Workshop Service Manual

Rubber Track Tractor

1149MT
1154MT
1159MT
1165MT

North America
4205 River Green Parkway, Duluth GA 30096 USA
FENDT is a worldwide brand of AGCO

October 2018
79037288C
EME
English

1.7 Maintenance access

1.7.1 Remove the guards

IMPORTANT:
To remove the side and bottom guards, move the machine to a smooth horizontal location. Lower all implements to the ground and lower the 3-point linkage to the ground. Make sure that the transmission control lever is in the park position. Stop the engine, apply the park brake, and take the key with you.

Procedure

1. Remove the bolts and the washers to remove the guards, (1) to get access below the machine.

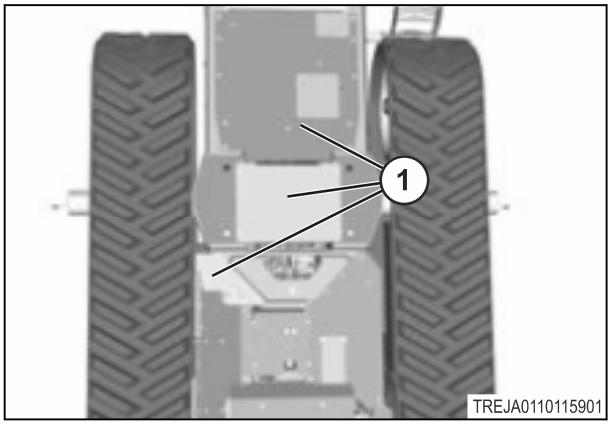

Fig. 19

2. Remove the bolts and the washers,(1),(2),(3), to get access to the left-hand side of the transmission housing.

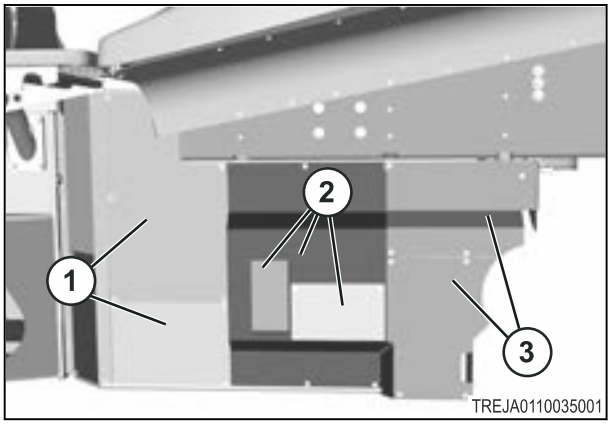

Fig. 20

3. Remove the bolts and the washers (1) to gain access to the fuel tank and the DEF tank on the right-hand side of the machine.

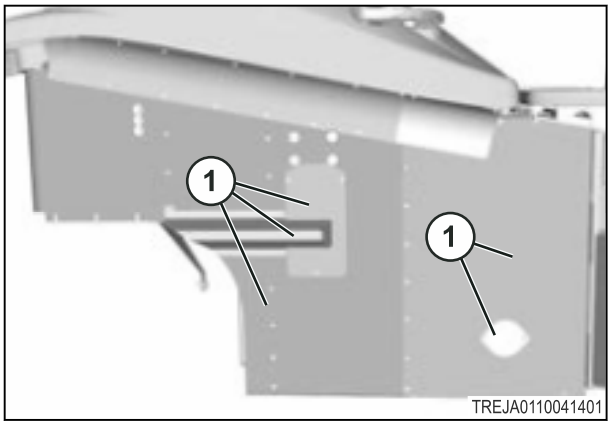

Fig. 21

5. Remove the hardware (1, 3) and the right-hand fan guard (2).

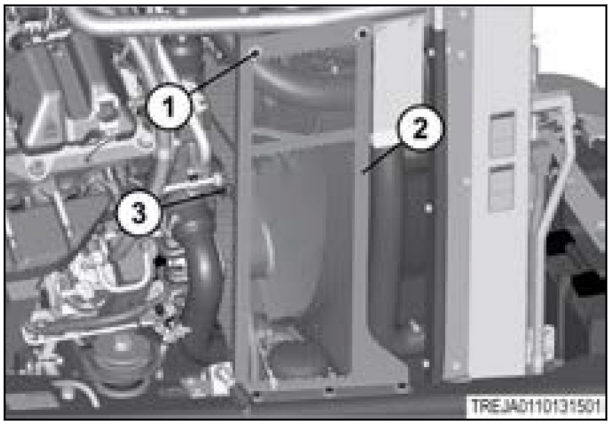

Fig. 8

6. **WARNING:**
Equipment or parts under spring tension can cause bodily injury. Use caution in releasing belt tension.

NOTE:
The fan drive belt must first be removed to replace the accessories belt.

Install the correct breaker bar into the square drive (1) of the fan drive belt tensioner (2). Push clockwise and remove the fan drive belt (3) from the pulleys. Slowly release the fan drive belt tensioner to the neutral position. Remove the breaker bar.

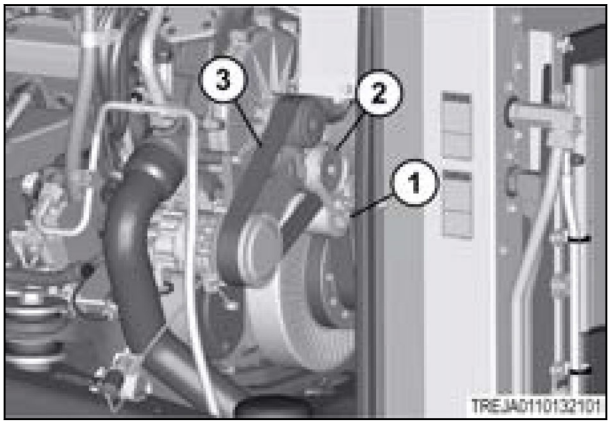

Fig. 9

2.2.2 Install the fan drive belt

Procedure

1. Follow the fan drive belt routing.

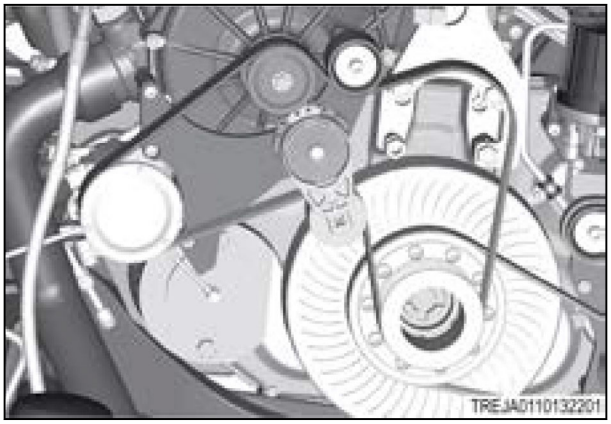

Fig. 10

15. Disconnect the two wire harnesses (1) from the air filter assembly.

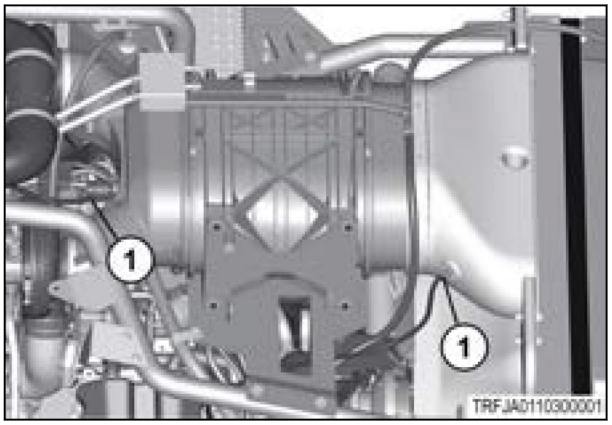

Fig. 100

16. Loosen the hose clamps (1) and disconnect the turbocharger inlet tubes (2).

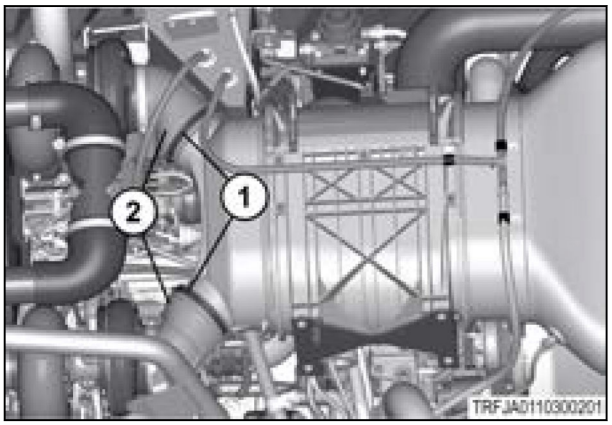

Fig. 101

17. Loosen the two hose clamps (1) and disconnect the two hoses (2).

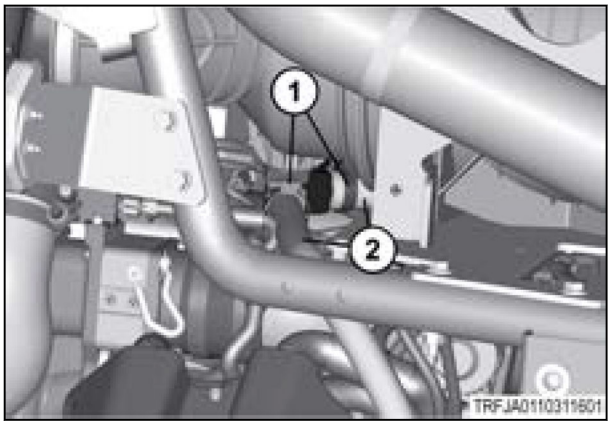

Fig. 102

18. Remove the hardware (1), the hose clips (2), and the doser expansion tank bracket (3).

19. Loosen the two hose clamps (4), and disconnect the two hoses.

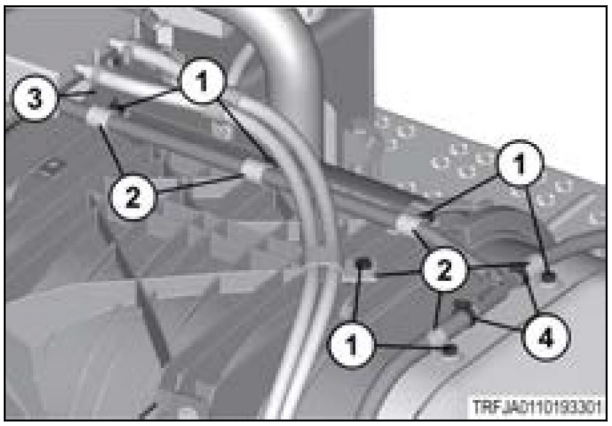

Fig. 103

18. Use the hose clamps (4) to connect the inlet radiator hose (5).

19. Use the hardware (1) to install the bracket (3) and the hose clamp (2).

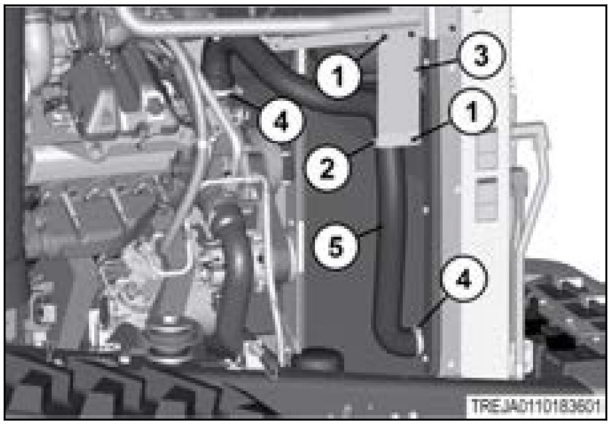

Fig. 201

20. Use the hardware (1) to install the air filter assembly mount (2).

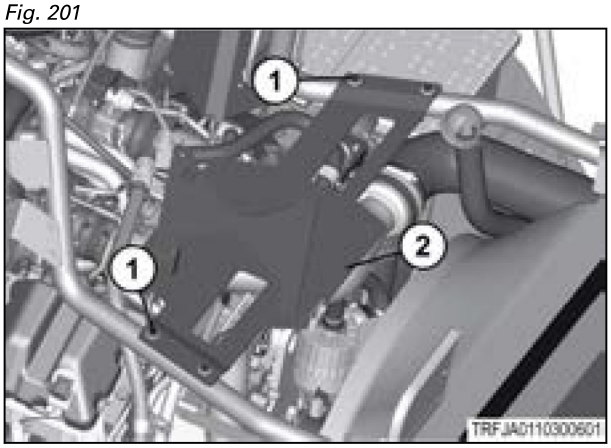

Fig. 202

21. Use the hardware (1), to install the hose clips (2).

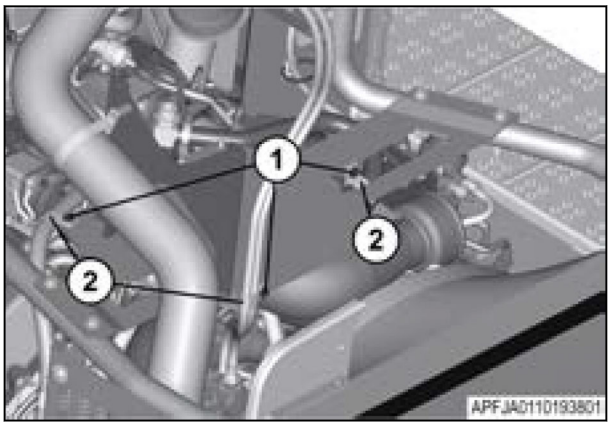

Fig. 203

22. Use the hardware (1) to install the air filter assembly (2).

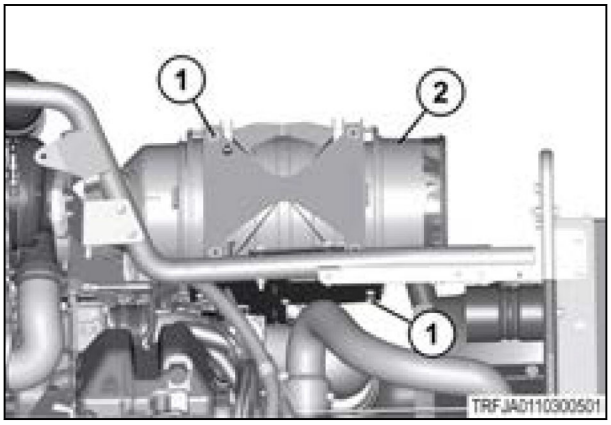

Fig. 204

6. Remove the hardware (1) and the cover plate (2).

7. Install a temporary hose to the radiator drain valve (3) and put through the access hole.

8. Set a correct container under the temporary hose.

9. Loosen the radiator drain valve (3) and drain the engine coolant.

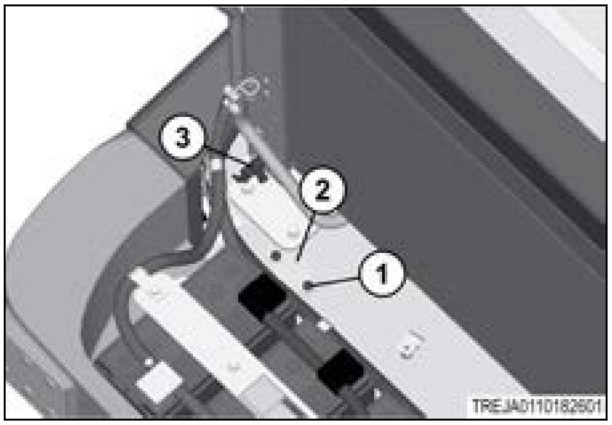

Fig. 290

10. Remove the hardware (1, 3) and the right fan guard (2).

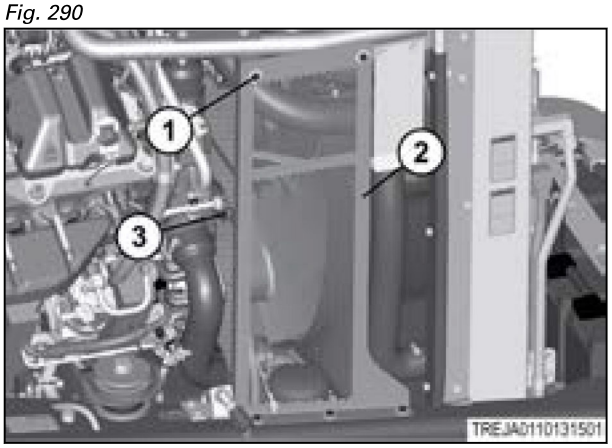

Fig. 291

11. Remove the hardware (1) and the left fan guard (2).

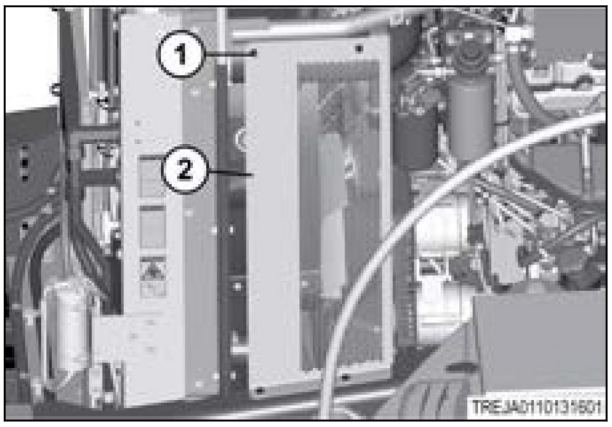

Fig. 292

12. Loosen the hose clamps (1) and disconnect the left charge air cooler hose (2).

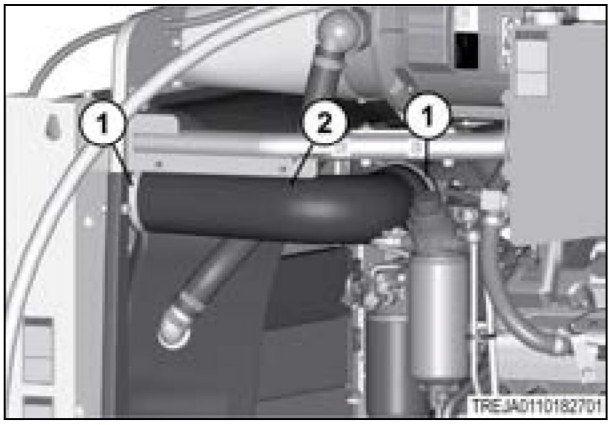

Fig. 293

9. Use the hardware (1) to install the hose clips (2), and the doser expansion tank bracket (3).

10. Use the two hose clamps (4) to connect the two hoses.

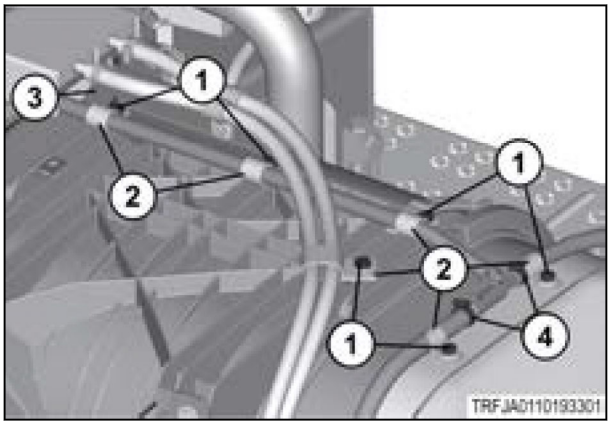

Fig. 388

11. Use the hose clamps (1) to connect the air filter intake tubes (2).

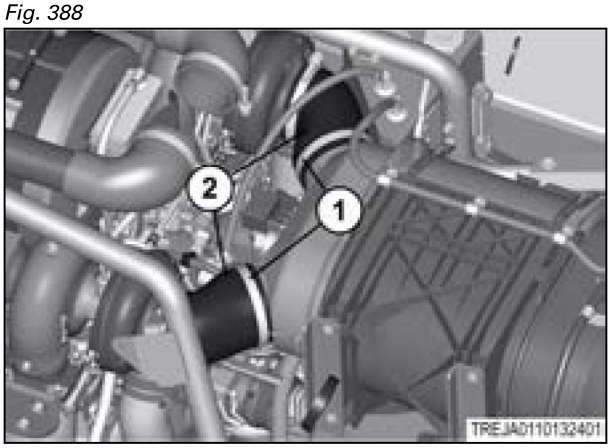

Fig. 389

12. Connect the two wire harnesses (1) to the air filter assembly.

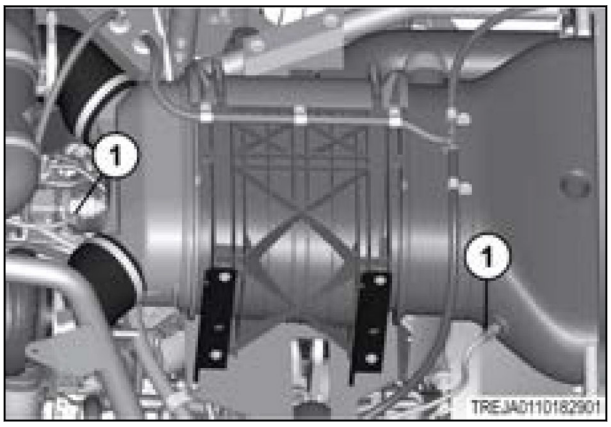

Fig. 390

13. Use the hose clamps (1) to connect the left side charge air cooler hose (2).

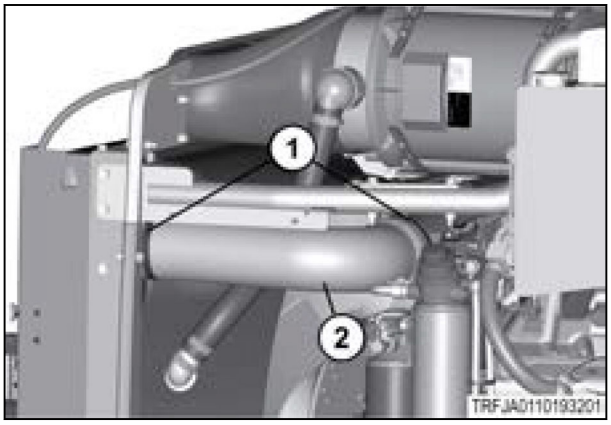

Fig. 391

68. **WARNING:**
Always use extreme caution when lifting heavy objects overhead.

Carefully lift the engine (1) from the chassis.

IMPORTANT: *The weight of the engine dry is approximately 1797 kg (3961 lb).*

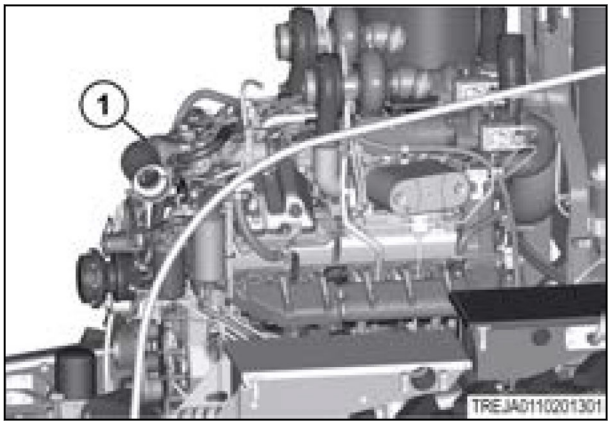

Fig. 478

69. Remove the hardware (1), the front engine mount (3) and the rear engine mount (2).

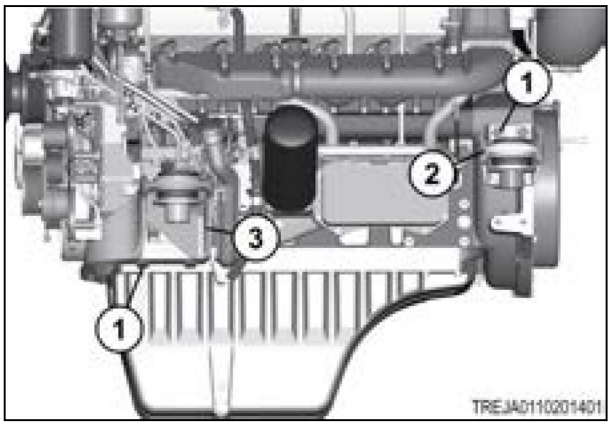

Fig. 479

70. Remove the hardware (1), and disconnect the wire harnesses.

71. Remove the hardware (2), and the starters (3).

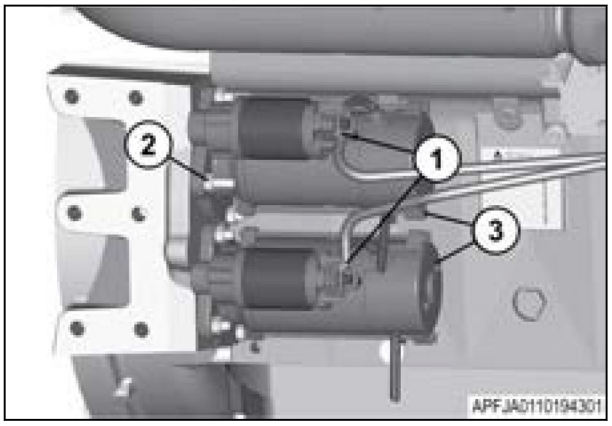

Fig. 480

72. Remove the air conditioning compressor (1).

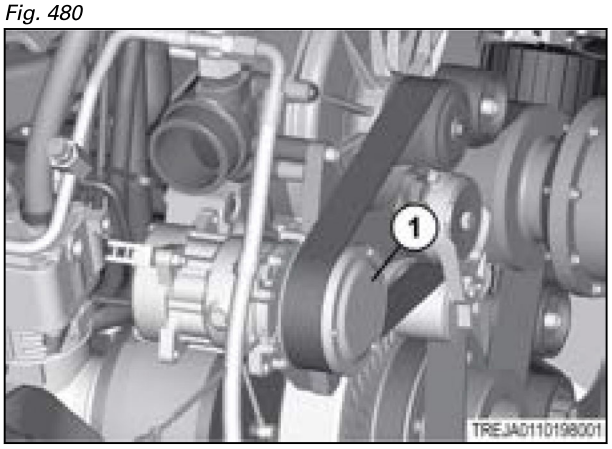

Fig. 481

Emissions related malfunction 2, active DEF dosing

- First level inducement: engine torque is limited to 75% of maximum torque.
- At final inducement engine is disabled to low idle and to 50% of idle torque.
- Fault detection possible with warm system and active dosing. Tx is detection time after restart when final inducement has been already active.
- Self healing is not possible after fault has been active 4 hours. To restore full power (after total time has been used), only service dealer with electronic diagnostic tool can clear emission faults and restore full power.

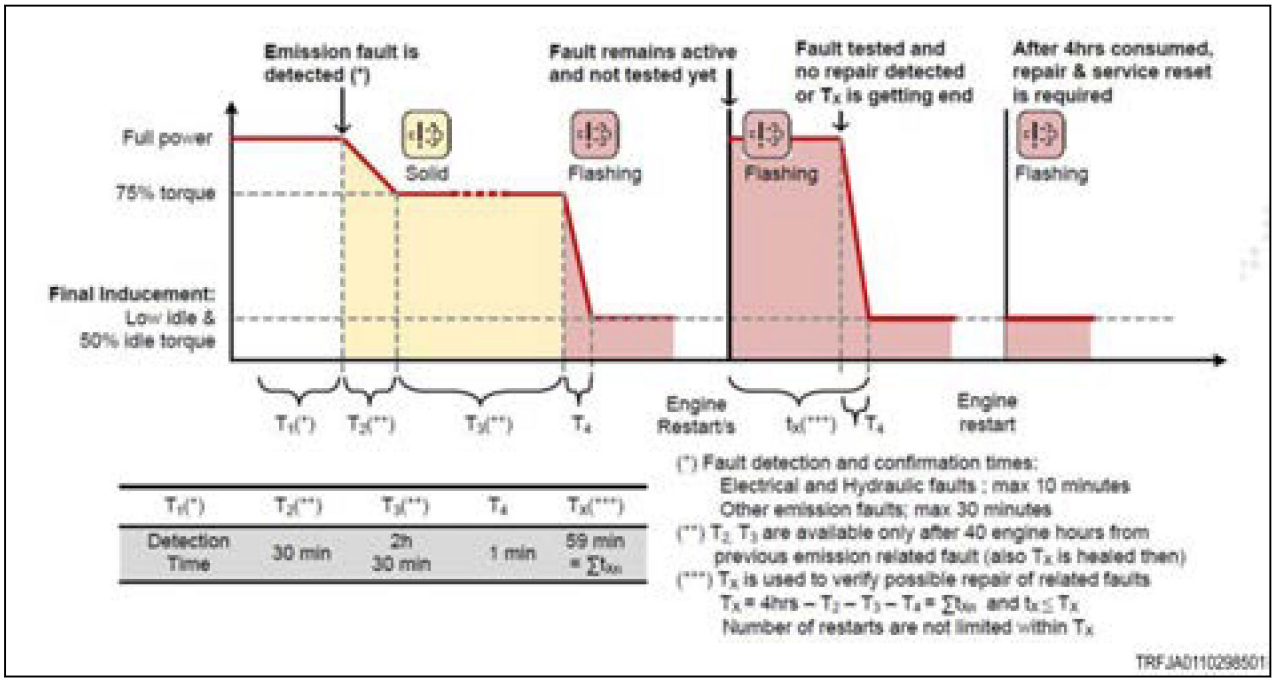

Fig. 549

Repeated emissions related malfunction 2 (T<40 hrs), active DEF dosing

- Authorities require 40 hours of operation without any emission fault, before the full inducement time is allowed.
- If any emission related fault is detected within 40 hours after the previous fault was corrected but Tx fault detection time hasn't elapsed, engine will have full power during Tx detection time until fault is tested again. Engine restarts are not limited.

30. Remove the hardware (1, 3) and the cover plates (2, 4).

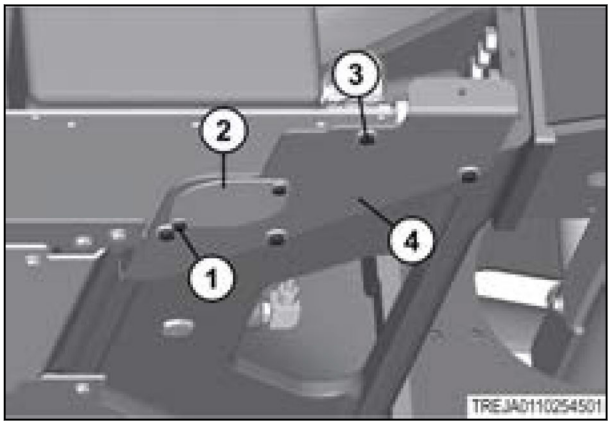

Fig. 630

31. Remove the hardware (1, 3) and the support plate (2) from the bottom tank plate (4).

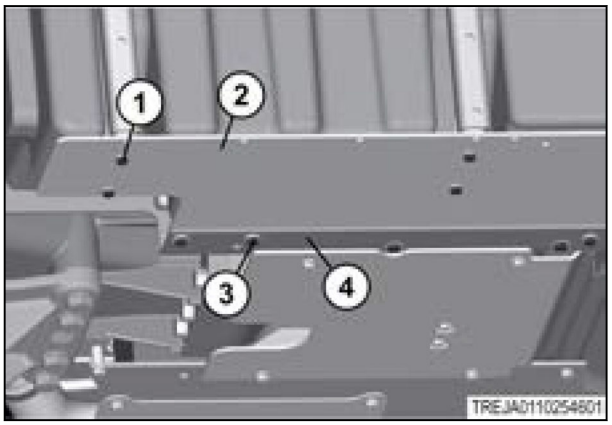

Fig. 631

32. Remove the hardware (1), the right fuel tank support (2), and the right fuel tank.

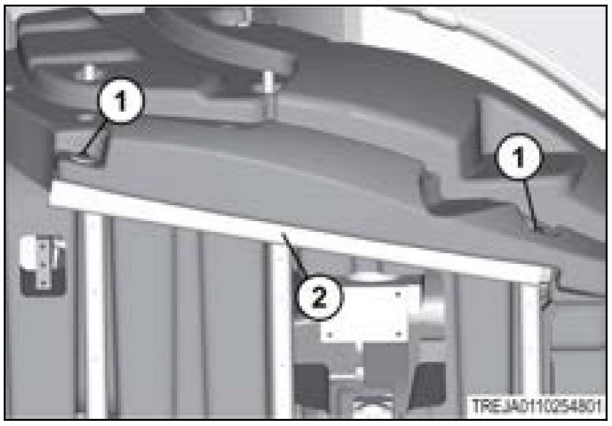

Fig. 632

Related Links

Fuel specifications page 2-264
Refill capacities page 1-20
Remove the undercarriage assembly page 12-79

30. Remove the hardware (1) and the plate (2).

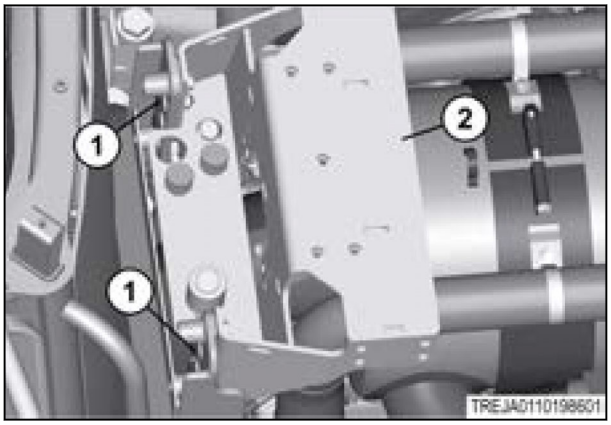

Fig. 722

31. Loosen the hose clamps (1) and disconnect the hoses (2).

32. Loosen the hose clamp (3) and disconnect the hose (4).

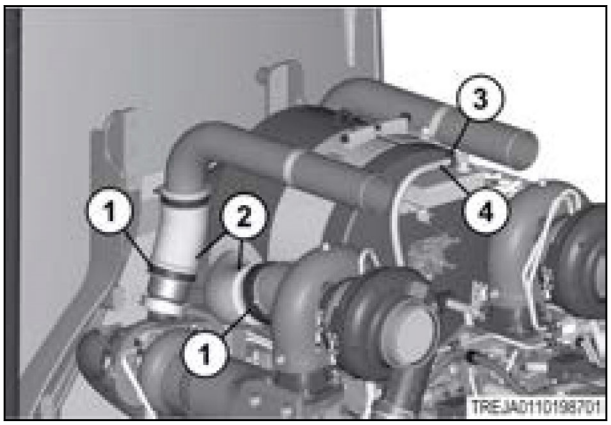

Fig. 723

33. Loosen the hose clamp (1).

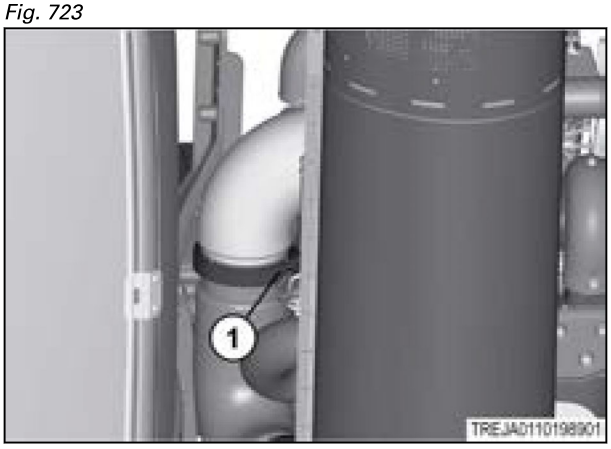

Fig. 724

34. Attach the correct lifting equipment to the diesel oxidation catalyst (DOC) (3).

35. Remove the hardware (1), open the band clamps (2), and remove the DOC (3).

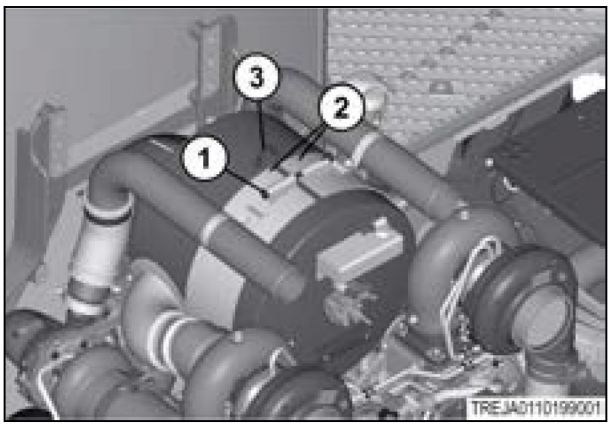

Fig. 725

2. Turn the battery disconnect switch key (1) counterclockwise to disconnect the battery power.

NOTE:
The battery disconnect switch is shown in the off position.

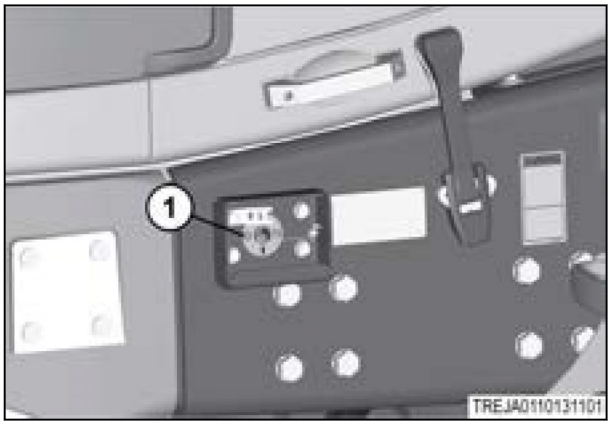

Fig. 819

3. Remove the battery disconnect switch key (1).

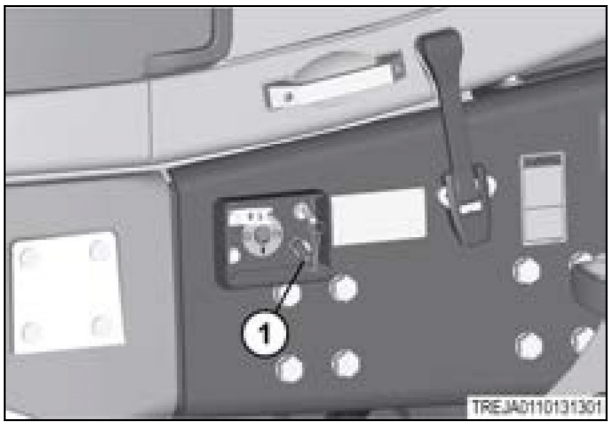

Fig. 820

4. **CAUTION:**
Safely prop open the engine cover. Closing engine cover creates a pinch point that can cause serious bodily injury.

Release both side latches (1) and open the engine cover (2) all the way.

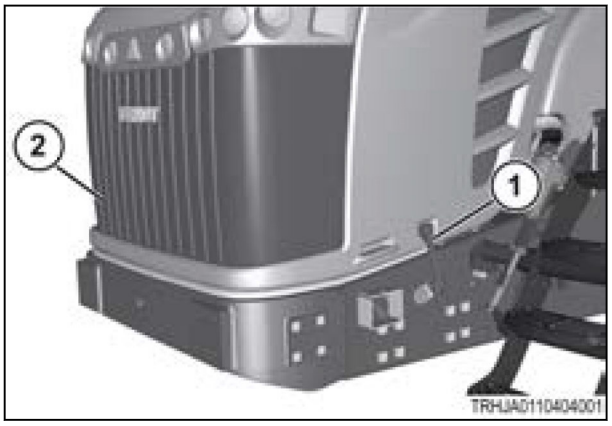

Fig. 821

5. Remove the hardware (1, 3) and the right-hand fan guard (2).

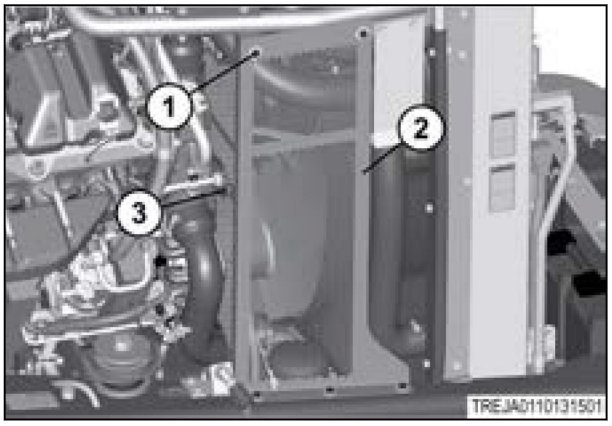

Fig. 822

2.11.9.2 Oil filter and oil cooler

(1) Oil cooler
(2) Oil filter
(3) Oil filler plug
(4) Oil dipstick

The engine has an oil filter of main flow type. It has a replaceable cartridge mounted on the left side of the engine.

The engine is equipped with a plate type oil cooler. The oil cooler is situated next to the oil filter on the left side of the engine. The oil cooler is cooled by the engine coolant circulating in the oil cooler. All oil that circulates through the oil filter goes also through the oil cooler. The oil cooler is of main flow type.

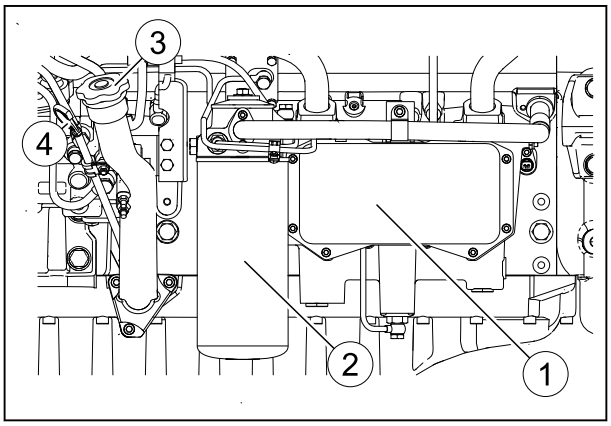

Fig. 859

2.11.10 Cooling system

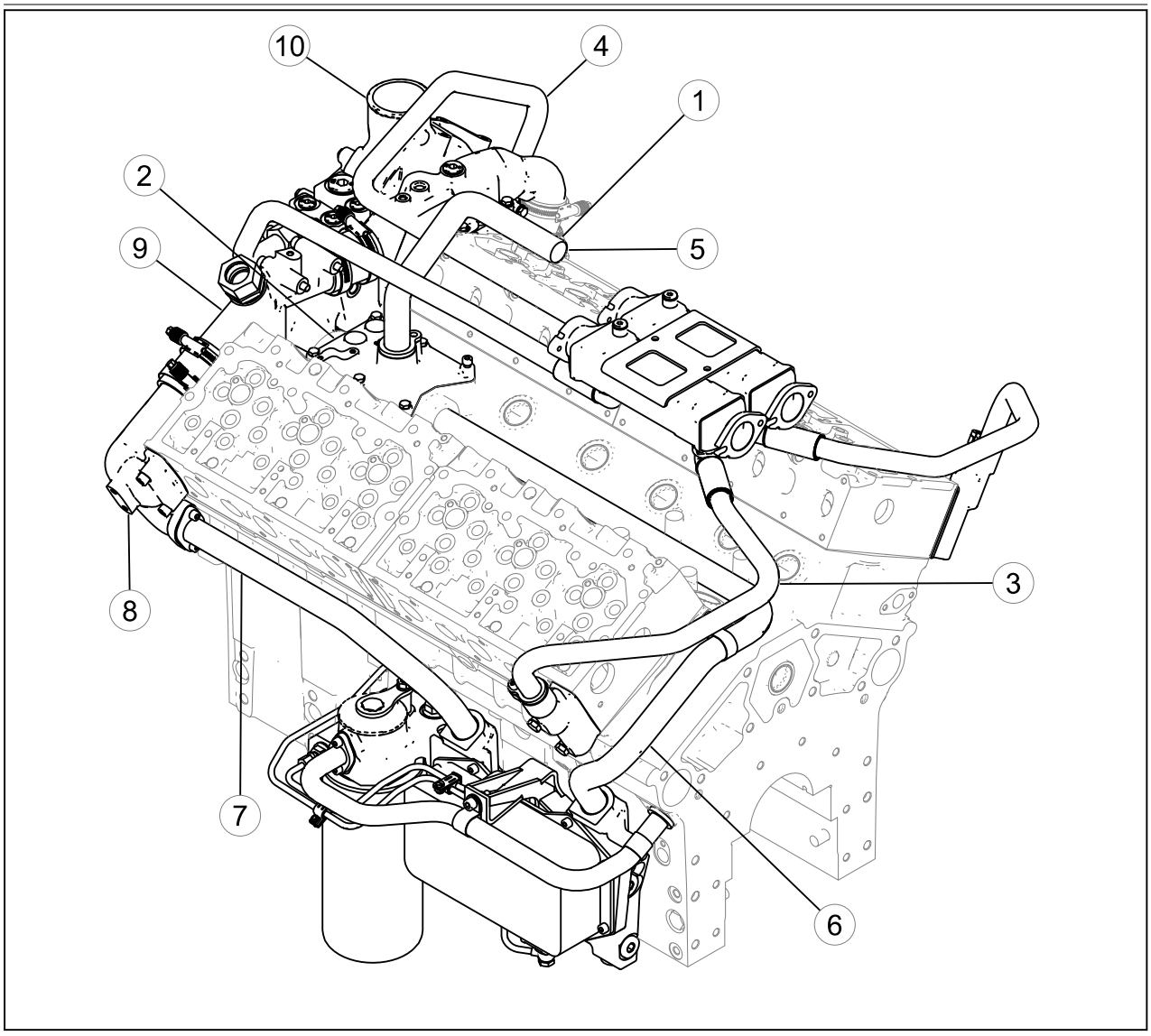

Fig. 860

2.14 Tightening torques

Object	Nm
Crankshaft screw	$1100^{\pm 50}$
Crankshaft pulley screws	
• M10	80
• M14	200
Flywheel screws (M16)	350
Flywheel housing screws	
• M14	200
• M12	150
Idler gear screws	
• M14	200
• M10	80
• M8	40
Small idler gear screws (shaft, 2 pcs), M8	45
Small idler gear screws (thrust ring), M8	32
Camshaft gear nut	200
Rocker arm shaft bracket screw and nuts	45
Valve cover and frame screws	25
Oil pump retaining screws	80
Oil sump drain plug M18	80
Oil pump regulating valve nut	210 ± 10
Oil sump screws M10	80
Oil sump screws M12	120
Coolant pump pulley screw M10	50
Belt tightener screw	48
Exhaust manifold screws	50
EGR valve screws (M8)	40
Injector fastening screw	See the correct tightening procedure from the work instructions.
Injector Fastening nut	See the correct tightening procedure from the work instructions.
Injector wire nuts (M4)	1,5
High pressure pump gear nut	280
High pressure pump fixing screws	37.5 ± 2.5

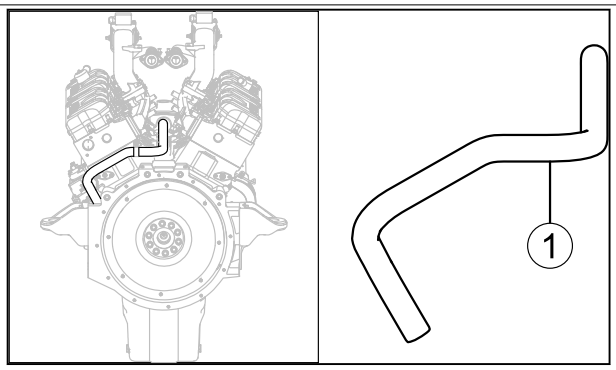

Fig. 903

(1) Coolant pipe

33. Remove the inlet manifolds with the air pipes.

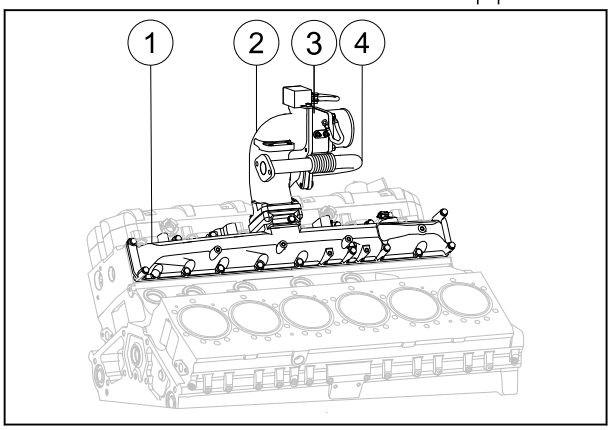

Fig. 904

(1) Inlet manifold
(2) Air pipe
(3) Air-intake heater
(4) EGR pipe

34. If you are replacing the long block, remove the distribution unit cover.

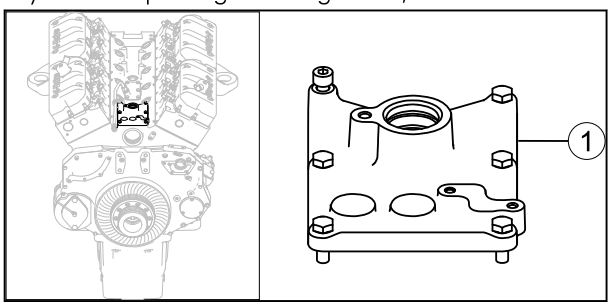

Fig. 905

(1) Distribution unit cover

35. Remove the high-pressure pump.

36. If you are replacing the long block, remove the speed sensor (crankshaft), the speed sensor (camshaft) and the oil pressure sensor from the cylinder block.

2. Make sure that all the parts of the valve mechanism are assembled.

3. Turn the crankshaft in the running direction of the engine until the valves in the 6th cylinder are rocking (exhaust closes, inlet opens).

4. Tighten the adjusting screw of the 1st cylinder until the push rod has no vertical clearance.

   To make sure when the vertical clearance is 0, you can lightly move the push rod up and down.

   The hydraulic lash adjuster must be on the top position.

   The push rod can have a small horizontal clearance.

5. Make sure that there is no clearance between the valve lever and the connecting part.

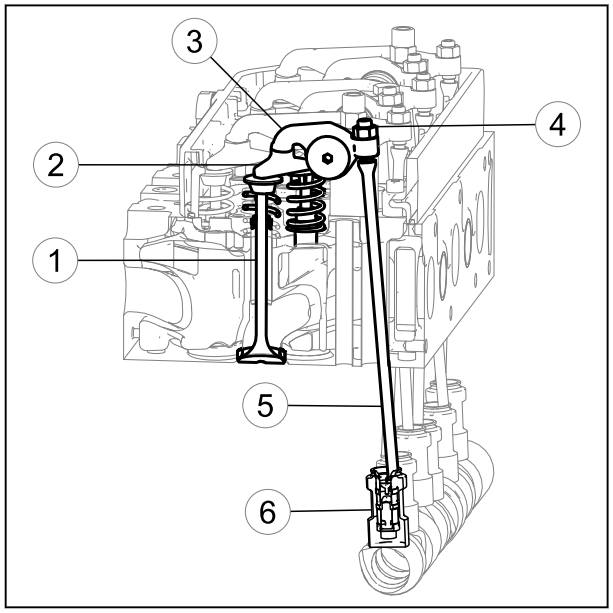

Fig. 954

(1) Valve
(2) Connecting part
(3) Rocker arm
(4) Adjusting screw
(5) Push rod
(6) Hydraulic lash adjuster

6. Tighten the adjusting screw 3 1/4 rounds clockwise.

   Hydraulic lash adjuster element will move 3,25 mm down.

   NOTE: *The quantity of oil in a hydraulic lash adjuster changes the stiffness of the hydraulic lash adjuster. Some of the unassembled hydraulic lash adjusters can feel stiffer than the other.*

7. Tighten the nut of the adjusting screw and make sure that 2-3 rounds of the adjusting screw thread is visible.

8. Refer to the injection sequence and do the steps 3-7 for all cylinders.

168 engines	
Injection sequence	1 - 12 - 2 - 11 - 4 - 9 - 6 - 7 - 5 - 8 - 3 - 10
Valves rock in cylinder number	6 - 7 - 5 - 8 - 3 - 10 - 1 - 12 - 2 - 11 - 4 - 9

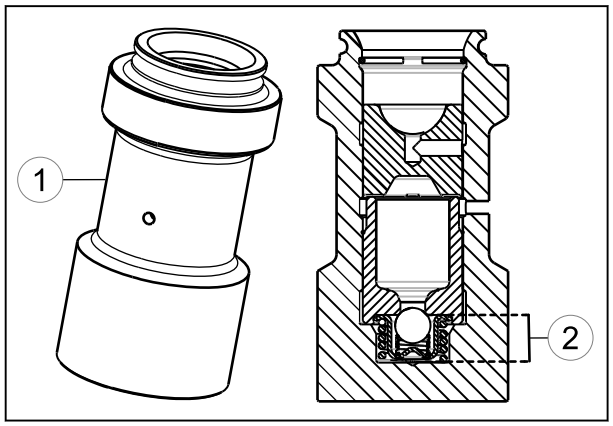

Fig. 955

(1) Hydraulic lash adjuster
(2) Hydraulic lash adjuster element

After finishing the procedure

The engine oil replaces the air in the hydraulic lash adjusters in approximately 45 minutes after the valve mechanism maintenance. Before the oil replaces the air, there can be unusual noises in the valve mechanism.

IMPORTANT: *The engine speed must be less than 1500 rpm during the 45 minutes after the valve mechanism maintenance.*

2.26 Lubrication system

2.26.1 Do a check for the oil pressure regulating valve

If the pressure of the engine lubricating oil is not sufficient or the pressure changes, you must do a check for the oil level. If it is necessary, do a check for the oil pressure regulating valve after the check of the oil level.

Procedure

1. Drain the engine oil.
2. Remove the oil sump.
3. Remove the nut (1) and the lock plate (2).
4. Remove the larger spring (3) and the smaller spring (4).
5. Clean the parts.
6. Make sure that the sealing surfaces are not damaged.

   Damaged parts must be replaced.
7. Install the springs.
8. Install the lock plate and the nut.

   NOTE: *Make sure that the lock plate goes under the nut.*
9. Tighten the nut to 210 ± 10 Nm.
10. Install the oil sump.
11. Fill in the lubricating oil.

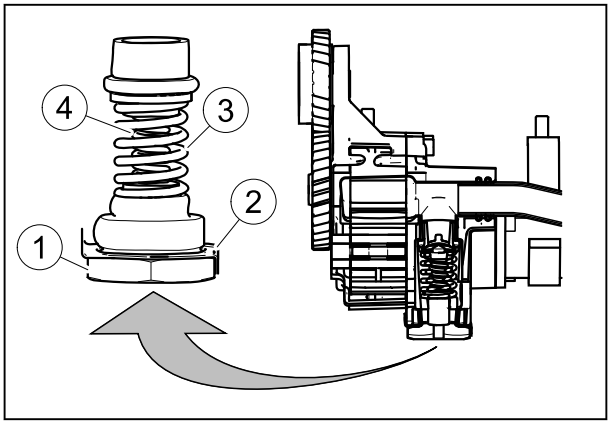

Fig. 1003

(1) Nut
(2) Lock plate
(3) Larger spring
(4) Smaller spring

Related Links

Fitting the oil sump gasket page 2-391
Oil quality requirements page 2-303
Oil sump capacity page 2-392

2.26.2 Removing the oil pump

Procedure

1. Drain the engine oil.
2. Remove the oil sump.
3. Remove the oil pump suction and pressure pipe.
4. Remove the oil pump together with any shims between the oil pump and the cylinder block.

2.26.3 Fitting the oil pump

Procedure

1. Fit the oil pump.

2.29 Fuel system

2.29.1 Bleed the fuel system

WARNING: Do not make any work at the common rail high pressure fuel system when the engine is running. Wait at least 30 seconds after stopping the engine. The first high pressure component has to be loosened slowly, so that the pressure inside the fuel system can adjust to ambient pressure.

If the jet of high pressure fuel contacts your skin, fuel penetrates the skin causing severe injuries. Get medical help immediately!

CAUTION: Diesel fuel.

Diesel fuel can cause skin and lung irritation if you touch or breath it.

Use protective gloves, when you do work with fuel equipment.

NOTE: *Use eye protection, safety clothing and safety gloves during the work.*

Procedure

1. Open the bleeding plug on the pre-filter bracket.
2. Put a transparent hose in the plug hole and lead it into a suitable container.
3. Pump fuel with the hand pump on top of the pre-filter.
4. Pump with the hand pump until there are no air bubbles in the fuel stream.
5. Remove the hose and turn in the bleeding plug.
6. Clean the engine of eventual overspill fuel.

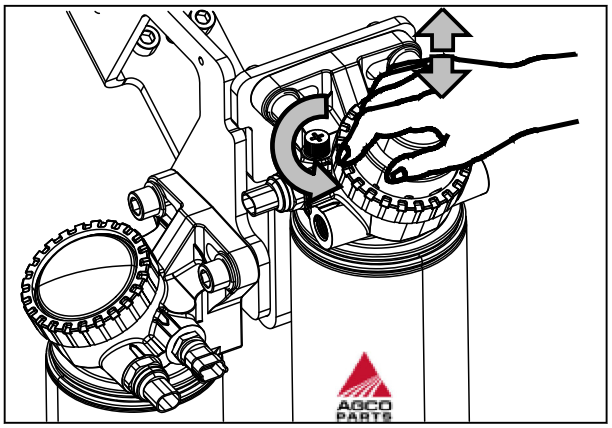

Fig. 1047

7. Start the engine. The fuel system removes automatically the air left in the system.

   NOTE: *Do not use the hand pump when the engine is running. Do not use any tools or excessive force on the pre-filter hand pump.*

   NOTE: *The fuel system is equipped with a pressure sensor that alarms before interference has developed. Reasons can be for instance:*

   - *Empty fuel tank.*
   - *Clogged fuel filters.*
   - *Suction piping clogged or leaking air.*
   - *Unsuitable fuel (e.g. summer fuel in the winter).*

   NOTE: *Use of spirits as antifreeze is not useful or recommended at all. It makes the fuel solidify and weakens the lubricating qualities of the fuel and increases the possibility of corrosion.*

2.29.2 Measuring fuel feed pressure

Procedure

1. Clean the pre-filter, the fuel filter and the related fuel pipes from the outside.

6. Before you can start the Catalyst Cleanup, make sure that the coolant temperature is above 40°C.
7. Make sure that the transmission is on a neutral position.
8. Make sure that the PTO and other devices are stopped.
9. Put the parking brake on.
10. Make sure that the acceleration pedal is in neutral position.

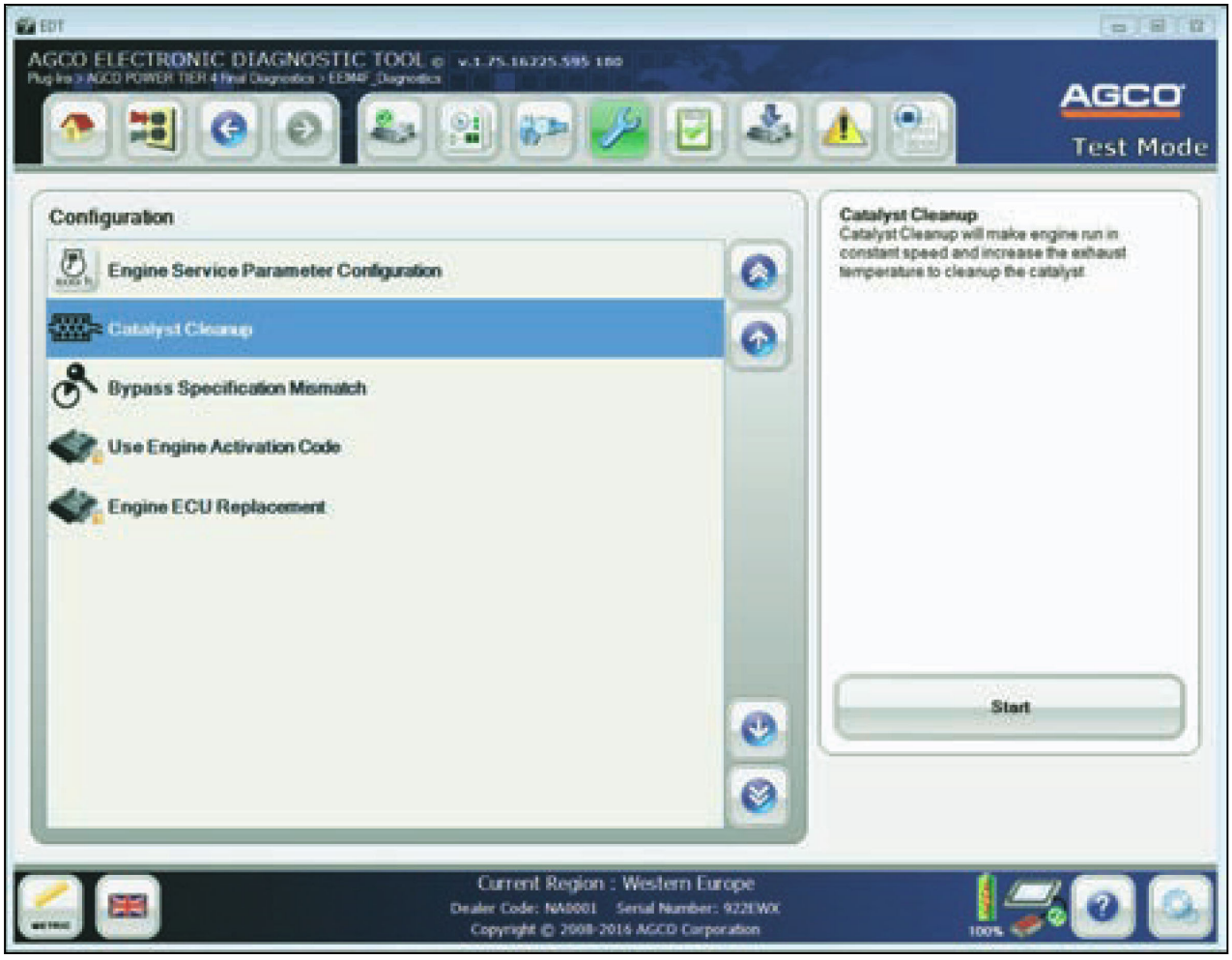

Fig. 1081

11. Start the Catalyst Cleanup function with the EDT.
    a) Do not let the machine run without supervision during the Catalyst Cleanup function!
12. Let the engine idle for minimum of 2 minutes before stopping the engine.

2.30.9.2 Make the dosing rate test

The dosing rate test is used to find, if the SCR dosing system operates correctly and if the dosing quantity is correct. Decreased dosing rate can be one possible root cause for fault codes:

- SPN 4090 FMI 16, SCR system malfunction: NOx emission too HIGH
- SPN 521025 FMI 31, SCR system malfunction: SCR efficiency not OK
- SPN 521026 FMI 31, SCR system malfunction: SCR efficiency not OK after DEF refill (possible bad quality)

Special tools needed for the procedure:

- SCR tool kit V837091048
- AGCO EDT service tool

3.1 Steering system introduction

The machines are equipped with a hydraulic system that provides steering output to the steering differential.

The steering system on the tracked machine is similar to the steering system on a wheeled machine. When the machine moves forward turn the steering wheel to the right and the machine will move to the right.

When the machine moves in reverse, turn the steering wheel to the right and the machine will move to the right.

(10) Bevel gear shaft
(12) Sun gear
(13) Sun gear
(14) Right-hand outer axle shaft
(15) Carrier
(16) Planet gears (steering)
(17) Carrier
(18) Planet gears (drive)
(19) Ring gear
(20) Ring gear
(21) Right-hand side
(22) Left-hand side

The two graphics illustrate steering power flow.

The transmission is in neutral. The following components hold stationary:

- Transmission input pinion
- Bevel gear
- Planet gears for drive function

When the transmission is in NEUTRAL position with the park brake disengaged, power input from the steering motor flows through the ring gear (19).

Power input from ring gear (19) divides in two paths.

Half the power flows through planet gears (steering) (16) to carrier (15). This power is lower speed and higher torque. Power from carrier (15) flows to the right-hand outer axle shaft (14).

The other half the power is higher speed and lower torque and flows through planet gears (steering) (16) to sun gear (13). Sun gear (13) rotates in the opposite direction.

Sun gear (13) sends power through center axle shaft (2) to sun gear (6).

Input from sun gear (6) is higher speed and lower torque. Input from sun gear (6) changes to lower speed and higher torque by the following components:

- planet gears (4)
- carrier (5)
- ring gear (9)

Output flows through carrier (5) to the left-hand outer axle shaft (7).

Both of the outer axle shafts have the same power. But, the direction of the shaft rotation is opposite. Thus, the machine counter rotates.

7. Connect the inlet hose (1).
8. Connect the common sump hose (2).
9. Connect the brake hoses (3) to the actuator valve.

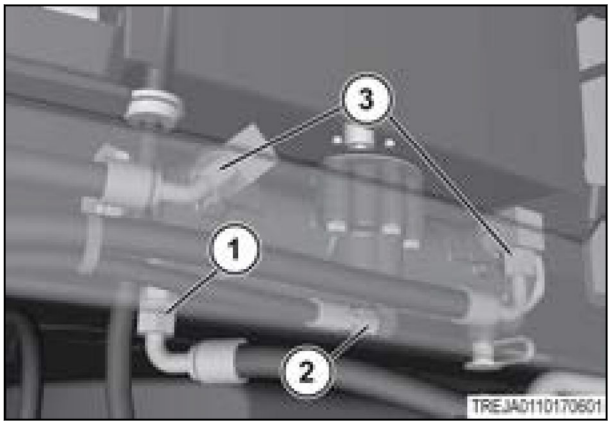

Fig. 88

3.7.9 Remove the secondary steering valve

The secondary steering valve is under the front of the cab on the right-hand side of the chassis.

Before starting the procedure

IMPORTANT:
Make sure to contain all fluids during inspection, maintenance, testing, adjusting, and repair of the machine. Contain the fluids with the correct containers before opening any compartment or disassembling any component containing fluids. Discard all fluids according to laws, regulations, and mandates.

NOTE:
Put identification marks on all hoses, hose assemblies, wires, and on all line assemblies for installation purposes. Close all openings. This can prevent fluid loss and will prevent contaminants from entering the system.

NOTE:
Clean components are important. Before starting a disassembly procedure, completely clean all components. Contaminants can damage precision components. Do the assembly procedures on a clean work surface. Keep the components covered and protected always.

Procedure

1. Park the machine on a hard level surface.
2. Move the transmission control lever into the neutral position and engage the park brake.
3. Turn the key start switch to the off position and take the key with you.
4. Make sure to let the machine cool.
5. Relieve all pressure from the hydraulic system.
6. Disconnect the harness from the electrical connector (1) on the solenoid.
7. Disconnect the hose (2) from the fitting in the G2-port.

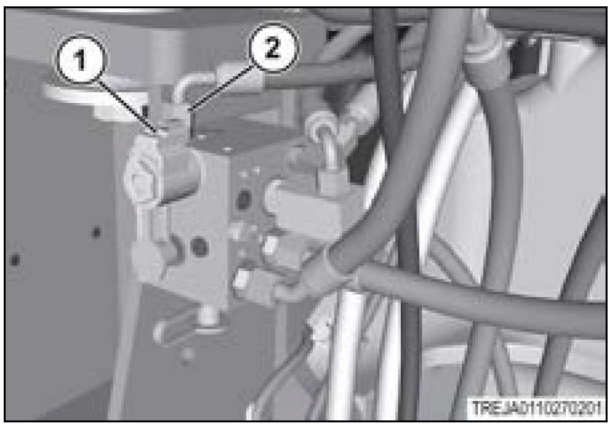

Fig. 89

8. Install the pressure gauge to the test port (1) .
9. Install the key into the battery disconnect switch.
10. Turn the battery disconnect switch to the on position.
11. Turn the key start switch to the on position.
12. Start the engine.
13. Operate the engine at low idle.
14. Put the transmission lever engaged in neutral position.

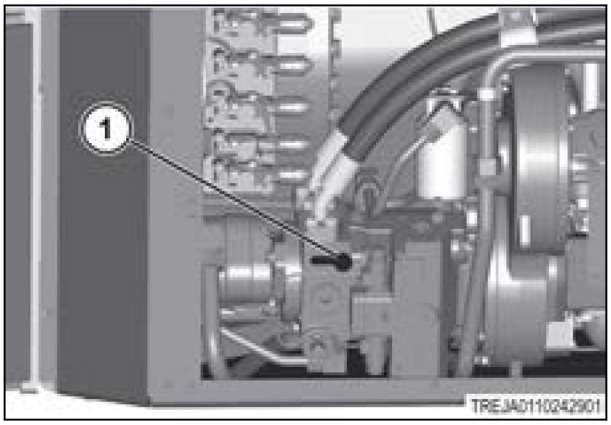

Fig. 126

15. Fully actuate the service brakes in the activated position.
16. Rotate the steering wheel in the direction that requires adjustment.
17. Record the pressure reading from the test port (1)
18. Turn the adjusting screws (2) or (3)clockwise

    Result

    The pressure reading from the test port (1) will be the charge pressure plus the following pressure:

    Standard gauge pressure is 469 bar (6802 psi).

    NOTE: *One turn of the adjusting screw* (2) *or* (3)*is equal to 152 bar* (2200 psi)

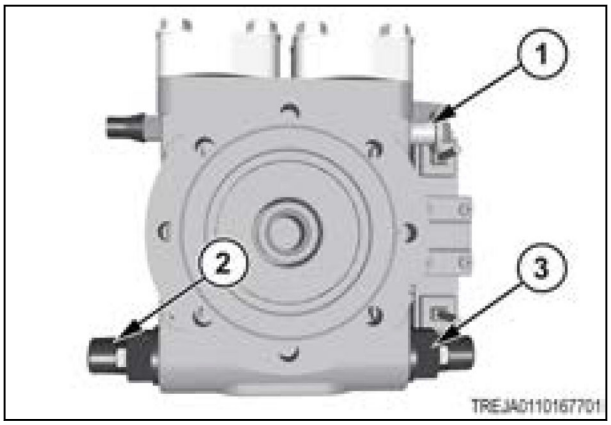

Fig. 127

19. Adjust the cutoff pressure for the steering pump using the steering pump high pressure cutoff adjustment procedure.

Related Links

Adjust the steering pump high pressure cutoff page 3-66
Adjusting the pressure override valve checks the maximum normal operating pressure for the steering system.

3.8.21 Test and adjust the secondary steering 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.

WARNING: Hot components can burn.

Severe personal injury can result.

Let the engine and components cool before doing maintenance.

6. Use the step plate (1) and the combination puller (2) to remove the gear (3) from the shaft.

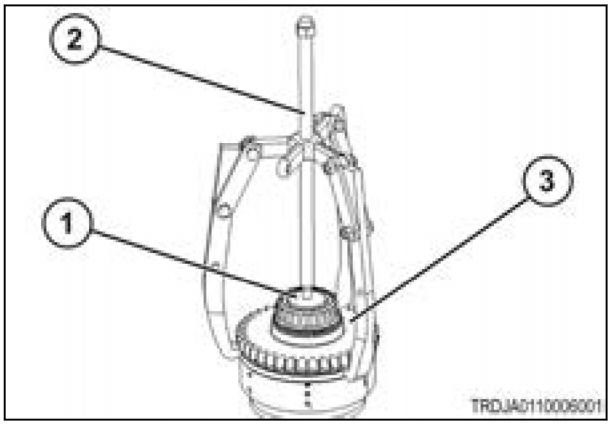

Fig. 30

7. Remove the bearing (1), the spacer (2), the thrust washer (3), and the gear (4) from the shaft (5).

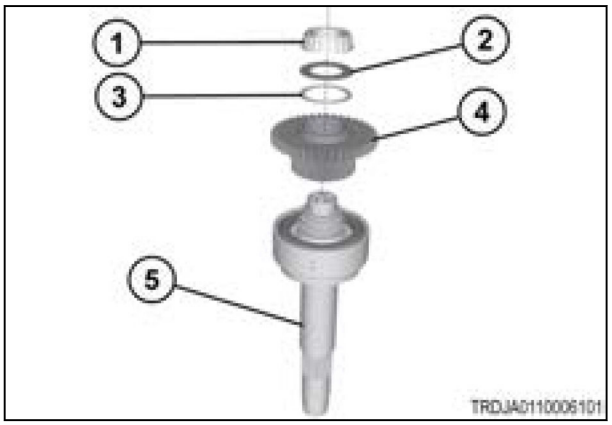

Fig. 31

8. Remove the bearings (1), and thrust washer (2) from the shaft (3).

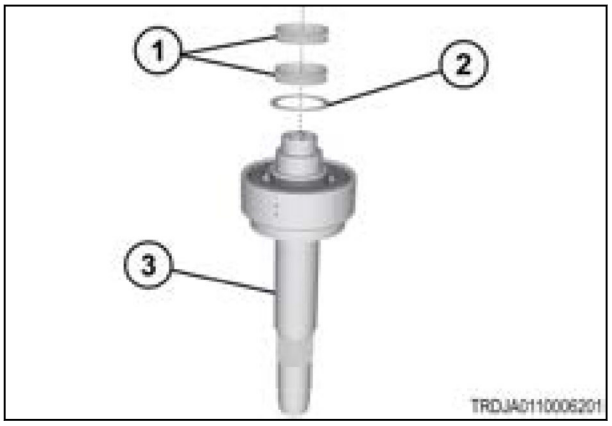

Fig. 32

9. Use a retaining ring pliers to remove the retaining ring (1).

NOTE:
If necessary use two flat blade screwdrivers to remove the retaining ring.

10. Remove the clutch plate (2) from the shaft (3).

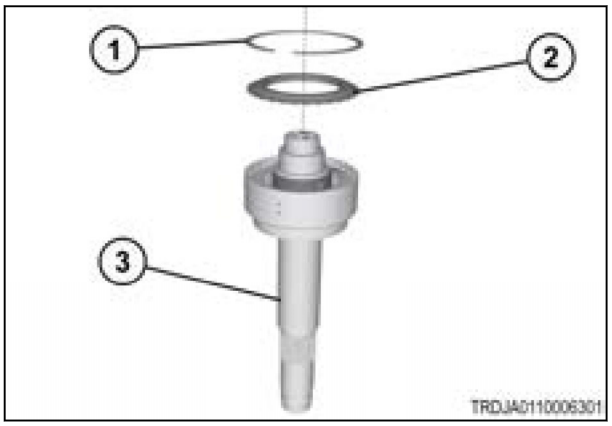

Fig. 33

Description	Part number	Vendor	Where used	Mandatory
Dial indicator	6V-3075	Caterpillar dealer network	Chassis	Mandatory
Dial indicator base	165-8958	Caterpillar dealer network	Chassis	Mandatory

Torque specifications

Description	Torque
Transmission mounting bolts	530 Nm (391 lbf ft)

Before starting the procedure

IMPORTANT:
Make sure to contain all fluids during inspection, maintenance, testing, adjusting, and repair of the machine. Contain the fluids with the correct containers before opening any compartment or disassembling any component containing fluids. Discard all fluids according to laws, regulations, and mandates.

NOTE:
Put identification marks on all hoses, hose assemblies, wires, and on all line assemblies for installation purposes. Close all openings. This can prevent fluid loss and will prevent contaminants from entering the system.

NOTE:
Clean components are important. Before starting an assembly procedure, completely clean all components. Contaminants can damage precision components. Do the assembly procedures on a clean work surface. Always keep the components under a cover and protected.

WARNING:
Wear all necessary protective equipment. Parts propelled by a released spring force can cause personal injury. Follow the procedure and use the correct tools.

Procedure

1. Install the seals (2) onto the piston (1).
2. Install the piston (1) onto the housing (6).

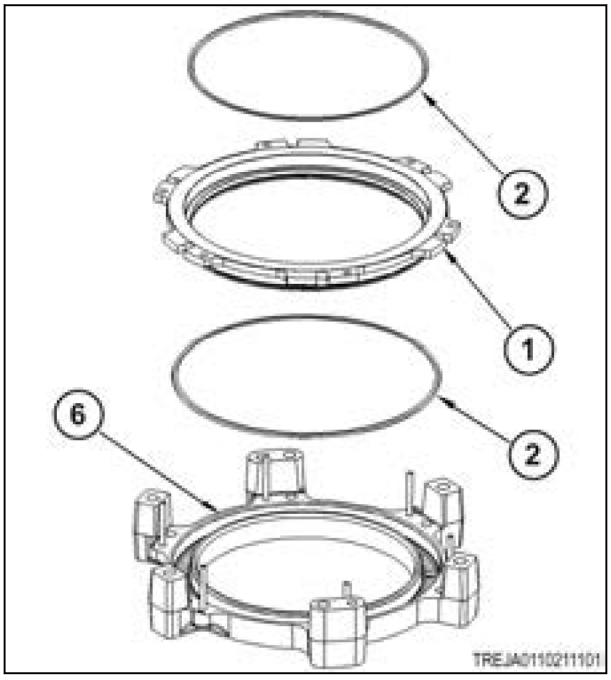

Fig. 119

3. Use the jack stand (1) to support the steering differential.
4. Install the bolts (2).
5. Tighten the bolts to 5230 to 5370 Nm (340 to 440 lbf).

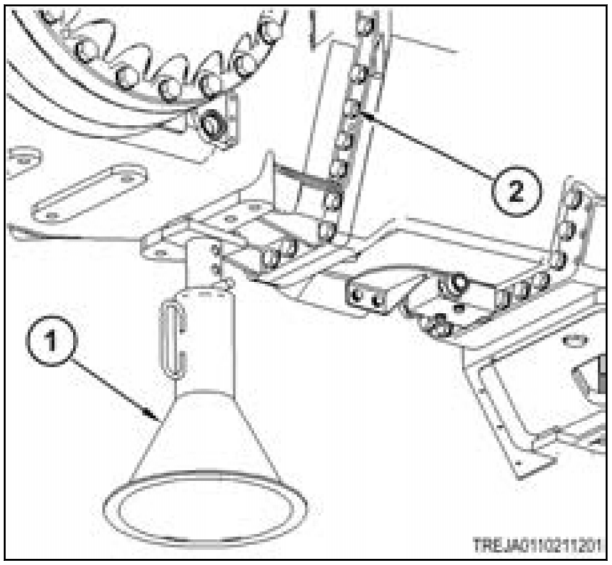

Fig. 207

6. Put the jack stands (1) under the front of the transmission.

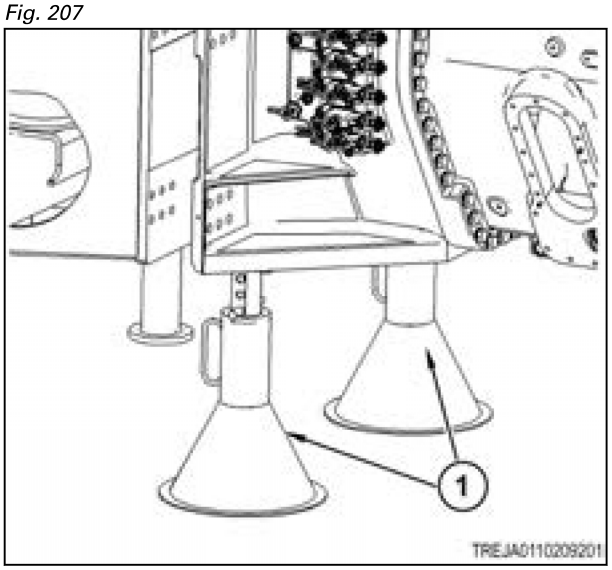

Fig. 208

7. Install the tube assembly (1).

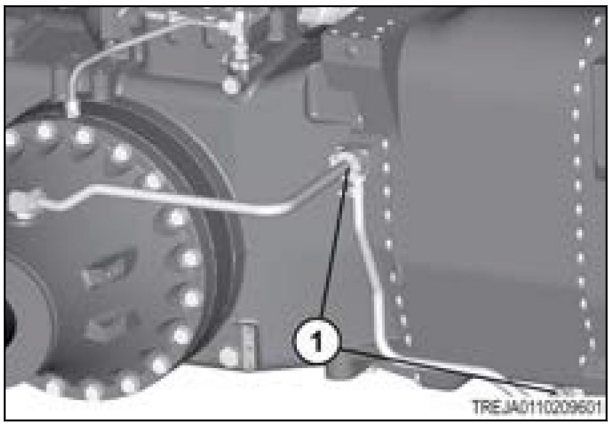

Fig. 209

9. Remove the bolts (1).

10. Install the guide bolts.

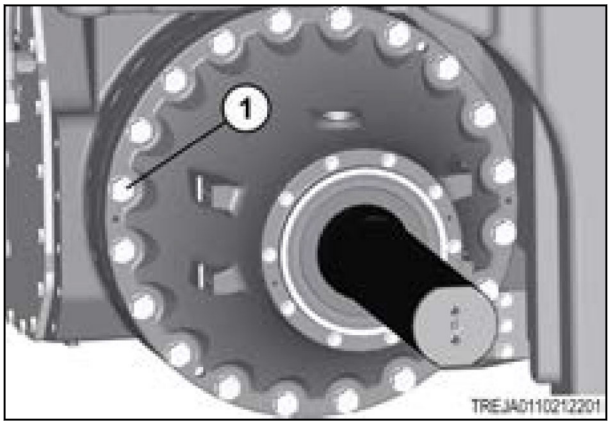

Fig. 281

11. Install the link brackets.

12. Fasten the lifting device (1) to the link brackets.

13. Install the forcing bolt (2) to the final drive.

14. Remove the remaining bolts (3).

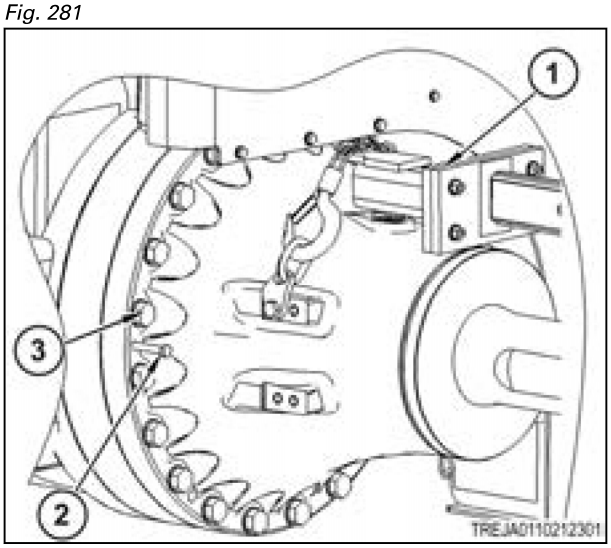

Fig. 282

15. Use the forcing bolt to disconnect the final drive from the ring gear (2).

16. Use the lifting device (1) to remove the final drive. The weight of the final drive is approximately 660 kg (1455 lb.

IMPORTANT:
Damage can occur if the weight of the final drive is not on the sun gear or supported correctly.

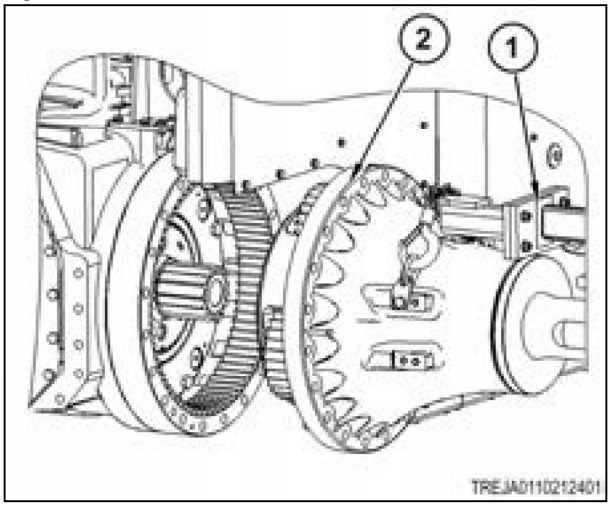

Fig. 283

22. Install a 14 mm pusher bolt (1) on the lower right-hand side of the differential housing.

Fig. 358

23. Disconnect the differential housing (1) from the transmission housing using the pusher bolts (2).

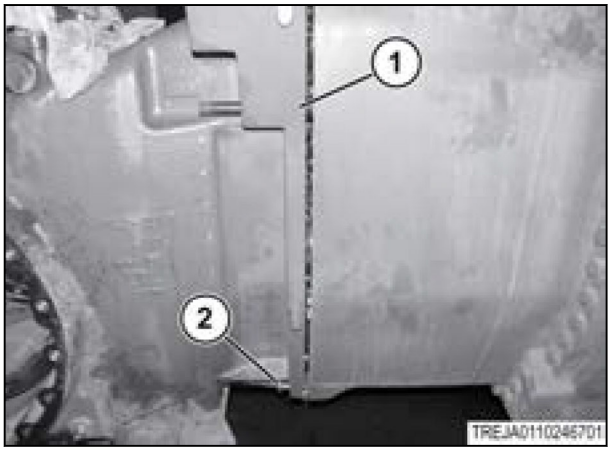

Fig. 359

24. Keep pushing the differential housing from the transmission housing until the shafts are disengaged.

25. Remove the differential housing (1).

26. Put the differential housing on blocks using the correct lifting equipment.

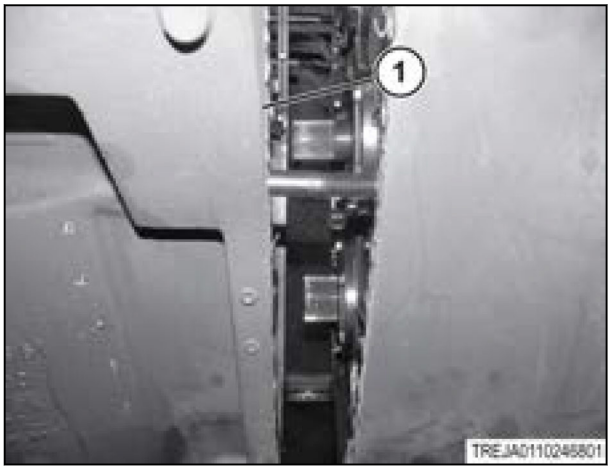

Fig. 360

Related Links

Remove the cab page 9-3
Remove the right fuel tank page 2-193
Remove the left fuel tank page 2-206
Remove the third fuel tank page 2-214
Remove the left-hand final drive page 4-97
Remove the right-hand final drive page 4-99
Remove the 3-point linkage page 14-41
Remove the power take-off page 13-13

5. Install the bolts (1).

6. Remove the guide pins.

7. After installing the bolts, torque the bolts to 519 Nm (383 lbf ft).

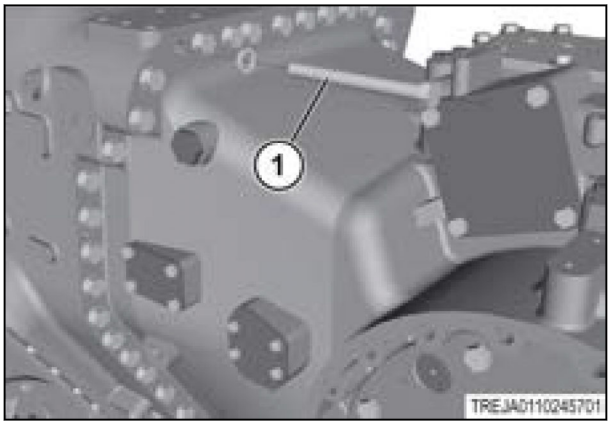

Fig. 450

8. Install the nine twelve point bolts (1) from the bottom of the steering differential.

9. Torque the bolts to 519 Nm (383 lbf ft).

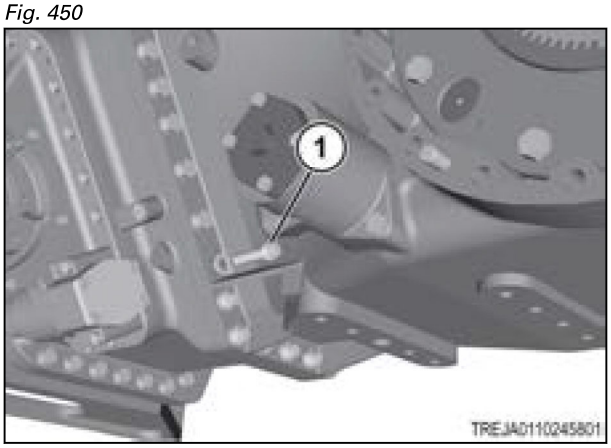

Fig. 451

10. Remove the elevated oil reservoir (EOR) manifold block (1).

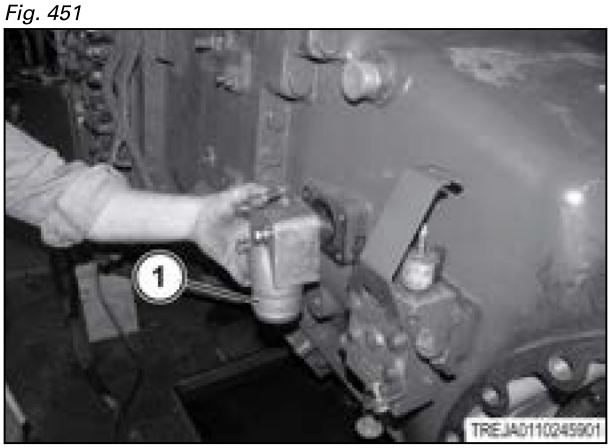

Fig. 452

NOTE:
Calibration will require certain conditions to be set prior to the start of the calibration. For example, set shift lever to Park. User must ensure that all setup for conditions of the calibration are satisfied.

NOTE:
To ensure proper heat-soak of transmission components prior to calibration, heat hydraulic oil by using a load line. When the transmission oil has reached about 32° C, operate the machine in roading gears (13F to 16F) with the load-line on to heat the hydraulic oil to near calibration temperature. Then operate the machine in gears 2R to 16F multiple times to properly heat-soak the transmission components. Continue shifting through the gear range until the hydraulic oil has reached calibration temperature. In cold weather operation, to facilitate faster oil heating, restrict the air flow to the hydraulic oil cooler (i.e. placing cardboard over radiator). Calibrate transmission as close to the minimum required temperature as possible (as outlined by Caterpillar Electronic Technician). To prevent the temperature dropping too much during calibration in cold climate, the load line can be left on to continuously heat the hydraulic oil. If during calibration temperature gets too hot or cold, load line or air flow to oil cooler can be adjusted to maintain proper calibration temperature.

Related Links

Warm the hydraulic oil page 3-63

4.8.10 Test the transmission clutch pressure

WARNING: Hot components can burn.

Severe personal injury can result.

Let the engine and components cool before doing maintenance.

CAUTION: Machine movement hazard. Hydraulic pressure release.

Personal injury or machine damage can occur.

Stand clear of the machine and components when releasing hydraulic pressure.

NOTE:
Contain all fluids during the performance of inspection, maintenance, doing tests, adjusting, and repair of the machine. Prepare to contain fluids with the correct containers before opening any compartment or disassembling any component containing fluids. Discard fluids according to the local regulations and the laws.

NOTE:
Use the correct pressure gauges for the following test procedure.

Procedure

1. Use the following transmission clutch callouts to correlate to a corresponding modulating valve.

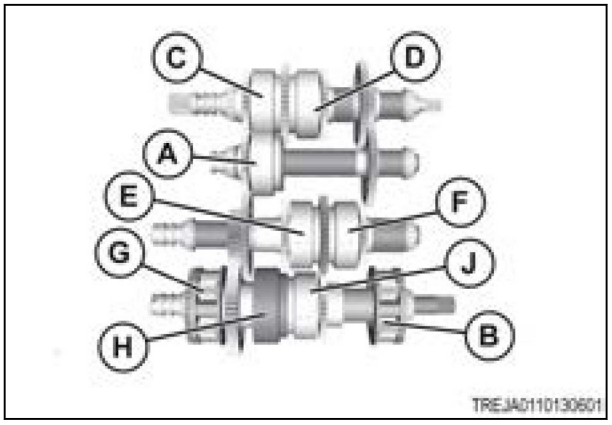

Fig. 507

Maintenance schedule page 1-22

5.3.4 Air compressor

The air compressor (1) is located on the right-hand side of the engine. The compressor generates compressed air for the air brake system. The compressor uses a single piston and is a gear-driven unit connected to the front of the engine. External lubrication is not necessary. The compressor is connected to the engine lubrication system.

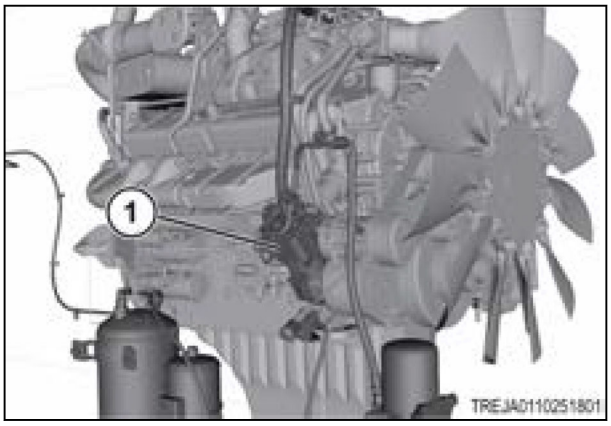

Fig. 28

5.3.5 Air trailer brake valve

The air trailer brake valve (1) receives hydraulic signals from the park brake and the service brake control valves. The park brake is either on or off. When the park brake is applied, the air trailer brakes will also be applied. The service brake is modulated. When the service brake is applied, the air trailer brakes will also be applied.

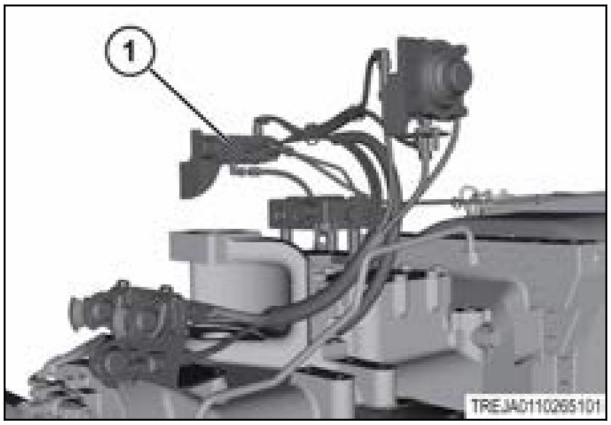

Fig. 29

5.3.6 Trailer control valve

The trailer control valve (1) works with the air trailer brake valve. The trailer brake is held in released position until the service brake pedal is pressed. When the service brake pedal is pressed, the trailer control valve vents air pressure. The reduction in air pressure lets the spring force in the trailer brake be applied.

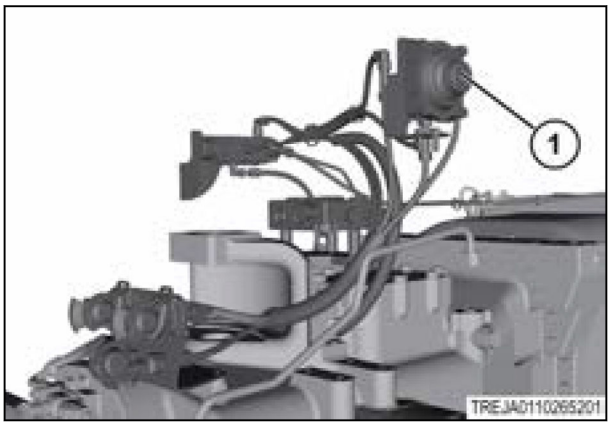

Fig. 30

2. Disconnect the hydraulic line (2) from the tee-fitting in the B port.

3. Remove the cotter pin from the clevis pin (1).

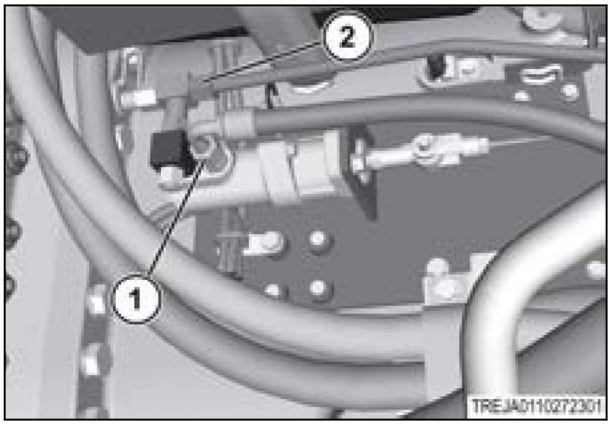

Fig. 91

4. Remove the two bolts (2) holding the secondary brake valve to to the bracket and remove the secondary brake valve.

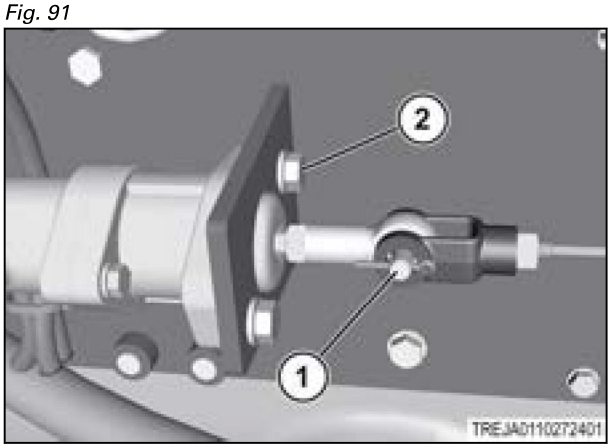

Fig. 92

5.5.8 Install the secondary brake valve

NOTE:
Make sure the component and area around the component are clean to prevent contamination.

Procedure

1. Install the secondary brake valve to the bracket with two bolts (1).

2. Install the clevis pin (2) into the rod end and secure it with a cotter pin.

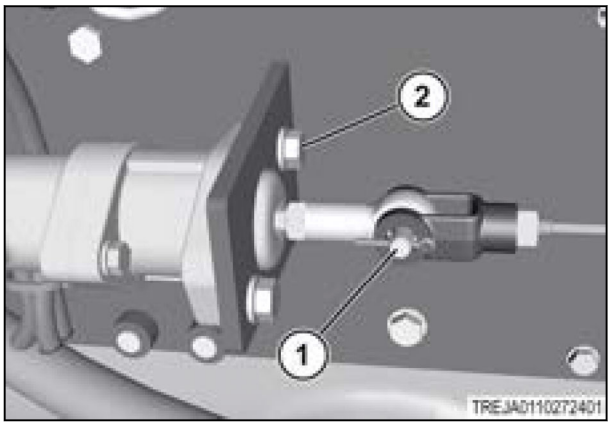

Fig. 93

3. Connect the hydraulic hose to the fitting (1) in the T port.

12. Close the engine cover (2) all the way and connect both side latches (1).

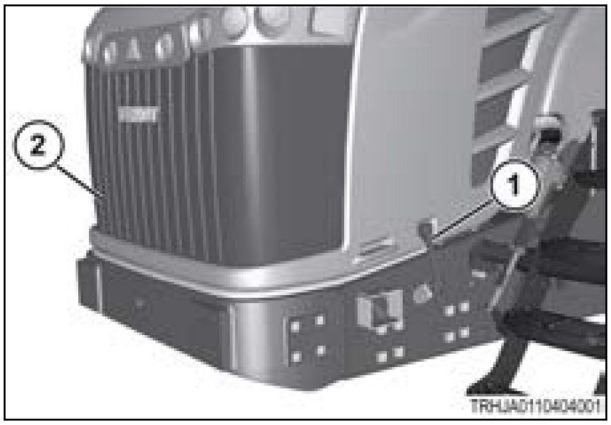

Fig. 17

13. Install the battery disconnect switch key (1).

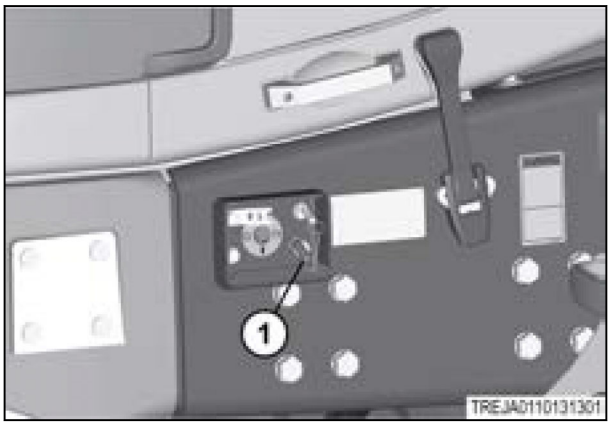

Fig. 18

14. Turn the battery disconnect switch key (1) clockwise to connect the battery power.

NOTE: *The battery disconnect switch is shown in the on position.*

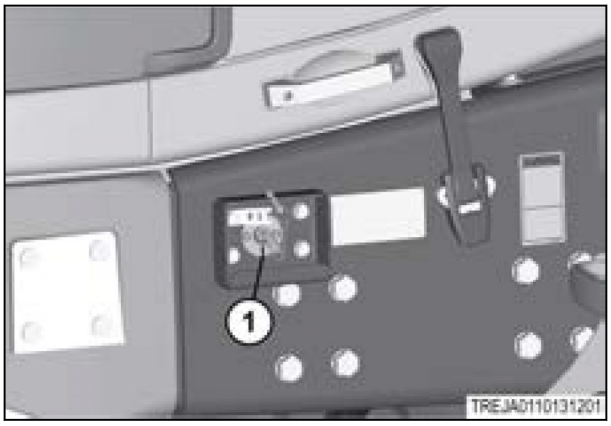

Fig. 19

Related Links

Refill the cooling system page 2-165

Coolant system fluid page 2-164

219 liter/min (58 gal/min) standard option

The hydraulic pump (1) has a maximum flow of 219 liters/min (58 gal/min).

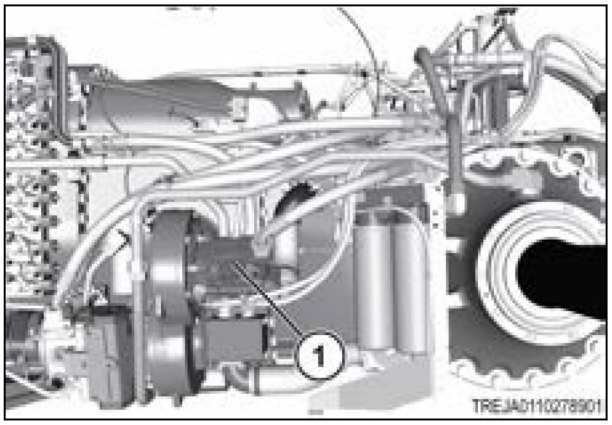

Fig. 15

322 liter/min (85 gal/min) high flow option

The hydraulic pump (1) has a maximum flow of 322 liters/min (85 gal/min).

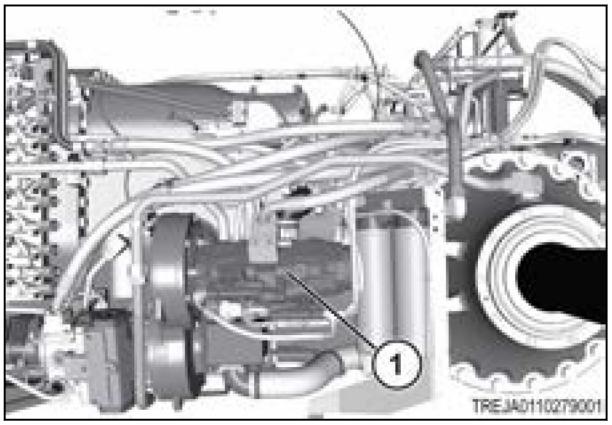

Fig. 16

7.1.16 Compensator valve

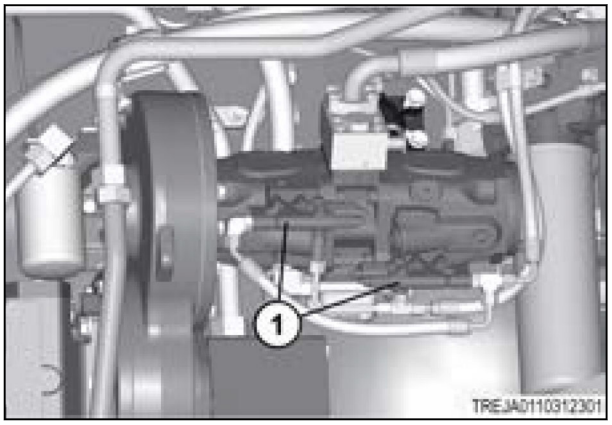

Fig. 17

The compensator valves (1) mount to the side of the hydraulic pump.

The compensator valves regulate the pump output flow in response to the following signals:

- Load sensing signal
- Implement valve reference signal

The compensator valves also work as a backup for limiting maximum system pressure.

6. Disconnect the harness (1) from the control valve solenoids.

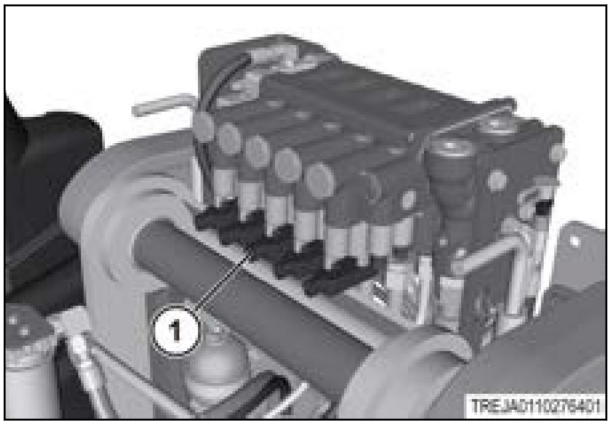

Fig. 64

7. Loosen the hose clamps and remove the drain hoses (1).

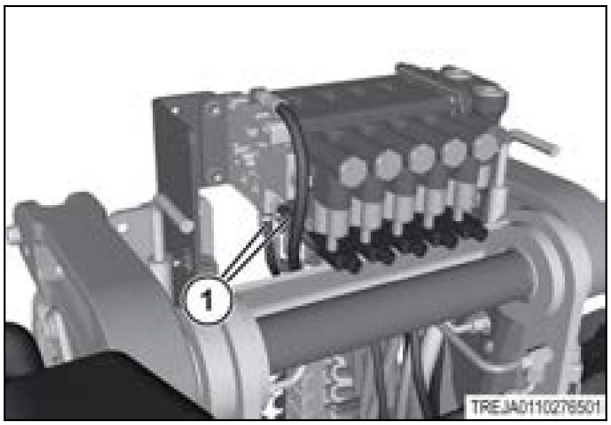

Fig. 65

8. Disconnect the pump reference hose (1).

9. Disconnect the return hose (2) and the supply hose (3).

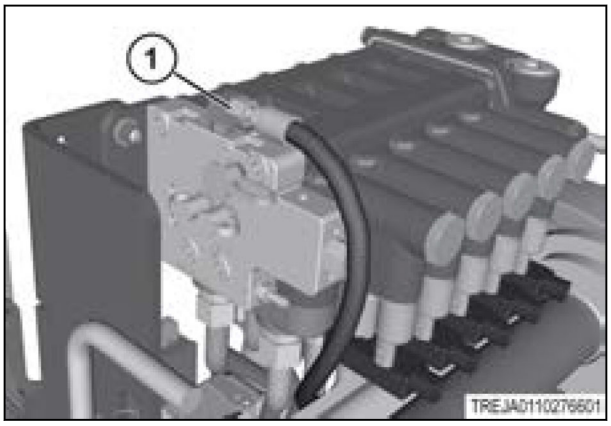

Fig. 66

10. Disconnect the load sense hose (1).

11. Disconnect the Tee-fitting (2).

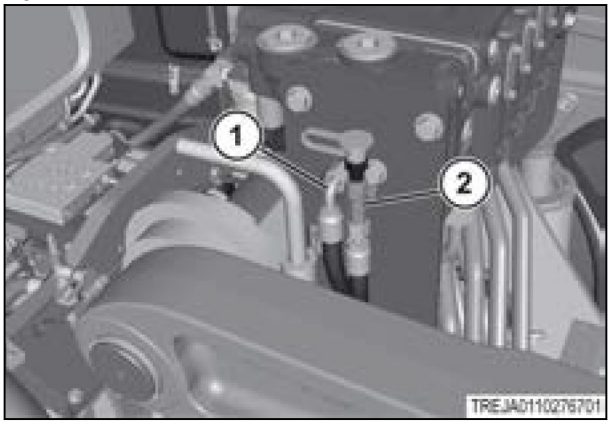

Fig. 67

7.3.5 Warm the hydraulic oil

Procedure

1. Install the hose assembly (1) into the quick coupler of any hydraulic control valve.
2. Put the hydraulic control lever in the extend detent position.
3. Adjust the valve (2) to heat the hydraulic oil.

   NOTE:
   During a diagnosis an any of the hydraulic systems, remember that correct oil flow and correct pressure are necessary for correct operation. Resistance of oil flow causes oil pressure. Oil temperature must be a minimum 60° C (140° F). The temperature of the hydraulic oil is on the information screen of the tractor management center.

Fig. 141

7.3.6 Position of the hydraulic control valve test ports

The test ports on the hydraulic control valve stack - drawbar configuration:

1 Pilot supply pressure
2 Pump supply pressure
3 Return pressure

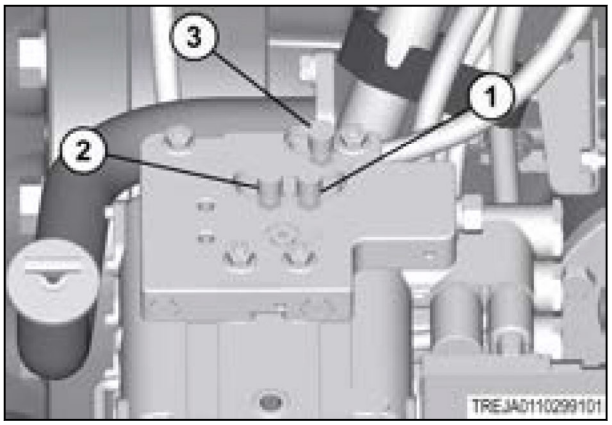

Fig. 142

The test ports are on the hydraulic control valve stack - 3-point linkage configuration:

1 Pilot supply pressure
2 Pump supply pressure
3 Return pressure

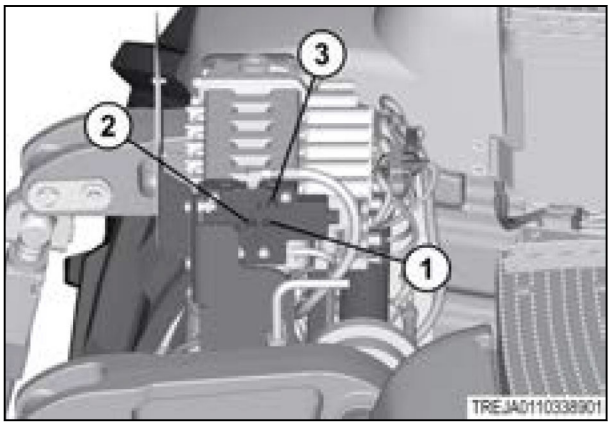

Fig. 143

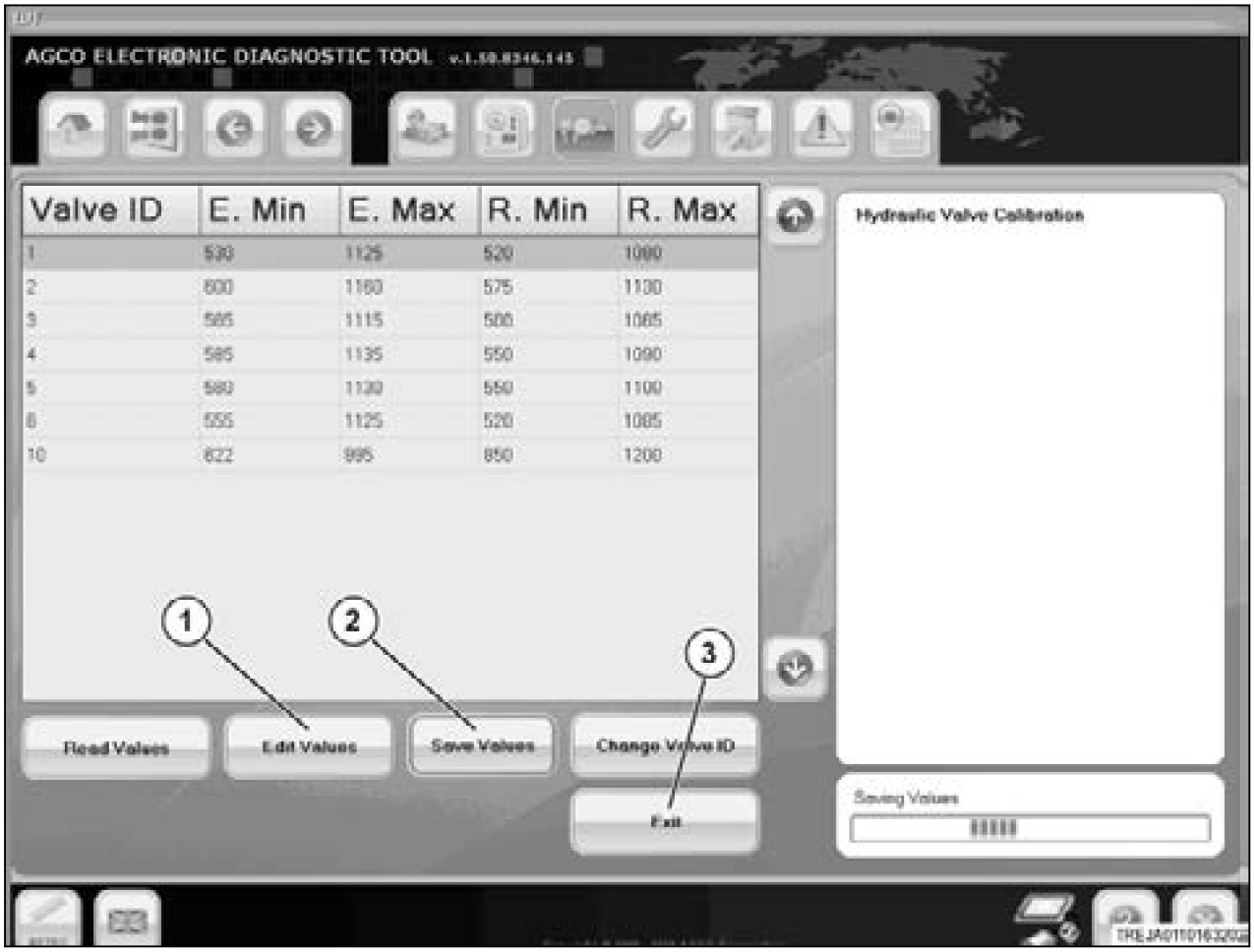

Fig. 171

5. Edit values (1) as necessary.
6. Save the values (2).
7. Press exit (3).
8. Contact AGCO Technical Service and Support for the correct calibration values for the new valves or if the calibration values are lost.

Cycle time is too slow for an implement	
Cause(s)	**Solution(s)**
Make sure the signal to the compensator valve is not blocked.	1. Do the margin pressure test. 2. Adjust the flow compensator spool to the correct margin pressure if necessary. If the correct margin pressure cannot be set, there is possibly a blockage in the load sensing signal circuit.
Piston seal leakage.	Check for a leakage around the piston seals of the hydraulic cylinders.
Broken hydraulic control valve.	Check for a broken spring in the hydraulic control valve.
Pump does not fully stroke.	Make sure the pump fully strokes. Make sure the actuator piston moves freely and that the swash plate is not blocked.

Cycle time is too fast for an implement	
Cause(s)	**Solution(s)**
Incorrect flow rate.	Make sure the flow rate for the hydraulic control valve is adjusted correctly.
Incorrect electrical current.	Check the current to the solenoid valve.
Make sure the solenoid valve is operating correctly.	Check the current that is applied to the solenoid.

Implement control valve does not return to the hold position when the hydraulic cylinders reach end of a stroke	
Cause(s)	**Solution(s)**
Incorrectly set detent time.	Make sure the detent time for the valve is not set for continuous operation.

Related Links

Implement system introduction page 7-3

8.2.5 Fuse relay block two

Fuse / relay block two		
Item	**Relay**	**Description**
1	35 Amp	Neutral start relay
2	35 Amp	Horn relay
3	35 Amp	ISO power relay
4	35 Amp	ISO ECU relay
5	35 Amp	ECU relay
Fuse / relay block two - ECU relay power		
Item	**Fuse**	**Description**
6	Not used	
7	Not used	
8	Not used	
9	Not used	
10	10 Amp	GPS
11	10 Amp	Armrest
12	10 Amp	Dash
13	20 Amp	Bottom light module
14	20 Amp	Bottom light module
15	20 Amp	Top light module

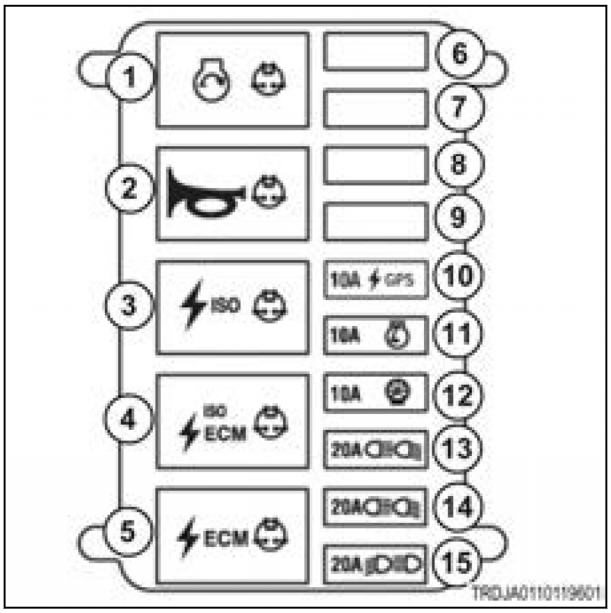

Fig. 8

8.2.6 Main fuse

The two main fuses for the cab power and the alternator are located inside the frame rail.

(1) Alternator, 300 Amps

(2) ECM, Starter relay and Auxiliary Relay, 100 Amps

(3) Cab stud, 175 Amps

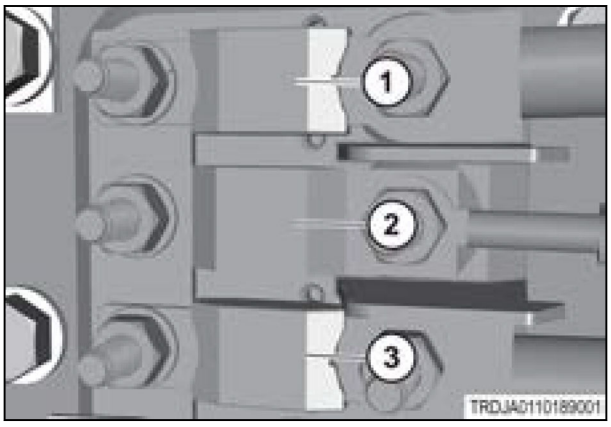

Fig. 9

8.5.12.1 DEF electrical schematic

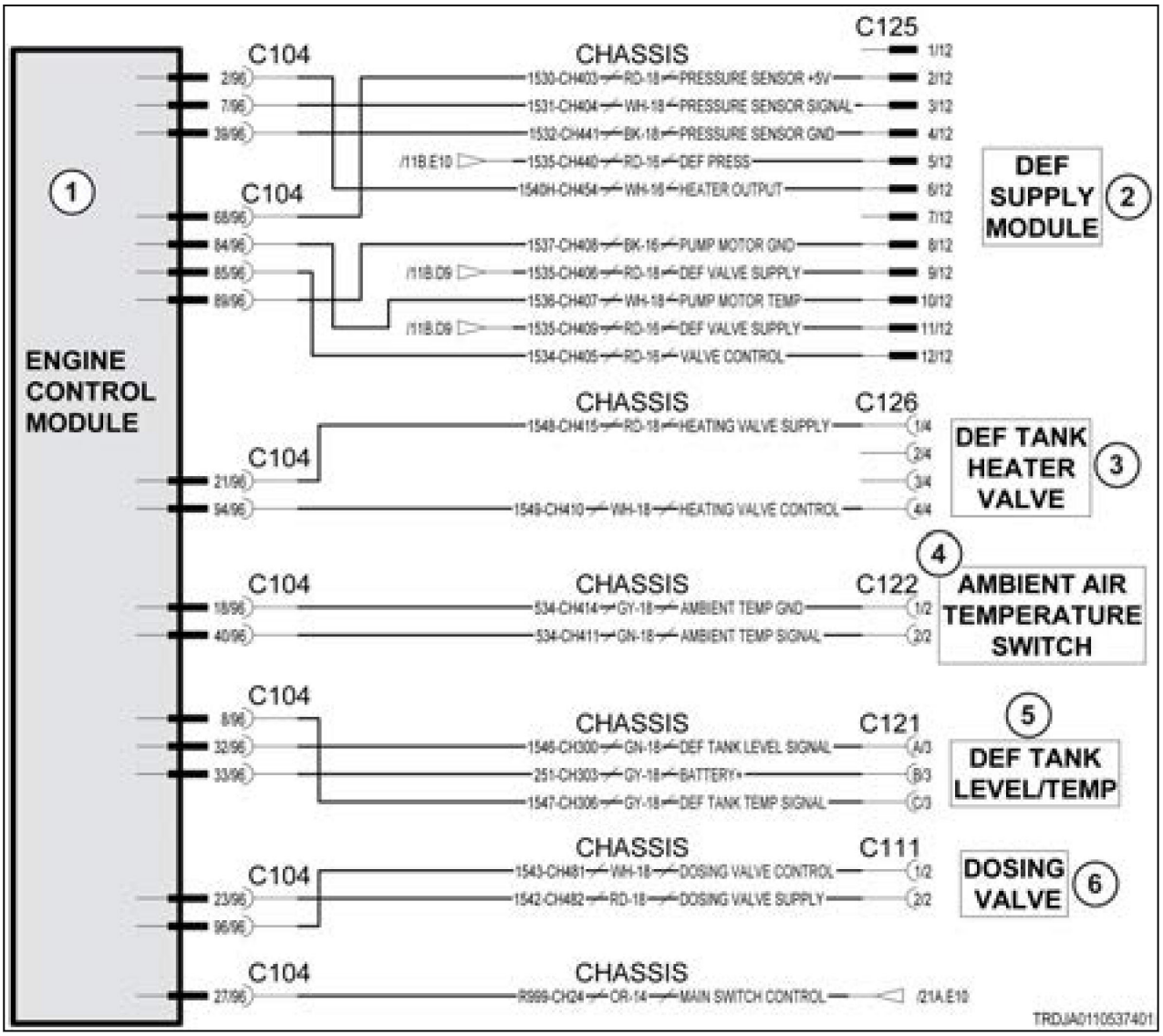

Fig. 46

Schematic legend		
Item	**Schematic term**	**Description**
1	ENGINE CONTROL MODULE	Engine module
2	DEF SUPPLY MODULE	DEF supply module
3	DEF TANK HEATER VALVE	DEF tank heater valve
4	AMBIENT AIR TEMPERATURE SWITCH	Ambient air temperature switch
5	DEF TANK LEVEL/TEMP	DEF tank level/temperature
6	DOSING VALVE	Dosing valve
--	DEF PRESS SENSOR GND	DEF pressure sensor ground
--	PUMP MOTOR GND	Pump motor ground
--	PUMP MOTOR TEMP	Pump motor temperature
--	AMBIENT TEMP GND	Ambient temperature ground

8.5.36.1 DEF electrical schematic

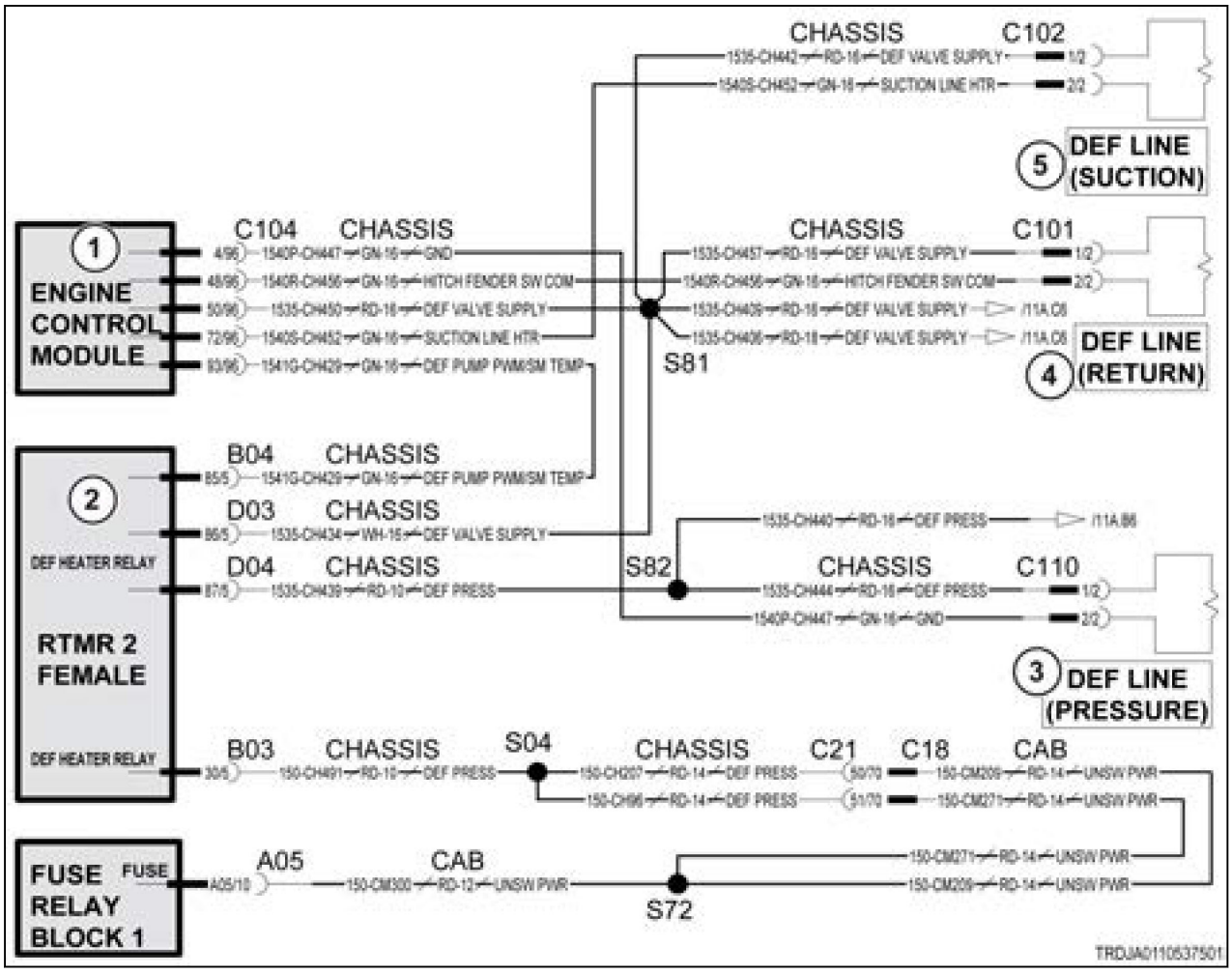

Fig. 62

Schematic legend		
Item	**Schematic term**	**Description**
1	ENGINE CONTROL MODULE	Engine module
2	RTMR 2 FEMALE	Rear terminal mini-fuse relay 2 female
3	DEF LINE (PRESSURE)	DEF pressure line
4	DEF LINE (RETURN)	DEF return line
5	DEF LINE (SUCTION)	DEF suction line
--	SUCTION LINE HTR	DEF suction line heater
--	HITCH FENDER SW COM	Hitch fender switch common
--	DEF PUMP PWM/SM TEMP	DEF pump pulse width modulation/supply module temperature
--	DEF PRESS	DEF pressure
--	UNSW PWR	Unswitched power

8.5.54.1 DEF electrical schematic

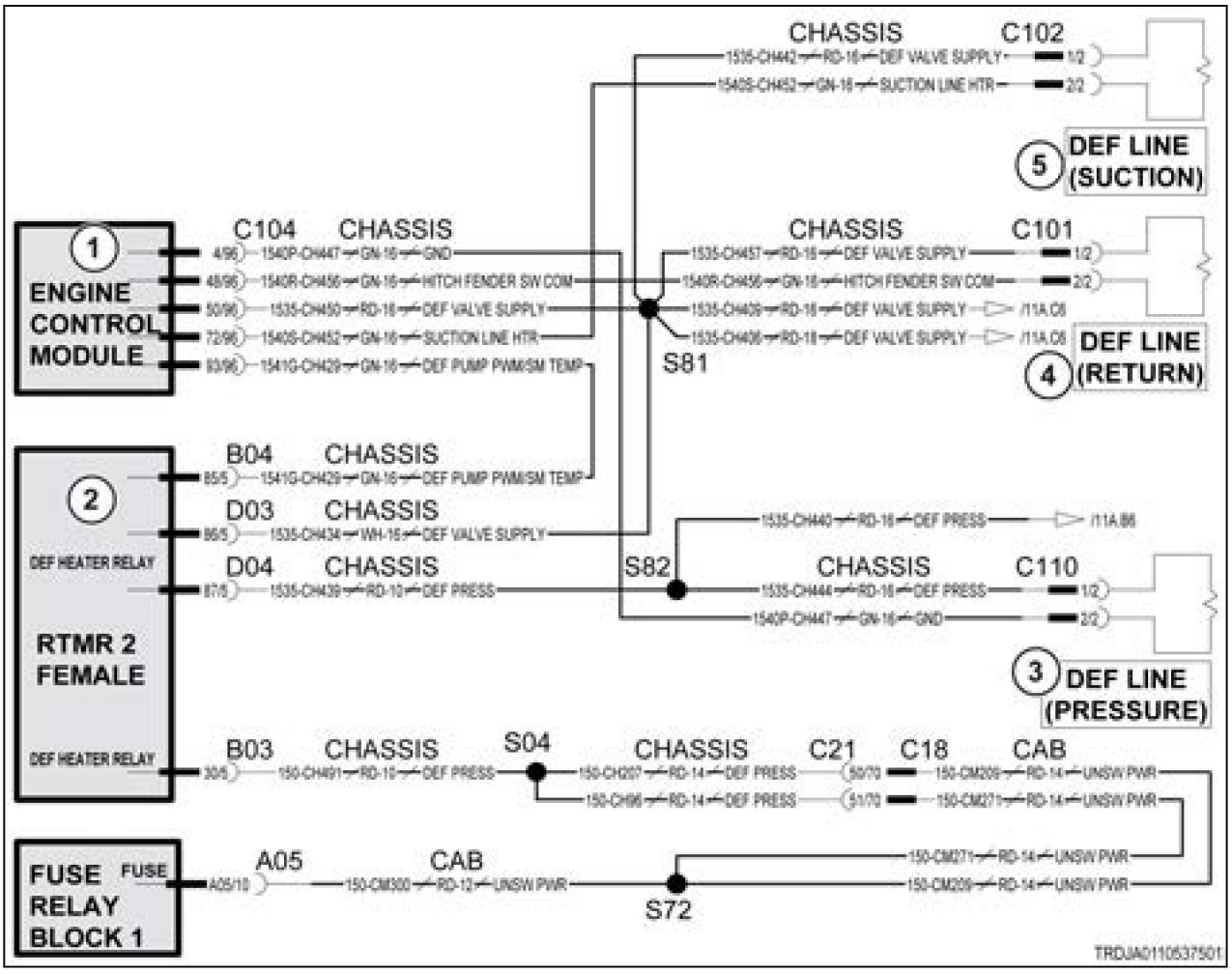

Fig. 80

Schematic legend		
Item	**Schematic term**	**Description**
1	ENGINE CONTROL MODULE	Engine module
2	RTMR 2 FEMALE	Rear terminal mini-fuse relay 2 female
3	DEF LINE (PRESSURE)	DEF pressure line
4	DEF LINE (RETURN)	DEF return line
5	DEF LINE (SUCTION)	DEF suction line
--	SUCTION LINE HTR	DEF suction line heater
--	HITCH FENDER SW COM	Hitch fender switch common
--	DEF PUMP PWM/SM TEMP	DEF pump pulse width modulation/supply module temperature
--	DEF PRESS	DEF pressure
--	UNSW PWR	Unswitched power

8.5.74 Code SA 00 SPN 4376 FMI 31

DEF pump direction valve low side control power stage over temperature.

Diagnosis and solution

1. Clear the error log.
2. Restart the engine module.
3. If the fault code shows again during the next driving cycle, check the following.
4. Check the DEF supply module harness. Make sure the connections are good and the contacts are clean.
5. Replace the DEF supply module. If the system is correct and the fault code is not active, the original DEF supply module is bad.
6. Replace the engine module. If the system is correct and the fault code is not active, the original engine module is bad.

8.5.74.1 DEF electrical schematic

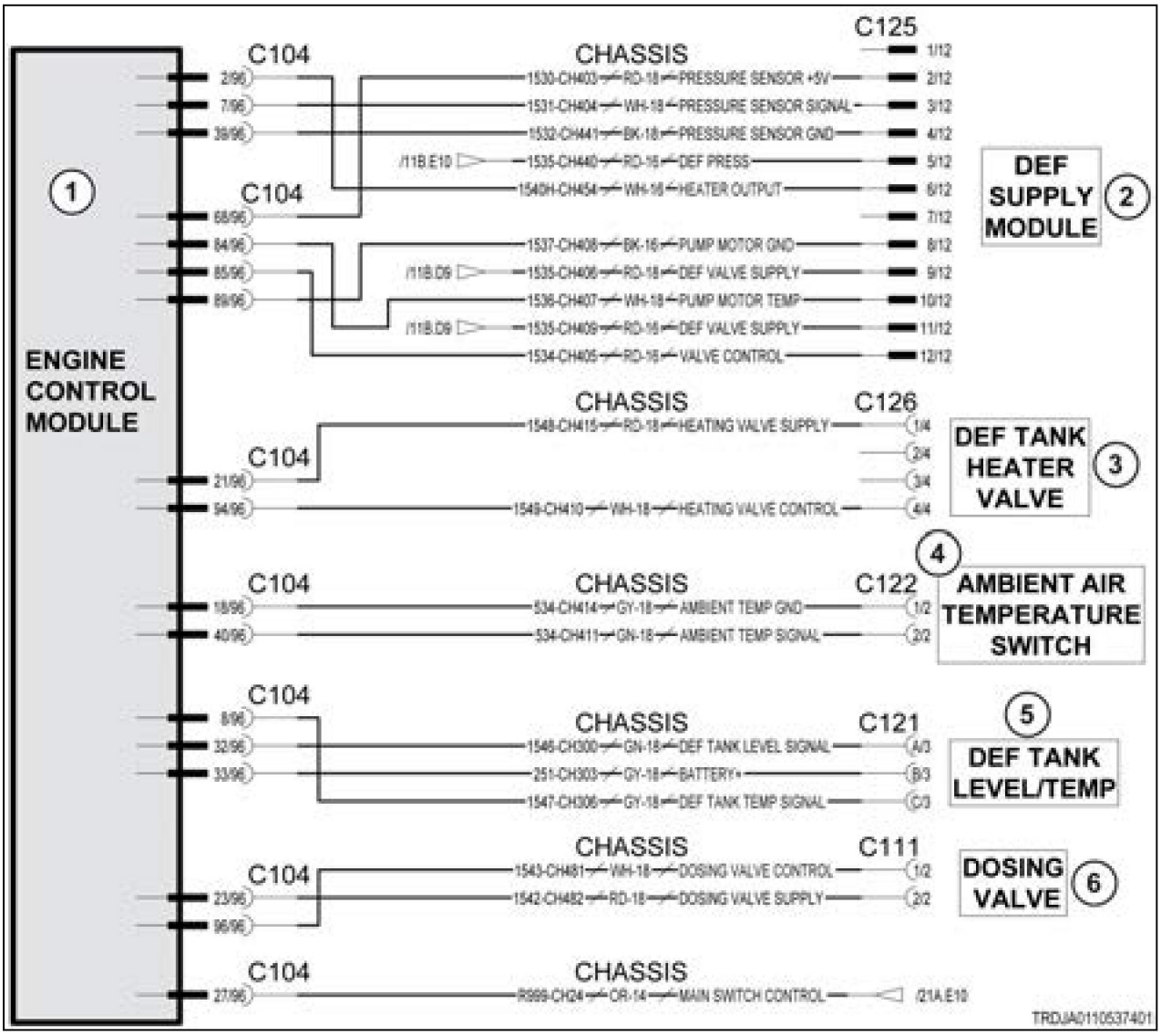

Fig. 100

7. Check the DEF pressure line hose and the connector. Make sure there is no obstruction.
8. Remove the DEF dosing valve and check the mounting boss condition.
9. Check the SCR system catalyst condition.

8.5.96 Code SA 00 SPN 521007 FMI 10

SCR system error. DEF backflow line blocked or implausible.

Diagnosis and solution

1. Clear the error log.
2. Restart the engine module.
3. If the fault code shows again during the next driving cycle, check the following.
4. Check the backflow line for any mechanical failure.
5. Change the DEF supply module main filter and the backflow connector.
6. Check the DEF for contamination and change if necessary.
7. Replace the DEF supply module. If the system is correct and the fault code is not active, the original DEF supply module is bad.

8.5.97 Code SA 00 SPN 521007 FMI 14

SCR system error. DEF pressure line or dosing valve blocked.

Diagnosis and solution

1. Clear the error log.
2. Restart the engine module.
3. If the fault code shows again during the next driving cycle, check the following.
4. Check the DEF pressure line hose and the connector. Make sure there is no obstruction.
5. Change the DEF supply module main filter.
6. Check the DEF system for any leaks.
7. Check the DEF for contamination and change if necessary.
8. Check the DEF dosing valve visually and with the service tool test function.
9. Remove the DEF dosing valve and check the nozzle for obstruction.
10. Replace the DEF supply module. If the system is correct and the fault code is not active, the original DEF supply module is bad.

8.5.98 Code SA 00 SPN 521007 FMI 31

SCR system error. DEF pressure stabilization failure.

Diagnosis and solution

1. Clear the error log.
2. Restart the engine module.
3. If the fault code shows again during the next driving cycle, check the following.
4. Change the DEF supply module backflow connector.
5. Change the DEF supply module main filter.
6. Check the DEF system for any leaks.

Result

- Sensor power is 5V, and the signal voltage is at or near or 0 volts.

  Either the sensor is faulty, or the signal wire is shorted to ground.

  See step 2 to check the harness for short to ground.
- Sensor power is 5V and the signal voltage is 3.4 volts.

  The sensor is working.

  See step 3 to check the voltage seen by the transmission module.
- The sensor's power voltage is at or near 0V.

  The sensor or harness is shorted to ground.

  See step 4 to check voltage at the transmission module.

2. Check the harness for a short to ground.

a) Turn the key start switch to the off position.
b) Disconnect the sensor from the harness connector.
c) Disconnect the J1 connector from the transmission module.
d) Check the resistance from contact J1-36 to all other contacts on the J1 connector.

Result

- All resistance readings are high (open circuit).

  Replace the pressure sensor

  See step 5 to validate the repair.
- Any resistance reading is at or near 0 ohms.

  Repair or replace the harness.

  See step 5 to validate the repair.

3. Check the signal voltage at the transmission module.

a) Make sure the machine is still running and the sensor still connected from the previous step.
b) Check voltage between contacts J1-21 and J1-36 on the transmission module harness.

Result

- If the voltage is 3.4 volts and the error persists, the transmission module is faulty.

  Replace the transmission module.

  See step 5 to validate the repair.
- If the voltage is at or near 0 volts, the harness may have both a short circuit and open circuit.

  Repair or replace the harness.

  See step 5 to validate the repair.

4. Check the sensor power voltage at the transmission module, with and without the sensor connected.

a) Make sure the machine is still running and all connections are still made from the previous step.
b) Check the voltage (sensor power) between contacts J1-11 and J1-21 at the transmission module connector.
c) Disconnect the sensor connector at the sensor.
d) Re-check the voltage (sensor power) between contacts J1-11 and J1-21 at the transmission module connector.

Result

- SPN 625 FMI 02 is not active.

  Stop.
- SPN 625 FMI 02 is active.

  Failure of the transmission module is possible but not common. Exit the procedure and do the procedure again. If the diagnostic code remains active, replace the module.

  Stop.

8.6.35 Code SA 03 SPN 678 FMI 03

Short-circuit to ground in the 8 volt supply circuit.

The transmission module has detected that its 8-volt output power to the steering system sensors is out of range, with amperage too high. The fault may be internal to the transmission module, or may be a short to ground in one of the sensor circuits.

Diagnosis and solution

1. Check for a short-circuit to ground.
a) Turn the key start switch to the off position.
b) Turn the battery disconnect switch to the off position.
c) Disconnect the J1 connector from the transmission module.
d) Check the resistance between contacts J1-44 and J1-45.

Result

- The resistance is high (more than 1000 ohms).

  The fault likely exists in the transmission module.

  Validate the error and replace the transmission module if the fault continues.

  See step 6 to validate the repair.
- The resistance is at or near 0 ohms.

  Isolate the short circuit to either the steering wheel circuit or the steering motor circuit.

  See step 2 to check the transmission harness.

2. Isolate the transmission harness, and re-check for short.
a) Disconnect the transmission harness from the chassis harness. The connector is located just aft of the cab, on the upper right side of the transmission.
b) Re-check the resistance between contacts J1-44 and J1-45.

Result

- The resistance measurement is high (not near 0 ohms).

  The fault likely exists in the disconnected transmission harness or sensor.

  See step 3 to check for short.
- The resistance remains at or near 0 ohms.

  Isolate the cab harness, and recheck for short.

  See step 4 to check the cab harness.

3. Check the transmission harness for short.
a) Check the resistance between contacts C13-4 and C13-34 on the transmission harness.
b) Disconnect the steering motor speed sensor from the harness.
c) Re-check the resistance between contacts C13-4 and C13-34 on the transmission harness.

Result

- A short circuit was detected when the sensor was connected, but cleared when the sensor was removed.

  Replace the sensor.

  See step 6 to validate the repair.

8.6.42.1 Transmission clutch solenoid electrical schematic

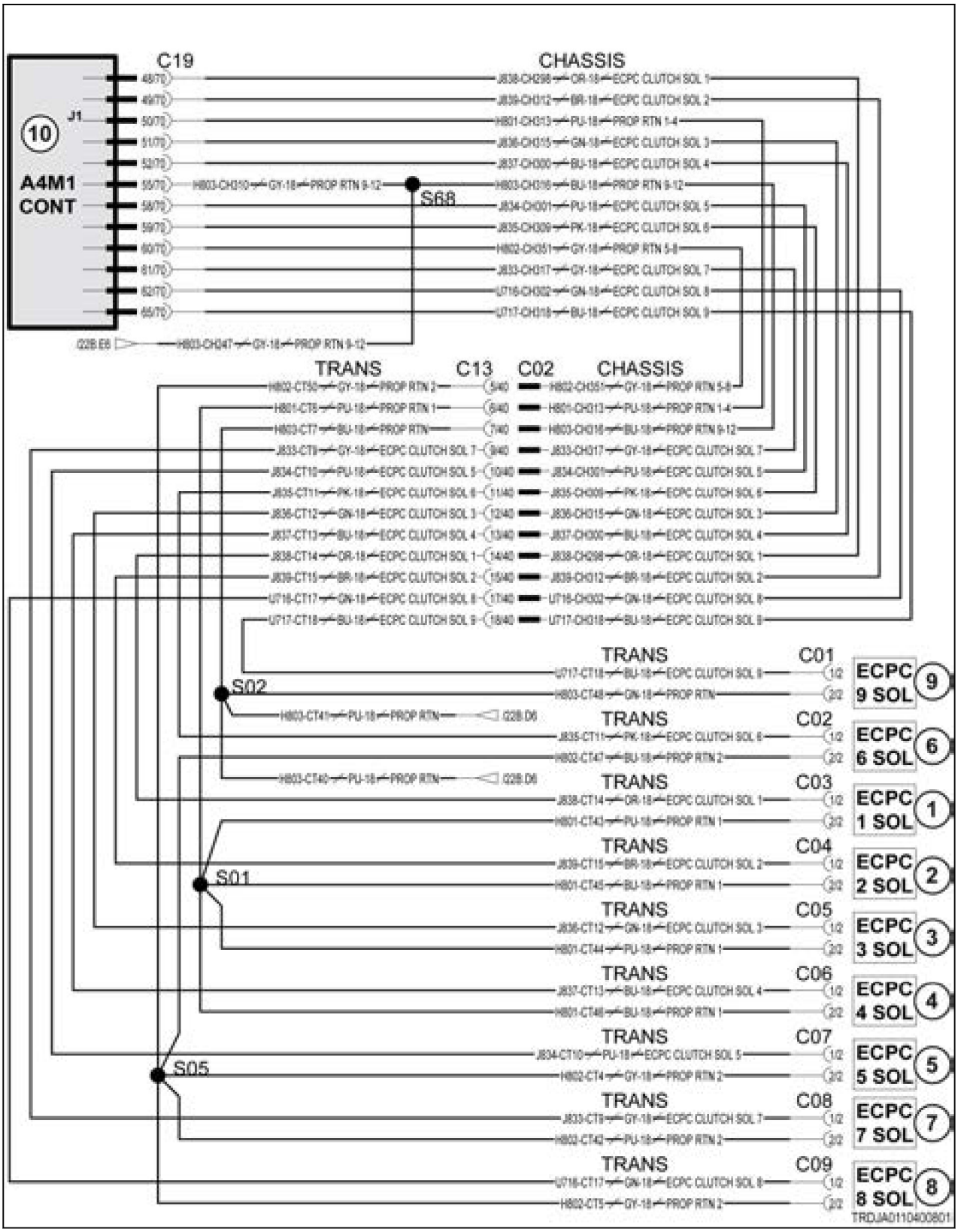

Fig. 182

8.6.51.1 Transmission clutch solenoid electrical schematic

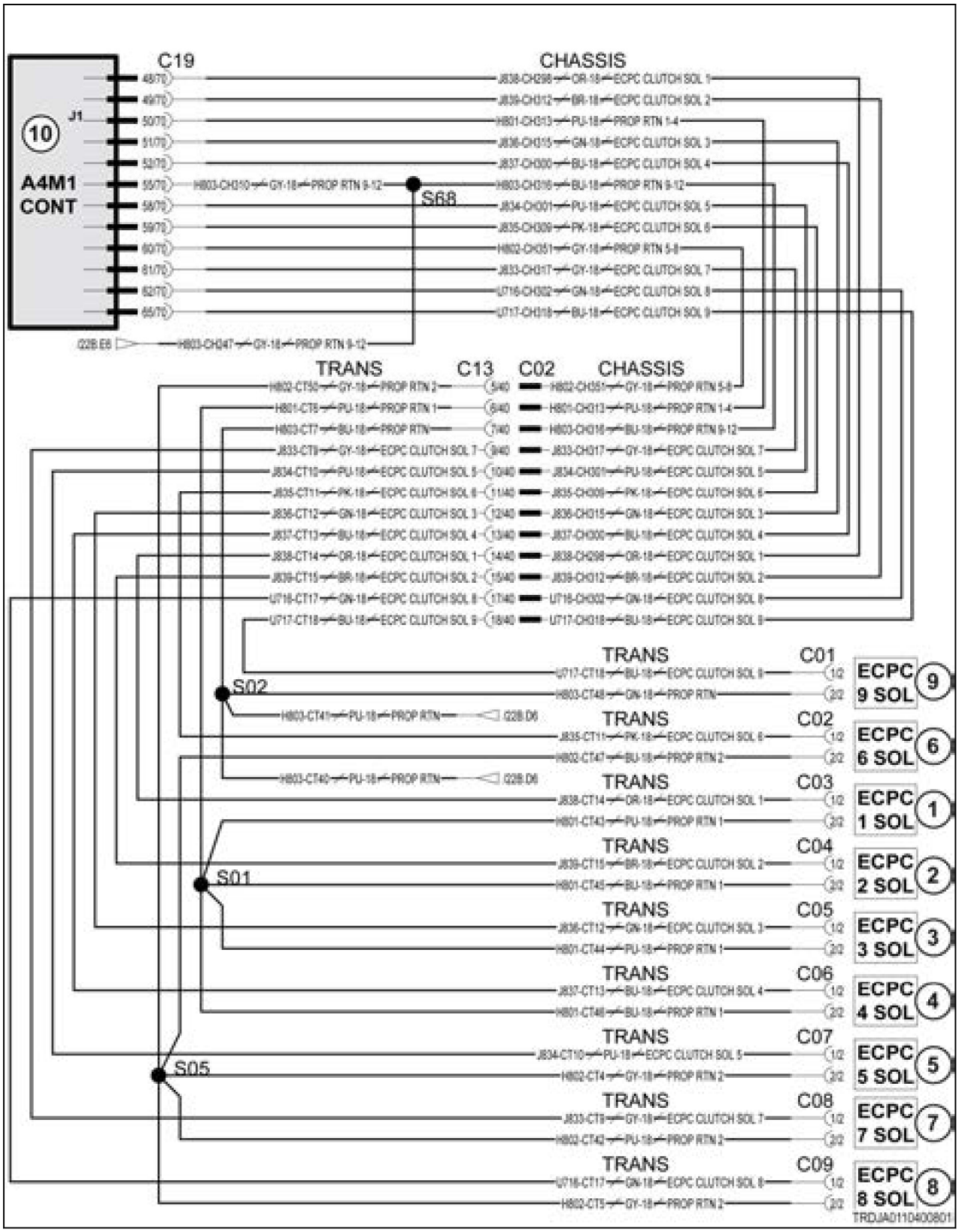

Fig. 191

- The sensor duty cycle is above 14%.

  Lengthen the sensor linkage (3).

e) Confirm the adjustment by cycling the hitch up and down while observing the duty cycle.

Result

- The sensor duty cycle goes below 10% or above 90%.

  Readjust the linkage length as necessary.
- The sensor cannot be adjusted to maintain the 10% to 90% duty cycle range.

  Replace the sensor and repeat the mechanical sdjustment.
- The sensor duty cycle remains between 10% and 90% for the full hitch height range.

  step 3 Calibrate **********.

3. Calibrate the hitch height position sensor.

a) Make sure the machine is still running and the AGCO EDT is still connected.
b) Select the service menu and calibration at the top of the screen.
c) Select rear hitch height sensor calibration.
d) Follow the screen prompts and perform the rear hitch height sensor calibration procedure.

Result

- The calibration completed without errors.

  step Validate **********
- The calibration is not successful.

  Check for additional SA 03 SPN 1873 FMI xx error codes and diagnose their conditions first.

  Repeat the duty cycle inspection

  step 1 DUTY CYCLE **********

4. Check if the diagnostic code remains.

a) Check and clean the harness connector contacts.
b) Connect all the connectors.
c) Turn the battery disconnect switch to the on position.
d) Turn the key start switch to the on position.
e) Operate the machine at low idle.
f) Check if the diagnostic code remains.

Result

Expected result - the diagnostic code is not active.

Results:

- Yes - SPN 1873 FMI 01 is not active.

  Stop.
- No - SPN 1873 FMI 01 is active.

  Failure of the transmission module is possible but not common. Exit the procedure and do the procedure again. If the diagnostic code remains active, replace the module.

  Stop.

8.6.63.1 Implement oil filter bypass switch electrical schematic

Fig. 203

- The resistance is high (not near 0 ohms).

  Repair or replace the harness.

  See step 3 to validate the repair.

3. Check if the diagnostic code remains.

a) Check and clean the harness connector contacts.
b) Connect all the connectors.
c) Turn the battery disconnect switch to the on position.
d) Turn the key start switch to the on position.
e) Operate the machine at low idle.
f) Check if the diagnostic code remains.

Result

- SPN 2905 FMI 05 is not active.

  Stop.
- SPN 2905 FMI 05 is active.

  Failure of the transmission module is possible but not common. Exit the procedure and do the procedure again. If the diagnostic code remains active, replace the module.

  Stop.

a) Inspect and clean the harness connector contacts.
b) Connect all the connectors.
c) Turn the battery disconnect switch to the on position.
d) Turn the key start switch to the on position.
e) Operate the machine at low idle.
f) Check if the diagnostic code remains.

Result

- SPN 3509 FMI 04 is not active.

  Stop.
- SPN 3509 FMI 04 is active.

  Failure of the transmission module is possible but not common. Exit the procedure and do the procedure again. If the diagnostic code remains active, replace the module.

  Stop.

b) Connect all the connectors.
c) Turn the battery disconnect switch to the on position.
d) Turn the key start switch to the on position.
e) Operate the machine at low idle.
f) Check if the diagnostic code remains.

Result

- SPN 520727 FMI 03 is not active.

  Stop.
- SPN 520727 FMI 03 is active.

  Failure of the transmission module is possible but not common. Exit the procedure and do the procedure again. If the diagnostic code remains active, replace the module.

  Stop.

Schematic legend		
Item	**Schematic term**	**Description**
--	TRANS CHARGE PRESS SNSR	Transmission charge pressure sensor
--	SNSR PWR	Sensor power
--	SENSOR RTN	Sensor return

8.6.110 Code SA 03 SPN 521469 FMI 02

Steering motor speed sensor 1 signal is not correct.

Diagnosis and solution

1. Check the sensor adjustment.
a) Turn the key start switch to the off position.
b) Turn the battery disconnect switch to the off position.
c) Remove the key from the battery disconnect switch.
d) Remove the speed sensor.
e) Clean the sensor and the mounting hole.
f) Install the sensor.
g) Turn the battery disconnect switch to the on position.
h) Turn the key start switch to the on position.
i) Operate the engine at low idle.
j) Check for active diagnostic codes.

Result

Expected result - SPN 521469 FMI 02 is not active.

Results:

- Yes - SPN 521469 FMI 02 is not active.

  Stop.
- No - SPN 521469 FMI 02 is active.

2. Check the return circuit.
a) Turn the key start switch to the off position.
b) Turn the battery disconnect switch to the off position.
c) Remove the key from the battery disconnect switch.
d) Disconnect the speed sensor from the harness.
e) Check resistance from connector contact 2 to frame ground.

Result

Expected result - resistance is less than 5 ohms.

Results:

- Yes - resistance is less than 5 ohms.
- No - resistance is not less than 5 ohms.

  Repair or replace the harness.

3. Check for an open circuit in the harness.
a) Turn the key start switch to the off position.
b) Turn the battery disconnect switch to the off position.
c) Remove the key from the battery disconnect switch.
d) Put a jumper wire between the speed sensor contact 2 and contact 3.
e) Disconnect the transmission module connectors.

8.6.118.1 Steering wheel position sensors electrical schematic

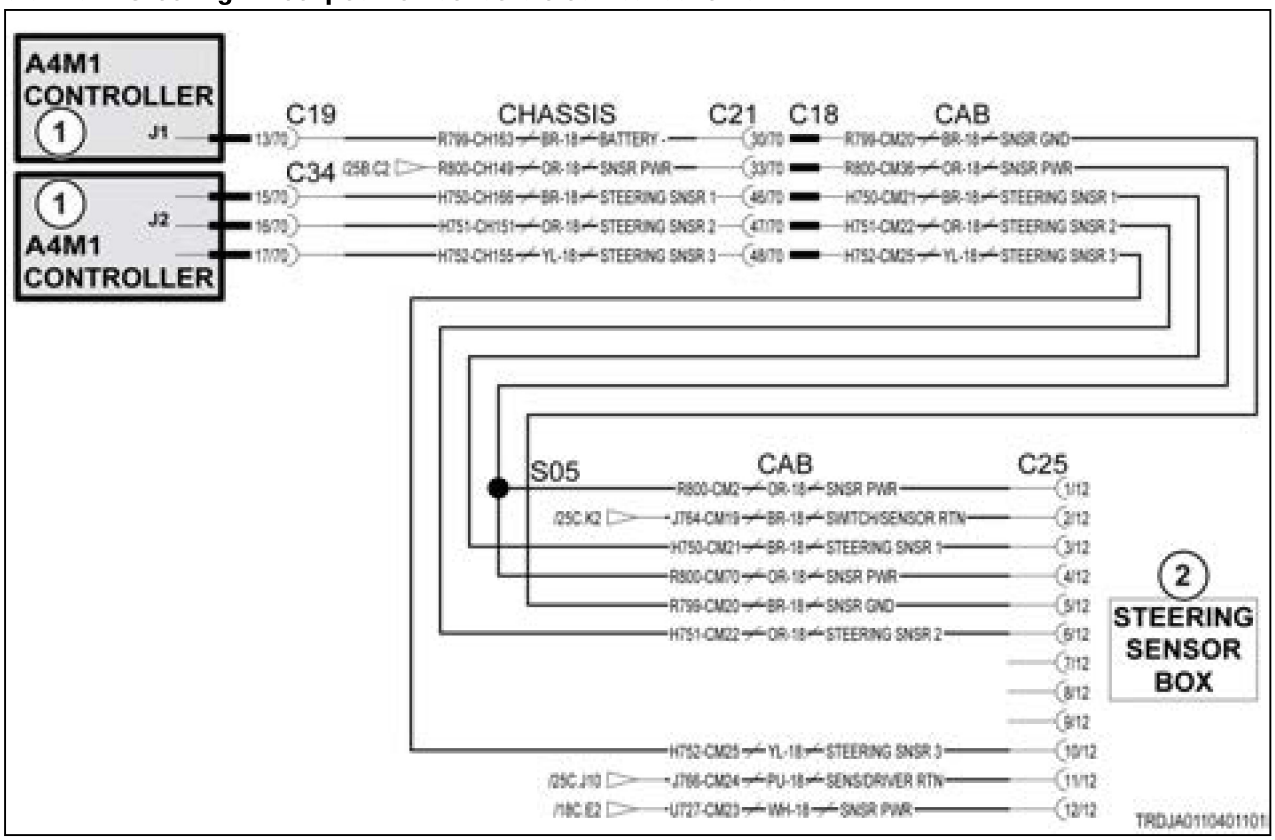

Fig. 259

Schematic legend		
Item	**Schematic term**	**Description**
1	A4M1 CONT	Transmission module
2	STEERING SENSOR BOX	Steering sensor box
--	STEERING SNSR	Steering sensor
--	SWITCH/SENSOR RTN	Switch/sensor return
--	SNSR GND	Sensor ground
--	SENS/DRIVER RTN	Sensor/driver return
--	SNSR PWR	Sensor power

8.6.119 Code SA 03 SPN 521471 FMI 08

The steering wheel position sensor 1 signal is not within expected range.

The transmission module detected abnormal or erratic voltage changes from the steering wheel position sensor. The sensor produces a variable voltage depending on the wheel position from left to right. Full left should be approximately 0.5 volts, center should be approximately 2.5 volts, and full right should be approximately 4.5 volts. If the voltage is erratic, the most likely cause is a loose connection or a faulty sensor. The 3 steering sensors are redundant, but have slightly different circuits. This can aid in isolating the cause.

Diagnosis and solution

1. Determine when the error condition occurs.
   a) Turn the key start switch to the on position, but do not start the machine.

8.6.128.1 Steering wheel position sensors electrical schematic

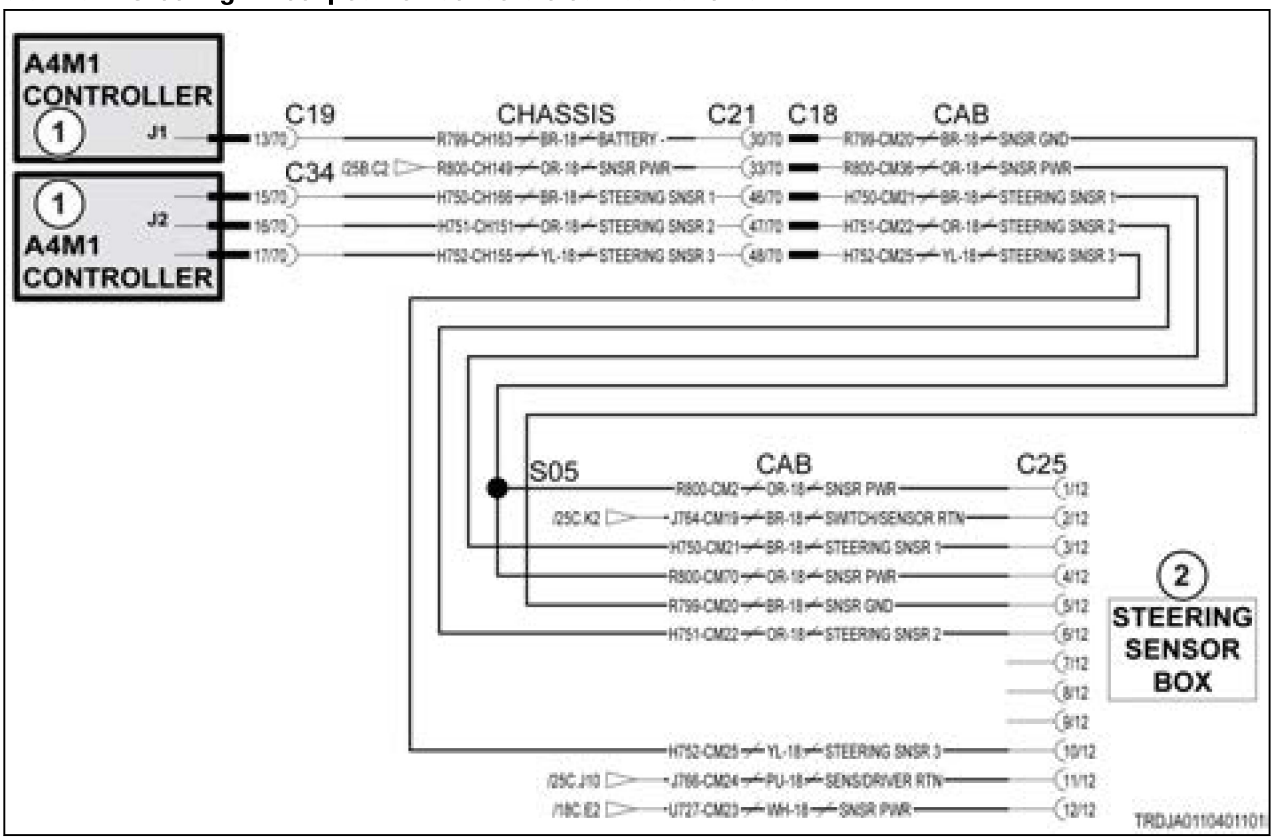

Fig. 269

Schematic legend		
Item	**Schematic term**	**Description**
1	A4M1 CONT	Transmission module
2	STEERING SENSOR BOX	Steering sensor box
--	STEERING SNSR	Steering sensor
--	SWITCH/SENSOR RTN	Switch/sensor return
--	SNSR GND	Sensor ground
--	SENS/DRIVER RTN	Sensor/driver return
--	SNSR PWR	Sensor power

8.6.129 Code SA 03 SPN 521473 FMI 01

The steering wheel position sensor 3 below normal operational range .

The transmission module is detecting low or no voltage from the steering wheel position sensor. The sensor produces a variable voltage depending on the wheel position from left to right. Full left should be approximately 0.5 volts, center should be approximately 2.5 volts, and full right should be approximately 4.5 volts. If the voltage is too low, the most likely cause is an open circuit on power or a short circuit on the signal wire. The 3 steering sensors are redundant, but have slightly different circuits. This can aid in isolating the cause.

Diagnosis and solution

1. Calibrate the steering position sensors.
   a) Turn the key start switch to the on position.

- The 1.66V and 3.33V power signals as they pass through the following switches:

  Creeper switch

  Auto Guide switch

  Engine A/B switch

  Shift Handle

  Armrest ECU C24-8 (3.33V) and C24-10 (1.66V)

f) Repair or replace any connector or harness found faulty.

Result

- No faulty contacts were found.

  See step 3 to check the switch function.
- Faulty contacts were found and repaired.

  See step 4 to validate the repair.

3. Check the switch function.

a) Disconnect the creeper switch.

b) Check resistance between contacts 2 & 1 and 2 & 4, as you operate the switch from on and off.

- In the on-position, contacts 2 and 4 should have continuity.
- In the off-position, contacts 2 and 1 should have continuity.

Result

- Continuity checks are correct.

  See step 4 to check if the error persists.
- Continuity checks are incorrect.

  Replace the switch.

  See step 4 to validate the repair.

4. Check if the fault code remains.

a) Inspect and clean the harness connector contacts.

b) Connect all the connectors.

c) Turn the battery disconnect switch to the on position.

d) Turn the key start switch to the on position.

e) Operate the machine at low idle.

f) Check if the fault code remains.

Result

- SPN 69 FMI 02 is not active.

  Stop.
- SPN 69 FMI 02 is active.

  Failure of the armrest module is possible but not common. Exit the procedure and do the procedure again. If the fault code remains active, replace the armrest module.

  Stop.

8.7.8.1 Power management switch electrical schematic

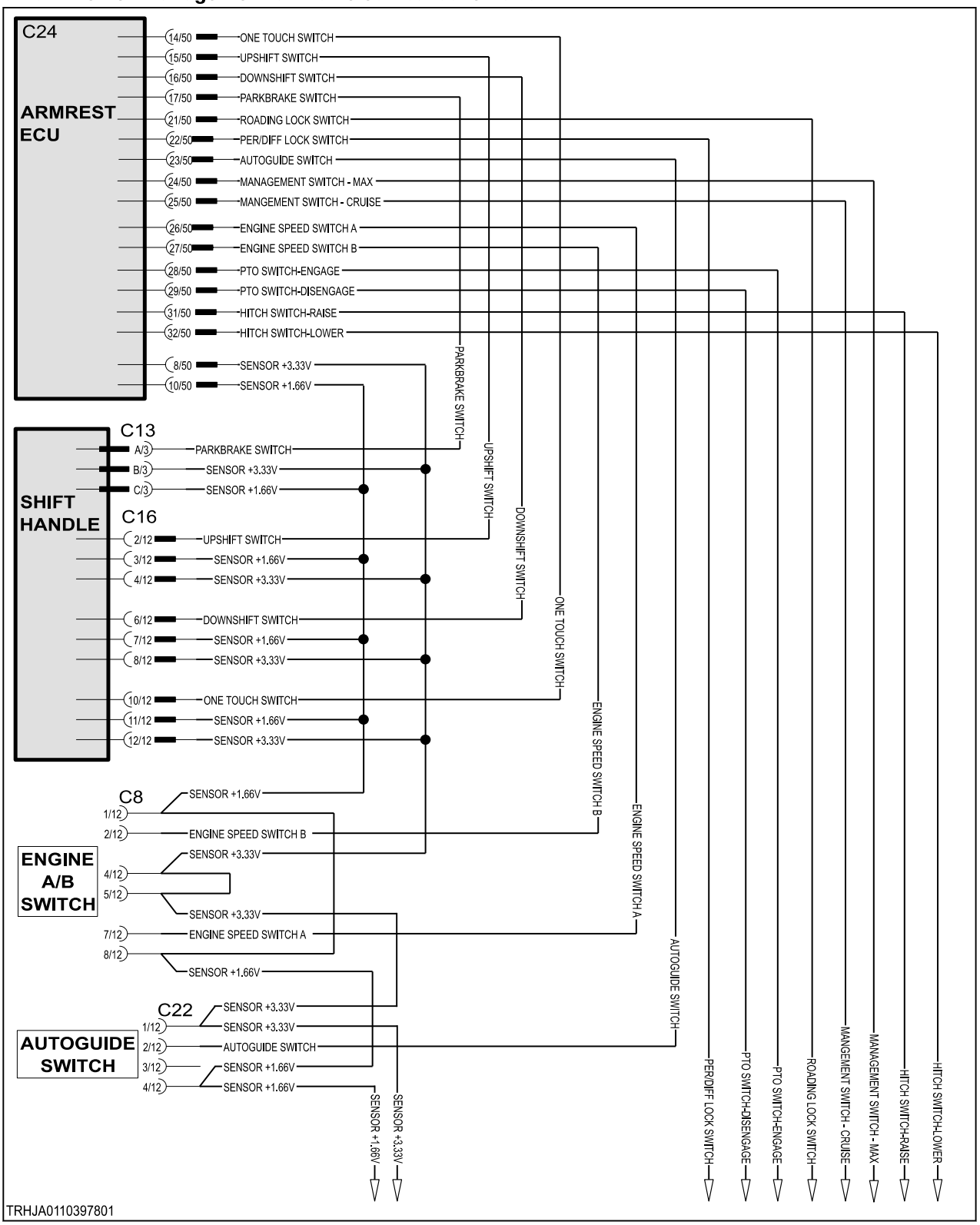

Fig. 305

Result

Expected result - resistance is less than 5 ohms.

Results:

- Yes - resistance is less than 5 ohms.
- No - resistance is not less than 5 ohms.

  Repair or replace the harness.

3. Check the operation of the switch.

a) Turn the key start switch to the off position.
b) Turn the battery disconnect switch to the off position.
c) Remove the key from the battery disconnect switch.
d) Connect the harness to the switch.
e) Check resistance from seat sensor contact 5 to contact 6 with no one sitting in the seat.
f) Check resistance from seat sensor contact 5 to contact 6 while a person sits in the seat.

Result

Expected results -

With no one sitting in the seat, resistance is more than 5000 ohms.

While person sits in the seat, resistance is less than 5 ohms.

Results:

- Yes - values are correct.
- No - values are not correct.

  Replace the switch.

4. Check if the diagnostic code remains.

a) Inspect and clean the harness connector contacts.
b) Connect all the connectors.
c) Turn the battery disconnect switch to the on position.
d) Turn the key start switch to the on position.
e) Operate the machine at low idle.
f) Check if the diagnostic code remains.

Result

Expected result - the diagnostic code is not active.

Results:

- Yes - SPN 1504 FMI 31 is not active.

  Stop.
- No - SPN 1504 FMI 31 is active.

  Failure of the armrest module is possible but not common. Exit the procedure and do the procedure again. If the diagnostic code remains active, replace the module.

  Stop.

This error is reported when the sensor data is not valid and drops below 0.5 volts. The most likely cause is a faulty sensor or short circuit to ground.

Diagnosis and solution

1. Check the harness for short circuit.

a) Turn the start switch to the off position.
b) Turn the battery disconnect switch to the off position.
c) Disconnect the harness connector from the sensor.
d) Disconnect the harness connector from the armrest module.
e) Check the resistance from contact C24-33 to all other C24 contacts at the armrest connector.

Result

- One or more resistance measurement is at or near 0 ohms.

  Repair or replace the armrest harness.

  See step 3 to validate the repair.
- All resistance measurements were high (not near 0 ohms).

  See step 2 to check the sensor voltages.

2. Check the voltages at the sensor.

a) Reconnect the sensor and ECU.
b) Turn the key start switch to the on position, but do not start the engine.
c) Check the voltage between contacts 1 and 2 at the sensor connector.

The 12-volt fuse is known to be okay, because it also powers the armrest ECU itself, and this error could not be reported without power.

Result

- The voltage is not at or near 12 volts.

  Repair or replace the harness between the sensor and the armrest ECU.

  See step 3 to validate the repair.
- The voltage is at or near 12 volts.

  Continue.

d) Check the voltage between contacts 1 and 3 at the sensor connector while moving tthe lever through its full range of motion.

Result

The expected range is 0.5 to 4.5 volts.

- The voltage drops below 0.5 volts.

  Replace the sensor.

  See step 2 to validate the repair.
- The voltage range is 0.5 to 4.5 volts.

  The armrest ECU is suspect.

  See step 3 to check if the error persists.

3. Check if the diagnostic code remains.

a) Inspect and clean the harness connector contacts.
b) Connect all the connectors.
c) Turn the battery disconnect switch to the on position.
d) Turn the key start switch to the on position.
e) Operate the machine at low idle.
f) Check if the diagnostic code remains.

Schematic legend		
Item	**Schematic term**	**Description**
5	IMPLEMENT LEVER POSITION 5 SENSOR	Implement lever 5 position sensor
6	IMPLEMENT LEVER POSITION 6 SENSOR	Implement lever 6 position sensor
7	ARMREST ECU	Armrest module
8	HITCH DEPTH POSITION SENSOR	Hitch depth position sensor
--	SIG HITCH DEPTH POS	Signal hitch depth position sensor
--	SIG IMP1 LVR POS	Signal implement lever 1 position sensor

8.7.29.2 Auxiliary valve control levers

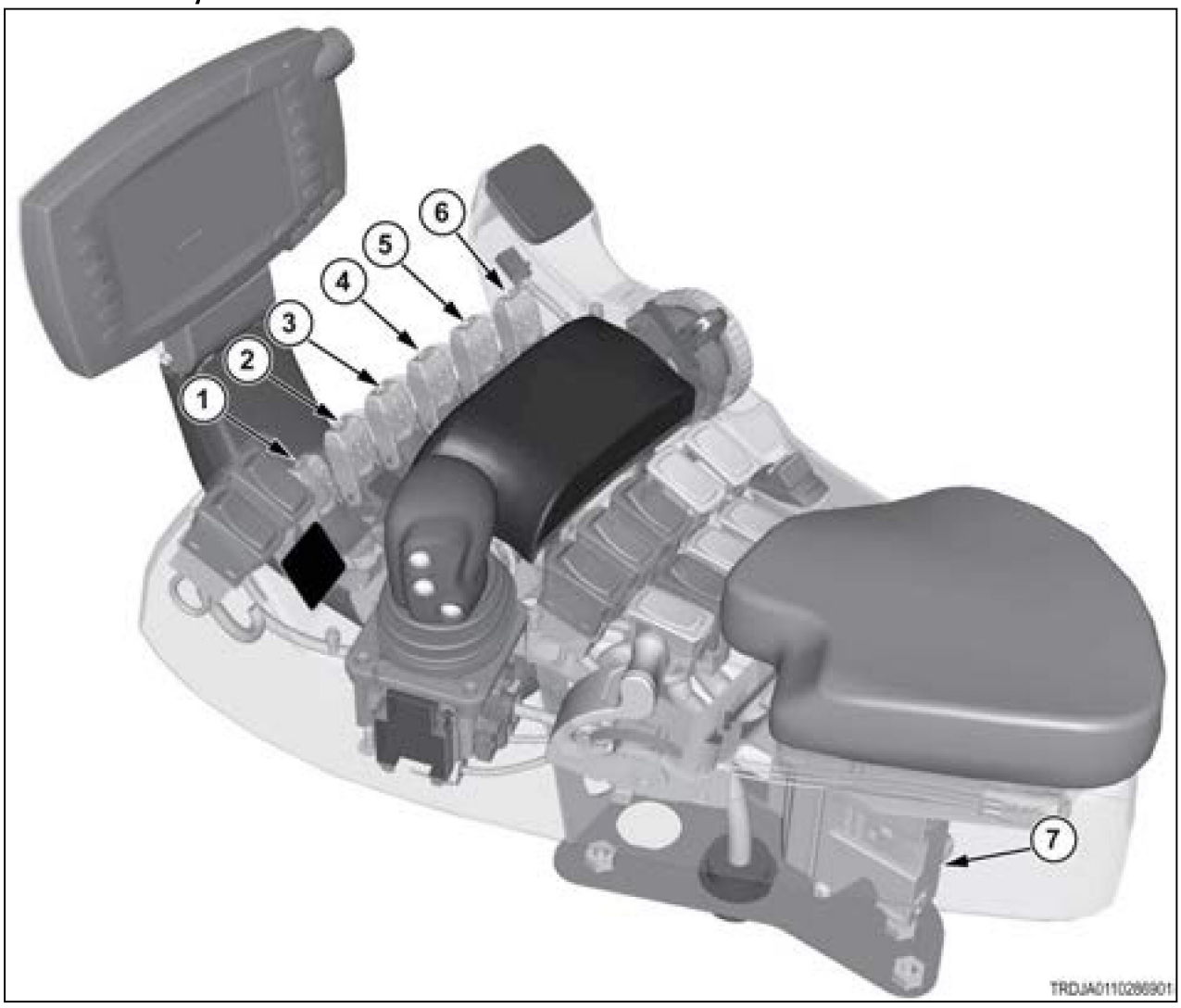

Fig. 366

(1)	Auxiliary valve 1 lever
(2)	Auxiliary valve 2 lever
(3)	Auxiliary valve 3 lever
(4)	Auxiliary valve 4 lever

(5)	Auxiliary valve 5 lever
(6)	Auxiliary valve 6 lever
(7)	Armrest module

8.7.37 Code SA 05 SPN 1943 FMI 03

The auxiliary valve lever 3 position sensor voltage is out of range - high.

The valve lever position sensor is a semi-intelligent hall effect sensor that internally contains a hall effect position sensor to accurately detect the lever's angular position, and circuitry to translate the hall effect sinusoidal data into a linear 0.5 to 4.5 volt output signal to the armrest module.

This error is reported when the sensor data is not valid and exceeds 4.5 volts. The most likely cause is a faulty sensor or short circuit to power.

Diagnosis and solution

1. Check the harness for short circuit.

a) Turn the start switch to the off position.
b) Turn the battery disconnect switch to the off position.
c) Disconnect the harness connector from the sensor.
d) Disconnect the harness connector from the armrest module.
e) Check the resistance from contact C24-36 to all other C24 contacts at the armrest connector.

Result

- One or more resistance measurement is at or near 0 ohms.

  Repair or replace the armrest harness.

  See step 3 to validate the repair.
- All resistance measurements were high (not near 0 ohms).

  See step 2 to check the sensor voltages.

2. Check the voltages at the sensor.

a) Reconnect the sensor and ECU.
b) Turn the key start switch to the on position, but do not start the engine.
c) Check the voltage between contacts 1 and 2 at the sensor connector.

The 12-volt fuse is known to be okay, because it also powers the armrest ECU itself, and this error could not be reported without power.

Result

- The voltage is not at or near 12 volts.

  Repair or replace the harness between the sensor and the armrest ECU.

  See step 3 to validate the repair.
- The voltage is at or near 12 volts.

  Continue.

d) Check the voltage between contacts 1 and 3 at the sensor connector while moving tthe lever through its full range of motion.

Result

The expected range is 0.5 to 4.5 volts.

- The voltage exceeds 4.5 volts.

  Replace the sensor.

  See step 2 to validate the repair.

e) Operate the machine at low idle.
f) Check if the diagnostic code remains.

Result

- SPN 1967 FMI 01 is not active.

  Stop.
- SPN 1967 FMI 01 is active.

  Failure of the armrest module is possible but not common. Exit the procedure and do the procedure again. If the diagnostic code remains active, replace the module.

  Stop.

Result

Results: The voltage is 2.4 volts.

- Yes - the voltage is 2.4 volts.

  see step 3, page 8-701
- No - the voltage is not 2.4 volts.

  Replace or repair the harness.

  see step 4, page 8-701

3. Check the voltage of the CAN high in the harness.

a) Turn the battery disconnect switch to the on position.
b) Turn the key start switch to the on position.
c) Check voltage of CAN high at the armrest module connector contact 6.

Result

Results: The voltage is 2.6 volts.

- Yes - the voltage is 2.6 volts.

  see step 4, page 8-701
- No - the voltage is not 2.6 volts.

  Replace or repair the harness.

  see step 4, page 8-701

4. Check if the diagnostic code remains.

a) Inspect and clean the harness connector contacts.
b) Connect all the connectors.
c) Turn the battery disconnect switch to the on position.
d) Turn the key start switch to the on position.
e) Operate the machine at low idle.
f) Check if the diagnostic code remains.

Result

Expected result - the diagnostic code is not active.

Results:

- Yes - SPN 2034 FMI 02 is not active.

  Stop.
- No - SPN 2034 FMI 02 is active.

  Failure of the armrest module is possible but not common. Exit the procedure and do the procedure again. If the diagnostic code remains active, replace the module.

  Stop.

8.7.53 Code SA 5 SPN 2161 FMI 2

Implement valve module 1 communication erratic, intermittent or incorrect.

The impliment valves at the rear of the machine each contain their own controller module that communicates with the armrest ECU via the auxiliary CAN Bus. This independant controller operates the proportional and directional valve solenoids based on commands from the armrest ECU. It also issues its own error codes when problems are detected with the solenoids.

This error indicates that the individual valve controller is not communicating properly with the armrest module.

circuits are shared by several other function switches on the armrest. This knowledge can aid in diagnosing the fault.

Diagnosis and solution

1. Check the function of upstream and downstream switches that share power circuits.

a) Turn the key start switch to the on position.
b) Operate the upshift and downshift buttons on the shift handle.
c) Operate the creeper switch in both directions.
d) Check for additional error codes.

Result

- SA 05 SPN 3652 FMI 02 or SA 05 SPN 3653 FMI 02 (shift) errors are reported.

  Focus further examination on the power circuits between the engine speed switch and the armrest controller.

  See step 2 to check for loose connections.
- SA 05 SPN 96 FMI 02 (creeper) is reported, but not a shift error.

  Focus further examination on the power circuits between the shift handle and the engine speed switch.

  See step 2 to check for loose connections.
- No additional error codes are reported.

  The power circuits are not suspect.

  Focus further examination on the switch signal output.

  See step 2 to check for loose connections.

2. Inspect all harness and switch connections.

a) Turn the key start switch to the off position.
b) Turn the battery disconnect switch to the off position.
c) Open the top of the armrest console.
d) Inspect and clean all connectors and connector contacts:

- Look for bent or worn pins.
- Look for deformed or oversized sockets.
- Look for corrosion on the pins and sockets. Corrosion is a sign of a loose connection.
- Look for signs of overheating. Overheating is a sign of a poor connection, and can further loosen the pin or socket mount. The whole connector body should be replaced.

e) Make sure to inspect the circuits identified in step 1 as they pass through the following connector locations:

- Switch signal at the armrest ECU C24-26 and C24-27.
- All contacts at the engine speed switch.
- The 1.66V and 3.33V power signals as they pass through the following switches:

  Engine A/B switch

  Shift Handle

  Armrest ECU C24-8 (3.33V) and C24-10 (1.66V)

f) Repair or replace any connector or harness found faulty.

Result

- No faulty contacts were found.

  See step 3 to check the switch function.

- Only downstream switches reported similar errors.

  The harness is open circuited at this switch location.

  Repair or replace the harness.

  See step 3 to validate the repair.
- No other switches reported similar errors.

  The switch is at fault.

  Replace the switch.

  See step 3 to validate the repair.

3. Check if the fault code remains.

a) Inspect and clean the harness connector contacts.
b) Connect all the connectors.
c) Turn the battery disconnect switch to the on position.
d) Turn the key start switch to the on position.
e) Operate the machine at low idle.
f) Check if the fault code remains.

Result

- SPN 2971 FMI 05 is not active.

  Stop.
- SPN 2971 FMI 05 is active.

  Failure of the armrest module is possible but not common. Exit the procedure and do the procedure again. If the fault code remains active, replace the armrest module.

  Stop.

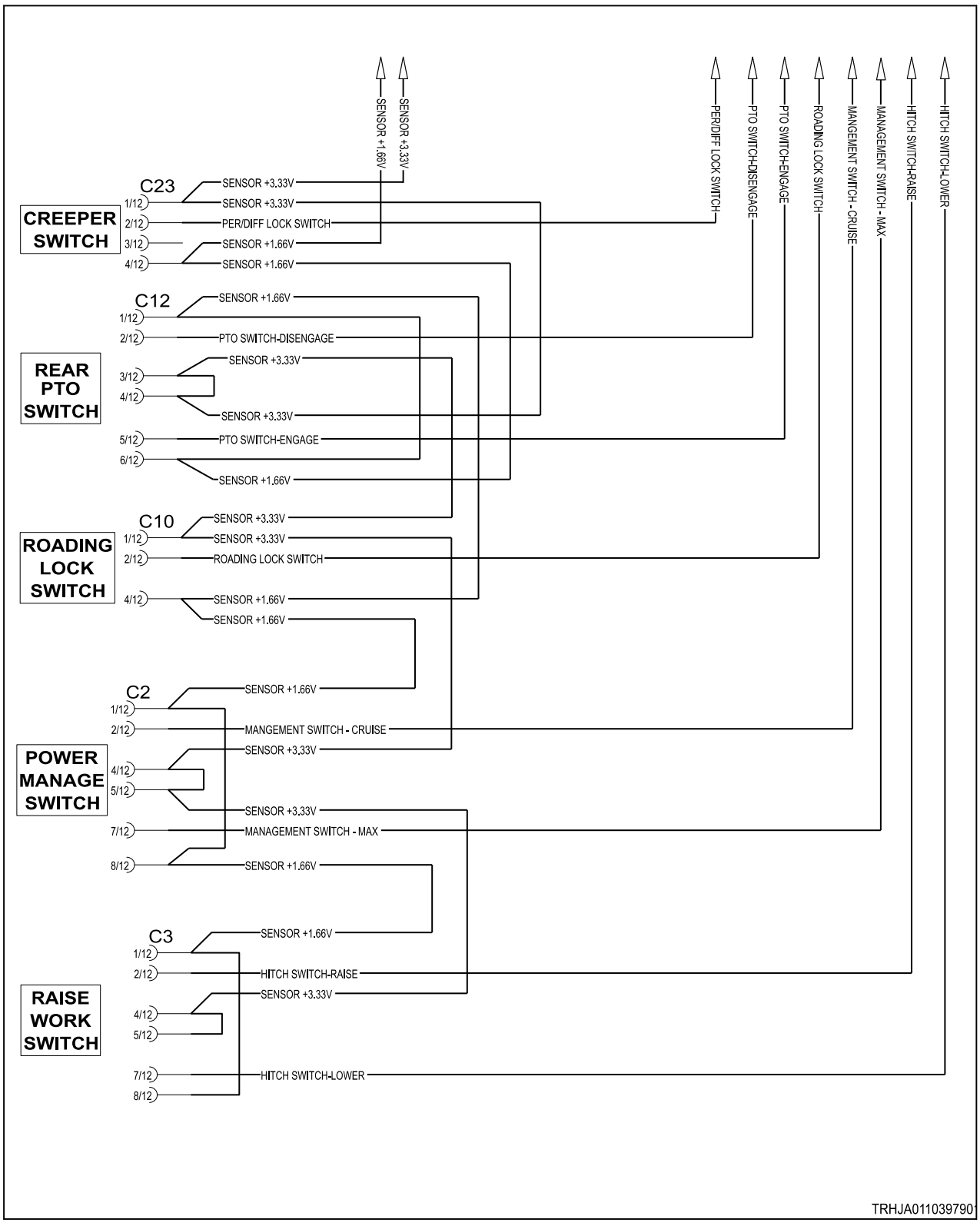
SENSOR +1.66V
SENSOR +3.33V
PER/DIFF LOCK SWITCH
PTO SWITCH-DISENGAGE
PTO SWITCH-ENGAGE
ROADING LOCK SWITCH
MANGEMENT SWITCH - CRUISE
MANAGEMENT SWITCH - MAX
HITCH SWITCH-RAISE
HITCH SWITCH-LOWER
CREEPER SWITCH
C23
1/12 SENSOR +3.33V
2/12 SENSOR +3.33V
3/12 PER/DIFF LOCK SWITCH
4/12 SENSOR +1.66V
SENSOR +1.66V
REAR PTO SWITCH
C12
1/12 SENSOR +1.66V
2/12 PTO SWITCH-DISENGAGE
3/12 SENSOR +3.33V
4/12
SENSOR +3.33V
5/12 PTO SWITCH-ENGAGE
6/12
SENSOR +1.66V
ROADING LOCK SWITCH
C10
1/12 SENSOR +3.33V
2/12 ROADING LOCK SWITCH
4/12 SENSOR +1.66V
SENSOR +1.66V
POWER MANAGE SWITCH
C2
1/12 SENSOR +1.66V
2/12 MANGEMENT SWITCH - CRUISE
SENSOR +3.33V
4/12
5/12
SENSOR +3.33V
7/12 MANAGEMENT SWITCH - MAX
8/12 SENSOR +1.66V
RAISE WORK SWITCH
C3
1/12 SENSOR +1.66V
2/12 HITCH SWITCH-RAISE
SENSOR +3.33V
4/12
5/12
7/12 HITCH SWITCH-LOWER
8/12
TRHJA011039790

Fig. 463

8.7.77.2 Transmission control lever

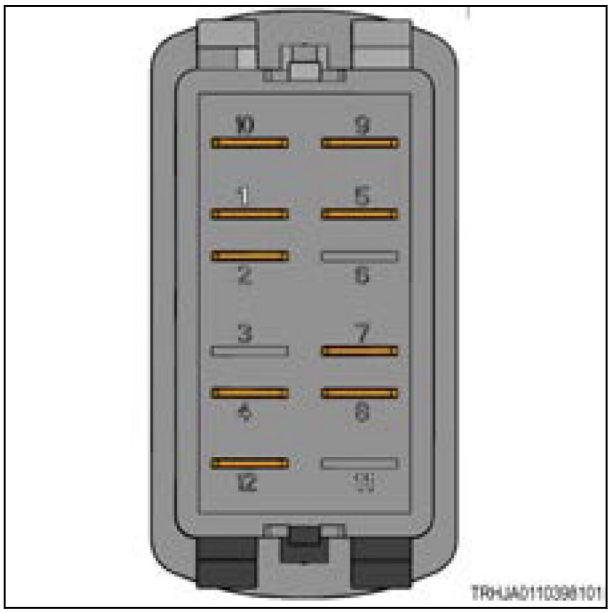

Fig. 483 Switch pinout

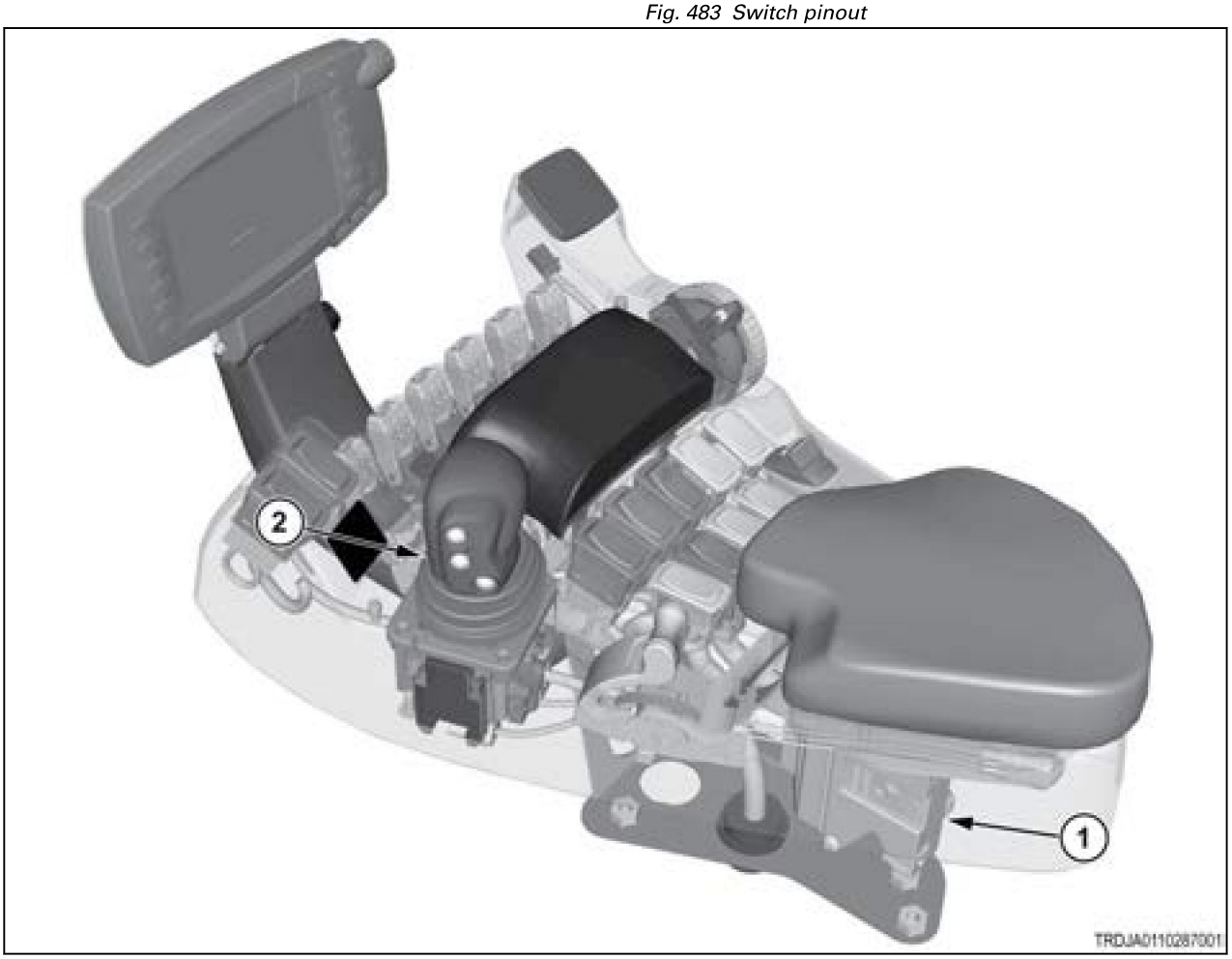

Fig. 484

(1)	Armrest module
(2)	Transmission control lever

8.7.82 Code SA 05 SPN 3653 FMI 02

The downshift switch signal is erratic, intermittent, or incorrect.

The switch is a single-pole, double-throw (SPDT) type switch, except the "common" terminal is the data output instead of a power source. The 2 other contacts are connected to 3.33-volt power and 1.66-volt power. Operating the switch selects one of these voltages for the signal output. These 2 power circuits are shared by several other function switches on the armrest. This knowledge can aid in diagnosing the fault.

Diagnosis and solution

1. Check the function of downstream switches that share power circuits.

This will help isolate whether the problem is in the power or signal circuit.

a) Turn the key start switch to the on position.
b) Operate the engine A/B speed switch in both directions.
c) Check for additional error codes.

Result

- SA 05 SPN 2970 FMI 02 or SA 05 SPN 2971 FMI 02 (engine speed) errors are reported.

  Focus further examination on the power circuits between the transmission control lever and the armrest controller.

  See step 2 to check for loose connections.
- No additional error codes are reported.

  The power circuits are not suspect.

  Focus further examination on the switch signal output.

  See step 2 to check for loose connections.

2. Inspect all harness and switch connections.

a) Turn the key start switch to the off position.
b) Turn the battery disconnect switch to the off position.
c) Open the top of the armrest console.
d) Inspect and clean all connectors and connector contacts:

- Look for bent or worn pins.
- Look for deformed or oversized sockets.
- Look for corrosion on the pins and sockets. Corrosion is a sign of a loose connection.
- Look for signs of overheating. Overheating is a sign of a poor connection, and can further loosen the pin or socket mount. The whole connector body should be replaced.

e) Make sure to inspect the circuits identified in step 1 as they pass through the following connector locations:

- Switch signal at the armrest ECU C24-16.
- All contacts at the downshift switch.
- The 1.66V and 3.33V power signals at the Armrest ECU C24-8 (3.33V) and C24-10 (1.66V)

f) Repair or replace any connector or harness found faulty.

Result

- No faulty contacts were found.

  See step 3 to check the switch function.
- Faulty contacts were found and repaired.

  See step 4 to validate the repair.

3. Check the switch function.

a) Disconnect the downshift switch.

b) Check resistance between contacts 10 & 11 and 10 & 12, as you operate the switch from on and off.

- In the on-position, contacts 10 and 11 should have continuity.
- In the off-position, contacts 10 and 12 should have continuity.

Result

- Continuity checks are correct.

  See step 4 to check if the error persists.
- Continuity checks are incorrect.

  Replace the switch.

  See step 4 to validate the repair.

4. Check if the fault code remains.

a) Inspect and clean the harness connector contacts.
b) Connect all the connectors.
c) Turn the battery disconnect switch to the on position.
d) Turn the key start switch to the on position.
e) Operate the machine at low idle.
f) Check if the fault code remains.

Result

- SPN 250193 FMI 02 is not active.

  Stop.
- SPN 520193 FMI 02 is active.

  Failure of the armrest module is possible but not common. Exit the procedure and do the procedure again. If the fault code remains active, replace the armrest module.

  Stop.

8.7.90.1 VarioGuide switch electrical schematic

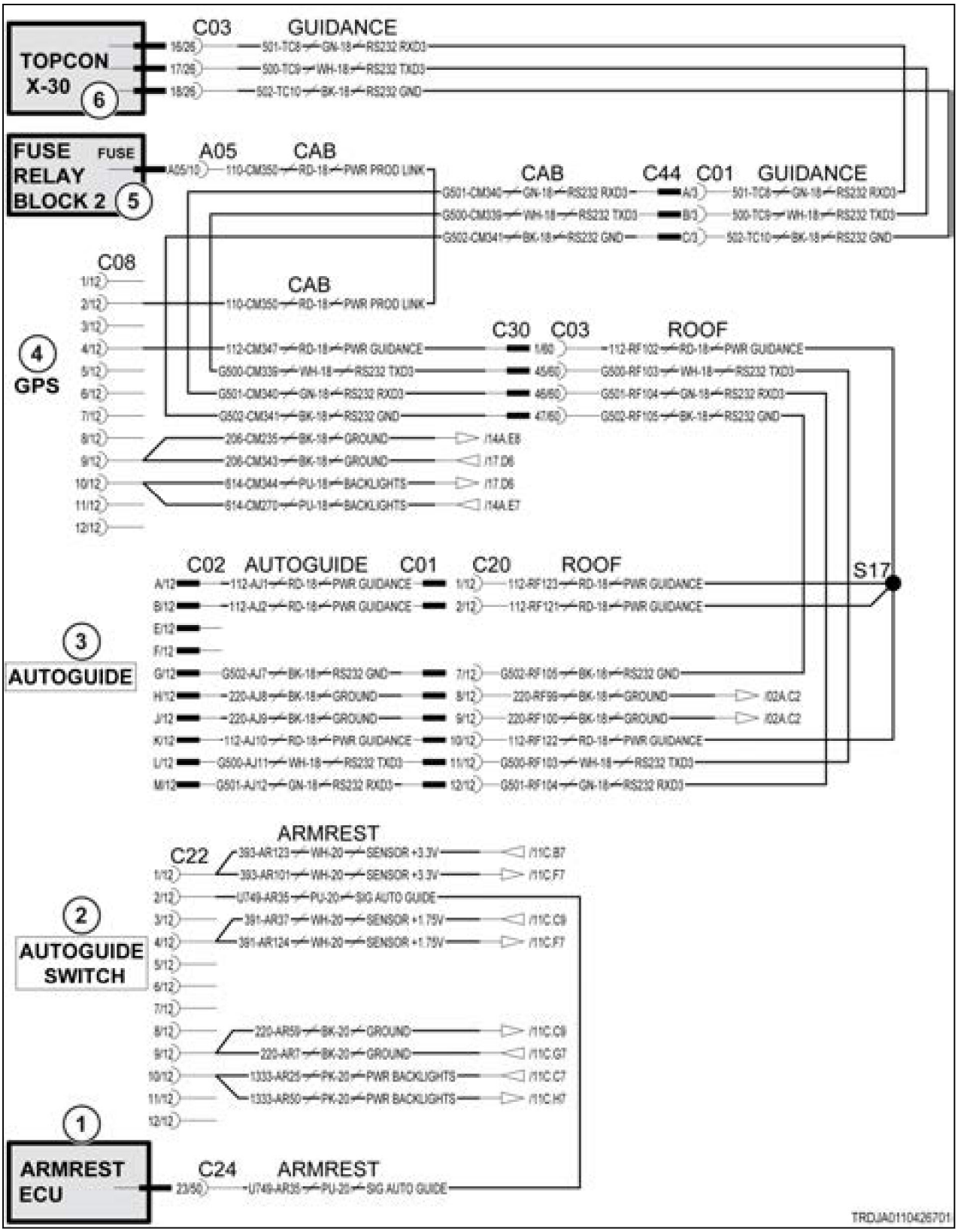

Fig. 545

Schematic legend		
Item	**Schematic term**	**Description**
1	ARMREST ECU	Armrest module
2	AUTOGUIDE SWITCH	VarioGuide switch
3	AUTOGUIDE	VarioGuide
4	GPS	Global positioning system
5	FUSE RELAY BLOCK 2	Fuse relay block 2
6	TOPCON X-30	Topcon
--	PWR BACKLIGHTS	Power to rear lamps
--	PWR GUIDANCE	Power to guidance
--	PWR PROD LINK	Power to product link
--	SIG AUTOGUIDE	Signal Auto-Guide

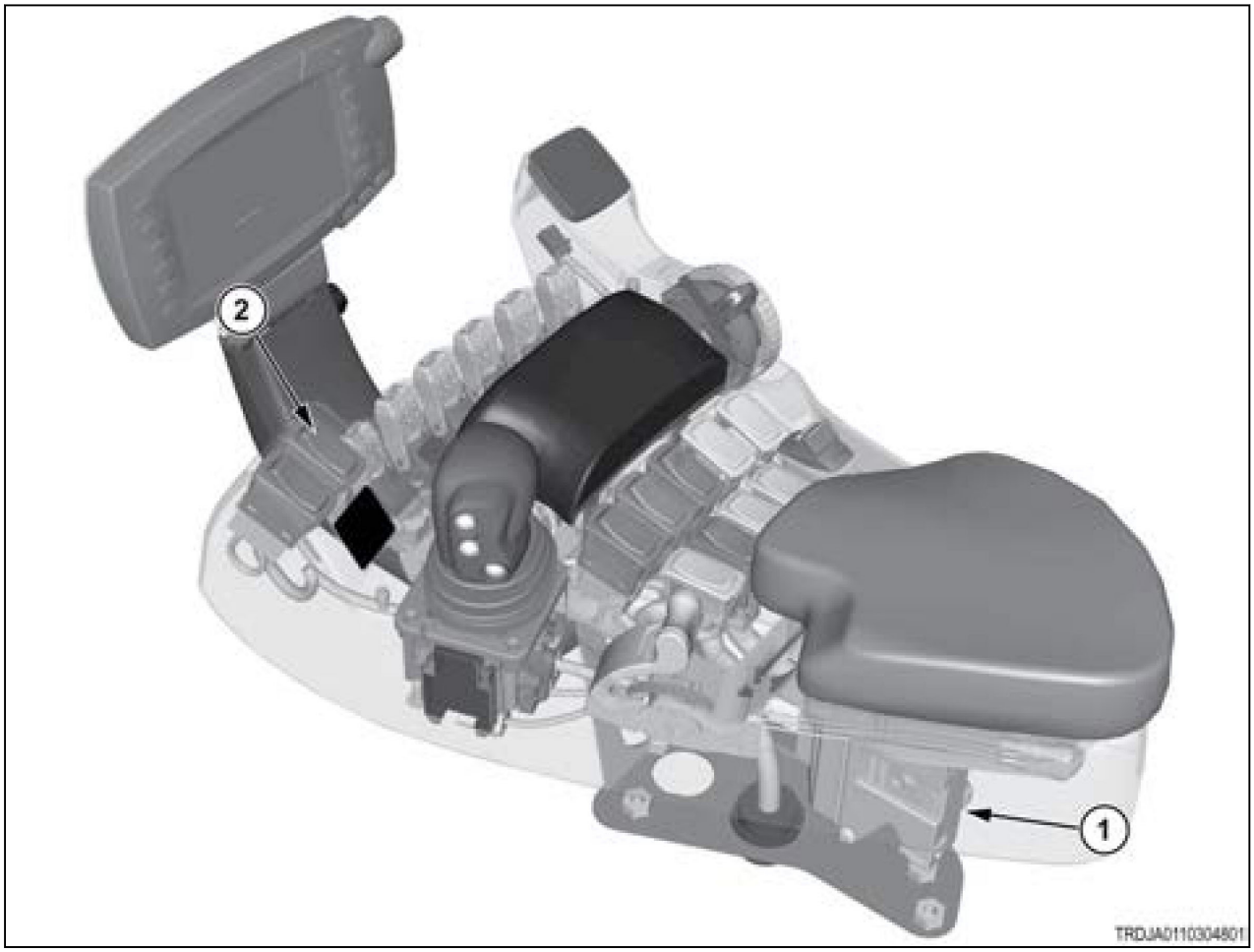

Fig. 587

(1)	Armrest module
(2)	Hitch raise/lower switch

8.7.100 Code SA 05 SPN 521474 FMI 03

The rear hitch raise switch signal voltage is above normal.

The signal voltage is higher than the 3.33-volt supply. The most likely cause is a short circuit to a higher voltage circuit.

The switch is a momentary double-pole, double-throw (DPDT) type switch, except the "common" terminal is the data output instead of a power source. The 4 other contacts are connected to 3.33-volt power and 1.66-volt power. Operating the switch selects one of these voltages for the signal output. One set of contacts for raise and one set for lower. This error will likely be accompanied by a power supply error too. This information can be used to isolate the cause.

Diagnosis and solution

1. Determine when this error is reported.
   a) Turn the key start switch to the on position.
   b) Check for this error code (SA 05 SPN 521474 FMI 03) as you operate the switch between the center position and hitch raise position.

      Note that power supply errors will likely also be reported, as noted below.

power. Operating the switch selects one of these voltages for the signal output. One set of contacts is for PTO engage and the other set for PTO disengage. These 2 power circuits are shared by several other function switches on the armrest. This knowledge can aid in diagnosing the fault.

Diagnosis and solution

1. Determine when this error is reported.
a) Turn the key start switch to the on position.
b) Check whether the error code is reported as you operate the switch between on and off states.

Result

- The error is reported only when the switch is in the off position.

  The open circuit is in the 3.33V power circuit.

  See step 2 to isolate the location.
- The error is reported only when the switch is in the on position.

  The open circuit is in the 1.66V power circuit.

  See step 2 to isolate the location.
- The error is reported regardless of switch position.

  The open circuit is in the signal circuit.

  Repair or replace the armrest harness.

  See step 3 to validate the repair.

2. Isolate the power circuit open circuit.
a) Operate all upstream (and at least one downstream) armrest switches, according to the list below, from their off to on positions.

Electrical sequence of switches, starting from the armrest module.

1. Shift Handle (3 pushbuttons)
2. Engine A/B switch
3. Autoguide switch
4. Creeper switch
5. Rear PTO
6. Roading Lock switch
7. Power management (cruise/full) switch
8. Hitch Raise/Work switch

b) Observe which other switches (if any) exhibit similar open circuit error codes.

Result

- At least one upstream switch reported a similar error.

  The open circuit lies at, or just upstream from, that switch.

  Repair or replace the armrest harness.

  See step 3 to validate the repair.
- Only downstream switches reported similar errors.

  The harness is open circuited at this switch location.

  Repair or replace the harness.

  See step 3 to validate the repair.

Schematic legend		
Item	**Schematic term**	**Description**
1	IMPLEMENT 1 SOLENOID	Implement 1 solenoid
2	IMPLEMENT 2 SOLENOID	Implement 2 solenoid
3	IMPLEMENT 3 SOLENOID	Implement 3 solenoid
4	IMPLEMENT 4 SOLENOID	Implement 4 solenoid
5	IMPLEMENT 5 SOLENOID	Implement 5 solenoid
6	IMPLEMENT 6 SOLENOID	Implement 6 solenoid
7	CAN RESISTOR	Controller area network (CAN) resistor
8	GROUND STUD RH FRAME B	Ground stud right-hand frame B
--	CAN B LOW	Controller area network (CAN) B low
--	CAN B HI	Controller area network (CAN) B high
--	PWR CAN VALVES	Power controller area network (CAN) valves
--	CAN + AUX	Controller area network (CAN) high auxiliary
--	CAN - AUX	Controller area network (CAN) low auxiliary

Diagnosis and solution

1. Reset the module.

a) Turn the key start switch to the off position.
b) Wait 60 seconds.
c) Turn the key start switch to the on position.
d) Check for the fault code.

Result

- The fault code is not active.

  Stop.
- The fault code is active.

  Replace the valve controller.

  See the hydraulics chapter in the service manual to properly program and set up the new controller.

2. Check if the fault code remains.

a) Inspect and clean the harness connector contacts.
b) Connect all the connectors.
c) Turn the battery disconnect switch to the on position.
d) Turn the key start switch to the on position.
e) Operate the machine at low idle.
f) Check for the fault code.

Result

- The fault code is not active.

  Stop.
- The fault code is active.

  Exit the procedure and do the procedure again.

  Stop.

8.10.3.1 CAN 2 electrical schematic

Auxiliary valve assembly

Item	Description
1	Controller
2	Proportional solenoid
3	Directional solenoid

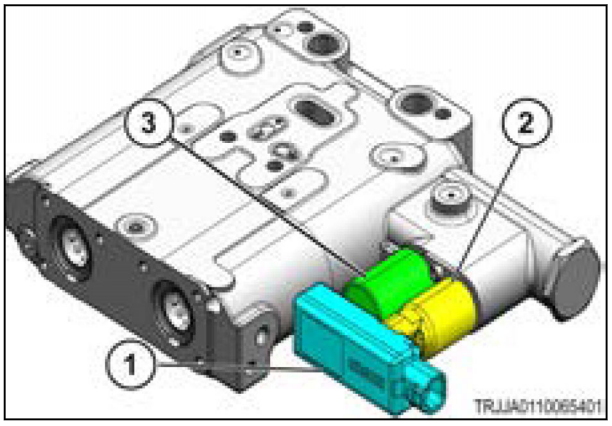

Fig. 639

- SA 164 SPN 701 FMI 06 is active.

  Failure of the auxiliary valve module is possible but not common. Exit the procedure and do the procedure again. If the diagnostic code remains active, replace the module.

  Stop.

8.11.7 Code SA 164 SPN 702 FMI 05

Implement valve 4 directional solenoid is disconnected.

Each implement valve has its own controller module, which operates the proportional and directional solenoids. Those solenoids are directly connected to the bottom of each control module. The likely cause for this error is a faulty solenoid.

Diagnosis and solution

1. Inspect the controller-to-solenoid connections.

a) Turn the key start switch to the off position.

b) Carefully release the controller from both solenoids.

Each solenoid has a connector retainer. Both must be released to lift the controller away from the solenoids.

c) Clean and inspect the contacts on the controller and both solenoids.

d) Reinstall the controller and all electrical connectors.

e) Turn the key start switch to the on position.

f) Operate the implement valve.

g) Check if the diagnostic code persists.

Result

- The diagnostic code is not active.

  Stop.
- The diagnostic code is active.

  Continue to step 2 to isolate the problem.

2. Temporarily swap adjacent controllers to isolate the problem.

Note that the function will follow the controller. In the cab, auxiliary control lever 4 will still control the original controller at its new location, and the source address (SA) of the diagnostic code will also follow that module.

a) Turn the key start switch to the off position.

b) Number the controller modules for later identification.

c) Swap the controllers from the current valve and one of the other valves that is not reporting any errors.

d) Turn the key start switch to the on position.

e) Operate both implement valves.

f) Check for diagnostic codes.

Result

- The original diagnostic code is still reported.

  The valve controller is at fault.

  Replace the valve controller.

  See the hydraulics chapter in the service manual to properly program and set up the new controller.

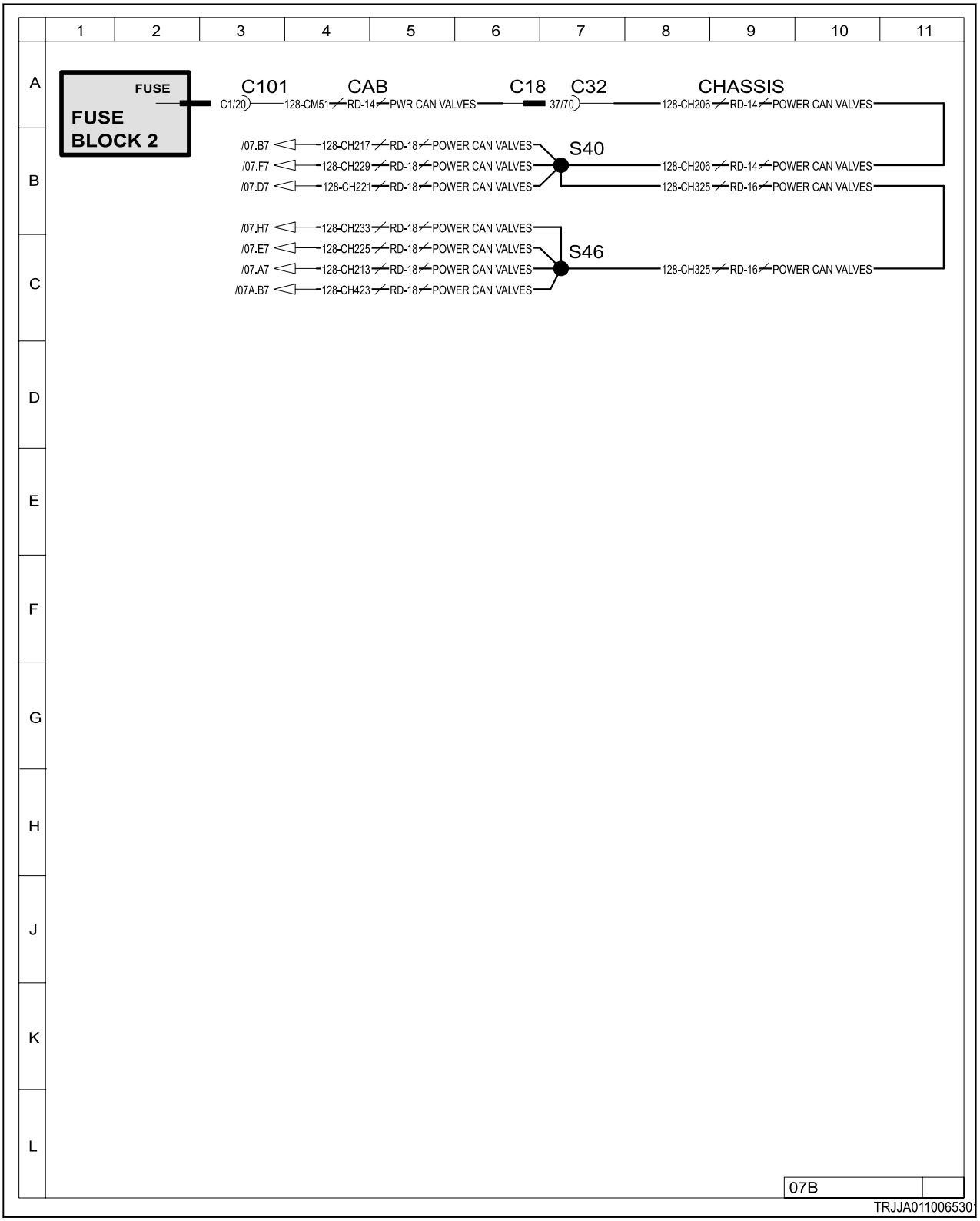

Fig. 662

8.13.2 Code SA 166 SPN 158 FMI 18

Implement valve module 6 is reporting under-voltage.

The implement valve controller module is reporting under-voltage in its supplied power. All implement valves share the same 12-volt power circuit. Unless this error is also reported for all other implement valve controllers, the fault likely lies at or near the reporting valve controller.

a) Turn the key start switch to the off position.
b) Turn the battery disconnect switch to the off position.
c) Remove the key from the battery disconnect switch.
d) Check all harness connections.

Result

Expected result - harness connections are good.

Results:

- Yes - harness connections are good.

  see step 3, page 8-1106
- No - harness connections are not good.

  Repair or replace the harness.

  see step 3, page 8-1106

3. Check for other diagnostic codes for this module.
a) Turn the key start switch to the off position.
b) Turn the battery disconnect switch to the off position.
c) Remove the key from the battery disconnect switch.
d) Connect the module using the controller area network (CAN) data link.
e) Turn the battery disconnect switch to the on position.
f) Turn the key start switch to the on position.
g) Check for active diagnostic codes for this module.

Result

Expected result - no diagnostic codes are active for this module.

Results:

- Yes - no diagnostic codes are active.

  Stop.
- No - diagnostic codes are active for this module.

  Failure of this module is possible but not common. Exit the procedure and troubleshoot the active codes. If the diagnostic code remains active, replace the module.

  Stop.

Schematic legend		
Item	Schematic term	Description
--	HORN SW TO RLY	Horn switch to relay
--	PWR LIGHT STALK SW	Power lamp stalk switch
--	RLY TO HORN	Relay to horn
--	PWR HORN RLY	Power horn relay

8.16.7 Code SA 208 SPN 2370 FMI 06

Front lighting module has detected right-hand turn signal current is above normal.

Diagnosis and solution

1. Check the harness for a short-circuit.

a) Turn the key start switch to the off position.
b) Turn the battery disconnect switch to the off position.
c) Remove the key from the battery disconnect switch.
d) Disconnect the harness connectors from the lamp switch.
e) Disconnect harness connectors from the front lighting module.
f) Check resistance from lighting module contact J2-4 to all other front lighting module contacts.

Result

Expected result - resistance is more than 5000 ohms.

Results:

- Yes - resistance is more than 5000 ohms.

  see step 2, page 8-1133
- No - resistance is not more than 5000 ohms.

  Repair or replace the harness.

  see step 2, page 8-1133

2. Check if the diagnostic code remains.

a) Check and clean the harness connector contacts.
b) Connect all the connectors.
c) Turn the battery disconnect switch to the on position.
d) Turn the key start switch to the on position.
e) Operate the machine at low idle.
f) Check if the diagnostic code remains.

Result

Expected result - the diagnostic code is not active.

Results:

- Yes - SPN 2370 FMI 06 is not active.

  Stop.
- No - SPN 2370 FMI 06 is active.

  Failure of the module is possible but not common. Exit the procedure and do the procedure again. If the diagnostic code remains active, replace the module.

  Stop.

Schematic legend		
Item	**Schematic term**	**Description**
--	PWR ROOF CTRL	Power to roof controller
--	LH TURN LAMP	Left-hand turn lamp
--	RH TURN LAMP	Right-hand turn lamp

8.17.6 Code SA 209 SPN 2370 FMI 06

Roof lighting module has detected current is above normal.

Diagnosis and solution

1. Check for a short-circuit in the right-hand lamp circuit.

a) Turn the key start switch to the off position.
b) Turn the battery disconnect switch to the off position.
c) Remove the key from the battery disconnect switch.
d) Disconnect the harness connectors from the turn signal lamps and the roof lighting module.
e) Check resistance from roof lighting module contact J3-5 to all other roof lighting module contacts.

Result

Expected result - each resistance is more than 5000 ohms.

Results:

- Yes - each resistance is more than 5000 ohms.

  see step 2, page 8-1160
- No - one or more resistance is not more than 5000 ohms.

  Repair or replace the harness.

  see step 2, page 8-1160

2. Check if the diagnostic code remains.

a) Check and clean the harness connector contacts.
b) Connect all the connectors.
c) Turn the battery disconnect switch to the on position.
d) Turn the key start switch to the on position.
e) Operate the machine at low idle.
f) Check if the diagnostic code remains.

Result

Expected result - the diagnostic code is not active.

Results:

- Yes - SPN 2370 FMI 06 is not active.

  Stop.
- No - SPN 2370 FMI 06 is active.

  Failure of the module is possible but not common. Exit the procedure and do the procedure again. If the diagnostic code remains active, replace the module.

  Stop.

8.17.16.1 License plate lamp electrical schematic

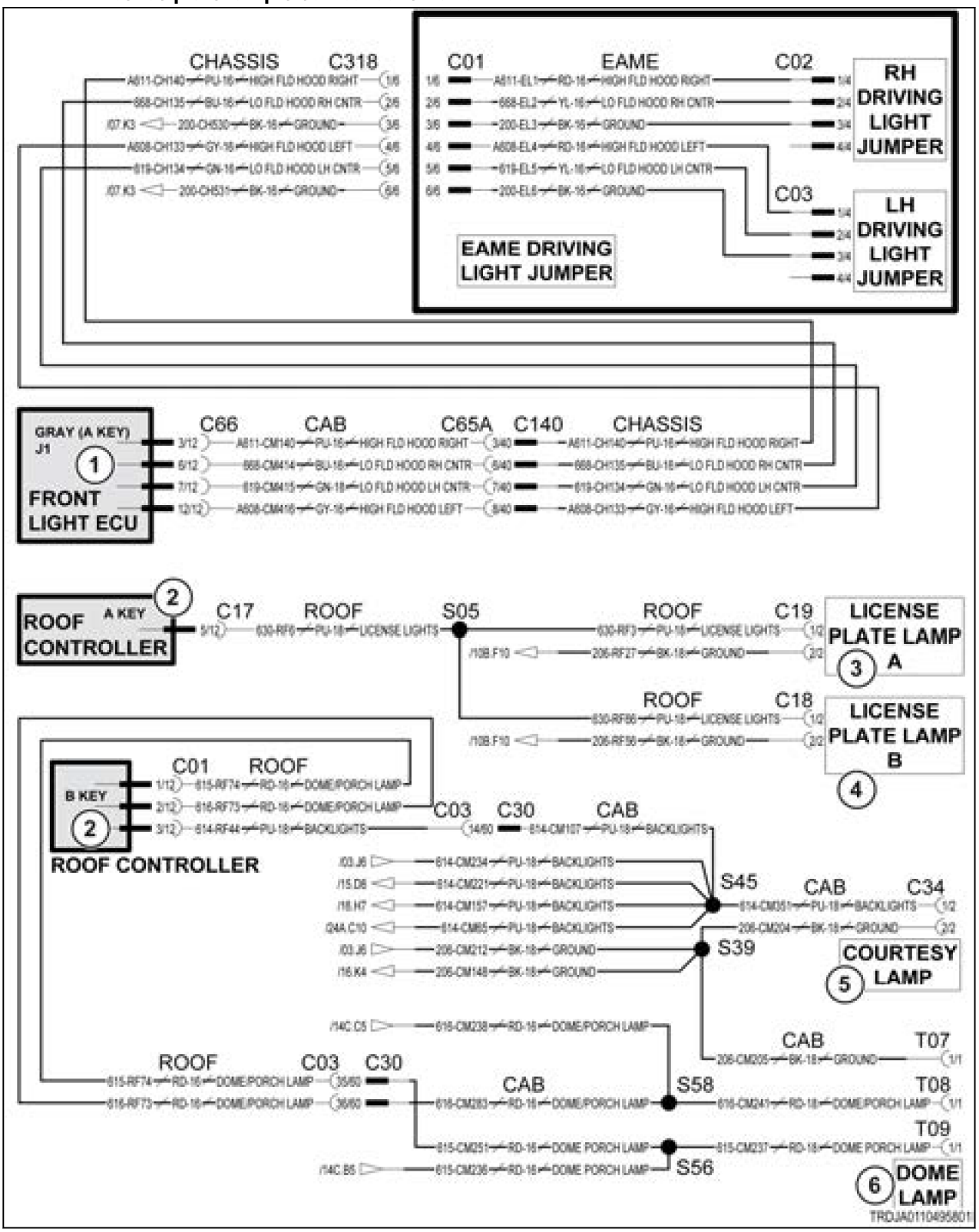

Fig. 706

Schematic legend		
Item	**Schematic term**	**Description**
1	AIR PRESSURE SENSOR	Air pressure sensor
2	REAR LIGHT ECU	Rear lighting module
3	RH BELT TENSION SENSOR	Right-hand belt tension sensor
4	LH BELT TENSION SENSOR	Left-hand belt tension sensor
5	FUSE BLOCK 2	Fuse block 2
--	LH TRACK PRESS	Left-hand track pressure
--	RH TRACK PRESS	Right-hand track pressure
--	AIR PRESS	Air pressure
--	SIG BELT TENSION	Signal belt tension
--	HIGH FLD ENGINE COVER LEFT	Left-hand high flood engine cover

8.18.9 Code SA 210 SPN 1084 FMI 00

Sensor signal circuit is above normal operating range.

Diagnosis an solution

1. Verify that hydraulic oil pressure in track tensioner is in correct operating range.

The high tension fault code comes on at 26 200kPa(3800 PSI) and will stay on until the pressure drops below 24 821 kPa(3600 PSI)

The low tension alarm comes on at 15 168 kPa(2199 PSI) and will remain on until the pressure is above 15 858 kPa(2300 psi)

2. Check the sensor.

a) Check the sensor, wiring, and hardware.

Result

Expected result - there is no damage to the sensor, wiring, or hardware.

Results:

- Yes - there is no damage to the sensor, wiring, or hardware.

  see step 3, page 8-1214
- No - there is damage to the sensor, wiring, or hardware.

  Repair or replace the harness.

  see step 6, page 8-1215

3. Check for power at the sensor.

a) Turn the battery disconnect switch to the on position.

b) Turn the key start switch to the on position.

c) Check voltage from contact A to frame ground at the sensor.

Result

Expected result - voltage is 12 volts.

Results:

- Yes - voltage is 12 volts.

  see step 4, page 8-1215

Result

Expected result - the diagnostic code is not active.

Results:

- Yes - SPN 2376 FMI 05 is not active.

  Stop.
- No - SPN 2376 FMI 05 is active.

  Failure of the module is possible but not common. Exit the procedure and do the procedure again. If the diagnostic code remains active, replace the module.

  Stop.

11. Connect the air-conditioning hose (2) to the compressor.

12. Install the p-clips and hardware (1).

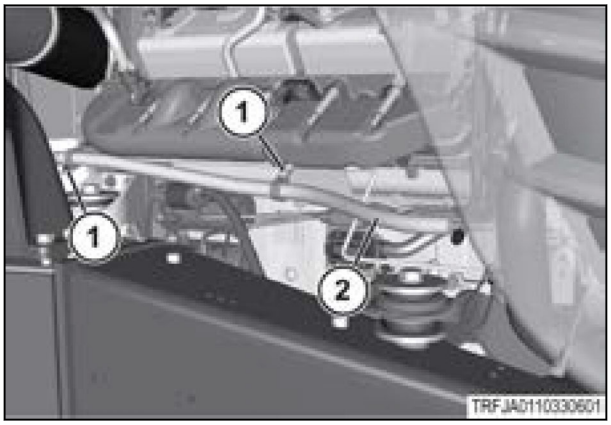

Fig. 24

13. Install the air-conditioning hose (2).

14. Install the heater hoses and clamps (1).

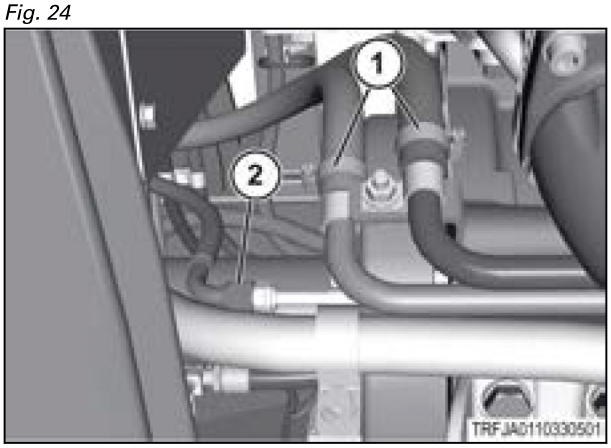

Fig. 25

15. Install the p-clip and hardware (1) to the fuel hose behind the cab.

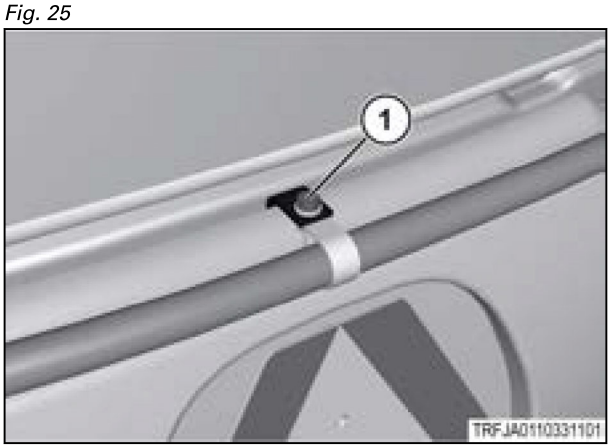

Fig. 26

16. Put the air-conditioning drain hose (2) along the rear axle and attach to the ladder clip with a tie strap (1).

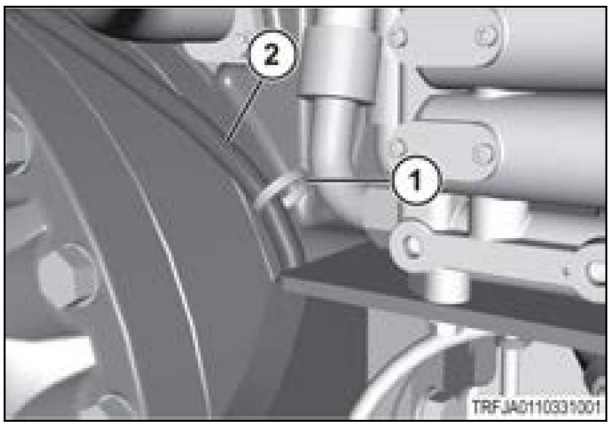

Fig. 27

- 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

10.2.3 Automatic temperature control panel test

Test LED display

1. Turn the system off.
2. Turn the ignition on.

Test result

1. LED will briefly flash 8888

Speed control for blower fan

1. Turn on the HVAC system.

Test result

1. The LED must show the last set point that was selected.
2. The blower fan must be circulating air. The temperature that is selected will determine the speed of the blower. The blower must increase in relation to the difference of the temperature.

Push button for temperature

1. Set the temperature to the highest setting 32 degrees C (90 degrees F).
2. Set the control for the blower fan to automatic.

Test result

1. The speed of the blower fan changes to full speed.
2. The heating system will turn on.
   a. The water valve must open.
   b. The temperature of the supply line at the heater core must increase as the engine temperature increases.

Push button for temperature

1. Set the temperature to the lowest setting 15.5 degrees C (60 degrees F).
2. Set the blower to automatic.

Test result

Relationship between temperature and pressure (R-134a Refrigerant)			Relationship between temperature and pressure (R-134a Refrigerant)	
-5 C (23.0 F)	141 kPa (20.5 psi)		30 C (86.0 F)	666 kPa (96.6 psi)
-4 C (24.0 F)	147 kPa (21.3 psi)		31 C (87.0 F)	678 kPa (98.4 psi)
-4 C (25.0 F)	152 kPa (22.0 psi)		31 C (88.0 F)	691 kPa (100.2 psi)
-3 C (26.0 F)	157 kPa (22.8 psi)		32 C (89.0 F)	703 kPa (102.0 psi)
-3 C (27.0 F)	163 kPa (23.6 psi)		32 C (90.0 F)	716 kPa (103.8 psi)
-2 C (28.0 F)	168 kPa (24.4 psi)		33 C (91.0 F)	729 kPa (105.7 psi)
-2 C (29.0 F)	174 kPa (25.2 psi)		33 C (92.0 F)	742 kPa (107.6 psi)
-1 C (30.0 F)	179 kPa (26.0 psi)		34 C (93.0 F)	755 kPa (109.5 psi)
-1 C (30.0 F)	185 kPa (26.8 psi)		34 C (94.0 F)	768 kPa (111.4 psi)
0 C (32.0 F)	191 kPa (27.7 psi)		35 C (95.0 F)	782 kPa (113.4 psi)
1 C (33.0 F)	197 kPa (28.5 psi)		36 C (96.0 F)	796 kPa (115.4 psi)
1 C (34.0 F)	203 kPa (29.4 psi)		36 C (97.0 F)	809 kPa (117.4 psi)
2 C (35.0 F)	209 kPa (30.3 psi)		37 C (98.0 F)	823 kPa (119.4 psi)
2 C (36.0 F)	215 kPa (31.2 psi)		37 C (99.0 F)	838 kPa (121.5 psi)
3 C (37.0 F)	221 kPa (32.1 psi)		38 C (100.0 F)	852 kPa (123.5 psi)
3 C (38.0 F)	228 kPa (33.0 psi)		38 C (101.0 F)	866 kPa (125.6 psi)
4 C (39.0 F)	234 kPa (34.0 psi)		39 C (102.0 F)	881 kPa (127.8 psi)
4 C (40.0 F)	241 kPa (34.9 psi)		39 C (103.0 F)	896 kPa (129.9 psi)
5 C (41.0 F)	248 kPa (35.9 psi)		40 C (104.0 F)	911 kPa (132.1 psi)
6 C (42.0 F)	254 kPa (36.9 psi)		41 C (105.0 F)	926 kPa (134.3 psi)
6 C (43.0 F)	261 kPa (37.9 psi)		41 C (106.0 F)	941 kPa (136.5 psi)
7 C (44.0 F)	263 kPa (38.9 psi)		42 C (107.0 F)	956 kPa (138.7 psi)
7 C (45.0 F)	275 kPa (39.9 psi)		42 C (108.0 F)	972 kPa (141.0 psi)
8 C (46.0 F)	283 kPa (41.0 psi)		43 C (109.0 F)	988 kPa (143.3 psi)
8 C (47.0 F)	290 kPa (42.0 psi)		43 C (110.0 F)	1004 kPa (145.6 psi)
9 C (48.0 F)	297 kPa (43.1 psi)		44 C (111.0 F)	1020 kPa (147.9 psi)
9 C (49.0 F)	305 kPa (44.2 psi)		44 C (112.0 F)	1036 kPa (150.3 psi)
10 C (50.0 F)	312 kPa (45.3 psi)		45 C (113.0 F)	1053 kPa (152.7 psi)
11 C (51.0 F)	320 kPa (46.4 psi)		46 C (114.0 F)	1069 kPa (155.1 psi)
11 C (52.0 F)	328 kPa (47.5 psi)		46 C (115.0 F)	1087 kPa (157.6 psi)
12 C (53.0 F)	336 kPa (48.7 psi)		47 C (116.0 F)	1103 kPa (160.0 psi)
12 C (54.0 F)	344 kPa (49.9 psi)		47 C (117.0 F)	1120 kPa (162.5 psi)
13 C (55.0 F)	352 kPa (51.0 psi)		48 C (118.0 F)	1138 kPa (165.1 psi)
13 C (56.0 F)	360 kPa (52.2 psi)		48 C (119.0 F)	1156 kPa (167.6 psi)
14 C (57.0 F)	369 kPa (53.5 psi)		49 C (120.0 F)	1173 kPa (170.2 psi)
14 C (58.0 F)	377 kPa (54.7 psi)		49 C (121.0 F)	1191 kPa (172.8 psi)
15 C (59.0 F)	385 kPa (55.9 psi)		50 C (122.0 F)	1209 kPa (175.4 psi)

15. Remove the hardware (1), the grille assembly (2), the top and bottom retainer assemblies (3), and the seals.

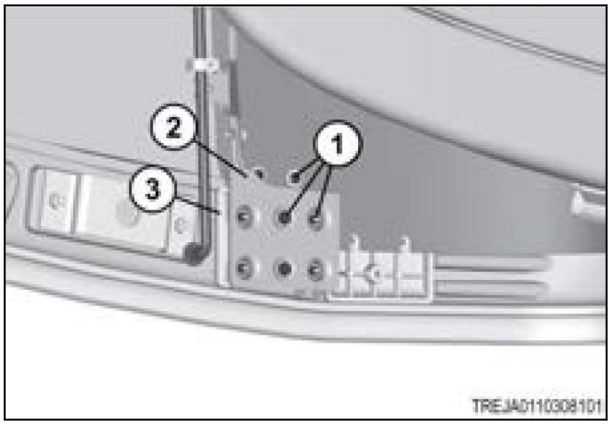

Fig. 23

16. Remove the hardware (1), the handle (2), and the bracket (3).

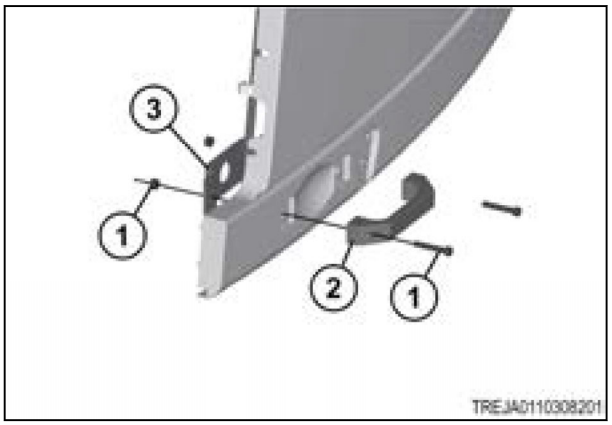

Fig. 24

17. Remove the seal (1).

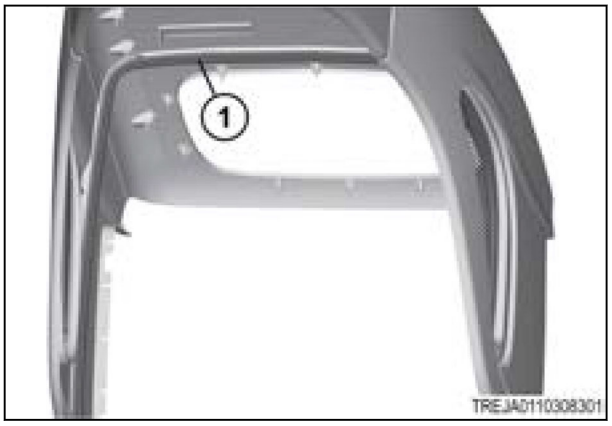

Fig. 25

18. Remove the hardware (1), the side panels (2, 4), and the top panel (3).

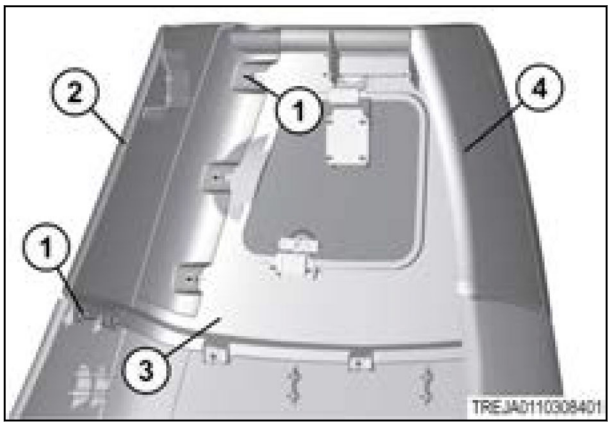

Fig. 26

9. Remove the hardware (1) and the bottom step assembly (2).

IMPORTANT:
The weight of the bottom step assembly is approximately 13 kg (28 lb).

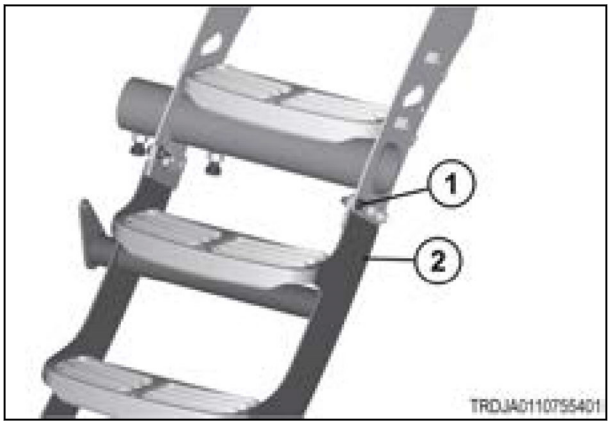

Fig. 116

10. Remove the hardware (1) and the top actuator mount (2).

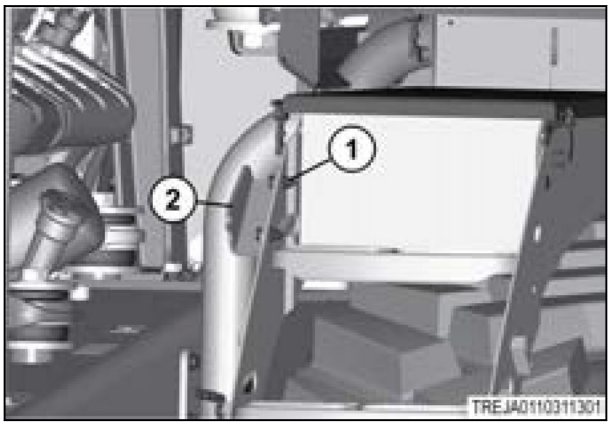

Fig. 117

11. Fasten the correct lifting equipment to the step assembly.

IMPORTANT:
The weight of the step assembly is approximately 60 kg (133 lb).

12. Loosen the hardware (1) and slide the step assembly (2) out to remove.

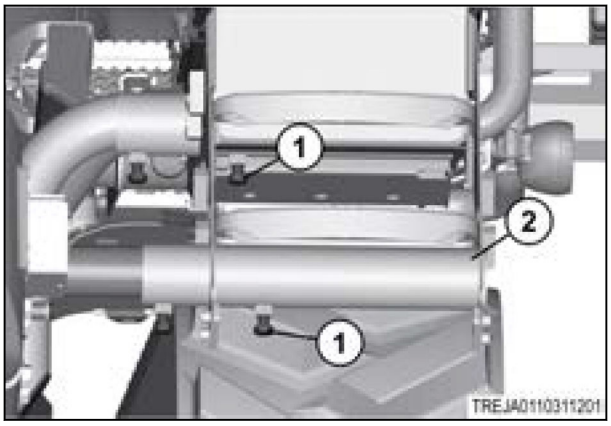

Fig. 118

13. Remove the hardware (1) and the step assembly supports (2).

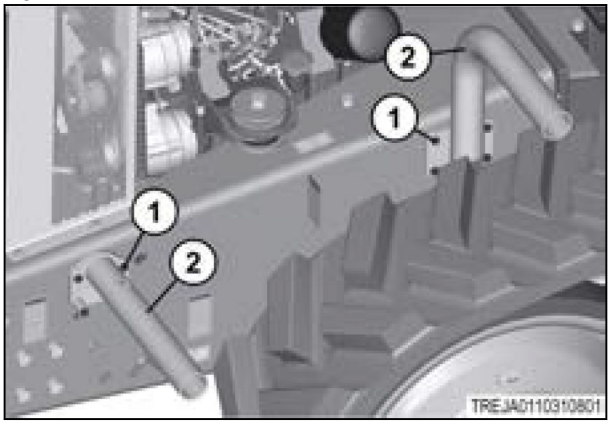

Fig. 119

12.3 Undercarriage width adjustment

12.3.1 Adjust the gauge spacing

ATTENTION:
Fully clean the hard bar, and the rear axle before starting the following procedure.

Procedure

1. Buy the tools required for changing the gauge spacing on the machine through the dealer.

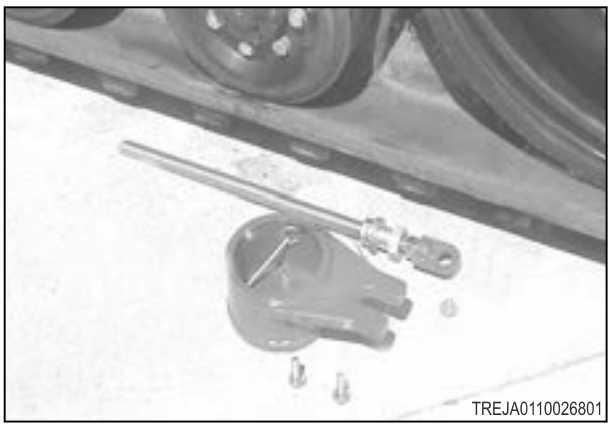

Fig. 8

2. Loosen the bolts (1) on both sides of the undercarriage. Loosen the bolts so there is approximately 12.7 mm (0.50 in) space between the cap (2) and the undercarriage.

IMPORTANT:
Do not use a petroleum-based lubricant. This type of lubricant can cause a deterioration of the rubber based bearing material on the bearing cap and the undercarriage.

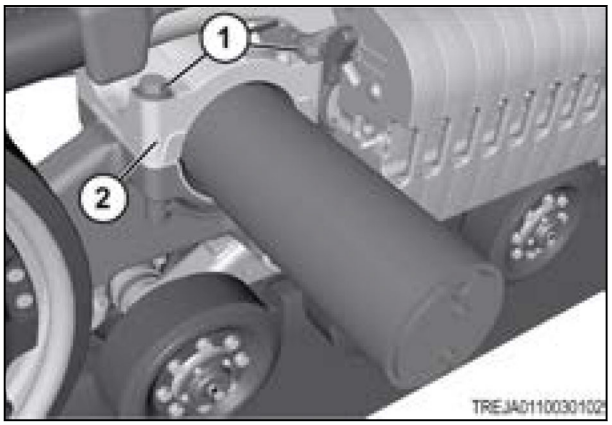

Fig. 9

3. Apply rubber lubricant to the hard bar surface on both sides of the undercarriage with a nozzle or a squirt bottle.

This aids in moving the undercarriage, and lets the lubricant to flow underneath the cap surface. If necessary, use a pry bar to lift the cap (1).

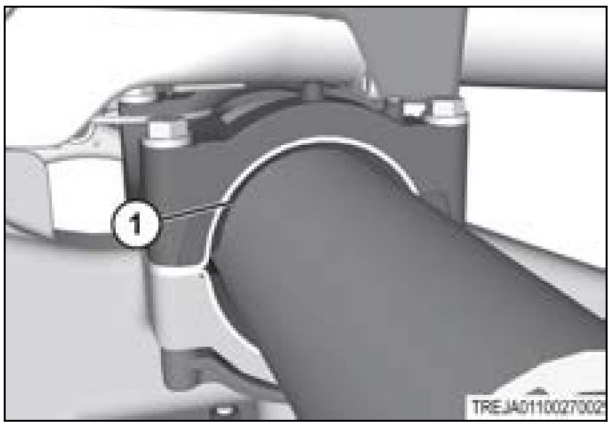

Fig. 10

3. Lower the tensioner assembly and install the pin (1).

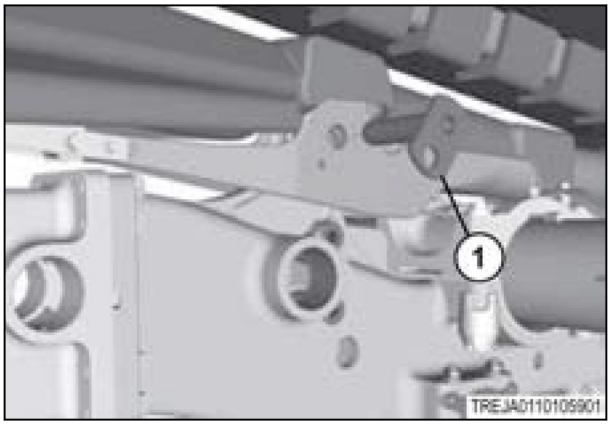

Fig. 66

4. Install the bolt (3), the washer (2), and the bushing (4) in the pin (1). Tighten the bolt to 200 to 280 Nm (148 to 207 lb ft).

5. Replace the tension on the track.

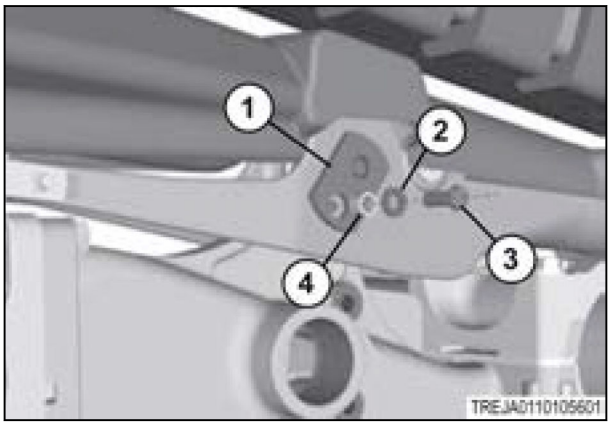

Fig. 67

12.8.3 Remove the undercarriage rupture disc

Procedure

1. Loosen the tension on the track.

2. Remove the bolt (3), the washer (2), and the bushing (4) from the pin (1).

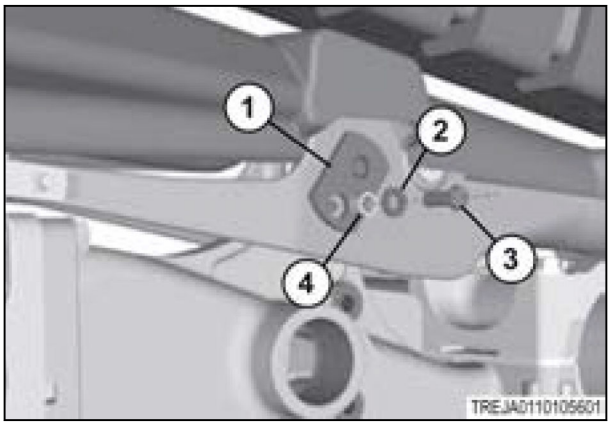

Fig. 68

15. Install the pin (1) to the swing link (2) and the tensioner (3).

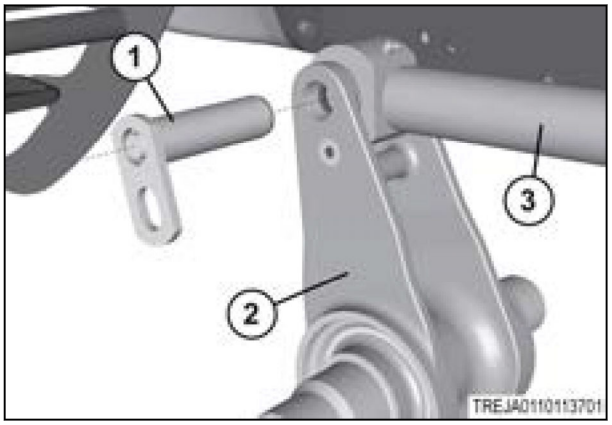

Fig. 159

16. Support the tensioner (1). Install the bolt (2), washer (3), and bushing (4).

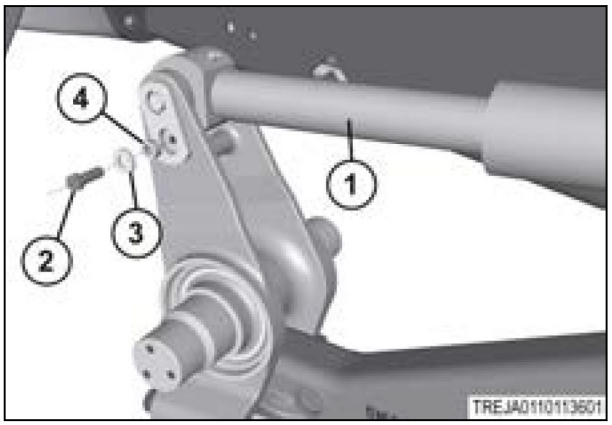

Fig. 160

17. Install the idler hub (1) and bearing (2).

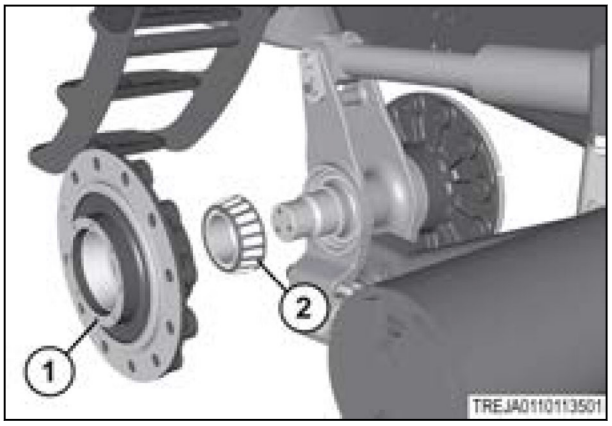

Fig. 161

18. Install the idler wheel (1).

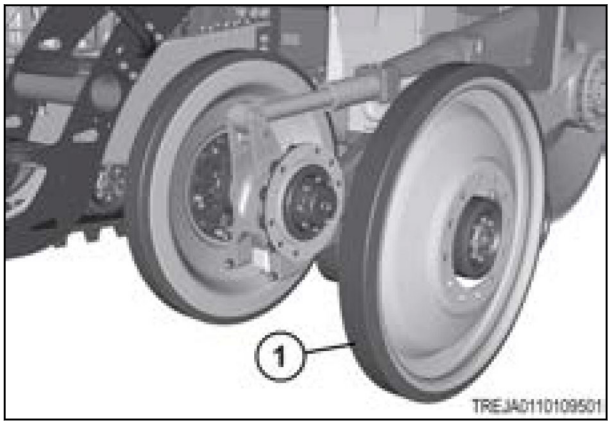

Fig. 162

24. After the cones become cool, install the bearing races (1) into the bearing carrier (2).

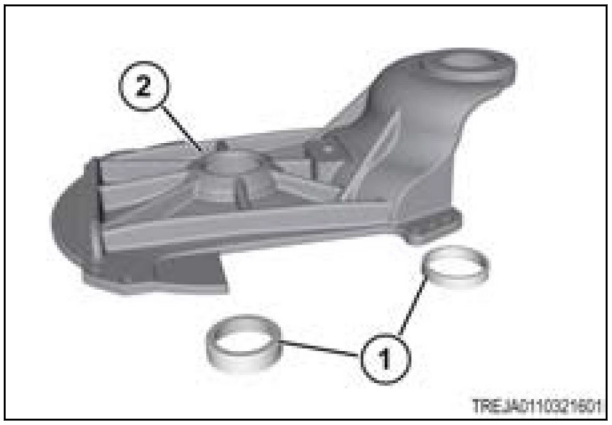

Fig. 67

25. Put the bearing carrier (1) on the housing.

26. Fasten the bearing carrier carrier to the housing with bolts (2) and washers.

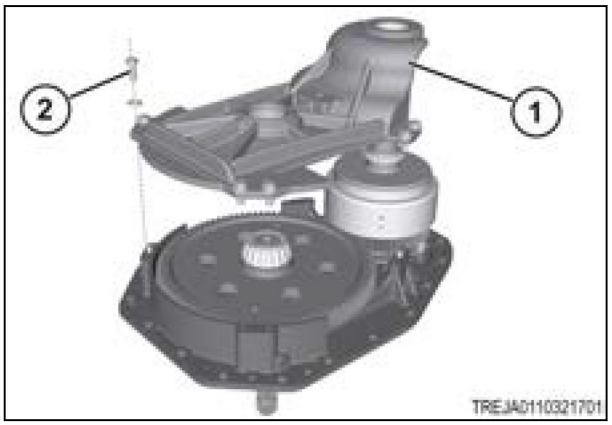

Fig. 68

27. Install the ring (1) in the tube assembly (2).

28. Center the tube assembly over the hole and secure the tube assembly with a bolt (3).

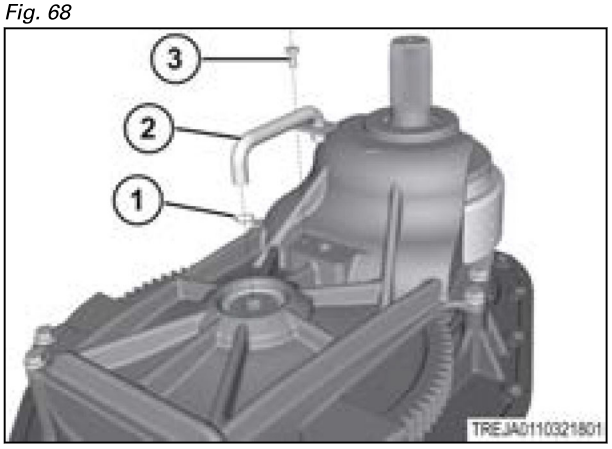

Fig. 69

29. Install the cage (1), the bolts (2), and the plugs (3) without the seals.

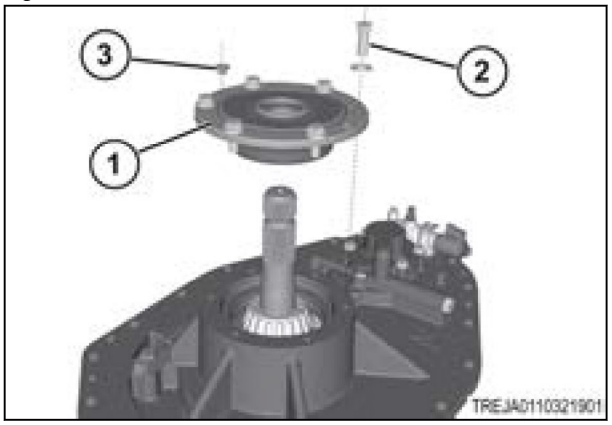

Fig. 70

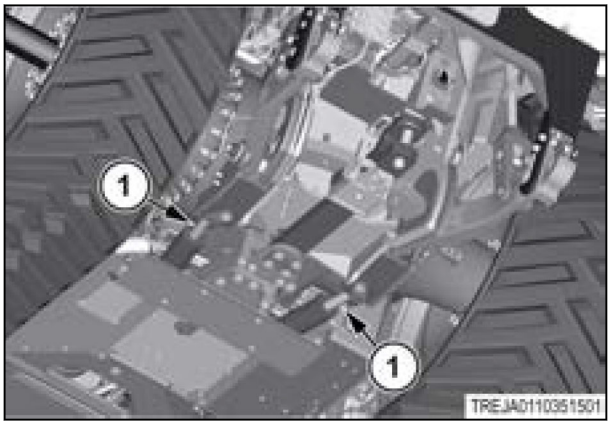

Fig. 26

The steering cylinders (1) mount between a flange on the differential housing and the draft arms.

The cylinders supply aid to the machine's differential steering system while the implement is working in the ground.

14.4.7 Lift cylinders

The 3-point linkage lift cylinders supply the lifting for the full 3-point linkage.

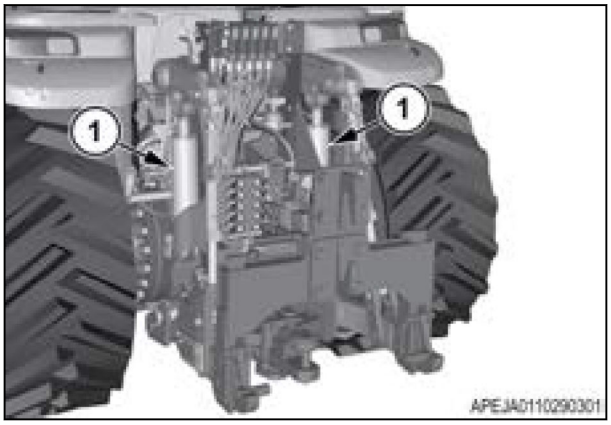

Fig. 27

The rod end of the 3-point linkage lift cylinders (1) fastens to the lift arms. The piston end of the cylinders fastens to the 3-point linkage frame. The 3-point linkage lift cylinders raises the 3-point linkage.

Behind the fastening points the lift capacity of the 3-point linkage lift cylinders 8845 kg (19500 lb) measured at 610 mm (24 in).

31. Fill the hydraulic system with an approved oil.

NOTE:
See the operation and the maintenance manual for the correct procedure.

Related Links

Assemble the 3-point linkage control valve page 14-62

14.9.3 Remove the rockshaft

Procedure

1. Remove the hardware (3) that holds the pin(2) that holds the cylinder (1) on.

2. Set the cylinder out of the way.

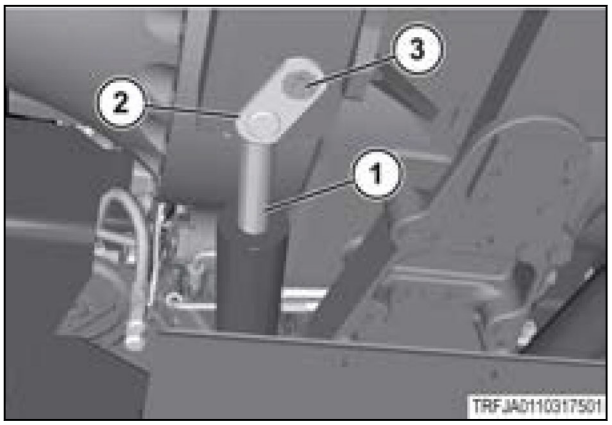

Fig. 73

3. Remove the bolt(1) that fasten the height sensor rod(2) to the bracket(3).

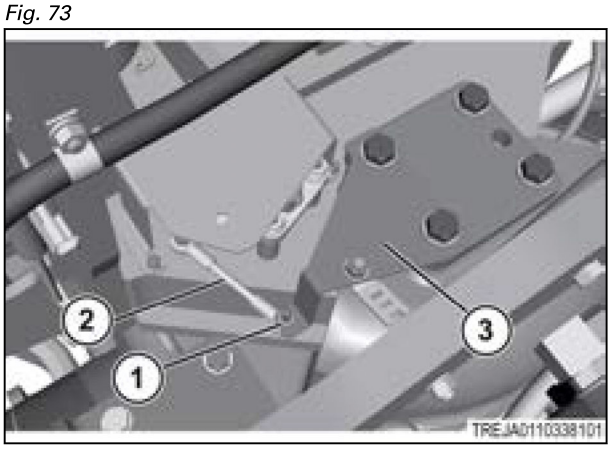

Fig. 74

4. Remove the left-hand rear fender (1).

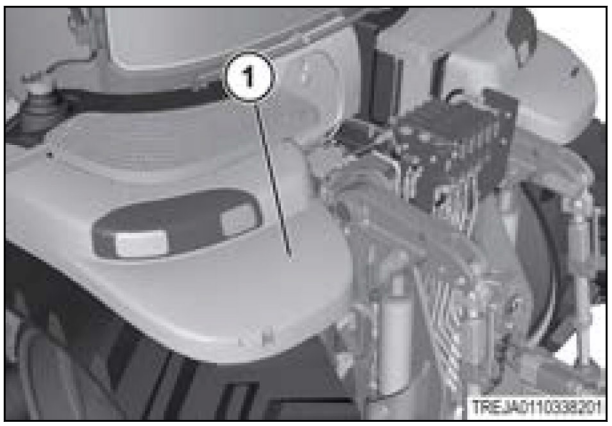

Fig. 75

5. Rotate the 3-point linkage to the right-hand side until the frame contacts the fuel tank support.

2. Select Fendt icon.

Fig. 146

3. Select tractors.

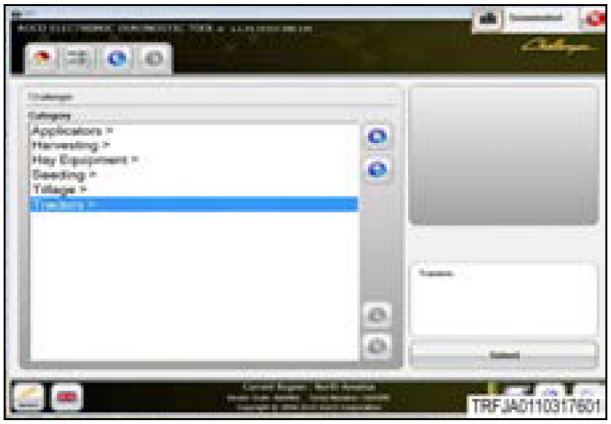

Fig. 147

4. Select the correct machine model series.

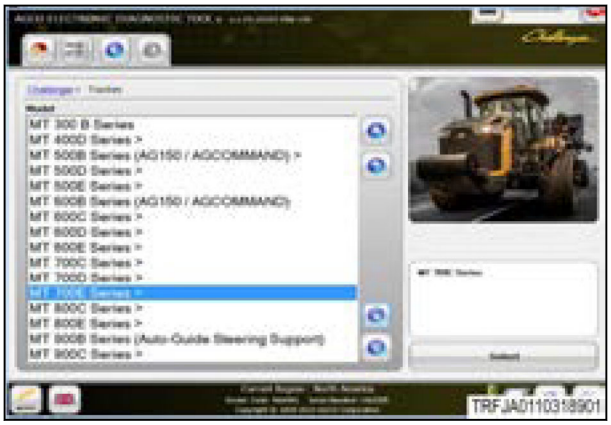

Fig. 148

5. Select the VarioGuide option.

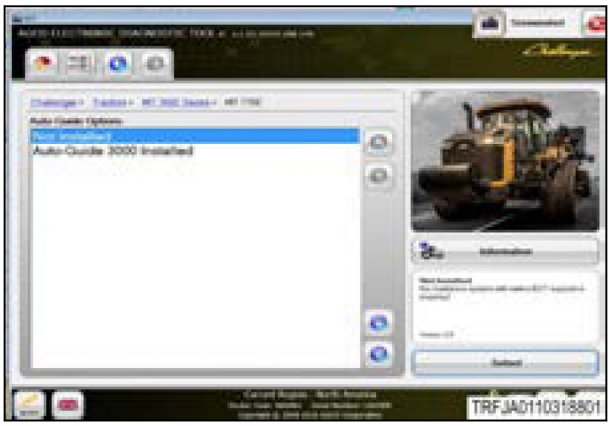

Fig. 149

16 Diagrams

16.2.1.12 Decel pedal sensor

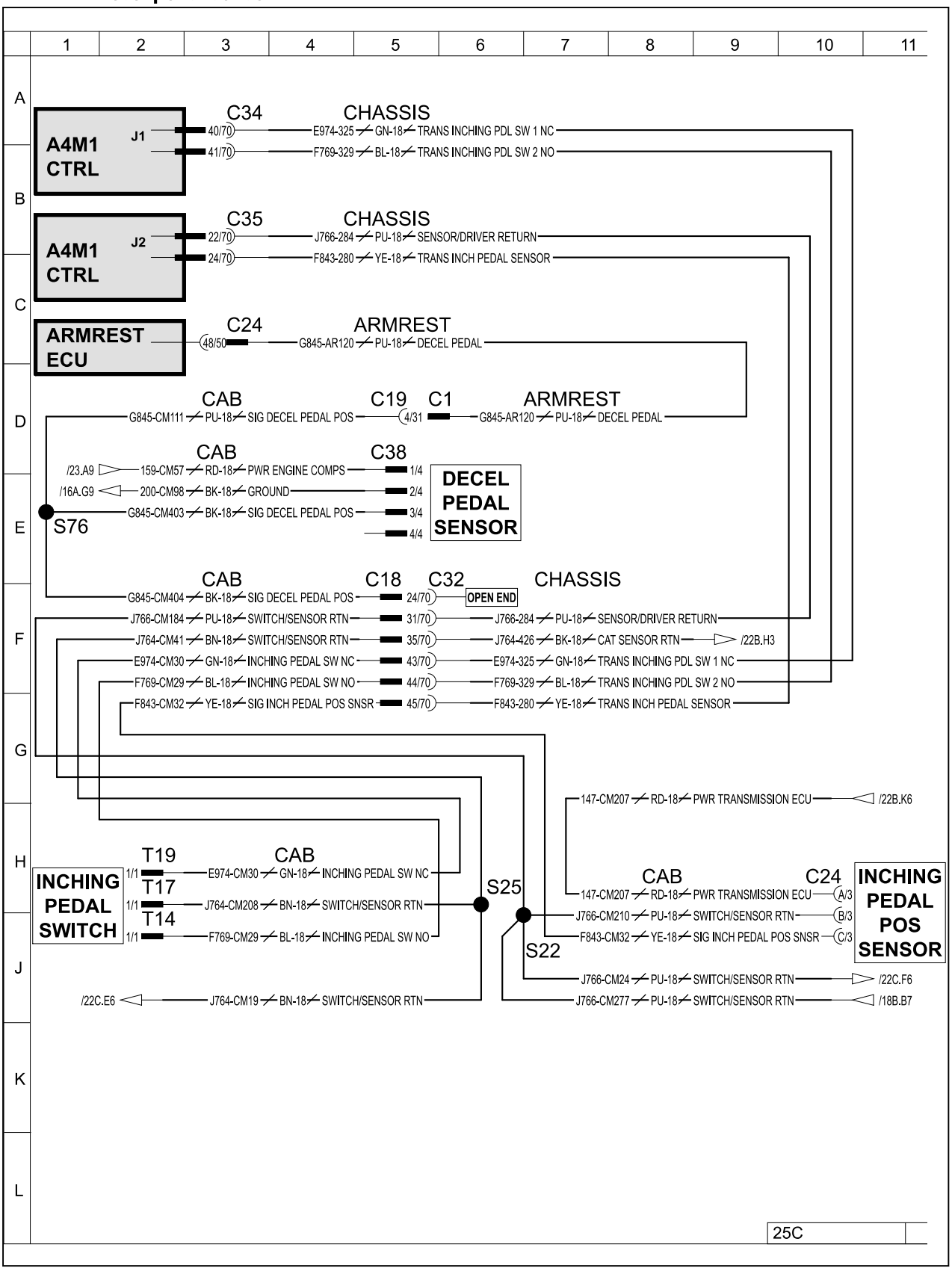

Fig. 20

16.2.1.39 Raise lower solenoid

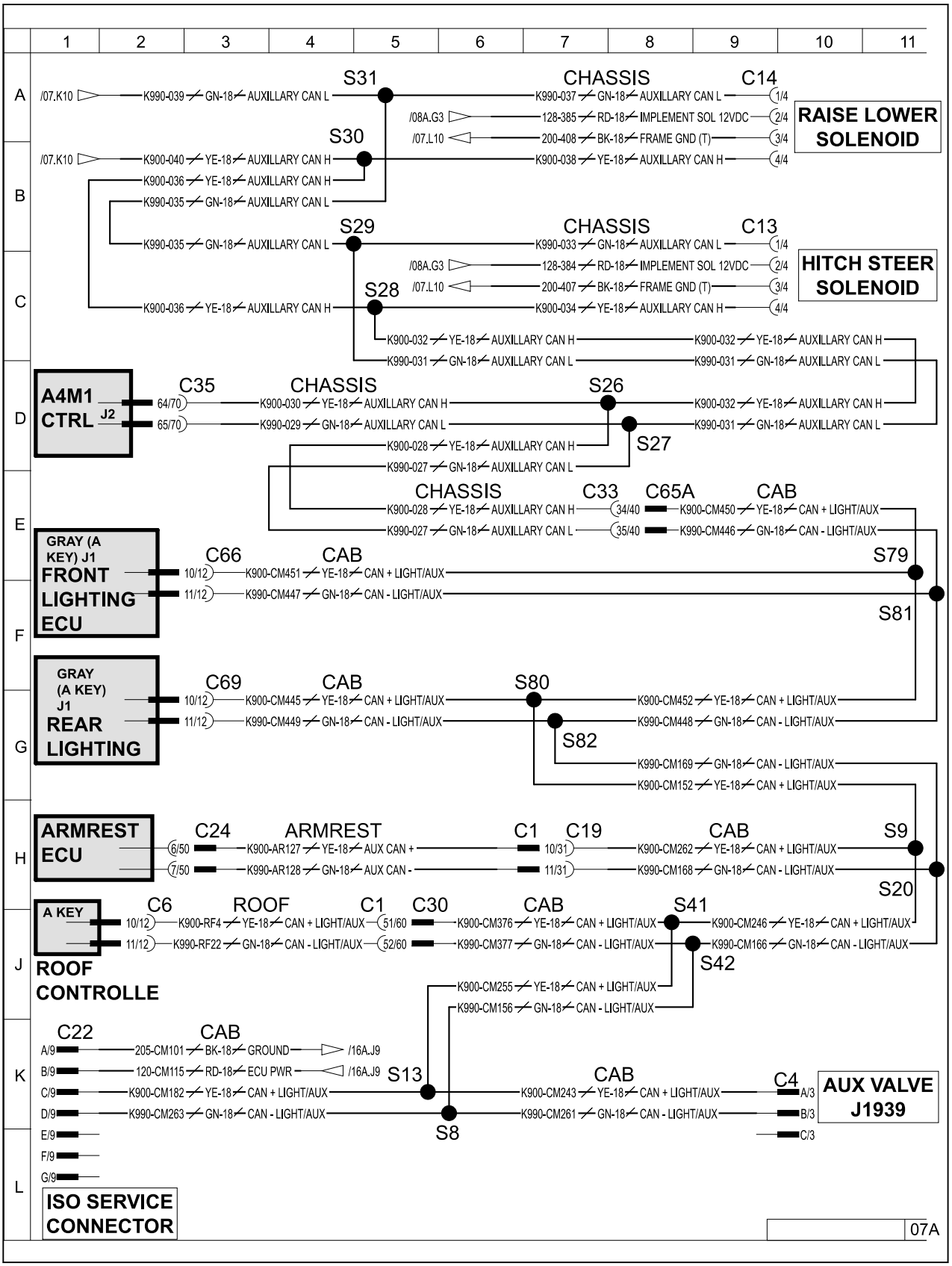

Fig. 47