MASSEY FERGUSON

MF WR9800

Series Windrower Tractor

Models: WR9840 / WR9860 / WR9870

SERVICE MANUAL

FROM MASSEY FERGUSON

emblem is clean, visible, and correctly mounted on the rear of the machine.

Always travel with the loader as low as possible. Do not drive with loader up.

Lock brake pedals together (if equipped with dual brake pedals) so both wheel brakes will be applied at the same time.

Raise implements to transport position and lock in place. Place all implements into narrowest transport configuration.

Disengage the power take-off and differential lock.

With towed implements, use a proper hitch pin with a clip retainer and safety transport chain.

Be aware of other traffic on the road. Keep well over to your own side of the road and pull over, whenever possible, to let faster traffic pass.

Be aware of the overall width, length, height, and weight of the machine. Be careful when transporting the machine on narrow roads and across narrow bridges.

Watch for overhead wires and other obstructions. Avoid contact with electrical power lines. Contact with electrical power lines can cause electrical shock, resulting in very serious injury or death.

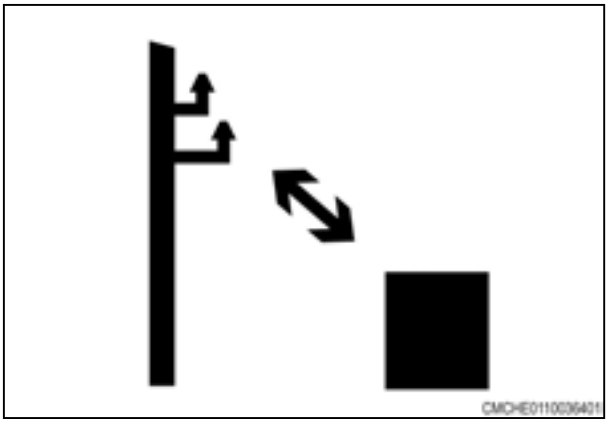


Fig. 15

1.2.9 Maintenance

1.2.9.1 General maintenance information

Before doing any unplugging, lubricating, servicing, cleaning, or adjusting:

- Park the machine on a solid level surface.
- Make sure all controls are in the neutral position and apply the park brake.
- Make sure all implements and attachments have been lowered to the ground.
- Stop the engine and take the key with you.
- Look and Listen! Make sure all moving parts have stopped.
- Put blocks in front of and behind the wheels of the machine before working on or under the machine.

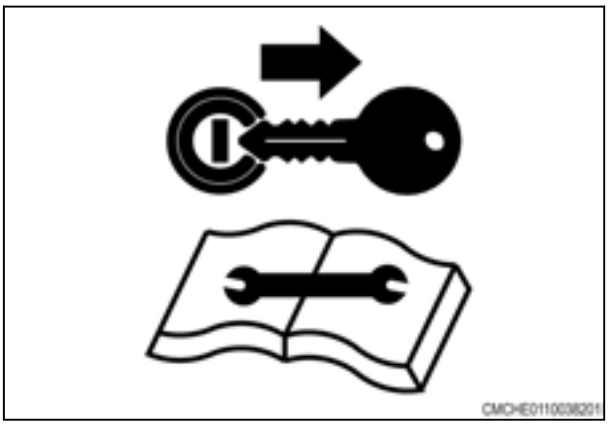


Fig. 16

1.4.11 Accessory specification

	WR9840	WR9860	WR9870
Marking and turn signals	2 LED tail lamps, and 2 round amber lamps		
Road and work lamps	9 halogen lamps on cab and 2 lamps on back		
Exit lamps	Left-hand side of machine		
Rear view mirrors	Right, left, and in cab		

1.4.12 Lubrication specifications

Lubricants

	WR9840	WR9860	WR9870
Grease fittings lubricant	No. 2 Multi Purpose Lithium Grease		
Wheel bearings lubricant	No. 2 Multi Purpose Lithium Grease		

Engine oil

	WR9840	WR9860	WR9870
Quantity with filter change	11.5 L (12.2 quarts)		25.5 L (27 quarts)
Type of fluid	See the engine Instruction Manual		

Hydraulic oil

	WR9840	WR9860	WR9870
Total system capacity	123 L (32.5 U.S. gallons)		
Tank capacity	99.6 L (26.3 U.S. gallons)		
Type of fluid	Premium grade AW MV ISO 46 hydraulic oil[1]		

[1] Permatran® 821 XL or equivalent can be used, but can cause hard engine starting in cold conditions.

Planetary gearbox

	WR9840	WR9860	WR9870
Quantity, each	1.6 L (3.3 pints)		
Lubricant	SAE 90 or 80w-90 gear oil, API GL-5		

Pump drive gearbox

	WR9840	WR9860	WR9870
Quantity	3 L (3.2 quarts)		
Lubricant	SAE 75W-90 synthetic gear oil		

3. Remove the nuts (1).
4. Remove the aspirator fan (2) and the sheave (3).
5. Remove the spacer (4).
6. Remove the retaining ring (5).
7. Remove the shaft (6) and the bearings (7) from the aspirator fan support (8).
8. Remove the wave springs (9) from the aspirator fan support.
9. Remove the bearings from the shaft.
10. Replace the components, as necessary.

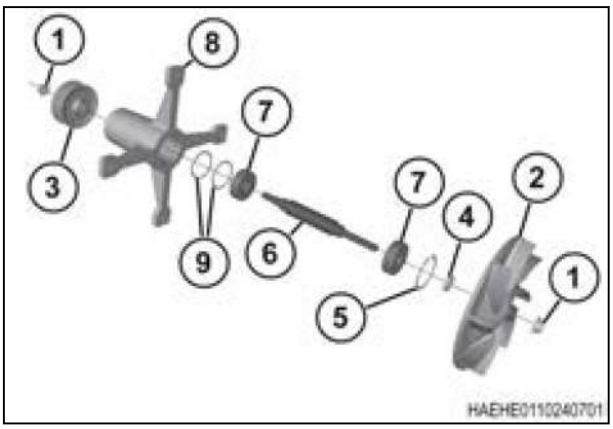


Fig. 9

2.3.3 Assembling the aspirator pump

Procedure

1. Install the bearings (1 and 2) onto the shaft (3).
2. Install the wave springs (4) into the aspirator fan support (5). Turn the wave springs so the split is on opposite ends of each other.
3. Apply medium strength retaining compound to the outer race of the outer bearing (2) only.
4. Install the shaft and bearings into the aspirator fan support and compress the wave springs.
5. Install the retaining ring (6).
6. Install the spacer (7) onto the shaft.
7. Apply medium strength retaining compound to the aspirator fan (8) and sheave (9).
8. Install the aspirator fan and sheave.

   NOTE:
   The aspirator fan has a left-hand rotation (as seen from the front of the engine) and has a LH mark.
9. Apply two to three drops of medium strength thread locking compound to the ends of the shaft.
10. Install the nuts (10) and tighten to 52 Nm (39 lbf ft).

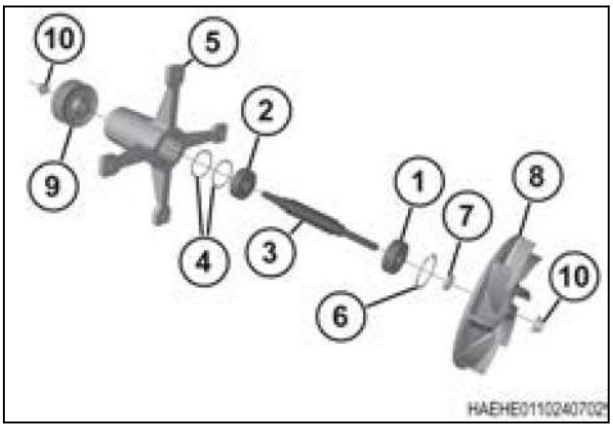


Fig. 10

2.6 Pump drive gearbox

2.6.1 Oil level

Check the pump drive gearbox oil level before starting the engine each day. Make sure the oil level is always between the add and full marks on the dipstick (1).

After the engine is started, the oil level will drop as oil is moved. For this reason, always check oil level and add oil before starting the engine.

Do not overfill or add oil above the full mark on the dipstick.

Do not operate the engine with the oil level below the add mark on the dipstick.

Insert the dipstick securely.

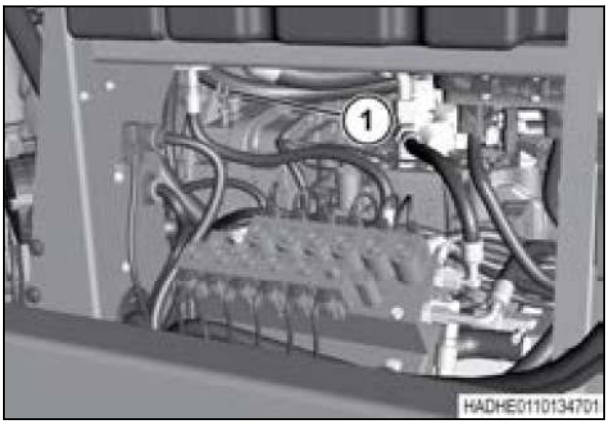


Fig. 58

2.6.2 Changing the oil

Change the oil after the first 50 hours of operation and every 500 hours of operation.

Procedure

1. Operate the engine until the pump drive gearbox is warm.
2. Stop the engine and take the key with you.
3. Remove the drain plug (1) and drain the oil into a container.
4. When the oil is drained, install the drain plug and tighten.

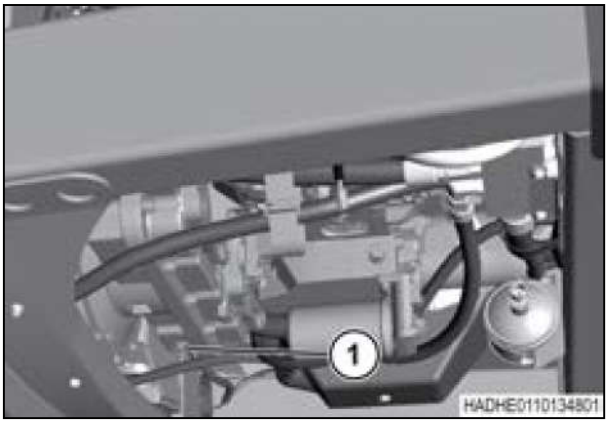


Fig. 59

5. Clean the area around the dipstick (1) and filler cap (2).
6. Remove the filler cap and fill the pump drive gearbox through the hole to the correct level with oil. See the specifications for the correct oil.
7. Install the filler cap.

   NOTE: *The filler cap also functions as a vent*
8. Start the engine and run at low idle.
9. Stop the engine and take the key with you.
10. Check for leaks and clean any oil from the pump drive gearbox.

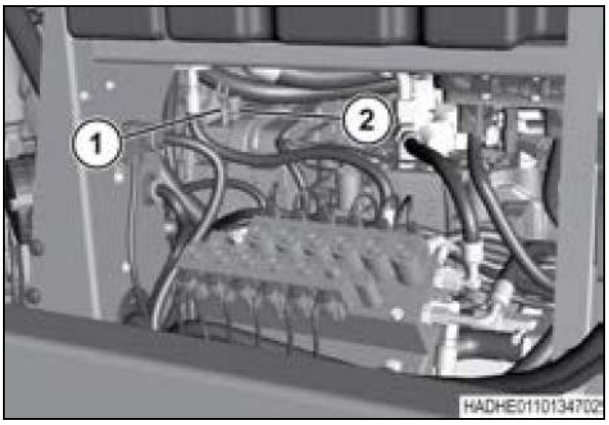


Fig. 60

8. Install the top coolant hose (1).

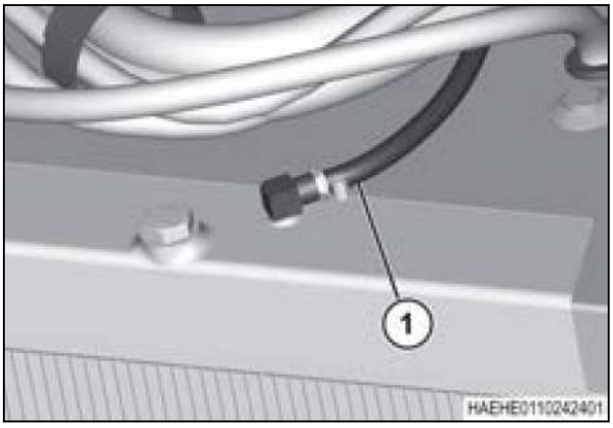


Fig. 109

9. Close the drain (1) on the bottom of the radiator.

10. Install the air conditioning condenser and the hydraulic oil cooler onto the radiator.

See the information for installing the hydraulic oil cooler and the information for installing the condenser.

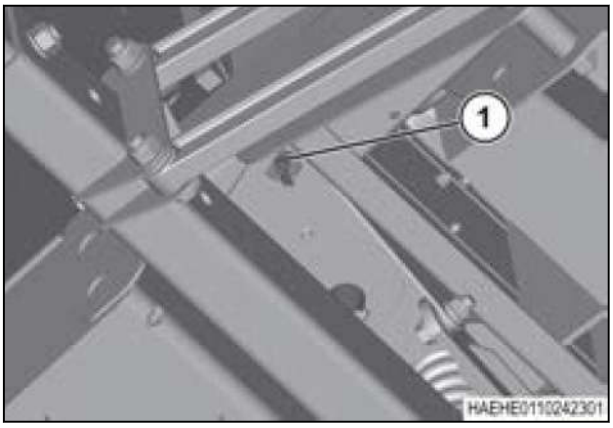


Fig. 110

11. Add coolant and install the radiator cap (1).

See specifications for the correct type and quantity of coolant.

12. Start and run the engine until the engine is at operating temperature.

13. Check for coolant leaks.

14. Stop the engine.

15. Check the coolant level in the coolant tank. Add coolant as necessary.

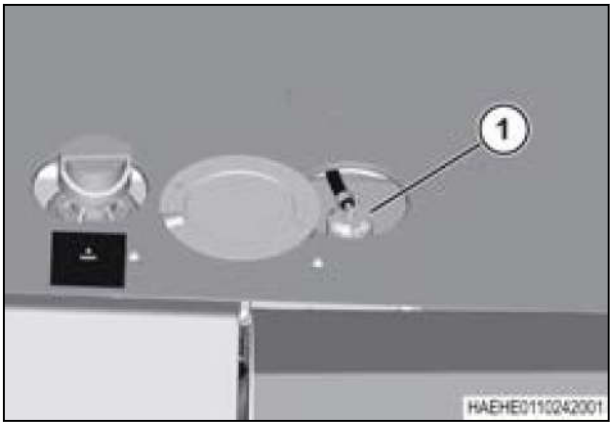


Fig. 111

16. Install the end cap (1).

17. Close the engine compartment doors (2).

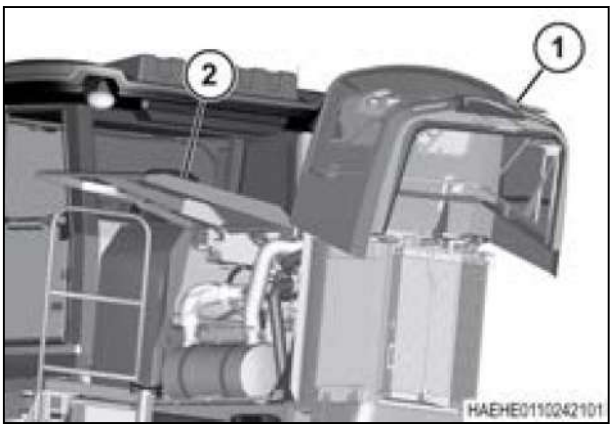


Fig. 112

2.9 Selective catalytic reduction (SCR) system, if equipped

2.9.1 Diesel exhaust fluid (DEF)

Diesel Exhaust Fluid (DEF) is a solution of urea and water used by the Selective Catalytic Reduction (SCR) system to reduce NOx emissions.

DEF is classified as non-hazardous by the Environmental Protection Agency.

DEF is very corrosive and must be handled with care. DEF must not contact any parts or containers made of aluminum.

If DEF is spilled on any surface clean the surface immediately. Clean the surface by wiping any DEF from the surface and wash the area with water. If crystals form on the surface, use water to wash the crystals from the area.

WARNING:
Use of cleaning agents other than water may produce hazardous gases.

Replace any electrical connector that has come in contact with DEF. The DEF will quickly corrode any electrical connections.

IMPORTANT: *Do not put DEF into the fuel tank. The DEF can damage the fuel system and the engine components.*

2.9.2 DEF storage and shelf life

The following table provides information for the DEF shelf life as a function of temperature:

Constant ambient temperature	Minimum shelf life - months
less than or equal to 10°C (50° F)	36
less than or equal to 25°C (77° F) (Note 1)	18
less than or equal to 30°C (86° F)	12
less than or equal to 35°C (95° F)	6
more than 35°C (95° F)	(Note 2)
NOTE: *Main factors taken into account to define shelf life in this table are ambient storage temperature and initial alkalinity of DEF. The difference in evaporation between vented and non-vented storage containers is an additional factor.*	
Note 1: To prevent decomposition of DEF, prolonged transportation or storage above 25°C (77° F) must be avoided.	
Note 2: Important loss of the shelf life: check every batch before use.	

DEF must only be stored in original or DEF approved containers.

The crystallization point or freezing point of DEF is -11°C (12.2° F).

2.9.3 Changing the diesel exhaust fluid filter

Change the diesel exhaust fluid (DEF) filter every 1200 hours or once a year.

Change the DEF filter at the start of the season after storage.

The DEF filter is located in the supply module.

- Do not let oil and other liquids to the environment when servicing the engine. Take them to a proper disposal point.
- Use only genuine AGCO Parts spare parts.

  NOTE: *Engine gaskets, seals and washers are disposable. Always change gaskets, seals and washers when opening joints.*
- All the engine gaskets are made of non-asbestos material.
- Be careful when washing the engine with high-pressure washing machine equipment. Do not use high pressure to wash e.g. the electric and fuel equipment or the radiator because they can easily be damaged. To get humidity removed, it is recommended to run the engine after washing.

2.12.11.1 Turbocharging

The turbocharger is a turbo-compressor driven by exhaust gas. The compact design of the turbocharger is fast to react even at low engine speeds. The turbocharger is lubricated and cooled by the lubrication system of the engine. Boost pressure is controlled by a wastegate. Traditional wastegate is replaced with a wastegate operated by actuator controlled by the electronic control unit (ECU). ECU-controlled wastegate is used to control acceleration smoke and exhaust temperatures.

2.12.11.2 Cooling of inlet air

The compressed air from turbocharger is cooled on the air-to-air basis. The air coming from the turbocharger has a temperature of abt. 150°C which is cooled by the cooling air of the engine. The cooling of the compressed air stabilises the combustion, irrespective of the temperature, and minimises the thermal and mechanical load of the engine thus lowering nitric oxides (NOx) and particles (PT).

2.12.11.3 Throttle valve

The throttle valve is used to manage temperatures in the exhaust gas aftertreatment system. The throttle valve controls Air/Fuel -ratio to speed up engine warming, to increase exhaust temperatures at low loads and to decrease exhaust temperatures at high loads. The throttle valve is controlled by the electronic control unit (ECU) with the PWM current (pulse width modulation). The throttle valve has an integrated actuator.

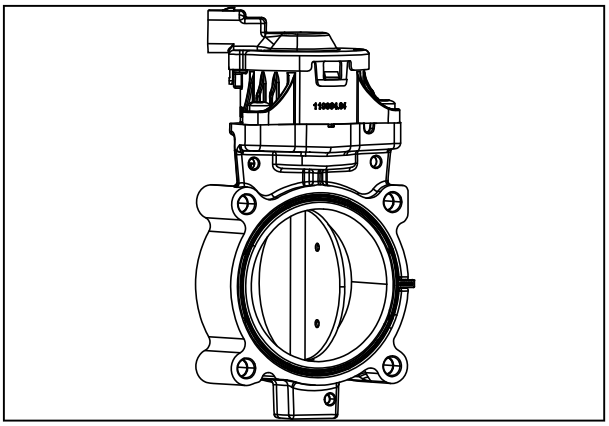


Fig. 200

2.12.12 Fuel system

The engine is equipped with common rail system which is controlled by electronic control unit (ECU).

Timing marks	
• against camshaft gear mark	• 1 dot on tooth
• against high pressure pump mark	• 2 dots on notch
On high pressure pump gear	1 dot on notch
On camshaft gear	1 dot on notch

2.13.11 Connecting rod

Connecting rod	
Big-end bearing shell thickness:	
• standard	1.835 - 1.842 mm
• 1st undersize 0.25 mm	1.960 - 1.967 mm
• 2nd undersize 0.50 mm	2.085 - 2.092 mm
• 3rd undersize 1.00 mm	2.335 - 2.342 mm
• 4th undersize 1.50 mm	2.585 - 2.592 mm
Big-end bearing clearance	0.046 - 0.098 mm
End float (side clearance) at big-end on crankshaft	0.200 - 0.410 mm
Piston pin bushing location perpendicular to longitudinal axis of connecting rod to be within	0.15:100
Piston pin bushing location and big-end bearing location to be parallel to within	0.05:100
Maximum permissible weight difference between connecting rods in the same engine	20 g
Weight marking (letter) at lower end.	

Inside diameter of piston pin bush (with bush pressed into connecting rod)	40.025 - 40.040 mm
Outside diameter of piston pin bush (std)	44.080 - 44.120 mm
Outside diameter of piston pin bush (oversize V835328326)	44.580 - 44.620 mm
Interference fit: connecting rod small end bushing-connecting rod	0.057 - 0.120 mm
Connecting rod small end bore	44.000 - 44.025 mm
Connecting rod small end bore (oversize bush)	44.500 - 44.525 mm
Connecting rod big-end bore	71.730 - 71.749 mm

NOTE: *Use of fuel not meeting these requirements may result as reduced performance and shorter engine life. It also invalidates the engine warranty.*

2.20 Valve mechanism

2.20.1 Reconditioning valve mechanism

Procedure

1. Examine the valve tappets, specially the contact surface against the camshaft.
2. Replace a worn or damaged valve tappet.
3. Roll the push rods on a surface table to examine the straightness of the push rods.
4. Examine the spherical surfaces at the ends of the push rods.
5. Measure the length of the push rods.

Total length of push rod	Order number of push rod
245 - 246.3 mm	V837070119

6. Disassemble and clean the rocker shaft assembly.
   a) Examine the shaft for wear.
   b) Examine that the oil ways are clean.
7. Measure the diameter of the rocker arm bore, 25.000 - 25.021 mm.
8. Replace a worn or damaged rocker arm.
9. Grind the valve contact surface of the rocker arm to the correct shape, if it is necessary.

   Do not grind more than necessary, as the hardened layer is thin.

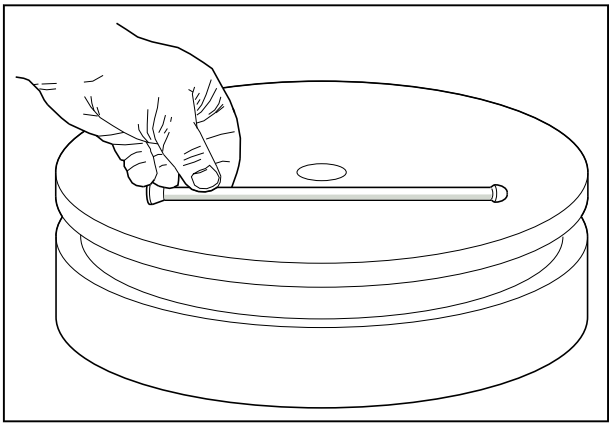


Fig. 253

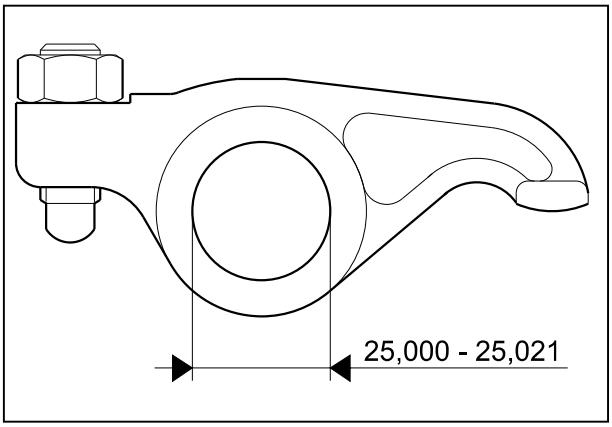


Fig. 254

10. Put a plug to the other end of the rocker arm shaft.
11. Lubricate the rocker arm shaft.

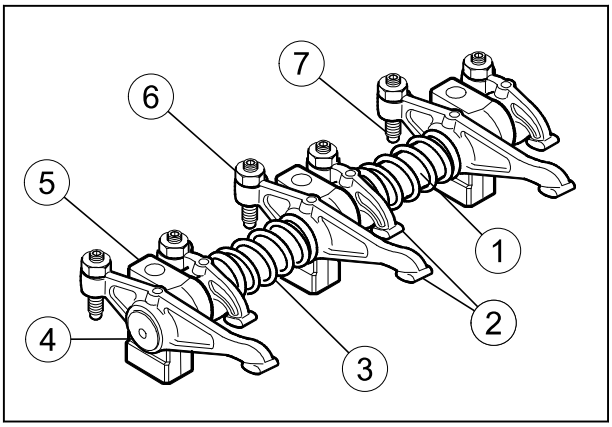


Fig. 255

(1) Rocker arm shaft
(2) Rocker arm
(3) Spring
(4) Plug
(5) Bearing bracket
(6) Nut

2.25 Timing gear assembly

2.25.1 Removing timing gear casing

Since the bottom face of the timing gear casing forms a part of the mating face of the oil sump gasket, the casing cannot be removed without first removing the oil sump (or the engine).

Procedure

1. Drain the engine oil and remove the oil sump.
2. Remove the radiator, fan, alternator, belt tensioner and belt.

   If the engine is equipped with an air compressor or air conditioner, it must be removed.
3. Flexonic driven coolant pump must also be removed.
4. Remove the crankshaft belt pulley and vibration damper.
5. Loosen the crankshaft nut about two turns with the spanner.

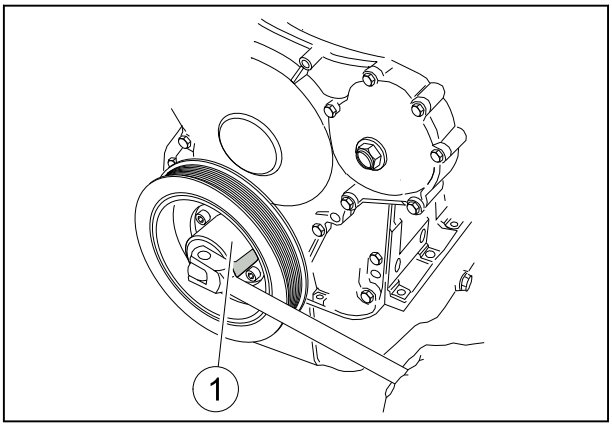


Fig. 282

(1) Spanner for crankshaft nut V902455800

6. **WARNING:**

   Risk of serious injury. The crankshaft hub can throw dangerously when the nut is loosened. Do not remove the nut completely at first.

   Remove the hub from the crankshaft with puller. Take off the puller, open the nut and remove the hub.

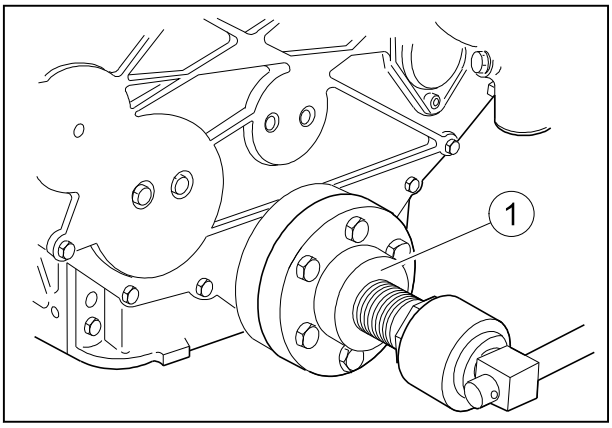


Fig. 283

(1) 33-49 engines: Crankshaft hub puller V920182390 66-98 engines: Crankshaft hub puller V910453300

Any loose objects or impurities can increase the back pressure for the exhaust gases from the turbine wheel.

2.28.3 Removing the actuator of the turbocharger

Procedure

1. Remove the cooling pipes and the cooling pipe supports of the actuator.
2. Remove the actuator from the turbocharger without removing the mounting bracket of the actuator from the turbocharger.

   NOTE: *Do not remove the link rod of the actuator.*

2.28.4 Fitting the actuator of the turbocharger

An unused actuator supplied as a spare part can be fitted in any engine type (49-168 engine). When an engine is started for the first time after changing the actuator, the actuator is calibrated for that engine type. After calibration the actuator can only be used in the same engine type.

Procedure

1. Fit the actuator to the turbocharger.
2. Fit the cooling pipes and the cooling pipe supports.
3. Finally, remove the air from the cooling system by using the highest bleeding plug of the engine.

2.28.5 Removing the turbocharger

Procedure

1. Remove the inlet and exhaust pipes and pressure and return oil pipes from the turbocharger.
2. Remove the cooling pipes of the actuator and the actuator wire.
3. Remove the fixing nuts and remove the turbocharger.

2.28.6 Checking the turbocharger

If a fault is suspected in the turbocharger, it can be located in the following way:

Procedure

1. Visually inspect the turbine and compressor wheels. The vanes must not show any signs of damage, deformation or wear caused by foreign objects.
2. Investigate any oil leaks through the sealing rings on the shaft in the turbine and compressor housing.

   NOTE: *At low idling speed there is always a certain amount of oil leakage on the compressor side. However, this should not cause too much concern unless the oil consumption is too great.*

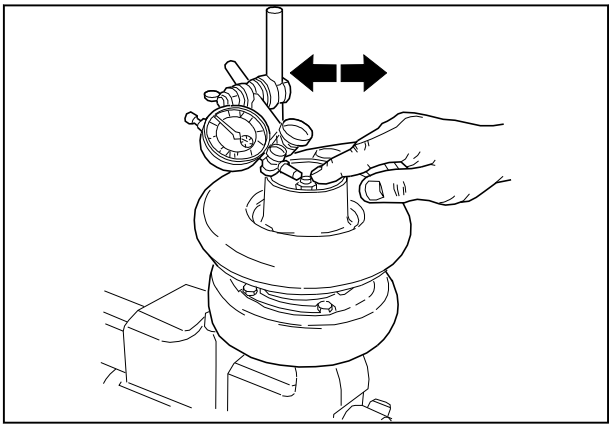


Fig. 310

(17) Fuse, inlet air heater
(18) Pressure control valve (PCV)
(19) Speed sensor (crankshaft)
(20) Fuel temperature sensor
(21) Fuel pressure sensor

The basic function of the electric control of the engine is continuous adjustment and measuring of the load, quantity of fuel and rotating speed. Other additional functions are for example cold start automatics, engine protecting automatics and SCR system control. The central unit of the electric control receives continuous signals from sensors that measure different functions in the engine like rotating speed, oil pressure, boost pressure, coolant and fuel temperature. The control unit receives the relevant information about the engine load need from the transmission or cabin through the CAN bus. The electronic control unit (ECU) makes it also possible to have a wide diagnostics through error codes.

2.31.1 Electronic diagnostic tool

NOTE:
See also EDT user manual and instructions of the appliance.

AGCO's Electronic Diagnostic Tool (EDT) program offers a common platform diagnostic tool used to service all AGCO brands. EDT is an in-field diagnostic program to help the dealer technician accurately diagnose and solve a technical problem.

The EDT can be used by dealership technicians to interface with specific machines that have a Controller Area Network CAN BUS as part of the electronic system architecture

EDT is a plug and play diagnostic tool kit that contains a diagnostic terminal, vehicle connection cables, CAN BUS protocol adapter, carry case, and other items.

A version of the EDT kit less the diagnostic terminal and associated parts is available. This kit will contain the EDT software application, cables, and 2x4 CAN USB Protocol Adapter.

EDT includes troubleshoot documentation with ECU fault codes and their explanations.

Fig. 329

2.31.1.1 EDT diagnostic terminal

NOTE:
Make sure hands are clean of grease, water or excessive grime before touching or turning on the unit.

The EDT diagnostic terminal is a tablet computer. The terminal has a network connection port and will function like any other computer.

The EDT diagnostic terminal is semi-ruggedized which means the terminal will withstand moderate shock and vibration during use. The screen is fluid resistant (including oil) with a replaceable protective cover.

Fig. 330

NOTE:
It is advised to treat the EDT diagnostic terminal as a service tool and not an additional computer to include in the dealership LAN network.

3.3 Steering sensor

3.3.1 Removing the steering sensor

Procedure

1. Disconnect the electrical harness (1).
2. Remove the four capscrews (2) that fasten the steering sensor (3) to the bracket (4).
3. Remove the steering sensor from the steering column shaft.

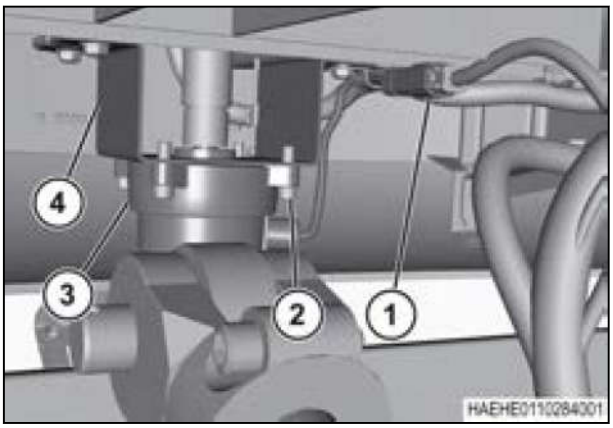


Fig. 5

4. Loosen the set screw (1).
5. Remove the coupler (2) from the steering sensor (3).
6. Replace the steering sensor as required.

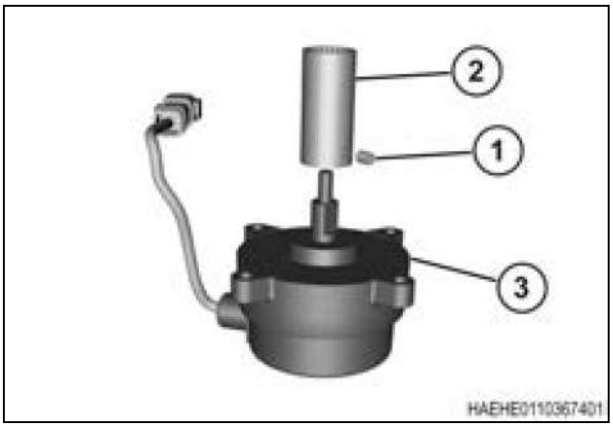


Fig. 6

3.3.2 Installing the steering sensor

Procedure

1. Install the coupler (1) onto the steering sensor (2).
2. Tighten the set screw (3) to 8.8 Nm (78 lbf inch).

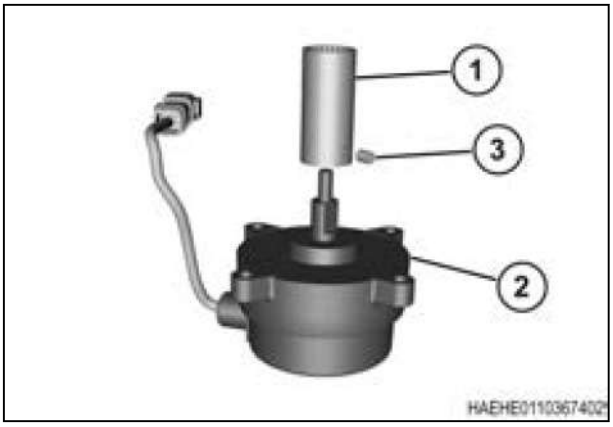


Fig. 7

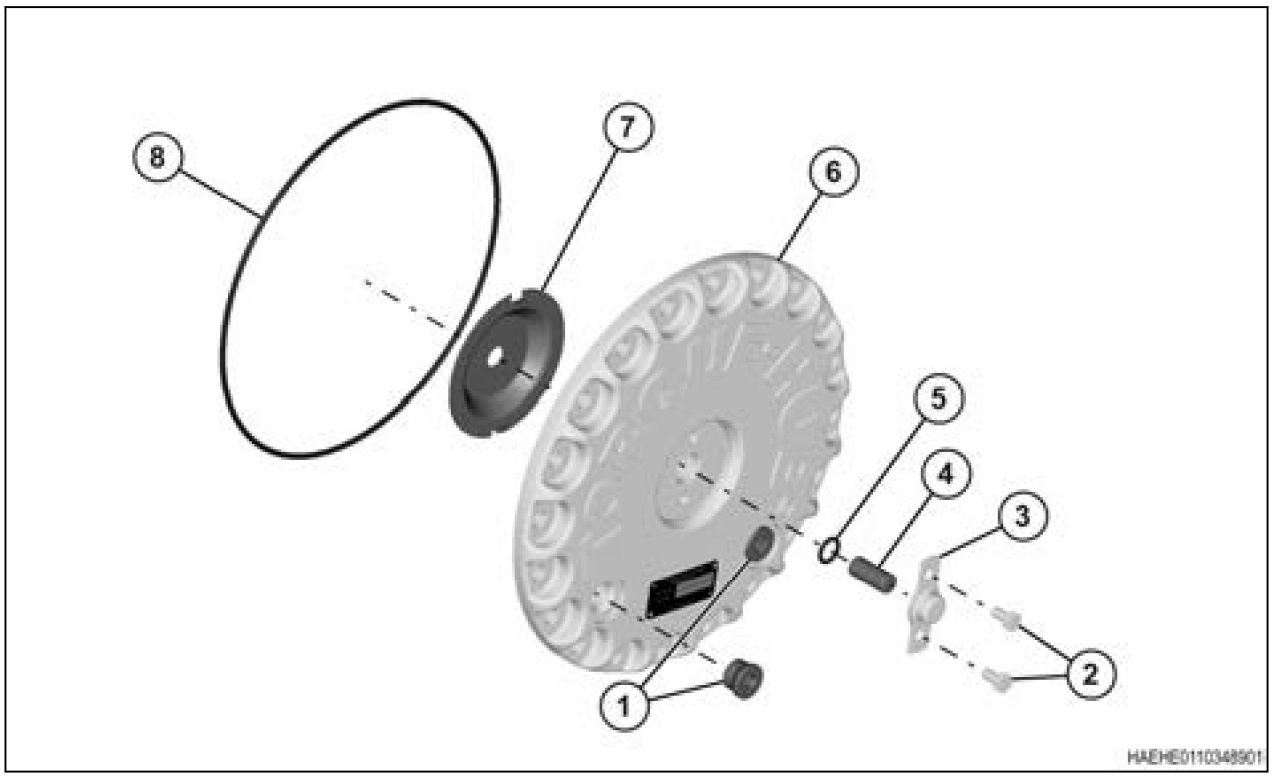


Fig. 24

5. Assemble the cover:
- a) Install the plugs (1) into the cover (6).
- b) Lubricate and install the new O-ring (8).
- c) Lubricate and install the thrust washer (7). Make sure the tangs in the thrust washer line up with the castings in the cover.
- d) Lubricate and install the new O-ring (5) into the cover.
- e) Put the disengage cap (3) into position.
- f) Install the hardware (2).

  Tighten the hardware to 0.46 Nm (65 lbf inches
- g) Install the disengage rod (4) in the rear of the cover.

6. Install the cover (2).

7. Apply thread locking compound to the cover hardware. (1).

8. Install the cover hardware

Tighten the hardware to 54 Nm (40 lbf ft)

9. Check the rolling torque.

See the information for checking the rolling torque.

10. Check for leaks.

See the information for checking for leaks.

11. Check the brakes.

See the information for checking the brakes.

12. Install the final drives.

See the information for installing the final drives.

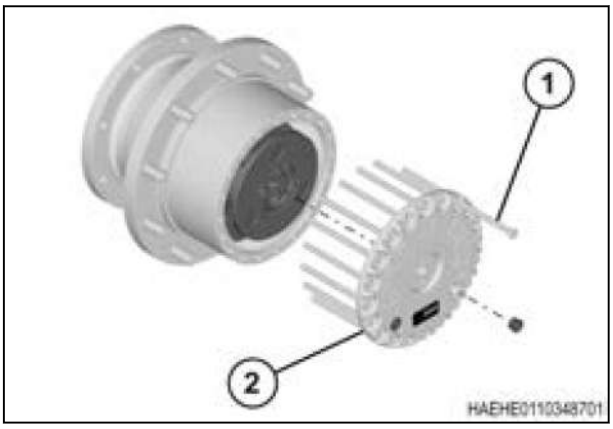


Fig. 25

5.6 Header lift and flotation circuit

The header lift switch is located in the ground speed lever. The header position switch has three positions; raise, hold, and lower.

To raise the header, pressure is applied to the rod end of the header lift cylinder (1). The cylinder retracts to raise the header.

In the hold position, flow to and from the header lift cylinders is blocked so the header is held in position.

The engine must be running and operating the charge pump to raise or lower the header.

To lower the header, the oil in the rod end of the cylinder is released by the header down valve (2) to the tank. The weight of the header extends the header lift cylinder.

The header flotation circuit is used to let the header follow the ground surface. The header flotation circuit includes two header flotation cylinders (3), accumulators (4), and the header lift and flotation valves. The flotation on each side of the header is controlled separately. The flotation pressure for the right-hand and left-hand sides of the header are shown on the main work screen of the terminal.

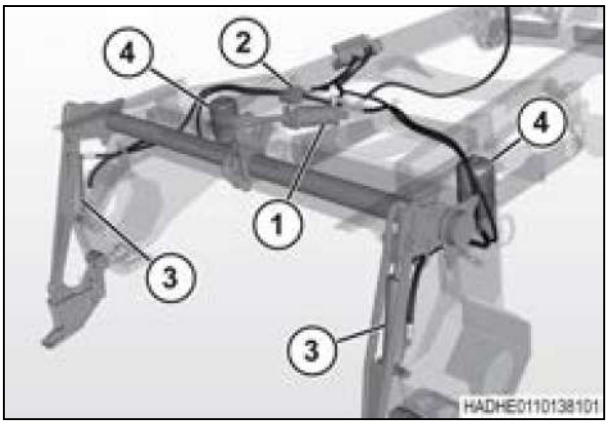


Fig. 15

The automatic flotation setting on the console will enable or disable the flotation function if desired.

The accumulators are charged with dry nitrogen. During field operation, the header is supported by the flotation cylinders.

DANGER:
Charging or replacing the accumulator must be performed by an authorized dealer only.

DANGER:
Use only dry nitrogen when charging the accumulator. Do not use air or oxygen that will cause an explosion.

DANGER:
Do not drop the accumulator. A charged accumulator contains nitrogen under pressure. If the charging valve breaks away from the accumulator, the escaping nitrogen will propel the accumulator at a high rate of speed.

In the float position, the header will rise and lower to follow the ground surface. As the surface of the ground becomes higher, the header is pushed up. The rising header extends the cylinders, pulling fluid into the cylinders from the accumulators. The nitrogen in the accumulators will expand a little. As the surface of the ground becomes lower, the header lowers. As the header lowers, the weight of the header retracts the cylinders. The cylinders force fluid back into the accumulators and the nitrogen is compressed into a little. The amount of force applied to the header flotation system remains almost constant through the complete float range.

The accumulators and the weight of the header can apply a large amount of pressure to the header flotation circuit. Relieve all pressure in the header flotation circuit before disconnecting any of the connections. Make sure the header is on the ground. Use the flotation dump function on the console to release the pressure. Make sure the flotation pressure shown on the console indicates 0 kPa (0 psi).

Before applying pressure to the circuit, make sure all connections are tight and the hydraulic hoses and hydraulic lines have not been damaged.

5. Tilt the header all the way back.
6. Select  to deselect the header angle calibration box.

   Result

   The calibration is complete.
7. Select  to return to the main work screen.

Fig. 45

5.12.3 Calibrating the header height sensor

Procedure

1. Start the engine and apply the park brake.
2. Raise the header.
3. Select the icons in the following order:

   Result

   The header height calibration box (1) will be selected.

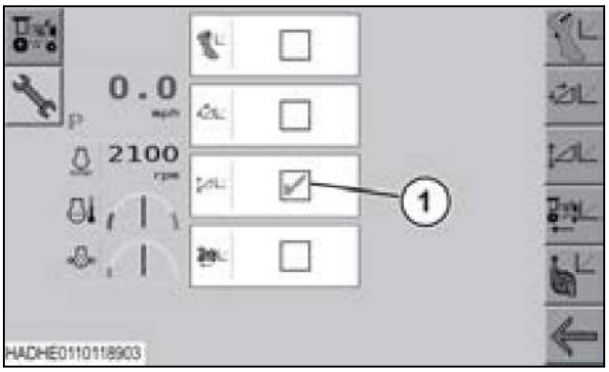


Fig. 46

4. Lower the header all the way down.

   This sets the lowest point for the header height indicator. Lower the header to ground level or below ground level, as desired

   NOTE: *For on-screen help, select*  *to move to the next step.*

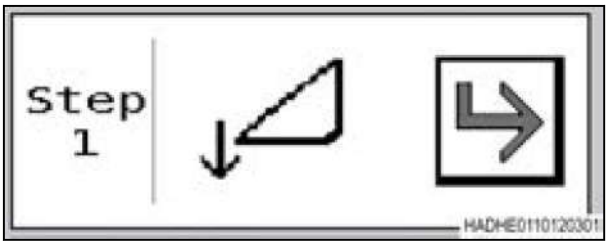


Fig. 47

5. Raise the header all the up.
6. Select  to deselect the header angle calibration box.

   Result

   The calibration is complete.
7. Select  to return to the main work screen.
8. Check the header height target on machine settings screen.

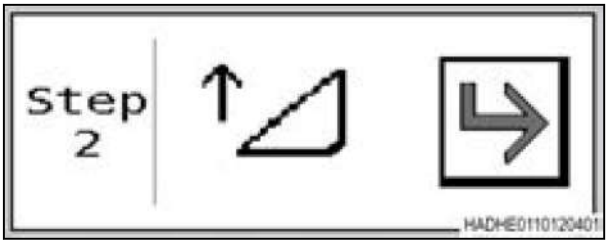


Fig. 48

5.12.4 Calibrating ground speed

The ground speed displayed on the console can be adjusted to be the same as the ground speed on another terminal.

The standard wheel motor case drain in neutral is more than the specification	
Cause	**Solution**
The ground drive is not adjusted to neutral.	Adjust the ground drive neutral.

The wheel motor case drain is more than the specification	
Cause	**Solution**
The case drain is excessive.	Replace the wheel motor.

5.13.8 Testing the park brake release system

Before starting the procedure

Make sure to have the following items:

- Pressure gauge with a rating of 70 bar (1000 psi).
- Adapter fittings for 9/16-18 JIC female to pressure gauge.

WARNING:

Hydraulic fluid under pressure can penetrate the skin or eyes. Serious personal injury, blindness, or death can occur. Relieve the pressure from the system or component before disconnecting components. Wear personal protective gear while working on the machine or equipment. Use a piece of cardboard to check for leaks. Never use your hand.

The park brake system uses spring pressure to engage the park brake and hydraulic pressure to release the park brake.

Procedure

1. Park the machine on a solid, level surface.
2. Lower the header all the way.
3. Release all the hydraulic pressure.
4. Stop the engine, apply the park brake, and take the key with you.
5. Put blocks in front of and behind both front drive wheels.
6. Completely clean all components to prevent contamination from entering the system.
7. Contain all fluids during the performance of inspection, maintenance, testing, adjusting, and repair of the machine. Prepare to contain fluids with correct containers before opening any compartment or disassembling any component containing fluids. Discard all fluids according to local regulations and laws.
8. Remove the hose (1) for the park brake from the final drive.
9. Install a 70 bar (1000 psi) pressure gauge into the hose.

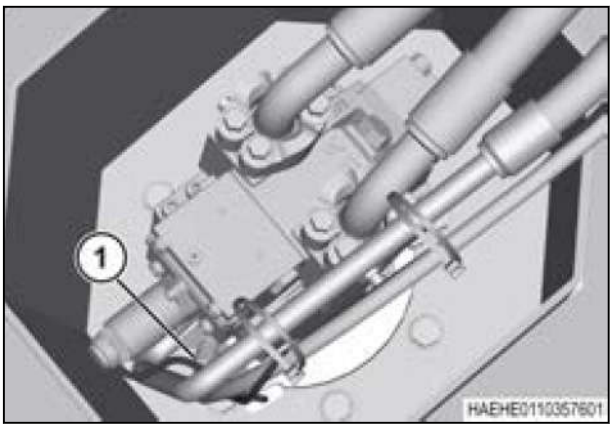


Fig. 79

10. Start the engine and release the park brake.

The system will not operate in either direction	
Cause(s)	**Solution(s)**
Charge pressure is not enough to charge the system	Measure the charge pressure with the pump in neutral. If the charge pressure is low, go to next step.
A pump charge relief valve that leaks, is contaminated, or is set too low will loose pressure in the system	Adjust or replace the pump charge relief valve as necessary.
A plugged charge filter will under supply the system loop	Inspect the charge filter and replace if necessary.
A bad charge pump will not give enough charge flow	Repair or replace the charge pump.
Low system pressure does not give enough power to move a load	Measure the system pressure. Continue to next step.
Bad high pressure relief and charge check valve cause system pressure to be low	Repair or replace a high pressure relief and charge check valve
Input to control module is not operating correctly	Repair or replace the control module.

System noise or vibration	
Cause(s)	**Solution(s)**
Low oil level in the hydraulic tank causes cavitation	Fill the hydraulic tank to the correct level.
Air in the system is indicated by excessive noise in pump, bubbles in the oil, and hot oil	Find the location where air is entering into the system and repair. Check that inlet line is not blocked.
Cold oil can be too viscous for correct pump function and cause cavitation	Warm the oil to normal operating temperature with the engine at idle speed.
High inlet vacuum causes noise or cavitation	Check that the inlet line is not plugged. Check the filter.
Loose hardware on the tandem pump	Make sure the tandem pump hardware is tight to the pump drive gearbox.
Noise that is not normal can indicate sticking or contaminated high pressure relief and charge check valves	Clean or replace the high pressure relief and charge check valve. This noise can be a normal condition.

Slow system performance	
Cause(s)	**Solution(s)**
Low oil level in the hydraulic tank	Fill the hydraulic tank to the correct level.
Wrong pressure settings	Replace the bad high pressure relief and charge check valves.
Low engine speed	Increase engine speed.
Wrong charge and control pressures	Measure and adjust the charge pressure and the control pressures.

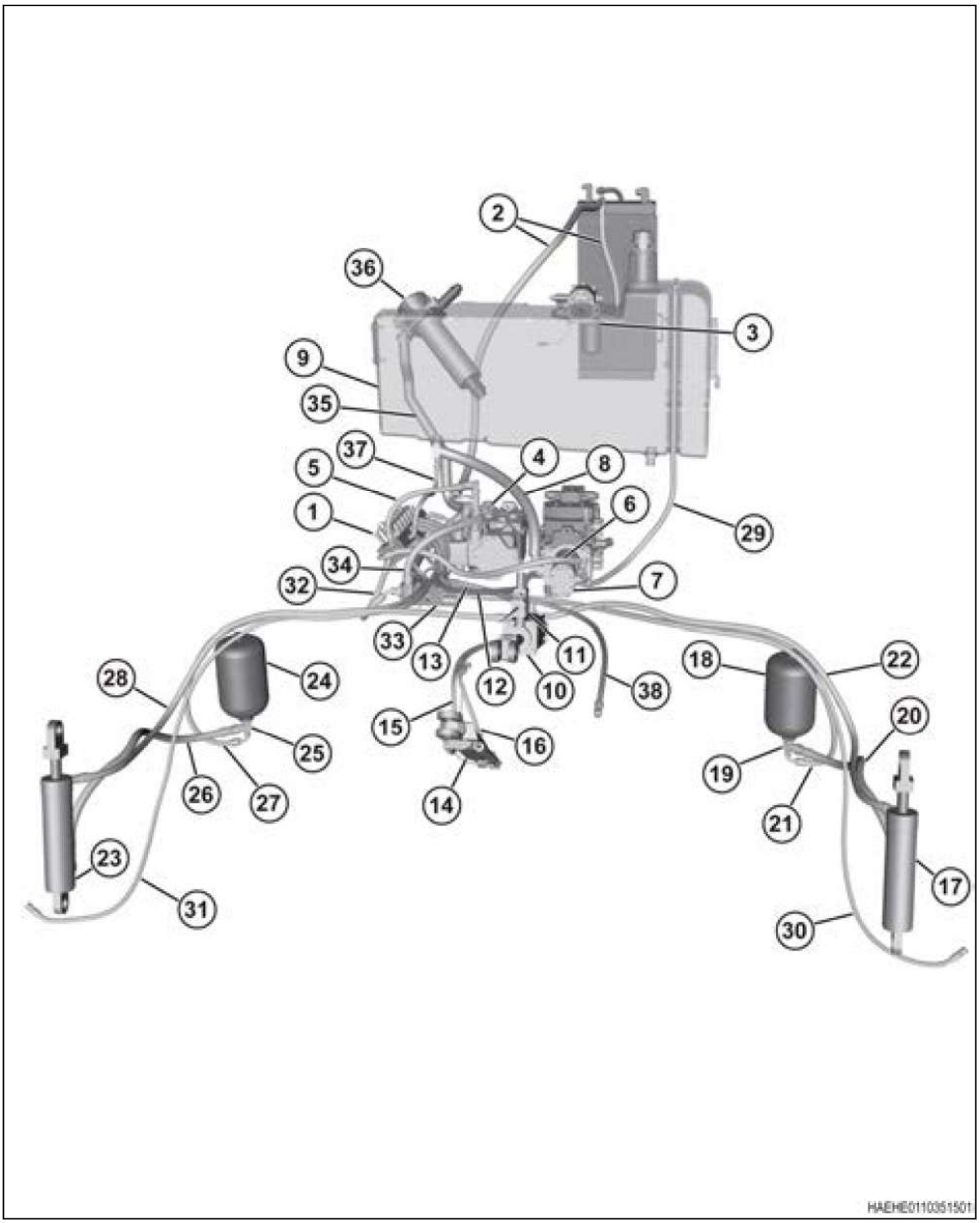


Fig. 105

9. Remove, disassemble, clean, and assemble the auxiliary function valve (1). Do not install the auxiliary function valve

See the information for removing, disassembling, and assembling the auxiliary function valve.

10. Flush the hoses (2) from the filter (3) for the fan motor to the tandem pump (4). If the hoses have contamination, flush the fan drive system.

See the information for cleaning and flushing the fan drive system.

6. Remove the capscrews (1) fastening the electrical control module (2) to the header drive pump.

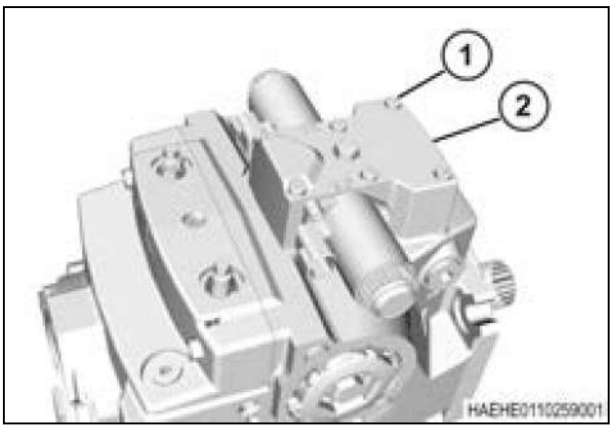


Fig. 126

7. Remove the electrical control module (1) and the gasket (2).
8. Record the direction of the screen (3) and remove the screen. Do not lose the screen.
9. If necessary, remove the orifices (4) using an 3 mm internal hex wrench.
10. Record the direction of the orifices for correct installation at assembly.

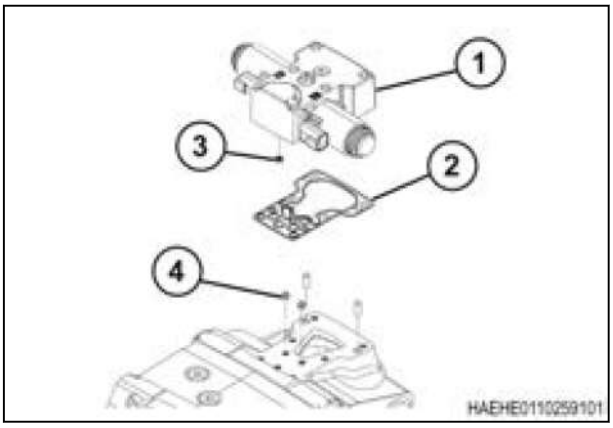


Fig. 127

5.16.3.3 Inspecting the electronic control module

Procedure

1. Inspect the machined surfaces on the electronic control module and the top of the header drive pump.
2. Replace the component if any surface damage or any scratches are visible.

5.16.3.4 Installing the electronic control module

Procedure

1. Use a 3 mm internal hex wrench and install the orifices (4).

   Tighten the orifice to 2.5 Nm (22 lbf inches).
2. Install a new screen (3).

   IMPORTANT:
   Make sure the mesh is toward the outside.
3. Install a new gasket (2).
4. Install the electronic control module (1).

   IMPORTANT:
   Make sure the screen stays inside the electronic control module.

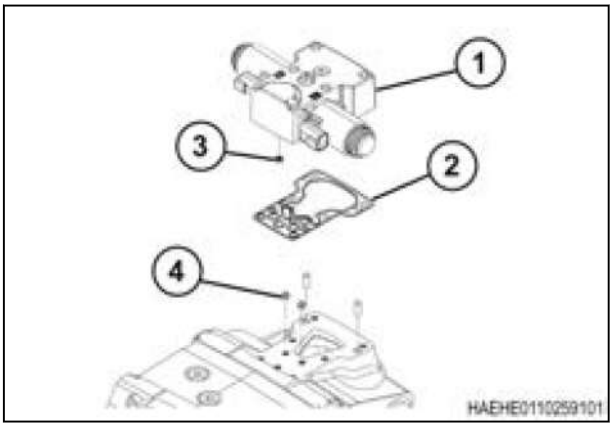


Fig. 128

6. Lubricate the new seal (2).
7. Install the seal into the pressure balance plate (1).
8. Use the record made during disassembly and install the pressure balance plate (1) in the correct direction.

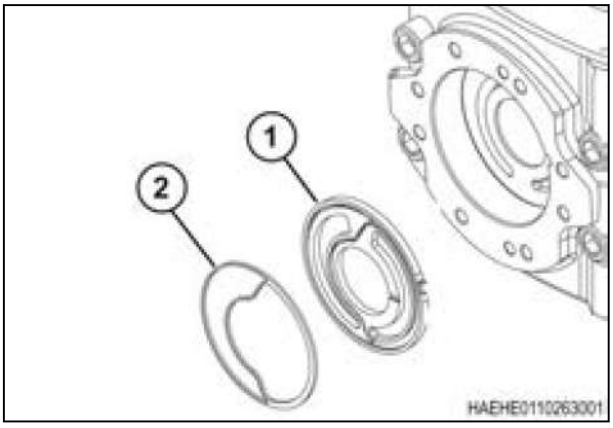


Fig. 167

9. Install the thrust washer (1).

IMPORTANT:
The surface material on the thrust washer must be toward the direction of the coupling.

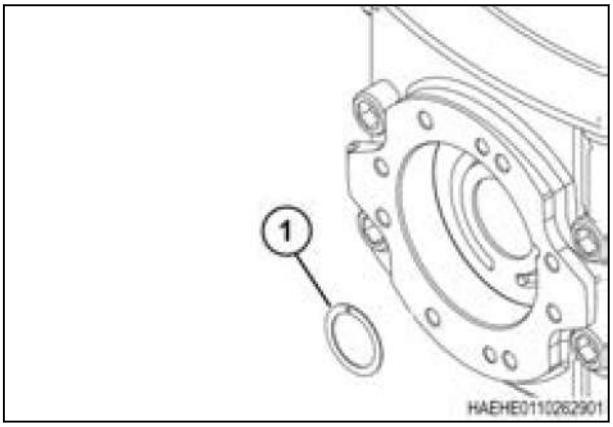


Fig. 168

10. Install a new gasket (3).
11. Put the mounting flange (2) into position on the header drive pump.
12. Install the hex head capscrews (1). Do not tighten.

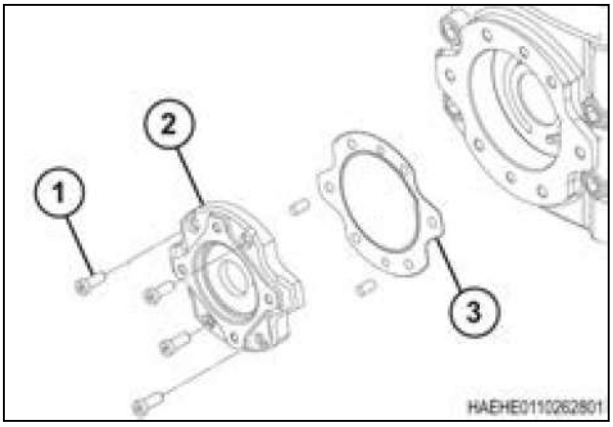


Fig. 169

13. Use the tightening sequence as shown.

    Tighten the hex head capscrews evenly to 92 Nm (68 lbf ft).
14. If necessary, install the header drive pump.

    See the information for installing the header drive pump.

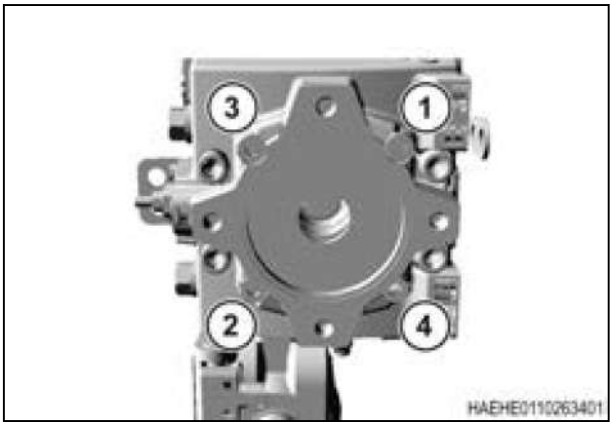


Fig. 170

14. Remove the plugs and the caps from all the hydraulic hoses.
15. Install the hydraulic hoses to the header drive pump.
16. Turn off the vacuum pump or the shop vacuum.

Fig. 206

17. Remove the vacuum pump or the shop vacuum.
18. Fill the hydraulic tank with oil.
    See specifications for the correct type of oil.

    IMPORTANT:
    After the initial start up, the oil level in the hydraulic tank will decrease. Make sure to keep the correct oil level in the hydraulic tank.
19. Charge the hydraulic system.
    See the information for charging the hydraulic system.
20. Adjust the header drive pump to neutral.
    See the information for adjusting neutral.
21. Use a piece of cardboard to check for leaks.

5.17.5 Electronic displacement control

5.17.5.1 Removing the electronic displacement control

Procedure

1. Park the machine on a solid, level surface.
2. Lower the header to the ground.
3. Stop the engine, apply the park brake, and take the key with you.
4. If necessary, remove the header drive pump.
   See the information for removing the header drive pump.
5. Disconnect the electrical connections from the header drive pump.
6. Use an internal hex wrench to remove the long screw (1) and the short screw (2).
7. Remove the electronic displacement control (3).
8. Make a record of the position for the two O-rings (4).
9. Remove and discard the two O-rings.
10. Remove and discard the O-ring (5).

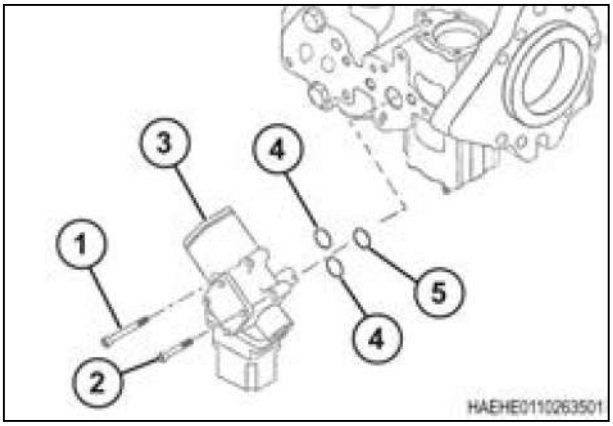


Fig. 207

10. Assemble the charge pump.
    See the information for assembling the charge pump.
11. Install the header drive pump.
    See the information for installing the header drive pump.

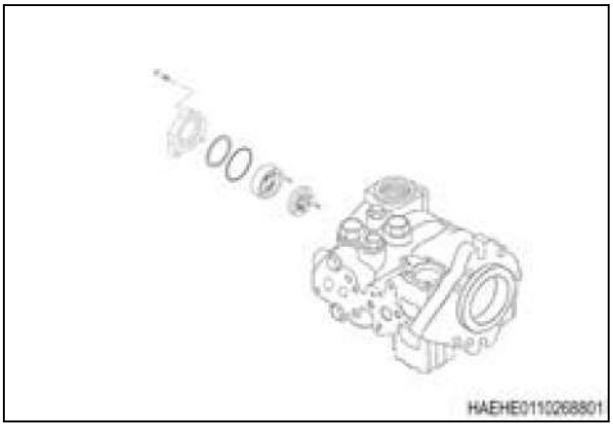


Fig. 244

5.17.11 Adjusting neutral

Procedure

1. Park the machine on a solid, level surface.
2. Lower the header all the way.
3. Stop the engine, apply the park brake, and take the key with you.
4. Clean the area around the header drive pump.
5. Disconnect the electrical connection (1) from the header drive pump.

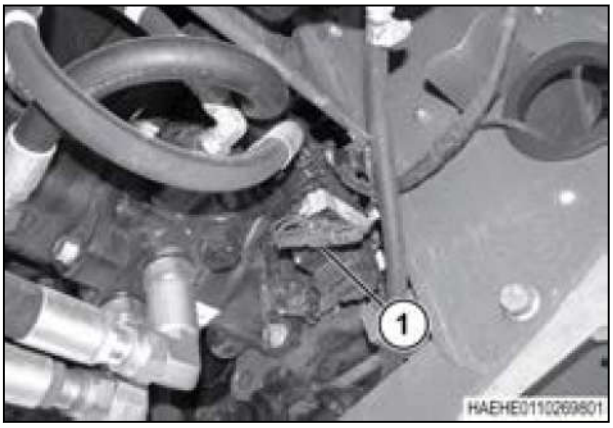


Fig. 245

6. Remove the plug (1) from the M4 servo port and install a 20 bar (300 psi) pressure gauge.

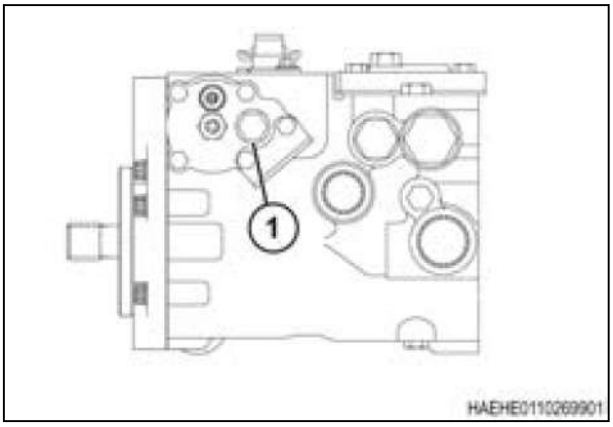


Fig. 246

5. Lubricate the seal (1) and the new O-ring (2).
6. Install the new O-ring onto the seal carrier (3).

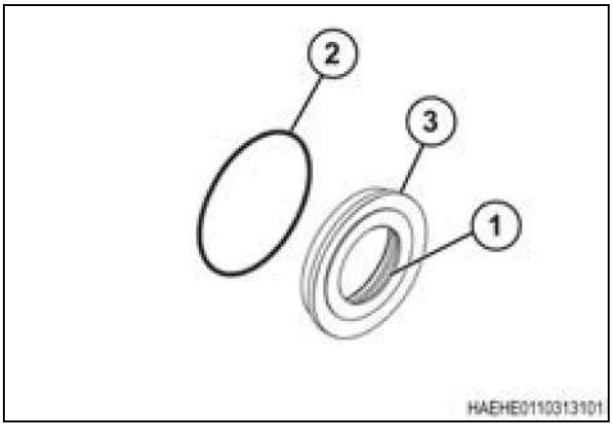


Fig. 279

7. Put the seal installation tool (1) over the shaft.
8. Install the seal carrier (2) into the tandem pump housing. Be careful not to damage the lip of the seal.
9. Remove the seal installation tool.

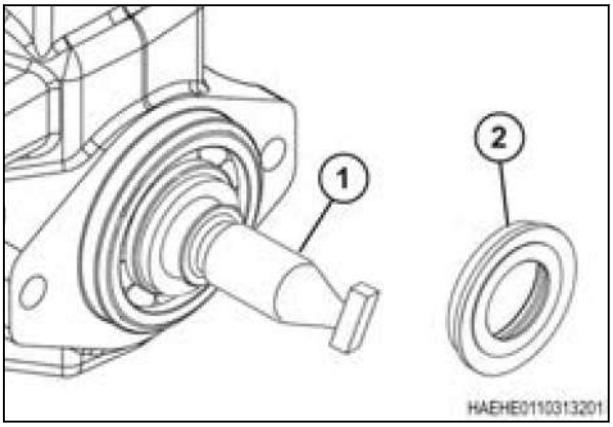


Fig. 280

10. Install the outer retaining ring.
11. Install the tandem pump.
    See the information for installing the tandem pump.

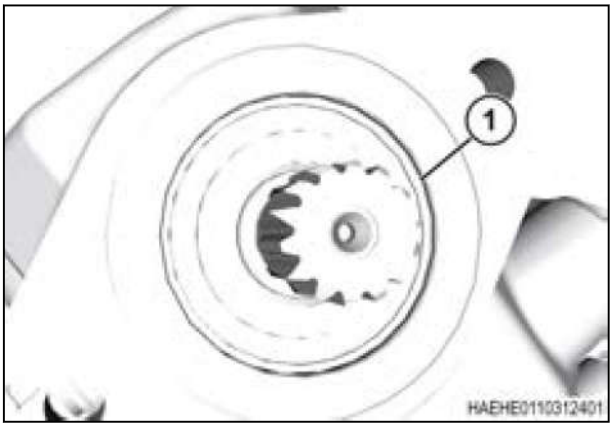


Fig. 281

5.18.15 Testing and adjusting the charge pressure relief valve

WARNING:

Hydraulic fluid under pressure can penetrate the skin or eyes. Serious personal injury, blindness, or death can occur. Relieve the pressure from the system or component before disconnecting components. Wear personal protective gear while working on the machine or equipment. Use a piece of cardboard to check for leaks. Never use your hand.

Procedure

1. Park the machine on a solid, level surface.
2. Lower the header to the ground.
3. Stop the engine, apply the park brake, and take the key with you.
4. Completely clean all components to prevent contamination from entering the system.

3. Remove the plastic nut (1) from the solenoid.

Fig. 310

4. Remove the coil (1).

Fig. 311

5. Put a wrench on the flat area (1) of the solenoid stem. Rotate the solenoid stem counterclockwise to remove the solenoid stem.

Fig. 312

Procedure

1. Park the machine on a solid, level surface.
2. Lower the header all the way.
3. Apply the park brake, stop the engine, and take the key with you.
4. Remove the hex socket head screw (1).
5. Remove the speed sensor (2).
6. Remove and discard the O-ring (3).

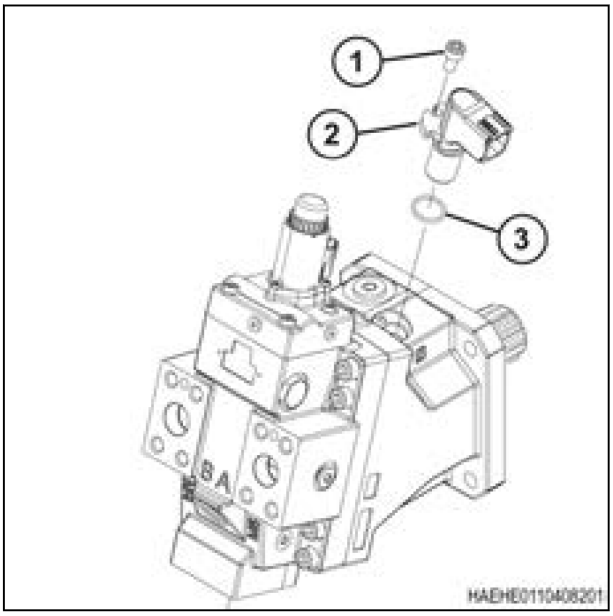


Fig. 339

5.20.7 Installing the speed sensor

Procedure

1. Lubricate and install a new O-ring (3) onto the speed sensor (2).
2. Install the speed sensor.
3. Install the hex socket head screw (1).

   Tighten the hex socket head screw to 8 Nm (72 lbf inches).

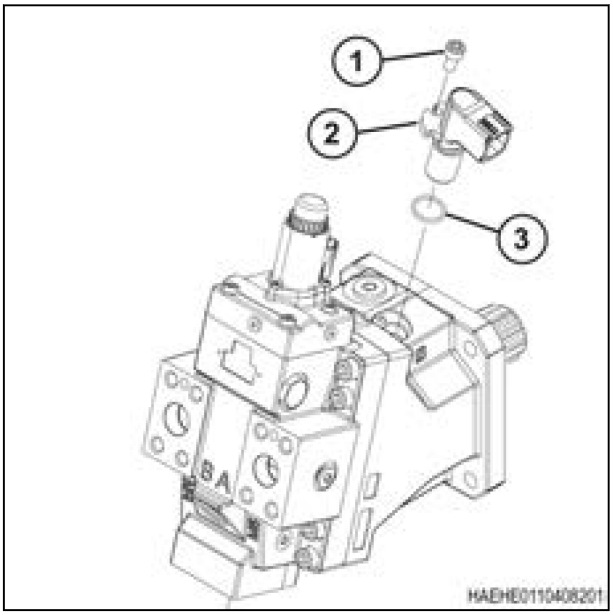


Fig. 340

2. Stop the engine, apply the park brake, and take the key with you.
3. Release all hydraulic pressure in the system.
4. Disconnect the connector (1).
5. Remove the nut (2).
6. Remove the coil (3).

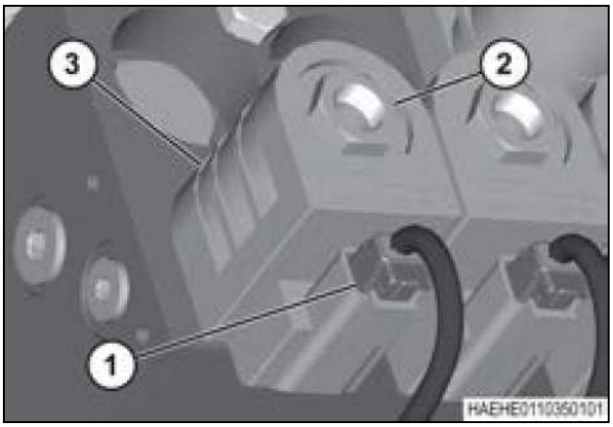


Fig. 372

7. Remove the cartridge (1).
8. Install the new cartridge.
   Tighten the cartridge to 47.5 Nm (35 lbf ft).

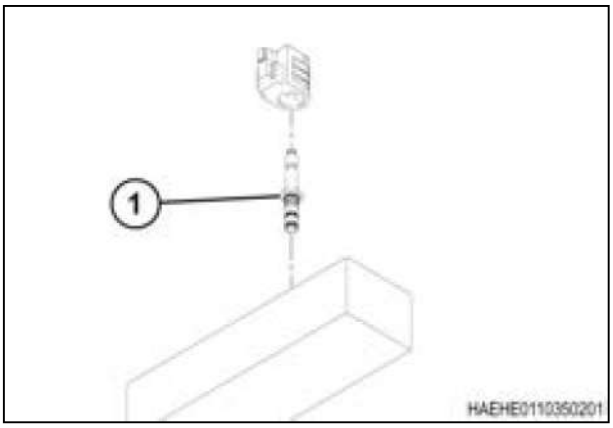


Fig. 373

9. Put the coil (3) into position.
10. Install the nut (2).
    Tighten the nut to 5.4 to 8.1 Nm (48 to 72 lbf inch).
11. Connect the connector (1).

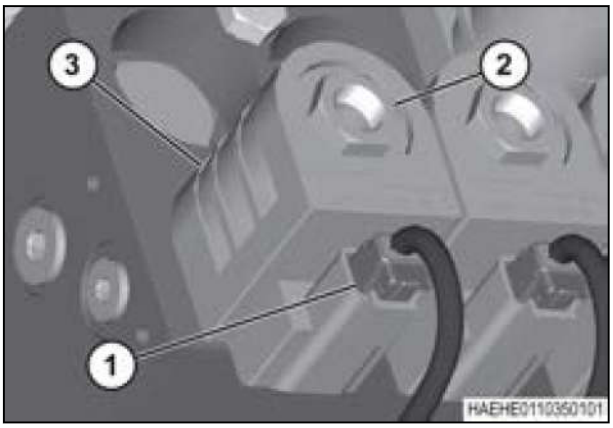


Fig. 374

16. Install the tie rods with the same thread lengths through the rod end cap.
17. Loosely install the nuts (1) onto the tie rods.
18. Tighten the nuts alternately and evenly in two increments to 80 Nm (60 lbf ft).

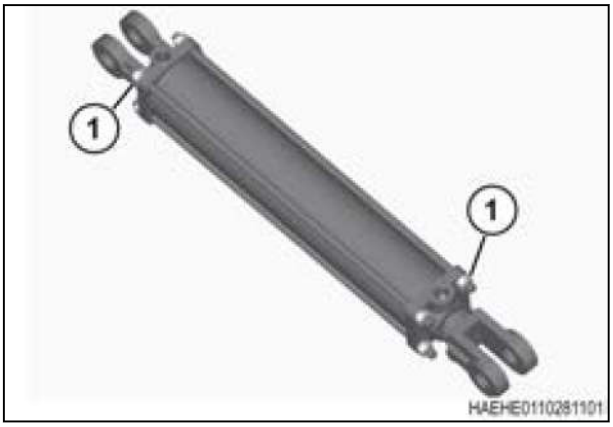


Fig. 407

19. Install the connector (4) on the rod end.
20. Install the elbow (3) on the base end.
21. Install the header down valve (2).
22. If necessary, install the cartridge valve.
    Tighten the cartridge valve to 41 Nm (30 lbf ft).
23. If necessary, install the coil (1).
    Tighten the nut on the coil to 3.4 Nm (30 lbf inches).

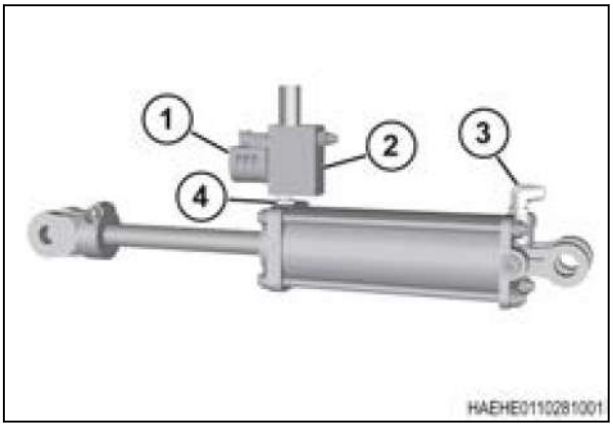


Fig. 408

5.27.6 Installing the header lift cylinder

WARNING:

Hydraulic fluid under pressure can penetrate the skin or eyes. Serious personal injury, blindness, or death can occur. Relieve the pressure from the system or component before disconnecting components. Wear personal protective gear while working on the machine or equipment. Use a piece of cardboard to check for leaks. Never use your hand.

Procedure

1. Park the machine on a solid, level surface.
2. Lower the header all the way.
3. Stop the engine, apply the park brake, and take the key with you.
4. Completely clean all components to prevent contamination from entering the system.
5. If necessary, install the elbow on the base end.
6. If necessary, install the connector on the rod end.
7. If necessary, install the header down valve.
8. Put the header lift cylinder into position on the machine.

6. Remove the base end of the cylinder (1) from the bracket (2).

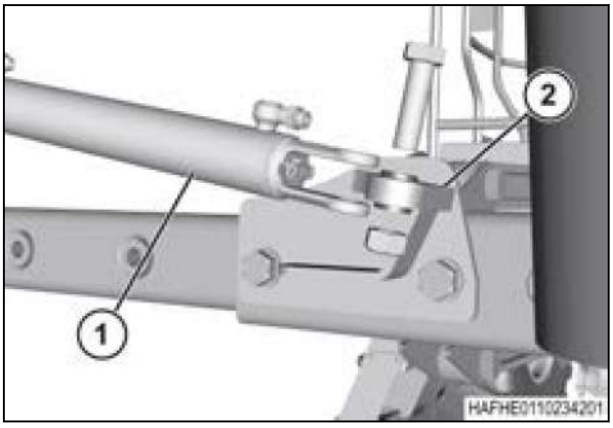


Fig. 434

5.30.2 Installing a rear steer cylinder

Procedure

1. Put the two bushings (4) into position on the bracket (2).

   Make sure the chamfers on the bushings are in the bracket.

2. Put the base end of the cylinder (1) into position. Install and tighten the capscrew (3)and the nut (5)

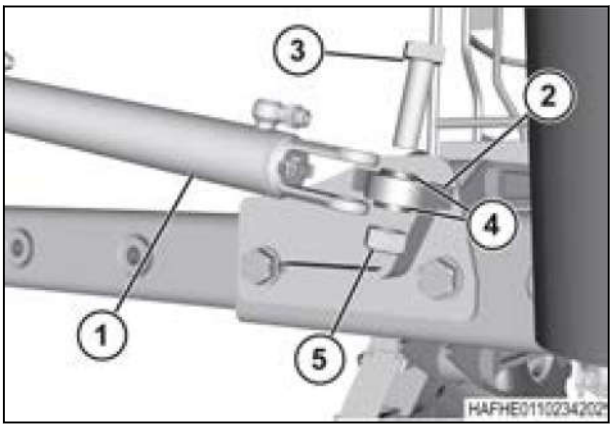


Fig. 435

3. Connect the wiring harness to the sensor (1) on the cylinder.
4. Connect the hoses (2) onto the cylinder.
5. Put the cylinder into position so the rod end can extend fully.
6. Connect EDT to the machine and do the procedure for air purge and calibration.

   The cylinder will be in the retracted position when the procedure is complete.

7. Align the rod end of the cylinder with the spindle arm hole.

   To extend or retract the cylinder by hand:

   a) Start the engine.
   b) Make sure rear steer is not selected.
   c) Move the rod end of the cylinder as required.
   d) Stop the engine and take the key with you.

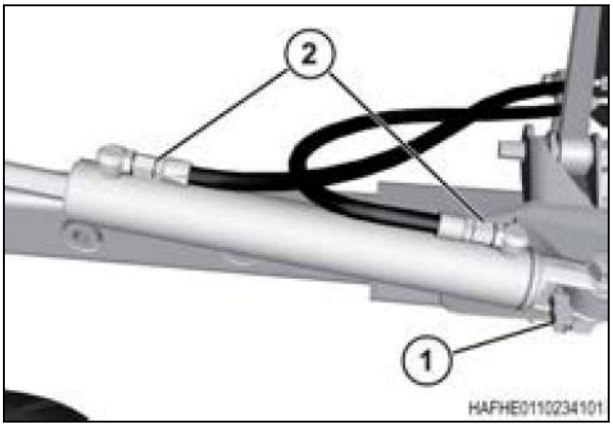


Fig. 436

12. Install the strain relief.

6.2.7 Replacing a Deutsch connector

Replacing a Deutsch connector requires the correct special tools.

Procedure

1. Disconnect the cover from the connector and slide the cover away from the connector.

2. Put the groove of the tool onto wire. Slowly push the tool all the way into the connector to push the fingers away from the pin or socket.

NOTE: *IMPORTANT: Do not rotate the tool or insert the tool at an angle.*

Fig. 11

3. Slowly remove the wire, terminal, and tool from the rear of the connector.

4. Remove the tool from the connector.

5. Cut the wire at the end of the terminal or socket.

6. Remove 6 to 8 mm (0.25 to 0.312 in) of insulation from the wire.

7. Crimp the new terminal onto the wire. Crimp the new terminal onto the wire. A special crimp tool is available for Deutsch connectors.

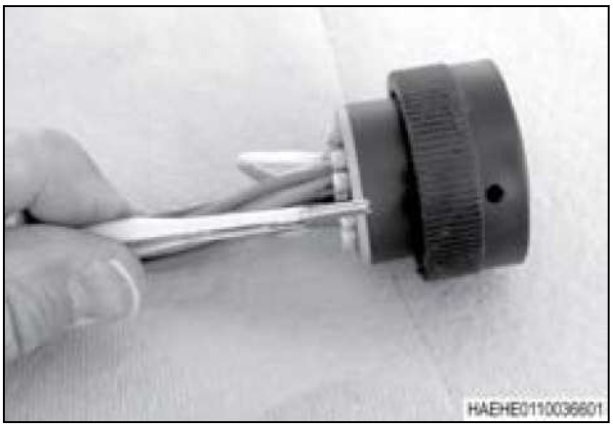


Fig. 12

8. Hold the wire about 25 mm (1 in) behind the crimp area on the terminal. Slowly push the terminal into the rear of the connector to the correct depth. Pull the wire a small amount to make sure the fingers are engaged in the terminal.

9. Install the cover on the connector.

10. Apply dielectric grease to the pins and sockets in both halves of the connector in the wiring harness.

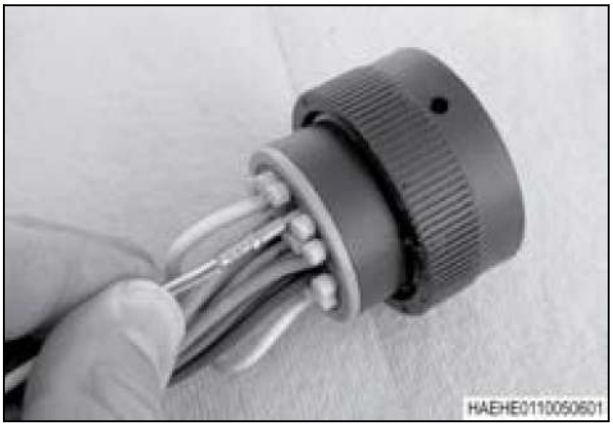


Fig. 13

3. Connect the positive lead of the multimeter to the red wire of the alternator (1). Connect the negative lead of the multimeter to a good ground connection on the engine.
4. Check the voltage with the key off.
   - If the multimeter indicates system voltage, do the next step.
   - If the multimeter does not indicate system voltage, repair or replace the cable between the alternator and the battery.

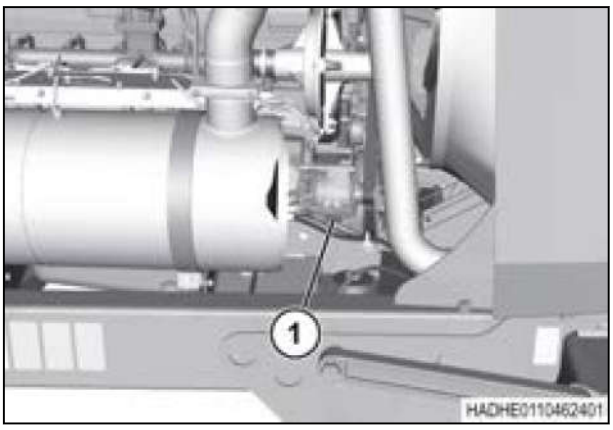


Fig. 33

5. Disconnect the red wire from the terminal of the alternator.
6. Connect the positive lead of the multimeter to the terminal on the red wire. Connect the negative lead of the multimeter to a good ground connection on the engine.
   - If the multimeter indicates approximate battery voltage or more, test the alternator and the voltage regulator.
   - If the multimeter indicates less than the approximate battery voltage, there is a problem in the circuit between the terminal and relay/fuse block. See the electrical schematic and use a multimeter to check the circuit.

SPN	FMI	Code Description
520400	11	Left enable circuit fault
520401	11	Left extend circuit fault
520402	11	Left retract circuit fault
520403	11	Left cylinder sensor circuit fault
520404	11	Left direction check failed
520405	11	Right enable circuit fault
520406	11	Right extend circuit fault
520407	11	Right retract circuit fault
520408	11	Right cylinder sensor circuit fault
520409	11	Right direction check failed
520410	11	Pilot pressure fault

6.15.3 Code SA 141 SPN 520300 FMI 0

Steering sensors A and B shorted together

The system sensed steering sensors signals shorted together.

Possible cause

- Loose or damaged pins, short in wiring harness, corrosion in connectors, intermittent connections
- Sensor/switch failure
- Main control module failure

Diagnosis and solution

1. Check the steering sensor for a short.

Check the duty cycle reading of steering A signal and compare to the duty cycle reading of steering B signal.

a) Steering A signal - Use a multimeter set to check for duty cycle. Put one lead in the steering A signal wire at pin 3 of the C71 connector (Light Blue/Yellow wire) and put the remaining lead in the ground wire at pin 2 of the C71 connector (Black/Light Blue wire) (1).

b) Steering B signal - Use a multimeter set to check for duty cycle. Put one lead in the steering B signal wire at pin 4 of the C71 connector (Light Blue/Pink wire) and put the remaining lead in the ground wire at pin 2 of the C71 connector (Black/Light Blue wire).

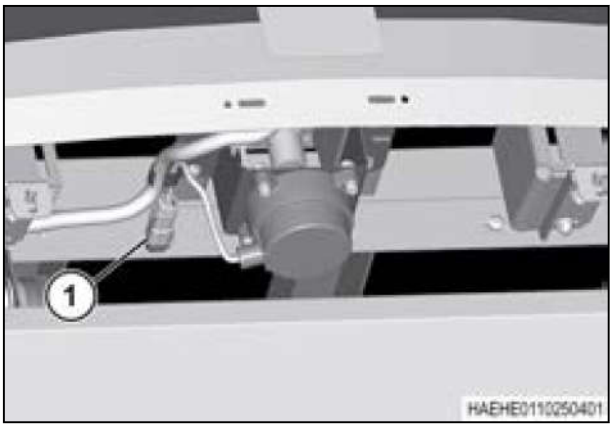


Fig. 50

Result

Expected result - The multimeter shows different duty cycle readings for steering A signal and steering B signal.

Results:

- Yes - The multimeter shows no continuity.

  Replace main control module.

  Stop
- No - The multimeter shows continuity.

  There is a short in the wiring harness between C06 connector in the Console Harness and the C84 connector in the Main Harness.

  Disconnect the harnesses one at a time, repeat the above continuity test and repair or replace the harness as required.

  Stop

6.15.12 Code SA 141 SPN 520302 FMI 2

FNR primary sensor intermittent signal

The system found an intermittent signal from the primary sensor.

NOTE:
The FNR sensor is also referred to as the ground drive handle sensor.

Possible cause

- Loose or damaged pins, short/open in wiring harness, corrosion in connectors, intermittent connections
- Sensor/switch has failed
- Main control module failure

Diagnosis and solution

1. Check the signal wire for a short.
   a) Remove the C06 connector from the ground drive handle sensor (1).
   b) Use a multimeter set to check for continuity. Put one lead in the primary signal wire at pin C of the C06 connector (Blue wire) and put the other lead in each of the remaining pins of the C06 connector, one at a time.
   c) Flex the harness and connectors while doing the test.

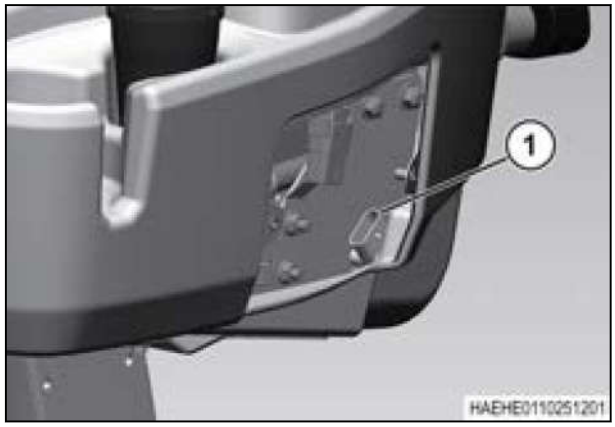


Fig. 71

Result

Expected results - The multimeter shows no continuity

Results:

- Yes - The multimeter shows no continuity.

  see step 2, page 6-65

3. Check for short to secondary power.

a) Remove C06 connector from the ground drive handle sensor (1).

b) Use a multimeter set to check for continuity. Put one lead in the secondary signal output at pin D of the C06 connector (Light Blue wire) and put the remaining lead in the secondary +5v supply at pin B of the C06 connector (Red/Light Blue wire).

c) Flex the harness and connectors while doing the test.

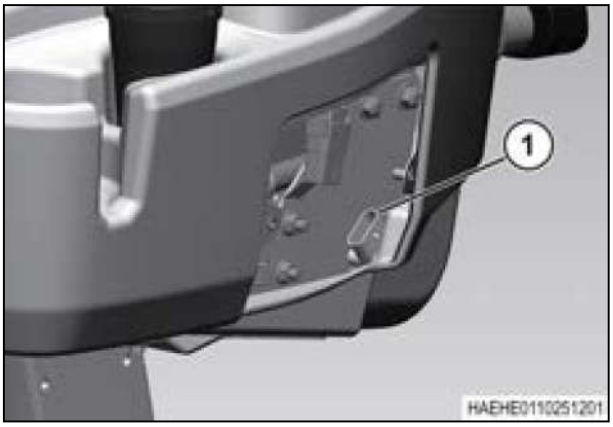


Fig. 87

Result

Expected results - The multimeter shows no continuity

Results:

- Yes - The multimeter shows no continuity.

  see step 4, page 6-80
- No - The multimeter shows continuity.

  There is a short in the wiring harness between C06 connector in the Console Harness and the C84 connector in the Main Harness.

  Disconnect the harnesses one at a time. Repeat the above continuity test and repair or replace the damaged harness as required.

  Stop

4. Check for open secondary ground.

a) Remove C06 connector from the ground drive handle sensor (1).

b) Use a multimeter set to check for continuity. Put one lead in the secondary ground at pin A of the C06 connector (Black/Light Blue wire) and put the remaining lead on a known good chassis ground.

c) Flex the harness and connectors while doing the test.

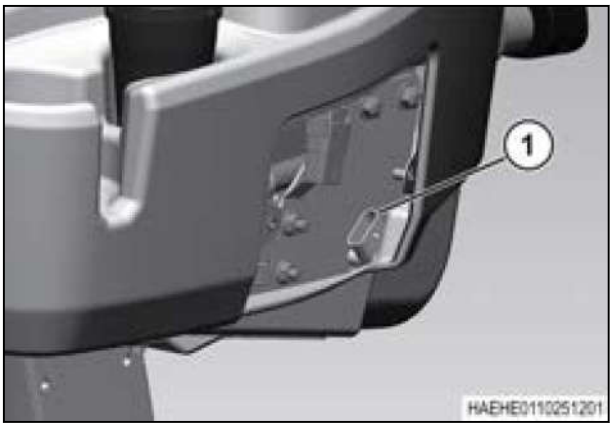


Fig. 88

Result

Expected results - The multimeter shows continuity

Results:

- Yes - The multimeter shows continuity.

  see step 5, page 6-81

3. Check the ground wire for an open.

a) Remove C89 connector from right-hand reverse EDC coil (1).

b) Remove the C113 connector (2) from the fuse/relay block.

c) Use a multimeter set to check for continuity. Put one lead in the ground wire at pin 2 of the C89 connector (Black/Grey wire) and put the remaining lead at pin G of the C113 connector (Black/Grey wire).

d) Flex the harness and connectors while doing the test.

Result

Expected results - The multimeter shows continuity.

Results:

- Yes - The multimeter shows continuity.

  Replace main control module.

  Stop
- No - The multimeter shows no continuity.

  There is an open in the main harness. Repair or replace as required.

  Stop

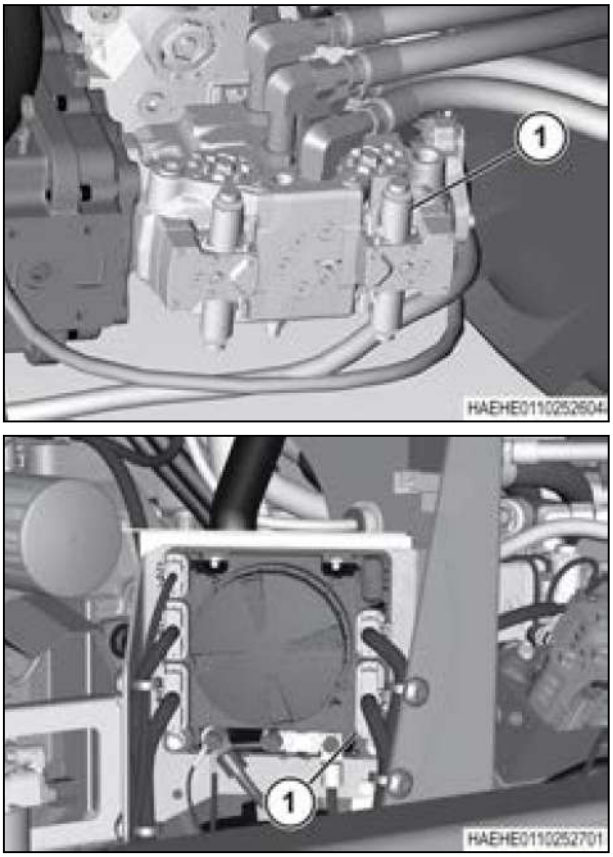


Fig. 110

6.15.27 Code SA 141 SPN 520308 FMI 3

Left wheel motor speed sensor short to power

A high signal voltage is found from the left-hand wheel speed sensor.

Failure mode: A warning will be displayed on the terminal screen.

Possible cause

- Loose or damaged pins, short in the wiring harness, corrosion in connectors, intermittent connections
- A sensor/switch has failed
- Main control module failure

Diagnosis and solution

1. Check for open in speed signal wire in main harness.

a) Remove C76 connector (1) from right-hand wheel speed sensor.

b) Use a multimeter set to check for continuity. Put one lead in the speed signal wire (B) at pin B (Light Blue/Orange wire).

c) Put the remaining lead from the multimeter in the back of the C84 connector (2) at pin 19 (Light Blue/Orange wire) and check for an open in the speed signal wire.

NOTE:
Do not remove the C84 connector for this test. Repeated removal/installation of the connector will reduce capacity of the connector to keep a good connection with the module.

d) Flex the harness and connectors while doing the test.

Result

Expected results - The multimeter shows continuity.

Results:

- Yes - The multimeter shows continuity.

  see step 2, page 6-112
- No - The multimeter shows no continuity.

  There is a short in the main harness. Repair or replace the harness as required.

  Stop

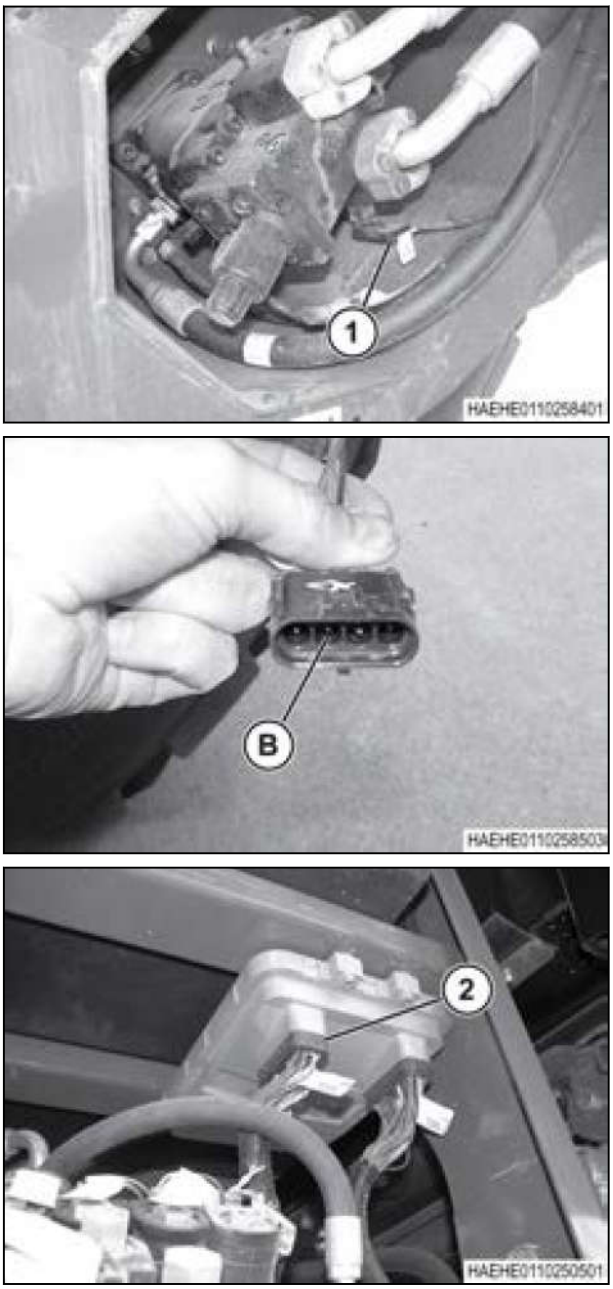


Fig. 129

2. Check for signal output from right-hand wheel speed sensor.

a) Use a multimeter set to check frequency (hertz). Put the positive lead at the speed signal wire, pin B (Light Blue/Orange wire) and the negative lead at the ground wire, pin C (Black/Light Blue wire) of the right-hand wheel speed sensor connector (1).

b) Start the machine and move in either direction so the right-hand wheel moves approximately 30 cm (12 in).

Result

Expected results - The multimeter will show a hertz reading output.

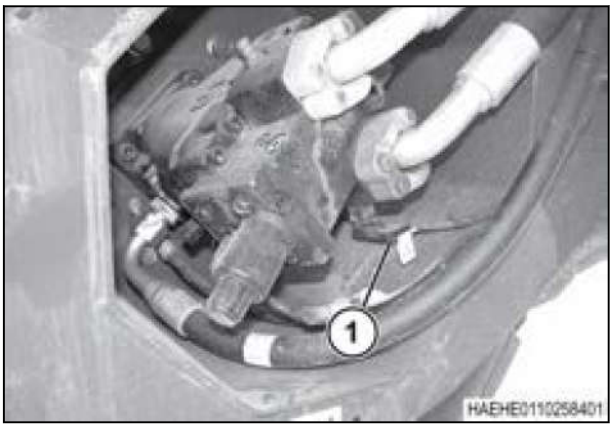


Fig. 130

The system sensed a measured speed less than expected.

Failure mode: A warning will be displayed on the terminal screen.

Possible cause

- Sensor out of adjustment
- Loose or damaged pins, short in wiring harness, corrosion in connectors, intermittent connections
- Failed sensor

Diagnosis and solution

1. Make sure the gap between the fan speed sensor (1) and the sensor plate (2) is 0.76 to 1.27 mm (0.030 to 0.050 in).

Result

Expected results - The fan speed sensor is adjusted correctly.

Results:

- Yes - The fan speed sensor is adjusted correctly.

  see step 2, page 6-128
- No - The fan speed sensor is not adjusted correctly.

  Adjust the fan speed sensor.

  Stop

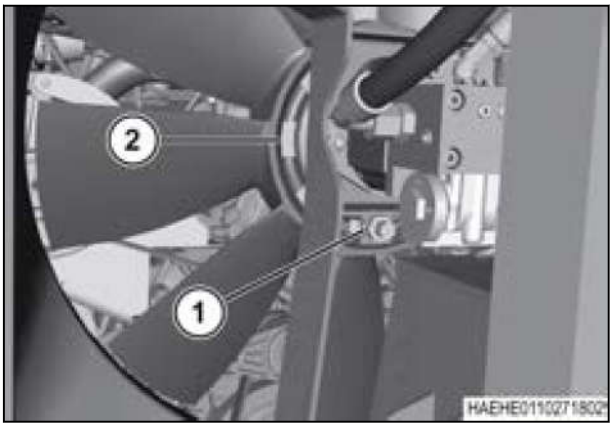


Fig. 150

2. Check the signal wire

a) Remove the C207 connector from the fan speed sensor (1).

b) Remove the C84 connector (2) from the main control module.

c) Use a multimeter set to check for continuity. Put one lead in pin A (White/Green wire) of the C197 connector and put the remaining lead in pin 26 (White/Green wire) of the C84 connector.

d) Flex the harness and connectors while doing the test.

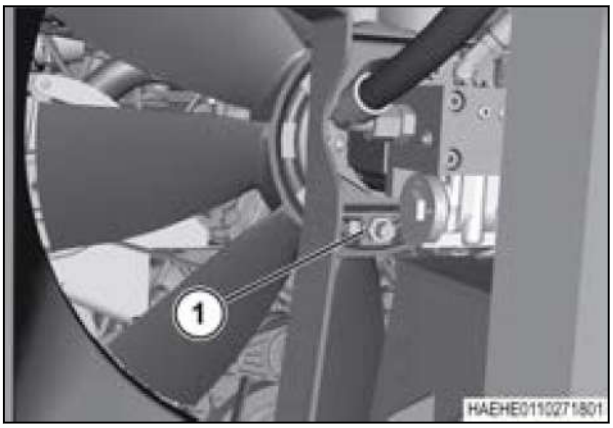
Result

Expected results - The multimeter shows continuity.

Results:

- Yes - The multimeter shows continuity.

  see step 3, page 6-129



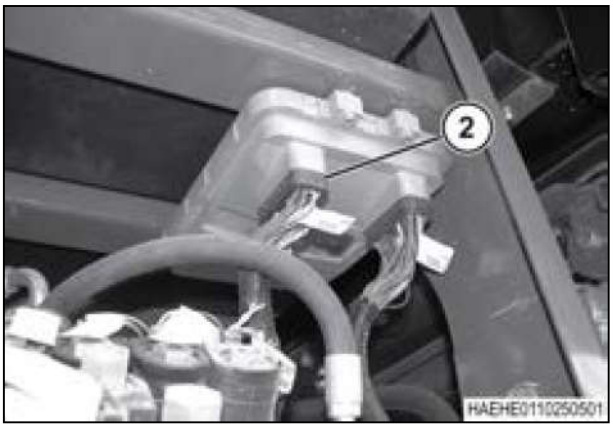


Fig. 151

6.15.56 Code SA 141 SPN 520321 FMI 6

Header pump forward EDC short circuit

The system sensed current that is more than the calibrated maximum current.

Failure mode: A warning will be displayed on the terminal screen.

Possible cause

- The coil has failed
- Short in the wiring harness
- Main control module failure

Diagnosis and solution

1. Check header pump forward EDC coil.

a) Remove C92 connector from header pump forward EDC coil (1).

b) Use a multimeter set to check for resistance (Ohms). Put the leads across the two pins in the coil.

Result

Expected results - Resistance is 3.66 ohms for WR9870 and WR9860 models and 23 Ohms for WR9840 model.

Results:

- Yes - The resistance is in range.

  Step 2
- No - The resistance is not in range.

  Replace header pump forward EDC coil.

  Stop

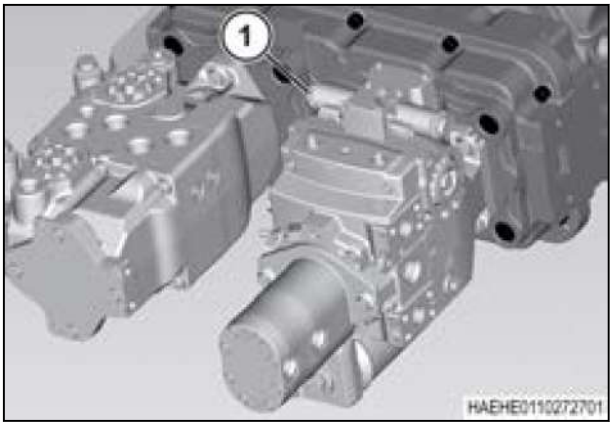


Fig. 169

2. Check current supply wire at coil for short to ground.

a) Remove C92 connector from header pump forward EDC coil (1).

b) Use a multimeter set to check for continuity. Put the leads in the C92 connector, across pin 1 (Brown wire) and pin 2 (Black/Grey wire).

c) Flex the harness and connectors while doing the test.

Result

Expected results - The multimeter shows no continuity.

Results:

- Yes - There is no continuity between pin 1 and pin 2.

  Replace the main control module.

  Stop

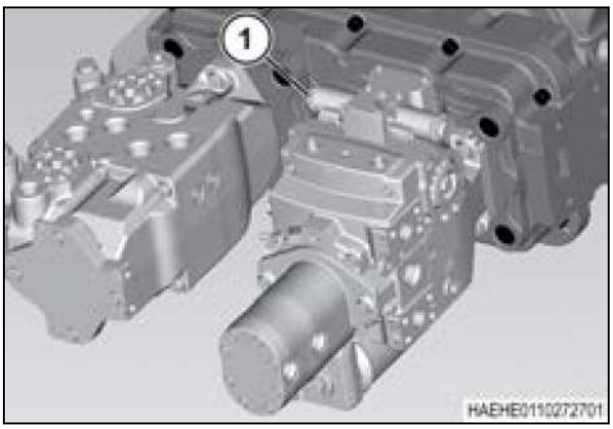


Fig. 170

3. Check the ground wire for an open.

a) Remove the C78 connector from the header lift lower coil (1).

b) Remove the T70 ground terminal (2) from the fuse/relay block.

c) Use a multimeter set to check for continuity. Put one lead in the ground wire at pin 2 of the C78 connector (Black/Grey wire) and put the remaining lead at the T70 ground terminal (Black/Grey wire) on the fuse/relay block.

d) Flex the harness and connectors while doing the test.

Result

Expected results - The multimeter shows continuity.

Results:

- Yes - The multimeter shows continuity.

  Replace main control module.

  Stop
- No - The multimeter shows no continuity.

  There is an open in the main harness. Repair or replace as required.

  Stop

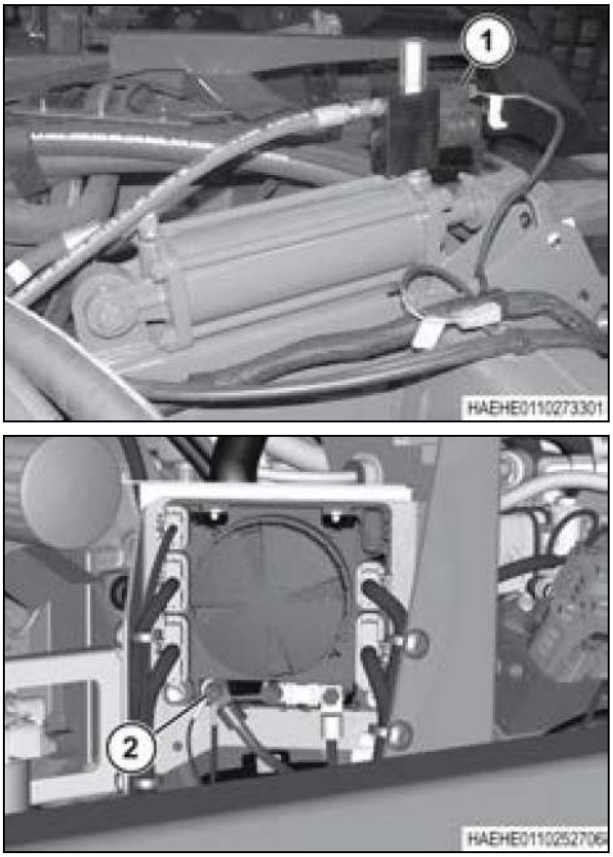


Fig. 183

6.15.72 Code SA 141 SPN 520331 FMI 11

Header lift power down coil circuit overload or open

The system sensed low or no current.

NOTE:
The header lift power down coil is also known as the header lift arm force down coil.

Failure mode: A warning will be displayed on the terminal screen.

Possible cause

- The coil has failed
- Open in wiring harness
- Main control module failure

3. Check the ground wire for an open.

a) Remove the C102 connector from the right flotation pressure decrease coil (1).

b) Remove the T70 ground terminal (2) from the fuse/relay block.

c) Use a multimeter set to check for continuity. Put one lead at the T70 ground terminal (Black/Grey wire) and put the remaining lead at pin 2 of the C102 connector (Black/Grey wire).

d) Flex the harness and connectors while doing the test.

Result

Expected results - The multimeter shows continuity.

Results:

- Yes - The multimeter shows continuity.

  Replace the main control module.

  Stop
- No - The multimeter shows no continuity.

  There is an open in the main harness. Repair or replace as required.

  Stop

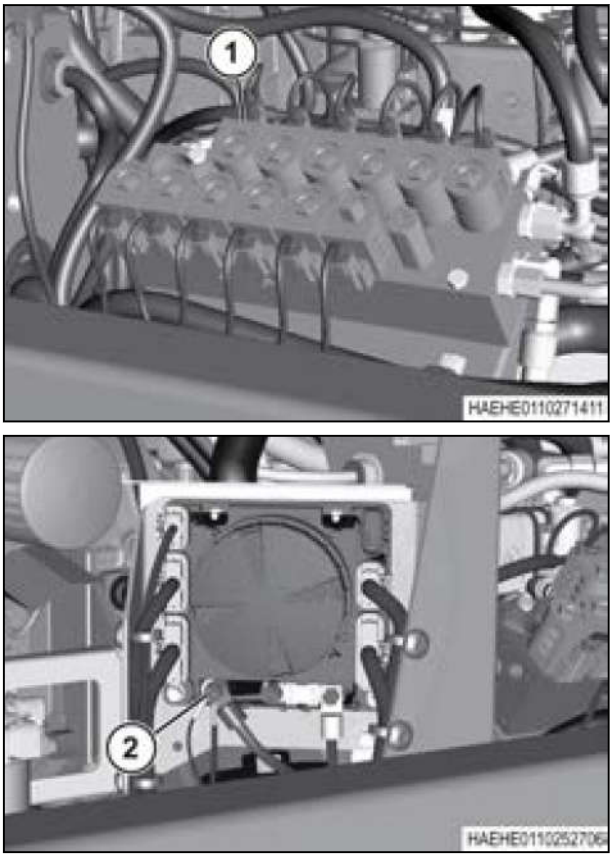


Fig. 207

6.15.80 Code SA 141 SPN 520339 FMI 11

Auxiliary 1 increase coil circuit overload or open

The system sensed low or no current.

Failure mode: A warning will be displayed on the terminal screen.

Possible cause

- The coil has failed
- Open in wiring harness
- Main control module failure

Diagnosis and solution

1. Check the auxiliary 1 increase coil.

a) Remove C97 connector from the auxiliary 1 pressure increase coil (1).

b) Use a multimeter set to check for resistance (ohms). Put both leads on the pins of the open center coil.

Result

Expected results - The resistance is 6.6 ohms at 21 degrees C (70 degrees F).

Results:

- Yes - Resistance is in range.

  see step 2, page 6-177

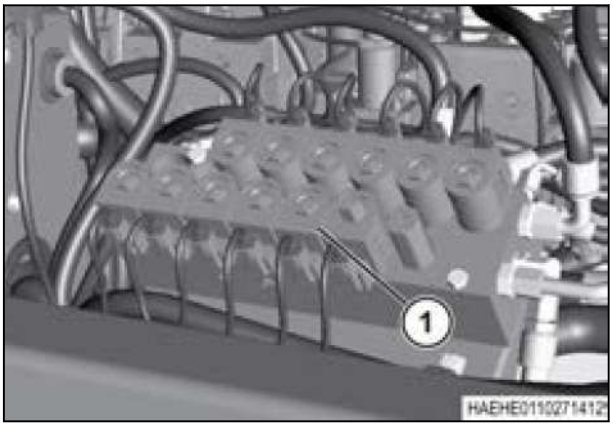


Fig. 208

Diagnosis and solution

1. Check the signal wire for an open.

a) Remove the C18 connector from the control console VMM (1).

NOTE:
The control console VMM is located inside the control console in the cab. Open the armrest and remove the cover for access to the control console VMM.

b) Remove the C08 connector from the throttle sensor.

c) Use a multimeter set to check for continuity. Put one lead in pin 33 (White wire) of the C18 connector and put the other lead in pin 3 (White wire) of the C08 connector.

d) Flex the harness and connectors while doing the test.

Fig. 230

Result

Expected results - The multimeter shows continuity.

Results:

- Yes - The multimeter shows continuity.

  see step 2, page 6-192
- No - The multimeter shows no continuity.

  There is an open in the console harness. Repair or replace as required.

  Stop

2. Check throttle sensor output voltage.

a) Use a multimeter set to check for voltage. Put the red lead in pin 3 (White wire) of the C08 connector on the throttle sensor. Put the black lead in pin 1 (Black/Grey wire) of the C08 connector.

b) Turn the throttle clockwise and counterclockwise. The voltage must increase as the knob is turned clockwise and decrease as the knob is turned counter-clockwise.

Result

Expected results - The minimum voltage is 0.5 volts and the maximum voltage is 4.5 volts.

Results:

- Yes - The voltage is in correct range.

  Contact AGCO Technical Support.

3. Check the ground wire for an open.

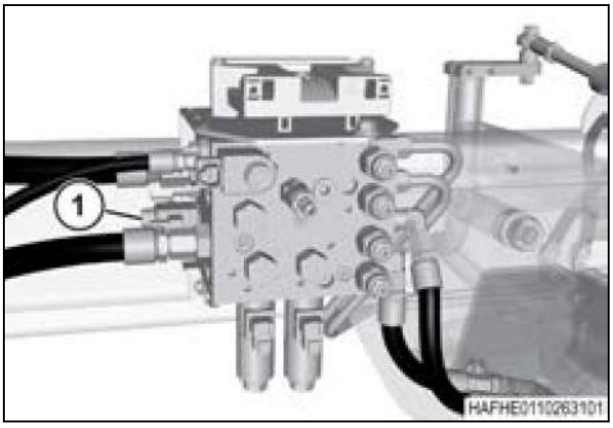
a) Remove the C535 connector from the left-hand enable coil (1).

b) Remove the C117 connector from the fuse/relay block (2).

c) Use a multimeter set to check for continuity. Put one lead in the ground wire at pin 2 of the C535 connector (Black wire) and put the remaining lead at pin E of the C117 connector (Black/Gray wire).

NOTE: *The wire color on the ground wire changes from black to Black/gray at splice S105.*

d) Flex the harness and connectors while doing the test.



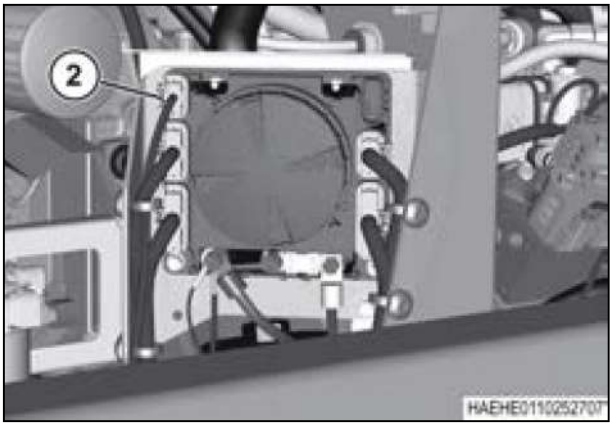


Fig. 247

Result

Expected results - The multimeter shows continuity.

Results:

- Yes - The multimeter shows continuity.

  see step 4, page 6-208
- No - The multimeter shows no continuity.

  There is an open in the rear steer harness or the main harness. Repair or replace as required.

  Stop

4. Check the current supply wire for a short to ground.

a) Remove the C535 connector from the left-hand enable coil (1).

b) Use a multimeter set to check for continuity. Put the leads in the C535 connector, across pin 1 (Light blue/yellow wire) and pin 2 (Black wire).

c) Flex the harness and connectors while doing the test.

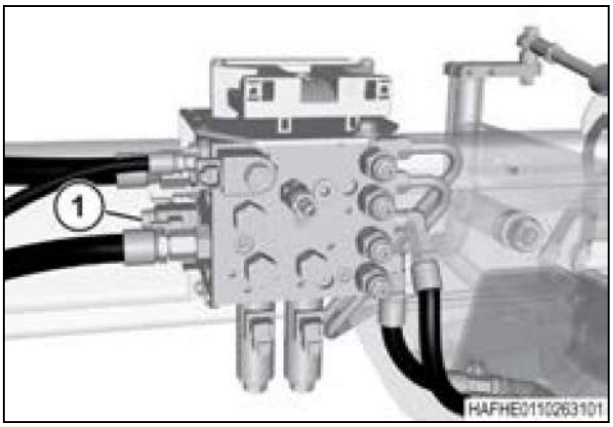


Fig. 248

Result

Expected results - There is no continuity between pin 1 and pin 2.

Results:

- Yes - There is no continuity between pin 1 and pin 2.

  Replace the rear steer module.
- No - The multimeter shows continuity between pin 1 and pin 2.

  There is short in the rear steer harness. Repair or replace as required.

  Stop

Results:

- Yes - The multimeter shows continuity.

  see step 3, page 6-224
- No - The multimeter shows no continuity.

  There is an open in the harness. Repair or replace as required.

  Stop

3. Check the ground wire for an open.

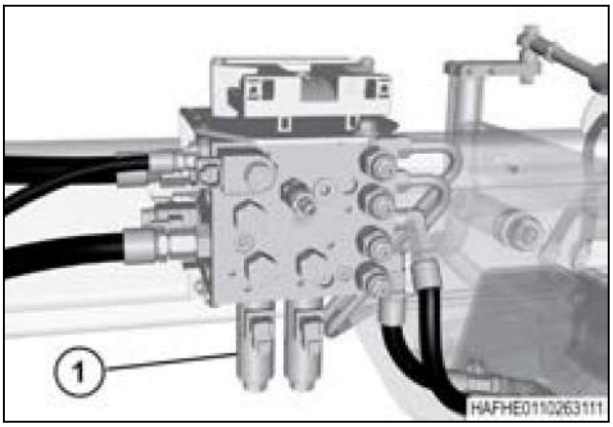
a) Remove the C532 connector from the right-hand retract coil (1).

b) Remove the C117 connector from the fuse/relay block (2).

c) Use a multimeter set to check for continuity. Put one lead in the ground wire at pin 2 of the C532 connector (Black wire) and put the remaining lead at pin E of the C117 connector (Black/Gray wire).

NOTE: *The wire color on the ground wire changes from black to Black/gray at splice S105.*

d) Flex the harness and connectors while doing the test.



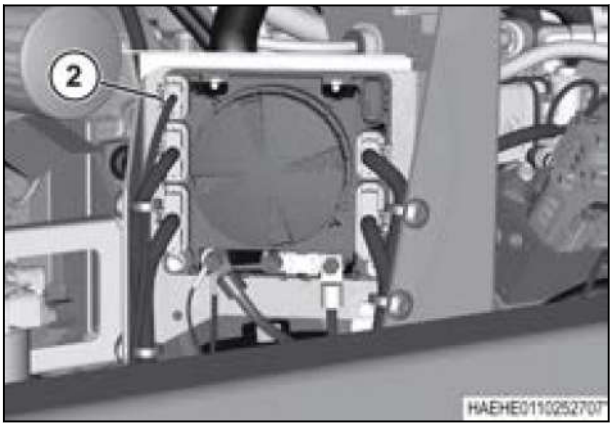


Fig. 275

Result

Expected results - The multimeter shows continuity.

Results:

- Yes - The multimeter shows continuity.

  see step 4, page 6-224
- No - The multimeter shows no continuity.

  There is an open in the rear steer harness or the main harness. Repair or replace as required.

  Stop

4. Check the current supply wire for a short to ground.

a) Remove the C532 connector from the right-hand retract coil (1).

b) Use a multimeter set to check for continuity. Put the leads in the C532 connector, across pin 1 (White/blue wire) and pin 2 (Black wire).

c) Flex the harness and connectors while doing the test.

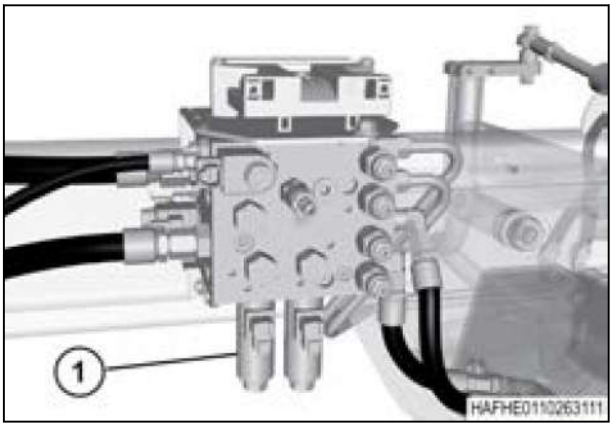


Fig. 276

Result

Expected results - There is no continuity between pin 1 and pin 2.

Results:

- No - there is a diagnostic fault code.

  Go to see step 3, page 6-240 .

  Repair - energize the guidance controller

2. Report the wrong diagnostic.
   a) Report the wrong diagnostic to the AGCO technical support.
   b) The operator can continue operating the system.
   c) The operator must monitor the system if the error shows.

   Result

   Stop.
3. Energize the guidance controller
   a) Disconnect the power to the guidance controller through the correct switch for 30 seconds.
   b) Connect power to the guidance controller.

   Result

   Expected result - there is no longer a diagnostic fault code.

   Results:

   - Yes - the system reported a wrong diagnostic.

     Go to see step 4, page 6-240 .

   - No - the guidance controller has a hardware failure.

     Repair - the guidance controller requires replacement.

     Stop.
4. Report the wrong diagnostic.
   a) Report the wrong diagnostic to the AGCO technical support.
   b) The operator can continue operating the system.
   c) The operator must monitor the system if the error shows.

   Result

   Stop.

6.16.9 Code SA 28 SPN 520225 FMI 13

The guidance controller has found that the signal from the internal inertial sensor is outside of the calibration limits. The internal inertial sensor measures vehicle roll. The guidance controller uses the internal inertial sensors to assist with guidance and to better the precision on undulating terrain. The internal inertial sensors are in the guidance unit and are unserviceable if there is a failure.

Diagnosis and Solution

1. Energize the guidance controller and the check the voltage.
   a) Disconnect the power to the guidance controller through the correct switch for 30 seconds.
   b) Connect power to the guidance controller.
   c) Make sure the system voltage remains above 9VDC in all conditions.

   Result

   Expected result - there is no longer a diagnostic fault code.

   Results:

   - Yes - the system reported a wrong diagnostic.

     Go to see step 2, page 6-241 .

b) Read the parameters on the steering subsystem (PVED-CL).
c) Navigate through the list of read parameters to index 65105.
d) Check to see what the value of index 65105.

Result

Expected result - the parameter value configured to 255.

Results:

- Yes - the parameter value configured to 255. The parameter correctly configured.

  Repair - the correct parameters correctly configured.

  Stop.

- No - the parameter not correctly configured.

  Go to see step 3, page 6-256 .

3. Flash the software on the guidance and the PVED-CL valve.
a) Do the flash procedure for the guidance controller and the PVED-CL.
b) Configure the parameters on the steering subsystem (PVED-CL).
c) Read the parameters on the steering subsystem (PVED-CL).
d) Navigate through the list of read parameters to index 65105.
e) Check to see what the value of index 65105.

Result

Expected result - the parameter value configured to 255.

Results:

- Yes - the parameter value configured to 255. The parameter correctly configured.

  Repair - the correct parameters correctly configured.

  Stop.

- No - the parameter not correctly configured.

  Repair - Contact AGCO technical support.

  Stop.

4. Report the wrong diagnostic.
a) Report the wrong diagnostic to the AGCO technical support.
b) The operator can continue operating the system.
c) The operator must monitor the system if the error shows.

Result

Stop.

6.16.28 Code SA 28 SPN 520267 FMI 7

The guidance controller has found the PVED-CL steering controller is in fault mode. Additional diagnostic troubleshooting codes should exist for the PVED-CL steering controller.

Possible causes

- The steering angle sensor absolute (SASA) or the wheel angle sensor failure.
- Wiring fault between the PVED-CL steering controller and sensor(s).
- The PVED-CL steering controller has an internal critical error.
- Not enough electrical power supply to the PVED-CL steering controller.

Diagnosis and Solution

1. Check for additional PVED-CL steering controller error codes.

2. Report the wrong diagnosis.
   a) Report the wrong diagnosis to AGCO technical support.
   b) The customer can continue operation of the system.
   c) The customer must monitor the system for the same error.

   Result

   Stop.

6.16.52 Code SA 28 SPN 520293 FMI 14

An implement and a way line are not selected. An implement and a way line must be selected in order to engage the guidance system.

Possible cause:

- The implement and way line are not selected.

Diagnosis and solution

1. Make a way line and an implement prior to engaging the guidance system.

   Result

   Expected result - there is no longer a diagnostic fault code.

   Results:

   - Yes - the system was operating correctly.

     Go to see step 2, page 6-272 .

   - No - go to see step 3, page 6-272 .

2. Continue normal operation.
   a) Report the wrong diagnosis to AGCO technical support if the problem continues.

   Result

   Stop.

3. Select an implement and a way line prior to engaging the guidance system.

   Result

   Expected result - there is no longer a diagnostic fault code.

   Results:

   - Yes - the system is operating correctly.

     Stop.

   - No - the guidence system has a hardware failure.

     The guidence system hardware requires replacement per the customers warranty.

     Stop.

6.16.53 Code SA 28 SPN 520294 FMI 14

An implement is not selected. An implement must be selected to engage the guidance system.

Possible cause:

- The implement is not selected.

Diagnosis and solution

1. Select an implement.
   a) Set the implement width.

- No - the guidance system has a hardware failure.

  Restart the guidance system.

  The guidance system hardware requires replacement per the customers warranty.

  Stop.

6.16.81 Code SA 28 SPN 520366 FMI 14

The system is not able to get a good connection to the base station.

Diagnosis and Solution

1. Make sure the serial connection to the base station has a connection and uses a null modem if necessary.

a) Make sure the wires have a connection.
b) Make sure the null modem is present.
c) Make sure to energize the base station.

Result

Expected result - there is no longer a diagnostic fault code.

Results:

- Yes - the base information not connected correctly.

  Stop.

- No - the base information entered correctly.

  Go to see step 2, page 6-288 .

2. Not correct base information.

a) Make sure base information entered correctly in the system.
b) Make sure the base channel matches that entered.
c) Make sure the communication settings match that entered.

Result

Expected result - there is no longer a diagnostic fault code.

Results:

- Yes - the base information not connected correctly.

  Stop.

- No - the base information entered correctly.

  Go to see step 3, page 6-288 .

3. Hardware failure.

a) Replace the real-time kinematic (RTK) module.
b) Replace the base station.

Result

Repair - replace the hardware.

Stop.

6.16.82 Code SA 28 SPN 520382 FMI 14

The system is not able to get a good connection to the base station.

ECU fault codes for software version h411-0.5.1-l.

- **FLm = Fuel limit by map**
- **Degradation 1 = 75% from max power**
- **Degradation 2 = 50% from max power + Speed Limit 1800 rpm**
- **Degradation 3 = 50% from max power + Speed Limit 1500 rpm**
- **SPN, FMI: Fault codes according to the standard SAE J1939**

	Fault description	SPN	FMI	Degradation	Emission degradation	Shutdown (delayed)
Main relay	Main relay early opening at previous afterrun	1485	31			
MOCSOP (Test of redundant shut-off paths)	ECU internal fault 0108	520215	31			
	ECU internal fault 0109	520216	31			
DOC inlet temperature	DOC inlet temp sensor voltage above normal or open circuit	4753	3		X	
	DOC inlet temp sensor voltage below normal	4753	4		X	
	DOC inlet temperature value not plausible	4753	10		X	
Catalyst inlet temperature sensor	SCR catalyst inlet gas temp sensor voltage above normal or open circuit	4360	3		X	
	SCR catalyst inlet gas temp sensor voltage below normal	4360	4		X	
	SCR catalyst inlet gas temp sensor value abnormal rate of change	4360	2		X	
	SCR catalyst inlet temperature value not plausible	4360	10			
Catalyst outlet temperature sensor	SCR catalyst outlet gas temp sensor voltage above normal or open circuit	4363	3		X	
	SCR catalyst outlet gas temp sensor voltage below normal	4363	4		X	
	SCR catalyst outlet gas temp sensor value abnormal rate of change	4363	2		X	
	SCR catalyst outlet temperature value not plausible	4363	10			
Upstream NOx sensor (intake)	Upstream NOx sensor missing or unavailable	3216	19		X	
	Upstream NOx sensor value implausible	3220	2		X	
	Upstream NOx sensor stability time exceeded	3220	12		X	
	Upstream NOx sensor supply voltage out of range	3218	14		X	

1.5 References

- Check the ECU operation with another EEM4F controller. If the system is functional and the fault is not active with the replacement ECU, then the original ECU is defective.

2.2.31 SPN 109, FMI 3, Coolant pressure sensor voltage above normal or open circuit

Description

Measured coolant pressure sensor voltage signal is above normal operating range. Possible causes are:

- The coolant pressure sensor wiring is defective (Shorted to high source or open circuit)
- The coolant pressure sensor is defective

Reaction in EEM

FC is stored and warning lamp is activated. CAN message indicates active fault.

Solution

First save the error log and then erase it. Restart the ECU after erasing the error log. If the fault occurs again during next driving cycle, check following paths:

- Check the coolant pressure sensor wiring, connectors and contact surfaces of the connector pins (possible oxidation).
- Check the operation with another coolant pressure sensor to see if coolant pressure sensor is defective.

See *Coolant pressure* (page 234) sensor for reference.

2.2.32 SPN 109, FMI 4, Coolant pressure sensor voltage below normal

Description

Measured coolant pressure sensor voltage signal is below normal operating range. Possible causes are:

- The coolant pressure sensor wiring is defective (Shorted to ground)
- The coolant pressure sensor is defective

Reaction in EEM

FC is stored and warning lamp is activated. CAN message indicates active fault.

Solution

First save the error log and then erase it. Restart the ECU after erasing the error log. If the fault occurs again during next driving cycle, check following paths:

- Check the coolant pressure sensor wiring, connectors and contact surfaces of the connector pins (possible oxidation).
- Check the operation with another coolant pressure sensor to see if coolant pressure sensor is defective.

See *Coolant pressure* (page 234) sensor for reference.

2.2.33 SPN 110, FMI 0, Coolant temperature HIGH, ALARM (>113C)

Description

The measured coolant temperature exceeds the overheating alarm limit. Possible causes are:

- The fuel supply pump pressure sensor is defective

Reaction in EEM

FC is stored and warning lamp is activated. Engine power will be reduced (Degradation Level 1). CAN message indicates active fault. Engine functions dependent on the fuel supply pump pressure are not active.

Solution

First save the error log and then erase it. Restart the ECU after erasing the error log. If the fault occurs again during next driving cycle, check following paths:

- Check the fuel supply pump pressure sensor wiring, connectors and contact surfaces of the connector pins (possible oxidation).
- Check the 5 V power supply to the sensor.
- Check the operation with another pressure sensor to see if fuel filter pressure sensor is defective.

See *Fuel supply pump inlet pressure* (page 227) sensor for reference.

2.2.65 SPN 1381, FMI 4, Fuel supply pump inlet pressure sensor voltage below normal

Description

The measured fuel supply pump pressure signal is below the normal operating range (< 0,4 V). Possible causes are:

- The fuel supply pump pressure sensor wiring is defective
- The fuel supply pump pressure sensor power supply is not correct
- The fuel supply pump pressure sensor is defective

Reaction in EEM

FC is stored and warning lamp is activated. Engine power will be reduced (Degradation Level 1). CAN message indicates active fault. Engine functions dependent on the fuel supply pump pressure are not active.

Solution

First save the error log and then erase it. Restart the ECU after erasing the error log. If the fault occurs again during next driving cycle, check following paths:

- Check the fuel supply pump pressure sensor wiring, connectors and contact surfaces of the connector pins (possible oxidation).
- Check the 5 V power supply to the sensor.
- Check the operation with another pressure sensor to see if fuel filter pressure sensor is defective.

See *Fuel supply pump inlet pressure* (page 227) sensor for reference.

2.2.66 SPN 1485, FMI 11, ECU internal fault 0100

Description

EEM4 system internal main relay is stuck. Possible reason is ECU hardware defect.

- ECU connector is defective

Reaction in EEM

FC is stored and warning lamp is activated. CAN message indicates active fault.

Solution

2.2.98 SPN 190, FMI 16, Engine Speed ABOVE NORMAL

Description

The Fault is activated if engine speed exceeds acceptable limit during operation. Possible cause:

- Engine braking while going downhill with too low gear ratio.

Reaction in EEM

FC is stored and warning lamp is activated. CAN message indicates active fault.

NOTE: Running the engine at excessive speed may damage the engine.

Solution

Engine will recover to normal operation, whenever the engine speed is reduced.

2.2.99 SPN 2659, FMI 1, EGR circulation mass flow rate below normal

Description

The EEM monitoring system has detected that EGR circulation rate is below normal. Possible causes are:

- Possible leakage in EGR piping
- The EGR pipe is blocked
- The shaft between EGR actuator and valve is defective.
- The valve is stuck
- The EGR actuator is defective

Reaction in EEM

FC is stored and warning lamp is activated. CAN message indicates active fault.

Solution

First save the error log and then erase it. Restart the ECU after erasing the error log. If the fault occurs again during next driving cycle, check following paths:

- Check EGR installation by visually to detect possible leakage.
- Check that shaft between actuator and valve is in order. Shaft should be movable when ignition and ECU is shutted OFF.
- Check the EGR actuator wiring, connectors and contact surfaces of the connector pins (possible oxidation).
- Check operation with another EGR actuator.

See *Exhaust gas temperature* (page 233) sensor for reference.

2.2.100 SPN 2791, FMI 0, EGR Valve temperature alert

Description

EGR actuator temperature is too high. Possible causes are:

- The EGR actuator is defective.
- The EGR actuator wiring is defective
- The EGR actuator water cooling pipes are defective if assembled

Reaction in EEM

- The voltage converter is defective (optional)
- The NOx sensor is defective

Reaction in EEM

FC is stored and warning lamp is activated. CAN message indicates active fault.

NOTE: Present fault is classified as a emission related fault. Engine power will be reduced after certain time which is defined by authorities.

Solution

First save the error log and then erase it. Restart the ECU after erasing the error log. If the fault occurs again during next driving cycle, check following paths:

- Check the NOx sensor wiring, connectors and contact surfaces of the connector pins (possible oxidation).
- Check the alternator operation. Measure alternator voltage and battery voltage.
- Check voltage converter operation if there is one in the system.
- Check the operation with another NOx sensor to see if sensor is defective.

See *NOx* (page 232) sensor for reference.

2.2.135 SPN 3229, FMI 2, Downstream NOx sensor maximum heating time exceeded

Description

The downstream NOx sensor maximum heating time exceeded after detecting the dew point. Possible causes are: * The downstream NOx sensor is defective

Reaction in EEM

FC is stored and warning lamp is activated. CAN message indicates active fault. NOTE: Present fault is classified for emission related fault. Engine power will be reduced after certain time which defined by authorities.

Solution

First save the error log and then erase it. Restart the ECU after erasing the error log. If the fault occurs again during next driving cycle, check following paths:

- Check that the downstream NOx sensor is connected correctly
- Check the downstream NOx sensor wiring, connectors and contact surfaces of the connector pins (possible oxidation).
- Check the operation with another NOx sensor to see if downstream NOx sensor is defective.

2.2.136 SPN 3230, FMI 12, Downstream NOx sensor stability time exceeded

Description

NOx sensor stabilation time is exceeded. Nox sensor stable bit doesn't reply to EEM4 request. Possible causes are:

- The downstream NOx sensor is defective
- The downstream NOx sensor is installed incorrectly
- Possible tampering

Reaction in EEM

2.2.170 SPN 3516, FMI 17, DEF concentration not valid

Description

Adblue suction module is installed in SCR tank. Suction module is independent unit which measures all the critical parameters of aqueous urea solution.

Measured DEF quality indicates: Measured urea concentration is < 0 %

Reaction in EEM

FC is stored and warning lamp is activated. Engine power is heavily reduced (Degradation Level 3). CAN message indicates active fault.

Solution

- Add valid Adblue to a external can and test suction module operation.

Save the error log and then erase it. Restart the ECU after erasing the error log. If the fault does not occur again during test cycle, check following paths:

- Drain fluid from DEF tank.
- Refill DEF tank with valid reducing agent (Adblue).

Save the error log and then erase it. Restart the ECU after erasing the error log. If the fault occurs again during next driving cycle, check following paths:

- Check operation with another Adblue suction module.

2.2.171 SPN 3516, FMI 19, Aftertreatment 1 Diesel Exhaust Fluid Information - message not present

Description

Adblue suction module is installed in SCR tank. Suction module is independent unit which measures all the critical parameters of aqueous urea solution.

EEM4 monitoring system is not able to detect DEF tank Information message from the bus.

Possible causes are:

- Fault is internal electronic fault in suction module.

Reaction in EEM

FC is stored and warning lamp is activated. Engine power is heavily reduced (Degradation Level 3). CAN message indicates active fault.

Solution

- Check the Adblue suction module wiring, connectors and contact surfaces of the connector pins (possible oxidation).

Save the error log and then erase it. Restart the ECU after erasing the error log. If the fault occurs again during next driving cycle, check following paths:

- Check operation with another Adblue suction module to see if module is defective.

2.2.172 SPN 3516, FMI 2, DEF concentration sensor error

Description

Adblue suction module is installed in SCR tank. Suction module is independent unit which measures all the critical parameters of aqueous urea solution.

Measured DEF quality indicates: Quality sensor optical data is incorrect

- The DEF suction line heater is defective

Reaction in EEM

FC is stored and warning lamp is activated. CAN message indicates active fault.

NOTE: Present fault is classified as a emission related fault. Engine power will be reduced after certain time which is defined by authorities.

Solution

First save the error log and then erase it. Restart the ECU after erasing the error log. If the fault occurs again during next driving cycle, check following paths:

- Check the DEF suction line heater relay wiring, connectors and contact surfaces of the connector pins (possible oxidation).
- Check the operation with another heater relay to see if relay is defective.

2.2.204 SPN 4340, FMI 5, DEF suction line heater control circuit open circuit

Description

EEM4 monitoring system has detected open circuit on DEF suction line heater control circuit. Possible causes are:

- The DEF suction line heater relay wiring is defective.
- The DEF suction line heater relay is defective

Reaction in EEM

FC is stored and warning lamp is activated. CAN message indicates active fault.

NOTE: Present fault is classified as a emission related fault. Engine power will be reduced after certain time which is defined by authorities.

Solution

First save the error log and then erase it. Restart the ECU after erasing the error log. If the fault occurs again during next driving cycle, check following paths:

- Check the DEF suction line heater relay wiring, connectors and contact surfaces of the connector pins (possible oxidation).
- Check the operation with another heater relay to see if relay is defective.

2.2.205 SPN 4342, FMI 3, DEF backflow line heater control circuit short circuit to HIGH SOURCE

Description

EEM4 monitoring system has detected short circuit on DEF backflow line heater control circuit. Possible causes are:

- The DEF backflow line heater wiring is defective. (Shorted to high source)
- The DEF backflow line heater relay is defective

Reaction in EEM

FC is stored and warning lamp is activated. CAN message indicates active fault.

NOTE: Present fault is classified as a emission related fault. Engine power will be reduced after certain time which is defined by authorities.

Solution

2.2.239 SPN 4753, FMI 10, DOC inlet temperature value not plausible.

Description

The DOC inlet temperature sensor value is not plausible. Possible causes are: * The DOC inlet temperature sensor is disconnected * The DOC inlet temperature sensor wiring is defective * The DOC inlet temperature sensor is cross connected with SCR inlet or SCR outlet sensor * The DOC inlet temperature sensor is defective

Reaction in EEM

FC is stored and warning lamp is activated. CAN message indicates active fault. NOTE: Present fault is classified for emission related fault. Engine power will be reduced after certain time which defined by authorities.

Solution

- Check that the DOC inlet temperature sensor is connected correctly
- Check the DOC temperature sensor wiring, connectors and contact surfaces of the connector pins (possible oxidation)
- Check that exhaust temperature sensors are not cross connected
- Check the operation with another DOC inlet temperature sensor to see if DOC inlet temperature sensor is defective.

2.2.240 SPN 4753, FMI 3, DOC inlet temp sensor voltage above normal or open circuit

Description

The measured DOC inlet gas temp signal is below the normal operating range (< 2,3 V). Possible causes are:

- The inlet gas temp sensor wiring is defective
- The inlet gas temp sensor is defective

Reaction in EEM

FC is stored and warning lamp is activated. CAN message indicates active fault.

NOTE: Present fault is classified as a emission related fault. Engine power will be reduced after certain time which is defined by authorities.

Solution

First save the error log and then clear it. After clearing restart the ECU, if the fault occurs again during next driving check following paths:

- Check the inlet gas temp sensor wiring, connectors and contact surfaces of the connector pins (possible oxidation).
- Measure sensor resistance value at known temperature.
- Check the operation with another inlet gas temp. sensor to see if sensor is defective.

See *Exhaust gas temperature* (page 233) sensor for reference.

2.2.241 SPN 4753, FMI 4, DOC inlet gas temp. sensor voltage below normal

Description

The measured DOC inlet gas temp signal is below the normal operating range (< 0,7 V). Possible causes are:

- The inlet gas temp sensor wiring is defective. (Shorted to ground)

First save the error log and then erase it. Restart the ECU after erasing the error log. If the fault occurs again during next driving cycle, check following paths:

- ECU shall be reprogrammed or replaced

2.2.274 SPN 520216, FMI 31, ECU internal fault 0109

Description

The fault is related to Monitoring concept of the redundant shut off paths:

This is very low level safety function in the ECU hardware to ensure the ECU could control the fuel injectors right away. The function is executed begin of the each driving cycle. Error could occur in case of wrong ECU settings in software or a real problem in the ECU hardware.

Reaction in EEM

FC is stored and warning lamp is activated. CAN message indicates active fault.

Solution

First save the error log and then erase it. Restart the ECU after erasing the error log. If the fault occurs again during next driving cycle, check following paths:

- ECU shall be reprogrammed or replaced

2.2.275 SPN 520217, FMI 31, ECU internal fault 0110

Description

The fault is related to Monitoring concept of the redundant shut off paths:

This is very low level safety function in the ECU hardware to ensure the ECU could control the fuel injectors right away. The function is executed begin of the each driving cycle. Error could occur in case of wrong ECU settings in software or a real problem in the ECU hardware.

Reaction in EEM

FC is stored and warning lamp is activated. CAN message indicates active fault.

Solution

First save the error log and then erase it. Restart the ECU after erasing the error log. If the fault occurs again during next driving cycle, check following paths:

- ECU shall be reprogrammed or replaced

2.2.276 SPN 520218, FMI 31, ECU internal fault 0111

Description

The fault is related to Monitoring concept of the redundant shut off paths:

This is very low level safety function in the ECU hardware to ensure the ECU could control the fuel injectors right away. The function is executed begin of the each driving cycle. Error could occur in case of wrong ECU settings in software or a real problem in the ECU hardware.

Reaction in EEM

FC is stored and warning lamp is activated. CAN message indicates active fault.

Solution

First save the error log and then erase it. Restart the ECU after erasing the error log. If the fault occurs again during next driving cycle, check following paths:

First save the error log and then erase it. Restart the ECU after erasing the error log. If the fault occurs again during next driving cycle, check following paths:

- Check the ECU operation with another EEM4 controller. If the system is functional and the fault is not active with the replacement ECU, then the original ECU is defective.

2.2.315 PN 520298, FMI 31, ECU internal fault 0133

Description

EEM4 monitoring system has detected internal failure. Possible reason is ECU hardware defect.

Reaction in EEM

FC is stored and warning lamp is activated. CAN message indicates active fault.

Solution

First save the error log and then erase it. Restart the ECU after erasing the error log. If the fault occurs again during next driving cycle, check following paths:

- Check the ECU operation with another EEM4 controller. If the system is functional and the fault is not active with the replacement ECU, then the original ECU is defective.

2.2.316 SPN 520307, FMI 31, Rail Pressure control: Pressure ABOVE measurable range

Description

The measured rail pressure is over critical limit. Measured pressure is > 2000bar. In case pressure control valve mechanical failure, EEM4 system continuously monitors rail pressure and if measured pressure >2150bar, engine will shutdown immediately.

Possible causes are:

- Pressure control valve is not working correctly (stuck)
- Pressure control valve wiring is defective
- The high pressure pump is not working correctly
- The high pressure pump wiring is defective
- The rail pressure sensor wiring is defective
- Rail pressure sensor power supply is not correct
- The rail pressure sensor is defective
- Pressure before high pressure pump too high (e.g. in the case of an electric presupply pump with pressure relief valve)

Reaction in EEM

FC is stored and warning lamp is activated. Engine power is heavily reduced (Degradation Level 3). CAN message indicates active fault. Engine functions dependent on rail pressure are not active.

NOTE: Due to the very high injection pressure (> 2000bar), during engine running there is a serious risk for injury, if the high pressure side has a leakage.

Solution

First save the error log and then erase it. Restart the ECU after erasing the error log. If the fault occurs again during next driving cycle, check following paths:

- Check the high pressure pump: Look for possible high pressure pump faults and inspect accordingly (e.g. faults with wiring and connectors)

Solution

First save the error log and then erase it. Restart the ECU after erasing the error log. If the fault occurs again during next driving cycle, check following paths:

- Check the crankshaft and camshaft repetition wiring, connectors and contact surfaces of the connector pins (possible oxidation).

Crank repetition signal pin numbers:

```
ECU 1   2.44 Output
ECU 2   2.66 Input
```

Also for for correct crank repetition signal operation. Jumper is needed between pins:

```
ECU 2   2.65
ECU 2   2.10
```

Cam repetition signal pin numbers:

```
ECU 1   2.43 Output
ECU 2   2.68 Input
```

Also for for correct cam repetition signal operation. Jumper is needed between pins:

```
ECU 2   2.67
ECU 2   2.32
```

- Look for possible electromagnetic noise sources on or close to the vehicle, disturbing the signal (devices using or carrying high currents, high voltages or strong magnetic fields).

See *Camshaft speed* (page 221) sensor for reference.

See *Crankshaft speed* (page 221) sensor for reference.

2.2.342 SPN 520387, FMI 0, ECU 2 over temperature HIGH, ALARM

Description

EEM4 monitoring system has detected too high internal ECU 2 temperature. Possible causes are:

- Vehicle cooling system is defective

Reaction in EEM

FC is stored and warning lamp is activated. CAN message indicates active fault. The engine will stop after 30 seconds, if ECU internal temperature continuously >114 °C.

Solution

First save the error log and then erase it. Restart the ECU after erasing the error log. If the fault occurs again during next driving cycle, check following paths:

- Let the engine cool down and try touch ECU by hand. If it is still very hot and faultcode is active try to replace the ECU.
- If there is faultcode in fault log which refers engine overheating, this faultcode should heal after applicable time (ecu_t< 109°C).
- Check the ECU operation with another EEM4 controller. If the system is functional and the fault is not active with the replacement ECU, then the original ECU is defective.

2.2.343 SPN 520388, FMI 31, Rail Pressure control: Over pressure protection mode activated

Description

Reaction in EEM

FC is stored and warning lamp is activated. CAN message indicates active fault. Engine start is disabled.

Solution

Contact a local representative service.

2.2.375 SPN 522073, FMI 31, Rail over pressure monitoring count exceeded

Description

The EEM monitoring system has detected that rail over pressure monitoring count has been exceed. In fault condition e.g. rail pressure sensor is defective, there is possibility that rail pressure might rise too high. Rail over pressure counter is always increment by one in fault condition. When counter is full this error is relesaed.

Reaction in EEM

FC is stored and warning lamp is activated. CAN message indicates active fault. Engine start is disabled.

Solution

Contact a local representative service.

2.2.376 SPN 522212, FMI 31, DEF dosing valve after cooler current above normal or short to GROUND

Description

DEF dosing valve after cooler current is above normal operating range. Possible causes are:

- The DEF dosing valve after cooler wiring is defective. (Shorted to ground)
- The DEF dosing valve after cooler is defective

Reaction in EEM

FC is stored and warning lamp is activated. CAN message indicates active fault.

Solution

First save the error log and then erase it. Restart the ECU after erasing the error log. If the fault occurs again during next driving cycle, check following paths:

- Check the DEF dosing valve after cooler wiring, connectors and contact surfaces of the connector pins (possible oxidation).
- Check the operation with another DEF dosing valve after cooler to see if after cooler is defective.

2.2.377 SPN 522213, FMI 31, DEF dosing valve after cooler current below normal or open circuit

Description

DEF dosing valve after cooler current is below normal operating range. Possible causes are:

- The DEF dosing valve after cooler wiring is defective. (Open circuit)
- The DEF dosing valve after cooler is defective

Reaction in EEM

FC is stored and warning lamp is activated. CAN message indicates active fault.

First save the error log and then erase it. Restart the ECU after erasing the error log. If the fault occurs again during next driving cycle, check following paths:

- Check the solenoid valve wiring, connector and contact surfaces of the connector pins (possible oxidation).
- Measure cables from solenoid valve to engine ground, to see if there is short circuit to ground.
- Check the operation with another diesel injector to see if diesel injector is defective.
- (For 3-cyl engine see *3-cyl engine injector harness* (page 243)), (For 4-cyl engine see *4-cyl engine injector harness* (page 243)), (For 6-cyl engine see *6-cyl engine injector harness* (page 243)), (For 7-cyl engine see *7-cyl engine injector harness* (page 245)), (For 12-cyl engine see *12-cyl engine injector harness* (page 245))

2.2.415 SPN 651, FMI 5, Engine injector cylinder #1, Current below normal: Open circuit

Description

The EEM4 system has detected open circuit on engine injector cylinder #1. Possible causes are:

- The solenoid valve connector is defective
- The solenoid valve wiring is defective
- The solenoid valve is defective

Reaction in EEM

FC is stored and warning lamp is activated. CAN message indicates active fault. Engine power will be heavily reduced (Degradation Level 3).

Solution

First save the error log and then erase it. Restart the ECU after erasing the error log. If the fault occurs again during next driving cycle, check following paths:

- Check the solenoid valve wiring, connector and contact surfaces of the connector pins (possible oxidation).
- Measure between solenoid valve 1 connectors and ECU connector, to see if there is faul in cables.
- Check the operation with another diesel injector to see if diesel injector is defective.
- (For 3-cyl engine see *3-cyl engine injector harness* (page 243)), (For 4-cyl engine see *4-cyl engine injector harness* (page 243)), (For 6-cyl engine see *6-cyl engine injector harness* (page 243)), (For 7-cyl engine see *7-cyl engine injector harness* (page 245)), (For 12-cyl engine see *12-cyl engine injector harness* (page 245))

2.2.416 SPN 652, FMI 13, Engine injector cylinder #2, Calibration value missing

Description

The EEM monitoring system has detected that calibration is missing from engine injector cylinder #2.

Reaction in EEM

FC is stored and warning lamp is activated. Engine power is heavily reduced (Degradation Level 3). CAN message indicates active fault.

Solution

Contact a local representative service. New injection calibration can be done by engine service tool.

2.2.453 SPN 723, FMI 31, Cam speed sensor signal missing

Description

The system has not been able to detect any signal from the camshaft sensor. Possible causes are:

- Invalid or no signal from camshaft sensor
- The sensor wiring is defective (signal lines reversed)
- The sensor is defective
- The trigger wheel is defective

Reaction in EEM

FC is stored and warning lamp is activated. CAN message indicates active fault. Engine power will be reduced (Degradation Level 2). Engine starting may take longer than normally and running may be bad due to missing/incorrect information for injection timing control. The engine runs with crankshaft speed sensor signal.

Solution

First save the error log and then erase it. Restart the ECU after erasing the error log. If the fault occurs again during next driving cycle, check following paths:

- Check the camshaft sensor wiring, connectors and contact surfaces of the connector pins (possible oxidation). Look for possible reverse connection.
- Check the coil resistance of the camshaft sensor (the engine must be stopped). The normal resistance values at + 20°C is 774 - 946 Ohms.
- Check the camshaft sensor mounting. The air gap between the sensor tip and trigger wheel teeth should be 0,2 - 1,0 mm.
- Check the condition of the camshaft trigger wheel. A damaged tooth may generate an abnormal pulse shape.
- Check the operation with another camshaft speed sensor to see if sensor is defective.

See *Camshaft speed* (page 221) sensor for reference.

2.2.454 SPN 723, FMI 8, Signal deviation between crankshaft and camshaft too large

Description

Signal between crankshaft and camshaft deviates too much. The synchronization between cam and crankshaft could be invalid. Possible causes are:

- Invalid signal from crankshaft sensor or crankshaft sensor
- The sensors wirings are defective
- The sensors are defective
- Distance between the sensor and the trigger wheel is too high, possibly loose sensor
- An external electromagnetic disturbance is affecting the sensor signal

Reaction in EEM

FC is stored and warning lamp is activated. CAN message indicates active fault. Engine power will be reduced (Degradation Level 2). Engine starting may take longer than normally and running may be bad due to missing/incorrect information for injection timing control. The engine runs with camshaft speed sensor signal.

Solution

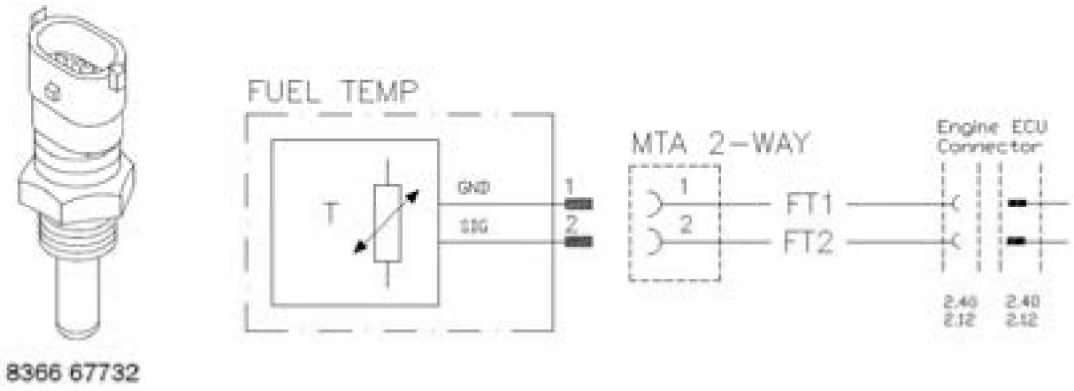


Figure 2.9: ECU connection EDC17CV41+, Fuel temperature sensor

T / [C°]	R / [Ω]
-40	45313
-20	15462
-10	9397
0	5896
20	2500
25	2057
40	1175
60	596
80	323
100	186
120	113
140	71
150	57

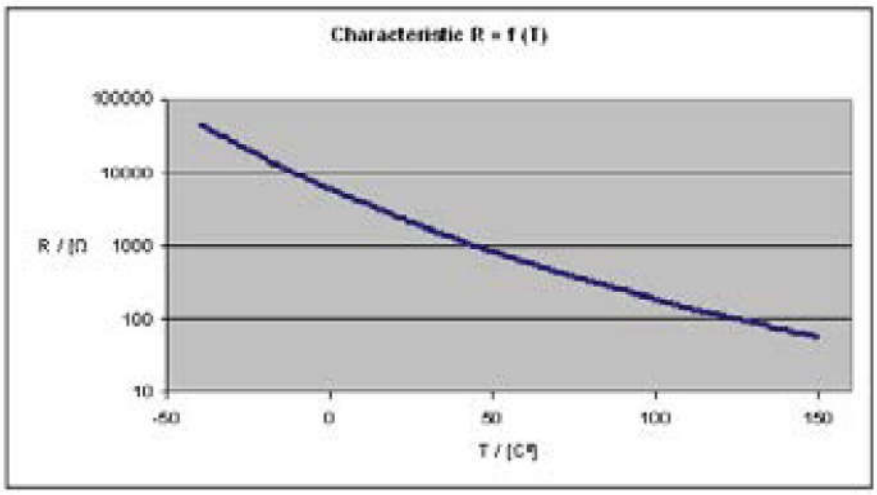
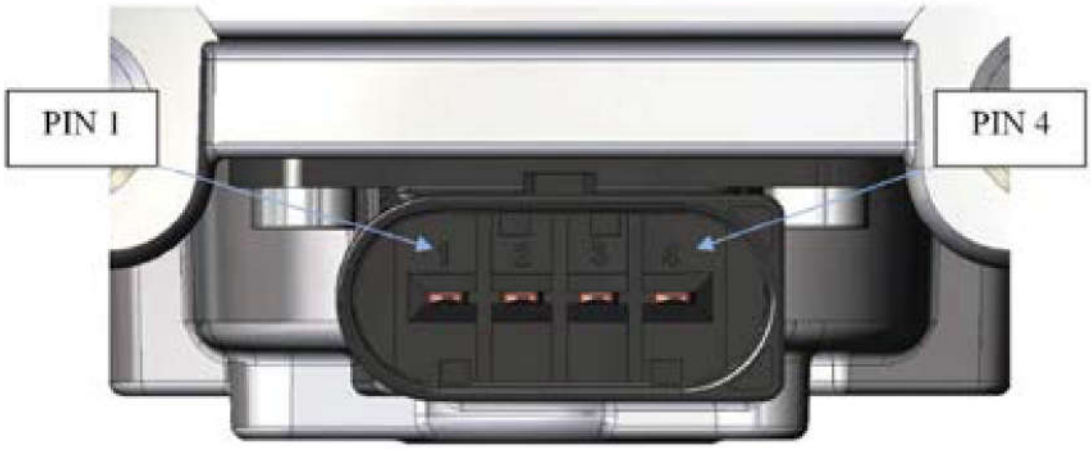


Figure 2.10: Characteristics, Fuel temperature sensor



Pin Number	Assignment
1	Vbat
2	GND
3	CAN low
4	CAN high

Figure 2.35: EGR actuator pinout

The electrical throttle valve is a component of electronic engine management system. Throttle valve consists of position sensor, electromagnetic rotary drive, coupling unit, flap and housing. A spring ensures that flap is rotated in the "open" direction if no supply current is available.

ECU connection

Pin numbers at ECU:

```
EDC17CV41+      2.04 Throttle High side
EDC17CV41+      2.28 Throttle Low side
EDC17CV41+      2.10 Supply voltage
EDC17CV41+      2.62 Input signal
EDC17CV41+      2.69 Ground
```

Throttle connection is shown in figure *ECU connection EDC17CV41+, Electrical throttle valve* (page 242).

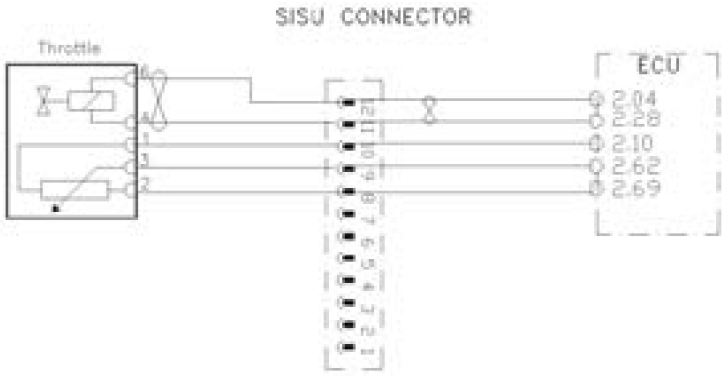


Figure 2.36: ECU connection EDC17CV41+, Electrical throttle valve

8. Connect the electrical harness to the compressors electrical connector (1).
9. Connect the heater hoses.

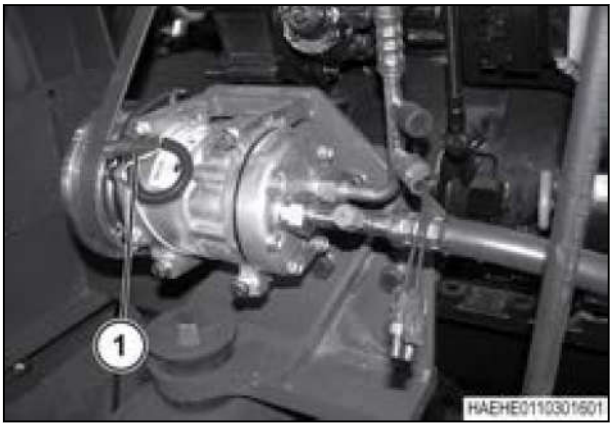


Fig. 11

10. Connect the three electrical harness connectors.
11. Have the air conditioning system charged by a certified HVAC technician.

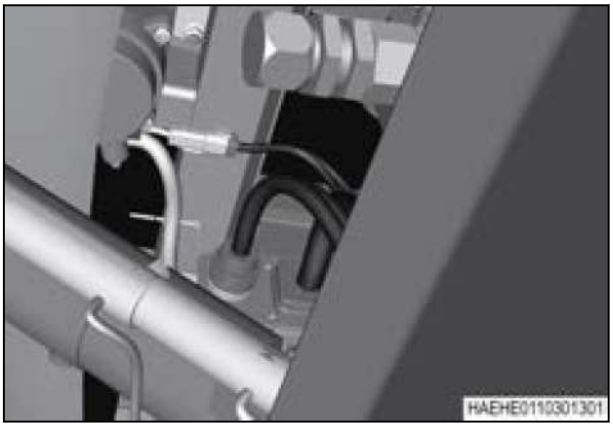


Fig. 12

12. On the left-hand bottom corner, remove the brace (1) and the washer (2).

13. Remove the lever bracket (3).

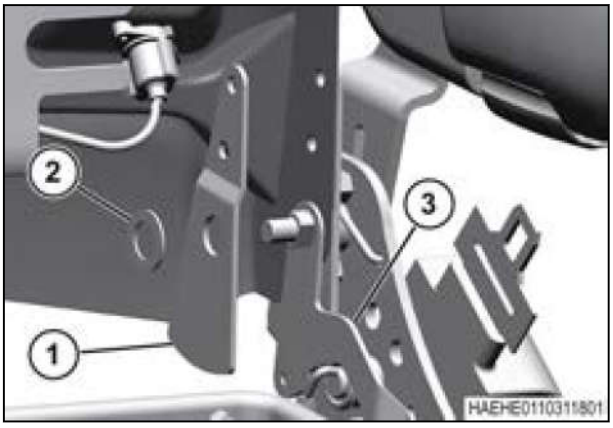


Fig. 46

14. Slide the seat assembly (1) forward all the way.

15. Loosen and remove the two nuts (2) that fasten the bracket (3) to the frame (4) of the seat.

16. Remove the seat back (5).

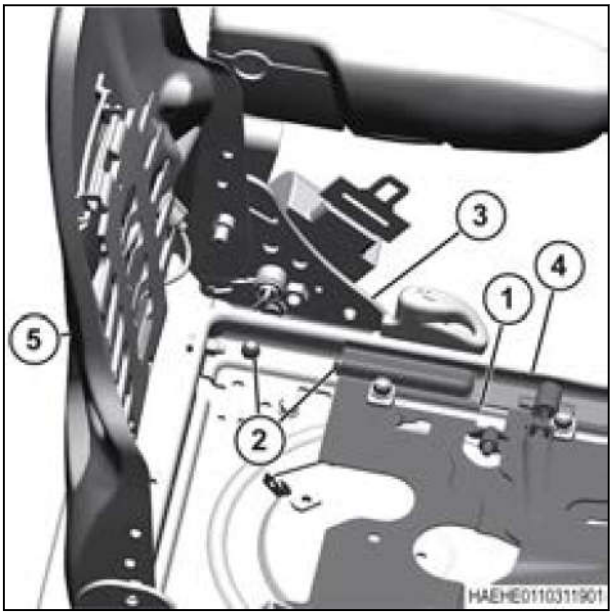


Fig. 47

7.5.13.1 Removing the isolator lever

Procedure

1. Remove the top plugs (1) that secure the bellows (2) to the frame of the seat.
2. Lower the bellows for access to the bracket assembly for the isolator lever (3).

   If necessary, remove the shock absorber knob (4).

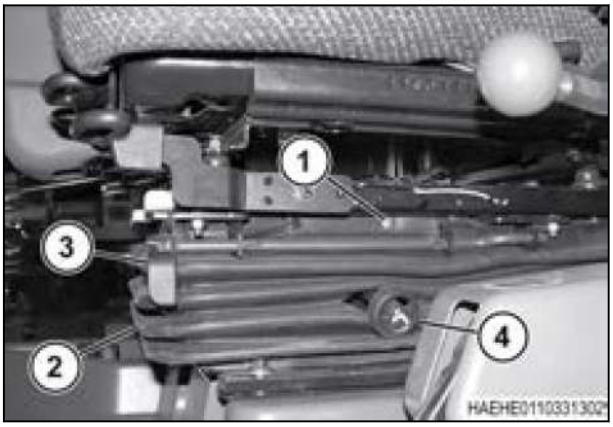


Fig. 94

3. Push the pivot pin (1) toward the rear of the seat.

   IMPORTANT:
   Do not remove the pivot pin by pushing the pivot pin toward the front of the seat.
4. Remove the pivot pin, pivot bracket (2) and the isolator lever (3).

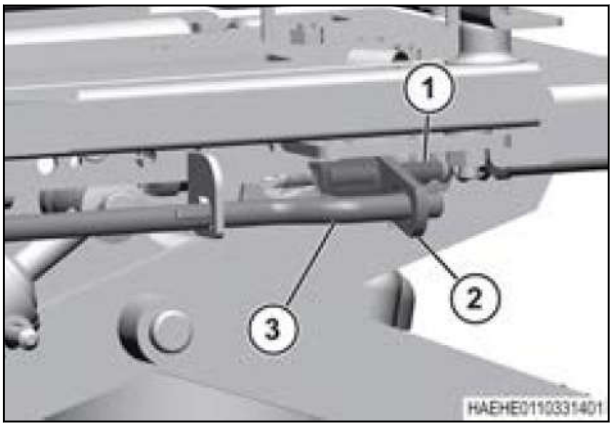


Fig. 95

7.5.13.2 Installing the isolator lever

Procedure

1. Put the pivot bracket (1) into position.
2. Put the isolator lever (2) into position.
3. Put the pivot pin (3) into the front side of the pivot block.

   Push the pivot pin toward the rear of the seat. The pivot pin must be flush with the back side of the pivot block.

   IMPORTANT:
   Do not install the pivot pin by pushing the pin toward the front of the seat.

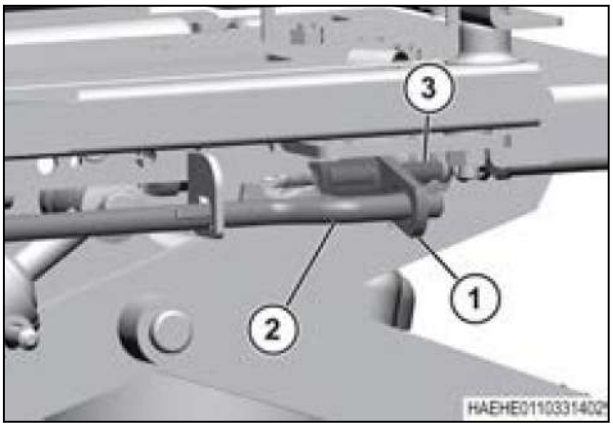


Fig. 96

7.5.19.2 Installing the seat compressor

Procedure

1. Install the compressor (1).
2. Install the two bolts (2) that secure the compressor clamp (3).
3. Install all electrical, air connections, and ties as required.

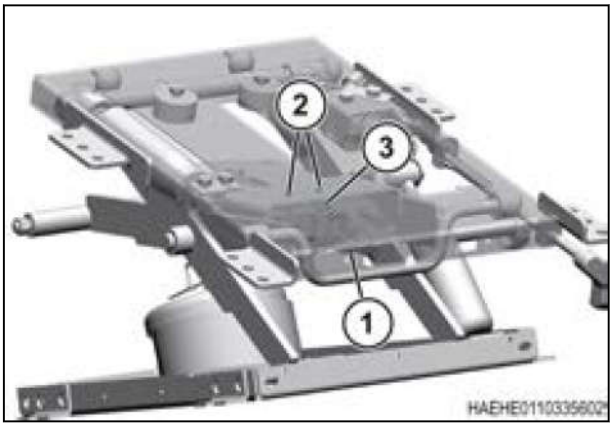


Fig. 144

4. Lower the rear end of the suspension (1).

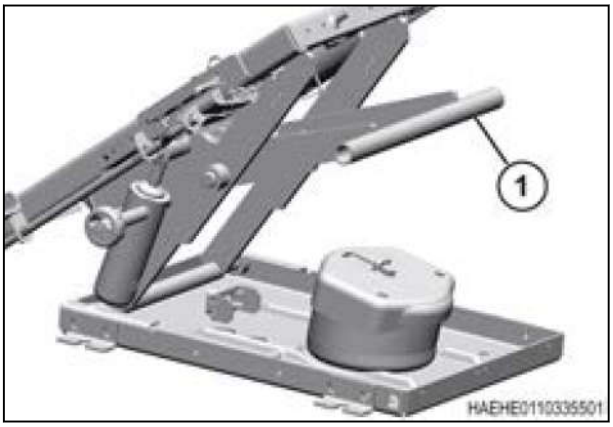


Fig. 145

5. Connect all wires and hoses.
6. Apply lubricant to the shaft. Do not apply lubricant to the threads.
7. Install the pivot pin (1) and the bearing tubes (2).
8. Install the nut (3) on the pivot pin.

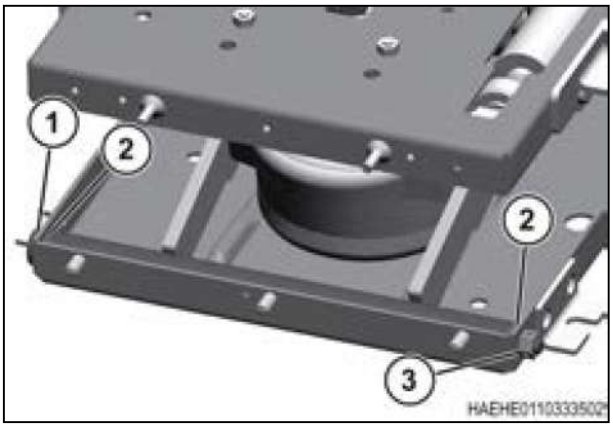


Fig. 146

26. Remove the roller (1) from the lower left-hand side of the suspension (2).

27. Remove the bearing sleeve (3) from the lower left-hand side of the suspension.

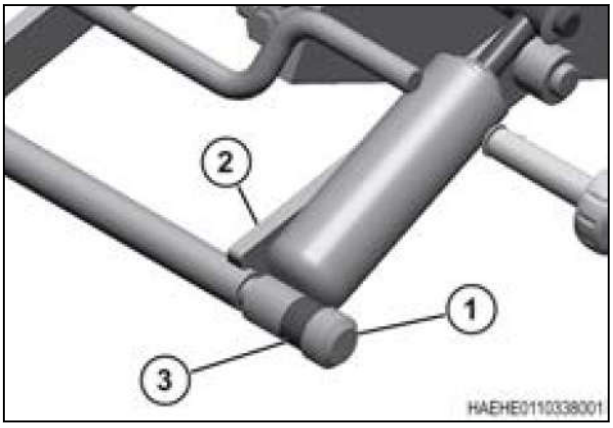


Fig. 194

28. Remove the internal tooth retainer (1).

29. Remove the shock absorber (2).

30. Remove the shock sleeve (3).

31. Remove the washer (4).

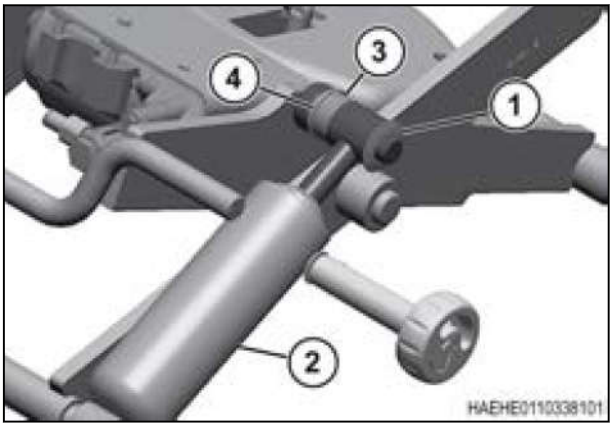


Fig. 195

32. Remove the two bolts (1) that secure the compressor clamp (2) to the bracket (3).

33. Remove the compressor (4).

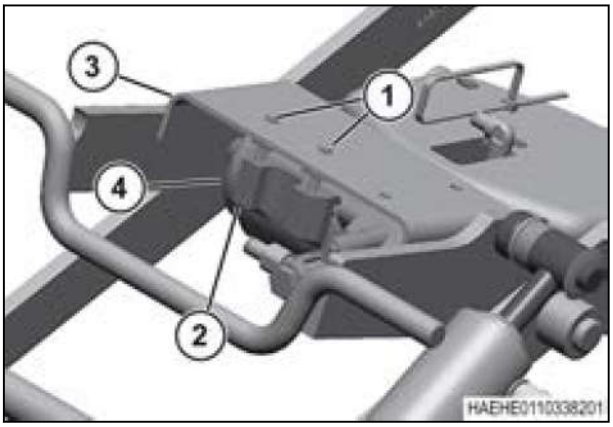


Fig. 196

- The formation of black sludge deposits in the system is a result of water contamination with the PAG oil. The contamination creates hydrofluoric acid whic results in sludge. The sludge causes desiccant breakdown and compressor component damage.
- White foam during recovery is normal. The foam is from the mixing oil and refrigerant.
- The R134a system charges must be within 0.03 kg to 0.06 kg (1 oz to 2 oz) of the specified charge for the unit.
- PAG oil and ester oil must never be mixed.
- All of the O-rings should be coated with mineral oil.

  NOTE: *Do not use PAG oil on O-rings. PAG oil is hygroscopic and attracts moisture which leads to rapid degradation of the O-rings.*

A loss of cooling or failure of the compressor can be caused by one or more of the following conditions:

- Low charge
- High charge
- Too much oil
- Dirty or plugged filter
- Dirty or plugged condenser

Temperature C (F)	Inches of vacuum	Microns	kPa (psi)
70 degrees C (158 degrees F)	526.3 mm Hg (20.72041 in Hg)526.3	233680 microns	31.2 kPa (4.525177 psi)
60 degrees C (140 degrees F)	610.6 mm Hg (24.0393 in Hg)	149352 microns	19.9 kPa (2.886251 psi)
50 degrees C (122 degrees F)	667.5 mm Hg (26.27945 in Hg)	92456 microns	12.3 kPa (1.783964 psi)
40 degrees C (104 degrees F)	704.9 mm Hg (27.75188 in Hg)	55118 microns	7.3 kPa (1.058775 psi)
30 degrees C (86 degrees F)	728.2 mm Hg (28.6692 in Hg)	31750 microns	4.2 kPa (.6091585 psi)
26.7 degrees C (80 degrees F)	734.6 mm Hg (28.92117 in Hg)	25400 microns	3.4 kPa (.4931283 psi)
24.4 degrees C (76 degrees F)	737.1 mm Hg (29.0196 in Hg)	22860 microns	3.0 kPa (.4361132 psi)
22.2 degrees C (72 degrees F)	739.6 mm Hg (29.11802 in Hg)	20320 microns	2.7 kPa (.3916019 psi)
20.6 degrees C (69 degrees F)	742.2 mm Hg (29.22038 in Hg)	17780 microns	2.4 kPa (.3480906 psi)
17.8 degrees C (64 degrees F)	744.7 mm Hg (29.31881 in Hg)	15240 microns	2.0 kPa (.2900755 psi)
15 degrees C (59 degrees F)	747.3 mm Hg (29.42117 in Hg)	12700 microns	1.7 kPa (.2465642 psi)
11.7 degrees C (53 degrees F)	749.8 mm Hg (29.5196 in Hg)	10160 microns	1.4 kPa (.2030528 psi)
7.2 degrees C (45 degrees F)	752.3 mm Hg (29.61802 in Hg)	7620 microns	1.0 kPa (.1450377 psi)
0 degrees C (32 degrees F)	755.4 mm Hg (29.74007 in Hg)	4572 microns	.6 kPa (.08702264 psi)
-6.1 degrees C (21 degrees F)	757.4 mm Hg (29.81881 in Hg)	2540 microns	.3 kPa (.04351132 psi)
-14.4 degrees C (6 degrees F)	758.7 mm Hg (29.86999 in Hg)	1270 microns	.2 kPa (.02900755 psi)
-31.1 degrees C (-24 degrees F)	759.7 mm Hg (29.90936 in Hg)	254 microns	.03 kPa (.004351132 psi)
-37.2 degrees C (-35 degrees F)	759.8 mm Hg (29.9133 in Hg)	127 microns	.02 kPa (.002900755 psi)
-51.1 degrees C (-60 degrees F)	759.9 mm Hg (29.91723 in Hg)	25.4 microns	.003 kPa (.000435113 psi)
-56.7 degrees C (-70 degrees F)	760 mm Hg (29.92117 in Hg)	12.7 microns	.002 kPa (.000290076 psi)
-67.8 degrees C (-90 degrees F)	760 mm Hg (29.92117 in Hg)	2.54 microns	.0003 kPa (.000049 psi)

5. Remove the temperature control module (1). Do not damage the tabs (2).

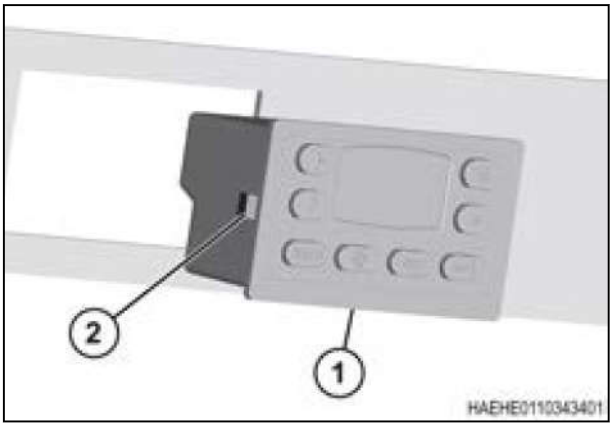


Fig. 26

6. Press the connector tabs (1) and remove the connectors from the temperature control module.

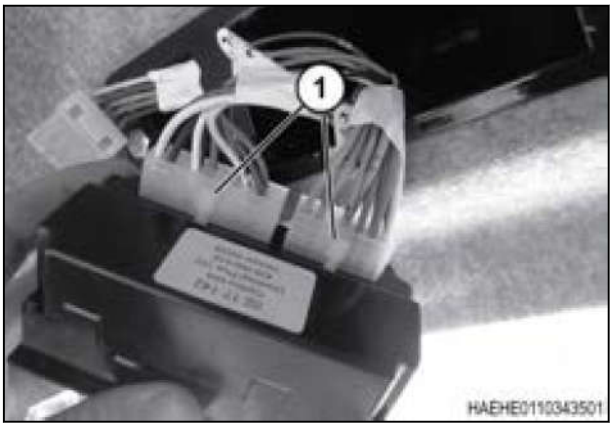


Fig. 27

8.8.11 Installing the temperature control module

Procedure

1. Park the machine on a solid, level surface.
2. Stop the engine, apply the park brake, and take the key with you.
3. Push the connector into the temperature control module until the tabs (1) engage.

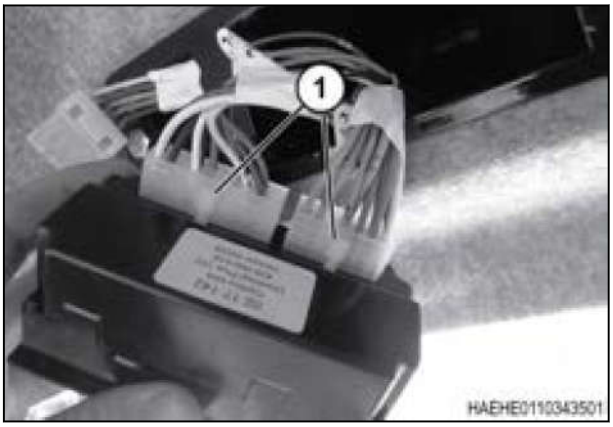


Fig. 28

8.13 Evaporator

8.13.1 Removing the evaporator

Before starting the procedure

Put caps and plugs on all hoses, fittings, ports, and openings to prevent contamination from entering the system.

Procedure

1. Park the machine on a solid, level surface.
2. Stop the engine, apply the park brake, and take the key with you.
3. Disconnect the electrical connector (1) from the compressor.
4. Evacuate the air conditioning system.

   IMPORTANT:
   The air conditioning system must be serviced by a certified technician.
5. Remove the cab roof.

   See the information for removing the cab roof.

Fig. 67

6. Remove the cover hardware (1).
7. Remove the cover (2).

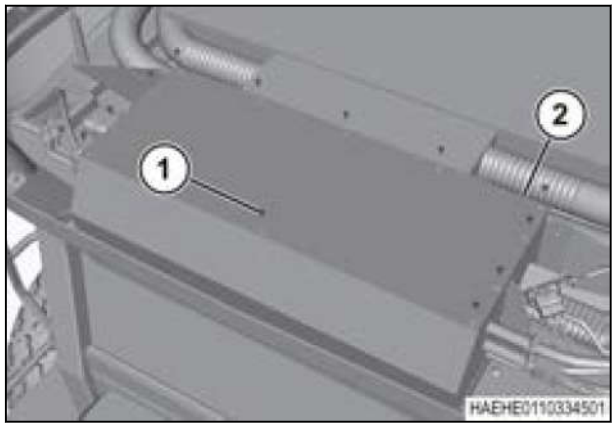


Fig. 68

8. Remove the foam (1) above the evaporator.

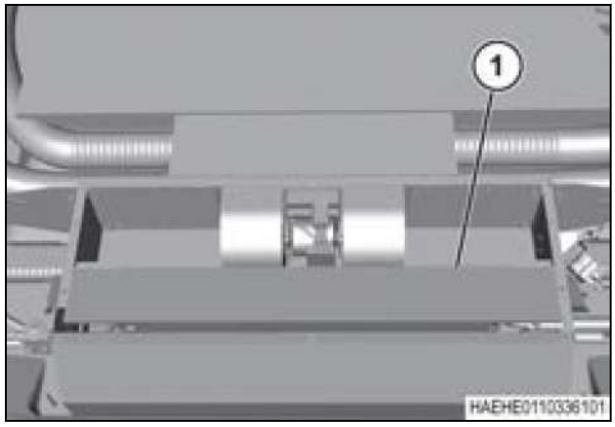


Fig. 69

5. Install the cable (1) onto the thermostat lever (2).

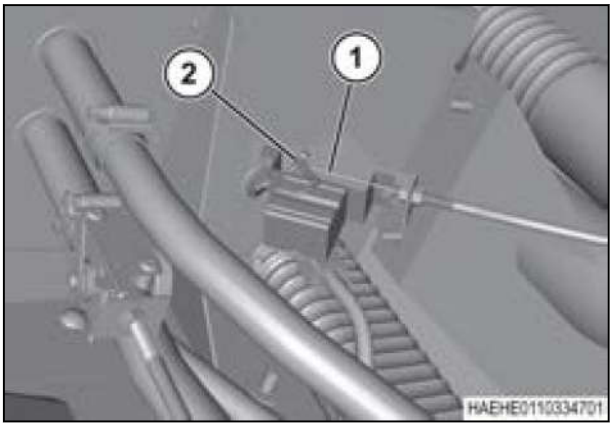


Fig. 111

6. Install the thermostat sensor (1) into the evaporator (2).

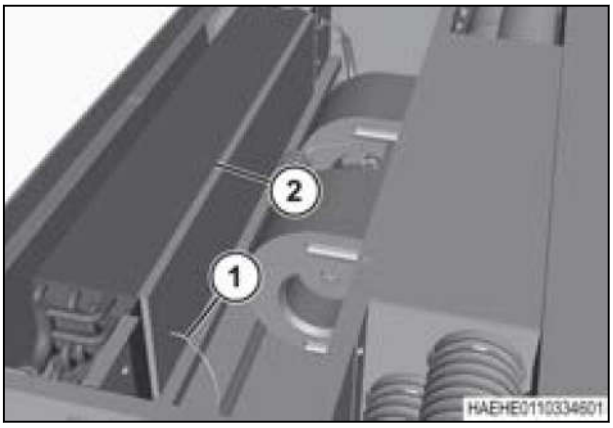


Fig. 112

7. Put the cover (2) into position.

8. Install the cover hardware (1).

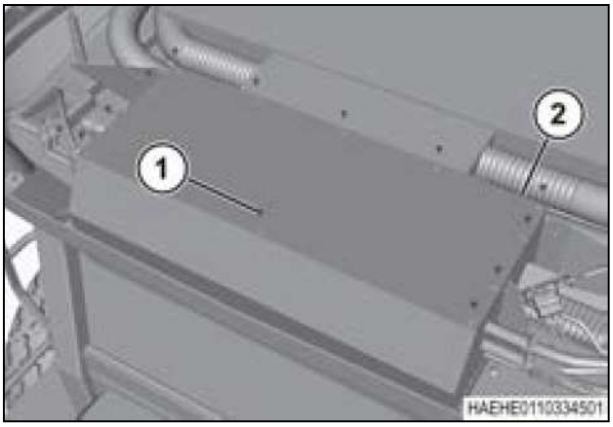


Fig. 113

9. Connect the wiring (1) to the thermostat (2).

10. Install the cab roof.

See the information for installing the cab roof.

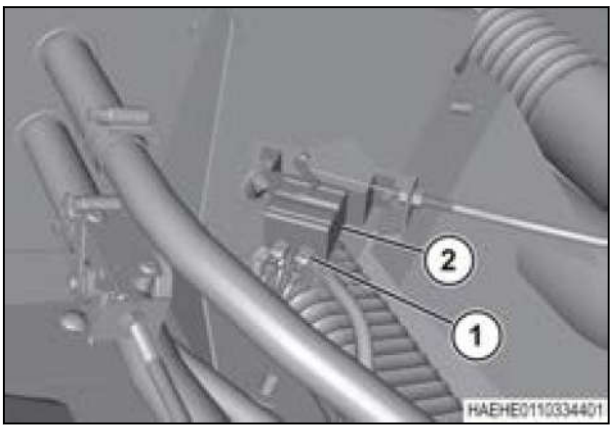


Fig. 114

12. Remove the limit strap hardware (1).

13. Support the suspended rear axle with correct lifting equipment.

The weight of the suspended rear axle is approximately 320 kg (700 lb).

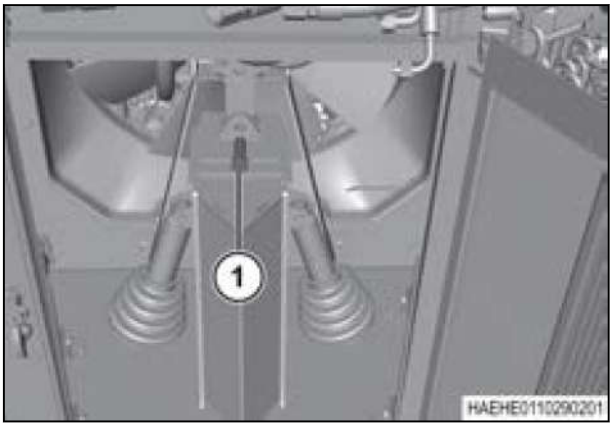


Fig. 33

14. Remove the shock absorber hardware (1).

15. Lower the suspended rear axle.

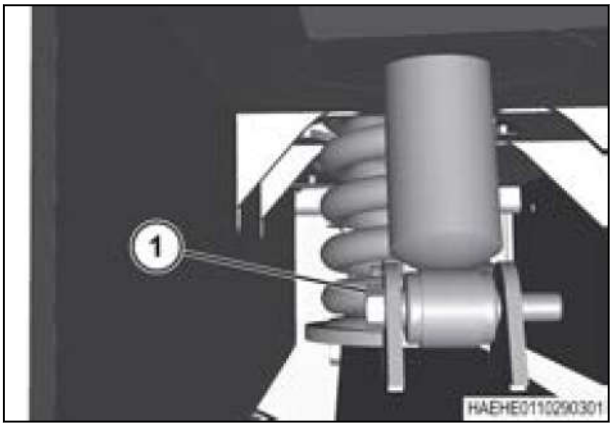


Fig. 34

16. Raise the compression spring (1).

17. Remove the cotter pin (2) and the clevis pin (3) from the limit strap (4).

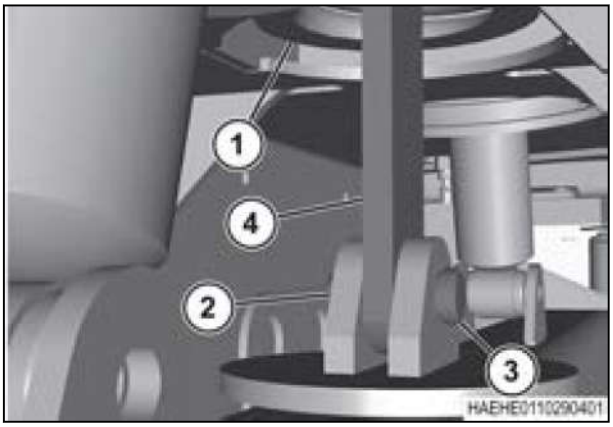


Fig. 35

18. Use the lifting equipment to remove the suspended rear axle (1).

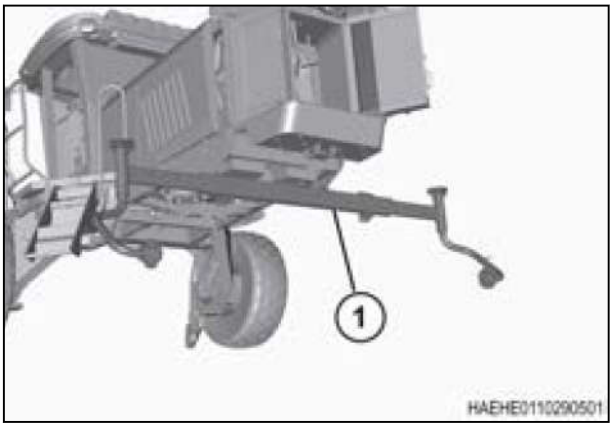


Fig. 36

11. Install the lift plate hardware (1).

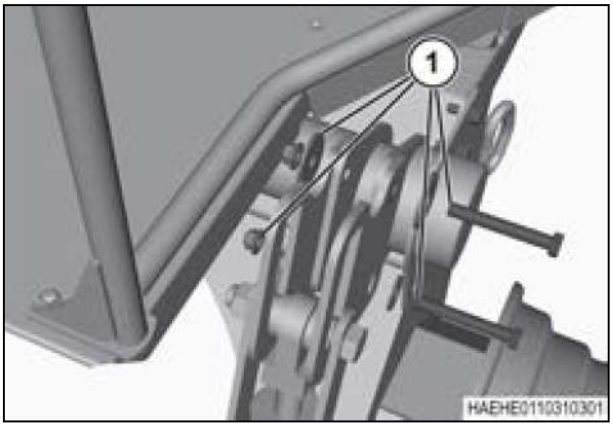


Fig. 22

12. Install the center support hardware (1).

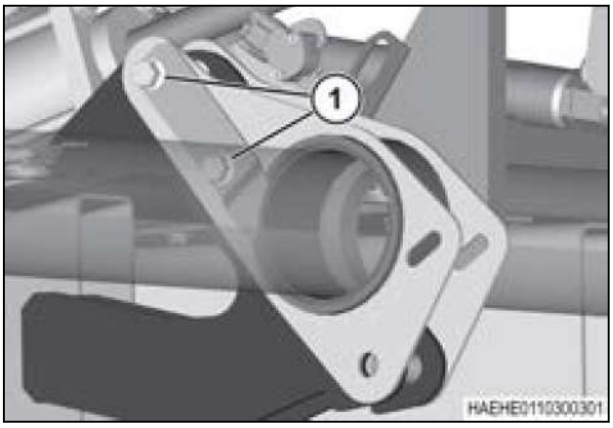


Fig. 23

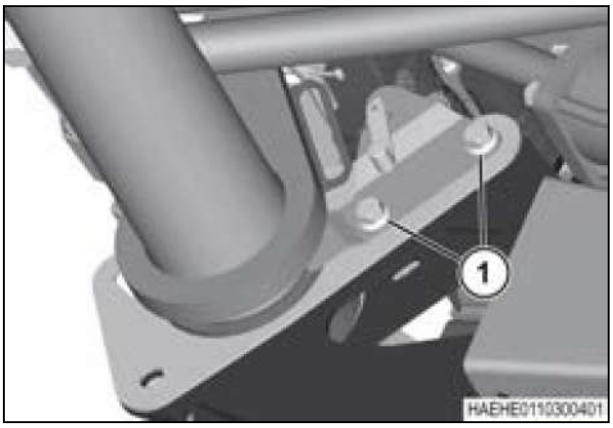


Fig. 24

12.1.5 Header drive pump schematic - WR9860 and WR9870

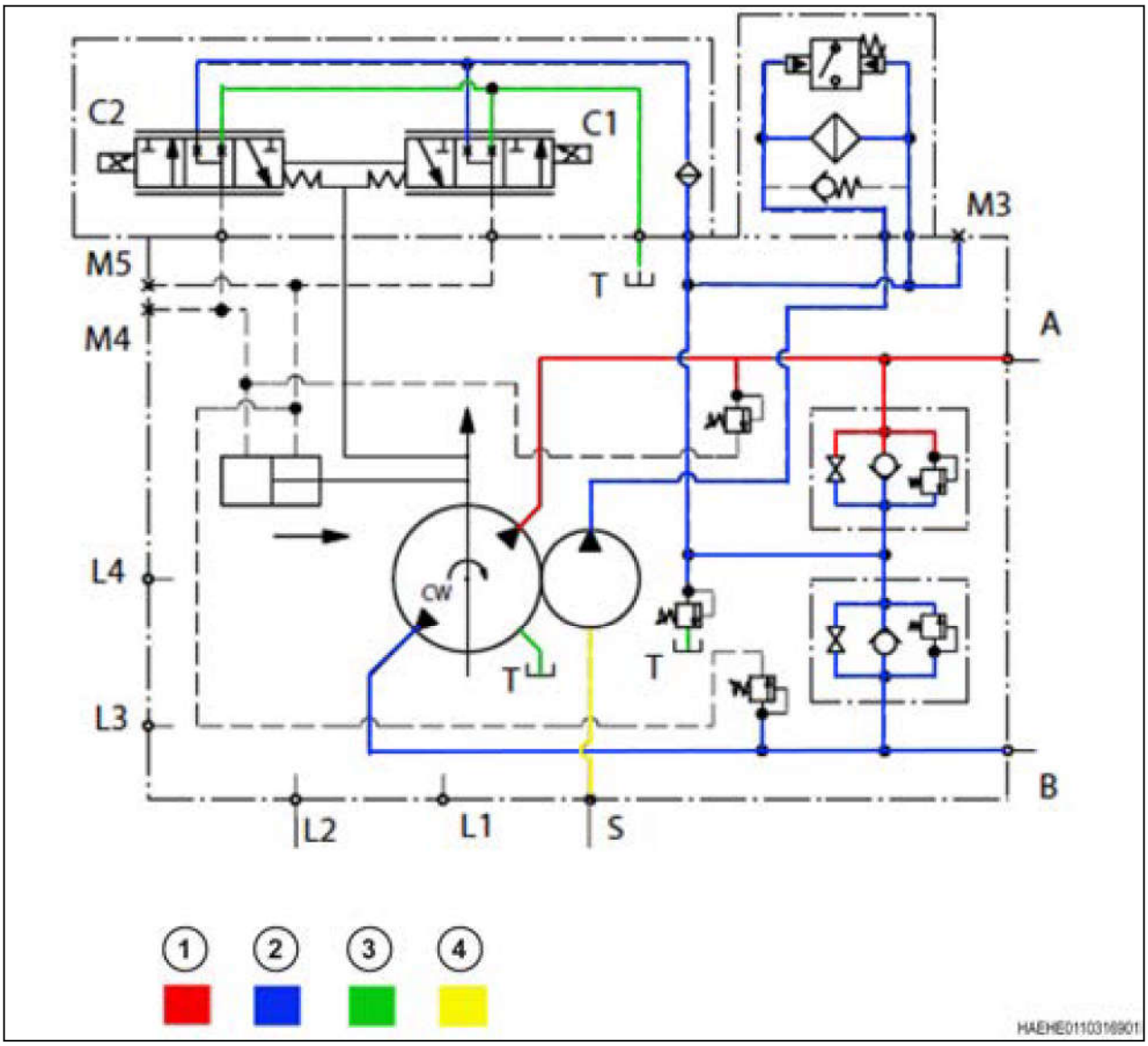


Fig. 9

(1) High pressure
(2) Charge pressure
(3) Case pressure
(4) Suction flow

DIN Number	Function	Location
B151	Up Stream Nox Sensor	WR18A.H11
B151	Up Stream Nox Sensor	WR08.F6
B152	Down Stream Exhaust Gas Temperature Sensor	WR18A.G19
B153	Down Stream Nox Sensor	WR18A.J11
B153	Down Stream Nox Sensor	WR08.C6
B160	Exhaust Gas Temperature Sensor (DOpen Center)	WR18A.N5
B191	Hydraulic Oil Level Sensor	WR16.C9
B192	Hydraulic Oil Temperature In	WR16.D9
B193	Fuel Level Sensor	WR12.B5
B193	Fuel Level Sensor	WR16.B9
B196	Coolant Level Sensor	WR12.B7
B196	Coolant Level Sensor	WR16.E9
B202	Hydraulic Oil Temperature Out	WR16.F9
B207	Fan Speed Sensor	WR19.D19
E27	Right-hand Rear Work Lamp	WR26.A20
E36	Right-hand Front Work Lamp 1	WR26.C20
E37	Right-hand Front Work Lamp 2	WR26.D20
E38	Right-hand Front Road Lamp	WR25.J20
E39	Center Work Lamp	WR26.E20
E40	Left-hand Front Road Lamp	WR25.M20
E41	Left-hand Front Work Lamp 2	WR26.F20
E42	Left-hand Front Work Lamp 1	WR26.G20
E43	Dome Lamp	WR26.K20
E45	Left-hand Rear Cab Work Lamp	WR26.J20
E47	Beacon Lamp	WR27.C20
E56	Dash Turn Indicator	WR27.G21
E57	Wait To Start Indicator	WR17.H9
E75	Right-hand Flasher	WR27.K20
E81	Left-hand Flasher	WR27.J20
E179	Water In Fuel Sensor	WR18A.L19
E198	Right-hand Rear Work Lamp	WR26.P20
E199	Right-hand Tail / Turn Lamp	WR27.M2
E200	Left-hand Tail / Turn Lamp	WR27.L2
E201	Left-hand Rear Work Lamp	WR26.M20
E276	Auxiliary Lamp Left-hand	WR26.M9
E277	Auxiliary Lamp Right-hand	WR26.P9

12.7.15 12V sensor

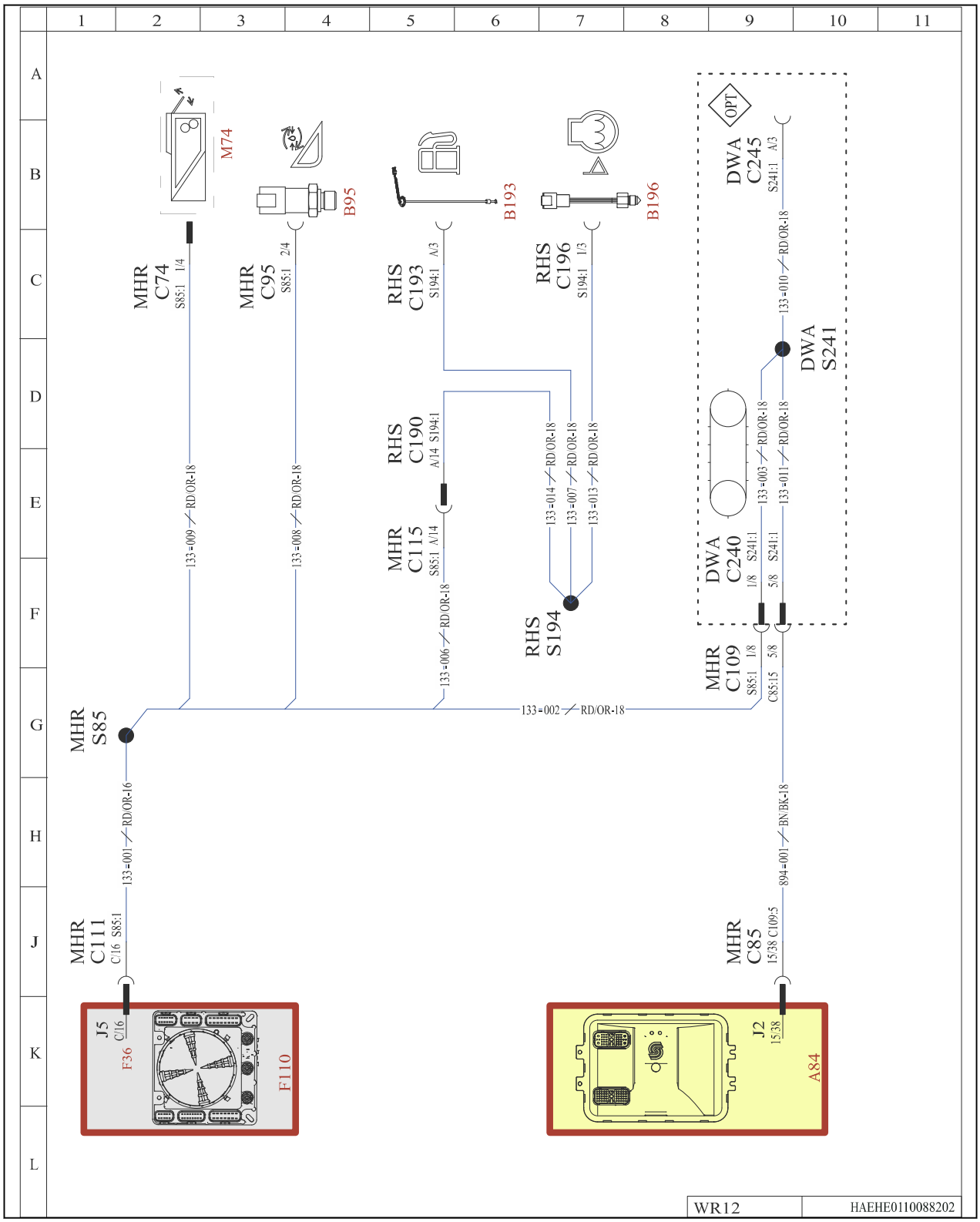


Fig. 49

12.7.31 Turn, hazard, and beacon lamps

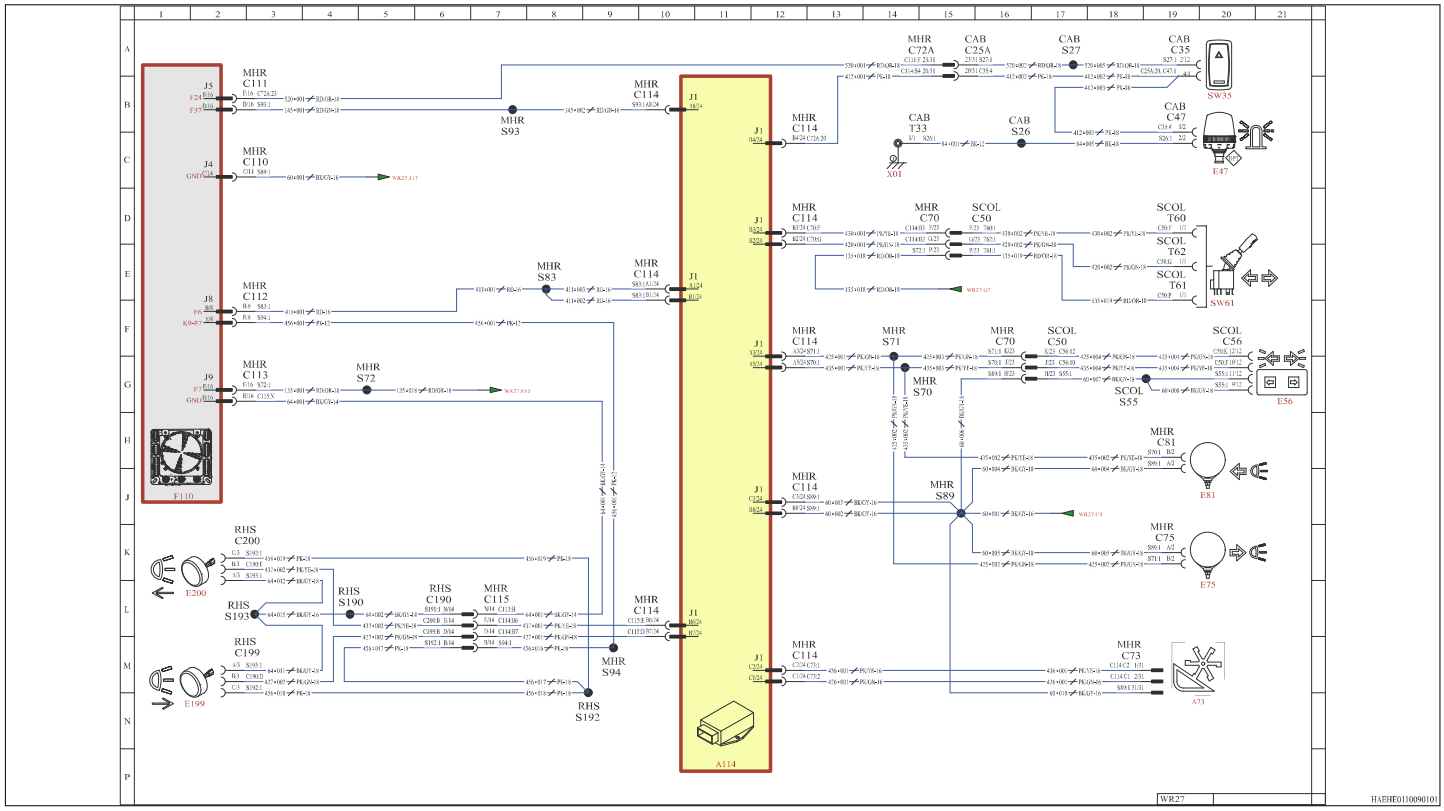


Fig. 65

Circuit number / Color / Gauge	Description	Connector location and number		Connector location and number		Harness
24TW16 / YE 18	CAN_1 HI Cable : CAN_1	WR07.J4	C315:A	WR07.G4	S20:	PHH
25TW0 / GY/ WH 18	CAN_2 LOW Cable : CAN_2	WR18A.N10	C158:6	WR08.F10	S146:1	ESH
26TW0 / YE/ WH 18	CAN_2 HI Cable : CAN_2	WR18A.N10	C158:5	WR08.F10	S145:1	ESH
25TW1 / GY/ WH 18	CAN_2 LOW Cable : CAN_2	WR18A.H10	C151:3	WR08.F10	S146:1	ESH
26TW1 / YE/ WH 18	CAN_2 HI Cable : CAN_2	WR18A.H10	C151:4	WR08.F10	S145:1	ESH
25TW2 / GY/ WH 18	CAN_2 LOW Cable : CAN_2	WR08.F10	S146:1	WR08.C10	S148:1	ESH
26TW2 / YE/ WH 18	CAN_2 HI Cable : CAN_2	WR08.C10	S147:1	WR08.F10	S145:1	ESH
25TW3 / GY/ WH 18	CAN_2 LOW Cable : CAN_2	WR18A.J10	C153:3	WR08.C10	S148:1	ESH
26TW3 / YE/ WH 18	CAN_2 HI Cable : CAN_2	WR18A.K10	C153:4	WR08.C10	S147:1	ESH
25TW4 / GY/ WH 18	CAN_2 LOW Cable : CAN_2	WR08.C10	S148:1	WR08.D2	S151:1	ESH
26TW4 / YE/ WH 18	CAN_2 HI Cable : CAN_2	WR08.C10	S147:1	WR08.D2	S150:1	ESH
25TW5 / GN/ WH 18	CAN_2 LOW Cable : CAN_2	WR08.D2	S151:1	WR18A.L10	C161:1	ESH
26TW5 / YE/ WH 18	CAN_2 HI Cable : CAN_2	WR08.D2	S150:1	WR18A.L10	C161:2	ESH
25TW6 / GN/ WH 18	CAN_2 LOW Cable : CAN_2	WR08.D2	S151:1	WR08.F2	C140:9	ESH
26TW6 / YE/ WH 18	CAN_2 HI Cable : CAN_2	WR08.D2	S150:1	WR08.F2	C140:8	ESH

Circuit number / Color / Gauge	Description	Connector location and number		Connector location and number		Harness
117-010 / RD 16	ECU Power	WR18A.A12	C149:1	WR18A.B9	S141:1	ESH
118-001 / RD/ GN 16	SCR Relay Power	WR18A.G5	C116:13	WR18A.F3	C117:A	MHR
118-002 / RD/ GN 16	SCR Relay Power	WR18A.F12	C149:27	WR18A.G6	C140:13	ESH
119-001 / RD/ GY 18	EGR Power	WR18A.N6	C116:17	WR18A.N3	C117:H	MHR
119-002 / RD/ GY 18	EGR Power	WR18A.N6	C140:17	WR18A.N10	C158:4	ESH
120-001 / RD 18	Key Switch Battery	WR17.C4	C111:S	WR17.F4	C70:A	MHR
120-002 / RD 18	Key Switch Battery	WR17.F4	C50:A	WR17.J4	T52:1	SCOL
121-001 / RD 18	Horn/Dome/ Exit	WR31.J2	C110:M	WR31.G2	S88:1	MHR
121-001 / RD 18	Horn/Dome/ Exit	WR26.F3	C110:M	WR26.F4	S88:1	MHR
121-002 / RD 16	Horn/Dome/ Exit	WR31.G5	C70:U	WR31.G2	S88:1	MHR
121-003 / RD 16	Horn/Dome/ Exit	WR31.G6	C50:U	WR31.G8	T59:1	SCOL
121-004 / RD 18	Horn/Dome/ Exit	WR26.D6	C72A:29	WR26.F4	S88:1	MHR
121-005 / RD 18	Horn/Dome/ Exit	WR26.D7	C25A:29	WR26.K19	C43:A	CAB
121-006 / RD 18	Horn/Dome/ Exit	WR26.F4	S88:1	WR26.F6	C70:E	MHR
121-007 / RD 18	Horn/Dome/ Exit	WR26.F7	C50:E	WR26.F9	T63:1	SCOL
122-001 / RD/ BN 18	WG Power	WR18A.M6	C116:21	WR18A.M3	C117:G	MHR
122-002 / RD/ BN 18	WG Power	WR18A.M6	C140:21	WR18A.M10	C158:3	ESH
123-001 / RD/ BL 18	Quality Sensor	WR18A.M3	C117:F	WR18A.L5	C116:22	MHR
123-002 / RD/ BL 18	Quality Sensor	WR18A.L6	C140:22	WR18A.L10	C161:4	ESH
130-001 / RD/ OR 18	Key Switch Ignition	WR17.C4	C111:K	WR17.F4	C70:B	MHR
130-002 / RD/ OR 18	Key Switch Ignition	WR17.J3	T53:1	WR17.F4	C50:B	SCOL

Circuit number / Color / Gauge	Description	Connector location and number		Connector location and number		Harness
466-001 / PK 12	Work Lamp Right-hand	WR26.A3	C112:D	WR26.A7	C72B:18	MHR
466-002 / PK 12	Work Lamp Right-hand	WR26.A7	C25B:18	WR26.A17	S30:1	CAB
466-003 / PK 16	Work Lamp Right-hand	WR26.A19	C27:A	WR26.A17	S30:1	CAB
466-004 / PK 16	Work Lamp Right-hand	WR26.C19	C36:A	WR26.A17	S30:1	CAB
466-005 / PK 16	Work Lamp Right-hand	WR26.D19	C37:A	WR26.A17	S30:1	CAB
466-006 / PK 16	Work Lamp Right-hand	WR26.E19	C39:A	WR26.A17	S30:1	CAB
469-001 / WH/PK 18	Work Lamp Switch	WR26.D11	C01A:26	WR26.D13	C17:4	CON
469-002 / WH/PK 18	Work Lamp Switch	WR26.D10	C26A:26	WR26.C6	C34:8	CAB
470-001 / WH/BL 18	Work Lamp Left-hand Signal	WR26.G11	C01A:13	WR26.G13	C18:24	CON
470-002 / WH/BL 18	Work Lamp Left-hand Signal	WR26.G10	C26A:13	WR26.G7	C25A:13	CAB
470-003 / WH/BL 18	Work Lamp Left-hand Signal	WR26.G7	C72A:13	WR26.G3	C113:N	MHR
471-001 / WH/RD 18	Work Lamp Right-hand Signal	WR26.H13	C18:35	WR26.H11	C01A:31	CON
471-002 / WH/RD 18	Work Lamp Right-hand Signal	WR26.H10	C26A:31	WR26.H7	C25A:31	CAB
471-003 / WH/RD 18	Work Lamp Right-hand Signal	WR26.H7	C72A:31	WR26.H3	C113:C	MHR
475-001 / WH 18	Exit Lamp Switch	WR26.D11	C01A:27	WR26.D13	C17:3	CON
475-002 / WH 18	Exit Lamp Switch	WR26.D10	C26A:27	WR26.D7	C25A:27	CAB
475-003 / WH 18	Exit Lamp Switch	WR26.D6	C72A:27	WR26.F6	C70:M	MHR
475-004 / WH 18	Exit Lamp Switch	WR26.F7	C50:M	WR26.E9	T56:1	SCOL
477-001 / WH 18	Wait To Start	WR17.F6	C140:18	WR17.G9	C149:6	ESH

Connector Number	Harness	Pin	Circuit Name	Wire ID	Wire Color-Size	Signal Name
C06	CON	C	200	003	BL-18	Ground Speed Lever Signal Primary
C06	CON	D	201	003	LB-18	Ground Speed Lever Signal Secondary
C06	CON	E	50	015	BK/LB-18	Ground, Sensor
C06	CON	F	100	014	RD/LB-18	+5V Sensor
C07	CON	1	857	002	BN/YE-18	Draper Speed Decrease
C07	CON	2	135	014	RD/OR-18	+12V Switches
C07	CON	4	858	001	BN-18	Draper Speed Increase
C07	CON	4	858	002	BN-18	Draper Speed Increase
C07	CON	5	858	002	BN-18	Draper Speed Increase
C07	CON	6	80	016	BK-18	Ground, Cab
C07	CON	8	857	002	BN/YE-18	Draper Speed Decrease
C07	CON	8	857	001	BN/YE-18	Draper Speed Decrease
C07	CON	9	80	015	BK-18	Ground, Cab
C07	CON	10	456	015	PK-18	Road/Tail Lamp
C08	CON	1	65	011	BK/GY-18	Ground, Control
C08	CON	2	101	001	RD/LB-18	+5V Sensor
C08	CON	3	330	001	WH-18	Throttle
C09	CON	A	80	012	BK-18	Ground, Cab
C09	CON	B	115	004	RD-16	Diagnostic Power
C09	CON	C	21TW16		YE/TN-18	CAN_0 HI
C09	CON	D	22TW16		GN/TN-18	CAN_0 LOW
C09	CON	H	24TW12		YE-18	CAN_1 HI
C09	CON	J	23TW12		GN-18	CAN_1 LOW
C10	CON	1	860	001	BN-18	Reel Aft Signal

Connector Number	Harness	Pin	Circuit Name	Wire ID	Wire Color-Size	Signal Name
C72B	MHR	8	191	001	RD/OR-12	Power Adapter Switch
C72B	MHR	9	571	003	OR/BL-16	Air Conditioner Clutch Signal
C72B	MHR	10	572	001	OR-12	Heating, Vent, Air Conditioning Fan
C72B	MHR	11	148	001	RD/OR-18	Auto Guidance Power
C72B	MHR	12	190	001	RD-12	Power Adapter Battery
C72B	MHR	13	146	001	RD-18	Console Power
C72B	MHR	14	465	002	PK/BL-12	Work Lamp Left-hand
C72B	MHR	15	147	006	RD/OR-14	VMM Control Power
C72B	MHR	16	456	002	PK-12	Road/Tail Lamp
C72B	MHR	17	65	004	BK/GY-14	Ground, Control
C72B	MHR	18	466	001	PK-12	Work Lamp Right-hand
C72B	MHR	19	540	001	OR/RD-14	Wiper Power
C73	MHR	1	436	001	PK/YE-16	Left-hand Flasher Header
C73	MHR	2	426	001	PK/GN-16	Right-hand Flasher Header
C73	MHR	3	855	003	BN/YE-16	Swathboard Up/Reel Speed Increase
C73	MHR	4	854	003	BN-16	Swathboard Down/Reel Speed Decrease
C73	MHR	5	858	004	BN-18	Draper Speed Increase
C73	MHR	6	857	004	BN/YE-18	Draper Speed Decrease

Connector Number	Harness	Pin	Circuit Name	Wire ID	Wire Color-Size	Signal Name
C145	ESH	1	384	001	WH/BL-18	DEF Tank Level
C145	ESH	2	382	001	WH/BK-18	DEF Sensor Ground
C145	ESH	3	383	001	WH/GN-18	DEF Tank Temp
C146	ESH	A	356	001	WH-18	WD Power
C146	ESH	B	357	001	WH-18	WD Signal
C146	ESH	C	358	001	WH-18	WD Ground
C147	ESH	2	391	001	RD/WH-18	DEF Pressure Sensor +5V
C147	ESH	3	392TW7	001	WH/PU-18	DEF Pressure Sensor Signal
C147	ESH	4	393TW7	001	WH/BK-18	DEF Pressure Sensor Ground
C147	ESH	5	381	002	PK/WH-16	DEF Heater Relay+
C147	ESH	6	375	003	WH/PK-16	DEF SM Heater
C147	ESH	8	394	001	BK-18	DEF Pump Motor Ground
C147	ESH	9	378	003	RD-18	DEF SM Power
C147	ESH	10	396	001	WH/BL-18	DEF Pump Motor PWM
C147	ESH	11	378	004	WH/RD-18	DEF SM Power
C147	ESH	12	398	001	WH-18	DEF Revert Valve Control
C148	ESH	1	387	001	WH/RD-18	DEF Tank Heat Valve Supply
C148	ESH	4	388	001	WH-18	DEF Tank Heat Valve Control
C149	ESH	1	117	010	RD-16	ECU Power
C149	ESH	2	375	003	WH/PK-16	DEF SM Heater
C149	ESH	3	66	004	BK/GY-16	Ground, ESH
C149	ESH	5	66	005	BK/GY-16	Ground, ESH
C149	ESH	6	477	001	WH-18	Wait To Start

Color Code	Color
PK/YE	Pink/yellow
RD	Red
RD/BL	Red/blue
RD/BN	Red/brown
RD/GN	Red/green
RD/GY	Red/gray
RD/LB	Red/light blue
RD/OR	Red/orange
RD/PK	Red/pink
RD/WH	Red/white
TN/PK	Tan/pink
TN/RD	Tan/red
WH	White
WH/BK	White/black
WH/BL	White/blue
WH/GN	White/green
WH/OR	White/orange
WH/PK	White/pink
WH/PU	White/purple (violet)
WH/RD	White/red
WH/YE	White/yellow
YE	Yellow
YE/TN	Yellow/tan
YE/WH	Yellow/white

12.8.3 Device identification numbers

Each electrical component on the machine is assigned a device identification number (DIN). The type of component can be determined by the letter designation before the DIN. The letter designations are as follows:

- A - Module or assembly
- B - Sensor
- E - Lamp or emitting device
- F - Fuse
- G - Battery
- GPS - Automatic guidance
- H - Horn/alarm/speaker
- K - Relay
- M - Motors or actuators
- P - Power plug
- R - Resistor
- S - Splice
- SW - Switch

12.8.11 CAN 2 network (engine / auxiliary CAN)

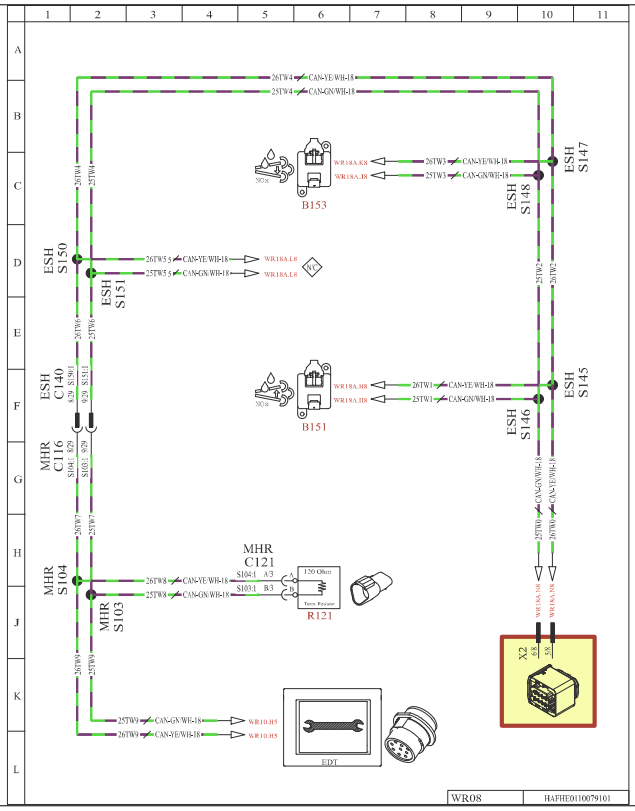


Fig. 84

12.8.27 Pressure and header position sensors - late production

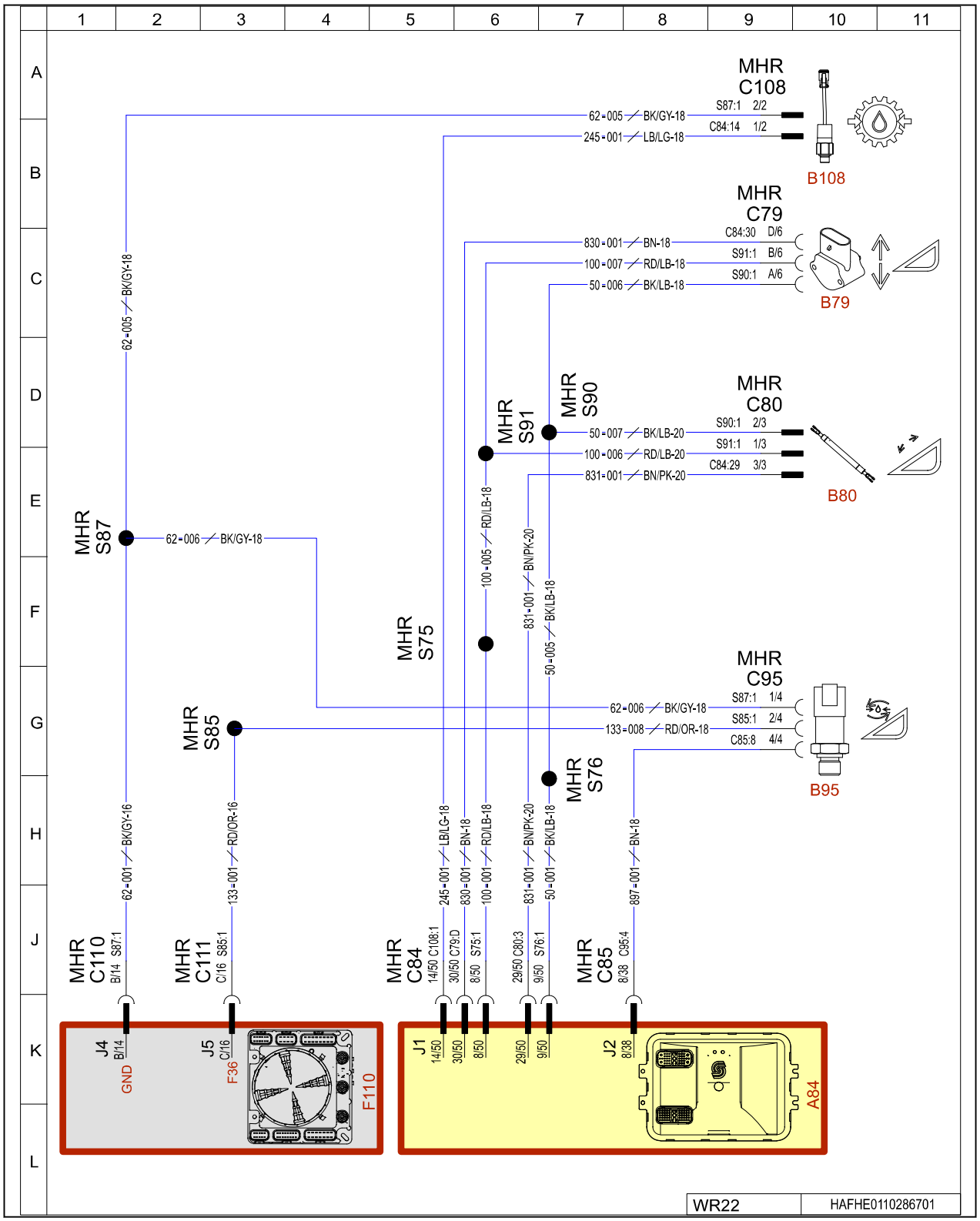


Fig. 100

12.8.42 Double windrow attachment / auxiliary pump and valve

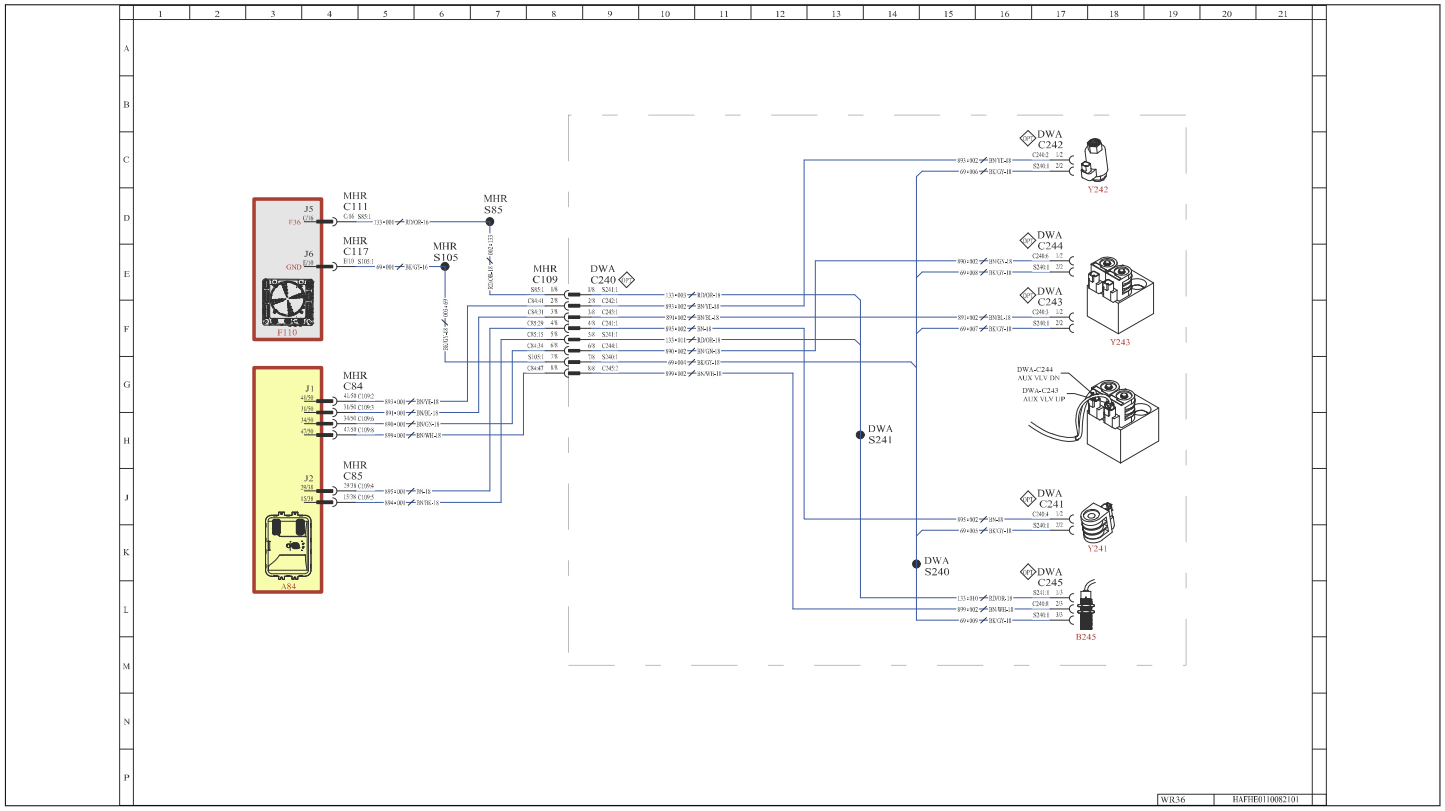


Fig. 115

Circuit number / Color / Gauge	Description	Connector location and number		Connector location and number		Harness
67-001 / BK 14	Ground, Reel Fore/ Aft	WR35.B4	T266:1	WR35.B9	S266:1	RFA
67-002 / BK 18	Ground, Reel Fore/ Aft	WR35.B9	S266:1	WR35.F16	C267:86	RFA
67-003 / BK 14	Ground, Reel Fore/ Aft	WR35.B9	S266:1	WR35.F16	C267:87A	RFA
67-004 / BK 18	Ground, Reel Fore/ Aft	WR35.B9	S266:1	WR35.C16	C268:86	RFA
67-005 / BK 14	Ground, Reel Fore/ Aft	WR35.B9	S266:1	WR35.D16	C268:87A	RFA
68-001 / BK 18	Ground-Auxiliary Lamp	WR26.N2	T275:1	WR26.N4	S275:1	ALK
68-002 / BK 18	Ground-Auxiliary Lamp	WR26.N8	C276:2	WR26.N4	S275:1	ALK
68-003 / BK 18	Ground-Auxiliary Lamp	WR26.P8	C277:2	WR26.N4	S275:1	ALK
69-001 / BK/ GY 16	Ground	WR10.K3	C117:E	WR10.G4	S105:1	MHR
69-001 / BK/ GY 16	Ground	WR36.E4	C117:E	WR36.E6	S105:1	MHR
69-001 / BK/ GY 16	Ground	WR37.N4	C117:E	WR37.N6	S105:1	MHR
69-002 / BK/ GY 16	Ground	WR10.G8	C120:A	WR10.G4	S105:1	MHR
69-003 / BK/ GY 18	Ground	WR36.G8	C109:7	WR36.E6	S105:1	MHR
69-004 / BK/ GY 18	Ground	WR36.G9	C240:7	WR36.K14	S240:1	DWA
69-005 / BK/ GY 18	Ground	WR36.K17	C241:2	WR36.K14	S240:1	DWA
69-006 / BK/ GY 18	Ground	WR36.C17	C242:2	WR36.K14	S240:1	DWA
69-007 / BK/ GY 18	Ground	WR36.F17	C243:2	WR36.K14	S240:1	DWA
69-008 / BK/ GY 18	Ground	WR36.E17	C244:2	WR36.K14	S240:1	DWA
69-009 / BK/ GY 18	Ground	WR36.L17	C245:3	WR36.K14	S240:1	DWA
69-010 / BK 16	Ground	WR37.N7	C123:P	WR37.N6	S105:1	MHR
69-011 / BK 16	Ground	WR37.N8	C523:P	WR37.F16	S506:	RWS

Circuit number / Color / Gauge	Description	Connector location and number		Connector location and number		Harness
244-001 / LB/LG 18	Rear Pump Reverse	WR20.H11	C84:40	WR20.H8	C91:1	MHR
245-001 / LB/LG 18	Charge Pressure Switch	WR22.J5	C84:14	WR22.B9	C108:1	MHR
246-001 / LB/LG 18	Front Pump Forward	WR20.J8	C88:1	WR20.J11	C84:37	MHR
247-001 / LB/DB 18	Hydraulic Oil Temperature Out	WR16.J7	C85:11	WR16.G4	C115:P	MHR
247-002 / LB/DB 18	Hydraulic Oil Temperature Out	WR16.F4	C190:P	WR16.F8	C202:1	RHS
260-001 / LB/PU 18	Steering Feedback +	WR20.B9	C01A:19	WR20.A3	C18:1	CON
260-002 / LB/PU 18	Steering Feedback +	WR20.B10	C26A:19	WR20.B12	C25A:19	CAB
260-003 / LB/PU 18	Steering Feedback +	WR20.D20	C71:5	WR20.B13	C72A:19	MHR
261-001 / LB/DB 18	Steering Feedback -	WR20.B9	C01A:18	WR20.A3	C18:2	CON
261-002 / LB/DB 18	Steering Feedback -	WR20.B10	C26A:18	WR20.B12	C25A:18	CAB
261-003 / LB/DB 18	Steering Feedback -	WR20.D20	C71:6	WR20.B13	C72A:18	MHR
262-001 / LB/YE 18	Steering_A	WR20.G14	C84:24	WR20.D20	C71:3	MHR
263-001 / LB/PK 18	Steering_B	WR20.G14	C84:25	WR20.D20	C71:4	MHR
300-001 / WH 18	Key Switch Start	WR17.C2	C117:J	WR17.F3	C70:C	MHR
300-002 / WH 18	Key Switch Start	WR17.F3	C50:C	WR17.J2	T54:1	SCOL
305-001 / WH 18	Neutral Relay Enable	WR17.C9	C85:31	WR17.C4	C111:P	MHR
306-001 / WH/RD 12	Starter Signal	WR17.C6	C112:A	WR17.F6	C116:1	MHR
306-002 / WH/RD 12	Starter Signal	WR17.F9	T141:1	WR17.F6	C140:1	ESH
314-001 / RD/OR 18	Alternator Excite	WR18A.F10	T143:1	WR18A.F12	C149:77	ESH
330-001 / WH 18	Throttle	WR18.C8	C08:3	WR18.G5	C18:33	CON
335-001 / WH/PK 18	Fuel Level	WR16.J6	C85:10	WR16.G3	C115:J	MHR

Circuit number / Color / Gauge	Description	Connector location and number		Connector location and number		Harness
891-002 / BN/BL 18	Auxiliary 2 Valve Up	WR36.F17	C243:1	WR36.F9	C240:3	DWA
892-001 / BN 18	Auxiliary 1 Valve Down	WR24.H6	C84:33	WR24.D6	C104:1	MHR
893-001 / BN/YE 18	Double Windrow Attachment Pump	WR36.F8	C109:2	WR36.G4	C84:41	MHR
893-002 / BN/YE 18	Double Windrow Attachment Pump	WR36.C17	C242:1	WR36.F9	C240:2	DWA
894-001 / BN/BK 18	Double Windrow Attachment Present	WR12.F9	C109:5	WR12.J9	C85:15	MHR
894-001 / BN/BK 18	Double Windrow Attachment Present	WR36.F8	C109:5	WR36.J4	C85:15	MHR
895-001 / BN 18	Double Windrow Attachment Lock	WR36.J4	C85:29	WR36.F8	C109:4	MHR
895-002 / BN 18	Double Windrow Attachment Lock	WR36.J17	C241:1	WR36.F9	C240:4	DWA
896-001 / BN 18	Auxiliary 1 Valve Up	WR24.B10	C97:1	WR24.H10	C84:32	MHR
897-001 / BN 18	Header Loop Pressure	WR22.J8	C85:8	WR22.G9	C95:4	MHR
899-001 / BN/WH 18	Double Windrow Attachment Deck Position	WR36.H4	C85:28	WR36.G8	C109:8	MHR
899-002 / BN/WH 18	Double Windrow Attachment Deck Position	WR36.G9	C240:8	WR36.L17	C245:2	DWA
900-001 / RD/WH 12	Cab Wire 2	WR30.C6	T71:1	WR30.H6	C119:1	MHR
902-001 / GN 18	Input Wire 1	WR24.E15	T72:1	WR24.D14	C72A:24	MHR
902-002 / GN 18	Input Wire 1	WR24.D15	C25A:24	WR24.D17	C26A:24	CAB
902-003 / GN 18	Input Wire 1	WR24.D18	C01A:24	WR24.D20	C17:1	CON
903-001 / BK/WH 12	Cab Wire 1 Ground	WR30.E10	C272:B	WR30.J6	C271:2	CCK
904-001 / RD 12	Compressor Power	WR30.E8	C270:1	WR30.E10	C272:A	CCK
905-001 / RD/WH 12	Cab Wire 2	WR30.E8	C270:2	WR30.J6	C271:1	CCK
906-000 / RD/LB 18	+5V Sensor	WR20.J18	C300:A	WR20.J20	C301:4	H1M