521F
Tier 4B (final)
Wheel Loader

SERVICE MANUAL

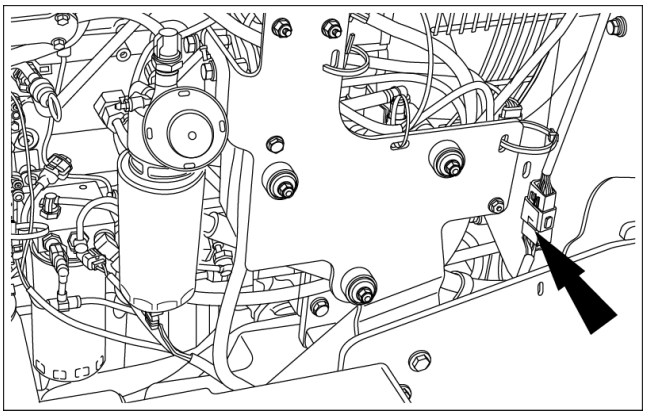
Part number 47955970
1st edition English
February 2016

CASE

Reassembling hydraulic equipment

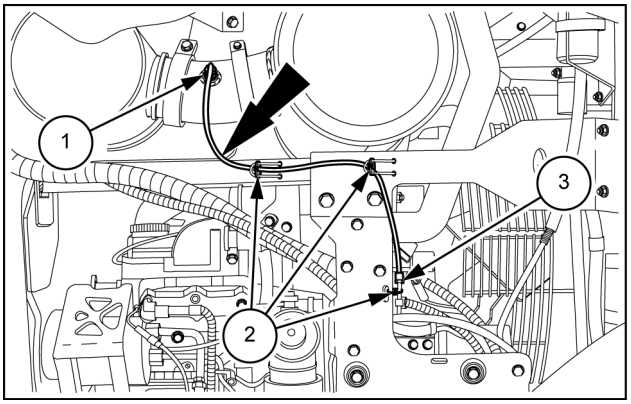
- Clean parts in a well ventilated room.
- Remove residual oil with compressed air, and apply fresh hydraulic oil or gear oil to surfaces before reassembly.
- Replace removed o-rings, back-up rings and oil seals with new ones. Apply gear oil on them before reassembling.
- Thoroughly clean and dry surfaces on which liquid sealant must be reapplied.
- Before assembling, remove rust preventives on new parts.
- Use special tools to fit bearings, bushing and oil seal.
- Assemble parts matching to the marks.
- After completion, check that there is no omission of parts.

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



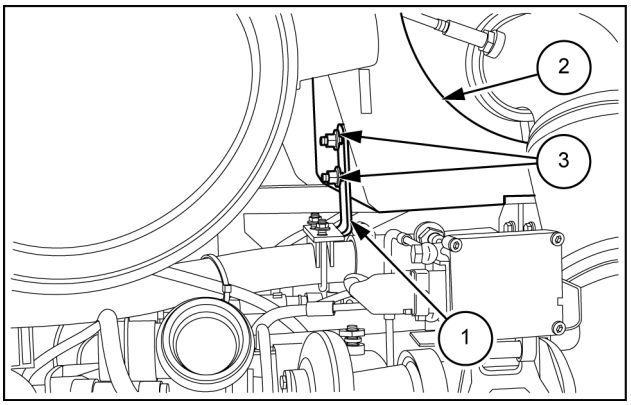
LEIL15WHL0227AB 36

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



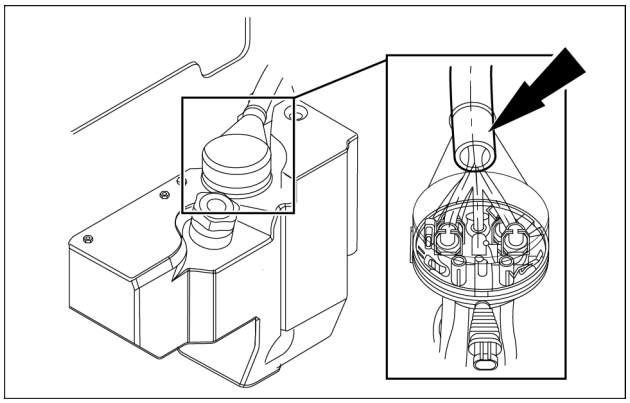
LEIL15WHL0266AB 37

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



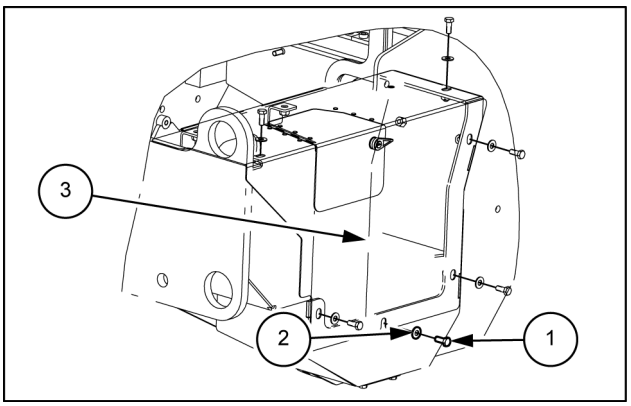
LEIL15WHL0267AB 38

41. Remove the caps and the plugs from lines and tag from wire harness. Connect wire harness and **DEF/ADBLUE®** supply and return lines to the **DEF/ADBLUE®** storage tank.



LEIL15WHL0304AB 31

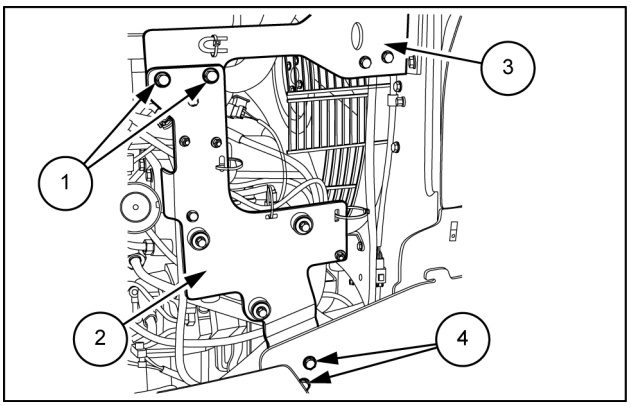
42. Install the **DEF/ADBLUE®** storage tank cover **(3)** on the frame machine. Secure it with the hexagonal bolts **(1)** and washers **(2)**.



LEIL15WHL0303AB 32

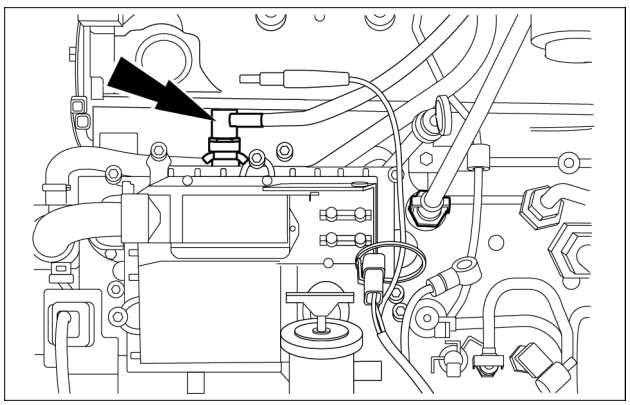
43. Locate the bracket **(2)** of the supply module, with the supply module, the **DEF/ADBLUE®** Heater Control valve and the fuel prefilter as an assembly. Install the bracket **(2)** on the support **(3)** using the two bolts **(1)**, the washers, and the nuts. Install the bracket **(2)** to rear chassis using the two bolts **(4)**, the washers, and the nuts.

NOTE: *pay attention to supply module and heater valve.*



LEIL15WHL0275AB 33

44. Remove the plug from the hose and cap from the fitting. Connect the fuel line to the ECU.



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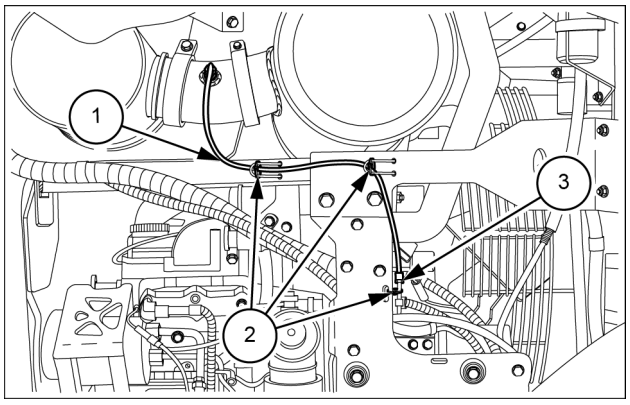
Engine - 10

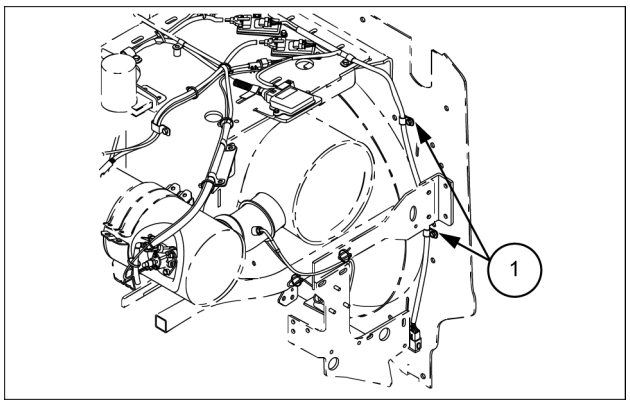
Selective Catalytic Reduction (SCR) exhaust treatment - 500

16. Reconnect the sensor **(1)** to the wiring harness **(3)** and secure harness to the catalyst mounting support bracket using new straps **(2)**.



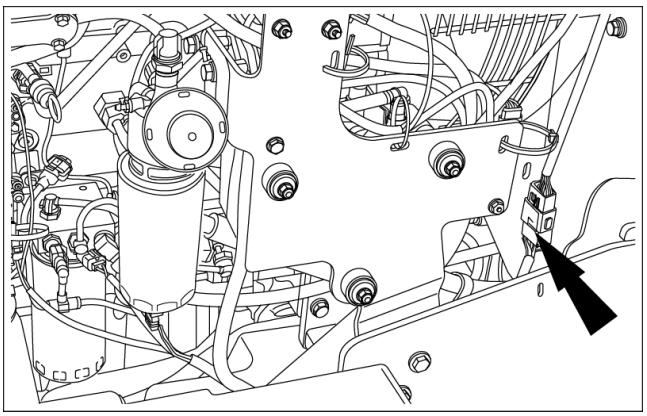
LEIL15WHL0331AB 14

17. Install the SCR sensor wiring harness to the rear plate of the cooling system plate using the bolts and clamps **(1)**.



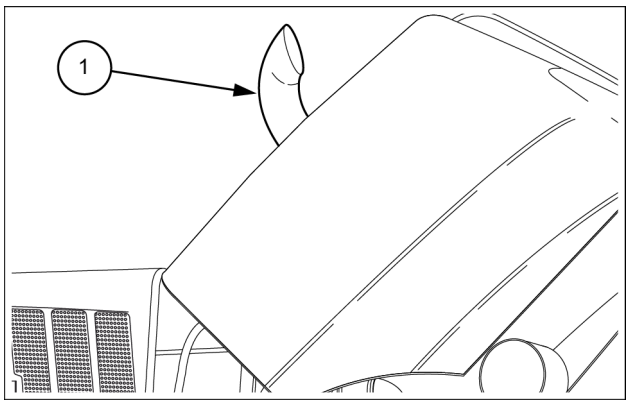
LEIL15WHL0272AB 15

18. Connect the SCR sensor connector to the rear chassis harness connector.



LEIL15WHL0227AB 16

19. Carefully raise and position the hood over the machine. Double up a nylon lifting strap and slide the strap through the exhaust stack, located on the hood **(1)**.



LEIL14WHL0400AB 17

Radiator - Install

⚠ WARNING

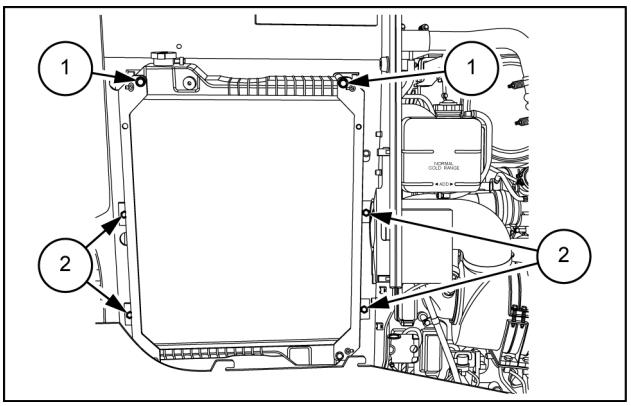
Hot liquid under pressure!
Scalding can result from fast removal of the radiator cap. Check and service the engine cooling system according to the maintenance instructions in this manual.
Failure to comply could result in death or serious injury.

W0163A

1. Using a suitable lifting device, position the radiator above the cooling frame. Carefully lower the radiator while guiding it into position on the cooling frame.

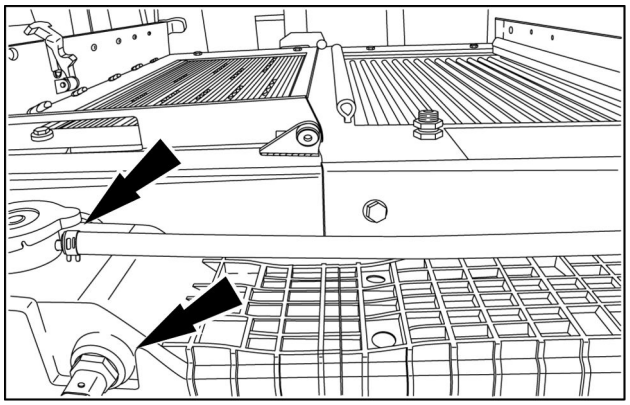
NOTE: *machines with the standard cooling option use a smaller radiator and a block-off plate attached to the radiator at the top bottom and sides. Install the radiator and block-off plate as one assembly. Attach the block-off plate to the radiator before the assembly is installed in the machine.*

2. Install the mounting bolts **(2)** and related spring lock washers to secure the radiator to the cooling frame. Disconnect the lifting equipment from lifting eyes and reinstall the original screws **(1)**.



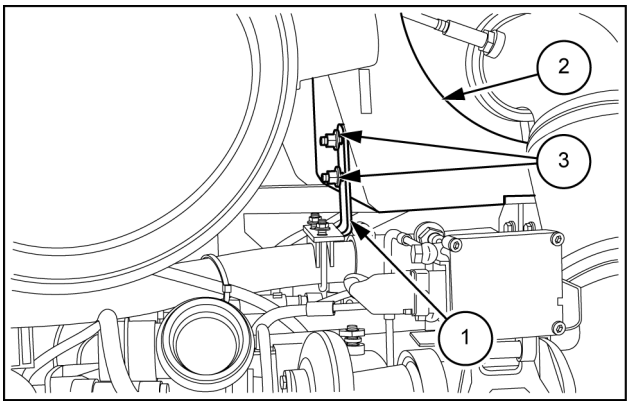
LEIL15WHL1429AB 1

3. Install the connector to the coolant level sender. Connect the overflow hose to the radiator.



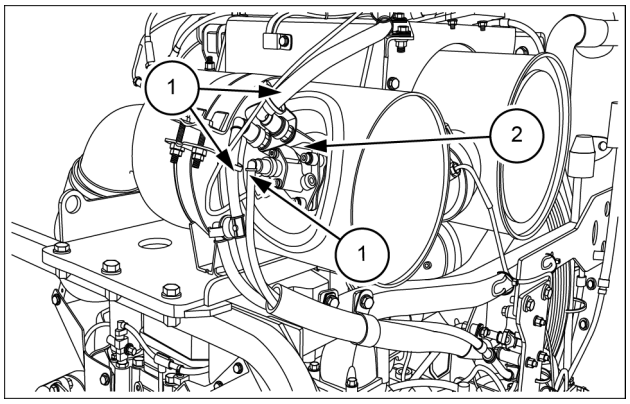
RAPH12WEL1416AA 2

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



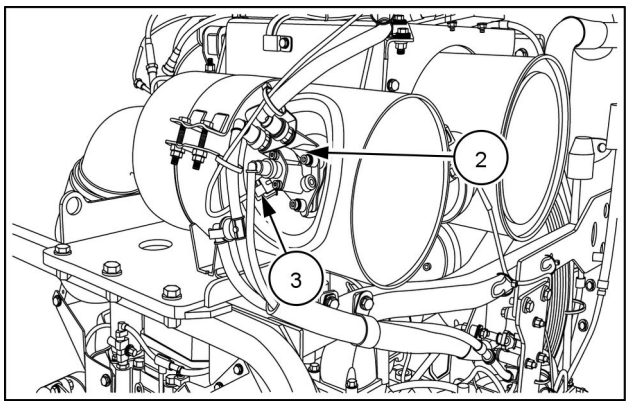
LEIL15WHL0267AB 12

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



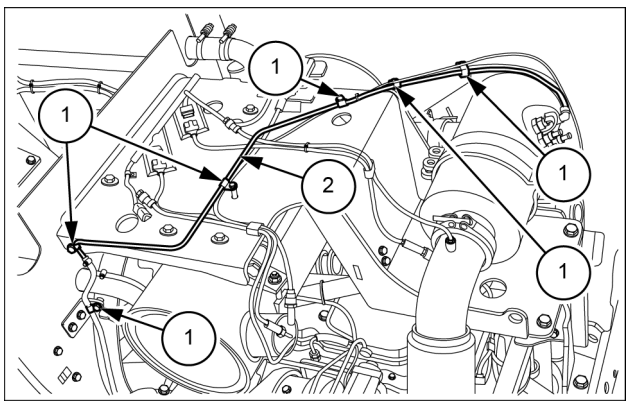
LEIL15WHL0323AB 13

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



LEIL15WHL0176AA 14

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



LEIL15WHL0270AB 15

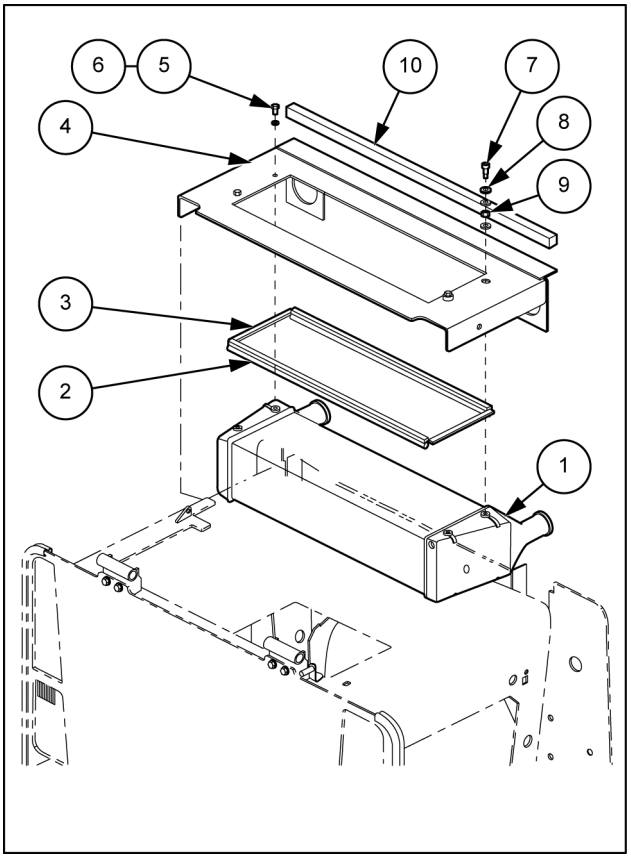
Aftercooler - Install

⚠ WARNING

Heavy objects!
Lift and handle all heavy components using lifting equipment with adequate capacity. Always support units or parts with suitable slings or hooks. Make sure the work area is clear of all bystanders. Failure to comply could result in death or serious injury.

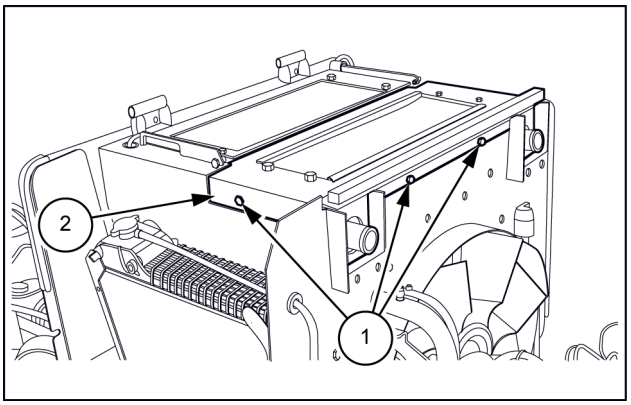
W0398A

1. Seal the aftercooler **(1)** to the bracket **(4)** with bulb and foam seals **(2)** and **(3)**.
   Install the two bolts **(5)** and the two spring lock washers **(6)**.
   Install the two hexagonal screws **(7)**, with related washers **(8)** and springs poppet return **(9)**.
   Apply the foam seal **(10)** to the bracket **(4)**.



LEIL15WHL1426BB 1

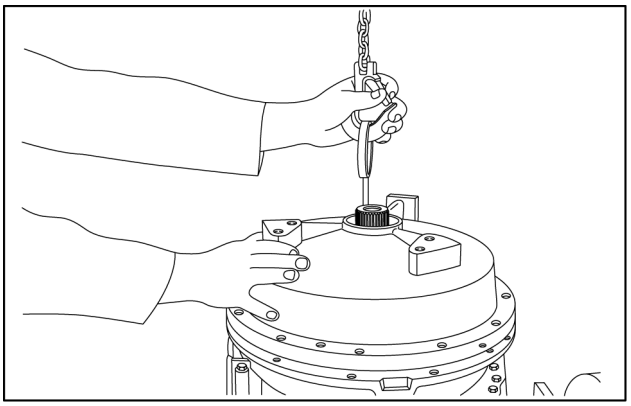
2. Place the aftercooler and its bracket in the correct position on the machine.
   Install the bolts **(1)** to secure the bracket **(2)** on the rear plate of the cooling system frame.



LEIL15WHL0294AB 2

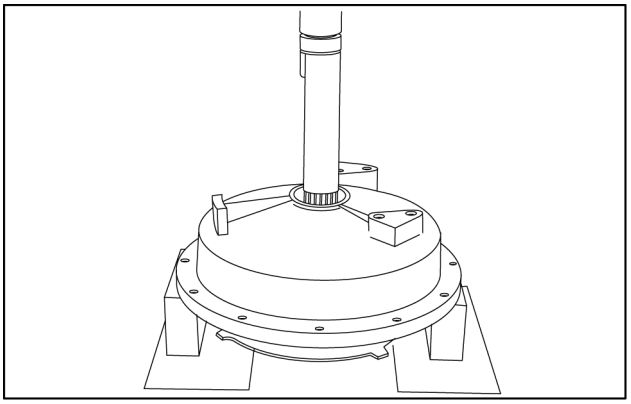
Minimum pump output (at **2000 rpm**)	
LW 170.B	**85 l/min** (**22.45 US gpm**)
Transmission oil operating temperature	**80 - 120 °C** (**176 - 248 °F**)
Clutch KV	**16 - 18 bar** (**232 - 261 psi**)
Clutch KR	**16 - 18 bar** (**232 - 261 psi**)
Clutch K1	**16 - 18 bar** (**232 - 261 psi**)
Clutch K2	**16 - 18 bar** (**232 - 261 psi**)
Clutch K3	**16 - 18 bar** (**232 - 261 psi**)
Clutch K4	**16 - 18 bar** (**232 - 261 psi**)

9. Connect a suitable lifting device to the shaft. Remove the cover, shaft, and converter from the transmission and place in a hydraulic press.



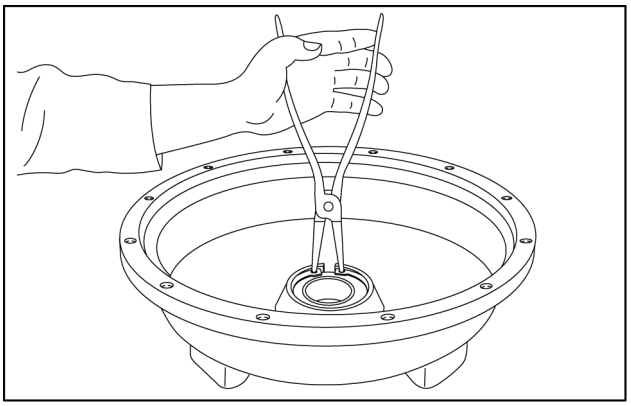
RAPH12WEL2124AA 9

10. Press the input shaft and converter from the cover using proper size rod.



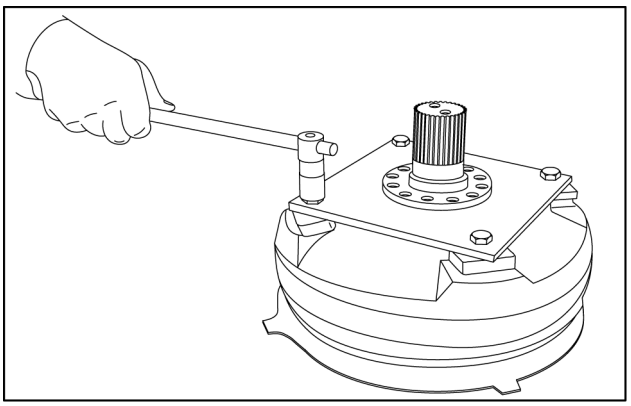
RAPH12WEL2125AA 10

11. Remove the retaining ring, then remove the bearing.



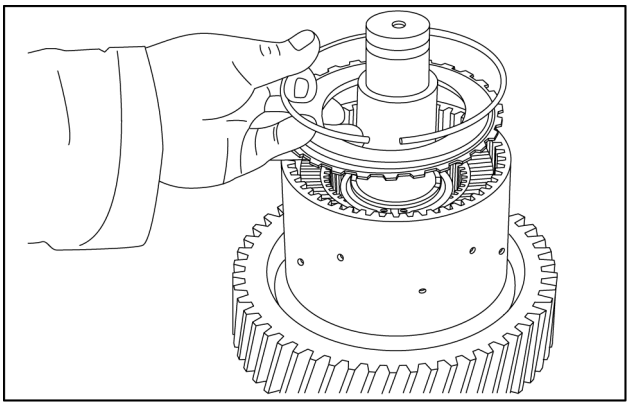
RAPH12WEL2126AA 11

12. Remove the four hex head screws. Remove the diaphragm and the input shaft.



RAPH12WEL2127AA 12

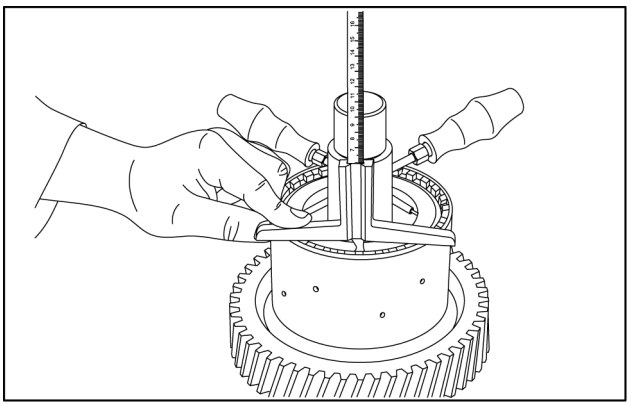
38. Install the end shim and snap ring.



RAPH12WEL2046AA 37

39. Adjust the running clearance to **2.1 - 2.3 mm** (**0.083 - 0.091 in**) . Press down on the end shim with approximately **10 kg** (**22 lb**). Measure and record dimension **(A)** from the carrier face to the end shim. Use a depth gauge as illustrated.
40. Use tools to lift the end shim upward against the snap ring until contact is obtained. Use a depth gauge to measure and record the dimension **(B)** from the carrier face to the end shim as illustrated. Subtract this measurement from recorded dimension **(A)**. The difference is the running clearance.

NOTE: *the required running clearance is **2.1 - 2.3 mm** (**0.083 - 0.091 in**). Use snap rings of different thicknesses to obtain correct running clearance.*



RAPH12WEL2048AA 38

Running Clearance Example

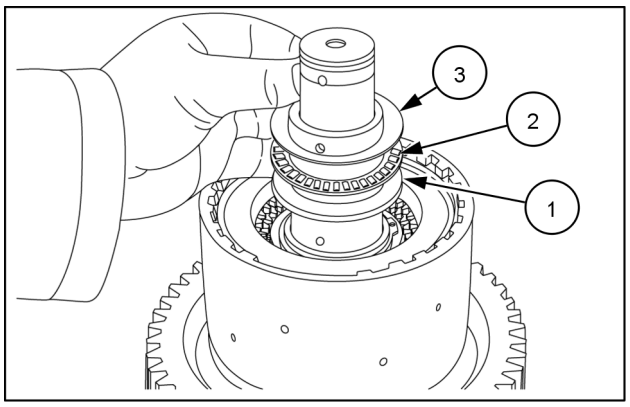
Dimension A	**8.2 mm** (**0.32 in**)
Dimension B	**–6.1 mm** (**0.24 in**)
Difference = Running clearance	**2.1 mm** (**0.08 in**)

Required running clearance is **2.1 - 2.3 mm** (**0.08 - 0.09 in**)

Use snap rings of different thickness as required to obtain correct running clearance.

41. Remove the clutch disc pack. Apply oil to the discs. Install the clutch disc pack, end shim, and snap ring to obtain correct running clearance.
42. Install the thrust washer **(1)**, thrust bearing **(2)**, and thrust washer **(3)**.

NOTE: *ensure the chamfer of the thrust washer **(1)** faces the thrust bearing.*



RAPH12WEL2049AA 39

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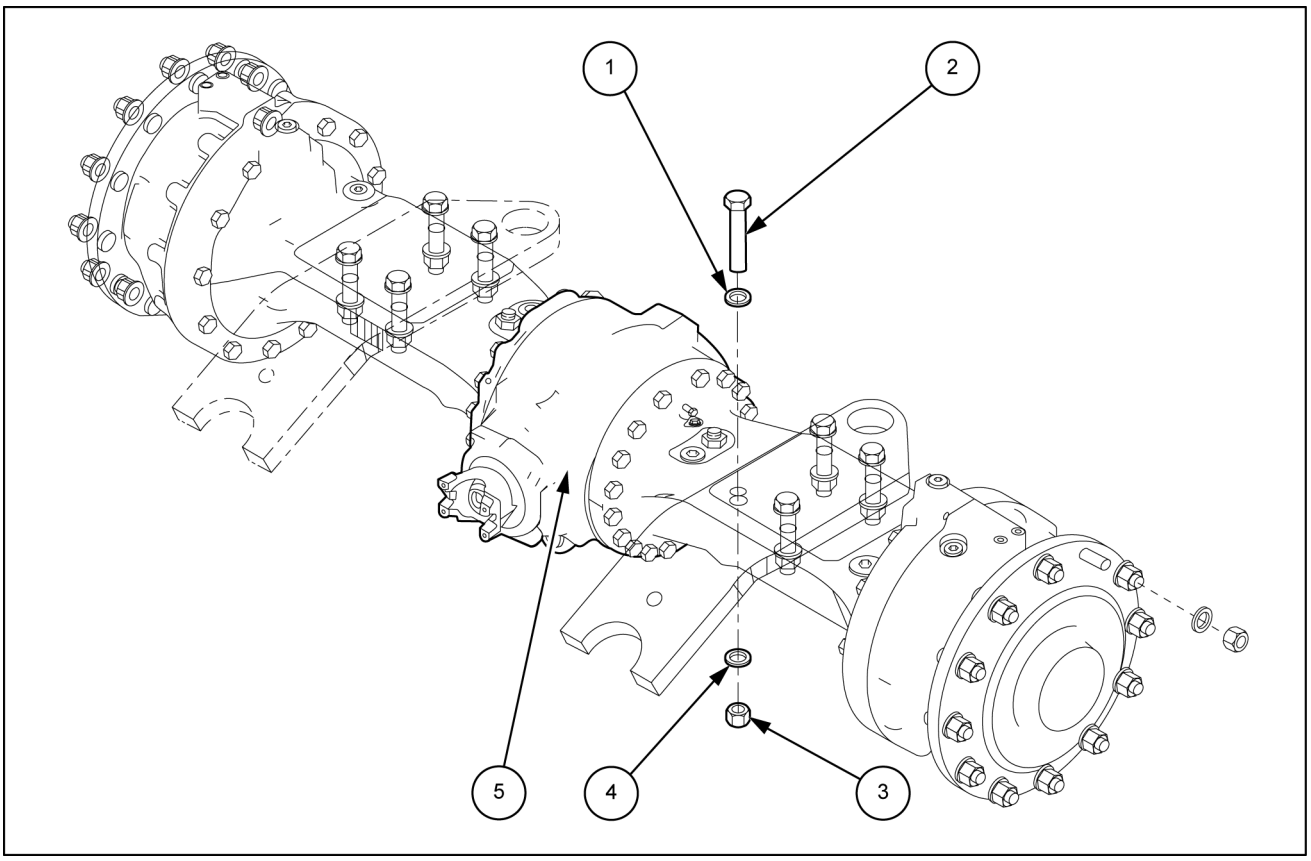
Four-Wheel Drive (4WD) system - 23

Drive shaft - 314

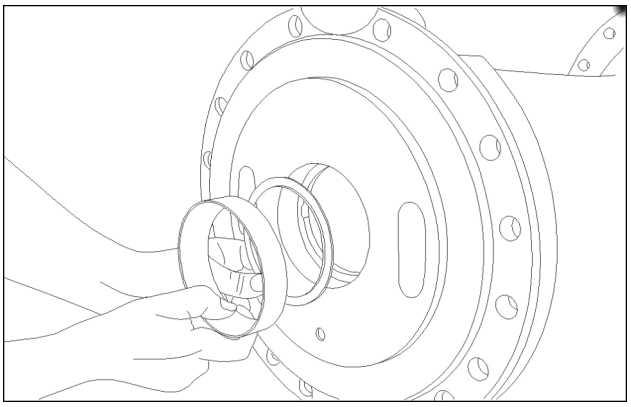
Powered front axle - External view



LEIL15WHL1253FB 1

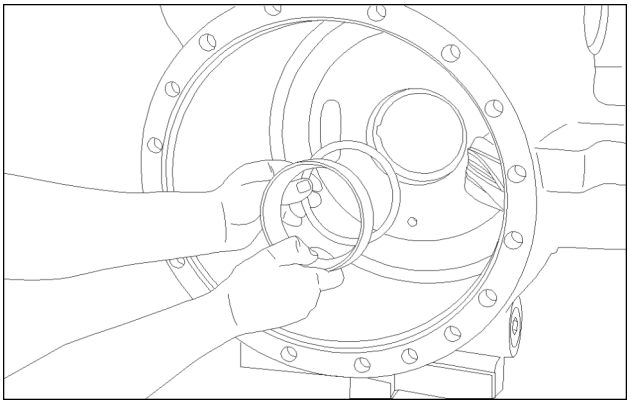
1. Washer
2. Bolt
3. Nut
4. Washer
5. Front axle

3. Insert shim A **0.90 mm** (**0.04 in**) and install the bearing cup. Use a suitable driver and ensure the bearing cup is seated in the axle housing.



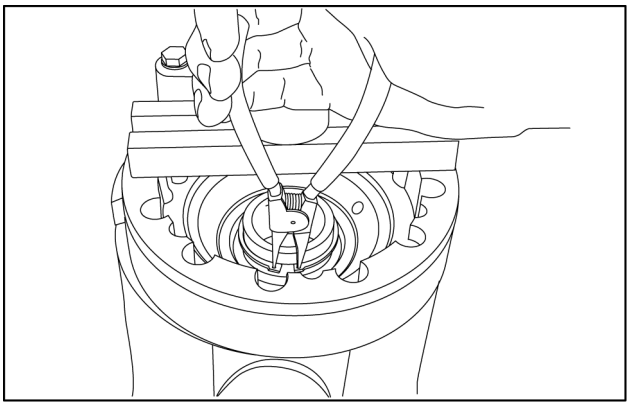
RAPH12WEL2203AA 3

4. Insert shim B **1.10 mm** (**0.04 in**) and install the bearing cup. Use a suitable driver and ensure the bearing cup is seated in the axle housing.



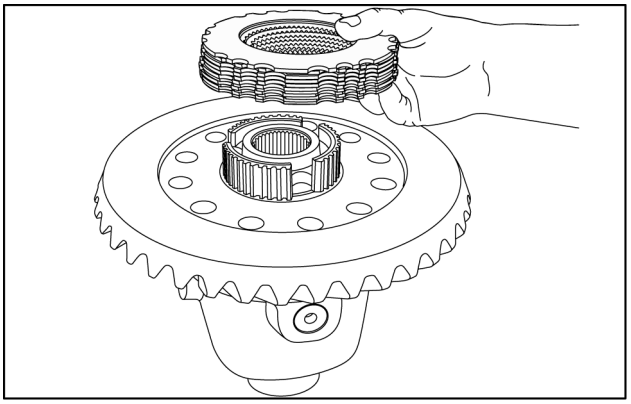
RAPH12WEL2204AA 4

9. Compensate for the spring preload of the lid by using a press. Remove the retaining ring. Remove the releasing components, which include the retaining ring, sliding sleeve, and the compression spring.



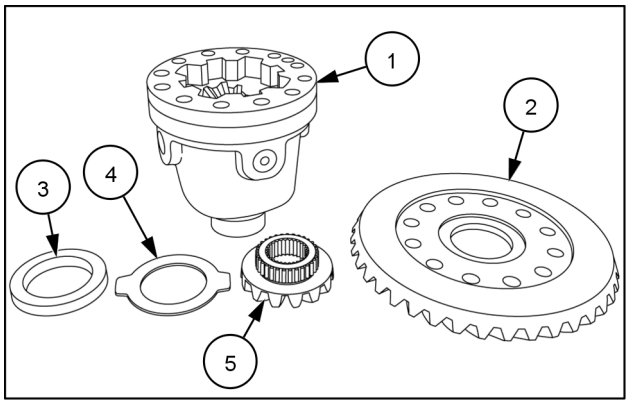
RAPH12WEL2357AA 9

10. Remove the disc package and the disc carrier.



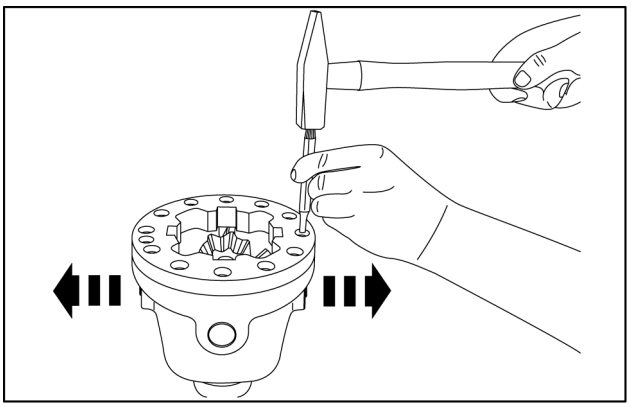
RAPH12WEL2358AA 10

11. Remove the crown wheel **(2)**, the constant spacer **(3)**, the thrust spacer **(4)** and the axle bevel gear **(5)** from the differential carrier **(1)**.



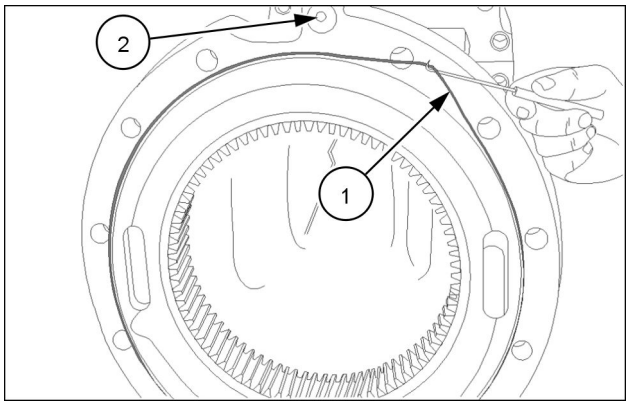
RAPH12WEL2359AA 11

12. Force the slotted pin out of both spider shaft halves. Remove both spider shaft halves in direction of arrows as illustrated.



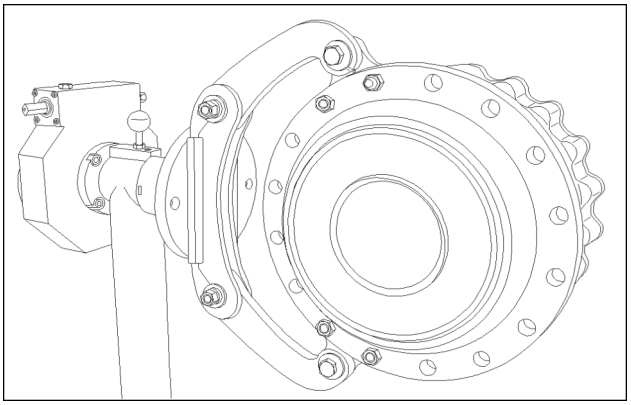
RAPH12WEL2360AA 12

5. Remove and discard the O-ring **(1)** from the axle housing wheel end and O-ring from the brake port **(2)**.



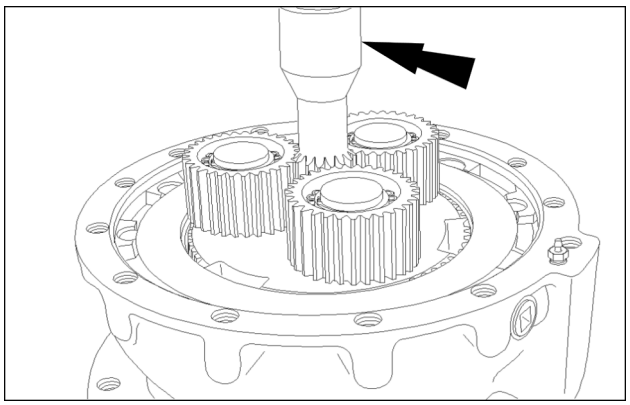
RAPH12WEL2218AA 4

6. Mount the wheel end on an acceptable stand.



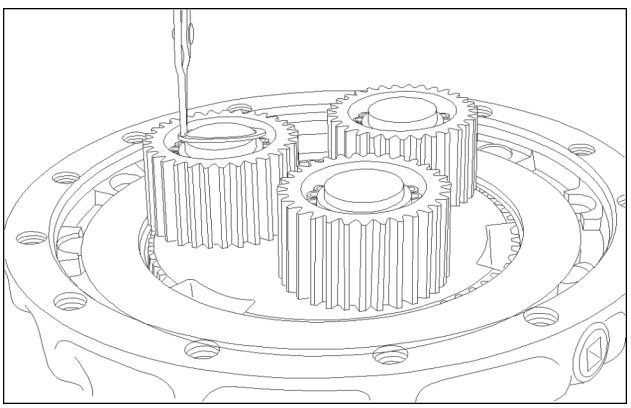
RAPH12WEL2180AA 5

7. Remove the sun gear shaft from the planetary gears. Do not loosen the shims located in the sun gear shaft.



RAPH12WEL2276AA 6

8. Remove the snap ring on all three planetary gears.



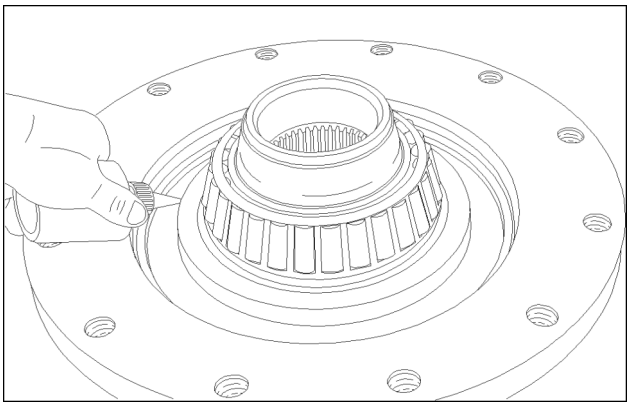
RAPH12WEL2275AA 7

4. **⚠ CAUTION**

   Burn hazard!
   Always wear heat-resistant protective gloves when handling heated parts.
   Failure to comply could result in minor or moderate injury.

   C0047A

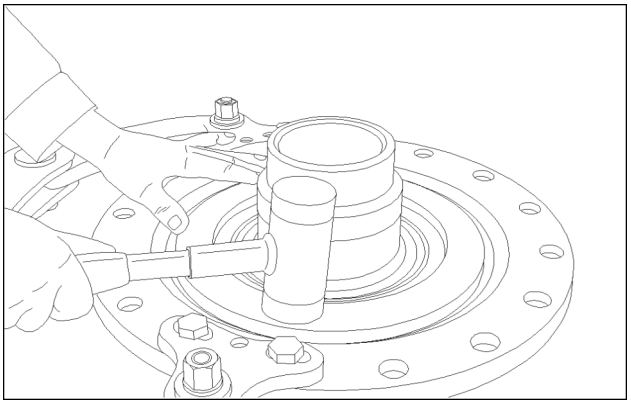
   Heat the metal face seal ring to **120 °C** (**248 °F**). Place the face seal ring onto the wheel end shaft.



RAPH12WEL2226AA 5

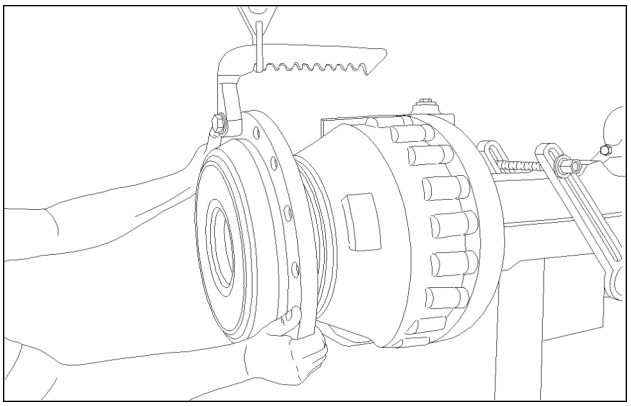
5. Use an acceptable tool to install the metal face seal ring into position onto the hub.

NOTE: *Ensure the sealing ring is properly seated.*



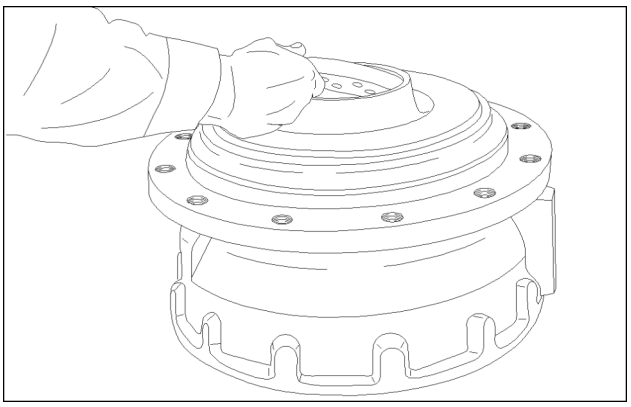
RAPH12WEL2189AA 6

6. Grease the seal lip of the shaft seal. Use an acceptable lifting bracket and install the wheel end onto the brake housing.



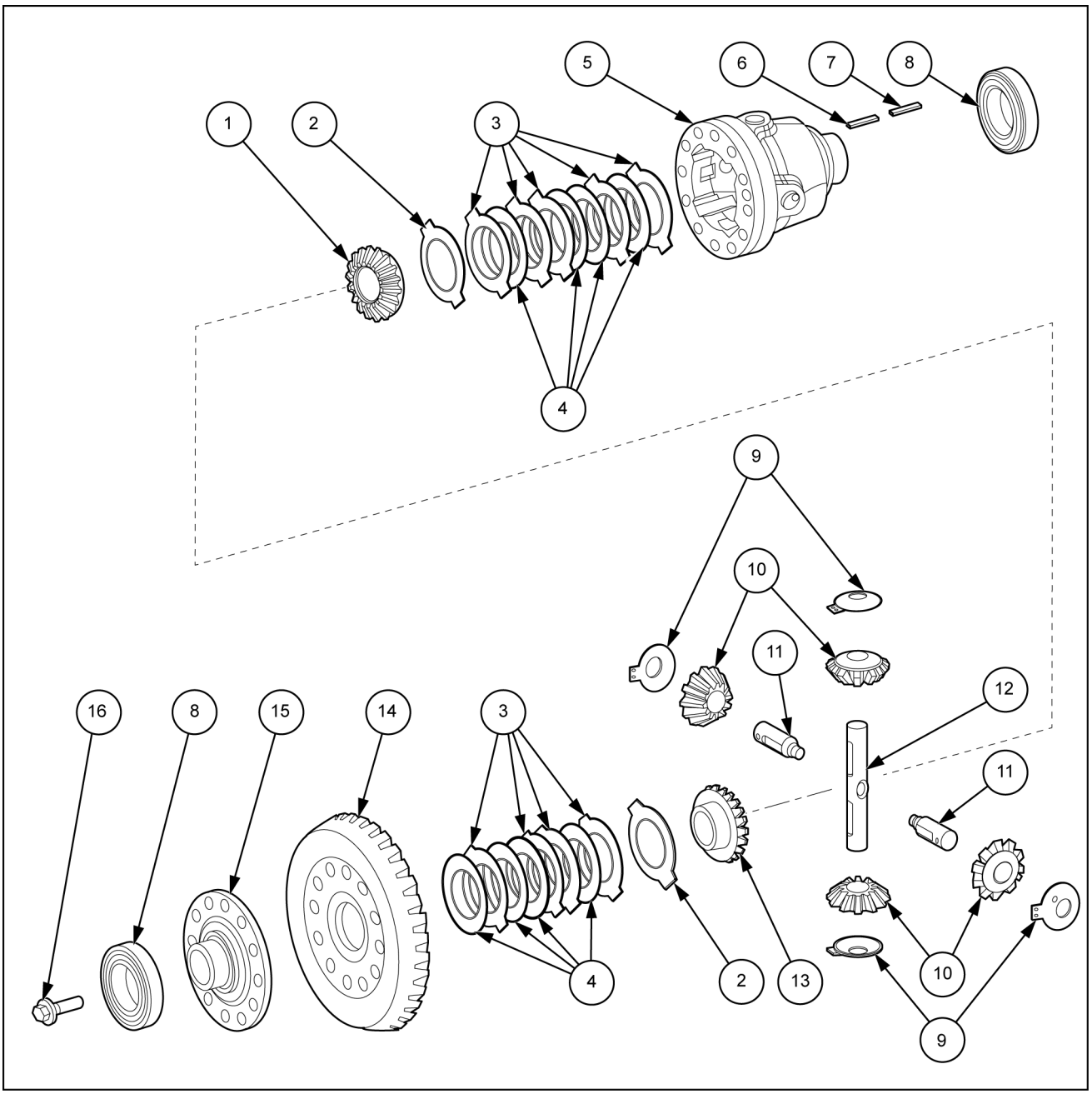
RAPH12WEL2190AA 7

7. Install the retainer on the wheel end.



RAPH12WEL2262AA 8

Limited slip differential - Exploded view



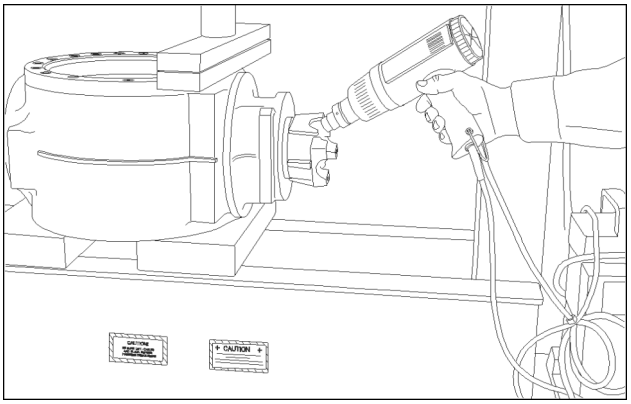
LEIL15WHL1252GB 1

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

Differential - Remove – Pinion

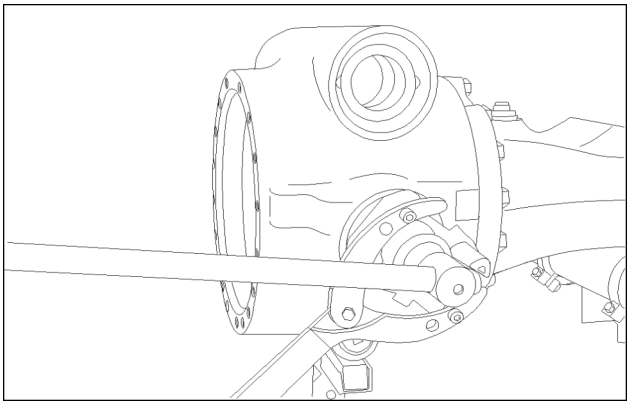
NOTE: *The ring gear and the drive pinion are a matched set. Do not service separately.*

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



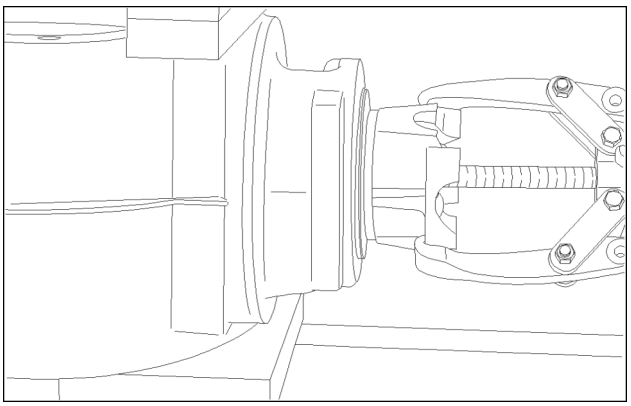
RAPH12WEL2314AA 1

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



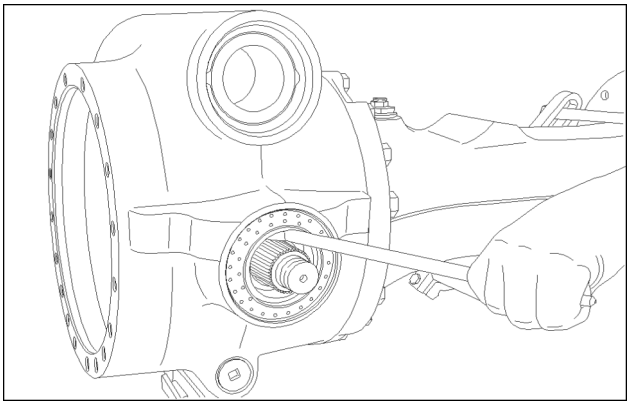
RAPH12WEL2435AA 2

3. Remove the input flange from the drive pinion.



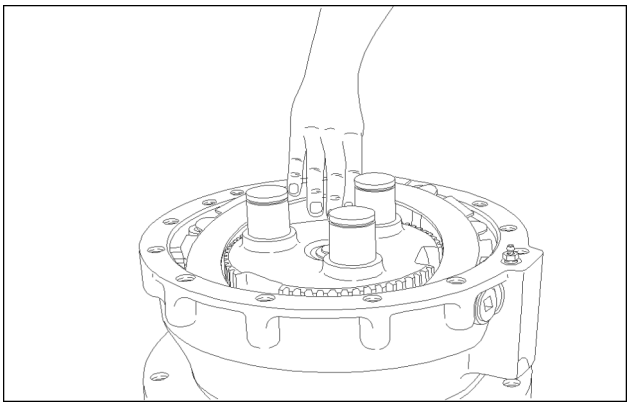
RAPH12WEL2318AA 3

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

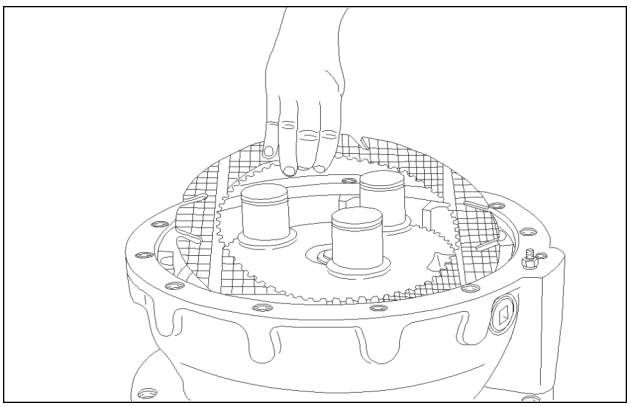


RAPH12WEL2436AA 4

11. Remove the reaction and friction brake plates alternately, until all of the brake plates have been removed.

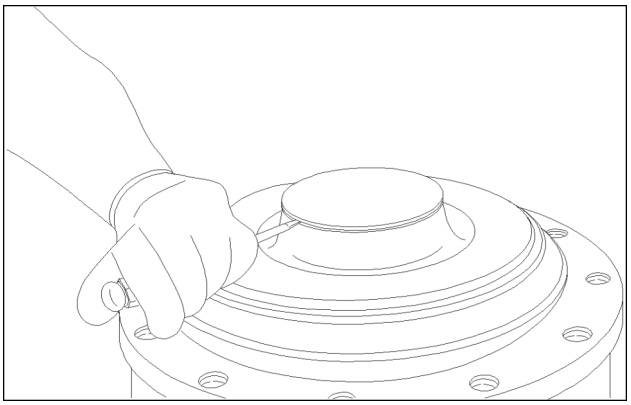


RAPH12WEL2271AA 12



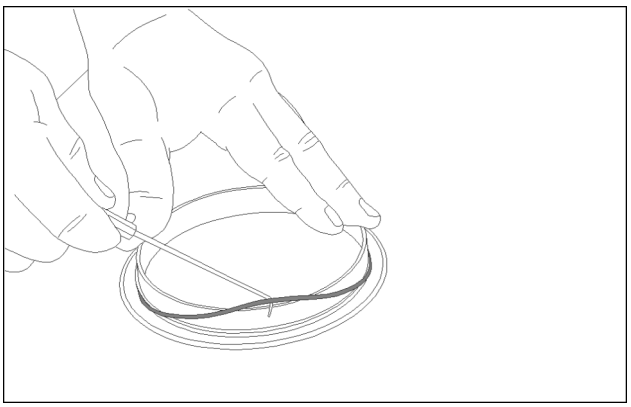
RAPH12WEL2272AA 13

12. Remove the cover from the wheel end.



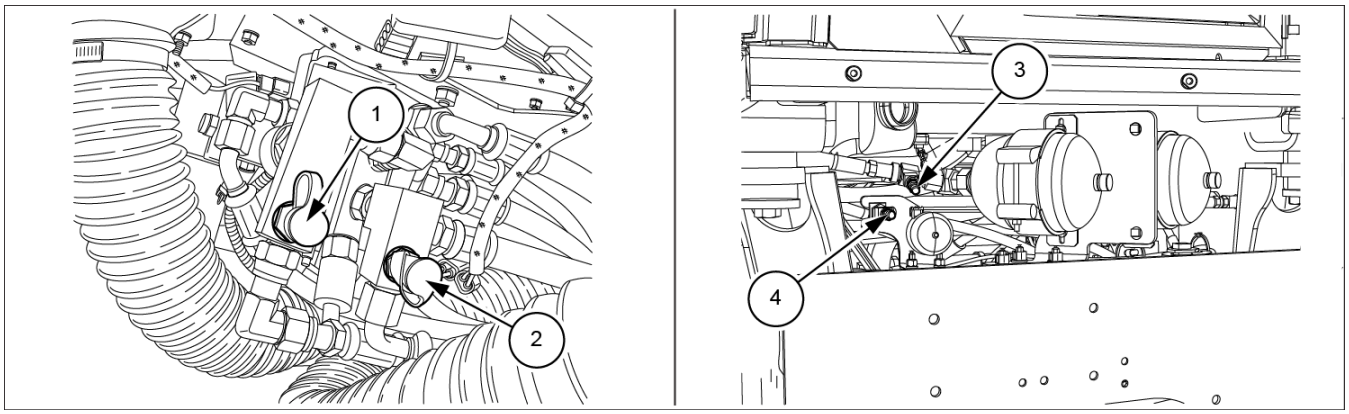
RAPH12WEL2268AA 14

13. Remove and discard the O-ring.



RAPH12WEL2265AA 15

Hydraulic service brakes - Check - Service brake system performance (stored energy)



LEIL15WHL1499EB 1

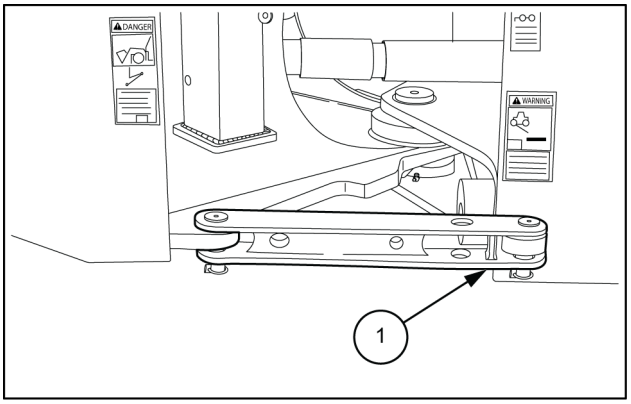
1. Front axle test port
2. Rear axle test port
3. Front brake accumulator test port
4. Rear brake accumulator test port

NOTE: *prior to doing this procedure make sure that the accumulator pressures are correct.*

1. Check the level of the hydraulic fluid in the reservoir, add as needed.
2. Install the articulation lock **(1)** before doing this test.
3. Remove the left-hand side cab skirt to gain access to the brake accumulator test ports.
4. Pump the brake pedal until there is no hydraulic pressure in the brake system (approximately 20 pumps).
5. Connect two **207 bar** (**3002 psi**) pressure gauges (**CAS10280** and **380001740**) to the test ports 3 and 4.
6. Start the engine and let idle until both the front and rear accumulators 3 and 4 are fully charged. The accumulators are fully charged at **190 - 196 bar** (**2755 - 2842 psi**).
7. Stop the engine.
8. Push the brake pedal valve down slowly, allowing for full piston actuation.

NOTE: *depress the brake pedal valve at the rate of three strokes per minute.*

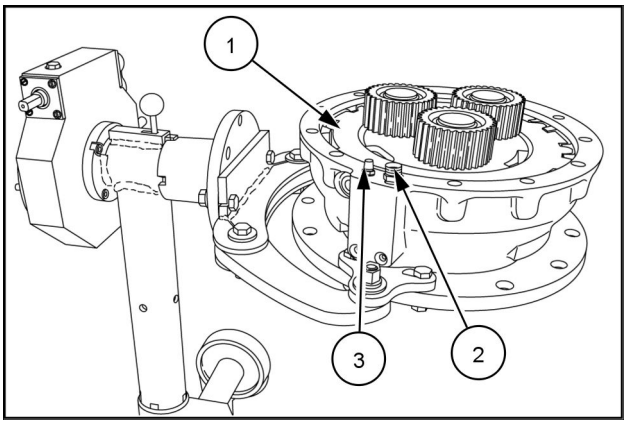
9. Continue pressing the brake pedal valve down. The low brake pressure light should activate when the pressure reaches **122 - 138 bar** (**1769 - 2001 psi**). After the low brake pressure light activates, press the brake pedal valve eight more times.
10. Record the readings on the pressure gauges. The pressure gauges should read at **65 - 70 bar** (**942 - 1015 psi**).
11. If the pressures are at **65 - 70 bar** (**942 - 1015 psi**), the test is complete.
12. If the pressures are not within the required specifications, then the brake system must be bled.



LEIL13WHL1234AB 2

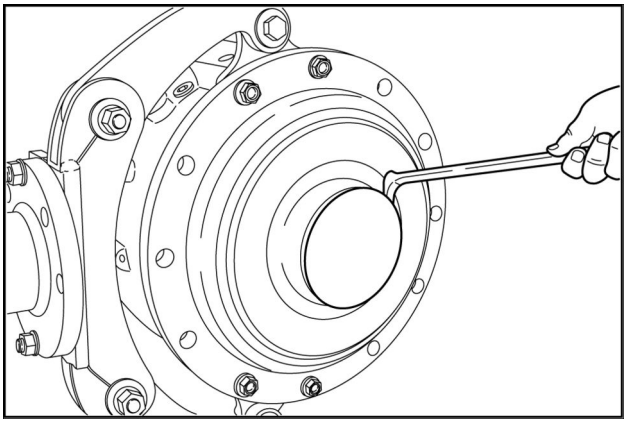
Brake discs - Disassemble - Models MT-L 3065 II / MT-L 3075 II

1. Attach output assembly to suitable work stand. Remove end plate **(1)**, brake breather valve **(2)**, and screw neck **(3)**.



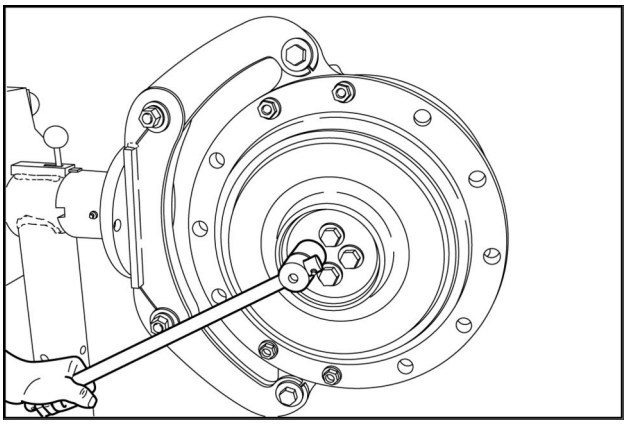
RAIL11WEL0009BA 1

2. Remove the cover from the output shaft.



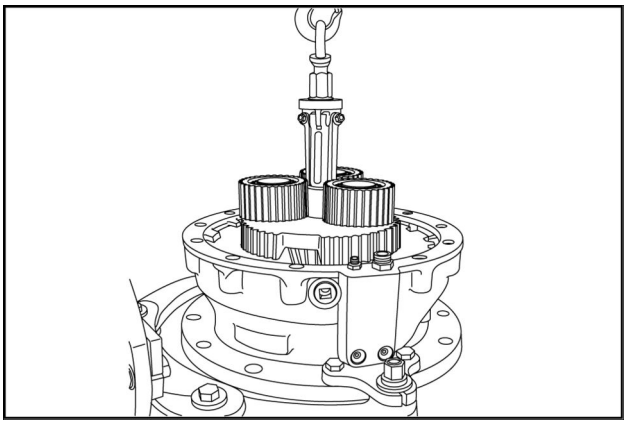
RAIL11WEL0010BA 2

3. Remove locking bolts and remove the releasing cover.



RAIL11WEL0011BA 3

4. With a suitable lifting device, lift the planetary carrier out of the brake housing.



RAIL11WEL0012BA 4

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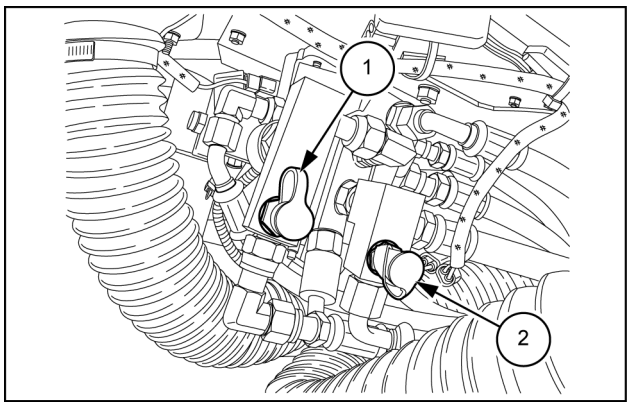
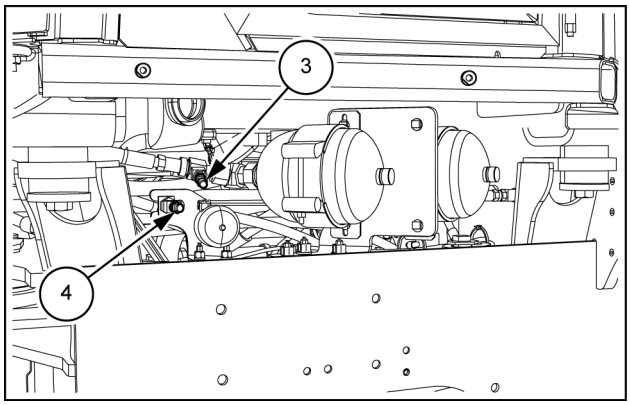
Hydraulic systems - Component localization - Test ports

1. Front axle test port
2. Rear axle test port



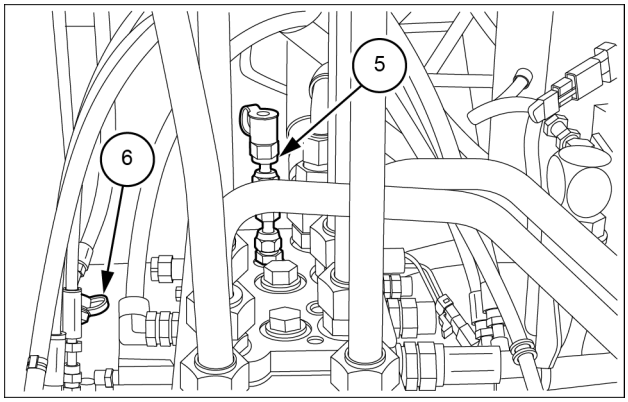
LEIL15WHL1402AB 1

3. Front brake accumulator test port
4. Rear brake accumulator test port



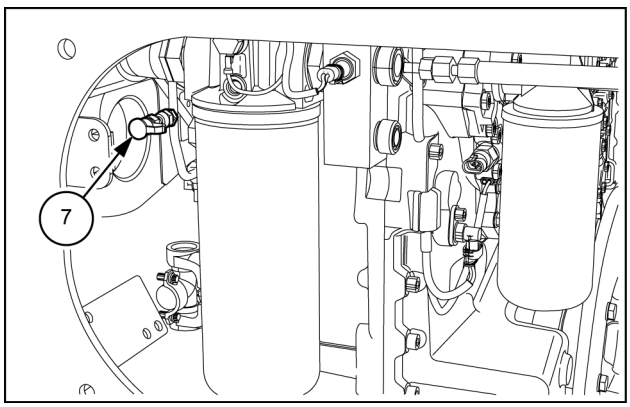
LEIL15WHL1349AB 2

5. Loader valve test port (load sense)
6. Loader valve test port (pilot pressure)



LEIL14WHL0530AB 3

7. Differential lock valve test port



LEIL15WHL1401AB 4

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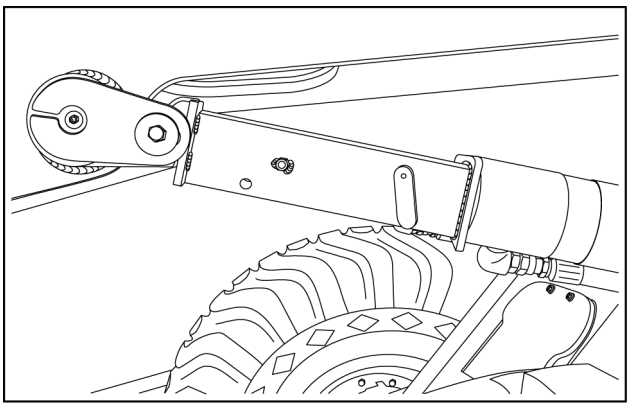
8. Connect the hoses **(3)**, **(4)**, **(7)**, **(8)** if equipped **(1)**, **(2)**, **(5)** and **(6)** to the remote control valve(s) at the main control valve. See **Main control valve - Remove (35.359)** and refer to Figure 5 in for color coding.
9. Fill the hydraulic reservoir with oil.
10. Tighten the accumulator manual bleeder valve located on the top of the Ride control valve to a torque of **3.5 N·m** (**2.6 lb ft**). Install the plug and torque to **7 N·m** (**5 lb ft**).
11. Place the master disconnect switch in the ON position.
12. Raise the loader arms and remove the safety strut.



LEIL13WHL1244AA 5

13. Put the articulation lock in the operating (unlocked) position.
14. Run engine at half throttle.
15. Slowly and completely extend and retract all cylinders at least 10 times to remove any air from the circuits.
16. Stop the engine and check for leaks.
17. Install the access cover on the front of the machine.
18. Check the level of the hydraulic oil and add hydraulic oil as required.

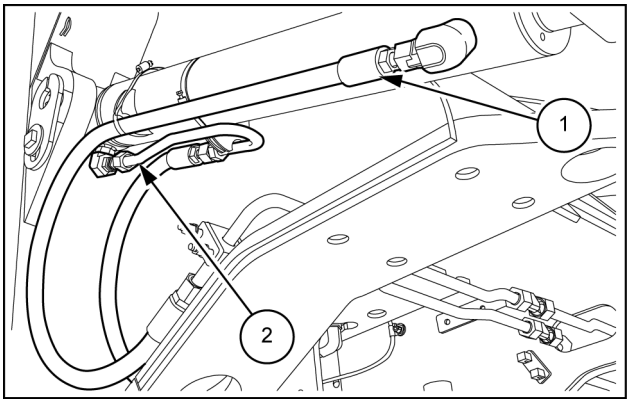
6. Turn the vacuum pump OFF. Disconnect the vacuum pump from the hydraulic reservoir.
7. Check the level of the hydraulic oil in the reservoir.
8. Start the engine. Run the engine at low idle for **2 min**.
9. Turn the engine OFF. Inspect for hydraulic oil leaks at the fan reversing valve.
10. Put the articulation lock in the OPERATING position.
11. Ensure the level of the hydraulic oil is to specification. Add oil as required. Tighten the filler cap on the reservoir.

Lift arm cylinder - Remove

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

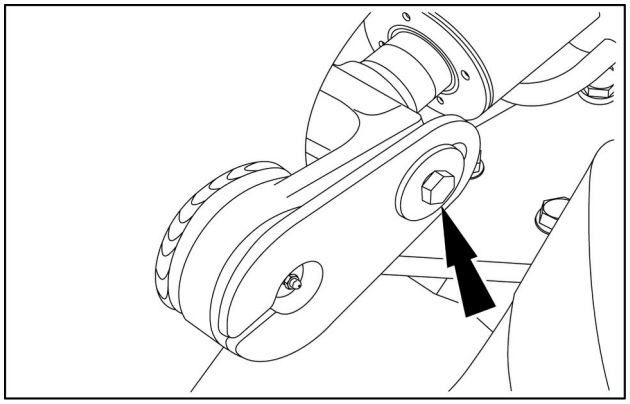
NOTICE: *with the engine NOT running, pump the brake repeatedly to be sure the brake accumulators have no hydraulic pressure, put the ignition switch in the ON position then move the loader control valve back and forth several times to release any hydraulic pressure in the pilot control circuit, turn ignition switch OFF.*

2. Relieve the pressure in the Ride control accumulator with the manual bleeder valve located at the rear of the front chassis.
3. Loosen the filler cap on the hydraulic reservoir to release any pressure.
4. Tag and disconnect the hose **(1)** on the front end of the lift cylinder. Tag and disconnect the tube **(2)** of the head of the lift cylinder.
   Install plugs in the hoses and caps on the fittings.



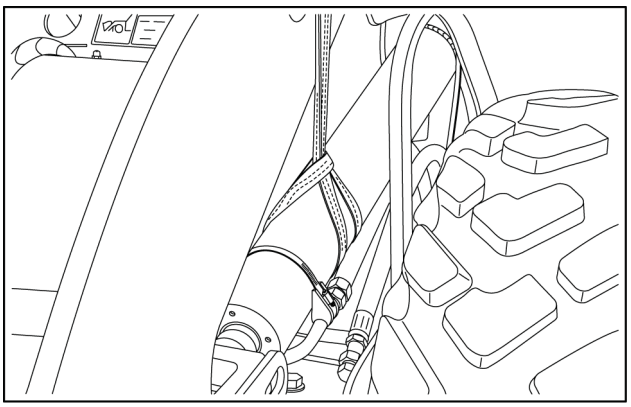
LEIL15WHL1435AB 1

5. Loosen and remove the bolt, washer and spacer that hold the pivot pin for the yoke.



LEIL13WHL1259AA 2

6. Use a proper lifting device and secure a strap around the lift cylinder.



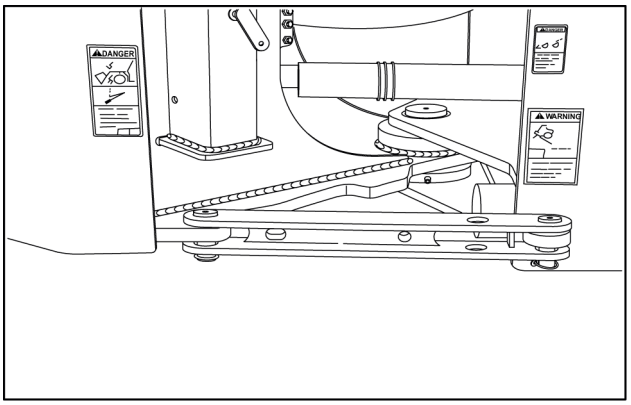
LEIL13WHL1260AA 3

Accumulator - Remove - Ride control

1. Park the machine on a firm, level surface. Lower the bucket to the ground. Turn the engine OFF. Apply the parking brake.

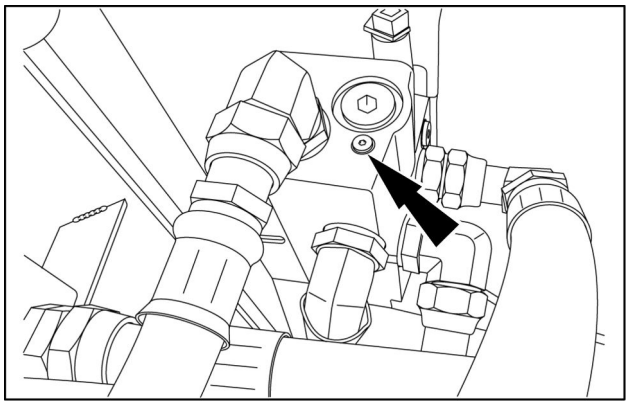
NOTE: *while the engine is turned OFF, pump the brake several times to relieve hydraulic pressure from the system. Turn the ignition switch to the ON position. Move the control levers back and forth several times to relieve any hydraulic pressure in the pilot control circuit. Turn the ignition switch to the OFF position.*

2. Put the articulation lock in the LOCKED position.



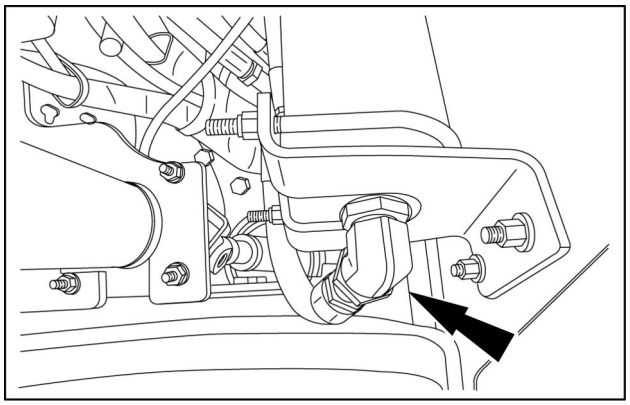
RAPH12WEL1412AA 1

3. Relieve the pressure in the Ride control accumulator by using the manual bleeder valve, located on the bottom of the Ride control valve. Remove the plug and turn the valve two turns in a counterclockwise direction.



RAPH12WEL2604AA 2

4. Loosen the filler cap on the hydraulic reservoir to release the air pressure in the reservoir. Connect a vacuum pump to the hydraulic reservoir. Turn the vacuum pump ON.
5. Disconnect the hose from the elbow at the bottom of the Ride control accumulator. Install a plug in the hose. Install a cap on the fitting.



RAPH12WEL2621AA 3

14. Place the loader control lever in the raise position and verify that the electromagnet holds it in that position until the height control target **(2)** passes in front of the proximity switch **(3)**.
15. With the lift arms still raised, place the loader control lever in the lower position and verify that the electromagnet holds it in that position until the return to travel target **(5)** passes in front of the proximity switch **(3)**.
16. Repeat steps 8 through 15 until the desired heights are reached.
17. Lower the bucket to the ground and stop the engine.

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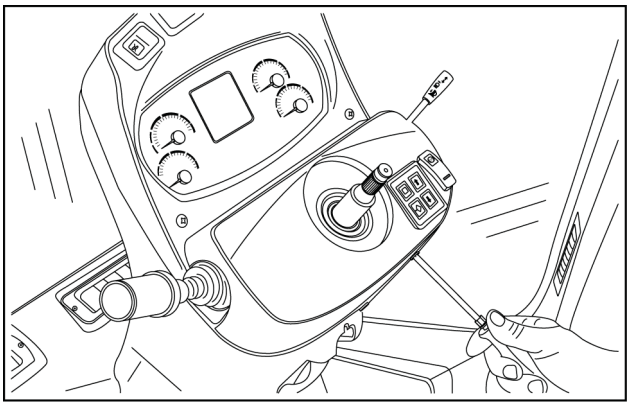
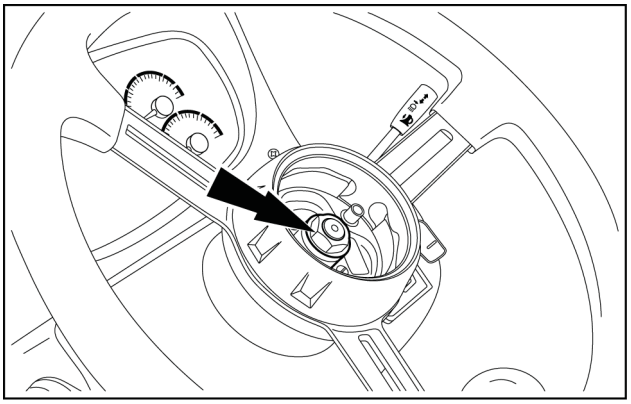
10. Install and tighten the six mounting screws for the instrument cover.



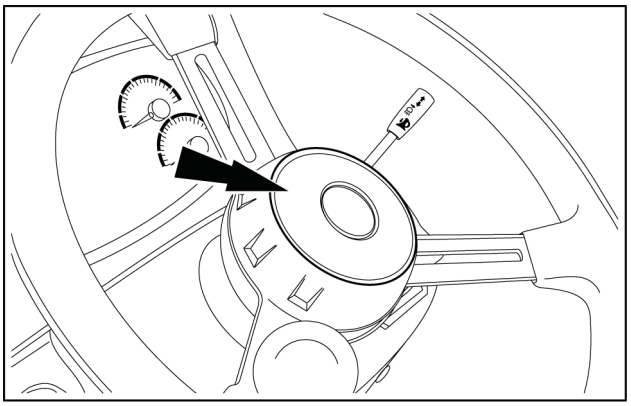
LEIL13WHL0640AA 9

11. Install the steering wheel. Install and tighten the mounting nut and the washers.



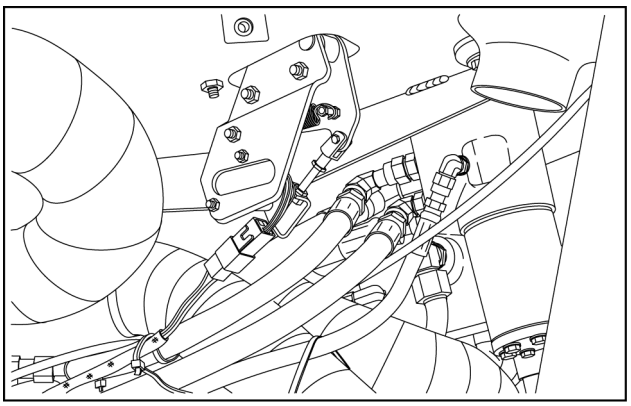
LEIL13WHL0638AB 10

12. Install the center cap on the steering wheel.



LEIL13WHL0637AB 11

13. Start the vacuum pump, remove the caps and plugs the fittings and hoses. Connect the hoses to the steering control valve according to the tags installed during removal. Remove and discard the tags.



LEIL13WHL0636AA 12

Steering cylinder - Inspect

NOTE: *refer to* ***Steering cylinder - Exploded view (41.216)*** *for the numbering of procedure.*

1. Clean all the parts in cleaning solvent.
2. Inspect and ensure the piston rod **(10)** is straight. If piston rod is bent, install a new piston rod.
3. Inspect the inside of the tube **(1)** for deep grooves or other damage. If deep grooves or other damage are noticed, a new tube must be used.
4. Inspect the bushings **(2)** and replace as required.

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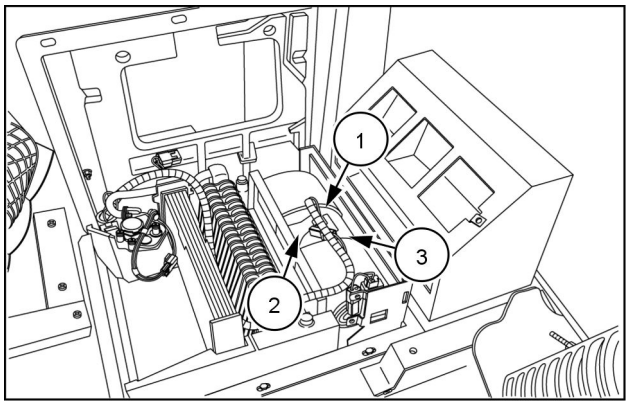
26. Pull the heater core and evaporator core from the lower box PPE.
27. Remove the expansion valve from the evaporator core.
28. Remove and discard the O-rings from the openings in the expansion valve.
29. Remove the screws from the heater core and remove the control valve.
30. Remove and discard the O-rings from the heater control valve.
31. Remove the fans from the lower PPE. Disconnect the electrical connectors. Remove the two mounting screws securing the resistor. Remove the resistor.

    1. Resistor
    2. Resistor connector
    3. Blower motor connector



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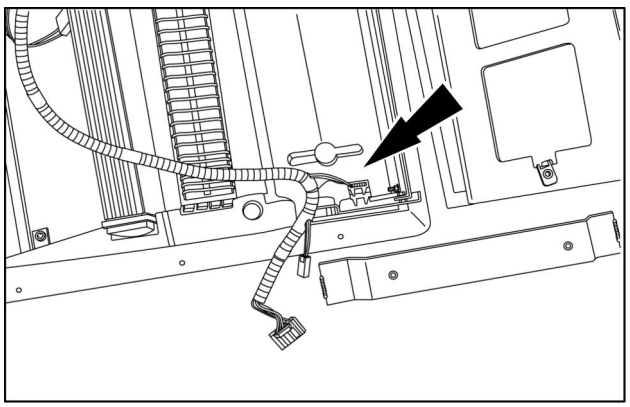
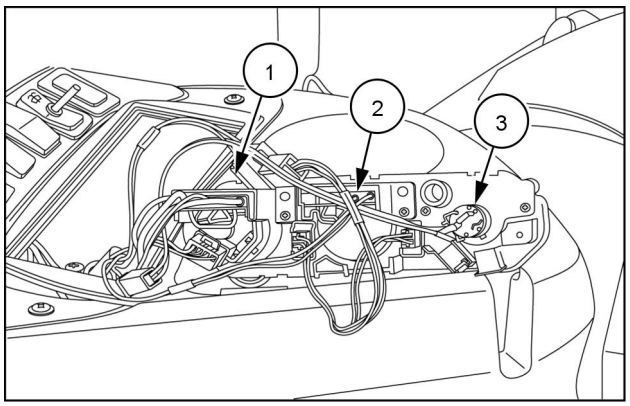
32. Disconnect the electrical connector for the recirculating vane motor. Disconnect the linkage from the vane. Remove the mounting screws and remove the motor.



RAPH12WEL2681AA 20

33. Remove the switch panel from the console. Disconnect the electrical connectors and remove the switches as required.

    1. Fan speed and Air Conditioning switch
    2. Inside and outside air selector switch
    3. Thermostat



RAPH12WEL2682AA 21

Air conditioner system evacuation and recharching

NOTE: *Replace the receiver-drier if one or more of the following conditions occurs before your remove the air and moisture from the system*

A. The system has been opened for service before.

B. Receiver-drier has operated two or more years.

C. Disassembly of compressor shows small particles of moisture removing material (gold or brown particles).

D. Large system leak (broken hose, break in line).

E. Too much air or moisture in system.

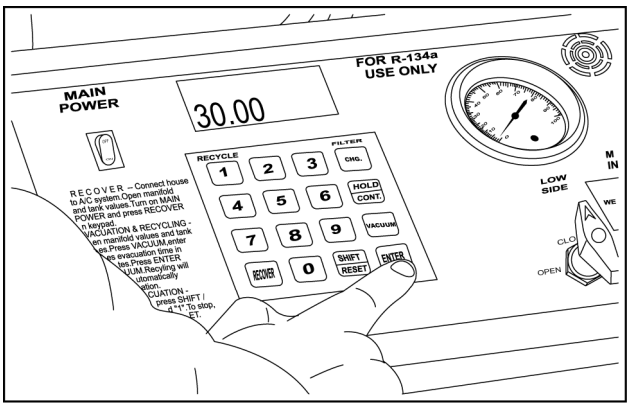
F. Removal of compressor caused the system to be open (uncapped) longer than 5 minutes.

10. With the charging station manifold gauge valves in the closed position, connect the hoses from the test gauges to the service ports as follows:
    1. Connect the hose from the low pressure gauge to the port on the suction hose.
    2. Connect the hose from the high pressure gauge to the port on the discharge hose.
    3. Turn in both thumbscrews to depress the service valves.

NOTE: *The pump on the reclamation unit will not pull a sufficient vacuum to remove air and moisture. Air and moisture are removed from the system by a vacuum pump. A vacuum pump is the only equipment made to lower the pressure enough to change the moisture to vapor that can be removed from the system.*

NOTE: *Refer to the vacuum pump manufacturer's user manual for additional information.*

11. Connect the main power plug to a **115 V** AC outlet. Move the main power switch to the ON position. If program and vacuum do not appear at the top of the display press the vacuum key. Program a minimum of 45 minutes and press the Enter key. The display will flash once indicating the programmed data has been accepted.



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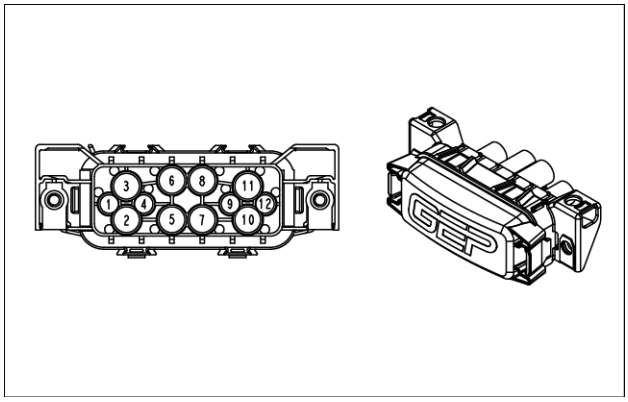
Location	Component
2D	Front washer motor
2F	Front wiper and washer
4F	Front wiper high speed K1
4E	Front wiper low speed K2
5E	Front wiper motor
4G	Fuse ECA-12: Front wiper and washer (**10 A**)
2F	Fuse ECA-13: Rear wiper/washer (**10 A**)
11G	Fuse ECA-17: Emergency steering (option) (**7.5 A**)
11H	Fuse ECA-4: Emergency steering (**7.5 A**)
9G	Fuse ECC-F7: Secondary steering (option) (**20 A**)
8H	Fuse ECF-GEP 15-11: **15 A** – hood control
8G	Hood down GEP 37-46
7D	Hood motor
8E	Hood switch
6G	Hood up GEP 39-48
2D	Rear washer motor
4C	Rear wiper motor
2E	Rear wiper switch
11D	Secondary steering motor (option)
9C	Secondary steering pressure switch
9D	Secondary steering solenoid (option)
5F	Wiper cut out K3

Harnesses and connectors - Electrical schematic sheet 23

Pin	From	Wire	Description	Color-Size	Frame
17	GND_CENG3	0_BJ	Air conditioning sensor ground	Bk_2.0	**SHEET 09**
18	SPL_A1A	35A_J	Reverse light	K-1.0	**SHEET 06**
18	ENG_H	35A_R	Reverse light	Y-1.0	
19	GND_CENG3	0_BG	Air conditioning power ground	Bk-2.0	**SHEET 09**
20	GND_CENG3	0_BH	Air conditioning power ground red	Bk-2.0	
21	ENG_D	13M_D	ECU disconnect ignition power	Or-1.0	**SHEET 04**
22	YFR	52A_B	Fan reverse relay output	W-1.0	**SHEET 10**
23	YFN	56_A	Fan control PWM	W-1.0	
24	RWW	68W_A	Rear washer pump	W-1.0	**SHEET 11**
25	FWW	63W_A	Front washer pump	W-1.0	
26	ALT_5	14	Alternator D+	LG-1.0	**SHEET 04**
27	BU2	35A_G	Backup alarm relay output	Y-1.0	**SHEET 06**
27	ENG_H	35A_GN	Backup alarm relay output	Y-1.0	
29	SPL_ACS	61R	Air conditioning relay control	W-1.0	**SHEET 14**
30	SPL_ACP	61A	Air conditioning pressure switch input	W-1.0	
27	E_HD	35A_S	Backup alarm relay output	Y-1.0	**SHEET 06**
31	ECF	1L_F	Power Non-disconnect	R-1.0	**SHEET 04**

Pin	From	Wire	Description	Color-Size	Frame
30	ECF	1FD	Engine auxiliary relay power	R-3.0	**SHEET 05**

Connector ECG – GEP Big relays fuses



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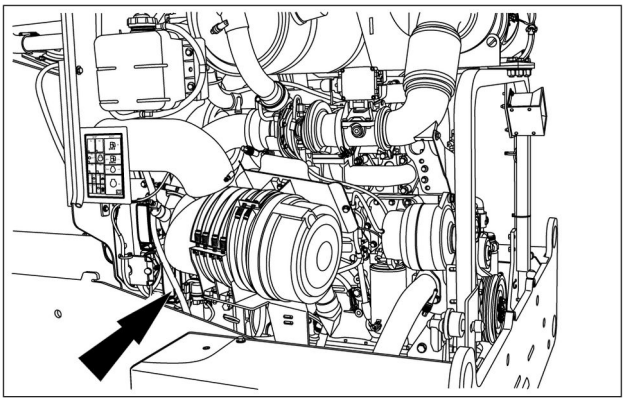
Connector ECG



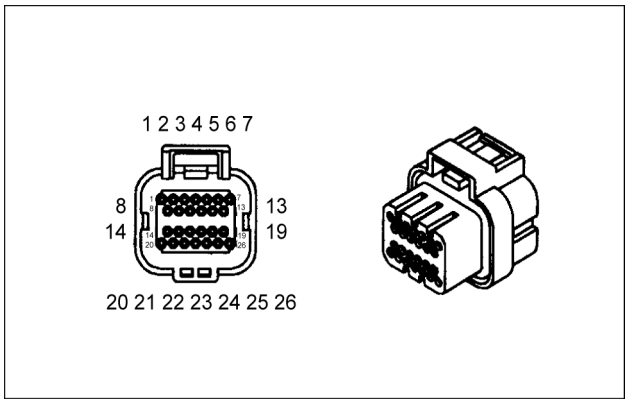
LEIL15WHL1359AA 48

Location: near the air cleaner, left-hand side of the engine compartment.

Pin	From	Wire	Description	Color-Size	Frame
6	SPL_EDC2	18J_F	EDC17 FSD power	R-6.0	**SHEET 05**
7	ECG	1FH	Battery + power	R-6.0	**SHEET 04**
9	ECU	28F	Fuel filter heater relay control	W-0.8	
10	SPL_HTR	1_GA	Filter heater power	R-6.0	
12	SPL_V4	31F_C	EDC relay control	Or-0.8	
5	SPL_1N	1L_B	Power non disconnected	R-6.0	
8	JC2	1FB	Battery + power	R-3.0	
11	ECG	1FH	Battery + power	R-6.0	

Harnesses and connectors - Component diagram 02 - Cab harness

Connector AIC_1 – Advanced Instrument Cluster _ 1



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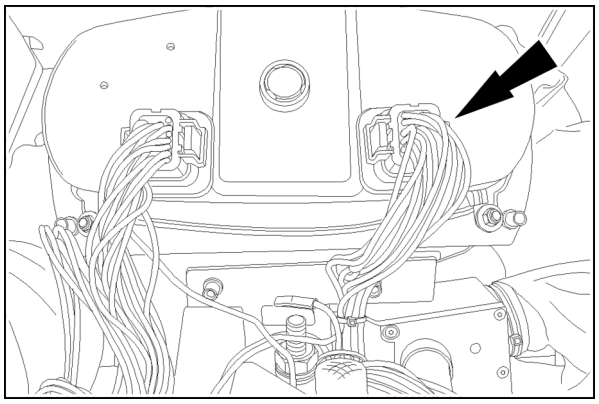
Connector AIC_1



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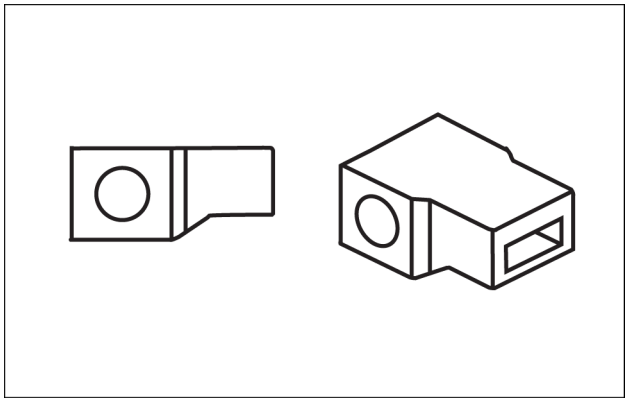
Location: behind the Advanced Instrument Cluster on the cab.

Pin	From	Wire	Description	Color-Size	Frame
1	SPL_AP	19S_E	AIC battery B+	Or-0.8	**SHEET 09**
2	CAB_E	36F_A	Fuel level analog	P-0.8	
5	CAB_E	36A	Axle temperature signal	Y-0.8	
6	SPL_D20	0_DX	AIC sensor ground	Bk-0.8	
8	CAB_F	36B	Axle temperature signal	Y-0.8	
9	CAB_T	36_HA	Hydraulic oil temperature	P-0.8	
11	CAB_E	36C_A	Radiator cool temperature signal	P-0.8	
12	SPL_D20	0_DW	AIC power ground	Bk-0.8	
13	BUZ	35B	AIC buzzer HSD	W-0.8	
14	ECB	52C	Park brake solenoid LSD	W-0.8	
25	SPL_SW_PD	17P_B	Switch pad power from AIC power	Or-0.8	
3	SPL_CAN	CAN_HG	CAN high	Y-0.8	**SHEET 12**
4	SPL_CAN_L	CAN_LG	CAN low	G-0.8	
7	CAB_RF	43_A	Dome light automatic mode	DU-0.8	**SHEET 07**
19	CAB_E	61H	Heat load solenoid valve	OR-0.8	**SHEET 10**
20	ECD	53C_A	Pilot control solenoid LSD	W-0.8	
23	ECB	52	Fan reverser LSD	W-0.8	
26	CAB_E	56	Fan control PWM	W-0.8	
21	JSS_CAB	51D_A	Relay control ground	Bk-0.8	**SHEET 13**
22	ECC	0_EZ	Power relay control	W-0.8	**SHEET 04**

Connector 216F – Alternator resistor



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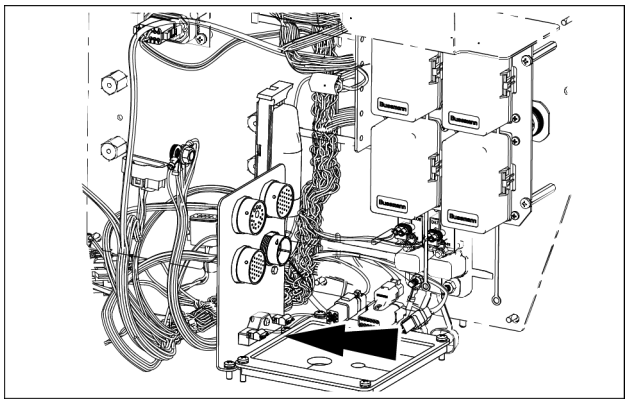
Connector 216F



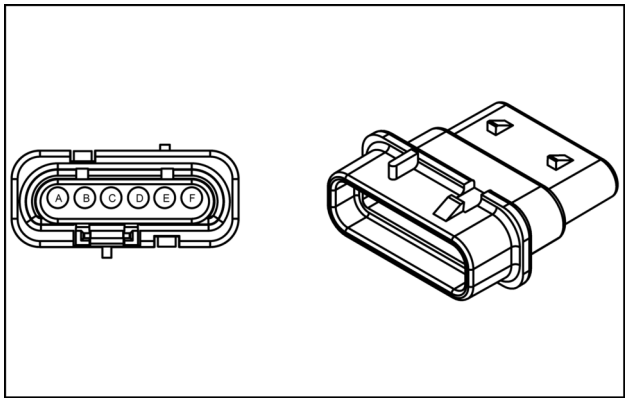
LEIL15WHL1589AB 50

Location: fuse box.

Pin	From	Wire	Description	Color-Size	Frame
1	SPL_2	19R_D	Alternator resistor FSD power	Or-0.8	**SHEET 11**

Pin	From	Wire	Description	Color-Size	Frame
3	CAB_T	0_DM	Speed sensor ground	Bk-0.8	**SHEET 08**
4	CAB_T	0_DN	Output speed sensor ground	Bk-0.8	
8	SPL_D19	58H_A	Power VPS2	W-0.8	
9	CAB_T	25P_A	Transmission solenoid valve Y5	LU-0.8	
10	CAB_T	25L_A	Transmission solenoid valve Y2	LU-0.8	
11	CAB_T	34C	Differential lock solenoid ground	LU-0.8	
17	CAB_T	32F_A	Transmission filter maintenance switch	Y-0.8	
19	CAB_T	25A_A	Engine speed signal	LU-0.8	
23	SPL_D17	19T_A	Battery power	Or-0.8	
24	CAB_B	22D	Pedal sensor ground	LU-0.8	
26	SPL_CAN_TRANS_L	CAN_LD	CAN low	G-0.8	
32	CAB_T	25M_A	Transmission solenoid valve Y3	LU-0.8	
37	CAB_B	22B	Pedal sensor + **5 V**	K-0.8	
38	CAB_B	22C	Pedal position signal	Y-0.8	
39	CAB_T	36T_A	Valve body temperature signal	P-0.8	
41	CAB_T	25C_A	Turbine speed signal	LU-0.8	
42	CAB_T	25B_A	Intermediate speed signal	LU-0.8	
46	CAB_T	36R_E	Transmission temp / filter return	P-0.8	
49	CAB_T	36G_A	Torque converter out temperature signal	P-0.8	
50	CAB_T	25R_A	Torque converter lockup solenoid power	LU-0.8	
51	CAB_T	25J_A	Transmission solenoid valve Y6	LU-0.8	
55	CAB_T	25N_A	Transmission solenoid valve Y4	LU-0.8	
56	CAB_T	25K_A	Transmission solenoid valve Y1	LU-0.8	
59	SDM	34D	Differential lock switch signal	LU-0.8	
62	CAB_T	25D_A	Output speed signal	LU-0.8	
68	SPL_D17	19T_B	Fused battery power	Or-0.8	
1	SPL_0D	0_DP	Diagnostic TECM ground	Bk-0.8	
2	SPL_0D	0_DQ	Diagnostic TECM ground	Bk-0.8	
5	SPL_D16	32J_D	Transmission enable indiction	Y-0.8	
7	ECD	35C	Backup alarm relay control	Y-0.8	
12	SPL_D12	25S_B	Output switched power VPS1	LU-0.8	
13	SPL_D12	25S_C	Output switched power VPS1	LU-0.8	
15	108F	37D_A	Diagnostic signal	P-0.8	
18	108F	37E	Diagnostic signal switched	P-0.8	
20	197F	26F_B	FNR forward signal	LU-0.8	
21	SDC	22A	De-clutch switch	DU-0.8	
22	SPL_D11	25Y_A	Transmission kick down signal	LU-0.8	
25	SPL_CAN_TRANS	CAN_HD	CAN high	Y-0.8	
29	STA	25H	Transmission auto signal	LU-0.8	
30	197F	26R_B	FNR reverse signal	LU-0.8	
31	STE	26E_A	Transmission enable signal	LU-0.8	
35	SDA	34B	Differential lock switch signal	LU-0.8	
43	TS1	25F	Forward signal	LU-0.8	
44	197F	26_NB	FNR neutral signal	LU-0.8	
45	SPL_TRNS_PWR	19A_K	TECM fused power	Or-0.8	
53	SPL_D19	58H_B	Power VPSL	W-08	

Connector SPL_PIN – SPL back light power



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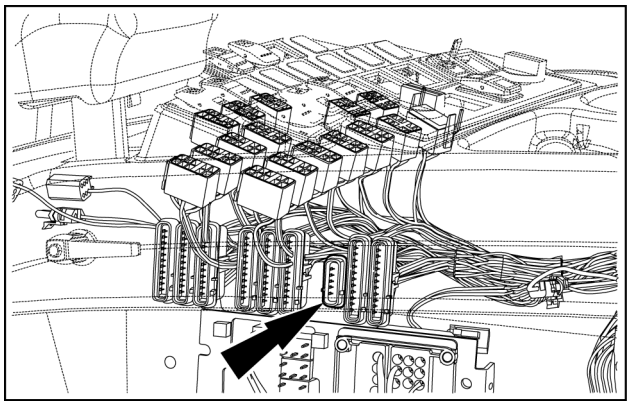
Connector SPL_PIN

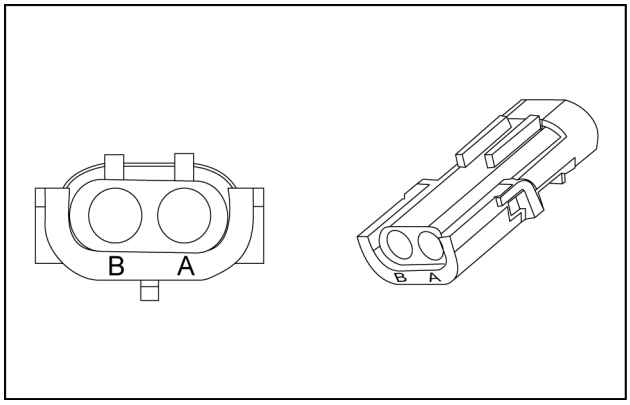


LEIL15WHL1635AB 129

Location: switch area, under the right-hand side console in the cab.

Pin	From	Wire	Description	Color-Size	Frame
A	SPE	19P_A	Pin engage switch power	Or-0.8	**SHEET 10**
B	ECA	19P	Pin engage/Fan power	Or-0.8	
C	SFC	19P_C	Fan reverse switch power	Or-0.8	
E	ECB	19P_D	Fan reverse relay power	Or-0.8	
F	ECB	19P_E	Fan reverse relay power	Or-0.8	

Connector PRB1 – Redundant brake switch



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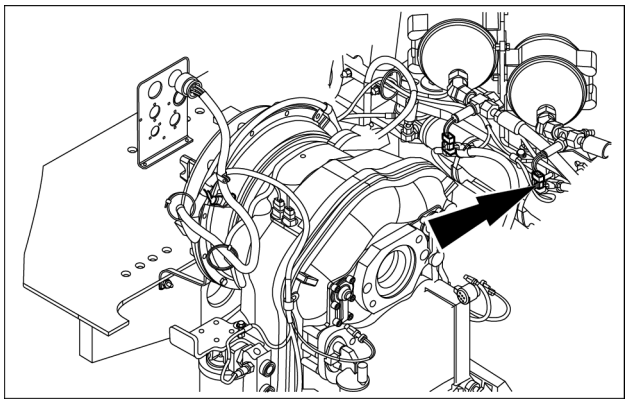
Connector PRB1



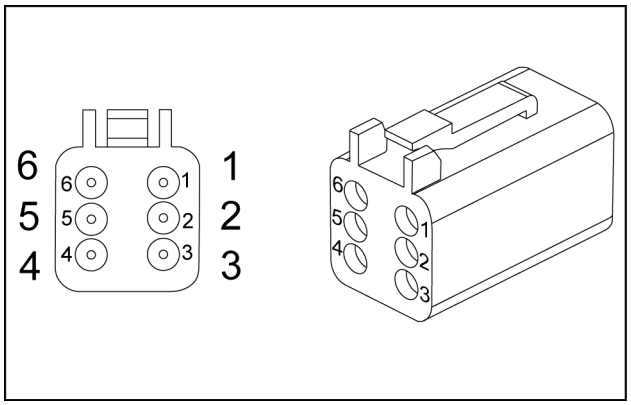
LEIL15WHL1709AA 12

Location: near the rear brake accumulator.

Pin	From	Wire	Description	Color-Size	Frame
B	GND_TRANS	0_HM	Redundant brake switch ground	Bk-1.0	**SHEET 09**
A	SPL_RD	33R_C	Redundant brake accumulator pressure low	Y-1.0	

Harnesses and connectors - Component diagram 06 - Front chassis harness

Connector LLF – Left-hand H front lights



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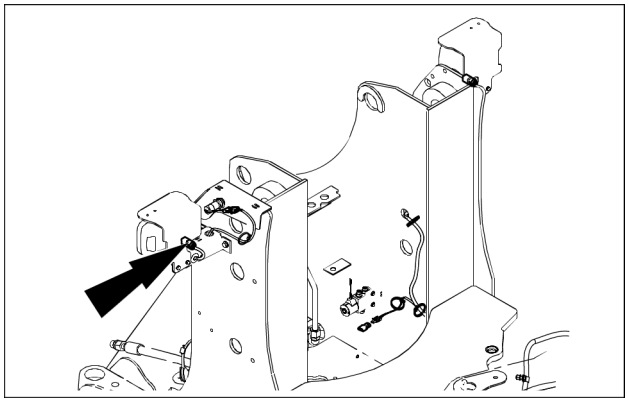
Connector LLF

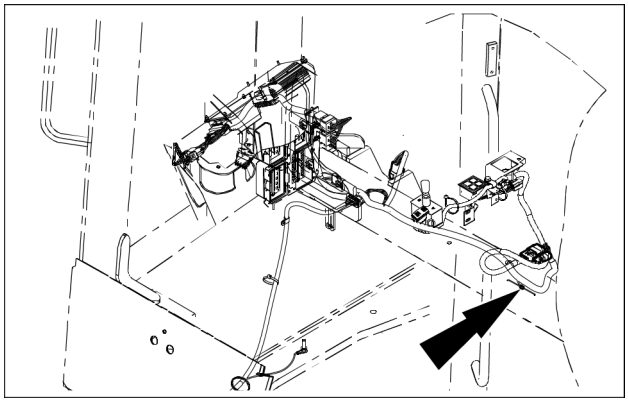


LEIL15WHL1659AA 2

Location: near the left-hand front light.

Pin	From	Wire	Description	Color-Size	Frame
1	SPL_A1	0_AJ	LH front lights ground	Bk-1.0	**SHEET 10**
2	FRONT	18D	LH low beam fused power	Or-1.0	**SHEET 06**
3	FRONT	18B	LH high beam fused power	Or-2.0	
4	FRONT	18F	LH position / tail fused power	Or-1.0	
5	FRONT	45L	Left turn signal	N-1.0	

Connector R1 – Resistor

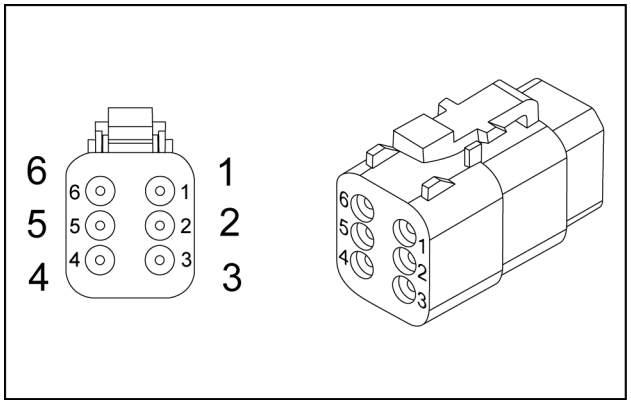


LEIL15WHL1748AB 23

Location: left-hand side of the cab.

Pin	From	Wire	Description	Color-Size	Frame
CS0	SPL_JSS_14	0_SP	Ground, joystick	Bk-0.8	**SHEET 13**
CS0	SPL_JSS_11	51J_D	Valve alarm	P-0.8	

Connector CAB_FNR – Main cab FNR



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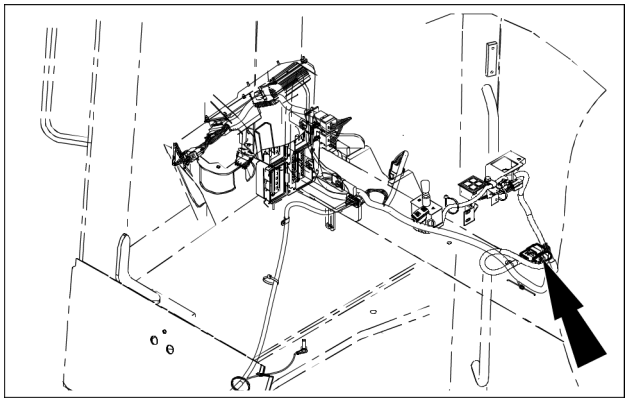
Connector CAB_FNR



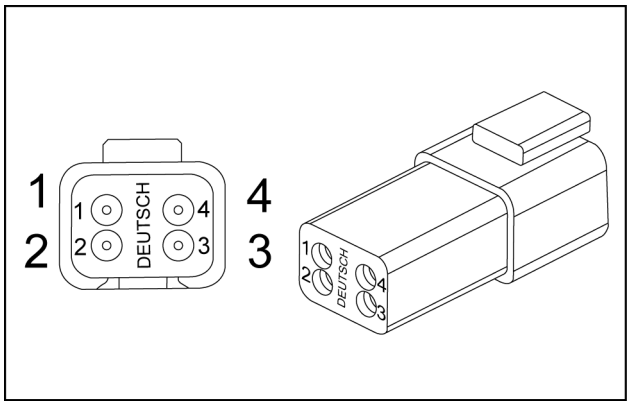
LEIL15WHL1749AB 25

Location: left-hand side of the cab.

Pin	From	Wire	Description	Color-Size	Frame
1	FNR_RLY	19B_B	Trans enable switched power	Or-0.8	**SHEET 13**
2	FWD_DIODE	26F_E	FNR forward signal	LU-0.8	
4	RVS_DIODE	26R_E	FNR reverse signal	LU-0.8	
5	SPL_JSS_21	32J_H	Trans enable LT signal	Y-0.8	
6	KD_DIODE	25Y_E	None	LU-0.8	
3	NTRL_DIODE	26N_E	FNR neutral signal	LU-0.8	

Harnesses and connectors - Component diagram 13 - Cold Start/Engine controls/Power distribution

Connector DEF2 – DEF quality jump



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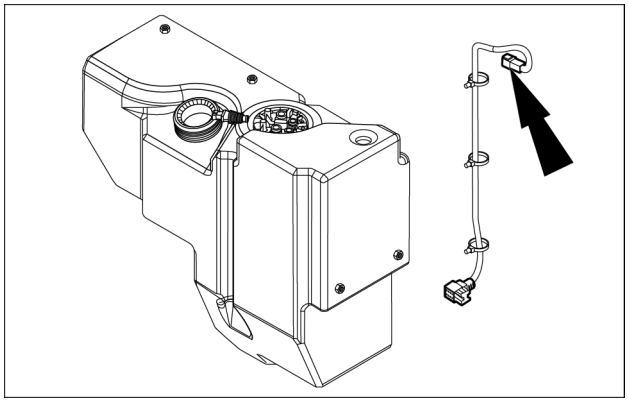
Connector DEF2

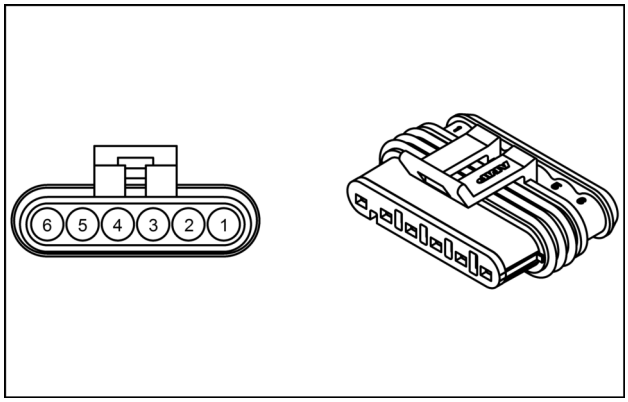


LEIL15WHL1615AB 2

Location: on the DEF/ADBLUE® tank, right-hand side of the machine.

Pin	From	Wire	Description	Color-Size	Frame
1	DEFQ	0_BFK	SCR sensor ground	Bk-1.0	**SHEET 05**
2	DEFQ	CANC_LN	CAN C SCR low	G-0.8	
3	DEFQ	CANC_HN	CAN C high	Y-0.8	
4	DEFQ	18T_N	SCR sensor power	Or-1.0	

Connector BPP – Pedal position



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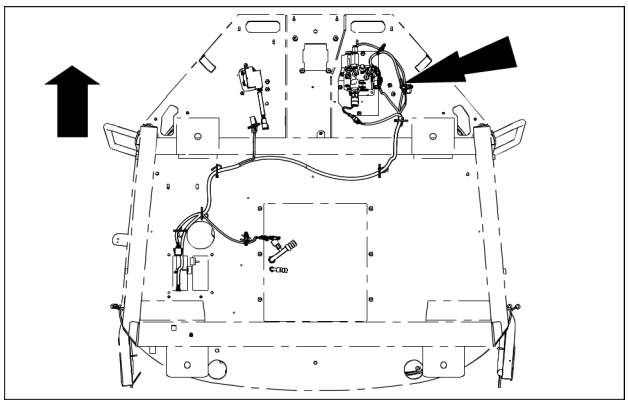
Connector BPP

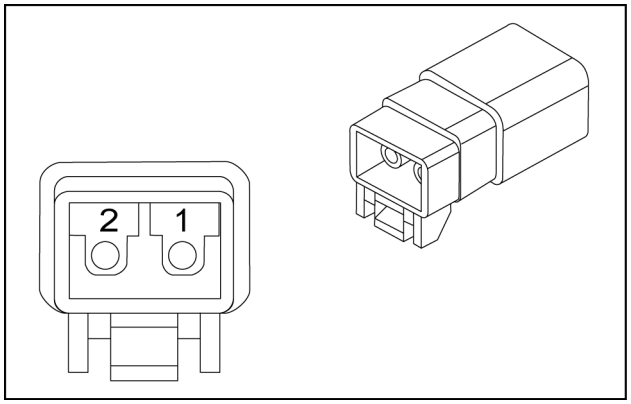


LEIL15WHL1642AB 6

Location: cab bottom, near the brake valve.

Pin	From	Wire	Description	Color-Size	Frame
1	BTM_C	22G	Pedal sensor ground	LU-0.8	**SHEET 08**
2	BTM_C	22E	Pedal sensor + **5 V**	K-0.8	
3	BTM_C	22F	Pedal POS signal	Y-0.8	
4	BTM_C	401B	Pedal POS signal	Y-0.8	
5	BTM_C	255E	Pedal sensor + **5 V**	K-0.8	
6	BTM_C	016B	Pedal sensor ground	DU-0.8	

Connector MH_L – Left-hand heated mirror



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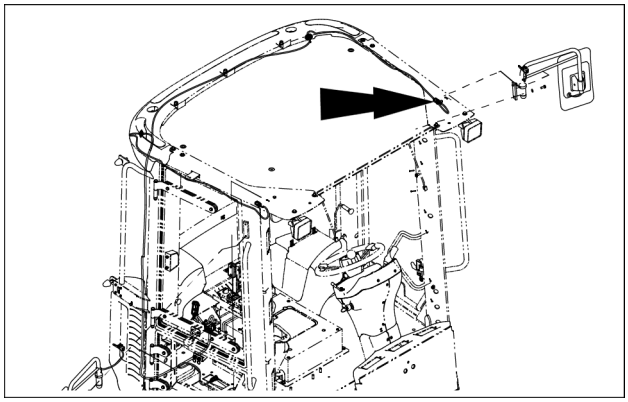
Connector MH_L

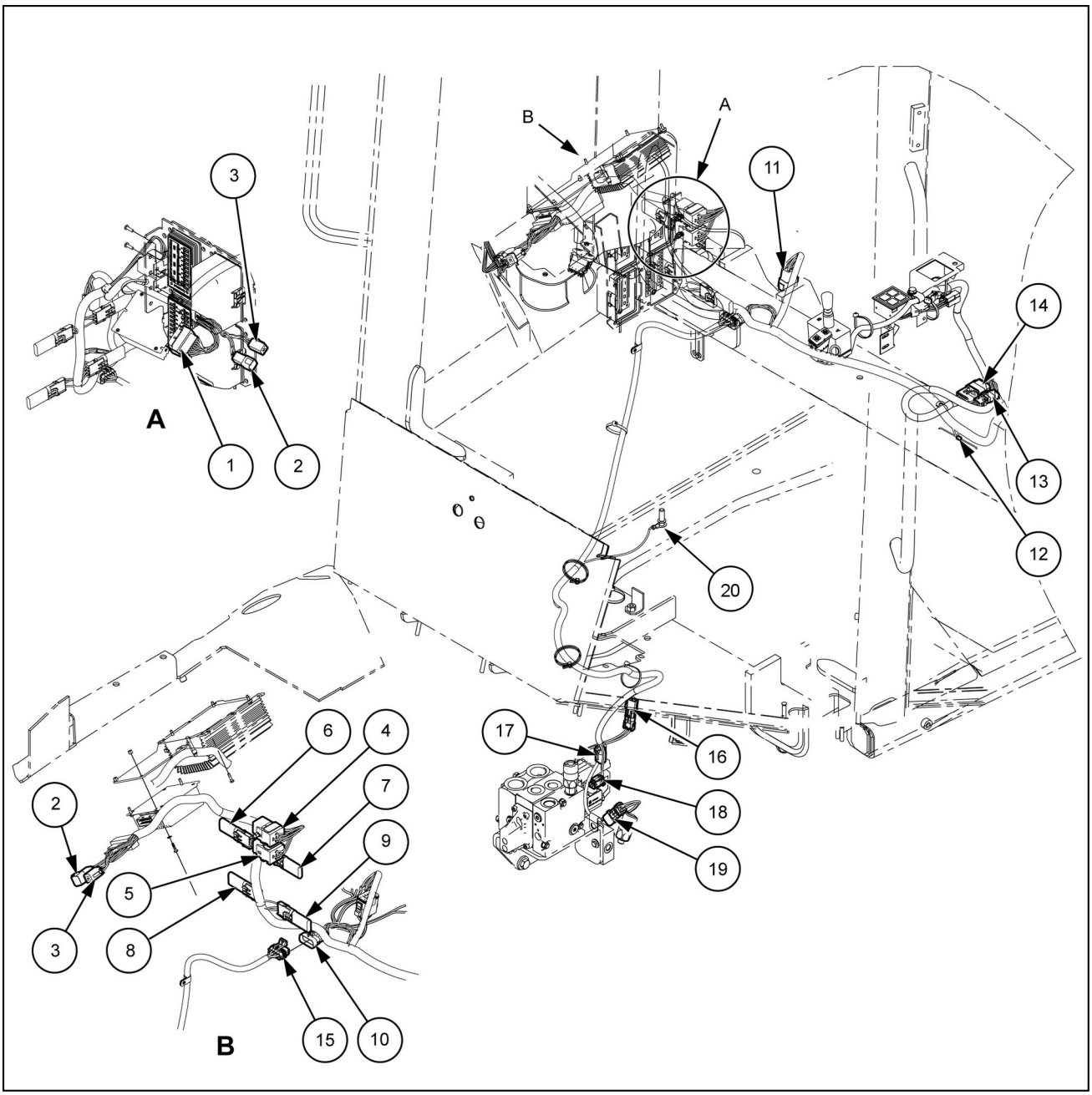


LEIL15WHL1762AA 10

Location: cab roof, near the left-hand light.

Pin	From	Wire	Description	Color-Size	Frame
1	SPL3	69_E	Heated mirror signal	W-1.0	**SHEET 12**
2	SPL_1	0_VH	Heated mirrors ground	Bk-1.0	

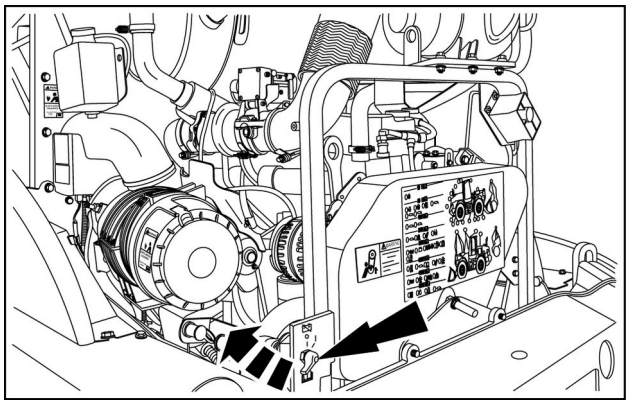
Wiring harnesses - Component diagram - Joystick harness



LEIL15WHL1377GB 1

Reference	Connector
1	**Connector JSS_CNT** – JSS controller
2	**Connector JSS_197F** – Main CAB FNR
3	**Connector JSS_197M** – FNR main CAB
4	**Connector JSS_RLY** – Relay K2
5	**Connector FNR_RLY** – Relay K2
6	**Connector RVS_DIODE** – Diode assembly
7	**Connector FWD_DIODE** – Diode assembly
8	**Connector KD_DIODE** – Diode assembly
9	**Connector NTRL_DIODE** – Diode assembly
10	**Connector CAB_FRM** – Cab to JSS frame
11	**Connector CAB_ARM_FRM** – Cab to arm to FRM
12	**Connector R1** – Resistor
13	**Connector CAB_FNR** – Main cab FNR

5. Turn the master electrical disconnect switch to the ON position. Lower the engine compartment hood.



LEIL15WHL0260AA 5

Contents

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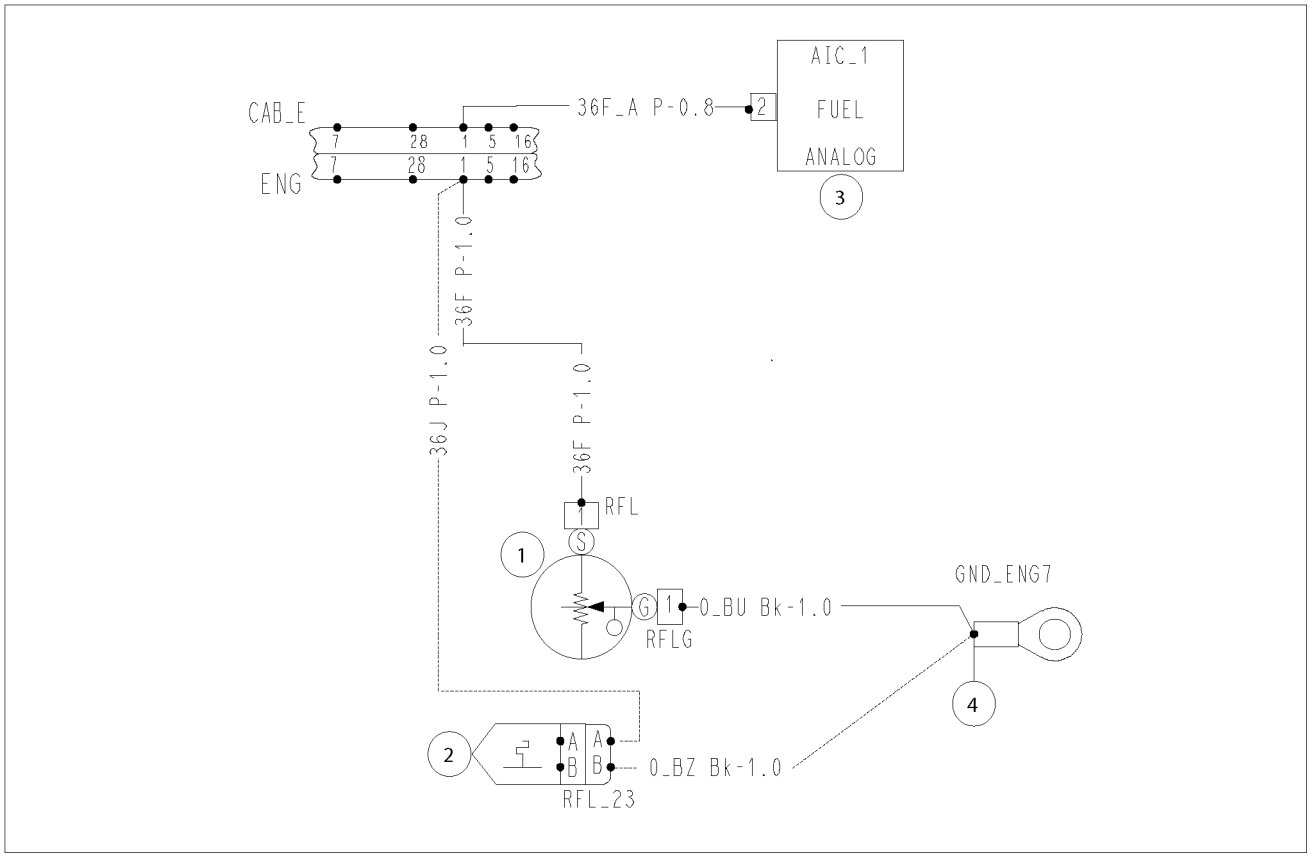
SERVICE

DIAGNOSTIC



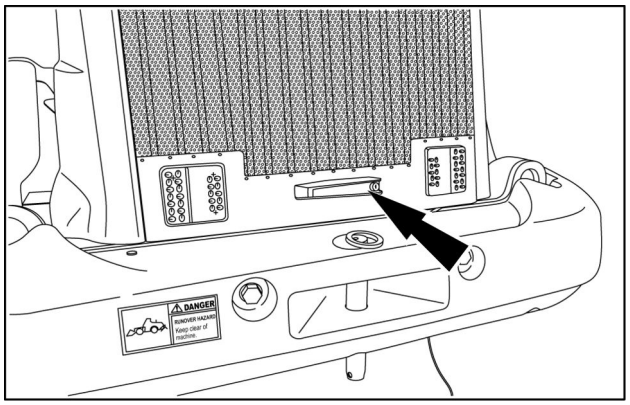
RCIL11WHL049FAK 1

(1)	Fuel level sender (**33 - 240 Ω**) — 521F, 621F, 721F, 821F, 921F, and 1121F.	**(3)**	Advanced Instrument Cluster — analog input
(2)	Fuel level sender (**33 - 240 Ω**) — 1021F	**(4)**	Chassis ground — on engine block near oil filter.

Selective Catalytic Reduction (SCR) humidity sensor - Remove

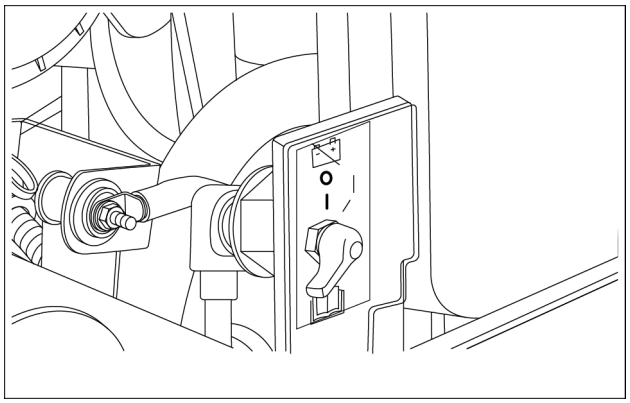
NOTICE: *Emission sensors in the exhaust system and on the vehicle may be damaged by vibrations from use of impact wrenches or hammers during service work. Avoid using these tools when servicing components close to the sensors. If use of impact tools or hammers cannot be avoided, carefully remove sensors close to area requiring service work.*

1. Raise the engine compartment hood.



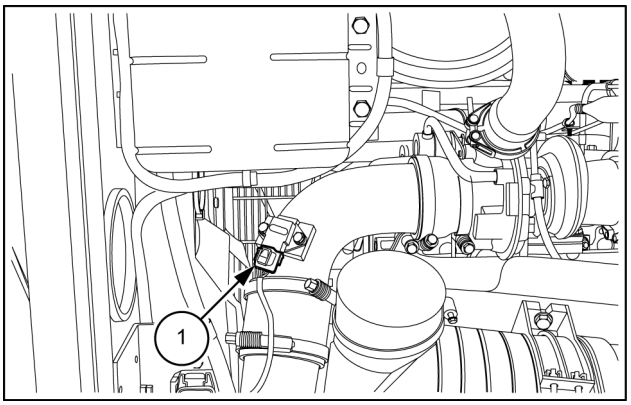
RAPH12WEL1493AA 1

2. Turn the master electrical disconnect switch to the OFF position.



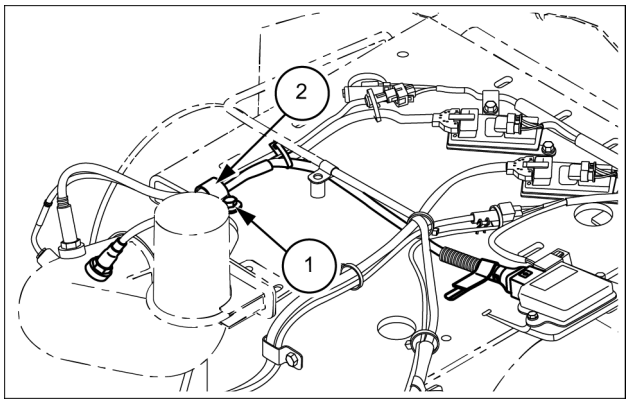
LEIL15WHL0327AA 2

3. Locate the air inlet humidity sensor **(1)** on air intake pipe between the air filter housing and turbocharger.



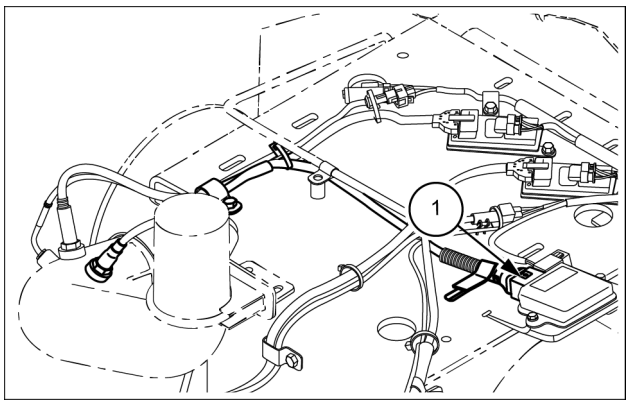
LEIL15WHL0197AB 3

5. Loosen the hexagonal bolt **(1)** and remove the clamp **(2)** that secure the sensor wiring harness to the catalyst mounting support bracket. Remove any straps holding the sensor wiring harness to the other wiring harness.



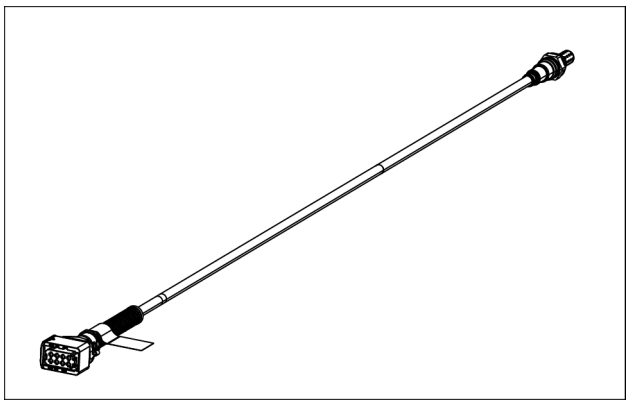
LEIL15WHL0341AB 4

6. Disconnect the sensor connector **(1)** from NH3 Electronic Control Unit.



LEIL15WHL0342AB 5

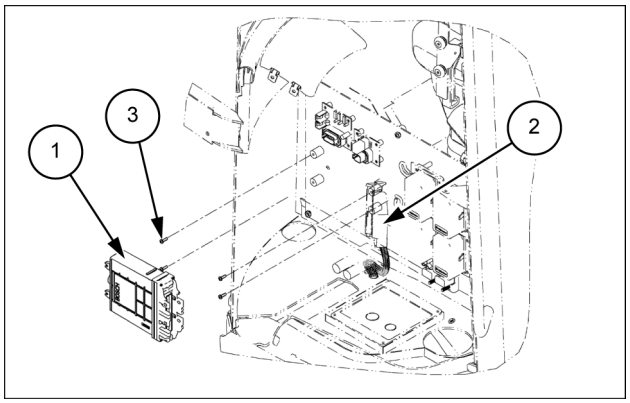
7. Remove the sensor catalyst outlet ammonia (NH3) sensor and the wiring harness.



LEIL15WHL0220AA 6

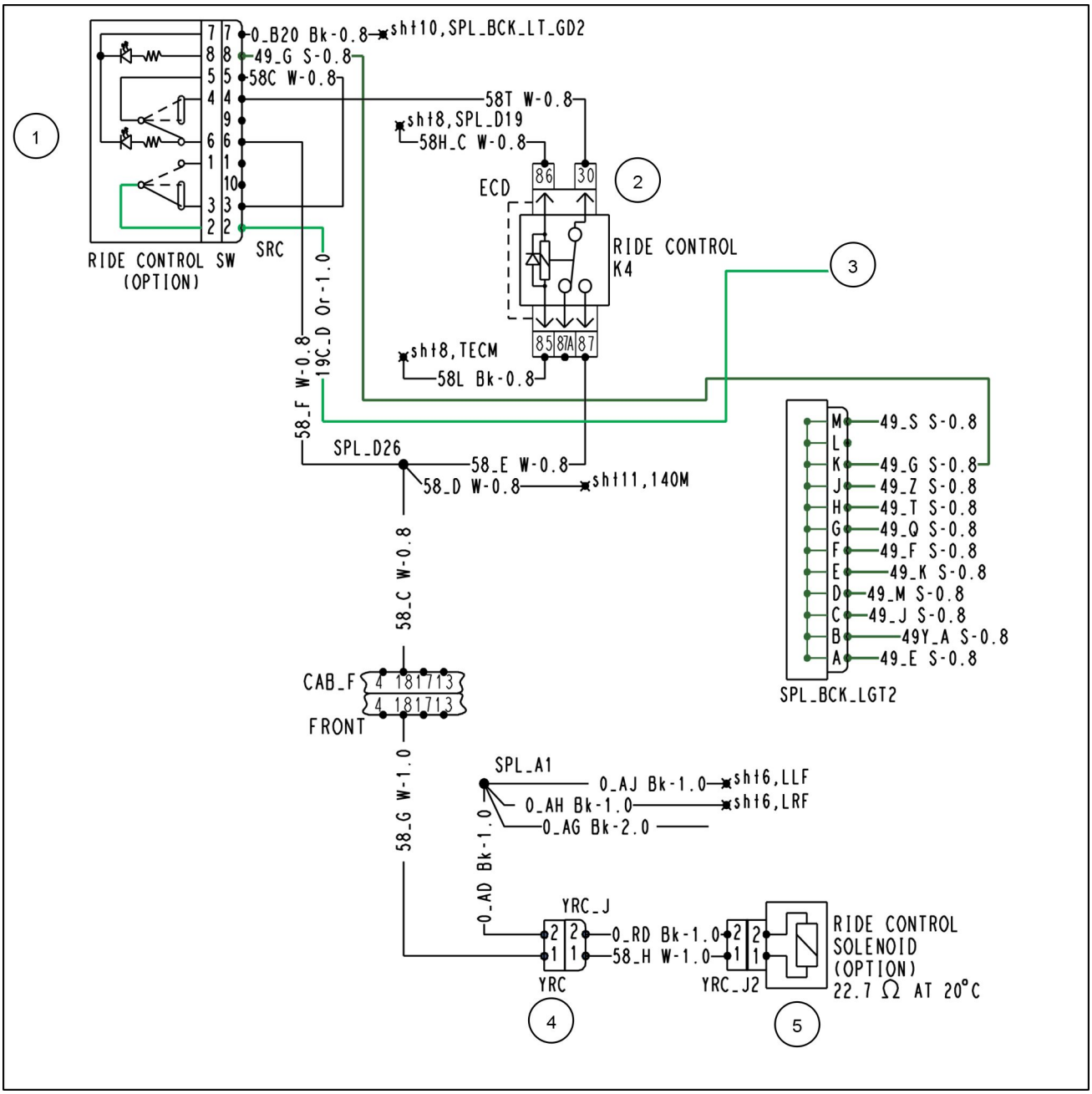
Transmission electronic control module - Remove

1. Gain access to the Transmission Electronic Control Module **(1)** on the fuse box.
2. Disconnect the TECM connector **(2)**.
3. Remove the four screws M5x16 **(3)** to remove the Transmission Electronic Control Module **(1)**.



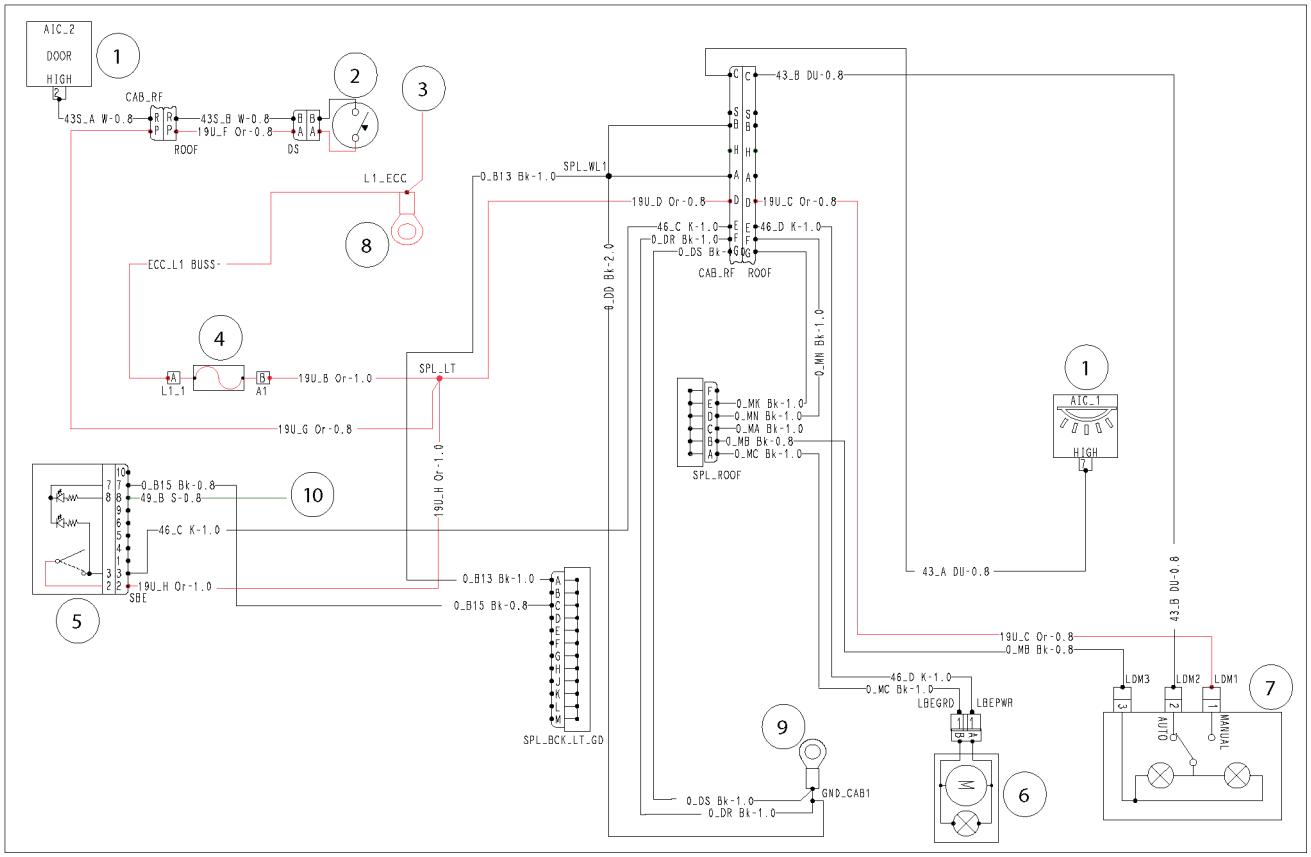
LEIL15WHL1381AB 1

Expected Result	**Result** The resistance should be approximately **20 - 26 ohms**. (**22.7 Ω** at **20 °C** (**68 °F**))
Other Result (Possible Cause)	**Action** The resistance is out of range. The ride control solenoid is bad. Replace the solenoid.



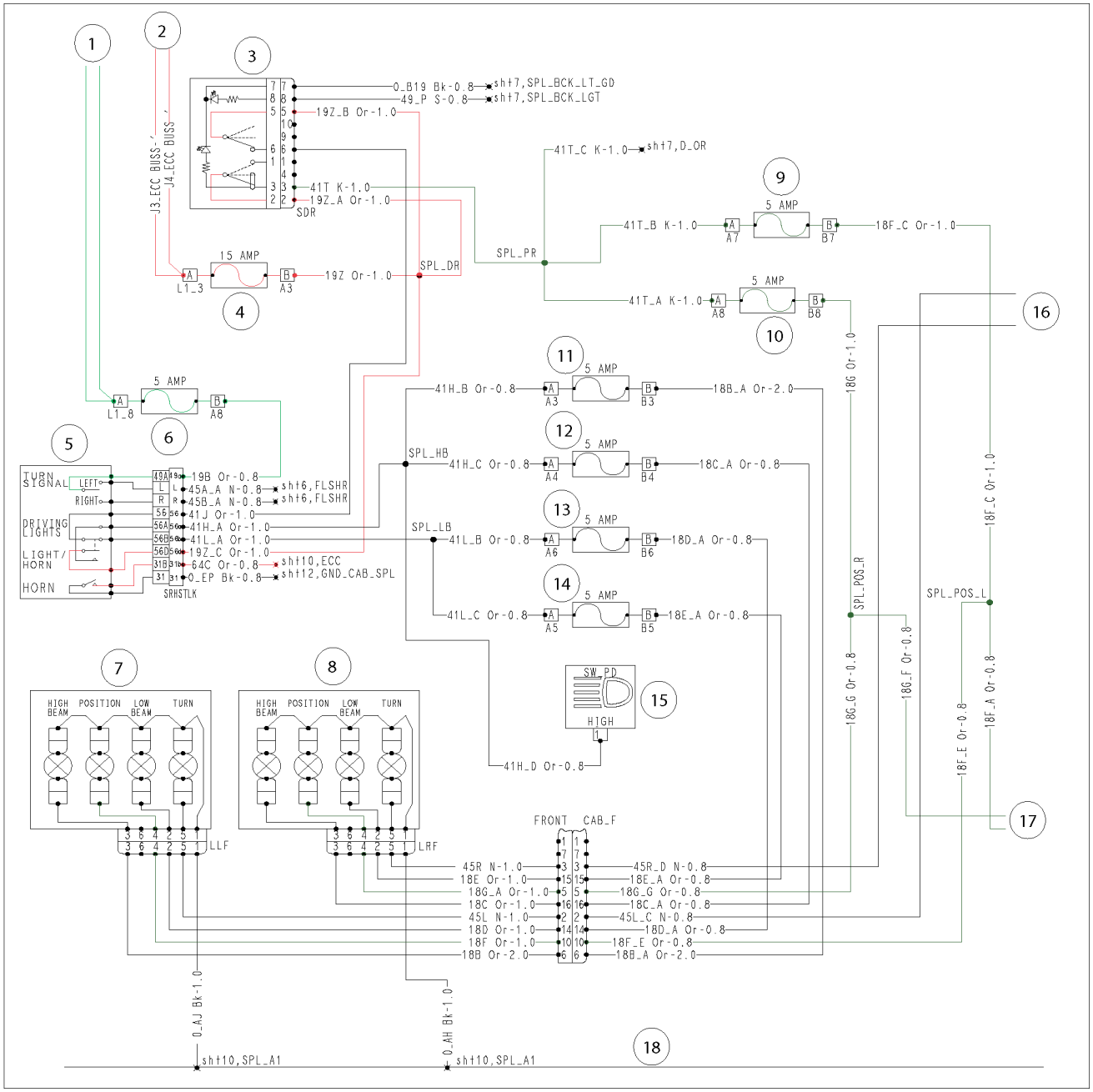
RAIL12WEL0144GA 1

(1)	Ride control switch.	**(4)**	***NOTE:*** *The YRC_J jumper is only used on model 821F*
(2)	Ride control relay K4.	**(5)**	Ride control solenoid (option).
(3)	**24 V** power from the fuse ECA-F5.		



RCIL11WHL040FAK 1

(1)	Advanced Instrumentation Cluster	**(6)**	Rotating Beacon (option)
(2)	Door switch — closes with door open	**(7)**	Dome light
(3)	**24 V** supply, unswitched battery	**(8)**	L1 located on electrical control C
(4)	Beacon \ Dome light power ECC-F1 **7.5 A** fuse	**(9)**	Right console ground
(5)	Rotating Beacon switch (option)	**(10)**	Back light power



RCIL11WHL042GAK 1

(1)	**24 V** switched battery	**(10)**	Position light Right (running / tail) and License plate light power ECB-F8 **5 A** fuse
(2)	**24 V** supply, unswitched battery	**(11)**	High beam power left ECB-F3 **5 A** fuse
(3)	Driving lights power switch	**(12)**	High beam power right ECB-F4 **5 A** fuse
(4)	Driving lights power ECC-F3 **15 A** fuse	**(13)**	Low beam power left ECB-F6 **5 A** fuse
(5)	Turn signal, High \ Low beam and Horn power switch	**(14)**	Low beam power right ECB-F5 **5 A** fuse
(6)	Turn signal power ECA-F8 **5 A** fuse	**(15)**	AIC high beam indicator light
(7)	Left-hand front combo lights	**(16)**	Left (FLSHR pin 8)/ Right (FLSHR pin 7) turn signals from Flasher module
(8)	Right-hand front combo lights	**(17)**	Position (tail) lights power to left (LLR pin 3)/ Right (LRR pin 3)
(9)	Position light Left (running / tail) power ECB-F7 **5 A** fuse	**(18)**	Chassis ground

Contents

Electrical systems - 55

Warning indicators, alarms, and instruments - 408

1317-Steering pressure too low

Control Module : AIC

NOTICE: *put the articulation lock in the LOCKED position before proceeding.*

NOTE: *this fault only pertains to machines equipped with secondary steering.*

Cause:

1. Steering pressure below a set range.
2. Connectors not mated fully, pins not pushed into connector fully, bent pin or broken wire at rear of connector.
3. Wiring or circuits shorted to chassis ground or minus battery.
4. Faulty reading from component.
5. Faulty Advanced Instrument Cluster.

Solution:

1. Verify that the fault code is still active, refer to **0000-Retrieving fault codes, Wheel Loaders (55.408)**.
   Prior to clearing fault codes write down all fault codes, number of occurrences, and engine hours at last occurrence.

   (1) Turn the key switch to RUN position.

   (2) Clear all fault codes.

   (3) To check for fault code: start and operate the machine.

   A. The fault is not recorded again. OK for return to service.

   B. Fault code 1317 is recorded again. Go to Step **2**.
2. Stop the machine operations.

   (1) Check the steering system pressures.

   A. The steering system pressure is OK. Go to Step **3**.

   B. The steering system pressure is low. Repair the steering system as needed. Return to Step **1** to confirm elimination of fault.
3. Verify that the harness and the connectors are not damaged.

   (1) Inspect the Advanced Instrument Cluster, the Secondary Steering Module (SSM) and the Secondary Steering Switch connections. All connections should be secure, tight, free of corrosion, abrasion and damage.

   (2) Inspect the harness from the Advanced Instrument Cluster to the Secondary Steering Module and the Secondary Steering Switch. Verify that the harness is free of damage, corrosion, abrasion or incorrect attachment.

   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 across the pressure switch.

   (1) Disconnect the **Connector PSS**.

   (2) Inspect the pins in the **Connector PSS**. Clean the connections.

   (3) With engine stopped, measure the resistance across the **Connector PSS pin A** and the **Connector PSS pin B** on the secondary steering pressure switch. The resistance should be greater than **20000 Ω**.

   (4) Measure the resistance across the **Connector PSS pin B** and the **Connector PSS pin C** on the secondary steering pressure switch. The resistance should be less than **10 Ω**.

4. Carefully disconnect the engine harness from the ECU A-9000 at connector **X-9002**. Use a multimeter to check for continuity from the engine harness side of connector **X-9002 pin 39** to chassis ground. There should be no continuity.

   A. If there is continuity, there is a short to ground condition in the engine harness between the ECU A-9000 engine plug connector **X-9002 pin 39** and the Coolant temperature sensor B-9003 connector **X-9006 pin 1**, wire EN-014. Locate and repair the grounded conductor.

   B. If there is no continuity, check the ECU A-9000 for the appropriate software and re-flash, if necessary.

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

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

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

Wiring harnesses - Electrical schematic sheet 05 (55.100)

3051 (DTC 1161)-Battery voltage is higher than expected

Control Module : ECU

Context:
The Engine Control Unit (ECU) monitors battery voltage. If the ECU determines that battery voltage has exceeded **16.1 V** , this fault will occur.

Cause:
Battery voltage is greater than **16.1 V**.

Possible failure modes:

1. Faulty charging system.
2. Faulty software of the ECU.

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 battery voltage.

   The engine must be running.

   Use a multimeter to perform the following voltage check:

From	To	Value
Battery (+) terminal	Battery (–) terminal	There should be approximately **12 V**

   A. If there is not approximately **12 V**, continue to Step **3**.

   B. If there is approximately **12 V**, check the ECU for the appropriate software and re-flash, if necessary.
3. Check the charging system for proper operation.

   A. If the charging system is not functioning properly, repair the charging system as necessary.

   B. If the charging system is functioning properly, check the ECU for the appropriate software and re-flash, if necessary.
4. Visually inspect the relevant harnesses and connectors for damage, bent or dislocated pins, corroded terminals, or broken wires. Verify that the connectors are fully installed. Flex the harnesses involved to reveal intermittent breaks or shorts in the wiring concerned. Operate the machine while you monitor the display.

   A. If you find damage or the display indicates other than normal display readings, 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.

Harnesses and connectors - Electrical schematic sheet 05 (55.100)

3096-(DTC 951B)-CAN A Bus off failure

Control Module : ECU

Context:
The Engine Control Unit (ECU) 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. CAN Node A Bus is the main vehicle interface bus. The ECU provides a CAN termination resistor for the CAN Node A Bus, internal to the ECU. If the ECU senses that CAN Node A Bus is not functioning properly, this fault will occur.

Cause:
ECU has sensed a “Bus Off” state to be present at the CAN Node A.

Possible failure modes:

1. Faulty supply voltage or ground, missing.
2. Faulty CAN circuit wiring, open circuit, short to ground, or short circuit.
3. Faulty ECU, 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 other vehicle CAN faults.

   Use the EST to determine if vehicle CAN faults exist.

   A. If other vehicle CAN faults do exist, resolve the vehicle CAN faults, then check to see that this fault is also resolved.

   B. If other vehicle CAN faults do not exist, continue with Step **3**.
3. Check the ECU supply voltage.

   Disconnect the vehicle (VE) harness from the ECU at **Connector EDC17**.

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

From	To	Value
Connector EDC17 pin 1	chassis ground	There should be **12.0 V**
Connector EDC17 pin 25	chassis ground	There should be **12.0 V**
Connector EDC17 pin 26	chassis ground	There should be **12.0 V**
Connector EDC17 pin 49	chassis ground	There should be **12.0 V**
Connector EDC17 pin 37	chassis ground	There should be **12.0 V**

   A. If the voltage is present on all of the checks, leave **Connector EDC17** 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.
4. Check the ECU grounding.

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

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

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

   A. If you find damage or the display indicates other than normal readings, 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.

Harnesses and connectors - Electrical schematic sheet 05 (55.100) Harnesses and connectors - Electrical schematic sheet 04 (55.100)

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.

Harnesses and connectors - Electrical schematic sheet 05 (55.100) Harnesses and connectors - Electrical schematic sheet 04 (55.100)

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

From	To	Value
Connector EDC17 pin 3	chassis ground	There should be continuity
Connector EDC17 pin 5	chassis ground	There should be continuity
Connector EDC17 pin 28	chassis ground	There should be continuity
Connector EDC17 pin 52	chassis ground	There should be continuity
Connector EDC17 pin 75	chassis ground	There should be continuity

A. If there is continuity on all of the checks, leave the **Connector EDC17** disconnected and continue with Step **5**.

B. If there is no continuity for one or more of the checks, refer to the appropriate vehicle service manual and electrical schematics to locate and restore the grounding circuit to the ECU.

5. Determine the condition of the ECU CAN circuit.

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

From	To	Value
Connector EDC17 pin 46	**Connector EDC17 pin 47**	There should be **120 Ω**
Connector EDC17 pin 46	chassis ground	There should not be continuity
Connector EDC17 pin 47	chassis ground	There should not be continuity

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

From	To	Value
Connector EDC17 pin 46	**Connector EDC17 pin 47**	There should be **120 Ω**

A. If the measured resistances are correct and neither conductor is grounded, check the ECU for the appropriate software and re-flash, if necessary.

B. If the measured resistances are not correct or one or both of the conductors is grounded, refer to the appropriate vehicle service manual and electrical schematics to locate and restore the termination resistance to the CAN circuit.

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

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

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

3253-(DTC E41D)-ECU internal failure - Voltage ratio in ADC monitoring

Control Module : ECU

Context:
The Engine Control Unit (ECU) monitors the efficiency of the Analog to Digital Converter (ADC) using a voltage ratio conversion test. The ECU will count each time the voltage ratio is out of the desired range. If the count exceeds 15 times, this fault will occur.

Solution:

1. Check the ECU for the appropriate software and re-flash, if necessary.

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

   B. If the fault has not been resolved, escalate an ASIST concern.

3305 (DTC 2765)-Fuel rail pressure has exceeded minimum limit

Control Module : ECU

Context:
For more information on the fuel injection system, see **Injection control - Dynamic description (55.010)**. The Engine Control Unit (ECU) monitors the fuel rail pressure sensor for the appropriate fuel pressure. If the ECU determines that fuel pressure is less than the necessary pressure needed to perform fuel injection, this fault will occur.

Cause:
The ECU has detected a fuel pressure less than **200.0 bar** (**2900.0 psi**).

Possible failure modes:

1. Faulty injectors, internal leakage or stuck open.
2. Faulty fuel metering unit, wiring or internal failure.
3. Faulty high pressure pump.
4. Faulty fuel filter, clogged.
5. Faulty Pressure Relief Valve (PRV), leaking or stuck open.
6. Faulty electric lift pump. (if equipped)
7. Faulty gear pump pressure, too low.
8. Faulty software of the ECU.

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.

Harnesses and connectors - Electrical schematic sheet 05 (55.100)

3501-(DTC E1FD)-ECU internal failure - Software resets in DSM 0

Control Module : ECU

Context:
The Engine Control Unit (ECU) monitors for a possible error to the ECU internal software. If the ECU detects a software failure, a software reset will be performed and this fault will occur. During a software reset, all instrument panel lights could flash (power on test) and the instruments could shortly read zero.

Solution:

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

3569-(DTC F15F)-SCR inducement warning due to distance/time is active - Level 2

Control Module : ECU

Context:
This fault is only for informational purposes and requires no action other than the resolution of the active fault causing this fault to occur. Any one of many Selective Catalytic Reduction (SCR) not displayed faults that remains active for an Engine Control Unit (ECU) predetermined length of time will trigger this fault. Since this fault is part of the inducement strategy, it may be necessary to perform the Engine Restart Counter Reset / Unlock Inducement configuration with the Electronic Service Tool (EST) before you return the machine to service, unless this was accomplished as part of the resolution of the fault causing this fault. See **Selective Catalytic Reduction (SCR) exhaust treatment - Configure - Engine restart counter reset (10.500)**, if necessary.

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

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

   A. If you find damage or the display indicates other than normal display readings, 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.

Harnesses and connectors - Electrical schematic sheet 05 (55.100)

3754-(DTC E6DD)-ECU internal failure - Rail pressure plausibility

Control Module : ECU

Context:
The Engine Control Unit (ECU) monitors fuel rail pressure for proper engine performance as well as safety concerns. Fuel rail pressure is monitored by the ECU to check if the ECU is functioning properly. If ECU detects an implausible rail pressure during monitoring, the ECU is not functioning correctly and this fault will occur.

Solution:

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

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

Control Module : ECU

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

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

Solution:

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

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.

Harnesses and connectors - Electrical schematic sheet 04 (55.100)

3967-(DTC 275D)-ECU temperature sensor voltage is lower than expected

Control Module : ECU

Context:
The Engine Control Unit (ECU) monitors the ECU temperature sensor, which is internal to the ECU, for a voltage lower than expected condition. If the ECU detects a voltage less than **383 mV** for a period greater than **500 ms** in the temperature sensor circuit, this fault will occur.

Solution:

1. Check the ECU for the appropriate software and re-flash, if necessary.

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

   B. If the fault has not been resolved, escalate an ASIST concern.

(5) Place range selector in 1st gear, place FNR in R position. **Connector TS1 pin A** to **Connector TS1 pin C**, **Connector TS2 pin B** and **Connector TS2 pin D**.

(6) Place range selector in 2nd gear, place FNR in F position. **Connector TS1 pin A** to **Connector TS1 pin B** and **Connector TS2 pin D**.

(7) Place range selector in 2nd gear, place FNR in R position. **Connector TS1 pin A** to **Connector TS1 pin C**, and **Connector TS2 pin D**.

(8) Place range selector in 3rd gear, place FNR switch F position. **Connector TS1 pin A** to **Connector TS1 pin B**, **Connector TS2 pin C** and **Connector TS2 pin D**.

(9) Place range selector in 3rd gear, place FNR in R position. **Connector TS1 pin A** to **Connector TS1 pin C**, and **Connector TS2 pin D**.

(10) Place range selector in 4th gear, place FNR in F position. **Connector TS1 pin A** to **Connector TS1 pin B**, **Connector TS2 pin B**, **Connector TS2 pin C** and **Connector TS2 pin D**.

(11) Place the range selector in any gear, place the FNR in N position. **Connector TS1 pin A** to **Connector TS1 pin D**.

A. NOT OK – Replace the FNR switch. Return to step**1** to confirm elimination of fault.

B. OK – Go to step **5**.

5. Check for open circuit between FNR switch and the transmission electronic control module.

(1) Disconnect the **Connector TS1** and the **Connector TS2**.

(2) Disconnect the **Connector TECM_TRANS** from the transmission electronic control module.

(3) Inspect the **Connector TECM_TRANS pin 22**, **Connector TECM_TRANS pin 43**, **Connector TECM_TRANS pin 63**, **Connector TECM_TRANS pin 64** and **Connector TECM_TRANS pin 65**. Clean connections.

(4) Check for continuity in the following circuits.

(5) Check for open circuit between the **Connector TS1 pin B** and the **Connector TECM_TRANS pin 43**.

(6) Check circuit between the **Connector TS1 pin C** and the **Connector TECM_TRANS pin 64**.

(7) Check circuit between the **Connector TS2 pin B** and the **Connector TECM_TRANS pin 65**.

(8) Check circuit between the **Connector TS2 pin C** and the **Connector TECM_TRANS pin 63**.

(9) Check circuit between the **Connector TS2 pin D** and the **Connector TECM_TRANS pin 22**.

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

B. OK – Go to Step **6**.

6. Replace the transmission electronic control module.

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

Harnesses and connectors - Electrical schematic sheet 08 (55.100)

4145-Short circuit to battery voltage or open circuit at engine speed input

Cause:

1. Failed speed sensor.
2. Faulty reading from the 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. Find out if the fault code is still active, refer to **0000-Retrieving fault codes, Wheel Loaders (55.408)**.
   Prior to clearing fault codes write down all fault codes, number of occurrences, and engine hours at last occurrence.

   (1) Turn key switch to RUN position.

   (2) Clear all fault codes.

   (3) To check for fault code: start and operate the machine.

   A. NOT OK – Fault code 4145 is recorded again. Go to Step **2**.

   B. OK – Fault is not recorded again. OK for return to service.
2. Check the circuit.

   (1) Disconnect the **Connector ESS**.

   (2) Inspect pins on the **Connector ESS**. Clean connections.

   (3) Disconnect the **Connector TECM_TRANS** from the transmission electronic control module.

   (4) Inspect the **Connector TECM_TRANS pin 3** and the **Connector TECM_TRANS pin 19**. Clean connections.

   (5) Check from the **Connector ESS pin 1** to the **Connector TECM_TRANS pin 19**.

   (6) Check from the **Connector ESS pin 2** to the **Connector TECM_TRANS pin 3**.

   (7) If circuit is open, check from the **Connector ESS pin 1** to the **Connector TRANS pin 7**.

   (8) From the **Connector CAB_T pin 7** to the **Connector TECM_TRANS pin 19**.

   (9) If circuit is open check from the **Connector ESS pin 2** to the **Connector TRANS pin 11**.

   (10) From the **Connector CAB_T pin 11** to the **Connector TECM_TRANS pin 3**.

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

   B. OK – Go to Step **3**.
3. Replace the engine speed sensor.

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

   B. NOT OK – If fault is recorded again go to Step **4**.
4. Replace the transmission electronic control module.

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

Harnesses and connectors - Electrical schematic sheet 08 (55.100)

4210-Short circuit to ground at clutch K1

Cause:

1. K1 clutch not operative, the transmission goes into limp home mode.
2. Faulty reading from the 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 the **0000-Retrieving fault codes, Wheel Loaders (55.408)**. Prior to clearing fault codes write down all fault codes, number of occurrences, and engine hours at last occurrence.

   (1) Turn the key switch to RUN position.

   (2) Clear all the fault codes.

   (3) To check for fault code: start and operate the machine.

   A. NOT OK – Fault code 4210 is recorded again. Go to the Step **2**.

   B. OK – Fault is not recorded again. OK for return to service.
2. Disconnect the connector at the valve body.

   (1) Measure the resistance at the valve body from pin 3 to pin 7. The resistance should be approximately **19 Ω** at **27 °C** (**80.6 °F**).

   A. NOT OK – Replace Y3 solenoid. Return to the Step **1** to confirm elimination of fault.

   B. OK – Go to the Step **3**.
3. Check the circuit.

   (1) Disconnect the **Connector TECM_TRANS** from the transmission electronic control module.

   (2) Inspect the **Connector TECM_TRANS pin 32**. Clean the connections.

   (3) Check from the **Connector TRC pin 3** to the **Connector TECM_TRANS pin 32**.

   (4) If circuit is open check from the **Connector TRC pin 3** to the **Connector TRANS pin 18**.

   (5) From the **Connector CAB_T pin 18** to the **Connector TECM_TRANS pin 32**.

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

   B. OK – Go to the Step **4**.
4. Replace the transmission electronic control module.

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

Harnesses and connectors - Electrical schematic sheet 08 (55.100)

4274-Slippage at clutch K2

NOTICE: *check the clutch pressures. Refer to* ***Powershift transmission - General specification Pressures (21.113)*** *and* ***Clutch - Dynamic description - Transmission Clutch Calibration (21.155)****.*

Cause:

1. Failed speed sensor.
2. Faulty reading from the component.
3. Connectors not mated fully, pins not pushed into the connector fully, bent pin or broken wire at rear of the 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 (55.408)**.
   Prior to clearing fault codes write down all fault codes, number of occurrences, and engine hours at last occurrence.

   (1) Turn the key switch to RUN position.

   (2) Clear all fault codes.

   (3) To check for fault code: start and operate the machine.

   A. NOT OK – Fault code 4274 is recorded again. Go to Step **2**.

   B. OK – Fault is not recorded again. OK for return to service.
2. Refer to **Powershift transmission - General specification Pressures (21.113)** to perform pressure checks and transmission troubleshooting.

   A. OK – No errors were found during the troubleshooting. Go to Step **3**.

   B. NOT OK – Repair the transmission as needed.
3. Refer to **4153 - Logical error at intermediate speed sensor input** and troubleshoot intermediate speed sensor (**Connector ISS**). Do not replace the transmission electronic control module at this time.

   A. OK – Go to Step **4**.
4. Refer to **4156 - Logical error at output speed sensor input** and troubleshoot output speed sensor (**Connector OSS**).

   A. OK – Go to Step **5**.
5. Replace the transmission electronic control module.

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

Harnesses and connectors - Electrical schematic sheet 08 (55.100)

4308-High voltage at battery

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

Cause:

1. Over voltage to the transmission electronic control module.
2. Faulty reading from the component.
3. Connectors not mated fully, pins not pushed into the connector fully, bent pin or broken wire at rear of the 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 (55.408)**.
   Prior to clearing fault codes write down all fault codes, number of occurrences, and engine hours at last occurrence.

   (1) Turn the key switch to RUN position.

   (2) Clear all fault codes.

   (3) To check for fault code: start and operate the machine.

   A. NOT OK – Fault code 4308 is recorded again. Go to Step **2**.

   B. OK – Fault is not recorded again. OK for return to service.
2. Check the equipment voltage.

   (1) Start and run the engine at high idle.

   (2) Check the output voltage of the alternator.

   A. NOT OK – Repair the electrical system as needed. Return to Step **1** to confirm elimination of fault.

   B. OK – Go to Step **3**.
3. Replace the transmission electronic 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 Engine Control Unit (ECU) monitors the SCR downstream temperature sensor circuit. Temperature signal is converted by the analog to digital converter which converts the raw voltage signal into a physical temperature value. If the ECU detects a voltage greater than **3.30 V** in the SCR downstream temperature sensor signal circuit, this fault will occur.

Cause:
The ECU has detected a voltage greater than **3.30 V** in the SCR downstream temperature sensor signal circuit.

Possible failure modes:

1. Faulty SCR downstream temperature sensor, wiring.
2. Faulty SCR downstream temperature sensor, internal failure.
3. Faulty ECU, 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 SCR downstream temperature sensor signal circuit for an open circuit condition.

   Disconnect the **Connector EDC17**.

   Disconnect the **Connector DTS**.

   The key must be in the OFF position.

   Use a multimeter to perform the following continuity check:

From	To	Value
Connector EDC17 pin 9	**Connector DTS pin 1**	There should be continuity

   A. If there is no continuity, there is an open circuit condition in the SCR downstream temperature sensor signal circuit, wire 38E_A. Locate and repair the broken conductor.

   B. If there is continuity, leave the connectors disconnected and continue to Step **3**.
3. Check the SCR downstream temperature sensor 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:

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.

Wiring harnesses - Electrical schematic sheet 04 (55.100)

B. If this fault is not present, the faulted condition is between the **Connector NOXS pin 1** or the **Connector NOXS pin 2** and the vehicle (VE) harness splice SPL_SCR2 or SPL_SCRG, wire 18T_F or O_BFE. Locate and repair the conductor failure.

4. As there is no method for field testing the SCR downstream NOx sensor, replace the SCR downstream NOx sensor.

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

   Then check to see that this fault is resolved.

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

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

5. 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.

Harnesses and connectors - Electrical schematic sheet 05 (55.100)

19071 (DTC 2DDA)-SCR catalyst efficiency lower than first NOx production threshold level

Control Module : ECU

NOTE: *before troubleshooting, download the 'Data Stored' information from the Engine Control Unit (ECU). See* ***Electronic module - Download (55.640)****.*

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 Selective Catalytic Reduction (SCR) system refer to **Selective Catalytic Reduction (SCR) exhaust treatment - Dynamic description (10.500)**. The instantaneous SCR catalyst efficiency is obtained from the Diesel Oxidation Catalyst (DOC) upstream NO_X sensor and the SCR downstream NO_X sensor. When the Engine Control Unit (ECU) determines that the SCR catalyst efficiency is lower than expected, this fault occurs.

Cause:
The ECU calculated that the SCR catalyst efficiency is lower than expected.

Possible failure modes:

1. Faulty SCR downstream NO_X sensor, measures too high values.
2. Faulty DOC upstream NO_X sensor, measures too high values.
3. Faulty NH3 sensor, measures too high values.
4. Faulty **DEF/ADBLUE®** quality sensor, measures too high values with too low **DEF/ADBLUE®** concentration at the same time.
5. Faulty **DEF/ADBLUE®** mixture concentration, too low.
6. Faulty **DEF/ADBLUE®** injection quantity, too low.
7. Faulty DOC and Mixing chamber assembly, catalyst contamination or damage or mixing chamber damage.
8. Faulty SCR assembly, catalyst contamination or damage.
9. Faulty ECU, software.

Solution:

1. Verify that the fault is present and active.

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

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

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

   Use the Electronic Service Tool (EST) to check for the presence of SCR Downstream NO_X sensor fault **3528 (DTC 319E) - Downstream NOx sensor values are not plausible** or DOC upstream NO_X sensor fault **19062-(DTC E98E) - Upstream NOx sensor values are not plausible**.

   A. If either **3528 (DTC 319E) - Downstream NOx sensor values are not plausible** or **19062-(DTC E98E) - Upstream NOx sensor values are not plausible** is present, resolve the relevant fault. Then determine if this fault is also resolved.

19095 (DTC 2F3A)-DEF/AdBlue tank temperature sensor plausibility failure

Control Module : ECU

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) checks for temperature increase in the **DEF/ADBLUE®** fluid during defrost. If the **DEF/ADBLUE®** fluid temperature fails to increase by:
1.46 °C (**2.63 °F**) at **-35.04 °C** (**-31.07 °F**) within **60 min** or
1.46 °C (**2.63 °F**) at **-25.04 °C** (**-13.07 °F**) within **60 min** or
1.46 °C (**2.63 °F**) at **-14.04 °C** (**6.73 °F**) within **120 min** or
0.96 °C (**1.73 °F**) at **-5.04 °C** (**22.93 °F**) within **30 min**, this fault will occur.

Cause:
The ECU has determined that the **DEF/ADBLUE®** fluid temperature did not increase the required minimum amount within the allotted time and the **DEF/ADBLUE®** tank heater valve is actuated.

Possible failure modes:

1. Extreme ambient conditions, time required is outside the established parameters.
2. Insufficient engine load, not great enough to generate required engine heat.
3. Faulty **DEF/ADBLUE®** tank heater valve, stuck in deactivated position.
4. Faulty coolant line between **DEF/ADBLUE®** tank and **DEF/ADBLUE®** tank heater valve, damaged or restricted.
5. Faulty **DEF/ADBLUE®** system, coolant lines improperly connected to the **DEF/ADBLUE®** tank heater valve.

19149-(DTC 737A)-DEF/AdBlue dosing valve actuator short circuit to ground failure

Control Module : ECU

Context:
The Engine Control Unit (ECU) monitors the low side driver circuit of the **DEF/ADBLUE®** dosing module. If the ECU detects a short to ground or open circuit condition in the low side driver circuit, this fault will occur.

Cause:
The ECU has detected a short to ground or open circuit condition in the driver circuit (low side) of the **DEF/ADBLUE®** dosing module.

Possible failure modes:

1. Faulty **DEF/ADBLUE®** dosing module, internal failure.
2. Faulty **DEF/ADBLUE®** dosing module wiring, short to ground or open circuit condition.
3. Faulty ECU, 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 **DEF/ADBLUE®** dosing module for an internal failure.

   Disconnect the **Connector DEFDM**.

   Use a multimeter to perform the following resistance check:

From	To	Value
Connector DEFDM pin 1	**Connector DEFDM pin 2**	There should be between **11 - 13 Ω**

   A. If the value is not within the specified range, the **DEF/ADBLUE®** dosing module has failed internally. Replace the **DEF/ADBLUE®** dosing module.

   B. If the value is within the specified range, leave the connector disconnected and continue to Step **3**.
3. Check the low side driver circuit of the **DEF/ADBLUE®** dosing module for an open circuit condition.

   Disconnect the **Connector EDC17**.

   The key must be in the OFF position.

   Use a multimeter to perform the following continuity check:

From	To	Value
Connector EDC17 pin 96	**Connector EDC17 pin 1**	There should be continuity

   A. If there is no continuity, there is an open circuit condition in the low side driver circuit of the **DEF/ADBLUE®** dosing module, wire 38_A. Locate and repair the broken conductor.

   B. If there is continuity, leave the connectors disconnected and continue to Step **4**.
4. Check the low side driver circuit of the **DEF/ADBLUE®** dosing module for a short to ground condition.

19262 (DTC 659A)-DEF/AdBlue tank heater actuator short circuit to battery failure

Control Module : ECU

Context:
The Engine Control Unit (ECU) monitors the circuit of the **DEF/ADBLUE®** tank heating valve. If the ECU detects a short to battery power condition in the circuit of the **DEF/ADBLUE®** tank heating valve, this fault will occur.

Cause:
The ECU has detected a short to battery power condition in the circuit of the **DEF/ADBLUE®** tank heating valve.

Possible failure modes:

1. Faulty **DEF/ADBLUE®** tank heating valve, internal failure.
2. Faulty **DEF/ADBLUE®** tank heating, valve wiring.
3. Faulty ECU, 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 **DEF/ADBLUE®** tank heating valve for an internal failure.

   Disconnect the **Connector THV**.

   Use a multimeter to perform the following resistance check:

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

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

   B. If the value is not within the specified range, the **DEF/ADBLUE®** tank heating valve has failed internally. Replace the **DEF/ADBLUE®** tank heating valve.
3. Check the **DEF/ADBLUE®** tank heating valve for a short to battery power condition.

   Disconnect the **Connector EDC17**.

   The key must be in the OFF position.

   Use a multimeter to perform the following continuity check:

From	To	Value
Connector EDC17 pin 72	**Connector EDC17 pin 50**	There should be no continuity
Connector EDC17 pin 72	All other pins	There should be no continuity

   A. If there is continuity, there is a short circuit condition in the circuit of the **DEF/ADBLUE®** tank heating valve, wire 38C. Locate and repair the shorted conductor.

   B. If there is no continuity, leave the connector disconnected and continue to Step **4**.
4. Check the **DEF/ADBLUE®** tank heating valve for a short to key battery power condition.

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

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

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

   A. If you find damage or the display indicates other than normal display readings, 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.