ANTI-LOCK BRAKING SYSTEM (ABS) AND ELECTRONIC STABILITY CONTROL (ESC): FOR MODULAR BRAKING SYSTEM PLATFORM (mBSP™) VERSION ECUs, 12-VOLT SYSTEMS

MAINTENANCE MANUAL

WABCO

About This Manual

This manual provides maintenance procedures for WABCO's Anti-Lock Braking System (ABS), Electronic Stability Control (ESC) and Hill Start Aid (HSA) using Modular Braking System Platform (mBSP™) version ECUs.

Before You Begin

1. Read and understand all instructions and procedures before you begin to service components.
2. Read and observe all Warning and Caution hazard alert messages in this publication. They provide information that can help prevent serious personal injury, damage to components, or both.
3. Follow your company's maintenance and service, installation, and diagnostics guidelines.
4. Use special tools when required to help avoid serious personal injury and damage to components.

Hazard Alert Messages and Torque Symbols

Read and observe all Warning and Caution hazard alert messages in this publication. They provide information that can help prevent serious personal injury, damage to components, or both.

⚠ WARNING

A Warning alerts you to an instruction or procedure that you must follow exactly to avoid serious personal injury and damage to components.

⚠ CAUTION

A Caution alerts you to an instruction or procedure that you must follow exactly to avoid damage to components.

This symbol alerts you to tighten fasteners to a specified torque value.

⚠ WARNING

To prevent serious personal injury, always wear safe eye protection when you perform vehicle maintenance or service.

Release all air from the air systems before you remove any components. Pressurized air can cause serious personal injury.

⚠ CAUTION

When welding on an ABS- or ABS/ATC/HSA/ESC-equipped vehicle is necessary, disconnect the power connector from the ECU to prevent damage to the electrical system and ABS/ATC components.

How to Obtain Additional Maintenance, Service and Product Information

Visit Literature on Demand at Meritor.com to access and order additional information.

Contact WABCO North America Customer Care at 855-228-3203 (United States and Canada); 001-800-889-1834 (Mexico); or email wnacustomercare@wabco-auto.com.

If Tools and Supplies are Specified in This Manual

Call Meritor's Commercial Vehicle Aftermarket at 888-725-9355 to obtain tools and supplies.

Information contained in this publication was in effect at the time the publication was approved for printing and is subject to change without notice or liability. WABCO reserves the right to revise the information presented or to discontinue the production of parts described at any time.

Contents

Asbestos and Non-Asbestos Fibers

⚠ ASBESTOS FIBERS WARNING

The following procedures for servicing brakes are recommended to reduce exposure to asbestos fiber dust, a cancer and lung disease hazard. Material Safety Data Sheets are available from WABCO.

Hazard Summary

Because some brake linings contain asbestos, workers who service brakes must understand the potential hazards of asbestos and precautions for reducing risks. Exposure to airborne asbestos dust can cause serious and possibly fatal diseases, including asbestosis (a chronic lung disease) and cancer, principally lung cancer and mesothelioma (a cancer of the lining of the chest or abdominal cavities). Some studies show that the risk of lung cancer among persons who smoke and who are exposed to asbestos is much greater than the risk for non-smokers. Symptoms of these diseases may not become apparent for 15, 20 or more years after the first exposure to asbestos.

Accordingly, workers must use caution to avoid creating and breathing dust when servicing brakes. Specific recommended work practices for reducing exposure to asbestos dust follow. Consult your employer for more details.

Recommended Work Practices

1. Separate Work Areas. Whenever feasible, service brakes in a separate area away from other operations to reduce risks to unprotected persons. OSHA has set a maximum allowable level of exposure for asbestos of 0.1 f/cc as an 8-hour time-weighted average and 1.0 f/cc averaged over a 30-minute period. Scientists disagree, however, to what extent adherence to the maximum allowable exposure levels will eliminate the risk of disease that can result from inhaling asbestos dust. OSHA requires that the following sign be posted at the entrance to areas where exposures exceed either of the maximum allowable levels:

DANGER: ASBESTOS
CANCER AND LUNG DISEASE HAZARD
AUTHORIZED PERSONNEL ONLY
RESPIRATORS AND PROTECTIVE CLOTHING
ARE REQUIRED IN THIS AREA.

2. Respiratory Protection. Wear a respirator equipped with a high-efficiency (HEPA) filter approved by NIOSH or MSHA for use with asbestos at all times when servicing brakes, beginning with the removal of the wheels.

3. Procedures for Servicing Brakes.

a. Enclose the brake assembly within a negative pressure enclosure. The enclosure should be equipped with a HEPA vacuum and worker arm sleeves. With the enclosure in place, use the HEPA vacuum to loosen and vacuum residue from the brake parts.

b. As an alternative procedure, use a catch basin with water and a biodegradable, non-phosphate, water-based detergent to wash the brake drum or rotor and other brake parts. The solution should be applied with low pressure to prevent dust from becoming airborne. Allow the solution to flow between the brake drum and the brake support or the brake rotor and caliper. The wheel hub and brake assembly components should be thoroughly wetted to suppress dust before the brake shoes or brake pads are removed. Wipe the brake parts clean with a cloth.

c. If an enclosed vacuum system or brake washing equipment is not available, employers may adopt their own written procedures for servicing brakes, provided that the exposure levels associated with the employer's procedures do not exceed the levels associated with the enclosed vacuum system or brake washing equipment. Consult OSHA regulations for more details.

d. Wear a respirator equipped with a HEPA filter approved by NIOSH or MSHA for use with asbestos when grinding or machining brake linings. In addition, do such work in an area with a local exhaust ventilation system equipped with a HEPA filter.

e. **NEVER** use compressed air by itself, dry brushing, or a vacuum not equipped with a HEPA filter when cleaning brake parts or assemblies. **NEVER** use carcinogenic solvents, flammable solvents, or solvents that can damage brake components as wetting agents.

4. Cleaning Work Areas. Clean work areas with a vacuum equipped with a HEPA filter or by wet wiping. **NEVER** use compressed air or dry sweeping to clean work areas. When you empty vacuum cleaners and handle used rags, wear a respirator equipped with a HEPA filter approved by NIOSH or MSHA for use with asbestos. When you replace a HEPA filter, wet the filter with a fine mist of water and dispose of the used filter with care.

5. Worker Clean-Up. After servicing brakes, wash your hands before you eat, drink or smoke. Shower after work. Do not wear work clothes home. Use a vacuum equipped with a HEPA filter to vacuum work clothes after they are worn. Launder them separately. Do not shake or use compressed air to remove dust from work clothes.

6. Waste Disposal. Dispose of discarded linings, used rags, cloths and HEPA filters with care, such as in sealed plastic bags. Consult applicable EPA, state and local regulations on waste disposal.

Regulatory Guidance

References to OSHA, NIOSH, MSHA, and EPA, which are regulatory agencies in the United States, are made to provide further guidance to employers and workers employed within the United States. Employers and workers employed outside of the United States should consult the regulations that apply to them for further guidance.

⚠ NON-ASBESTOS FIBERS WARNING

The following procedures for servicing brakes are recommended to reduce exposure to non-asbestos fiber dust, a cancer and lung disease hazard. Material Safety Data Sheets are available from WABCO.

Hazard Summary

Most recently manufactured brake linings do not contain asbestos fibers. These brake linings may contain one or more of a variety of ingredients, including glass fibers, mineral wool, aramid fibers, ceramic fibers and silica that can present health risks if inhaled. Scientists disagree on the extent of the risks from exposure to these substances. Nonetheless, exposure to silica dust can cause silicosis, a non-cancerous lung disease. Silicosis gradually reduces lung capacity and efficiency and can result in serious breathing difficulty. Some scientists believe other types of non-asbestos fibers, when inhaled, can cause similar diseases of the lung. In addition, silica dust and ceramic fiber dust are known to the State of California to cause lung cancer. U.S. and international agencies have also determined that dust from mineral wool, ceramic fibers and silica are potential causes of cancer.

Accordingly, workers must use caution to avoid creating and breathing dust when servicing brakes. Specific recommended work practices for reducing exposure to non-asbestos dust follow. Consult your employer for more details.

Recommended Work Practices

1. Separate Work Areas. Whenever feasible, service brakes in a separate area away from other operations to reduce risks to unprotected persons.

2. Respiratory Protection. OSHA has set a maximum allowable level of exposure for silica of 0.1 mg/m3 as an 8-hour time-weighted average. Some manufacturers of non-asbestos brake linings recommend that exposures to other ingredients found in non-asbestos brake linings be kept below 1.0 f/cc as an 8-hour time-weighted average. Scientists disagree, however, to what extent adherence to these maximum allowable exposure levels will eliminate the risk of disease that can result from inhaling non-asbestos dust.

Therefore, wear respiratory protection at all times during brake servicing, beginning with the removal of the wheels. Wear a respirator equipped with a high-efficiency (HEPA) filter approved by NIOSH or MSHA, if the exposure levels may exceed OSHA or manufacturers' recommended maximum levels. Even when exposures are expected to be within the maximum allowable levels, wearing such a respirator at all times during brake servicing will help minimize exposure.

3. Procedures for Servicing Brakes.

a. Enclose the brake assembly within a negative pressure enclosure. The enclosure should be equipped with a HEPA vacuum and worker arm sleeves. With the enclosure in place, use the HEPA vacuum to loosen and vacuum residue from the brake parts.

b. As an alternative procedure, use a catch basin with water and a biodegradable, non-phosphate, water-based detergent to wash the brake drum or rotor and other brake parts. The solution should be applied with low pressure to prevent dust from becoming airborne. Allow the solution to flow between the brake drum and the brake support or the brake rotor and caliper. The wheel hub and brake assembly components should be thoroughly wetted to suppress dust before the brake shoes or brake pads are removed. Wipe the brake parts clean with a cloth.

c. If an enclosed vacuum system or brake washing equipment is not available, carefully clean the brake parts in the open air. Wet the parts with a solution applied with a pump-spray bottle that creates a fine mist. Use a solution containing water, and, if available, a biodegradable, non-phosphate, water-based detergent. The wheel hub and brake assembly components should be thoroughly wetted to suppress dust before the brake shoes or brake pads are removed. Wipe the brake parts clean with a cloth.

d. Wear a respirator equipped with a HEPA filter approved by NIOSH or MSHA when grinding or machining brake linings. In addition, do such work in an area with a local exhaust ventilation system equipped with a HEPA filter.

e. **NEVER** use compressed air by itself, dry brushing, or a vacuum not equipped with a HEPA filter when cleaning brake parts or assemblies. **NEVER** use carcinogenic solvents, flammable solvents, or solvents that can damage brake components as wetting agents.

4. Cleaning Work Areas. Clean work areas with a vacuum equipped with a HEPA filter or by wet wiping. **NEVER** use compressed air or dry sweeping to clean work areas. When you empty vacuum cleaners and handle used rags, wear a respirator equipped with a HEPA filter approved by NIOSH or MSHA, to minimize exposure. When you replace a HEPA filter, wet the filter with a fine mist of water and dispose of the used filter with care.

5. Worker Clean-Up. After servicing brakes, wash your hands before you eat, drink or smoke. Shower after work. Do not wear work clothes home. Use a vacuum equipped with a HEPA filter to vacuum work clothes after they are worn. Launder them separately. Do not shake or use compressed air to remove dust from work clothes.

6. Waste Disposal. Dispose of discarded linings, used rags, cloths and HEPA filters with care, such as in sealed plastic bags. Consult applicable EPA, state and local regulations on waste disposal.

Regulatory Guidance

References to OSHA, NIOSH, MSHA, and EPA, which are regulatory agencies in the United States, are made to provide further guidance to employers and workers employed within the United States. Employers and workers employed outside of the United States should consult the regulations that apply to them for further guidance.

Contents

This manual contains service information for the following systems.

- WABCO mBSP™ anti-lock braking system (ABS)
- Automatic traction control (ATC)
- Electronic stability control (ESC) for trucks, tractors and buses

The ABS version is marked on the ECU. Figure 1.1. If you cannot identify the ECU version installed on your vehicle, contact WABCO North America Customer Care at 855-228-3203.

Figure 1.1

Anti-Lock Braking System (ABS)

ABS is a system designed to provide and maintain the best possible traction and steering control during an extreme braking event. During a potential wheel lock event, the ABS ECU, using information provided by the wheel speed sensors, sends a signal(s) to the appropriate modulator valve(s) to hold, apply or release the brakes as needed. ABS works automatically. The driver does not have to select this feature.

System Components

Electronic Control Unit (ECU)

The ECU is the control center or “brain” of the ABS, ATC and ESC systems. It receives information from the sensors and CAN data link, processes data and sends signals to modulators and active braking valves to achieve different tasks.

Wheel Speed Sensing Systems

Wheel speed sensing systems consist of a tooth wheel mounted on the hub or rotor of each monitored wheel and a speed sensor installed with its end against the tooth wheel. The sensor continuously sends wheel speed information to the ECU. A sensor clip holds the sensor in place and against the tooth wheel. Figure 1.2.

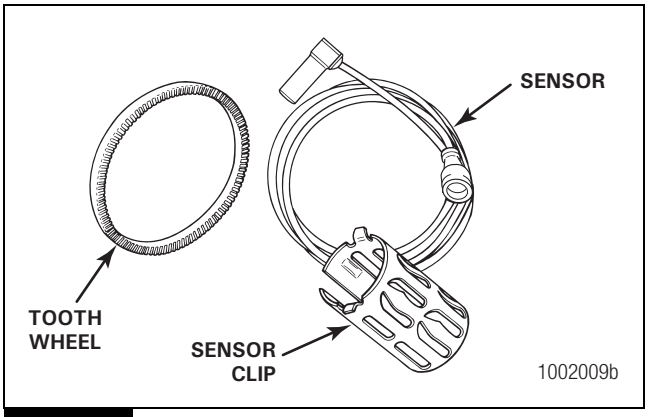

Figure 1.2

Pressure Modulator Valves

A modulator valve controls air pressure to an affected wheel-end brake during an ABS or ESC event to reduce speed and prevent wheel lock-up. Modulator valves are also used during ATC events to correctly gain traction on the affected wheel end.

A modulator valve is usually located on a frame rail or cross member near the brake chamber or as part of a valve package. A valve package combines two modulator valves, a service relay or quick release valve, and depending on the vehicle configuration, an active braking valve (ABV). Figure 1.3, Figure 1.4, Figure 1.5 and Figure 1.6.

FRONT AXLE VALVE PACKAGE
PART NUMBER 976 200 100 0 AND 976 200 101 0

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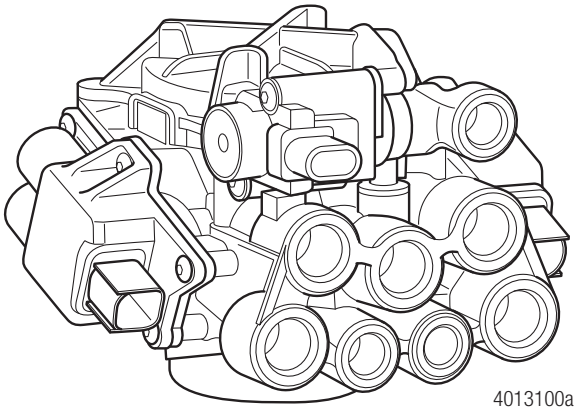
Figure 1.3

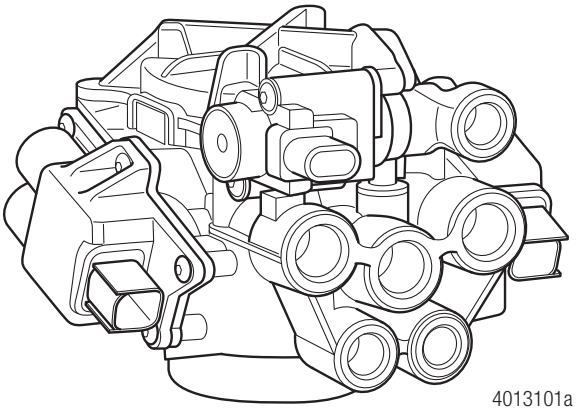
REAR VALVE PACKAGE
PART NUMBERS 976 000 120 0, 976 000 107 0
AND 976 000 112 0



4013100a

Figure 1.4

REAR VALVE PACKAGE
PART NUMBERS 976 000 121 0, 976 000 103 0,
976 000 105 0 AND 976 000 110 0



4013101a

Figure 1.5

SOLENOID MODULATOR VALVE
PART NUMBER 472 196 025 0

4013102a

Figure 1.6

Active Braking Valves (ABV)

Two active braking valves (ABV), sometimes referred to as 3/2 valve, are solenoid valves which are integrated into the valve packages and are used to produce active braking during ATC or ESC events. Depending on the mBSP™ system configuration, ABVs can be located in the front axle braking system and rear axle braking system.

Foot Brake Valve (FBV)

The foot brake valve (FBV) is part of the mBSP™ brake system. It provides the system with the driver's brake demand. The FBV generates the electrical and pneumatic signals required for the control of a pneumatic braking system. Normally, the FBV is actuated by a foot pedal assembly. Figure 1.7.

FOOT BRAKE VALVE DIGITAL
PART NUMBER 461 333 008 0

4013104a

Figure 1.7

Steering Angle Sensor (SAS)

The SAS is part of the mBSP™ ESC system. The SAS delivers the driver's steering input (steering wheel position) to the ECU using the vehicle chassis CAN communication data link. The SAS is provided by the vehicle manufacturer.

Electronic Stability Control (ESC) Module

The ESC module is part of the mBSP™ ESC system. It measures the vehicle yaw rate as well as vehicle lateral acceleration. It exchanges data with the ECU via the ESC system internal data link. The ECU supplies the module with voltage and ground. The ESC module must be initialized by diagnostic tools whenever the ECU or the ESC module is replaced. Figure 1.8.

ESC 6 MODULE
PART NUMBER 446 065 080 0

4013106a

Figure 1.8

Trailer Modulator Valve

For some stability control applications, an additional modulator valve (the same as what is used for ABS modulation) will be located in the trailer control line downstream of the front axle ABV which is also used to control the trailer.

Off-Road ABS Switch

On some vehicles, an off-road ABS switch can be included. The off-road ABS function improves vehicle control and helps reduce stopping distances in off-road conditions or on poor traction surfaces such as loose gravel, sand and dirt.

ATC Switch

A vehicle manufacturer might offer an ATC switch to control the ATC function. The ATC switch can be configured to momentarily disable ATC.

Automatic Traction Control (ATC)

ATC is available as an option with mBSP™ ECUs and is standard on most. ATC helps improve traction in low traction road conditions. ATC reduces the potential of jackknifing caused by excessive wheel spin during acceleration or in curves.

ATC Components

ATC uses the base ABS components plus an active braking valve that can be installed with individual modulator valves, or installed as part of the rear valve package.

When installed with individual modulator valves, the active braking valve is mounted on the frame or cross member, near the rear of the vehicle.

When it is part of the rear valve package, the active braking valve is attached to the relay valve.

ATC Switch

If the vehicle manufacturer offers an ATC switch to control the ATC functionality, the switch can be configured as an ATC momentary override option. This function allows the driver to momentarily disable/override ATC for the duration of the ignition cycle.

Electronic Stability Control (ESC)

Electronic Stability Control (ESC) combines the rollover prevention with directional stability in order to keep the vehicle traveling on its intended path by providing spinout and drift out control. ESC is automatic. It becomes active when the system senses imminent directional or roll instabilities, often before the driver is aware. You will notice a difference in the vehicle when stability control is functioning, but you should continue to drive as normal and provide any additional needed corrections. You may again notice a reduction in engine torque and additional deceleration from the retarder, if so equipped. You also may notice individual or all brakes applying depending on whether the vehicle is in a roll or directional control event.

ESC Components

ESC is built from the ABS platform and uses many of the same components as ATC. An active braking valve to control the front axle brakes and trailer, a foot brake valve, an ESC module and a Steering Angle Sensor (SAS) are required.

The ESC ECU contains parameter settings which are specific to a vehicle configuration validated by WABCO Engineering. It is imperative that the correct ECU is installed on your vehicle in service. Contact WABCO or your respective vehicle OEM with any questions regarding ESC ECU.

Hill Start Aid (HSA)

HSA supports select automated manual transmissions in reducing/totally eliminating the rolling back of the vehicle while launching on a grade. When requested from the transmission, HSA holds pressure in the service brakes of all axles of the towing vehicle when the vehicle is standing still. HSA will hold pressure for a maximum of three seconds following full release of the brake pedal.

HSA Components

HSA is available with the mBSP™ brake system. Same as ESC, HSA is built from the ABS platform and uses many of the same components as ATC and ESC. HSA uses the front axle active braking valve as well as the rear active braking valve to help maintain the pressure trapped during HSA activation.

The foot brake valve provides the system with the driver's brake demand. The measured pressure is used by HSA to set the trapped pressure and/or activate the HSA function. The vehicle manufacturer can provide an HSA switch multiplexed through the dashboard or hard wired for momentary HSA deactivation.

Drag Torque Control

The ABS ECU has the ability to send a message to the engine to increase engine RPM to prevent drive axle lock-up, if the vehicle is on a downhill grade and in the incorrect gear.

Maintenance Information

There is no regularly scheduled maintenance required for the WABCO mBSP™ ABS, ATC or ESC systems. However, this does not change current vehicle maintenance requirements.

- **Lamp Check:** To ensure the ABS tractor lamp is operating, drivers should check the lamp every time the vehicle is started. When the vehicle is started, the ABS lamp should come on momentarily. If it does not come on, it could mean a burned-out bulb.
- **ABS Wheel Speed Sensors:** Check the wheel speed sensor adjustment and lubricate the sensor and sensor clip whenever wheel-end maintenance is performed. Use only WABCO-recommended lubricant.

TOOLBOX™ Software Diagnostics

For complete instructions for installing and using TOOLBOX™ Software, refer to the User Manual posted on wabco-auto.com. WABCO TOOLBOX™ Software provides computer-based diagnostic capabilities for the complete range of WABCO Vehicle Control Systems. The program provides the following functions:

- Displays both static (e.g., ECU number) and dynamic (e.g., RPMs) information from the system under test.
- Displays both active and stored system faults, as well as the appropriate repair instructions.
- Activates system components to verify system integrity, correct component operation and installation wiring.

NOTE: For mBSP™ software versions, TOOLBOX™ 12.3 or higher is required.

To display ABS, ESC or HSA faults:

1. Connect the computer to the vehicle:
   - Attach the USB/serial cable from your computer's USB or serial port to the adapter.
   - Attach the Deutsch diagnostic cable from the adapter to the vehicle. Figure 3.1.

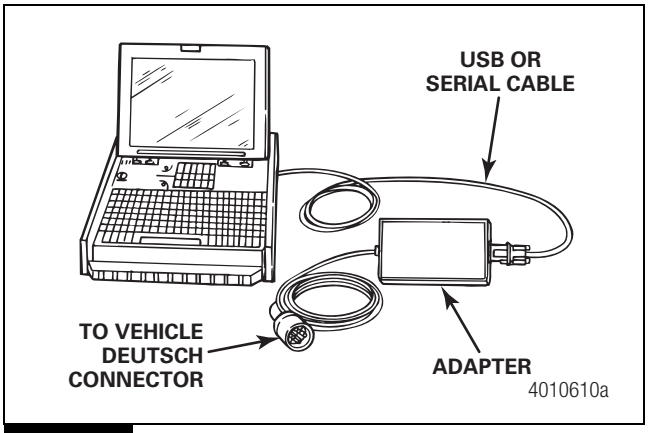


Figure 3.1

2. Select the TOOLBOX™ Software icon from the desktop or from the Windows® Start Menu to display the Main Menu.
3. **Adapter Selection**

   Verify the TOOLBOX™ Software is set for the device and communication protocol that will be used.

   To access "Adapter Selection" for TOOLBOX™ Software 11 or newer, click on "Utilities" from the main TOOLBOX™ screen. Figure 3.3.

   Make sure the "Vendor:" and "Adapter:" drop-downs are set for the device being used and set the "Protocol:" drop-down to J1939 according to the system you will be communicating through, and click "OK". Figure 3.2.

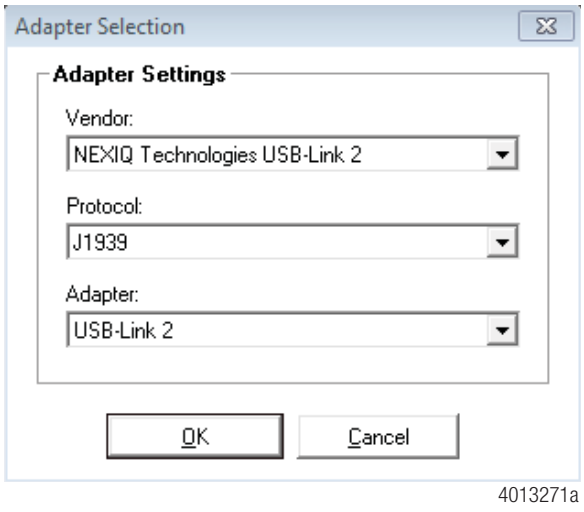


Figure 3.2

NOTE: When switching between J1939 and J1708 communications with TOOLBOX™ Software 11, the vehicle ignition must be cycled between sessions to correctly communicate with the ECU.

NOTE: TOOLBOX™ Software must be connected to the vehicle and the vehicle ignition must be ON in order to display information. If unable to communicate with the ECU:

- Verify device and data link connections are secure.
- Verify the device is RP1210A compliant and that the comport settings (Vendor, Protocol, Adapter) in TOOLBOX™ Software are correct.
- Verify the device software and firmware is up to date.
- Check all the powers and grounds coming to the ECU including load testing.
- Check VMM/chassis CAN circuit at the ECU and the data link connector.

4. Depending on the software version used, there will be two options to communicate with the vehicle:

   - If using TOOLBOX™ 11 or higher and a vehicle with Software ECU E4.4b or higher, diagnostics over J1939 communications can be possible. Figure 3.3.

     NOTE: mBSP™ software versions will only communicate over VMM/chassis CAN.

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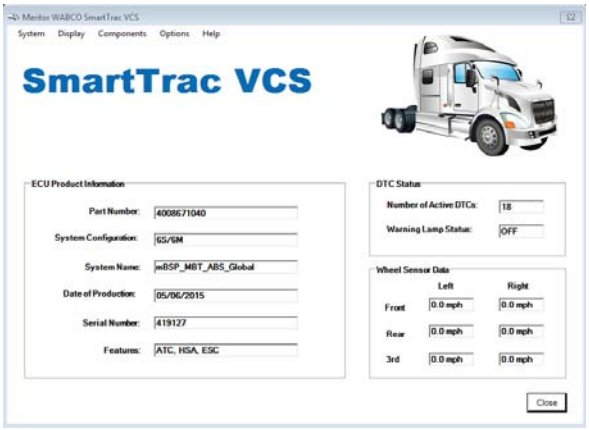
Figure 3.3

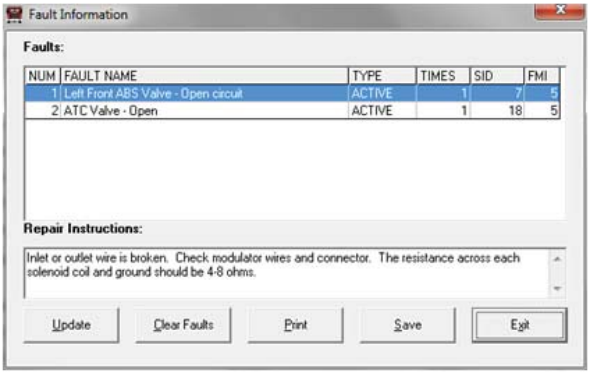
5. In the **Main Menu**, select **Pneumatic ABS/ST Hydr J1939**. The **ABS Main Screen** will appear. Figure 3.4.



4013273a

Figure 3.4

6. Select **Display** from the top menu.
7. From the pull-down menu, select **Diagnostic Trouble Codes**. This will open the Fault Information screen. Figure 3.5 and Figure 3.6.



4010615a

Figure 3.5

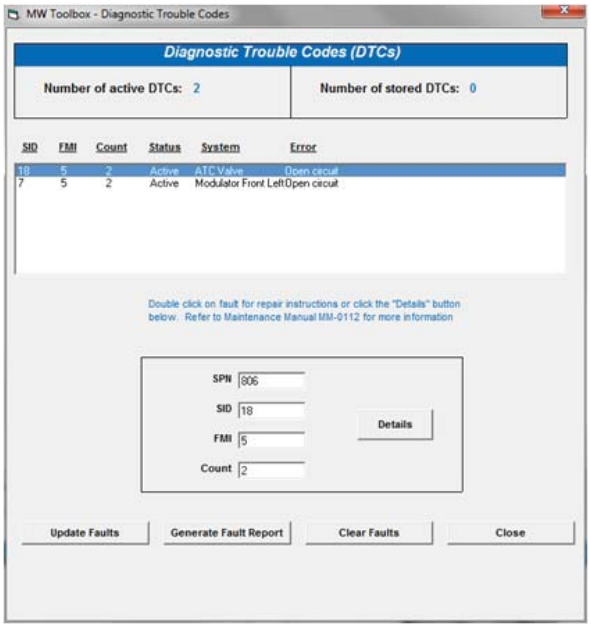


Figure 3.6

8. A description of the fault, the number of times the fault occurred, the system identifier (SID), the failure mode (FMI) and Suspect Parameter Number (SPN) are all displayed in the fault information window. Basic repair instructions for each fault are also provided. More detailed information about SID and FMI troubleshooting and repair is provided in the following section as well as the SID FMI table.

   Double-clicking on the fault, or clicking on **Details**, will provide troubleshooting and detailed repair instructions. TOOLBOX™ Software version 11 also provides links to the appropriate system schematic which are also provided in this maintenance manual.

   NOTE: If you are using TOOLBOX™ Software version 11, Internet Explorer is required to load files containing repair information, maintenance manual and schematics.

   Faults that may occur after the screen is displayed will not appear until screen is manually updated. Use the **Update** button to refresh the fault information table.

   After making the necessary repairs, use the **clear faults** button to clear the fault. Use the **Update** button to refresh the fault information table and display the new list of faults. Some faults may require vehicle ignition to be cycled and vehicle speed over 4 mph (6.4 kph) to clear them.

   Use the **Save** or **Print** button to save or print the fault information data.

   NOTE: If the TOOLBOX™ Software is unable to communicate with the ECU, verify the system is self-testing when the key is cycled.

   If the system is not self-testing: Check all the powers and grounds connecting to the ECU including load testing.

   If the system is self-testing: Check the following.

   - Verify the ECU part number.
   - Verify device and data link connections are secure.
   - Verify the device is RP1210A compliant and that the comport settings (Vendor, Protocol, Adapter) in TOOLBOX™ Software are correct.
   - Verify the device software and firmware are up-to-date.

Testing

Wheel Speed Sensor Testing

Sensor Adjustment

- Push the sensor in until it contacts the tooth wheel.
- Do not pry or push sensors with sharp objects.
- Sensors will self-adjust during wheel rotation.

Electrical Checks

- Check wheel speed sensor by itself for resistance.
- Check ECU harness and sensor together for resistance.
- Verify no change in resistance or open circuit between sensor by itself and through harness.
- Check harness by itself for any shorts to battery and shorts to ground.
- Measurements should read as follows:

Location	Measurement
Between sensor leads	900-2000 ohm
At ECU harness pins with sensor connected	Same as above, no more than 1 ohm difference
ECU harness by itself for DC voltage or ground	No continuity
Sensor output voltage	At least 0.2 volt AC at 30 rpm

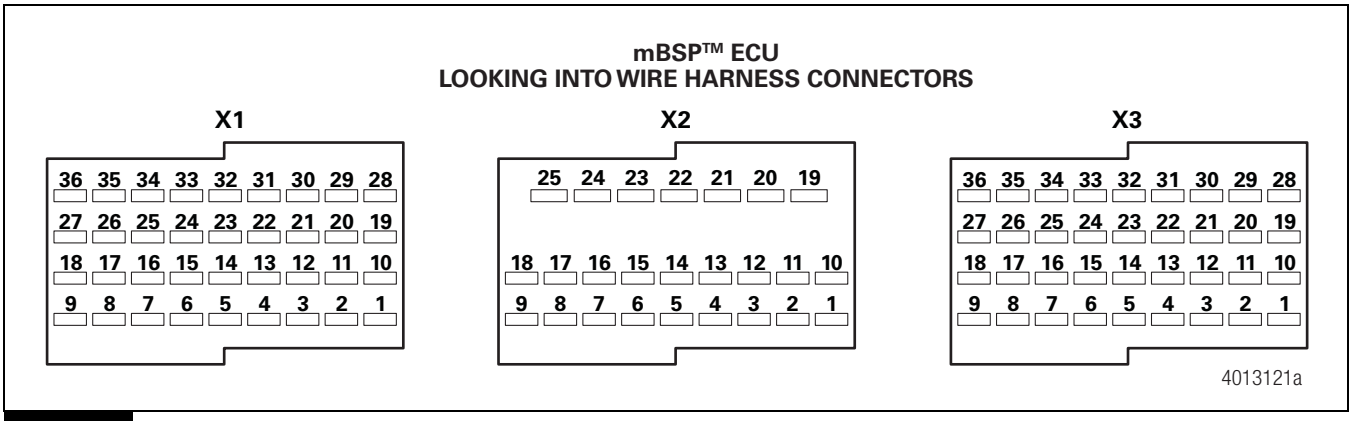


Figure 3.7

Table A: X1 Harness Connector

Pin	Name	Function
X1.1	WSS-FAL-L	WSS Front Axle left low
X1.2	WSS-FAL-H	WSS Front Axle left high
X1.3	ABS-FAL-IV	ABS Valve FA left IV
X1.4	ABS-FAL-GND	ABS Valve FA left GND
X1.5	ABS-FAL-OV	ABS Valve FA left OV
X1.6	SYS-1A-GND	ESCM Ground
X1.7	SYS-1A-UB	ESCM Power Supply
X1.8	SYS-1A-CANL	ESCM CAN-Low
X1.9	SYS-1A-CANH	ESCM CAN-High
X1.10	WSS-FAR-L	WSS Front Axle right low
X1.11	WSS-FAR-H	WSS Front Axle right high
X1.12	ABS-FAR-IV	ABS Valve FA right IV
X1.13	ABS-FAR-GND	ABS Valve FA right GND
X1.14	ABS-FAR-OV	ABS Valve FA right OV
X1.15	FA-ABV	[ABV FA] *3
X1.16	FA-ABV-GND	[ABV FA GND] *3
X1.17		
X1.18		
X1.19	WSS-DAL-L	WSS Drive Axle left low
X1.20	WSS-DAL-H	WSS Drive Axle left high
X1.21	ABS-DAL-IV	ABS Valve DA left IV
X1.22	ABS-DAL-GND	ABS Valve DA left GND
X1.23	ABS-DAL-OV	ABS Valve DA left OV
X1.24	DA-ABV	[ABV DA] *3
X1.25	DA-ABV-GND	[DAL DA GND] *3
X1.26	TRV-GND	[ABV Trailer GND] *3
X1.27	TRV	[ABV Trailer] *3
X1.28	WSS-DAR-L	WSS Drive Axle right low
X1.29	WSS-DAR-H	WSS Drive Axle right high
X1.30	ABS-DAR-IV	ABS Valve DA right IV
X1.31	ABS-DAR-GND	ABS Valve DA right GND
X1.32	ABS-DAR-OV	ABS Valve DA right OV
X1.33	AUX-3	[Trailer Modulator IV] *3
X1.34	AUX-3-GND	[Trailer Modulator GND] *3
X1.35	AUX-4-GND	[Trailer Modulator GND] *3
X1.36	AUX-4	[Trailer Modulator OV] *3

Table B: X2 Harness Connector

Pin	Name	Function
X2.1	VEH-CANL	VMM/Chassis CAN Low
X2.2	VEH-CANSH	VMM/Chassis CAN Shield
X2.3	VEH-CANH	VMM/Chassis CAN High
X2.4	FBV-UB	Foot Brake Valve Power Supply
X2.5	FBV-PW1	Foot Brake Valve PWM Signal 1
X2.6		
X2.7		
X2.8		
X2.9		

Pin	Name	Function
X2.10		
X2.11		
X2.12	ALG1-S	Analog 1 Signal
X2.13	FBV-GND	Foot Brake Valve Ground
X2.14	FBV-PW2	Foot Brake Valve PWM Signal 2
X2.15		
X2.16		
X2.17		
X2.18		
X2.19	TRM-30A	Ubat/Terminal 30A
X2.20	TRM-30B	Ubat/Terminal 30B
X2.21		
X2.22		
X2.23	TRM-31A	GND/Terminal 31A
X2.24	TRM-31B	GND/Terminal 31B
X2.25		

Table C: X3 Harness Connector

Pin	Name	Function
X3.1	WSS-IAL-L	WSS Intermediate Axle left low
X3.2	WSS-IAL-H	WSS Intermediate Axle left high
X3.3	ABS-IAL-IV	ABS Valve IA left IV
X3.4	ABS-IAL-GND	ABS Valve IA left GND
X3.5	ABS-IAL-OV	ABS Valve IA left OV
X3.6	AUX-1	[Diff-Lock] *3
X3.7		
X3.8		
X3.9		
X3.10	WSS-IAR-L	WSS Int. Axle right low
X3.11	WSS-IAR-H	WSS Int. Axle right high
X3.12	ABS-IAR-IV	ABS Valve IA right IV
X3.13	ABS-IAR-GND	ABS Valve IA right GND
X3.14	ABS-IAR-OV	ABS Valve IA right OV
X3.15	AUX-1-GND	[Dif-Lock GND] *3
X3.16		
X3.17		
X3.18		
X3.19	AUX-5	[3/2-Valve Governor] *3
X3.20	AUX-5-GND	[3/2-Valve Governor GND] *3
X3.21	AUX-6-GND	[3/2-Valve Regeneration GND] *3
X3.22	AUX-6	[3/2-Valve Regeneration] *3
X3.23	AUX-2	[TC-Lock] *3
X3.24	AUX-2-GND	[TC-Lock GND] *3
X3.25		
X3.26		
X3.27		
X3.28		
X3.29		
X3.30		
X3.31		
X3.32		
X3.33		
X3.34		
X3.35		
X3.36		

Modulator Valve Testing

Electrical Checks

- Check modulator valve by itself for resistance.
- Check ECU harness and modulator valve together for resistance. Figure 3.7.
- Verify no change in resistance or open circuit between valve by itself and through harness.
- Check harness by itself for any shorts to battery and shorts to ground.
- Measurements should read as follows:

Location	Measurement
Inlet valve pin to Ground	4.0-9.0 ohm for 12V system
Outlet valve pin to Ground	4.0-9.0 ohm for 12V system
At ECU harness pins with modulator valve connected	4.0-9.0 ohm for 12V system, no more than 1 ohm difference

Location	Measurement
ECU harness by itself for battery voltage or ground	No continuity

ABV Testing

Electrical Checks

- Check ABV 3/2 solenoid by itself for resistance.
- Check ECU harness and ABV 3/2 solenoid together for resistance. Figure 3.7.
- Verify no change in resistance or open circuit between ABV by itself and through harness.
- Check harness by itself for any shorts to battery and shorts to ground.
- Measurements should read as follows:

Location	Measurement
ABV Supply to ABV Common	7.0-14.0 ohm for 12V system
At ECU harness pins with ABV connected	7.0-14.0 ohm for 12V system, no more than 1 ohm difference
ECU harness by itself for battery voltage or ground	No continuity

ESC CAN Network Testing

The ECU and ESC module are all connected on propriety CAN network with internal terminating resistors on each one of these components. A failure to one of the components will cause others to fault out.

ESC Module Testing

Electrical Checks

For the following checks, all of the ECU connectors must be plugged in. The ECU provides voltage, ground and CAN communication to ESC module.

- Take measurements at the ESC module harness connector.
- Measure voltage supply Key ON.
- Measure CAN High voltage Key ON.
- Measure CAN Low voltage Key ON.
- Measure terminating resistance across CAN High and Low with Key OFF.

With ECU and ESC Module disconnected:

- Verify continuity end to end on each line
- Verify no shorts to ground or battery on all lines.
- Verify no continuity between pins.

Measurements should read as follows:

Circuit	Measurement
Voltage Supply to Chassis Ground	8.0-16.0V
ESC Ground to Chassis Ground	Less than 1 ohm resistance
Terminating Resistance between ESC CAN-High to ESC CAN-Low	Approximately 180 ohms
With ECU disconnected, check CAN lines, power supply and ground for battery voltage or ground.	No continuity
CAN High Voltage	2.5-5.0V
CAN Low Voltage	0.1-2.4V

ESC Module Mounting

The ESC module contains sensors which measure both lateral acceleration and yaw rate. Thus, it is critical that the module is securely mounted, leveled and in correct location to the vehicle and that the module is mounted as expected by the ECU and as per vehicle OEM specifications.

The module should be installed in a manner where the label is right side up. The module must be mounted perpendicular to the vehicle frame rails on a cross member or cross member bracket. The module connector could be facing the front or rear of the vehicle depending on the OEM's specified mounting. It is critical that the unit be mounted in the exact location and manner as originally installed by the vehicle manufacturer.

SAS Testing

Contact the OEM for electrical checks and all troubleshooting.

mBSP™ ABS ECU Wiring Diagram

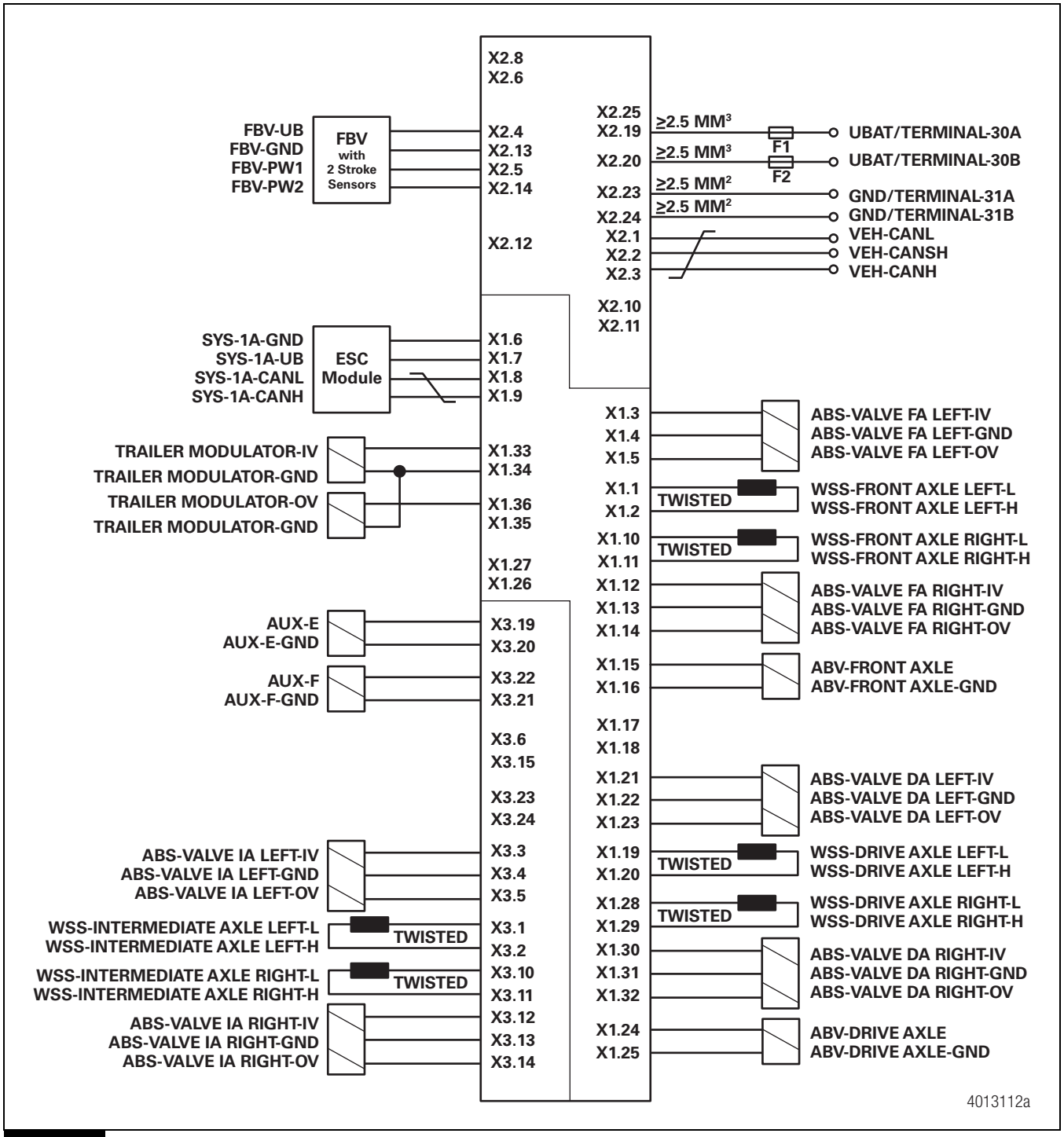
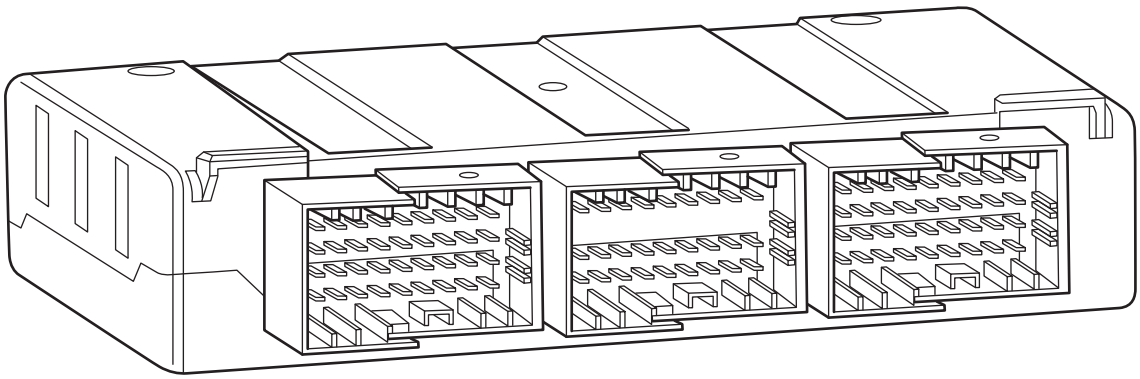
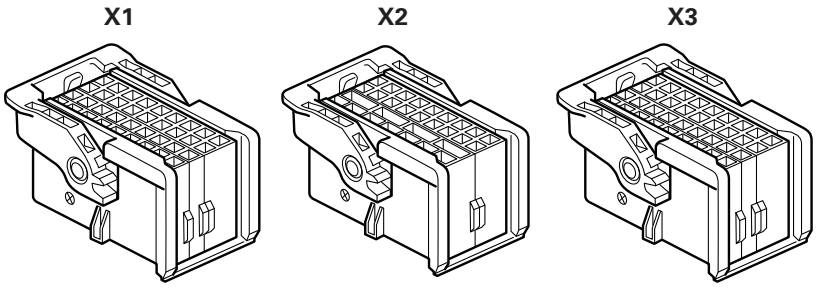


Figure 4.1

Harness Connectors





CONNECTOR	NUMBER OF PINS	CONNECTOR TYPE
X1	2 X 18	C-114-18664, CODING A REV. F2
X2	18 + 7	C-114-18721, CODING A REV. A1
X3	2 X 18	C-114-18664, CODING B REV. F2

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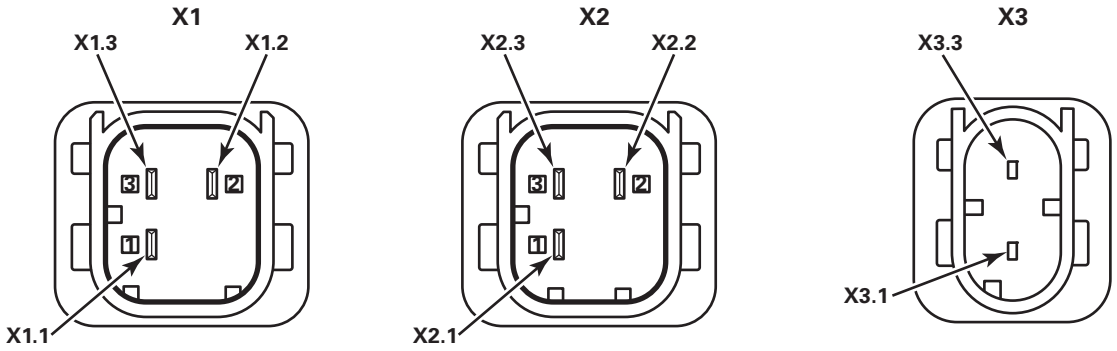
Figure 4.2

REAR AXLE VALVE PACKAGE HARNESS CONNECTORS

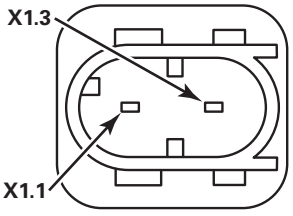


UNIT	ELECTRICAL PORT	FUNCTION	TYPE
ABS CONNECTOR LEFT X1	X1.1	GROUND	TYCO HDSCS 3X2.8 CODING A
	X1.2	INLET	
	X1.3	OUTLET	
ABS CONNECTOR RIGHT X2	X2.1	GROUND	TYCO HDSCS 3X2.8 CODING B
	X2.2	INLET	
	X2.3	OUTLET	
ACTIVE BRAKING VALVE CONNECTOR X3	X3.1	GROUND	TYCO HDSCS 2X1.5 CODING A
	X3.3	INLET	

4013108a

Figure 4.3

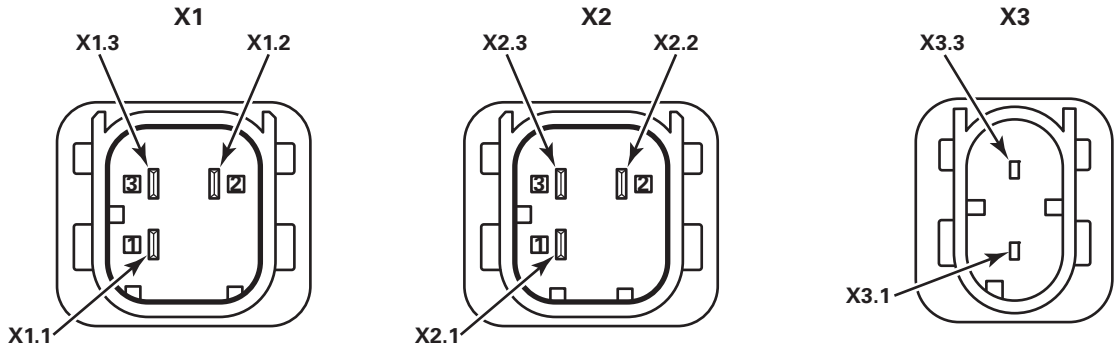
FRONT AXLE VALVE PACKAGE HARNESS CONNECTOR CONNECTOR TYCO HDSCS 2 X 1.5 CODING A

3/2 SOLENOID VALVE CONNECTOR X1	ELECTRICAL PORT	FUNCTION
	X1.1	GROUND
	X1.3	INLET

4013098a

Figure 4.4

REAR AXLE VALVE PACKAGE HARNESS CONNECTORS



UNIT	ELECTRICAL PORT	FUNCTION	TYPE
ABS CONNECTOR LEFT X1	X1.1	GROUND	TYCO HDSCS 3X2.8 CODING A
	X1.2	INLET	
	X1.3	OUTLET	
ABS CONNECTOR RIGHT X2	X2.1	GROUND	TYCO HDSCS 3X2.8 CODING B
	X2.2	INLET	
	X2.3	OUTLET	
ACTIVE BRAKING VALVE CONNECTOR X3	X3.1	GROUND	TYCO HDSCS 2X1.5 CODING A
	X3.3	INLET	

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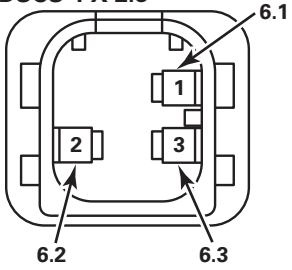
Figure 4.5

ABS MODULATOR VALVE HARNESS CONNECTOR MAIN APPLICATION 3-POLE TYCO CONNECTOR HDSCS 4 X 2.8



6.1: GND
6.2: Inlet valve
6.3: Outlet valve

Surface protection of pins: Sn

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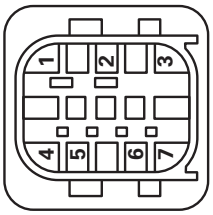
Figure 4.6

FOOT BRAKE VALVE HARNESS CONNECTOR



PIN ASSIGNMENT
PIN 1 = 6.1 Ground (OV)
PIN 2 = 6.2 Voltage supply
PIN 3 = not connected
PIN 4 = not connected
PIN 5 = 6.5 PWM Signal 1
PIN 6 = not connected
PIN 7 = 6.7 PWM Signal 2

PIN	CROSS SECTION	ABBREVIATION	FUNCTION
1	2.8 MM	GND	Common valve pin
2	2.8 MM	Ub	Voltage supply
3			not connected
4	1.5 MM		not connected
5	1.5 MM	PWM1	PWM signal 1
6	1.5 MM		not connected
7	1.5 MM	PWM2	PWM signal 2

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Figure 4.7

ELECTRONIC STABILITY CONTROL MODULE HARNESS CONNECTOR

Pin 1: GND
Pin 2: Voltage Supply
Pin 3: CAN High
Pin 4: CAN Low

Surface protection of pins: Sn

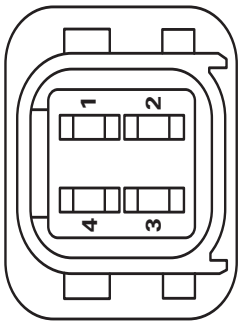

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Figure 4.8

DTC SPN FMI Tables

DTC SPN FMI	Failure Detection Name	Failure Detection Description	Repair
627 - 0 = Power Supply - data valid, but above normal operating range (most severe level)	System Overvoltage (30A) (30B)	An overvoltage at terminal 30A/30B is detected if the voltage is above 16V for longer than 1250 ms. The overvoltage condition is reset if the voltage is 1V lower than 16V.	• Check the voltage supply of the vehicle. (Is the battery or voltage governor defective?)
627 - 1 = Power Supply - data valid, but below normal operating range (most severe level)	System Undervoltage (30A) (30B)	An undervoltage at terminal 30A/30B is detected if the voltage is below 11V for longer than 1250 ms. The undervoltage condition is reset if the voltage is 1V higher than 11V. The undervoltage failure will not be displayed if vehicle standstill is detected.	• Check the voltage supply of the vehicle. (Is the battery or voltage governor defective?)
627 - 14 = Power Supply - special instructions	Interruption of Ground (31B)	This failure is detected after 100 ms if terminal 31A is connected, but terminal 31B is not connected.	• Check the electric supply line 'terminal 31b'. (Is it broken? Is there increased electrical resistance?) • Contact WABCO North America Customer Care at 855-228-3203.
627 - 17 = Power Supply - data valid, but below normal operating range (least severe level)	Interruption of Terminal (30A)	An interruption of terminal 30A is detected if the voltage at terminal 30A is significantly lower than at terminal 30B (filtered value 30A <70% of 30B) for more than 100 ms.	• Check if the relevant fuse at terminal 30a is blown. • Check the electric supply line 'terminal 30a'. (Is it broken? Is there increased electric resistance?) • Check the terminal 30a line for other voltage drops. • Contact WABCO North America Customer Care at 855-228-3203.
627 - 18 = Power Supply - data valid, but below normal operating range (moderately severe level)	Interruption of Terminal (30B)	An interruption of terminal 30B is detected if the voltage at terminal 30B is significantly lower than at terminal 30A (filtered value 30B <70% of 30A) for more than 100 ms.	• Check if the relevant fuse at terminal 30b is blown. • Check the electric supply line 'terminal 30b'. (Is it broken? Is there increased electric resistance?) • Check the terminal 30b line for other voltage drops. • Contact WABCO North America Customer Care at 855-228-3203.
629 - 9 = Controller #1 - abnormal update rate	Safety Controller Communication Faulty	The communication between main and safety controller is faulty.	• Contact WABCO North America Customer Care at 855-228-3203.
629 - 11 = Controller #1 - failure mode not identifiable/root cause not known	Trap Handler/Trap Set	The trap handler has detected a trap set.	• Contact WABCO North America Customer Care at 855-228-3203.
629 - 12 = Controller #1 - bad intelligent device or component	Pic Wdc/MC Error	The Pic Watchdog Controller has detected an MC error.	• Contact WABCO North America Customer Care at 855-228-3203.
629 - 14 = Controller #1 - special instructions	Watchdog/Reset Failure	The Watchdog has detected a Reset Failure.	• Contact WABCO North America Customer Care at 855-228-3203.
639 - 12 = J1939 Network #1, Primary Vehicle Network (previously SAE J1939 Data Link) - bad intelligent device or component	BusOffError on VMM-CAN	A failure is set if a BusOff condition of the CAN-controller (vehicle CAN data link) was detected.	• Check the wiring of the chassis-CAN data connection and the relating electric connectors between the main ECU and the other chassis-CAN ECUs.
701 - 3 = Diff Lock - voltage above normal or shorted high	Failure detection 'ShortUb' at Auxiliary Output (Diff Lock)	A short circuit to UB of the relevant actuator is detected in active and inactive states. The detection time is 200 ms.	• Check wiring of relevant valve/actuator. (Is there a short circuit?) • Contact WABCO North America Customer Care at 855-228-3203.
701 - 4 = Diff Lock - voltage below normal or shorted low	Failure detection 'ShortGnd' at Auxiliary Output (Diff Lock)	A short circuit to GND of the relevant actuator is detected in active and inactive states. The detection time is 200 ms. Remark: A shorted load also leads to a short to GND failure. A shorted load is detected: - After 200 ms after ignition-on and also if valve is activated. - After 1000 ms if valve is not activated.	• Check wiring of relevant valve/actuator. (Is there a short circuit?) • Check relevant valve/actuator. (Is there an internal short circuit?) • Contact WABCO North America Customer Care at 855-228-3203.

DTC SPN FMI	Failure Detection Name	Failure Detection Description	Repair
701 - 5 = Diff Lock - current below normal or open circuit	Failure detection 'Interruption' at Auxiliary Output (Diff Lock)	An interruption of the relevant actuator is detected in active and inactive states. The detection time is 200 ms.	• Check for correct parameter setting. (Is the relevant valve/actuator equipped?) • Check wiring of relevant valve/actuator. (Is there an interruption?) • Check relevant valve/actuator (Is there an internal interruption?) • Contact WABCO North America Customer Care at 855-228-3203.
701 - 13 = Diff Lock - out of calibration	Failure detection 'OverEquipped' at Auxiliary Output (Diff Lock)	A failure is detected if a component is connected to the ECU, but it is not activated in the parameter settings.	• Check for correct parameter setting. (Is the relevant valve/actuator equipped?) • Check wiring of relevant valve/actuator. (Is ECU pin open?) • Contact WABCO North America Customer Care at 855-228-3203.
702 - 3 = Transfer Case Lock - voltage above normal or shorted high	Failure detection 'ShortUb' at Auxiliary Output (Transfer Case Lock)	A short circuit to UB of the relevant actuator is detected in active and inactive states. The detection time is 200 ms.	• Check wiring of relevant valve/actuator. (Is there a short circuit?) • Contact WABCO North America Customer Care at 855-228-3203.
702 - 4 = Transfer Case Lock - voltage below normal or shorted low	Failure detection 'ShortGnd' at Auxiliary Output (Transfer Case Lock)	A short circuit to GND of the relevant actuator is detected in active and inactive states. The detection time is 200 ms. Remark: A shorted load also leads to a short to GND failure. A shorted load is detected: - After 200 ms after ignition-on and also if valve is activated. - After 1000 ms if valve is not activated.	• Check wiring of relevant valve/actuator. (Is there a short circuit?) • Check relevant valve/actuator. (Is there an internal short circuit?) • Contact WABCO North America Customer Care at 855-228-3203.
702 - 5 = Transfer Case Lock - current below normal or open circuit	Failure detection 'Interruption' at Auxiliary Output (Transfer Case Lock)	An interruption of the relevant actuator is detected in active and inactive states. The detection time is 200 ms.	• Check for correct parameter setting. (Is the relevant valve/actuator equipped?) • Check wiring of relevant valve/actuator. (Is there an interruption?) • Check relevant valve/actuator. (Is there an internal interruption?) • Contact WABCO North America Customer Care at 855-228-3203.
702 - 13 = Transfer Case Lock - out of calibration	Failure detection 'OverEquipped' at Auxiliary Output (Transfer Case Lock)	A failure is detected if a component is connected to the ECU, but it is not activated in the parameter settings.	• Check for correct parameter setting. (Is the relevant valve/actuator equipped?) • Check wiring of relevant valve/actuator. (Is ECU pin open?) • Contact WABCO North America Customer Care at 855-228-3203.
703 - 3 = Trailer Modulator IV - voltage above normal or shorted high	Failure detection 'ShortUb' at Auxiliary Output (Trailer Modulator IV)	A short circuit to UB of the relevant actuator is detected in active and inactive states. The detection time is 200 ms.	• Check wiring of relevant valve/actuator. (Is there a short circuit?) • Contact WABCO North America Customer Care at 855-228-3203.
703 - 4 = Trailer Modulator IV - voltage below normal or shorted low	Failure detection 'ShortGnd' at Auxiliary Output (Position A)	A short circuit to GND of the relevant actuator is detected in active and inactive states. The detection time is 200 ms. Remark: A shorted load also leads to a short to GND failure. A shorted load is detected: - After 200 ms after ignition-on and also if valve is activated. - After 1000 ms if valve is not activated.	• Check wiring of relevant valve/actuator. (Is there a short circuit?) • Check relevant valve/actuator. (Is there an internal short circuit?) • Contact WABCO North America Customer Care at 855-228-3203.
703 - 5 = Trailer Modulator IV - current below normal or open circuit	Failure detection 'Interruption' at Auxiliary Output (Trailer Modulator IV)	An interruption of the relevant actuator is detected in active and inactive states. The detection time is 200 ms.	• Check for correct parameter setting. (Is the relevant valve/actuator equipped?) • Check wiring of relevant valve/actuator. (Is there an interruption?) • Check relevant valve/actuator (Is there an internal interruption?) • Contact WABCO North America Customer Care at 855-228-3203.
703 - 13 = Trailer Modulator IV - out of calibration	Failure detection 'OverEquipped' at Auxiliary Output (Trailer Modulator IV)	A failure is detected if a component is connected to the ECU, but it is not activated in the parameter settings.	• Check for correct parameter setting. (Is the relevant valve/actuator equipped?) • Check wiring of relevant valve/actuator. (Is ECU pin open?) • Contact WABCO North America Customer Care at 855-228-3203.
704 - 3 = Trailer Modulator OV - voltage above normal or shorted high	Failure detection 'ShortUb' at Auxiliary Output (Trailer Modulator OV)	A short circuit to UB of the relevant actuator is detected in active and inactive states. The detection time is 200 ms.	• Check wiring of relevant valve/actuator. (Is there a short circuit?) • Contact WABCO North America Customer Care at 855-228-3203.

DTC SPN FMI	Failure Detection Name	Failure Detection Description	Repair
704 - 4 = Trailer Modulator OV - voltage below normal or shorted low	Failure detection 'ShortGnd' at Auxiliary Output (Trailer Modulator OV)	A short circuit to GND of the relevant actuator is detected in active and inactive states. The detection time is 200 ms. Remark: A shorted load also leads to a short to GND failure. A shorted load is detected: - After 200 ms after ignition-on and also if valve is activated. - After 1000 ms if valve is not activated.	• Check wiring of relevant valve/actuator. (Is there a short circuit?) • Check relevant valve/actuator. (Is there an internal short circuit?) • Contact WABCO North America Customer Care at 855-228-3203.
704 - 5 = Trailer Modulator OV - current below normal or open circuit	Failure detection 'Interruption' at Auxiliary Output (Trailer Modulator OV)	An interruption of the relevant actuator is detected in active and inactive states. The detection time is 200 ms.	• Check for correct parameter setting. (Is the relevant valve/actuator equipped?) • Check wiring of relevant valve/actuator. (Is there an interruption?) • Check relevant valve/actuator. (Is there an internal interruption?) • Contact WABCO North America Customer Care at 855-228-3203.
704 - 13 = Trailer Modulator OV - out of calibration	Failure detection 'OverEquipped' at Auxiliary Output (Trailer Modulator OV)	A failure is detected if a component is connected to the ECU, but it is not activated in the parameter settings.	• Check for correct parameter setting. (Is the relevant valve/actuator equipped?) • Check wiring of relevant valve/actuator. (Is ECU pin open?) • Contact WABCO North America Customer Care at 855-228-3203.
705 - 3 = 3/2 Valve Governor - voltage above normal or shorted high	Failure detection 'ShortUb' at Auxiliary Output (3/2 Valve Governor)	A short circuit to UB of the relevant actuator is detected in active and inactive states. The detection time is 200 ms.	• Check wiring of relevant valve/actuator. (Is there a short circuit?) • Contact WABCO North America Customer Care at 855-228-3203.
705 - 4 = 3/2 Valve Governor - voltage below normal or shorted low	Failure detection 'ShortGnd' at Auxiliary Output (3/2 Valve Governor)	A short circuit to GND of the relevant actuator is detected in active and inactive states. The detection time is 200 ms. Remark: A shorted load also leads to a short to GND failure. A shorted load is detected: - After 200 ms after ignition-on and also if valve is activated. - After 1000 ms if valve is not activated.	• Check wiring of relevant valve/actuator. (Is there a short circuit?) • Check relevant valve/actuator. (Is there an internal short circuit?) • Contact WABCO North America Customer Care at 855-228-3203.
705 - 5 = 3/2 Valve Governor - current below normal or open circuit	Failure detection 'Interruption' at Auxiliary Output (3/2 Valve Governor)	An interruption of the relevant actuator is detected in active and inactive states. The detection time is 200 ms.	• Check for correct parameter setting. (Is the relevant valve/actuator equipped?) • Check wiring of relevant valve/actuator. (Is there an interruption?) • Check relevant valve/actuator. (Is there an internal interruption?) • Contact WABCO North America Customer Care at 855-228-3203.
705 - 13 = 3/2 Valve Governor - out of calibration	Failure detection 'OverEquipped' at Auxiliary Output (3/2 Valve Governor)	A failure is detected if a component is connected to the ECU, but it is not activated in the parameter settings.	• Check for correct parameter setting. (Is the relevant valve/actuator equipped?) • Check wiring of relevant valve/actuator. (Is ECU pin open?) • Contact WABCO North America Customer Care at 855-228-3203.
706 - 3 = 3/2 Valve Regeneration - voltage above normal or shorted high	Failure detection 'ShortUb' at Auxiliary Output (3/2 Valve Regeneration)	A short circuit to UB of the relevant actuator is detected in active and inactive states. The detection time is 200 ms.	• Check wiring of relevant valve/actuator. (Is there a short circuit?) • Contact WABCO North America Customer Care at 855-228-3203.
706 - 4 = 3/2 Valve Regeneration - voltage below normal or shorted low	Failure detection 'ShortGnd' at Auxiliary Output (3/2 Valve Regeneration)	A short circuit to GND of the relevant actuator is detected in active and inactive states. The detection time is 200 ms. Remark: A shorted load also leads to a short to GND failure. A shorted load is detected: - After 200 ms after ignition-on and also if valve is activated. - After 1000 ms if valve is not activated.	• Check wiring of relevant valve/actuator. (Is there a short circuit?) • Check relevant valve/actuator. (Is there an internal short circuit?) • Contact WABCO North America Customer Care at 855-228-3203.
706 - 5 = 3/2 Valve Regeneration - current below normal or open circuit	Failure detection 'Interruption' at Auxiliary Output (3/2 Valve Regeneration)	An interruption of the relevant actuator is detected in active and inactive states. The detection time is 200 ms.	• Check for correct parameter setting. (Is the relevant valve/actuator equipped?) • Check wiring of relevant valve/actuator. (Is there an interruption?) • Check relevant valve/actuator. (Is there an internal interruption?) • Contact WABCO North America Customer Care at 855-228-3203.

DTC SPN FMI	Failure Detection Name	Failure Detection Description	Repair
706 - 13 = 3/2 Valve Regeneration - out of calibration	Failure detection 'OverEquipped' at Auxiliary Output (3/2 Valve Regeneration)	A failure is detected if a component is connected to the ECU, but it is not activated in the parameter settings.	• Check for correct parameter setting. (Is the relevant valve/actuator equipped?) • Check wiring of relevant valve/actuator. (Is ECU pin open?) • Contact WABCO North America Customer Care at 855-228-3203.
789 - 1 = Wheel Speed Sensor (Front Axle Left) - data valid, but below normal operation range (most severe level)	AirGap Failure of Wheel Speed Sensor (Front Axle Left)	An air gap failure is detected if the voltage amplitude is too low (depends on signal frequency).	• Check the relevant wheel speed sensor and its fitting. Is the distance between tooth wheel and sensor (air gap) too wide? • Check the wheel speed sensor for correct voltage output. (Is voltage output sufficient?) • If sensor and air gap are correct, contact WABCO North America Customer Care at 855-228-3203.
789 - 3 = Wheel Speed Sensor (Front Axle Left) - voltage above normal or shorted high	Short Circuit to UB of Wheel Speed Sensor (Front Axle Left)	A short circuit to UB at the wheel speed sensor (IG-H or IG-L) is detected after 150 ms.	• Check wiring of relevant sensor. (Is there a short circuit?) • Check relevant sensor. (Is there an internal short circuit?) • Contact WABCO North America Customer Care at 855-228-3203.
789 - 4 = Wheel Speed Sensor (Front Axle Left) - voltage below normal or shorted low	Short Circuit to GND of Wheel Speed Sensor (Front Axle Left)	A short circuit to GND at the wheel speed sensor (IG-H or IG-L) is detected 150 ms.	• Check wiring of relevant sensor. (Is there a short circuit?) • Check relevant sensor. (Is there an internal short circuit?) • Contact WABCO North America Customer Care at 855-228-3203.
789 - 5 = Wheel Speed Sensor (Front Axle Left) - current below normal or open circuit	Interruption of Wheel Speed Sensor (Front Axle Left)	An interruption (open load) at the wheel speed sensor (IG-H or IG-L) is detected after 150 ms.	• Check for correct parameter setting. (Is the relevant sensor equipped?) • Check wiring of relevant sensor. (Is there an interruption?) • Check relevant sensor. (Is there an internal interruption?) • Contact WABCO North America Customer Care at 855-228-3203.
789 - 6 = Wheel Speed Sensor (Front Axle Left) - current above normal or grounded circuit	Shorted Coil of Wheel Speed Sensor (Front Axle Left)	A shorted coil of the wheel speed sensor (<300 ohm) is detected after 150 ms.	• Check wiring of relevant sensor. (Is there a short circuit?) • Check relevant sensor. (Is there an internal short circuit?) • Contact WABCO North America Customer Care at 855-228-3203.
789 - 7 = Wheel Speed Sensor (Front Axle Left) - mechanical system not responding properly or out of adjustment	Polewheel Failure of Wheel Speed Sensor (Front Axle Left)	The wheel speed detection shall be able to detect insufficient and/or missing teeth defined within 3000 counts of teeth.	• Check the relevant tooth wheel. (Is it damaged or dirty?)
789 - 8 = Wheel Speed Sensor (Front Axle Left) - abnormal frequency, pulse width or period	Wheel Speed Sensor Frequency Too High (Front Axle Left)	A failure is detected if the wheel speed signal frequency is >3500 Hz.	• Check whether there are inadmissible oscillation-effects at the relevant foundation brake. • Check whether there are inadmissible oscillation-effects at the fitting of the relevant wheel speed sensor. • Check the isolation of the wheel-speed sensor wiring (high frequencies might be induced). • If the other effects were already checked, contact WABCO North America Customer Care at 855-228-3203.
789 - 11 = Wheel Speed Sensor (Front Axle Left) - failure mode not identifiable/root cause not known	Plausibility Check of Wheel Speed Sensor (Front Axle Left)	The wheel speed detection shall monitor analog input and digital input of WABA ASIC and compare both signals whether or not they are consistency (plausibility check).	• Check wiring of relevant wheel speed sensor. • Contact WABCO North America Customer Care at 855-228-3203.
789 - 13 = Wheel Speed Sensor (Front Axle Left) - out of calibration	Failure Detection 'OverEquipped' of Wheel Speed Sensor (Front Axle Left)	A failure is detected if a component is connected to the ECU, but it is not activated in the parameter settings.	• Check for correct parameter setting. (Is the relevant wheel speed sensor equipped?) • Check wiring of relevant sensor. (Is ECU pin open?) • Contact WABCO North America Customer Care at 855-228-3203.

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DTC SPN FMI	Failure Detection Name	Failure Detection Description	Repair
789 - 14 = Wheel Speed Sensor (Front Axle Left) - special instructions	RunOut Failure of Wheel Speed Sensor (Front Axle Left)	A RunOut failure will be detected if the ratio of min/max amplitudes is too high.	• Check the relevant tooth wheel. (Is it damaged?) • Check the relevant wheel bearing. (Is it loosened?)
790 - 1 = Wheel Speed Sensor (Front Axle Right) - data valid, but below normal operation range (most severe level)	AirGap Failure of Wheel Speed Sensor (Front Axle Right)	An air gap failure is detected if the voltage amplitude is too low (depends on signal frequency).	• Check the relevant wheel speed sensor and its fitting. Is the distance between tooth wheel and sensor (air gap) too wide? • Check the wheel speed sensor for correct voltage output. (Is voltage output sufficient?) • If sensor and air gap are correct, contact WABCO North America Customer Care at 855-228-3203.
790 - 3 = Wheel Speed Sensor (Front Axle Right) - voltage above normal or shorted high	Short Circuit to UB of Wheel Speed Sensor (Front Axle Right)	A short circuit to UB at the wheel speed sensor (IG-H or IG-L) is detected after 150 ms.	• Check wiring of relevant sensor. (Is there a short circuit?) • Check relevant sensor. (Is there an internal short circuit?) • Contact WABCO North America Customer Care at 855-228-3203.
790 - 4 = Wheel Speed Sensor (Front Axle Right) - voltage below normal or shorted low	Short Circuit to GND of Wheel Speed Sensor (Front Axle Right)	A short circuit to GND at the wheel speed sensor (IG-H or IG-L) is detected after 150 ms.	• Check wiring of relevant sensor. (Is there a short circuit?) • Check relevant sensor. (Is there an internal short circuit?) • Contact WABCO North America Customer Care at 855-228-3203.
790 - 5 = Wheel Speed Sensor (Front Axle Right) - current below normal or open circuit	Interruption of Wheel Speed Sensor (Front Axle Right)	An interruption (open load) at the wheel speed sensor (IG-H or IG-L) is detected after 150 ms.	• Check for correct parameter setting. (Is the relevant sensor equipped?) • Check wiring of relevant sensor. (Is there an interruption?) • Check relevant sensor. (Is there an internal interruption?) • Contact WABCO North America Customer Care at 855-228-3203.
790 - 6 = Wheel Speed Sensor (Front Axle Right) - current above normal or grounded circuit	Shorted Coil of Wheel Speed Sensor (Front Axle Right)	A shorted coil of the wheel speed sensor (<300 ohm) is detected after 150 ms.	• Check wiring of relevant sensor. (Is there a short circuit?) • Check relevant sensor. (Is there an internal short circuit?) • Contact WABCO North America Customer Care at 855-228-3203.
790 - 7 = Wheel Speed Sensor (Front Axle Right) - mechanical system not responding properly or out of adjustment	Polewheel Failure of Wheel Speed Sensor (Front Axle Right)	The wheel speed detection shall be able to detect insufficient and/or missing teeth defined within 3000 counts of teeth.	• Check the relevant tooth wheel. (Is it damaged or dirty?)
790 - 8 = Wheel Speed Sensor (Front Axle Right) - abnormal frequency, pulse width or period	Wheel Speed Sensor Frequency Too High (Front Axle Right)	A failure is detected if the wheel speed signal frequency is >3500 Hz.	• Check whether there are inadmissible oscillation-effects at the relevant foundation brake. • Check whether there are inadmissible oscillation-effects at the fitting of the relevant wheel speed sensor. • Check the isolation of the wheel-speed sensor wiring (high frequencies might be induced). • If the other effects were already checked, contact WABCO North America Customer Care at 855-228-3203.
790 - 11 = Wheel Speed Sensor (Front Axle Right) - failure mode not identifiable/root cause not known	Plausibility Check of Wheel Speed Sensor (Front Axle Right)	The wheel speed detection shall monitor analog input and digital input of WABA ASIC and compare both signals whether or not they are consistency (plausibility check).	• Check wiring of relevant wheel speed sensor. • Contact WABCO North America Customer Care at 855-228-3203.
790 - 13 = Wheel Speed Sensor (Front Axle Right) - out of calibration	Failure Detection 'OverEquipped' of Wheel Speed Sensor (Front Axle Right)	A failure is detected if a component is connected to the ECU, but it is not activated in the parameter settings.	• Check for correct parameter setting. (Is the relevant wheel speed sensor equipped?) • Check wiring of relevant sensor. (Is ECU pin open?) • Contact WABCO North America Customer Care at 855-228-3203.
790 - 14 = Wheel Speed Sensor (Front Axle Right) - special instructions	RunOut Failure of Wheel Speed Sensor (Front Axle Right)	A RunOut failure will be detected, if the ratio of min/max amplitudes is too high.	• Check the relevant tooth wheel. (Is it damaged?) • Check the relevant wheel-bearing. (Is it loosened?)

DTC SPN FMI	Failure Detection Name	Failure Detection Description	Repair
791 - 1 = Wheel Speed Sensor (Drive Axle Left) - data valid, but below normal operation range (most severe level)	AirGap Failure of Wheel Speed Sensor (Drive Axle Left)	An air gap failure is detected, if the voltage amplitude is too low (depends on signal frequency).	• Check the relevant wheel speed sensor and its fitting. Is the distance between tooth wheel and sensor (air gap) too wide? • Check the wheel speed sensor for correct voltage output. (Is voltage output sufficient?) • If sensor and air gap are correct, contact WABCO North America Customer Care at 855-228-3203.
791 - 3 = Wheel Speed Sensor (Drive Axle Left) - voltage above normal or shorted high	Short Circuit to UB of Wheel Speed Sensor (Drive Axle Left)	A short circuit to UB at the wheel speed sensor (IG-H or IG-L) is detected after 150 ms.	• Check wiring of relevant sensor. (Is there a short circuit?) • Check relevant sensor. (Is there an internal short circuit?) • Contact WABCO North America Customer Care at 855-228-3203.
791 - 4 = Wheel Speed Sensor (Drive Axle Left) - voltage below normal or shorted low	Short Circuit to GND of Wheel Speed Sensor (Drive Axle Left)	A short circuit to GND at the wheel speed sensor (IG-H or IG-L) is detected 150 ms.	• Check wiring of relevant sensor. (Is there a short circuit?) • Check relevant sensor. (Is there an internal short circuit?) • Contact WABCO North America Customer Care at 855-228-3203.
791 - 5 = Wheel Speed Sensor (Drive Axle Left) - current below normal or open circuit	Interruption of Wheel Speed Sensor (Drive Axle Left)	An interruption (open load) at the wheel speed sensor (IG-H or IG-L) is detected after 150 ms.	• Check for correct parameter setting. (Is the relevant sensor equipped?) • Check wiring of relevant sensor. (Is there an interruption?) • Check relevant sensor. (Is there an internal interruption?) • Contact WABCO North America Customer Care at 855-228-3203.
791 - 6 = Wheel Speed Sensor (Drive Axle Left) - current above normal or grounded circuit	Shorted Coil of Wheel Speed Sensor (Drive Axle Left)	A shorted coil of the wheel speed sensor (<300 ohm) is detected after 150 ms.	• Check wiring of relevant sensor. (Is there a short circuit?) • Check relevant sensor. (Is there an internal short circuit?) • Contact WABCO North America Customer Care at 855-228-3203.
791 - 7 = Wheel Speed Sensor (Drive Axle Left) - mechanical system not responding properly or out of adjustment	Polewheel Failure of Wheel Speed Sensor (Drive Axle Left)	The wheel speed detection shall be able to detect insufficient and/or missing teeth defined within 3000 counts of teeth.	• Check the relevant tooth wheel. (Is it damaged or dirty?)
791 - 8 = Wheel Speed Sensor (Drive Axle Left) - abnormal frequency, pulse width or period	Wheel Speed Sensor Frequency Too High (Drive Axle Left)	A failure is detected if the wheel speed signal frequency is >3500 Hz.	• Check whether there are inadmissible oscillation-effects at the relevant foundation brake. • Check whether there are inadmissible oscillation-effects at the fitting of the relevant wheel speed sensor. • Check the isolation of the wheel-speed sensor wiring (high frequencies might be induced). • If the other effects were already checked, contact WABCO North America Customer Care at 855-228-3203.
791 - 11 = Wheel Speed Sensor (Drive Axle Left) - failure mode not identifiable/root cause not known	Plausibility Check of Wheel Speed Sensor (Drive Axle Left)	The wheel speed detection shall monitor analog input and digital input of WABA ASIC and compare both signals whether or not they are consistency (plausibility check).	• Check wiring of relevant wheel speed sensor. • Contact WABCO North America Customer Care at 855-228-3203.
791 - 13 = Wheel Speed Sensor (Drive Axle Left) - out of calibration	Failure Detection 'OverEquipped' of Wheel Speed Sensor (Drive Axle Left)	A failure is detected if a component is connected to the ECU, but it is not activated in the parameter settings.	• Check for correct parameter setting. (Is the relevant wheel speed sensor equipped?) • Check wiring of relevant sensor. (Is ECU pin open?) • Contact WABCO North America Customer Care at 855-228-3203.
791 - 14 = Wheel Speed Sensor (Drive Axle Left) - special instructions	RunOut Failure of Wheel Speed Sensor (Drive Axle Left)	A RunOut failure will be detected if the ratio of min/max amplitudes is too high.	• Check the relevant tooth wheel. (Is it damaged?) • Check the relevant wheel-bearing. (Is it loosened?)

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DTC SPN FMI	Failure Detection Name	Failure Detection Description	Repair
792 - 1 = Wheel Speed Sensor (Drive Axle Right) - data valid, but below normal operation range (most severe level)	AirGap Failure of Wheel Speed Sensor (Drive Axle Right)	An air gap failure is detected if the voltage amplitude is too low (depends on signal frequency).	• Check the relevant wheel speed sensor and its fitting. Is the distance between tooth wheel and sensor (air gap) too wide? • Check the wheel speed sensor for correct voltage output. (Is voltage output sufficient?) • If sensor and air gap are correct, contact WABCO North America Customer Care at 855-228-3203.
792 - 3 = Wheel Speed Sensor (Drive Axle Right) - voltage above normal or shorted high	Short Circuit to UB of Wheel Speed Sensor (Drive Axle Right)	A short circuit to UB at the wheel speed sensor (IG-H or IG-L) is detected after 150 ms.	• Check wiring of relevant sensor. (Is there a short circuit?) • Check relevant sensor. (Is there an internal short circuit?) • Contact WABCO North America Customer Care at 855-228-3203.
792 - 4 = Wheel Speed Sensor (Drive Axle Right) - voltage below normal or shorted low	Short Circuit to GND of Wheel Speed Sensor (Drive Axle Right)	A short circuit to GND at the wheel speed sensor (IG-H or IG-L) is detected 150 ms.	• Check wiring of relevant sensor. (Is there a short circuit?) • Check relevant sensor. (Is there an internal short circuit?) • Contact WABCO North America Customer Care at 855-228-3203.
792 - 5 = Wheel Speed Sensor (Drive Axle Right) - current below normal or open circuit	Interruption of Wheel Speed Sensor (Drive Axle Right)	An interruption (open load) at the wheel speed sensor (IG-H or IG-L) is detected after 150 ms.	• Check for correct parameter setting. (Is the relevant sensor equipped?) • Check wiring of relevant sensor. (Is there an interruption?) • Check relevant sensor. (Is there an internal interruption?) • Contact WABCO North America Customer Care at 855-228-3203.
792 - 6 = Wheel Speed Sensor (Drive Axle Right) - current above normal or grounded circuit	Shorted Coil of Wheel Speed Sensor (Drive Axle Right)	A shorted coil of the wheel speed sensor (<300 ohm) is detected after 150 ms.	• Check wiring of relevant sensor. (Is there a short circuit?) • Check relevant sensor. (Is there an internal short circuit?) • Contact WABCO North America Customer Care at 855-228-3203.
792 - 7 = Wheel Speed Sensor (Drive Axle Right) - mechanical system not responding properly or out of adjustment	Polewheel Failure of Wheel Speed Sensor (Drive Axle Right)	The wheel speed detection shall be able to detect insufficient and/or missing teeth defined within 3000 counts of teeth.	• Check the relevant tooth wheel. (Is it damaged or dirty?)
792 - 8 = Wheel Speed Sensor (Drive Axle Right) - abnormal frequency, pulse width or period	Wheel Speed Sensor Frequency Too High (Drive Axle Right)	A failure is detected if the wheel speed signal frequency is >3500 Hz.	• Check whether there are inadmissible oscillation-effects at the relevant foundation brake. • Check whether there are inadmissible oscillation-effects at the fitting of the relevant wheel speed sensor. • Check the isolation of the wheel-speed sensor wiring (high frequencies might be induced). • If the other effects were already checked, contact WABCO North America Customer Care at 855-228-3203.
792 - 11 = Wheel Speed Sensor (Drive Axle Right) - failure mode not identifiable/root cause not known	Plausibility Check of Wheel Speed Sensor (Drive Axle Right)	The wheel speed detection shall monitor analog input and digital input of WABA ASIC and compare both signals whether or not they are consistency (plausibility check).	• Check wiring of relevant wheel speed sensor. • Contact WABCO North America Customer Care at 855-228-3203.
792 - 13 = Wheel Speed Sensor (Drive Axle Right) - out of calibration	Failure Detection 'OverEquipped' of Wheel Speed Sensor (Drive Axle Right)	A failure is detected if a component is connected to the ECU, but it is not activated in the parameter settings.	• Check for correct parameter setting. (Is the relevant wheel speed sensor equipped?) • Check wiring of relevant sensor. (Is ECU pin open?) • Contact WABCO North America Customer Care at 855-228-3203.
792 - 14 = Wheel Speed Sensor (Drive Axle Right) - special instructions	RunOut Failure of Wheel Speed Sensor (Drive Axle Right)	A RunOut failure will be detected if the ratio of min/max amplitudes is too high.	• Check the relevant tooth wheel. (Is it damaged?) • Check the relevant wheel-bearing. (Is it loosened?)

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DTC SPN FMI	Failure Detection Name	Failure Detection Description	Repair
793 - 1 = Wheel Speed Sensor (Intermediate Axle Left) - data valid, but below normal operation range (most severe level)	AirGap Failure of Wheel Speed Sensor (Intermediate Axle Left)	An air gap failure is detected if the voltage amplitude is too low (depends on signal frequency).	• Check the relevant wheel speed sensor and its fitting. Is the distance between tooth wheel and sensor (air gap) too wide? • Check the wheel speed sensor for correct voltage output. (Is voltage output sufficient?) • If sensor and air gap are correct, contact WABCO North America Customer Care at 855-228-3203.
793 - 3 = Wheel Speed Sensor (Intermediate Axle Left) - voltage above normal or shorted high	Short Circuit to UB of Wheel Speed Sensor (Intermediate Axle Left)	A short circuit to UB at the wheel speed sensor (IG-H or IG-L) is detected after 150 ms.	• Check wiring of relevant sensor. (Is there a short circuit?) • Check relevant sensor. (Is there an internal short circuit?) • Contact WABCO North America Customer Care at 855-228-3203.
793 - 4 = Wheel Speed Sensor (Intermediate Axle Left) - voltage below normal or shorted low	Short Circuit to GND of Wheel Speed Sensor (Intermediate Axle Left)	A short circuit to GND at the wheel speed sensor (IG-H or IG-L) is detected 150 ms.	• Check wiring of relevant sensor. (Is there a short circuit?) • Check relevant sensor. (Is there an internal short circuit?) • Contact WABCO North America Customer Care at 855-228-3203.
793 - 5 = Wheel Speed Sensor (Intermediate Axle Left) - current below normal or open circuit	Interruption of Wheel Speed Sensor (Intermediate Axle Left)	An interruption (open load) at the wheel speed sensor (IG-H or IG-L) is detected after 150 ms.	• Check for correct parameter setting. (Is the relevant sensor equipped?) • Check wiring of relevant sensor. (Is there an interruption?) • Check relevant sensor. (Is there an internal interruption?) • Contact WABCO North America Customer Care at 855-228-3203.
793 - 6 = Wheel Speed Sensor (Intermediate Axle Left) - current above normal or grounded circuit	Shorted Coil of Wheel Speed Sensor (Intermediate Axle Left)	A shorted coil of the wheel speed sensor (<300 ohm) is detected after 150 ms.	• Check wiring of relevant sensor. (Is there a short circuit?) • Check relevant sensor. (Is there an internal short circuit?) • Contact WABCO North America Customer Care at 855-228-3203.
793 - 7 = Wheel Speed Sensor (Intermediate Axle Left) - mechanical system not responding properly or out of adjustment	Polewheel Failure of Wheel Speed Sensor (Intermediate Axle Left)	The wheel speed detection shall be able to detect insufficient and/or missing teeth defined within 3000 counts of teeth.	• Check the relevant tooth wheel. (Is it damaged or dirty?)
793 - 8 = Wheel Speed Sensor (Intermediate Axle Left) - abnormal frequency, pulse width or period	Wheel Speed Sensor Frequency Too High (Intermediate Axle Left)	A failure is detected if the wheel speed signal frequency is >3500 Hz.	• Check whether there are inadmissible oscillation-effects at the relevant foundation brake. • Check whether there are inadmissible oscillation-effects at the fitting of the relevant wheel speed sensor. • Check the isolation of the wheel-speed sensor wiring (high frequencies might be induced). • If the other effects were already checked, contact WABCO North America Customer Care at 855-228-3203.
793 - 11 = Wheel Speed Sensor (Intermediate Axle Left) - failure mode not identifiable/root cause not known	Plausibility Check of Wheel Speed Sensor (Intermediate Axle Left)	The wheel speed detection shall monitor analog input and digital input of WABA ASIC and compare both signals whether or not they are consistency (plausibility check).	• Check wiring of relevant wheel speed sensor. • Contact WABCO North America Customer Care at 855-228-3203.
793 - 13 = Wheel Speed Sensor (Intermediate Axle Left) - out of calibration	Failure Detection 'OverEquipped' of Wheel Speed Sensor (Intermediate Axle Left)	A failure is detected if a component is connected to the ECU, but it is not activated in the parameter settings.	• Check for correct parameter setting. (Is the relevant wheel speed sensor equipped?) • Check wiring of relevant sensor. (Is ECU pin open?) • Contact WABCO North America Customer Care at 855-228-3203.
793 - 14 = Wheel Speed Sensor (Intermediate Axle Left) - special instructions	RunOut Failure of Wheel Speed Sensor (Intermediate Axle Left)	A RunOut failure will be detected if the ratio of min/max amplitudes is too high.	• Check the relevant tooth wheel. (Is it damaged?) • Check the relevant wheel-bearing. (Is it loosened?)

DTC SPN FMI	Failure Detection Name	Failure Detection Description	Repair
794 - 1 = Wheel Speed Sensor (Intermediate Axle Right) - data valid, but below normal operation range (most severe level)	AirGap Failure of Wheel Speed Sensor (Intermediate Axle Right)	An air gap failure is detected if the voltage amplitude is too low (depends on signal frequency).	• Check the relevant wheel speed sensor and its fitting. Is the distance between tooth wheel and sensor (air gap) too wide? • Check the wheel speed sensor for correct voltage output. (Is voltage output sufficient?) • If sensor and air gap are correct, contact WABCO North America Customer Care at 855-228-3203.
794 - 3 = Wheel Speed Sensor (Intermediate Axle Right) - voltage above normal or shorted high	Short Circuit to UB of Wheel Speed Sensor (Intermediate Axle Right)	A short circuit to UB at the wheel speed sensor (IG-H or IG-L) is detected after 150 ms.	• Check wiring of relevant sensor. (Is there a short circuit?) • Check relevant sensor. (Is there an internal short circuit?) • Contact WABCO North America Customer Care at 855-228-3203.
794 - 4 = Wheel Speed Sensor (Intermediate Axle Right) - voltage below normal or shorted low	Short Circuit to GND of Wheel Speed Sensor (Intermediate Axle Right)	A short circuit to GND at the wheel speed sensor (IG-H or IG-L) is detected 150 ms.	• Check wiring of relevant sensor. (Is there a short circuit?) • Check relevant sensor. (Is there an internal short circuit?) • Contact WABCO North America Customer Care at 855-228-3203.
794 - 5 = Wheel Speed Sensor (Intermediate Axle Right) - current below normal or open circuit	Interruption of Wheel Speed Sensor (Intermediate Axle Right)	An interruption (open load) at the wheel speed sensor (IG-H or IG-L) is detected after 150 ms.	• Check for correct parameter setting. (Is the relevant sensor equipped?) • Check wiring of relevant sensor. (Is there an interruption?) • Check relevant sensor. (Is there an internal interruption?) • Contact WABCO North America Customer Care at 855-228-3203.
794 - 6 = Wheel Speed Sensor (Intermediate Axle Right) - current above normal or grounded circuit	Shorted Coil of Wheel Speed Sensor (Intermediate Axle Right)	A shorted coil of the wheel speed sensor (<300 ohm) is detected after 150 ms.	• Check wiring of relevant sensor. (Is there a short circuit?) • Check relevant sensor. (Is there an internal short circuit?) • Contact WABCO North America Customer Care at 855-228-3203.
794 - 7 = Wheel Speed Sensor (Intermediate Axle Right) - mechanical system not responding properly or out of adjustment	Polewheel Failure of Wheel Speed Sensor (Intermediate Axle Right)	The wheel speed detection shall be able to detect insufficient and/or missing teeth defined within 3000 counts of teeth.	• Check the relevant tooth wheel. (Is it damaged or dirty?)
794 - 8 = Wheel Speed Sensor (Intermediate Axle Right) - abnormal frequency, pulse width or period	Wheel Speed Sensor Frequency Too High (Intermediate Axle Right)	A failure is detected if the wheel speed signal frequency is >3500 Hz.	• Check whether there are inadmissible oscillation-effects at the relevant foundation brake. • Check whether there are inadmissible oscillation-effects at the fitting of the relevant wheel speed sensor. • Check the isolation of the wheel-speed sensor wiring (high frequencies might be induced). • If the other effects were already checked, contact WABCO North America Customer Care at 855-228-3203.
794 - 11 = Wheel Speed Sensor (Intermediate Axle Right) - failure mode not identifiable/root cause not known	Plausibility Check of Wheel Speed Sensor (Intermediate Axle Right)	The wheel speed detection shall monitor analog input and digital input of WABA ASIC and compare both signals whether or not they are consistency (plausibility check).	• Check wiring of relevant wheel speed sensor. • Contact WABCO North America Customer Care at 855-228-3203.
794 - 13 = Wheel Speed Sensor (Intermediate Axle Right) - out of calibration	Failure Detection 'OverEquipped' of Wheel Speed Sensor (Intermediate Axle Right)	A failure is detected if a component is connected to the ECU, but it is not activated in the parameter settings.	• Check for correct parameter setting. (Is the relevant wheel speed sensor equipped?) • Check wiring of relevant sensor. (Is ECU pin open?) • Contact WABCO North America Customer Care at 855-228-3203.

DTC SPN FMI	Failure Detection Name	Failure Detection Description	Repair
794 - 14 = Wheel Speed Sensor (Intermediate Axle Right) - special instructions	RunOut Failure of Wheel Speed Sensor (Intermediate Axle Right)	A RunOut failure will be detected, if the ratio of min/max amplitudes is too high.	• Check the relevant tooth wheel. (Is it damaged?) • Check the relevant wheel-bearing. (Is it loosened?)
795 - 3 = Pressure Modulation Valve ABS (Front Axle Left) - voltage above normal or shorted high	Failure detection 'ShortUb' at AbsInlet/AbsOutlet (Front Axle Left)	A short circuit to UB of the relevant actuator is detected in active and inactive states. The detection time is 200 ms.	• Check wiring of relevant valve/actuator. (Is there a short circuit?) • Contact WABCO North America Customer Care at 855-228-3203.
795 - 4 = Pressure Modulation Valve ABS (Front Axle Left) - voltage below normal or shorted low	Failure detection 'ShortGnd' at AbsInlet/AbsOutlet (Front Axle Left)	A short circuit to GND of the relevant actuator is detected in active and inactive states. The detection time is 200 ms. Remark: A shorted load also leads to a short to GND failure. A shorted load is detected: - After 200 ms after ignition-on and also if valve is activated. - After 1000 ms if valve is not activated.	• Check wiring of relevant valve/actuator. (Is there a short circuit?) • Check relevant valve/actuator. (Is there an internal short circuit?) • Contact WABCO North America Customer Care at 855-228-3203.
795 - 5 = Pressure Modulation Valve ABS (Front Axle Left) - current below normal or open circuit	Failure detection 'Interruption' at AbsInlet/ AbsOutlet (Front Axle Left)	An interruption of the relevant actuator is detected in active and inactive states. The detection time is 200 ms.	• Check for correct parameter setting. (Is the relevant valve/actuator equipped?) • Check wiring of relevant valve/actuator. (Is there an interruption?) • Check relevant valve/actuator. (Is there an internal interruption?) • Contact WABCO North America Customer Care at 855-228-3203.
795 - 13 = Pressure Modulation Valve ABS (Front Axle Left) - out of calibration	Failure detection 'OverEquipped' at AbsInlet/ AbsOutlet (Front Axle Left)	A failure is detected if a component is connected to the ECU, but it is not activated in the parameter settings.	• Check for correct parameter setting. (Is the relevant valve/actuator equipped?) • Check wiring of relevant valve/actuator. (Is ECU pin open?) • Contact WABCO North America Customer Care at 855-228-3203.
796 - 3 = Pressure Modulation Valve ABS (Front Axle Right) - voltage above normal or shorted high	Failure detection 'ShortUb' at AbsInlet/AbsOutlet (Front Axle Right)	A short circuit to UB of the relevant actuator is detected in active and inactive states. The detection time is 200 ms.	• Check wiring of relevant valve/actuator. (Is there a short circuit?) • Contact WABCO North America Customer Care at 855-228-3203.
796 - 4 = Pressure Modulation Valve ABS (Front Axle Right) - voltage below normal or shorted low	Failure detection 'ShortGnd' at AbsInlet/AbsOutlet (Front Axle Right)	A short circuit to GND of the relevant actuator is detected in active and inactive states. The detection time is 200 ms. Remark: A shorted load also leads to a short to GND failure. A shorted load is detected: - After 200 ms after ignition-on and also if valve is activated. - After 1000 ms if valve is not activated.	• Check wiring of relevant valve/actuator. (Is there a short circuit?) • Check relevant valve/actuator. (Is there an internal short circuit?) • Contact WABCO North America Customer Care at 855-228-3203.
796 - 5 = Pressure Modulation Valve ABS (Front Axle Right) - current below normal or open circuit	Failure detection 'Interruption' at AbsInlet/ AbsOutlet (Front Axle Right)	An interruption of the relevant actuator is detected in active and inactive states. The detection time is 200 ms.	• Check for correct parameter setting. (Is the relevant valve/actuator equipped?) • Check wiring of relevant valve/actuator. (Is there an interruption?) • Check relevant valve/actuator. (Is there an internal interruption?) • Contact WABCO North America Customer Care at 855-228-3203.
796 - 13 = Pressure Modulation Valve ABS (Front Axle Right) - out of calibration	Failure detection 'OverEquipped' at AbsInlet/ AbsOutlet (Front Axle Right)	A failure is detected if a component is connected to the ECU, but it is not activated in the parameter settings.	• Check for correct parameter setting. (Is the relevant valve/actuator equipped?) • Check wiring of relevant valve/actuator. (Is ECU pin open?) • Contact WABCO North America Customer Care at 855-228-3203.
797 - 3 = Pressure Modulation Valve ABS (Drive Axle Left) - voltage above normal or shorted high	Failure detection 'ShortUb' at AbsInlet/AbsOutlet (Drive Axle Left)	A short circuit to UB of the relevant actuator is detected in active and inactive states. The detection time is 200 ms.	• Check wiring of relevant valve/actuator. (Is there a short circuit?) • Contact WABCO North America Customer Care at 855-228-3203.

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DTC SPN FMI	Failure Detection Name	Failure Detection Description	Repair
797 - 4 = Pressure Modulation Valve ABS (Drive Axle Left) - voltage below normal or shorted low	Failure detection 'ShortGnd' at AbsInlet/AbsOutlet (Drive Axle Left)	A short circuit to GND of the relevant actuator is detected in active and inactive states. The detection time is 200 ms. Remark: A shorted load also leads to a short to GND failure. A shorted load is detected: - After 200 ms after ignition-on and also if valve is activated. - After 1000 ms if valve is not activated.	• Check wiring of relevant valve/actuator. (Is there a short circuit?) • Check relevant valve/actuator. (Is there an internal short circuit?) • Contact WABCO North America Customer Care at 855-228-3203.
797 - 5 = Pressure Modulation Valve ABS (Drive Axle Left) - current below normal or open circuit	Failure detection 'Interruption' at AbsInlet/ AbsOutlet (Drive Axle Left)	An interruption of the relevant actuator is detected in active and inactive states. The detection time is 200 ms.	• Check for correct parameter setting. (Is the relevant valve/actuator equipped?) • Check wiring of relevant valve/actuator. (Is there an interruption?) • Check relevant valve/actuator. (Is there an internal interruption?) • Contact WABCO North America Customer Care at 855-228-3203.
797 - 13 = Pressure Modulation Valve ABS (Drive Axle Left) - out of calibration	Failure detection 'OverEquipped' at AbsInlet/ AbsOutlet (Drive Axle Left)	A failure is detected if a component is connected to the ECU, but it is not activated in the parameter settings.	• Check for correct parameter setting. (Is the relevant valve/actuator equipped?) • Check wiring of relevant valve/actuator. (Is ECU pin open?) • Contact WABCO North America Customer Care at 855-228-3203.
798 - 3 = Pressure Modulation Valve ABS (Drive Axle Right) - voltage above normal or shorted high	Failure detection 'ShortUb' at AbsInlet/AbsOutlet (Drive Axle Right)	A short circuit to UB of the relevant actuator is detected in active and inactive states. The detection time is 200 ms.	• Check wiring of relevant valve/actuator. (Is there a short circuit?) • Contact WABCO North America Customer Care at 855-228-3203.
798 - 4 = Pressure Modulation Valve ABS (Drive Axle Right) - voltage below normal or shorted low	Failure detection 'ShortGnd' at AbsInlet/AbsOutlet (Drive Axle Right)	A short circuit to GND of the relevant actuator is detected in active and inactive states. The detection time is 200 ms. Remark: A shorted load also leads to a short to GND failure. A shorted load is detected: - After 200 ms after ignition-on and also if valve is activated. - After 1000 ms if valve is not activated.	• Check wiring of relevant valve/actuator. (Is there a short circuit?) • Check relevant valve/actuator. (Is there an internal short circuit?) • Contact WABCO North America Customer Care at 855-228-3203.
798 - 5 = Pressure Modulation Valve ABS (Drive Axle Right) - current below normal or open circuit	Failure detection 'Interruption' at AbsInlet/ AbsOutlet (Drive Axle Right)	An interruption of the relevant actuator is detected in active and inactive states. The detection time is 200 ms.	• Check for correct parameter setting. (Is the relevant valve/actuator equipped?) • Check wiring of relevant valve/actuator. (Is there an interruption?) • Check relevant valve/actuator. (Is there an internal interruption?) • Contact WABCO North America Customer Care at 855-228-3203.
798 - 13 = Pressure Modulation Valve ABS (Drive Axle Right) - out of calibration	Failure detection 'OverEquipped' at AbsInlet/ AbsOutlet (Drive Axle Right)	A failure is detected if a component is connected to the ECU, but it is not activated in the parameter settings.	• Check for correct parameter setting. (Is the relevant valve/actuator equipped?) • Check wiring of relevant valve/actuator. (Is ECU pin open?) • Contact WABCO North America Customer Care at 855-228-3203.
799 - 3 = Pressure Modulation Valve ABS (Intermediate Axle Left) - voltage above normal or shorted high	Failure detection 'ShortUb' at AbsInlet/AbsOutlet (Intermediate Axle Left)	A short circuit to UB of the relevant actuator is detected in active and inactive states. The detection time is 200 ms.	• Check wiring of relevant valve/actuator. (Is there a short circuit?) • Contact WABCO North America Customer Care at 855-228-3203.
799 - 4 = Pressure Modulation Valve ABS (Intermediate Axle Left) - voltage below normal or shorted low	Failure detection 'ShortGnd' at AbsInlet/AbsOutlet (Intermediate Axle Left)	A short circuit to GND of the relevant actuator is detected in active and inactive states. The detection time is 200 ms. Remark: A shorted load also leads to a short to GND failure. A shorted load is detected: - After 200 ms after ignition-on and also if valve is activated. - After 1000 ms if valve is not activated.	• Check wiring of relevant valve/actuator. (Is there a short circuit?) • Check relevant valve/actuator. (Is there an internal short circuit?) • Contact WABCO North America Customer Care at 855-228-3203.

DTC SPN FMI	Failure Detection Name	Failure Detection Description	Repair
799 - 5 = Pressure Modulation Valve ABS (Intermediate Axle Left) - current below normal or open circuit	Failure detection 'Interruption' at AbsInlet/ AbsOutlet (Intermediate Axle Left)	An interruption of the relevant actuator is detected in active and inactive states. The detection time is 200 ms.	• Check for correct parameter setting. (Is the relevant valve/actuator equipped?) • Check wiring of relevant valve/actuator. (Is there an interruption?) • Check relevant valve/actuator. (Is there an internal interruption?) • Contact WABCO North America Customer Care at 855-228-3203.
799 - 13 = Pressure Modulation Valve ABS (Intermediate Axle Left) - out of calibration	Failure detection 'OverEquipped' at AbsInlet/ AbsOutlet (Intermediate Axle Left)	A failure is detected if a component is connected to the ECU, but it is not activated in the parameter settings.	• Check for correct parameter setting. (Is the relevant valve/actuator equipped?) • Check wiring of relevant valve/actuator. (Is ECU pin open?) • Contact WABCO North America Customer Care at 855-228-3203.
800 - 3 = Pressure Modulation Valve ABS (Intermediate Axle Right) - voltage above normal or shorted high	Failure detection 'ShortUb' at AbsInlet/AbsOutlet (Intermediate Axle Right)	A short circuit to UB of the relevant actuator is detected in active and inactive states. The detection time is 200 ms.	• Check wiring of relevant valve/actuator. (Is there a short circuit?) • Contact WABCO North America Customer Care at 855-228-3203.
800 - 4 = Pressure Modulation Valve ABS (Intermediate Axle Right) - voltage below normal or shorted low	Failure detection 'ShortGnd' at AbsInlet/AbsOutlet (Intermediate Axle Right)	A short circuit to GND of the relevant actuator is detected in active and inactive states. The detection time is 200 ms. Remark: A shorted load also leads to a short to GND failure. A shorted load is detected: - After 200 ms after ignition-on and also if valve is activated. - After 1000 ms if valve is not activated.	• Check wiring of relevant valve/actuator. (Is there a short circuit?) • Check relevant valve/actuator. (Is there an internal short circuit?) • Contact WABCO North America Customer Care at 855-228-3203.
800 - 5 = Pressure Modulation Valve ABS (Intermediate Axle Right) - current below normal or open circuit	Failure detection 'Interruption' at AbsInlet/ AbsOutlet (Intermediate Axle Right)	An interruption of the relevant actuator is detected in active and inactive states. The detection time is 200 ms.	• Check for correct parameter setting. (Is the relevant valve/actuator equipped?) • Check wiring of relevant valve/actuator. (Is there an interruption?) • Check relevant valve/actuator. (Is there an internal interruption?) • Contact WABCO North America Customer Care at 855-228-3203.
800 - 13 = Pressure Modulation Valve ABS (Intermediate Axle Right) - out of calibration	Failure detection 'OverEquipped' at AbsInlet/ AbsOutlet (Intermediate Axle Right)	A failure is detected if a component is connected to the ECU, but it is not activated in the parameter settings.	• Check for correct parameter setting. (Is the relevant valve/actuator equipped?) • Check wiring of relevant valve/actuator. (Is ECU pin open?) • Contact WABCO North America Customer Care at 855-228-3203.
801 - 3 = Retarder Control Relay - voltage above normal or shorted high	Failure detection 'ShortUb' at Endurance Brake Relay	A short circuit to UB of the relevant actuator is detected in active and inactive states. The detection time is 200 ms.	• Check wiring of relevant valve/actuator. (Is there a short circuit?) • Contact WABCO North America Customer Care at 855-228-3203.
801 - 4 = Retarder Control Relay - voltage below normal or shorted low	Failure detection 'ShortGnd' at Endurance Brake Relay	A short circuit to GND of the relevant actuator is detected in active and inactive states. The detection time is 200 ms.	• Check wiring of relevant valve/actuator. (Is there a short circuit?) • Check relevant valve/actuator. (Is there an internal short circuit?) • Contact WABCO North America Customer Care at 855-228-3203.
801 - 5 = Retarder Control Relay - current below normal or open circuit	Failure detection 'Interruption' at Endurance Brake Relay	An interruption of the relevant actuator is detected in active and inactive states. The detection time is 200 ms.	• Check for correct parameter setting. (Is the relevant valve/actuator equipped?) • Check wiring of relevant valve/actuator. (Is there an interruption?) • Check relevant valve/actuator. (Is there an internal interruption?) • Contact WABCO North America Customer Care at 855-228-3203.
801 - 13 = Retarder Control Relay - out of calibration	Failure detection 'OverEquipped' at Endurance Brake Relay	A failure is detected if a component is connected to the ECU, but it is not activated in the parameter settings.	• Check for correct parameter setting. (Is the relevant valve/actuator equipped?) • Check wiring of relevant valve/actuator. (Is ECU pin open?) • Contact WABCO North America Customer Care at 855-228-3203.

DTC SPN FMI	Failure Detection Name	Failure Detection Description	Repair
810 - 2 = Speed Signal Input - data erratic, intermittent or incorrect	Check between Speedometer Signal and ABS Speed	This error is set when the calculated uncorrected speedometer adjustment factor is invalid or when inconsistencies are detected between the sensed wheel speeds and the vehicle speed for the defined time periods.	• Check the air gap of all wheel speed sensors (might be too wide). • Check the parameters 'wheel diameter' and 'tooth wheel teeth numbers' (if applicable). • Is the speed signal of the tachograph ECU (on chassis CAN data link) correct? • Is the speed signal of the tachograph ECU (on chassis CAN data link) not available?
1066 - 0 = Brake Signal Transmitter - data valid, but above normal operating range (most severe level)	Detection of Invalid Offset Value of Brake Signal	The detection checks if the resulting PWM signal of the FBV (foot brake valve) is too high in unbraked condition.	• Contact WABCO North America Customer Care at 855-228-3203.
1066 - 2 = Brake Signal Transmitter - data erratic, intermittent or incorrect	Detection of Significant PWM Input Signal Difference	The detection compares both PWM signals of the FBV (foot brake valve). If an inadmissible deviation (500 µs) is detected, then the failure is set. The check shall only be executed: - If both PWM signals are available and - If at least one signal (PWM1 or PWM2) is below 2000 µs Remark. Due to the FBV characteristic, this check shall not be done if brake pedal is strongly applied.	• Contact WABCO North America Customer Care at 855-228-3203.
1066 - 8 = Brake Signal Transmitter - abnormal frequency, pulse width or period	Difference of PWM Signal Frequency not 4 Hz	A failure is detected if the difference of PWM frequencies is not within valid range (4 Hz nominal). With the PWM tolerances, the frequency difference f_PWM2 - f_PWM1 shall be in the range 1,5 Hz . . . 12 Hz. The detection time is 250 ms.	• Check for correct type of FBV (foot brake valve). • Contact WABCO North America Customer Care at 855-228-3203.
1066 - 12 = Brake Signal Transmitter - bad intelligent device or component	Detection of Total Failure of both PWM Input Signals	The detection checks if both PWM signals of the FBV (foot brake valve) are not available. If both PWM signals are not available, then the failure is set. The check is only active if the Parameter 'Driver Demand Sensortype' is =2.	• Check for correct parameter setting (driver demand sensortype). • Check for correct wiring of FBV. (Is there an interruption? A short circuit?) • Contact WABCO North America Customer Care at 855-228-3203.
1067 - 2 = Brake Signal Sensor 1 - data erratic, intermittent or incorrect	Detection of invalid duty-cycle/pulse-width at PWM signal 1	A failure is set after 250 ms if the duty cycle of PWM1 is not in the range 6-97% (300 µs-4850 µs). Failure will be reset if duty cycle is within range 9,5-94% (475 µs-4700 µs) again.	• Contact WABCO North America Customer Care at 855-228-3203.
1067 - 4 = Brake Signal Sensor 1 - voltage below normal or shorted low	Detection of permanent low level at PWM signal 1	A failure is detected after 200 ms if the PWM1 signal is on permanent low level.	• Check for correct wiring of FBV. (Is there an interruption? A short circuit?) • Contact WABCO North America Customer Care at 855-228-3203.
1067 - 5 = Brake Signal Sensor 1 - current below normal or open circuit	Detection of open load at PWM signal 1	A failure is detected after 200 ms if the PWM1 signal has open load. Remark: This causes a permanent high level of the signal.	• Check for correct parameter setting (driver demand sensortype). • Check for correct wiring of FBV. (Is there an interruption? A short circuit?) • Contact WABCO North America Customer Care at 855-228-3203.
1067 - 5 = Brake Signal Sensor 1 - current below normal or open circuit	Detection of permanent high level at PWM signal 1	A failure is detected after 200 ms if the PWM1 signal is on permanent high level.	• Check for correct parameter setting (driver demand sensortype). • Check for correct wiring of FBV. (Is there an interruption? A short circuit?) • Contact WABCO North America Customer Care at 855-228-3203.
1067 - 8 = Brake Signal Sensor 1 - abnormal frequency, pulse width or period	Detection of invalid frequency at PWM signal 1	A failure is detected after 250 ms if the frequency of the PWM1 signal is outside the range: - 194 Hz-202 Hz (old FBV version, nominal frequency 198 Hz). - 184 Hz-192 Hz (new FBV version, nominal frequency 188 Hz).	• Check for correct type of FBV (foot brake valve). • Contact WABCO North America Customer Care at 855-228-3203.

DTC SPN FMI	Failure Detection Name	Failure Detection Description	Repair
1067 - 13 = Brake Signal Sensor 1 - out of calibration	Failure Detection 'OverEquipped' at PWM signal 1	A failure is detected if a component is connected to the ECU, but it is not activated in the parameter settings.	• Check for correct parameter setting (driver demand sensortype). • Contact WABCO North America Customer Care at 855-228-3203.
1068 - 2 = Brake Signal Sensor 2 - data erratic, intermittent or incorrect	Detection of invalid duty-cycle/pulse-width at PWM signal 2	A failure is set after 250 ms if the duty cycle of PWM2 is not in the range 6-97% (300 µs-4850 µs). Failure will be reset if duty cycle is within range 9,5-94% (475 µs-4700 µs) again.	• Contact WABCO North America Customer Care at 855-228-3203.
1068 - 4 = Brake Signal Sensor 2 - voltage below normal or shorted low	Detection of permanent low level at PWM signal 2	A failure is detected after 200 ms if the PWM2 signal is on permanent low level.	• Check for correct wiring of FBV. (Is there an interruption? A short circuit?) • Contact WABCO North America Customer Care at 855-228-3203.
1068 - 5 = Brake Signal Sensor 2 - current below normal or open circuit	Detection of open load at PWM signal 2	A failure is detected after 200 ms, the PWM2 signal has open load. Remark: This causes a permanent high level of the signal.	• Check for correct parameter setting (driver demand sensortype). • Check for correct wiring of FBV. (Is there an interruption? A short circuit?) • Contact WABCO North America Customer Care at 855-228-3203.
1068 - 5 = Brake Signal Sensor 2 - current below normal or open circuit	Detection of permanent high level at PWM signal 2	A failure is detected after 200 ms, the PWM2 signal is on permanent high level.	• Check for correct parameter setting (driver demand sensor type). • Check for correct wiring of FBV. (Is there an interruption? A short circuit?) • Contact WABCO North America Customer Care at 855-228-3203.
1068 - 8 = Brake Signal Sensor 2 - abnormal frequency, pulse width or period	Detection of invalid frequency at PWM signal 2	A failure is detected after 250 ms if the frequency of the PWM2 signal is outside the range: - 198 Hz-206 Hz (old FBV version, nominal frequency 202 Hz). - 188 Hz-196 Hz (new FBV version, nominal frequency 192 Hz).	• Check for correct type of FBV (foot brake valve). • Contact WABCO North America Customer Care at 855-228-3203.
1068 - 13 = Brake Signal Sensor 2 - out of calibration	Failure Detection 'OverEquipped' at PWM signal 2	A failure is detected if a component is connected to the ECU, but it is not activated in the parameter settings.	• Check for correct parameter setting (driver demand sensor type). • Contact WABCO North America Customer Care at 855-228-3203.
1243 - 12 = ABS Fully Operational - bad intelligent device or component	ABS Function Is Not Fully Operational	This failure is displayed if the ABS function is temporarily deactivated (partly or completely). Possible causes are: - After ABS-deactivation during driving, the ABS requires certain driving conditions to be met prior to becoming active again? - The ABS function was deactivated by parameter - Important parameters for ABS-function are not available	• This DTC does not require any repair. It is only driver information.
1351 - 0 = Air Compressor - data valid, but above normal operating range (most severe level)	EAPU - Compressor/ Overpressure Fault	The system pressure is above the parametrized max. value.	• Check parameter setting. • Check relating pressure sensors. • Check control line for compressor (blocked, faulty, leaky). • Check solenoid block.
1351 - 6 = Air Compressor - current above normal or grounded circuit	EAPU - Compressor/ Compressor Not Off In Idle	The system pressure rises even with a shut off compressor. Failure detection immediate after reaching overpressure limit.	• Check control line for compressor (blocked, faulty, leaky). • Check solenoid block.
1351 - 11 = Air Compressor - failure mode not identifiable/ root cause not known	EAPU - Compressor/ Critical Air Consumption	The system pressures being reached after a long period of pumping are not at an appropriate level that allows regeneration. Failure detection immediate after reaching critical air consumption limit.	• Check the vehicle for a critical air consumption -> avoid or stop usage of high air consumers. • Check vehicle for leakage in vehicle. • Check compressor. • Check solenoid block.

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DTC SPN FMI	Failure Detection Name	Failure Detection Description	Repair
1807 - 0 = Steering Wheel Angle - data valid, but above normal operating range (most severe level)	Signal Offset Failure of Steering Wheel Angle Sensing	The software monitors the determined offsets. The maximum allowed offset values are derived from the sensor data sheets.	• Check the mechanical steering elements at the front axle (defect, twisted, faulty assembly, etc.). • Check the mounting position of the steering angle sensor on the steering shaft (cranky, faulty assembly, etc.). • Contact WABCO North America Customer Care at 855-228-3203.
1807 - 2 = Steering Wheel Angle - data erratic, intermittent or incorrect	Steerwheel Plausibility Check	This check monitors the steering angle and compares it to other signals. It detects deviating signals which are not plausible to the currently driven situation.	• Check the ABS ECU concerning correct EOL parameter (steering ratio, wheelbase, wheel diameter, etc.). • Check whether the SAS is correctly assembled. • Contact WABCO North America Customer Care at 855-228-3203.
1807 - 2 = Steering Wheel Angle - data erratic, intermittent or incorrect	SAS Signal is Not Plausible	Detection 1) Failure is detected when the extracted steering wheel angle value from CAN message is not between -180 degree to +180 degree (less than 28905 or greater than 35344). Detection 2) Error is detected if the change in steering wheel angle is more than 30 degrees in 5ms.	• Check the ABS ECU concerning correct EOL parameter (steering ratio, wheelbase, wheel diameter, etc.). • Check whether the SAS is correctly assembled. • Contact WABCO North America Customer Care at 855-228-3203.
1807 - 7 = Steering Wheel Angle - mechanical system not responding correctly or out of adjustment	Yaw rate Cross Check (Steerangle)	The following four yaw rates are compared: - Measured by the yaw rate sensor - Calculated by lateral acceleration (yr-aq) - Calculated by steering wheel angle (yr-lw) - Calculated by wheel speeds front axle If yr-lw does not match with the rest and the rest itself is consistent the yr-lw is rated suspicious (at least 5 °/s deviation). Afterwards, special conditions which lead to not-matching-yaw-rates are detected (banked curve, oversteering, understeering).	• Check the ABS ECU concerning correct EOL parameter (steering ratio, wheelbase, wheel diameter, etc.). • Check whether the SAS is correctly assembled. • Contact WABCO North America Customer Care at 855-228-3203.
1807 - 8 = Steering Wheel Angle - abnormal frequency, pulse width or period	Timeout of SAS CAN Message	A timeout of the steering angle sensor CAN message is detected after 105 ms.	• Check main ECU for correct EOL configuration (steering wheel sensor yes/no). • Check the wiring between main ECU and steering wheel sensor. • Check the voltage supply of the steering angle sensor. • Check the steering wheel sensor. • Contact WABCO North America Customer Care at 855-228-3203.
1807 - 9 = Steering Wheel Angle - abnormal update rate	Steering Wheel Angle Minimum Dynamic Failure	The signal of the steering wheel angle is extremely constant (minimum dynamic failure).	• Check if SAS is mechanically connected to the steering column. (Does it rotate?) • Check steering angle sensor. • Contact WABCO North America Customer Care at 855-228-3203.
1807 - 12 = Steering Wheel Angle - bad intelligent device or component	Error Indication of SAS Signal	If steering wheel angle value is between 0xFE00 and 0xFEFF(including) or when the steering wheel angle range counter equals 0x3E, then this failure will be detected.	• Contact WABCO North America Customer Care at 855-228-3203.
1807 - 13 = Steering Wheel Angle - out of calibration	Failure Detection ‘OverEquipped’ for Steering Angle Sensor	A failure is detected if a component is connected to the ECU, but it is not activated in the parameter settings.	• Check for correct parameter setting (SAS yes/no). • Contact WABCO North America Customer Care at 855-228-3203.
1807 - 14 = Steering Wheel Angle - special instructions	Constant Message Counter of SAS CAN Message	When message counter value received from SAS CAN message remains constant for 180 ms, then message counter failure will be detected.	• Check the main ECU concerning correct EOL parameter (steering wheel sensor type). • Check whether the correct SAS type is assembled at the vehicle. • Check the steering angle sensor/replace the steering angle sensor. • Check the main ECU. • Contact WABCO North America Customer Care at 855-228-3203.

DTC SPN FMI	Failure Detection Name	Failure Detection Description	Repair
1807 - 17 = Steering Wheel Angle - data valid, but below normal operating range (least severe level)	Signal Not Available Indication of SAS Signal	If steering wheel angle value is between 0xFF00 and 0xFFFF (including) or when the steering wheel angle range counter equals 0x3F continuously for 1 second, then this failure will be detected.	• Check if steering angle sensor is configured and calibrated correctly. • Contact WABCO North America Customer Care at 855-228-3203.
1807 - 18 = Steering Wheel Angle - data valid, but below normal operating range (moderately severe level)	Neutral Value Detection (Steerangle)	A failure is detected if the target yaw rate (from SAS) stays near zero and the actual sensor yaw rate and the yaw rate calculated from the lateral acceleration are above the detection threshold (e.g. 5ø/s).	• Check the mechanical connection between steering angle sensor and steering shaft (loosened?). • Contact WABCO North America Customer Care at 855-228-3203.
1807 - 19 = Steering Wheel Angle - received network data in error	Invalid Checksum of SAS CAN Message	This failure is produced when the checksum value received in steering wheel angle sensor CAN message does not match with checksum calculated from data content of the CAN message.	• Check the main ECU concerning correct EOL parameter (steering wheel sensor type). • Check whether the correct SAS type is assembled at the vehicle. • Check the steering angle sensor and main ECU. • Contact WABCO North America Customer Care at 855-228-3203.
1807 - 31 = Steering Wheel Angle - condition exists	Invalid Status of SAS Signal	This failure is produced when the steering wheel angle sensor sends ‘not calibrated state’ or ‘not active state’.	• Check if steering angle sensor is configured and calibrated correctly. • Contact WABCO North America Customer Care at 855-228-3203.
1808 - 1 = Yaw Rate - data valid, but below normal operating range (most severe level)	Minimum Dynamic Failure/ Yaw Rate	This failure indicates an active minimal dynamic failure for the yaw rate sensor. This failure is set when the error flag inside the ESC1 message is set (ESC1: Byte 3 Bit 1) for a certain time.	• Contact WABCO North America Customer Care at 855-228-3203.
1808 - 2 = Yaw Rate - data erratic, intermittent or incorrect	Range Check Failure of Yaw Rate Sensor Signal	A failure is detected if the yaw-rate exceeds a certain maximum value.	• Contact WABCO North America Customer Care at 855-228-3203.
1808 - 3 = Yaw Rate - voltage above normal or shorted high	Drift Failure of Yaw Rate Sensor Signal (Standstill)	The yaw rate signal drifts in standstill more than a permissible limit.	• Contact WABCO North America Customer Care at 855-228-3203.
1808 - 5 = Yaw Rate - current below normal or open circuit	Offset Failure of Yaw Rate Sensor Signal	The software monitors the determined offsets. The maximum allowed offset values are derived from the sensor data sheets.	• Contact WABCO North America Customer Care at 855-228-3203.
1808 - 6 = Yaw Rate - current above normal or grounded circuit	Drift Failure of Yaw Rate Sensor Signal (Driving)	The yaw rate signal drifts during driving more than a permissible limit.	• Contact WABCO North America Customer Care at 855-228-3203.
1808 - 7 = Yaw Rate - mechanical system not responding correctly or out of adjustment	Faulty Sign between Yaw Rate and Steerangle	A failure is set if the sign between the target yaw rate (steering wheel sensor) and the sensor yaw rate is faulty. Principle: Calculate the ratio between the target yaw rate and the sensor yaw rate. If the ratio is negative (-0,6 up to -1,4) for both turning direction a failure shall be indicated.	• Check EOL parameters for mounting direction (ESC module). • Check for correct mounting direction (assembly position) of ESC module. • Check for correct mounting direction of steering angle sensor. • Contact WABCO North America Customer Care at 855-228-3203.
1808 - 11 = Yaw Rate - failure mode not identifiable/root cause not known	Plausibility Check of Yaw Rate Signal (Straight Driving)	Plausibility check of the actual yaw rate while driving straight under stable conditions. If the vehicle is driving straight under stable condition and the actual yaw rate is higher than threshold (e.g. 6 * pi /180), an error is set.	• Check for correct assembly position of ESC module. • Check ESC module. • Check steering angle sensor. • Contact WABCO North America Customer Care at 855-228-3203.
1808 - 12 = Yaw Rate - bad intelligent device or component	ESC Module Failure Flag ‘Yaw Rate Sensor’	This failure indicates that the yaw rate sensor inside the ESC indicates an error. This failure is set when the error indication flag inside the ESC1 message is set (ESC1 Multiplexer = 0x0 (Multiplexer Byte 0 Bit 4-7) and Byte 1 Bit 1 is set to one).	• Contact WABCO North America Customer Care at 855-228-3203.

DTC SPN FMI	Failure Detection Name	Failure Detection Description	Repair
1808 - 13 = Yaw Rate - out of calibration	Scaling Failure Detection (Yaw Rate and Steerangle)	Detection of scaling failures between the target yaw rate and the actual yaw rate. The ratio between the target yaw rate and the actual yaw rate has to be outside the threshold range (0.7 to 1.3) and not in the negative range -0,7 to -1,3, and the trust counter value has to be set to zero. The trust counter will be incremented to a maximum of 60 seconds if the sensor signal is inside the threshold range.	• Check EOL parameter for mounting-direction of ESC module. • Check for correct mounting direction (assembly position) of ESC module. • Check the ESC module. • Check the steering angle sensor. • Contact WABCO North America Customer Care at 855-228-3203.
1808 - 14 = Yaw Rate - special instructions	Yaw Rate Cross Check (Yaw Rate Signal)	The following four yaw rates are compared: - Measured by the yaw rate sensor - Calculated by lateral acceleration (yr-aq) - Calculated by steering wheel angle - Calculated by wheel speeds front axle If yr does not match with the rest and the rest itself is consistent, the yr is rated suspicious (at least 5°/s deviation). Afterwards, special conditions which lead to not-matching-yaw-rates are detected (banked curve, oversteering, understeering, ...).	• Check the ABS ECU concerning correct EOL parameter (steering ratio, wheelbase, wheel diameter, etc.). • Check whether the ESC module is assembled in correct position. • Contact WABCO North America Customer Care at 855-228-3203.
1808 - 17 = Yaw Rate - data valid, but below normal operating range (least severe level)	Neutral Value Detection (Yaw Rate)	The actual yaw rate (from the yaw rate sensor) does not follow the target yaw rate and the yaw rate derived from the lateral acceleration. Actual yaw rate is near zero and difference between the actual yaw rate and the target yaw rate and yaw rate from lateral acceleration is higher than the threshold (e.g. 5 ø/s).	• Check EOL parameter for mounting direction of ESC module. • Check for correct mounting direction (assembly position) of ESC module. • Contact WABCO North America Customer Care at 855-228-3203.
1808 - 19 = Yaw Rate - received network data in error	Plausibility Check of Yaw Rate Signal (Curve)	Plausibility check while driving a curve. The actual yaw rate will be compared to the target yaw rate, yaw rate from lateral acceleration and the yaw rate from the front axle wheel speeds. This functionality is divided into two parts. Detection under stable conditions and under unstable conditions.	• Check the ESC module. • Contact WABCO North America Customer Care at 855-228-3203.
1808 - 22 = Yaw Rate - reserved (22)	Plausibility between Front Axle Speed and Yaw Rate Sensor Signal	The failure is detected if the yaw rate (calculated by the front wheel speed signals) differs from the measured yaw rate.	• When tires were changed, the speedometer must be calibrated to the new tire dimensions. - Check the TCO signal (function of speedometer). - Is the TCO speed signal correctly calibrated? - Check the vehicle-specific parameters of the speedometer. • The ABS ECU must have correct parameters. - Check the parameters in the ABS ECU (speedometer signal source, tire dimensions). • The ESC function requires a correct assembly of the ESC module. - Check the assembly position of the ESC module (mechanical hardware coding between ESC module and vehicle-frame). - Check the correct electric connection of the ESC module. - Check the fitting of the ESC module.
1809 - 1 = Lateral Acceleration - data valid, but below normal operating range (most severe level)	Minimum Dynamic Failure/ Lateral Acceleration	This failure indicates an active minimal dynamic failure for the lateral acceleration sensor. This failure is set when the error flag inside the ESC1 message is set (ESC1: Byte 3 Bit0) for a certain time.	• Contact WABCO North America Customer Care at 855-228-3203.
1809 - 2 = Lateral Acceleration - data erratic, intermittent or incorrect	Range Check of Lateral- and Longitudinal Acceleration	Range check for the lateral and longitudinal acceleration value.	• Check EOL parameter for mounting direction of ESC module. • Check for correct mounting direction (assembly position) of ESC module. • Contact WABCO North America Customer Care at 855-228-3203.

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DTC SPN FMI	Failure Detection Name	Failure Detection Description	Repair
1809 - 7 = Lateral Acceleration - mechanical system not responding correctly or out of adjustment	Faulty Sign between Lateral Acceleration and Steerangle	Detection of sign failures between the target yaw rate (steering wheel sensor) and the lateral acceleration. Principle: Calculate the ratio between the target yaw rate and the yaw rate from the lateral acceleration. If the ratio is negative for both turning direction, a failure shall be indicated. Set Condition: The ratio is negative and inside the ratio tolerance threshold (-0,6 up to -1,4).	• Check EOL parameters for mounting direction (ESC module). • Check for correct mounting direction (assembly position) of ESC module. • Check for correct mounting direction of steering angle sensor. • Contact WABCO North America Customer Care at 855-228-3203.
1809 - 12 = Lateral Acceleration - bad intelligent device or component	ESC Module Failure Flag 'Lateral Acceleration Sensor'	This failure indicates that the lateral acceleration sensor inside the ESC module indicates an error. This failure is set when the error indication flag inside the ESC1 message is set (ESC1 Multiplexer = 0x0 (Multiplexer Byte 0 Bit 4 - 7) and Byte 1 Bit 0 is set to one).	• Contact WABCO North America Customer Care at 855-228-3203.
1809 - 14 = Lateral Acceleration - special instructions	Yaw Rate Cross Check (Lateral Acceleration)	The following four yaw rates are compared: - Measured by the yaw rate sensor - Calculated by lateral acceleration (yr-aq) - Calculated by steering wheel angle - Calculated by wheel speeds front axleare compared If yr-aq does not match with the rest and the rest itself is consistent, the yr-aq is rated suspicious (at least 5 °/s deviation). Afterwards, special conditions which lead to not-matching-yaw-rates are detected (banked curve, oversteering, understeering, ...).	• Check the ABS ECU concerning correct EOL parameter (steering ratio, wheelbase, wheel diameter, etc.). • Check whether the ESC module is assembled in correct position • Contact WABCO North America Customer Care at 855-228-3203.
1809 - 15 = Lateral Acceleration - data valid, but above normal operating range (least severe level)	Signal Offset Failure of Lateral Acceleration Sensing	The offset value of the sensor is evaluated permanently during driving straight-on. This offset value is used for a correction of the lateral acceleration information. An offset failure is detected if the difference between sensor signal and lateral acceleration calculated by yaw rate exceeds 1,7 m/s². The failure detection is only active if vehicle speed is higher than 10 km/h and if vehicle is driving straight-on.	• Check EOL parameter for mounting direction of ESC module. • Check for correct mounting direction (assembly position) of ESC module. • Contact WABCO North America Customer Care at 855-228-3203.
1809 - 17 = Lateral Acceleration - data valid, but below normal operating range (least severe level)	Neutral Value Detection (Lateral Acceleration)	The yaw rate calculated from the lateral acceleration does not follow the actual yaw rate and the target yaw rate.	• Check EOL parameter for mounting direction of ESC module. • Check for correct mounting direction (assembly position) of ESC module. • Contact WABCO North America Customer Care at 855-228-3203.
1809 - 20 = Lateral Acceleration - data drifted high	Signal Drift Failure of Lateral Acceleration Sensing	The lateral acceleration signal was drifting outside the valid range.	• Contact WABCO North America Customer Care at 855-228-3203.
1810 - 0 = Longitudinal Acceleration - data valid, but above normal operating range (most severe level)	Offset Failure of Longitudinal Acceleration Sensor Signal	This failure indicates a faulty offset value of the longitudinal acceleration sensor.	• Check EOL parameter for mounting direction of ESC module. • Check for correct mounting direction (assembly position) of ESC module. • Contact WABCO North America Customer Care at 855-228-3203.
1810 - 1 = Longitudinal Acceleration - data valid, but below normal operating range (most severe level)	Minimum Dynamic Failure/ Longitudinal Acceleration	This failure indicates an active minimal dynamic failure for the longitudinal acceleration sensor.	• Contact WABCO North America Customer Care at 855-228-3203.
1810 - 2 = Longitudinal Acceleration - data erratic, intermittent or incorrect	Plausibility Failure of Longitudinal Acceleration Sensor Signal	This failure indicates a plausibility failure of the longitudinal acceleration sensor (e.g. characteristic not correct).	• Check EOL parameter for mounting direction of ESC module. • Check for correct mounting direction (assembly position) of ESC module. • Contact WABCO North America Customer Care at 855-228-3203.

DTC SPN FMI	Failure Detection Name	Failure Detection Description	Repair
1810 - 7 = Longitudinal Acceleration - mechanical system not responding correctly or out of adjustment	Assembly Failure of Longitudinal Acceleration Sensor Signal	This failure indicates a faulty assembly of the longitudinal acceleration sensor (i.e. mounting direction not correct).	• Check EOL parameter for mounting direction of ESC module. • Check for correct mounting direction (assembly position) of ESC module. • Contact WABCO North America Customer Care at 855-228-3203.
1810 - 12 = Longitudinal Acceleration - bad intelligent device or component	ESC Module Failure Flag 'Longitudinal Acceleration Sensor'	This failure indicates that the longitudinal acceleration sensor inside the ESC module indicates an error. This failure is set when the error indication flag inside the ESC2 message is set (ESC2 Multiplexer = 0x0 (Multiplexer Byte 0 Bit 4 - 7) and Byte 1 Bit 0 is set to one).	• Contact WABCO North America Customer Care at 855-228-3203.
3509 - 3 = Sensor supply - voltage above normal or shorted high	Failure detection 'ShortUb' at SensorSupply	A permanent high voltage level (shorted to permanent UB) at the sensor-supply is detected after ignition-on.	• Check wiring of relevant sensors. (Is there a short circuit to UB?) • Contact WABCO North America Customer Care at 855-228-3203.
3509 - 4 = Sensor supply - voltage below normal or shorted low	Failure detection 'ShortGnd' at SensorSupply	A failure is detected after 200 ms if the sensor supply is too low (shorted to GND).	• Check wiring of relevant sensors. (Is there a short circuit to GND?) • Check relevant sensors. (Is there an internal short circuit to GND? Electric current too high?) • Contact WABCO North America Customer Care at 855-228-3203.
520210 - 8 = ESC-module - abnormal frequency, pulse width or period	ESC Module CAN Messages/Timeout Failure	A timeout of the ESC module CAN message is detected after 105 ms.	• Check main ECU for correct EOL configuration (ESC module yes/no). • Check the wiring between main ECU and ESC module. • Check the voltage supply of the ESC module. • Check the ESC module. • Contact WABCO North America Customer Care at 855-228-3203.
520210 - 10 = ESC-module - abnormal rate of change	ESC Module CAN Messages/Blockdata Counter Failure	A failure is detected if the message counter inside the ESC1 (Byte 0 - Bit 4 to Bit 7) or inside the ESC2 (Byte 0 - Bit 4 to Bit 7) is not correctly incremented.	• Check the ESC module. • Check the main ECU. • Contact WABCO North America Customer Care at 855-228-3203.
520210 - 12 = ESC-module - bad intelligent device or component	ESC Module Failure Flag 'Internal Error'	This failure indicates that the ESC sensor has recognized an internal error. This failure is set when the internal error indication flag inside the ESC1 message is set (ESC1 Multiplexer = 0x0 (Multiplexer Byte 0 Bit 4 - 7) and Byte 1 Bit 3 is set to one).	• Contact WABCO North America Customer Care at 855-228-3203.
520210 - 13 = ESC-module - out of calibration	Failure Detection 'OverEquipped' for ESC module	A failure is detected if a component is connected to the ECU, but it is not activated in the parameter settings.	• Check for correct parameter setting (ESC yes/no). • Contact WABCO North America Customer Care at 855-228-3203.
520210 - 14 = ESC-module - special instructions	CAN Incompatibility of the ESC Module	It was detected that the characteristic number (CAN) of the ESC module is invalid.	• For a correct function of the brake system, the right combination of brake system ECUs and ESC module must be assembled in the vehicle. Please read the numbers of all these components and check them for compatibility against each other.
520210 - 19 = ESC-module - received network data in error	ESC Module CAN Messages/Checksum Failure	The software shall set the failure when the ESC1 Checksum (ESC1 Byte 0 - Bit 0 - 3) or the ESC2 Checksum (ESC2 Byte 0 - Bit 0 -3) differs from the internal calculated checksum.	• Check the ESC module. • Check the main ECU. • Contact WABCO North America Customer Care at 855-228-3203.
520213 - 31 = ESC-Calibration Procedure - condition exists	ESC Calibration Procedure Is Active	This failure code is displayed if the calibration function of the ESC is currently active.	• This DTC does not require any repair. It is only driver information.

DTC SPN FMI	Failure Detection Name	Failure Detection Description	Repair
520214 - 2 = Steering Angle Ratio - data erratic, intermittent or incorrect	Learning value of steering ratio characteristics is incorrect	With steering angle ratio adaptation mode enabled, failure can be set when learned steering angle ratio correction value over time is invalid. With steering angle ratio free learning mode enabled, failure detection is enabled only after learning of the steering angle ratio curve is completed. Failure can be set if new learned steering angle ratio values over time compared with the calculated steering angle ratios from what was previously learned has deviated. With steering angle ratio no adaptation mode enabled, failure will be set if learned steering angle ratio compared to the calculated steering angle ratio from parameter setting has deviated. This error detection is enabled by parameter.	• Check the ABS ECU concerning correct ESC-specific EOL parameters (e.g. steering-ratio, wheel base, tooth wheel teeth-numbers, tire-circumference, etc.). • Is the vehicle damaged at the front axle (steering, axle, etc.)? • Check the ESC module. • Check the steering wheel angle sensor. • Contact WABCO North America Customer Care at 855-228-3203.
520216 - 31 = ESC function is reduced (trailer ABS not OK) - condition exists	Reduced ESC Functionality (Trailer ABS Failure)	It was detected that the trailer had faulty ABS functionality.	• Check the ABS in the trailer.
520240 - 9 = External Brake Demand System (VRDU) - abnormal update rate	External Brake Request, Message Timeout	Error will be set if any of the below conditions are satisfied: - E1 message not received for 50 ms when message valid counter is greater than 0 (indicates that the message has been received at least once). - E4 message not received for 50 ms when message valid counter is greater than 0 (indicates that the message has been received at least once).	• Check the failure memory of the VRDU ECU and repair all failures. • Check the wiring of the chassis CAN data connection and the relating electric connectors between ABS ECU and the VRDU ECU. Remark: VRDU = Video Radar Decision Unit
520240 - 19 = External Brake Demand System (VRDU) - received network data in error	External Brake Request, Severe Error	ECU interface severe error will be set if: - The CAN signals of the parameterized interface have data error (checksum, counter, format incorrect, message content implausible) or - Timeout error occurred during execution of the external request.	• Check the VRDU electronic device (is there an internal failure memory of VRDU?) and repair/replace it, if necessary. • Check the ABS ECU and replace it, if necessary. Remark: VRDU = Video Radar Decision Unit
520247 - 31 = Failure Memory Bit (ESC) - condition exists	ESC Memorybit Was Activated	A sensor failure (yaw rate, lateral acceleration, steering angle) occurred in the last ignition cycle and has activated the ESC memory function.	• Repair the relevant sensor failure (yaw rate, lateral acceleration, steering angle) that is stored in error memory.
520272 - 13 = EOL Parameter ESC-Function (Steering Ratio Parameters) - out of calibration	Steering Angle Parameters Are Not Correct	Configured parameter value for SteerAg function is not valid. When quality value of all of the parameters below are greater than or equals 10, then the failure detection shall be activated. - PRMnumSteerRatLrngMod - PRMangOutrRi - PRMrSteerOutrRi - PRMangInrRi - PRMrSteerInrRi - PRMangInrLe - PRMrSteerInrLe - PRMangOutrLe - PRMrSteerOutrLe	• Check the relevant EOL parameters and correct them.
520290 - 9 = Four Wheel Auxiliary Parking Brake System - abnormal update rate	Malfunction of Auxiliary Parkbrake Function	The circumstances (supply pressure, etc.) do not ensure a safe operation of auxiliary park brake function.	• Check if an incorrect driver behavior occurred during active 4-wheel park brake function (ignition-off, parkbrake release, engine stops running, etc.). • Check if the supply pressure is too low. • Check if the front axle pressure control is faulty.

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DTC SPN FMI	Failure Detection Name	Failure Detection Description	Repair
520310 - 2 = Electronic Air Dryer - data erratic, intermittent or incorrect	EAPU - AirDryer/Pressure Sensor Plausibility Fault	Minimum one pressure sensor value is not plausible compared to another value. Detection time: approx. 1 minute with difference 500 mbar	• Check sensor 1 or sensor 2.
520310 - 7 = Electronic Air Dryer - mechanical system not responding correctly or out of adjustment	EAPU - AirDryer/ Regeneration Fault	The system pressure does not drop during regeneration. Detection time: immediate at the end of a regeneration process	• Check regeneration orifice (blocked?). • Check solenoid block. • Check silencer (blocked?).
520310 - 8 = Electronic Air Dryer - abnormal frequency, pulse width or period	EAPU - AirDryer/Fail Safe Mode	No input pressure to generate system pressure available or compressor/regeneration valve failure active.	• Check parameter setting (configuration of sensors, Air1-message configuration). • Check pressure signals in Air1/Brakes message.
520310 - 9 = Electronic Air Dryer - abnormal update rate	EAPU - AirDryer/ Mechanical Mode due to mandatory CAN signals (engine state)	One of the received CAN messages from the engine system has timed out or one data is invalid. Detection time: approx. 4x cycle time	• Check parameter setting (configuration of mandatory CAN inputs). • Check if necessary CAN messages are available.
520310 - 10 = Electronic Air Dryer - abnormal rate of change	EAPU - AirDryer/Volume Compressor Fault	The system pressure reaches a high pressure level much too fast. Detection time: immediate at the end of a pumping phase	• Check parameter setting (compressor characteristic).
520310 - 14 = Electronic Air Dryer - special instructions	EAPU - AirDryer/No Ambient Temperature Available	The ambient condition message has timed out or one data is invalid. Detection time: approx. 4x cycle time	• Check parameter setting (configuration of CAN input: ambient condition). • Check if necessary CAN messages are available.
520501 - 2 = Wheel Speed Sensing and Polewheel - Axle 1 Left - data erratic, intermittent or incorrect	Wheel Speed Chattering Failure at Axle 1 Left	Undesirable jumps in wheel speed is recognized as chattering. When this behavior of chattering is active for certain time period, the wheel speed chattering fault will be recognized. Detection is only active if vehicle reference speed is more than 15 km/h.	• Check the fitting and mounting of the relevant wheel speed sensor. (Can vibrations cause chattering?) • Check the relevant foundation brake for inadmissible vibrations (return spring defect? brake linings loosened?).
520501 - 7 = Wheel Speed Sensing and Polewheel - Axle 1 Left - mechanical system not responding properly or out of adjustment	Wheel Speed Permanent Slip Failure at Axle 1 Left	When a sensor is left unconnected from tooth wheel assembly, no wheel speeds are measured in this particular wheel, resulting in larger slip value on this wheel. This condition will result in permanent slip failure on this wheel. This error detection is possible in three different ways: Source 1: Based on wheel slip signal (lambda signal) from ABS control function. Source 2: Based on wheel speed values. Source 3: When sensor status is invalid due to high frequency signal measured by sensor.	• Check the relevant wheel speed sensor and its fitting. Is the distance between tooth wheel and sensor (air gap) too wide? • Check the wheel speed sensor for correct voltage output. (Is voltage output sufficient?) • If sensor and air gap are correct, contact WABCO North America Customer Care at 855-228-3203.
520501 - 9 = Wheel Speed Sensing and Polewheel - Axle 1 Left - abnormal update rate	Wheel Speed Jump Down Detection at Axle 1 Left	Jump down failure is detected when wheel speed drops suddenly to standstill from higher speeds. The failure can happen because of larger air gap between tooth wheel and sensor, or due to sensor getting misaligned while driving.	• Check the relevant wheel speed sensor and its fitting. Is the distance between tooth wheel and sensor (air gap) too wide or is the sensor fitting loose? • If sensor and air gap are correct, contact WABCO North America Customer Care at 855-228-3203.
520501 - 10 = Wheel Speed Sensing and Polewheel - Axle 1 Left - abnormal rate of change	Wheel Speed Jump Up Detection at Axle 1 Left	Larger air gap between sensor and tooth wheel will lead to jump up failure. Jump up failure will be detected when wheels start rotating from standstill.	• Check the relevant wheel speed sensor and its fitting. Is the sensor fitting loose? • If sensor and air gap are correct, contact WABCO North America Customer Care at 855-228-3203.

DTC SPN FMI	Failure Detection Name	Failure Detection Description	Repair
520501 - 13 = Wheel Speed Sensing and Polewheel - Axle 1 Left - out of calibration	Impermissable Tire Size Detected at Axle 1 Left	When deviation of tire size is greater than the allowable limit, the impermissible tire size error shall be set for the concerned wheel. The software shall report impermissible tire size error for a wheel if the minimum of all uncorrected wheel speeds in the vehicle is greater than 20 km/h. When the preconditions are satisfied with any of the following conditions, then the impermissible tire size error shall be set for the concerned wheel: - The difference in correction values between the left and right wheels of an axle exceeds 10%. - Correction value of the wheel is more than 14%. - Wheel speed deviation between the left and right wheels of an axle exceeds 10%. - Wheel speed deviation of the wheel compared to the average front axle wheel speed is greater than 14%.	• Check all tires of the vehicle concerning correct size. • Check the EOL parameters (tire circumference, tooth wheel teeth numbers).
520501 - 14 = Wheel Speed Sensing and Polewheel - Axle 1 Left - special instructions	Impermissable Deviation of Tire Size Detected at Axle 1 Left	When wheel speed deviates from the fastest wheel by more than the allowable limit, the impermissible deviation error shall be reported for the concerned wheel. The software shall monitor the wheel speeds only when the minimum wheel speed is 20 km/h or higher. The software shall report 'impermissible deviation' error for a wheel if the compensated speed of concerned wheel deviates from the maximum compensated wheel speed by more than 10%.	• Check all tires of the vehicle concerning correct size. • Check the EOL parameters (tire circumference, tooth wheel teeth numbers).
520502 - 2 = Wheel Speed Sensing and Polewheel - Axle 1 Right - data erratic, intermittent or incorrect	Wheel Speed Chattering Failure at Axle 1 Right	Undesirable jumps in wheel speed is recognized as chattering. When this behavior of chattering is active for a certain time period, the wheel speed chattering fault will be recognized. Detection is only active if vehicle reference speed is more than 15 km/h.	• Check the fitting and mounting of the relevant wheel speed sensor. (Can vibrations cause chattering?) • Check the relevant foundation brake for inadmissible vibrations (return spring defect? brake linings loosened?).
520502 - 7 = Wheel Speed Sensing and Polewheel - Axle 1 Right - mechanical system not responding properly or out of adjustment	Wheel Speed Permanent Slip Failure at Axle 1 Right	When a sensor is left unconnected from tooth wheel assembly, no wheel speeds are measured in this particular wheel resulting in larger slip value on this wheel. This condition will result in permanent slip failure on this wheel. This error detection is possible in three different ways: Source 1: Based on wheel slip signal (lambda signal) from ABS control function. Source 2: Based on wheel speed values. Source 3: When sensor status is invalid due to high frequency signal measured by sensor.	• Check the relevant wheel speed sensor and its fitting. Is the distance between tooth wheel and sensor (air gap) too wide? • Check the wheel speed sensor for correct voltage output. (Is voltage output sufficient?) • If sensor and air gap are correct, contact WABCO North America Customer Care at 855-228-3203.
520502 - 9 = Wheel Speed Sensing and Polewheel - Axle 1 Right - abnormal update rate	Wheel Speed Jump Down Detection at Axle 1 Right	Jump down failure is detected when wheel speed drops suddenly to standstill from higher speeds. The failure can happen because of larger air gap between tooth wheel and sensor or due to sensor getting misaligned while driving.	• Check the relevant wheel speed sensor and its fitting. Is the distance between tooth wheel and sensor (air gap) too wide or is the sensor fitting loose? • If sensor and air gap are correct, contact WABCO North America Customer Care at 855-228-3203.
520502 - 10 = Wheel Speed Sensing and Polewheel - Axle 1 Right - abnormal rate of change	Wheel Speed Jump Up Detection at Axle 1 Right	Larger air gap between sensor and tooth wheel will lead to jump up failure. Jump up failure will be detected when wheels start rotating from standstill.	• Check the relevant wheel speed sensor and its fitting. Is the sensor fitting loose? • If sensor and air gap are correct, contact WABCO North America Customer Care at 855-228-3203.

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DTC SPN FMI	Failure Detection Name	Failure Detection Description	Repair
520502 - 13 = Wheel Speed Sensing and Polewheel - Axle 1 Right - out of calibration	Impermissable Tire Size Detected at Axle 1 Right	When deviation of tire size is greater than the allowable limit, the impermissible tire size error shall be set for the concerned wheel. The software shall report 'impermissible tire size error' for a wheel if the minimum of all uncorrected wheel speeds in the vehicle is greater than 20 km/h. When the preconditions are satisfied with any of the following conditions, then the impermissible tire size error shall be set for the concerned wheel: - The difference in correction values between the left and right wheels of an axle exceeds 10%. - Correction value of the wheel is more than 14%. - Wheel speed deviation between the left and right wheels of an axle exceeds 10%. - Wheel speed deviation of the wheel compared to the average front axle wheel speed is greater than 14%.	• Check all tires of the vehicle concerning correct size. • Check the EOL parameters (tire circumference, tooth wheel teeth numbers).
520502 - 14 = Wheel Speed Sensing and Polewheel - Axle 1 Right - special instructions	Impermissable Deviation of Tire Size Detected at Axle 1 Right	When wheel speed deviates from the fastest wheel by more than the allowable limit, the impermissible deviation error shall be reported for the concerned wheel. The software shall monitor the wheel speeds only when the minimum wheel speed is 20 km/h or higher. The software shall report 'impermissible deviation' error for a wheel if the compensated speed of concerned wheel deviates from the maximum compensated wheel speed by more than 10%.	• Check all tires of the vehicle concerning correct size. • Check the EOL parameters (tire circumference, tooth wheel teeth numbers).
520503 - 2 = Wheel Speed Sensing and Polewheel - Axle 2 Left - data erratic, intermittent or incorrect	Wheel Speed Chattering Failure at Axle 2 Left	Undesirable jumps in wheel speed is recognized as chattering. When this behavior of chattering is active for certain time period, the wheel speed chattering fault will be recognized. Detection is only active if vehicle reference speed is more than 15 km/h.	• Check the fitting and mounting of the relevant wheel speed sensor. (Can vibrations cause chattering?) • Check the relevant foundation brake for inadmissible vibrations (return spring defect? brake linings loosened?).
520503 - 7 = Wheel Speed Sensing and Polewheel - Axle 2 Left - mechanical system not responding properly or out of adjustment	Wheel Speed Permanent Slip Failure at Axle 2 Left	When a sensor is left unconnected from tooth wheel assembly, no wheel speeds are measured in this particular wheel, resulting in larger slip value on this wheel. This condition will result in permanent slip failure on this wheel. This error detection is possible in three different ways: Source 1: Based on wheel slip signal (lambda signal) from ABS control function. Source 2: Based on wheel speed values. Source 3: When sensor status is invalid due to high frequency signal measured by sensor.	• Check the relevant wheel speed sensor and its fitting. Is the distance between tooth wheel and sensor (air gap) too wide? • Check the wheel speed sensor for correct voltage output. (Is voltage output sufficient?) • If sensor and air gap are correct, contact WABCO North America Customer Care at 855-228-3203.
520503 - 9 = Wheel Speed Sensing and Polewheel - Axle 2 Left - abnormal update rate	Wheel Speed Jump Down Detection at Axle 2 Left	Jump down failure is detected when wheel speed drops suddenly to standstill from higher speeds. The failure can happen because of larger air gap between tooth wheel and sensor or due to sensor getting misaligned while driving.	• Check the relevant wheel speed sensor and its fitting. Is the distance between tooth wheel and sensor (air gap) too wide or is the sensor fitting loose? • If sensor and air gap are correct, contact WABCO North America Customer Care at 855-228-3203.
520503 - 10 = Wheel Speed Sensing and Polewheel - Axle 2 Left - abnormal rate of change	Wheel Speed Jump Up Detection at Axle 2 Left	Larger air gap between sensor and tooth wheel will lead to jump up failure. Jump up failure will be detected when wheels start rotating from standstill.	• Check the relevant wheel speed sensor and its fitting. (Is the sensor fitting loose?) • If sensor and air gap are correct, contact WABCO North America Customer Care at 855-228-3203.

DTC SPN FMI	Failure Detection Name	Failure Detection Description	Repair
520503 - 13 = Wheel Speed Sensing and Polewheel - Axle 2 Left - out of calibration	Impermissable Tire Size Detected at Axle 2 Left	When deviation of tire size is greater than the allowable limit, the impermissible tire size error shall be set for the concerned wheel. The software shall report 'impermissible tire size error' for a wheel if the minimum of all uncorrected wheel speeds in the vehicle is greater than 20 km/h. When the preconditions are satisfied with any of the following conditions, then the impermissible tire size error shall be set for the concerned wheel: - The difference in correction values between the left and right wheels of an axle exceeds 10%. - Correction value of the wheel is more than 14%. - Wheel speed deviation between the left and right wheels of an axle exceeds 10%. - Wheel speed deviation of the wheel compared to the average front axle wheel speed is greater than 14%.	• Check all tires of the vehicle concerning correct size. • Check the EOL parameters (tire circumference, tooth wheel teeth numbers).
520503 - 14 = Wheel Speed Sensing and Polewheel - Axle 2 Left - special instructions	Impermissable Deviation of Tire Size Detected at Axle 2 Left	When wheel speed deviates from the fastest wheel by more than the allowable limit, the impermissible deviation error shall be reported for the concerned wheel. The software shall monitor the wheel speeds only when the minimum wheel speed is 20 km/h or higher. The software shall report 'impermissible deviation' error for a wheel if the compensated speed of concerned wheel deviates from the maximum compensated wheel speed by more than 10%.	• Check all tires of the vehicle concerning correct size. • Check the EOL parameters (tire circumference, tooth wheel teeth numbers).
520504 - 2 = Wheel Speed Sensing and Polewheel - Axle 2 Right - data erratic, intermittent or incorrect	Wheel Speed Chattering Failure at Axle 2 Right	Undesirable jumps in wheel speed is recognized as chattering. When this behavior of chattering is active for a certain time period, the wheel speed chattering fault will be recognized. Detection is only active if vehicle reference speed is more than 15 km/h.	• Check the fitting and mounting of the relevant wheel speed sensor. (Can vibrations cause chattering?) • Check the relevant foundation brake for inadmissible vibrations (return spring defect? brake linings loosened?).
520504 - 7 = Wheel Speed Sensing and Polewheel - Axle 2 Right - mechanical system not responding properly or out of adjustment	Wheel Speed Permanent Slip Failure at Axle 2 Right	When a sensor is left unconnected from tooth wheel assembly, no wheel speeds are measured in this particular wheel, resulting in larger slip value on this wheel. This condition will result in permanent slip failure on this wheel. This error detection is possible in three different ways: Source 1: Based on wheel slip signal (lambda signal) from ABS control function. Source 2: Based on wheel speed values. Source 3: When sensor status is invalid due to high frequency signal measured by sensor.	• Check the relevant wheel speed sensor and its fitting. Is the distance between tooth wheel and sensor (air gap) too wide? • Check the wheel speed sensor for correct voltage output. (Is voltage output sufficient?) • Replace the main ECU if sensor and air gap are correct.
520504 - 9 = Wheel Speed Sensing and Polewheel - Axle 2 Right - abnormal update rate	Wheel Speed Jump Down Detection at Axle 2 Right	Jump down failure is detected when wheel speed drops suddenly to standstill from higher speeds. The failure can happen because of larger air gap between tooth wheel and sensor or due to sensor getting misaligned while driving.	• Check the relevant wheel speed sensor and its fitting. Is the distance between tooth wheel and sensor (air gap) too wide or is the sensor fitting loose? • If sensor and fitting are correct, contact WABCO North America Customer Care at 855-228-3203.
520504 - 10 = Wheel Speed Sensing and Polewheel - Axle 2 Right - abnormal rate of change	Wheel Speed Jump Up Detection at Axle 2 Right	Larger air gap between sensor and tooth wheel will lead to jump up failure. Jump up failure will be detected when wheels start rotating from standstill.	• Check the relevant wheel speed sensor and its fitting. (Is the sensor fitting loose?) • If sensor and fitting are correct, contact WABCO North America Customer Care at 855-228-3203.

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DTC SPN FMI	Failure Detection Name	Failure Detection Description	Repair
520504 - 13 = Wheel Speed Sensing and Polewheel - Axle 2 Right - out of calibration	Impermissable Tire Size Detected at Axle 2 Right	When deviation of tire size is greater than the allowable limit, the impermissible tire size error shall be set for the concerned wheel. The software shall report 'impermissible tire size error' for a wheel if the minimum of all uncorrected wheel speeds in the vehicle is greater than 20 km/h. When the preconditions are satisfied with any of the following conditions, then the impermissible tire size error shall be set for the concerned wheel: - The difference in correction values between the left and right wheels of an axle exceeds 10%. - Correction value of the wheel is more than 14%. - Wheel speed deviation between the left and right wheels of an axle exceeds 10%. - Wheel speed deviation of the wheel compared to the average front axle wheel speed is greater than 14%.	• Check all tires of the vehicle concerning correct size. • Check the EOL parameters (tire circumference, tooth wheel teeth numbers).
520504 - 14 = Wheel Speed Sensing and Polewheel - Axle 2 Right - special instructions	Impermissable Deviation of Tire Size Detected at Axle 2 Right	When wheel speed deviates from the fastest wheel by more than the allowable limit, the impermissible deviation error shall be reported for the concerned wheel. The software shall monitor the wheel speeds only when the minimum wheel speed is 20 km/h or higher. The software shall report 'impermissible deviation' error for a wheel if the compensated speed of concerned wheel deviates from the maximum compensated wheel speed by more than 10%.	• Check all tires of the vehicle concerning correct size. • Check the EOL parameters (tire circumference, tooth wheel teeth numbers).
520505 - 2 = Wheel Speed Sensing and Polewheel - Axle 3 Left - data erratic, intermittent or incorrect	Wheel Speed Chattering Failure at Axle 3 Left	Undesirable jumps in wheel speed is recognized as chattering. When this behavior of chattering is active for a certain time period, the wheel speed chattering fault will be recognized. Detection is only active if vehicle reference speed is more than 15 km/h.	• Check the fitting and mounting of the relevant wheel speed sensor. (Can vibrations cause chattering?) • Check the relevant foundation brake for inadmissible vibrations (return spring defect? brake linings loosened?).
520505 - 7 = Wheel Speed Sensing and Polewheel - Axle 3 Left - mechanical system not responding properly or out of adjustment	Wheel Speed Permanent Slip Failure at Axle 3 Left	When a sensor is left unconnected from tooth wheel assembly, no wheel speeds are measured in this particular wheel resulting in larger slip value on this wheel. This condition will result in permanent slip failure on this wheel. This error detection is possible in three different ways: Source 1: Based on wheel slip signal (lambda signal) from ABS control function. Source 2: Based on wheel speed values. Source 3: When sensor status is invalid due to high frequency signal measured by sensor.	• Check the relevant wheel speed sensor and its fitting. Is the distance between tooth wheel and sensor (air gap) too wide? • Check the wheel speed sensor for correct voltage output. (Is voltage output sufficient?) • If sensor and air gap are correct, contact WABCO North America Customer Care at 855-228-3203.
520505 - 9 = Wheel Speed Sensing and Polewheel - Axle 3 Left - abnormal update rate	Wheel Speed Jump Down Detection at Axle 3 Left	Jump down failure is detected when wheel speed drops suddenly to standstill from higher speeds. The failure can happen because of larger air gap between tooth wheel and sensor or due to sensor getting misaligned while driving.	• Check the relevant wheel speed sensor and its fitting. Is the distance between tooth wheel and sensor (air gap) too wide or is the sensor fitting loose? • If sensor and fitting are correct, contact WABCO North America Customer Care at 855-228-3203.
520505 - 10 = Wheel Speed Sensing and Polewheel - Axle 3 Left - abnormal rate of change	Wheel Speed Jump Up Detection at Axle 3 Left	Larger air gap between sensor and tooth wheel will lead to jump up failure. Jump up failure will be detected when wheels start rotating from standstill.	• Check the relevant wheel speed sensor and its fitting. (Is the sensor fitting loose?) • If sensor and fitting are correct, contact WABCO North America Customer Care at 855-228-3203.

DTC SPN FMI	Failure Detection Name	Failure Detection Description	Repair
520505 - 13 = Wheel Speed Sensing and Polewheel - Axle 3 Left - out of calibration	Impermissable Tire Size Detected at Axle 3 Left	When deviation of tire size is greater than the allowable limit, the impermissible tire size error shall be set for the concerned wheel. The software shall report 'impermissible tire size error' for a wheel if the minimum of all uncorrected wheel speeds in the vehicle is greater than 20 km/h. When the preconditions are satisfied with any of the following conditions, then the impermissible tire size error shall be set for the concerned wheel: - The difference in correction values between the left and right wheels of an axle exceeds 10%. - Correction value of the wheel is more than 14%. - Wheel speed deviation between the left and right wheels of an axle exceeds 10%. - Wheel speed deviation of the wheel compared to the average front axle wheel speed is greater than 14%.	• Check all tires of the vehicle concerning correct size. • Check the EOL parameters (tire circumference, tooth wheel teeth numbers).
520505 - 14 = Wheel Speed Sensing and Polewheel - Axle 3 Left - special instructions	Impermissable Deviation of Tire Size Detected at Axle 3 Left	When wheel speed deviates from the fastest wheel by more than the allowable limit, the impermissible deviation error shall be reported for the concerned wheel. The software shall monitor the wheel speeds only when the minimum wheel speed is 20 km/h or higher. The software shall report 'impermissible deviation' error for a wheel if the compensated speed of concerned wheel deviates from the maximum compensated wheel speed by more than 10%.	• Check all tires of the vehicle concerning correct size. • Check the EOL parameters (tire circumference, tooth wheel teeth numbers).
520506 - 2 = Wheel Speed Sensing and Polewheel - Axle 3 Right - data erratic, intermittent or incorrect	Wheel Speed Chattering Failure at Axle 3 Right	Undesirable jumps in wheel speed is recognized as chattering. When this behavior of chattering is active for certain time period, the wheel speed chattering fault will be recognized. Detection is only active if vehicle reference speed is more than 15 km/h.	• Check the fitting and mounting of the relevant wheel speed sensor. (Can vibrations cause chattering?) • Check the relevant foundation brake for inadmissible vibrations (return spring defect? brake linings loosened?).
520506 - 7 = Wheel Speed Sensing and Polewheel - Axle 3 Right - mechanical system not responding properly or out of adjustment	Wheel Speed Permanent Slip Failure at Axle 3 Right	When a sensor is left unconnected from tooth wheel assembly, no wheel speeds are measured in this particular wheel resulting in larger slip value on this wheel. This condition will result in permanent slip failure on this wheel. This error detection is possible in three different ways: Source 1: Based on wheel slip signal (lambda signal) from ABS control function. Source 2: Based on wheel speed values. Source 3: When sensor status is invalid due to high frequency signal measured by sensor.	• Check the relevant wheel speed sensor and its fitting. Is the distance between tooth wheel and sensor (air gap) too wide? • Check the wheel speed sensor for correct voltage output. (Is voltage output sufficient?) • If sensor and air gap are correct, contact WABCO North America Customer Care at 855-228-3203.
520506 - 9 = Wheel Speed Sensing and Polewheel - Axle 3 Right - abnormal update rate	Wheel Speed Jump Down Detection at Axle 3 Right	Jump down failure is detected when wheel speed drops suddenly to standstill from higher speeds. The failure can happen because of larger air gap between tooth wheel and sensor or due to sensor getting misaligned while driving.	• Check the relevant wheel speed sensor and its fitting. Is the distance between tooth wheel and sensor (air gap) too wide or is the sensor fitting loose? • If sensor and fitting are correct, contact WABCO North America Customer Care at 855-228-3203.
520506 - 10 = Wheel Speed Sensing and Polewheel - Axle 3 Right - abnormal rate of change	Wheel Speed Jump Up Detection at Axle 3 Right	Larger air gap between sensor and tooth wheel will lead to jump up failure. Jump up failure will be detected when wheels start rotating from standstill.	• Check the relevant wheel speed sensor and its fitting. (Is the sensor fitting loose?) • If sensor and fitting are correct, contact WABCO North America Customer Care at 855-228-3203.

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DTC SPN FMI	Failure Detection Name	Failure Detection Description	Repair
520506 - 13 = Wheel Speed Sensing and Polewheel - Axle 3 Right - out of calibration	Impermissable Tire Size Detected at Axle 3 Right	When deviation of tire size is greater than the allowable limit, the impermissible tire size error shall be set for the concerned wheel. The software shall report 'impermissible tire size error' for a wheel if the minimum of all uncorrected wheel speeds in the vehicle is greater than 20 km/h. When the preconditions are satisfied with any of the following conditions, then the impermissible tire size error shall be set for the concerned wheel: - The difference in correction values between the left and right wheels of an axle exceeds 10%. - Correction value of the wheel is more than 14%. - Wheel speed deviation between the left and right wheels of an axle exceeds 10%. - Wheel speed deviation of the wheel compared to the average front axle wheel speed is greater than 14%.	• Check all tires of the vehicle concerning correct size. • Check the EOL parameters (tire circumference, tooth wheel teeth numbers).
520506 - 14 = Wheel Speed Sensing and Polewheel - Axle 3 Right - special instructions	Impermissable Deviation of Tire Size Detected at Axle 3 Right	When wheel speed deviates from the fastest wheel by more than the allowable limit, the impermissible deviation error shall be reported for the concerned wheel. The software shall monitor the wheel speeds only when the minimum wheel speed is 20 km/h or higher. The software shall report 'impermissible deviation' error for a wheel if the compensated speed of concerned wheel deviates from the maximum compensated wheel speed by more than 10%.	• Check all tires of the vehicle concerning correct size. • Check the EOL parameters (tire circumference, tooth wheel teeth numbers).
520507 - 2 = Wheel Speed Sensing and Polewheel - Axle 4 Left - data erratic, intermittent or incorrect	Wheel Speed Chattering Failure at Axle 4 Left	Undesirable jumps in wheel speed is recognized as chattering. When this behavior of chattering is active for certain time period, the wheel speed chattering fault will be recognized. Detection is only active if vehicle reference speed is more than 15 km/h.	• Check the fitting and mounting of the relevant wheel speed sensor. (Can vibrations cause chattering?) • Check the relevant foundation brake for inadmissible vibrations (return spring defect? brake linings loosened?).
520507 - 7 = Wheel Speed Sensing and Polewheel - Axle 4 Left - mechanical system not responding properly or out of adjustment	Wheel Speed Permanent Slip Failure at Axle 4 Left	When a sensor is left unconnected from tooth wheel assembly, no wheel speeds are measured in this particular wheel resulting in larger slip value on this wheel. This condition will result in permanent slip failure on this wheel. This error detection is possible in three different ways: Source 1: Based on wheel slip signal (lambda signal) from ABS control function. Source 2: Based on wheel speed values. Source 3: When sensor status is invalid due to high frequency signal measured by sensor.	• Check the relevant wheel speed sensor and its fitting. Is the distance between tooth wheel and sensor (air gap) too wide? • Check the wheel speed sensor for correct voltage output. (Is voltage output sufficient?) • If sensor and air gap are correct, contact WABCO North America Customer Care at 855-228-3203.
520507 - 9 = Wheel Speed Sensing and Polewheel - Axle 4 Left - abnormal update rate	Wheel Speed Jump Down Detection at Axle 4 Left	Jump down failure is detected when wheel speed drops suddenly to standstill from higher speeds. The failure can happen because of larger air gap between tooth wheel and sensor or due to sensor getting misaligned while driving.	• Check the relevant wheel speed sensor and its fitting. Is the distance between tooth wheel and sensor (air gap) too wide or is the sensor fitting loose? • If sensor and fitting are correct, contact WABCO North America Customer Care at 855-228-3203.
520507 - 10 = Wheel Speed Sensing and Polewheel - Axle 4 Left - abnormal rate of change	Wheel Speed Jump Up Detection at Axle 4 Left	Larger air gap between sensor and tooth wheel will lead to jump up failure. Jump up failure will be detected when wheels start rotating from standstill.	• Check the relevant wheel speed sensor and its fitting. (Is the sensor fitting loose?) • If sensor and fitting are correct, contact WABCO North America Customer Care at 855-228-3203.

DTC SPN FMI	Failure Detection Name	Failure Detection Description	Repair
520507 - 13 = Wheel Speed Sensing and Polewheel - Axle 4 Left - out of calibration	Impermissable Tire Size Detected at Axle 4 Left	When deviation of tire size is greater than the allowable limit, the impermissible tire size error shall be set for the concerned wheel. The software shall report 'impermissible tire size error' for a wheel if the minimum of all uncorrected wheel speeds in the vehicle is greater than 20 km/h. When the preconditions are satisfied with any of the following conditions, then the impermissible tire size error shall be set for the concerned wheel: - The difference in correction values between the left and right wheels of an axle exceeds 10%. - Correction value of the wheel is more than 14%. - Wheel speed deviation between the left and right wheels of an axle exceeds 10%. - Wheel speed deviation of the wheel compared to the average front axle wheel speed is greater than 14%.	• Check all tires of the vehicle concerning correct size. • Check the EOL parameters (tire circumference, tooth wheel teeth numbers).
520507 - 14 = Wheel Speed Sensing and Polewheel - Axle 4 Left - special instructions	Impermissable Deviation of Tire Size Detected at Axle 4 Left	When wheel speed deviates from the fastest wheel by more than the allowable limit, the impermissible deviation error shall be reported for the concerned wheel. The software shall monitor the wheel speeds only when the minimum wheel speed is 20 km/h or higher. The software shall report 'impermissible deviation' error for a wheel if the compensated speed of concerned wheel deviates from the maximum compensated wheel speed by more than 10%.	• Check all tires of the vehicle concerning correct size. • Check the EOL parameters (tire circumference, tooth wheel teeth numbers).
520508 - 2 = Wheel Speed Sensing and Polewheel - Axle 4 Right - data erratic, intermittent or incorrect	Wheel Speed Chattering Failure at Axle 4 Right	Undesirable jumps in wheel speed is recognized as chattering. When this behavior of chattering is active for certain time period, the wheel speed chattering fault will be recognized. Detection is only active if vehicle reference speed is more than 15 km/h.	• Check the fitting and mounting of the relevant wheel speed sensor. (Can vibrations cause chattering?) • Check the relevant foundation brake for inadmissible vibrations (return spring defect? brake linings loosened?).
520508 - 7 = Wheel Speed Sensing and Polewheel - Axle 4 Right - mechanical system not responding properly or out of adjustment	Wheel Speed Permanent Slip Failure at Axle 4 Right	When a sensor is left unconnected from tooth wheel assembly, no wheel speeds are measured in this particular wheel resulting in larger slip value on this wheel. This condition will result in permanent slip failure on this wheel. This error detection is possible in three different ways: Source 1: Based on wheel slip signal (lambda signal) from ABS control function. Source 2: Based on wheel speed values. Source 3: When sensor status is invalid due to high frequency signal measured by sensor.	• Check the relevant wheel speed sensor and its fitting. Is the distance between tooth wheel and sensor (air gap) too wide? • Check the wheel speed sensor for correct voltage output. (Is voltage output sufficient?) • If sensor and air gap are correct, contact WABCO North America Customer Care at 855-228-3203.
520508 - 9 = Wheel Speed Sensing and Polewheel - Axle 4 Right - abnormal update rate	Wheel Speed Jump Down Detection at Axle 4 Right	Jump down failure is detected when wheel speed drops suddenly to standstill from higher speeds. The failure can happen because of larger air gap between tooth wheel and sensor or due to sensor getting misaligned while driving.	• Check the relevant wheel speed sensor and its fitting. Is the distance between tooth wheel and sensor (air gap) too wide or is the sensor fitting loose? • If sensor and fitting are correct, contact WABCO North America Customer Care at 855-228-3203.
520508 - 10 = Wheel Speed Sensing and Polewheel - Axle 4 Right - abnormal rate of change	Wheel Speed Jump Up Detection at Axle 4 Right	Larger air gap between sensor and tooth wheel will lead to jump up failure. Jump up failure will be detected when wheels start rotating from standstill.	• Check the relevant wheel speed sensor and its fitting. (Is the sensor fitting loose?) • If sensor and fitting are correct, contact WABCO North America Customer Care at 855-228-3203.

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DTC SPN FMI	Failure Detection Name	Failure Detection Description	Repair
520508 - 13 = Wheel Speed Sensing and Polewheel - Axle 4 Right - out of calibration	Impermissable Tire Size Detected at Axle 4 Right	When deviation of tire size is greater than the allowable limit, the impermissible tire size error shall be set for the concerned wheel. The software shall report 'impermissible tire size error' for a wheel if the minimum of all uncorrected wheel speeds in the vehicle is greater than 20 km/h. When the preconditions are satisfied with any of the following conditions, then the impermissible tire size error shall be set for the concerned wheel: - The difference in correction values between the left and right wheels of an axle exceeds 10%. - Correction value of the wheel is more than 14%. - Wheel speed deviation between the left and right wheels of an axle exceeds 10%. - Wheel speed deviation of the wheel compared to the average front axle wheel speed is greater than 14%.	• Check all tires of the vehicle concerning correct size. • Check the EOL parameters (tire circumference, tooth wheel teeth numbers).
520508 - 14 = Wheel Speed Sensing and Polewheel - Axle 4 Right - special instructions	Impermissable Deviation of Tire Size Detected at Axle 4 Right	When wheel speed deviates from the fastest wheel by more than the allowable limit, the impermissible deviation error shall be reported for the concerned wheel. The software shall monitor the wheel speeds only when the minimum wheel speed is 20 km/h or higher. The software shall report 'impermissible deviation' error for a wheel if the compensated speed of concerned wheel deviates from the maximum compensated wheel speed by more than 10%.	• Check all tires of the vehicle concerning correct size. • Check the EOL parameters (tire circumference, tooth wheel teeth numbers).
520509 - 2 = Wheel Speed Sensing and Polewheel - Axle 5 Left - data erratic, intermittent or incorrect	Wheel Speed Chattering Failure at Axle 5 Left	Undesirable jumps in wheel speed is recognized as chattering. When this behavior of chattering is active for certain time period, the wheel speed chattering fault will be recognized. Detection is only active if vehicle reference speed is more than 15 km/h.	• Check the fitting and mounting of the relevant wheel speed sensor. (Can vibrations cause chattering?) • Check the relevant foundation brake for inadmissible vibrations (return spring defect? brake linings loosened?).
520509 - 7 = Wheel Speed Sensing and Polewheel - Axle 5 Left - mechanical system not responding properly or out of adjustment	Wheel Speed Permanent Slip Failure at Axle 5 Left	When a sensor is left unconnected from tooth wheel assembly, no wheel speeds are measured in this particular wheel resulting in larger slip value on this wheel. This condition will result in permanent slip failure on this wheel. This error detection is possible in three different ways: Source 1: Based on wheel slip signal (lambda signal) from ABS control function. Source 2: Based on wheel speed values. Source 3: When sensor status is invalid due to high frequency signal measured by sensor.	• Check the relevant wheel speed sensor and its fitting. Is the distance between tooth wheel and sensor (air gap) too wide? • Check the wheel speed sensor for correct voltage output. (Is voltage output sufficient?) • If sensor and air gap are correct, contact WABCO North America Customer Care at 855-228-3203.
520509 - 9 = Wheel Speed Sensing and Polewheel - Axle 5 Left - abnormal update rate	Wheel Speed Jump Down Detection at Axle 5 Left	Jump down failure is detected when wheel speed drops suddenly to standstill from higher speeds. The failure can happen because of larger air gap between tooth wheel and sensor or due to sensor getting misaligned while driving.	• Check the relevant wheel speed sensor and its fitting. Is the distance between tooth wheel and sensor (air gap) too wide or is the sensor fitting loose? • If sensor and fitting are correct, contact WABCO North America Customer Care at 855-228-3203.
520509 - 10 = Wheel Speed Sensing and Polewheel - Axle 5 Left - abnormal rate of change	Wheel Speed Jump Up Detection at Axle 5 Left	Larger air gap between sensor and tooth wheel will lead to jump up failure. Jump up failure will be detected when wheels start rotating from standstill.	• Check the relevant wheel speed sensor and its fitting. (Is the sensor fitting loose?) • If sensor and fitting are correct, contact WABCO North America Customer Care at 855-228-3203.

DTC SPN FMI	Failure Detection Name	Failure Detection Description	Repair
520509 - 13 = Wheel Speed Sensing and Polewheel - Axle 5 Left - out of calibration	Impermissable Tire Size Detected at Axle 5 Left	When deviation of tire size is greater than the allowable limit, the impermissible tire size error shall be set for the concerned wheel. The software shall report 'impermissible tire size error' for a wheel if the minimum of all uncorrected wheel speeds in the vehicle is greater than 20 km/h. When the preconditions are satisfied with any of the following conditions, then the impermissible tire size error shall be set for the concerned wheel: - The difference in correction values between the left and right wheels of an axle exceeds 10%. - Correction value of the wheel is more than 14%. - Wheel speed deviation between the left and right wheels of an axle exceeds 10%. - Wheel speed deviation of the wheel compared to the average front axle wheel speed is greater than 14%.	• Check all tires of the vehicle concerning correct size. • Check the EOL parameters (tire circumference, tooth wheel teeth numbers).
520509 - 14 = Wheel Speed Sensing and Polewheel - Axle 5 Left - special instructions	Impermissable Deviation of Tire Size Detected at Axle 5 Left	When wheel speed deviates from the fastest wheel by more than the allowable limit, the impermissible deviation error shall be reported for the concerned wheel. The software shall monitor the wheel speeds only when the minimum wheel speed is 20 km/h or higher. The software shall report 'impermissible deviation' error for a wheel if the compensated speed of concerned wheel deviates from the maximum compensated wheel speed by more than 10%.	• Check all tires of the vehicle concerning correct size. • Check the EOL parameters (tire circumference, tooth wheel teeth numbers).
520510 - 2 = Wheel Speed Sensing and Polewheel - Axle 5 Right - data erratic, intermittent or incorrect	Wheel Speed Chattering Failure at Axle 5 Right	Undesirable jumps in wheel speed is recognized as chattering. When this behavior of chattering is active for certain time period, the wheel speed chattering fault will be recognized. Detection is only active if vehicle reference speed is more than 15 km/h.	• Check the fitting and mounting of the relevant wheel speed sensor. (Can vibrations cause chattering?) • Check the relevant foundation brake for inadmissible vibrations (return spring defect? brake linings loosened?).
520510 - 7 = Wheel Speed Sensing and Polewheel - Axle 5 Right - mechanical system not responding properly or out of adjustment	Wheel Speed Permanent Slip Failure at Axle 5 Right	When a sensor is left unconnected from tooth wheel assembly, no wheel speeds are measured in this particular wheel resulting in larger slip value on this wheel. This condition will result in permanent slip failure on this wheel. This error detection is possible in three different ways: Source 1: Based on wheel slip signal (lambda signal) from ABS control function. Source 2: Based on wheel speed values. Source 3: When sensor status is invalid due to high frequency signal measured by sensor.	• Check the relevant wheel speed sensor and its fitting. Is the distance between tooth wheel and sensor (air gap) too wide? • Check the wheel speed sensor for correct voltage output. (Is voltage output sufficient?) • If sensor and air gap are correct, contact WABCO North America Customer Care at 855-228-3203.
520510 - 9 = Wheel Speed Sensing and Polewheel - Axle 5 Right - abnormal update rate	Wheel Speed Jump Down Detection at Axle 5 Right	Jump down failure is detected when wheel speed drops suddenly to standstill from higher speeds. The failure can happen because of larger air gap between tooth wheel and sensor or due to sensor getting misaligned while driving.	• Check the relevant wheel speed sensor and its fitting. Is the distance between tooth wheel and sensor (air gap) too wide or is the sensor fitting loose? • If sensor and air gap are correct, contact WABCO North America Customer Care at 855-228-3203.
520510 - 10 = Wheel Speed Sensing and Polewheel - Axle 5 Right - abnormal rate of change	Wheel Speed Jump Up Detection at Axle 5 Right	Larger air gap between sensor and tooth wheel will lead to jump up failure. Jump up failure will be detected when wheels start rotating from standstill.	• Check the relevant wheel speed sensor and its fitting. (Is the sensor fitting loose?) • If sensor and air gap are correct, contact WABCO North America Customer Care at 855-228-3203.

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DTC SPN FMI	Failure Detection Name	Failure Detection Description	Repair
520510 - 13 = Wheel Speed Sensing and Polewheel - Axle 5 Right - out of calibration	Impermissable Tire Size Detected at Axle 5 Right	When deviation of tire size is greater than the allowable limit, the impermissible tire size error shall be set for the concerned wheel. The software shall report 'impermissible tire size error' for a wheel if the minimum of all uncorrected wheel speeds in the vehicle is greater than 20 km/h. When the preconditions are satisfied with any of the following conditions, then the impermissible tire size error shall be set for the concerned wheel: - The difference in correction values between the left and right wheels of an axle exceeds 10%. - Correction value of the wheel is more than 14%. - Wheel speed deviation between the left and right wheels of an axle exceeds 10%. - Wheel speed deviation of the wheel compared to the average front axle wheel speed is greater than 14%.	• Check all tires of the vehicle concerning correct size. • Check the EOL parameters (tire circumference, tooth wheel teeth numbers).
520510 - 14 = Wheel Speed Sensing and Polewheel - Axle 5 Right - special instructions	Impermissable Deviation of Tire Size Detected at Axle 5 Right	When wheel speed deviates from the fastest wheel by more than the allowable limit, the impermissible deviation error shall be reported for the concerned wheel. The software shall monitor the wheel speeds only when the minimum wheel speed is 20 km/h or higher. The software shall report 'impermissible deviation' error for a wheel if the compensated speed of concerned wheel deviates from the maximum compensated wheel speed by more than 10%.	• Check all tires of the vehicle concerning correct size. • Check the EOL parameters (tire circumference, tooth wheel teeth numbers).
520511 - 2 = Wheel Speed Sensing and Polewheel - Axle 6 Left - data erratic, intermittent or incorrect	Wheel Speed Chattering Failure at Axle 6 Left	Undesirable jumps in wheel speed is recognized as chattering. When this behavior of chattering is active for certain time period, the wheel speed chattering fault will be recognized. Detection is only active if vehicle reference speed is more than 15 km/h.	• Check the fitting and mounting of the relevant wheel speed sensor. (Can vibrations cause chattering?) • Check the relevant foundation brake for inadmissible vibrations (return spring defect? brake linings loosened?).
520511 - 7 = Wheel Speed Sensing and Polewheel - Axle 6 Left - mechanical system not responding properly or out of adjustment	Wheel Speed Permanent Slip Failure at Axle 6 Left	When a sensor is left unconnected from tooth wheel assembly, no wheel speeds are measured in this particular wheel resulting in larger slip value on this wheel. This condition will result in permanent slip failure on this wheel. This error detection is possible in three different ways: Source 1: Based on wheel slip signal (lambda signal) from ABS control function. Source 2: Based on wheel speed values. Source 3: When sensor status is invalid due to high frequency signal measured by sensor.	• Check the relevant wheel speed sensor and its fitting. Is the distance between tooth wheel and sensor (air gap) too wide? • Check the wheel speed sensor for correct voltage output. (Is voltage output sufficient?) • If sensor and air gap are correct, contact WABCO North America Customer Care at 855-228-3203.
520511 - 9 = Wheel Speed Sensing and Polewheel - Axle 6 Left - abnormal update rate	Wheel Speed Jump Down Detection at Axle 6 Left	Jump down failure is detected when wheel speed drops suddenly to standstill from higher speeds. The failure can happen because of larger air gap between tooth wheel and sensor or due to sensor getting misaligned while driving.	• Check the relevant wheel speed sensor and its fitting. Is the distance between tooth wheel and sensor (air gap) too wide or is the sensor fitting loose? • If sensor and air gap are correct, contact WABCO North America Customer Care at 855-228-3203.
520511 - 10 = Wheel Speed Sensing and Polewheel - Axle 6 Left - abnormal rate of change	Wheel Speed Jump Up Detection at Axle 6 Left	Larger air gap between sensor and tooth wheel will lead to jump up failure. Jump up failure will be detected when wheels start rotating from standstill.	• Check the relevant wheel speed sensor and its fitting. (Is the sensor fitting loose?) • If sensor and air gap are correct, contact WABCO North America Customer Care at 855-228-3203.

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DTC SPN FMI	Failure Detection Name	Failure Detection Description	Repair
520511 - 13 = Wheel Speed Sensing and Polewheel - Axle 6 Left - out of calibration	Impermissable Tire Size Detected at Axle 6 Left	When deviation of tire size is greater than the allowable limit, the impermissible tire size error shall be set for the concerned wheel. The software shall report 'impermissible tire size error' for a wheel if the minimum of all uncorrected wheel speeds in the vehicle is greater than 20 km/h. When the preconditions are satisfied with any of the following conditions, then the impermissible tire size error shall be set for the concerned wheel: - The difference in correction values between the left and right wheels of an axle exceeds 10%. - Correction value of the wheel is more than 14%. - Wheel speed deviation between the left and right wheels of an axle exceeds 10%. - Wheel speed deviation of the wheel compared to the average front axle wheel speed is greater than 14%.	• Check all tires of the vehicle concerning correct size. • Check the EOL parameters (tire circumference, tooth wheel teeth numbers).
520511 - 14 = Wheel Speed Sensing and Polewheel - Axle 6 Left - special instructions	Impermissable Deviation of Tire Size Detected at Axle 6 Left	When wheel speed deviates from the fastest wheel by more than the allowable limit, the impermissible deviation error shall be reported for the concerned wheel. The software shall monitor the wheel speeds only when the minimum wheel speed is 20 km/h or higher. The software shall report 'impermissible deviation' error for a wheel if the compensated speed of concerned wheel deviates from the maximum compensated wheel speed by more than 10%.	• Check all tires of the vehicle concerning correct size. • Check the EOL parameters (tire circumference, tooth wheel teeth numbers).
520512 - 2 = Wheel Speed Sensing and Polewheel - Axle 6 Right - data erratic, intermittent or incorrect	Wheel Speed Chattering Failure at Axle 6 Right	Undesirable jumps in wheel speed is recognized as chattering. When this behavior of chattering is active for certain time period, the wheel speed chattering fault will be recognized. Detection is only active if vehicle reference speed is more than 15 km/h.	• Check the fitting and mounting of the relevant wheel speed sensor. (Can vibrations cause chattering?) • Check the relevant foundation brake for inadmissible vibrations (return spring defect? brake linings loosened?).
520512 - 7 = Wheel Speed Sensing and Polewheel - Axle 6 Right - mechanical system not responding properly or out of adjustment	Wheel Speed Permanent Slip Failure at Axle 6 Right	When a sensor is left unconnected from tooth wheel assembly, no wheel speeds are measured in this particular wheel resulting in larger slip value on this wheel. This condition will result in permanent slip failure on this wheel. This error detection is possible in three different ways: Source 1: Based on wheel slip signal (lambda signal) from ABS control function. Source 2: Based on wheel speed values. Source 3: When sensor status is invalid due to high frequency signal measured by sensor.	• Check the relevant wheel speed sensor and its fitting. Is the distance between tooth wheel and sensor (air gap) too wide? • Check the wheel speed sensor for correct voltage output. (Is voltage output sufficient?) • If sensor and air gap are correct, contact WABCO North America Customer Care at 855-228-3203.
520512 - 9 = Wheel Speed Sensing and Polewheel - Axle 6 Right - abnormal update rate	Wheel Speed Jump Down Detection at Axle 6 Right	Jump down failure is detected when wheel speed drops suddenly to standstill from higher speeds. The failure can happen because of larger air gap between tooth wheel and sensor or due to sensor getting misaligned while driving.	• Check the relevant wheel speed sensor and its fitting. Is the distance between tooth wheel and sensor (air gap) too wide or is the sensor fitting loose? • If sensor and air gap are correct, contact WABCO North America Customer Care at 855-228-3203.
520512 - 10 = Wheel Speed Sensing and Polewheel - Axle 6 Right - abnormal rate of change	Wheel Speed Jump Up Detection at Axle 6 Right	Larger air gap between sensor and tooth wheel will lead to jump up failure. Jump up failure will be detected when wheels start rotating from standstill.	• Check the relevant wheel speed sensor and its fitting. (Is the sensor fitting loose?) • If sensor and air gap are correct, contact WABCO North America Customer Care at 855-228-3203.

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DTC SPN FMI	Failure Detection Name	Failure Detection Description	Repair
520512 - 13 = Wheel Speed Sensing and Polewheel - Axle 6 Right - out of calibration	Impermissable Tire Size Detected at Axle 6 Right	When deviation of tire size is greater than the allowable limit, the impermissible tire size error shall be set for the concerned wheel. The software shall report 'impermissible tire size error' for a wheel if the minimum of all uncorrected wheel speeds in the vehicle is greater than 20 km/h. When the preconditions are satisfied with any of the following conditions, then the impermissible tire size error shall be set for the concerned wheel: - The difference in correction values between the left and right wheels of an axle exceeds 10%. - Correction value of the wheel is more than 14%. - Wheel speed deviation between the left and right wheels of an axle exceeds 10%. - Wheel speed deviation of the wheel compared to the average front axle wheel speed is greater than 14%.	• Check all tires of the vehicle concerning correct size. • Check the EOL parameters (tire circumference, tooth wheel teeth numbers).
520512 - 14 = Wheel Speed Sensing and Polewheel - Axle 6 Right - special instructions	Impermissable Deviation of Tire Size Detected at Axle 6 Right	When wheel speed deviates from the fastest wheel by more than the allowable limit, the impermissible deviation error shall be reported for the concerned wheel. The software shall monitor the wheel speeds only when the minimum wheel speed is 20 km/h or higher. The software shall report 'impermissible deviation' error for a wheel if the compensated speed of concerned wheel deviates from the maximum compensated wheel speed by more than 10%.	• Check all tires of the vehicle concerning correct size. • Check the EOL parameters (tire circumference, tooth wheel teeth numbers).
520513 - 2 = Wheel Speed Sensing and Polewheel - Axle 7 Left - data erratic, intermittent or incorrect	Wheel Speed Chattering Failure at Axle 7 Left	Undesirable jumps in wheel speed is recognized as chattering. When this behavior of chattering is active for certain time period, the wheel speed chattering fault will be recognized. Detection is only active if vehicle reference speed is more than 15 km/h.	• Check the fitting and mounting of the relevant wheel speed sensor. (Can vibrations cause chattering?) • Check the relevant foundation brake for inadmissible vibrations (return spring defect? brake linings loosened?).
520513 - 7 = Wheel Speed Sensing and Polewheel - Axle 7 Left - mechanical system not responding properly or out of adjustment	Wheel Speed Permanent Slip Failure at Axle 7 Left	When a sensor is left unconnected from tooth wheel assembly, no wheel speeds are measured in this particular wheel resulting in larger slip value on this wheel. This condition will result in permanent slip failure on this wheel. This error detection is possible in three different ways: Source 1: Based on wheel slip signal (lambda signal) from ABS control function. Source 2: Based on wheel speed values. Source 3: When sensor status is invalid due to high frequency signal measured by sensor.	• Check the relevant wheel speed sensor and its fitting. Is the distance between tooth wheel and sensor (air gap) too wide? • Check the wheel speed sensor for correct voltage output. (Is voltage output sufficient?) • If sensor and air gap are correct, contact WABCO North America Customer Care at 855-228-3203.
520513 - 9 = Wheel Speed Sensing and Polewheel - Axle 7 Left - abnormal update rate	Wheel Speed Jump Down Detection at Axle 7 Left	Jump down failure is detected when wheel speed drops suddenly to standstill from higher speeds. The failure can happen because of larger air gap between tooth wheel and sensor or due to sensor getting misaligned while driving.	• Check the relevant wheel speed sensor and its fitting. Is the distance between tooth wheel and sensor (air gap) too wide or is the sensor fitting loose? • If sensor and air gap are correct, contact WABCO North America Customer Care at 855-228-3203.
520513 - 10 = Wheel Speed Sensing and Polewheel - Axle 7 Left - abnormal rate of change	Wheel Speed Jump Up Detection at Axle 7 Left	Larger air gap between sensor and tooth wheel will lead to jump up failure. Jump up failure will be detected when wheels start rotating from standstill.	• Check the relevant wheel speed sensor and its fitting. (Is the sensor fitting loose?) • If sensor and air gap are correct, contact WABCO North America Customer Care at 855-228-3203.

DTC SPN FMI	Failure Detection Name	Failure Detection Description	Repair
520513 - 13 = Wheel Speed Sensing and Polewheel - Axle 7 Left - out of calibration	Impermissable Tire Size Detected at Axle 7 Left	When deviation of tire size is greater than the allowable limit, the impermissible tire size error shall be set for the concerned wheel. The software shall report 'impermissible tire size error' for a wheel if the minimum of all uncorrected wheel speeds in the vehicle is greater than 20 km/h. When the preconditions are satisfied with any of the following conditions, then the impermissible tire size error shall be set for the concerned wheel: - The difference in correction values between the left and right wheels of an axle exceeds 10%. - Correction value of the wheel is more than 14%. - Wheel speed deviation between the left and right wheels of an axle exceeds 10%. - Wheel speed deviation of the wheel compared to the average front axle wheel speed is greater than 14%.	• Check all tires of the vehicle concerning correct size. • Check the EOL parameters (tire circumference, tooth wheel teeth numbers).
520513 - 14 = Wheel Speed Sensing and Polewheel - Axle 7 Left - special instructions	Impermissable Deviation of Tire Size Detected at Axle 7 Left	When wheel speed deviates from the fastest wheel by more than the allowable limit, the impermissible deviation error shall be reported for the concerned wheel. The software shall monitor the wheel speeds only when the minimum wheel speed is 20 km/h or higher. The software shall report 'impermissible deviation' error for a wheel if the compensated speed of concerned wheel deviates from the maximum compensated wheel speed by more than 10%.	• Check all tires of the vehicle concerning correct size. • Check the EOL parameters (tire circumference, tooth wheel teeth numbers).
520514 - 2 = Wheel Speed Sensing and Polewheel - Axle 7 Right - data erratic, intermittent or incorrect	Wheel Speed Chattering Failure at Axle 7 Right	Undesirable jumps in wheel speed is recognized as chattering. When this behavior of chattering is active for certain time period, the wheel speed chattering fault will be recognized. Detection is only active if vehicle reference speed is more than 15 km/h.	• Check the fitting and mounting of the relevant wheel speed sensor. (Can vibrations cause chattering?) • Check the relevant foundation brake for inadmissible vibrations (return spring defect? brake linings loosened?).
520514 - 7 = Wheel Speed Sensing and Polewheel - Axle 7 Right - mechanical system not responding properly or out of adjustment	Wheel Speed Permanent Slip Failure at Axle 7 Right	When a sensor is left unconnected from tooth wheel assembly, no wheel speeds are measured in this particular wheel resulting in larger slip value on this wheel. This condition will result in permanent slip failure on this wheel. This error detection is possible in three different ways: Source 1: Based on wheel slip signal (lambda signal) from ABS control function. Source 2: Based on wheel speed values. Source 3: When sensor status is invalid due to high frequency signal measured by sensor.	• Check the relevant wheel speed sensor and its fitting. Is the distance between tooth wheel and sensor (air gap) too wide? • Check the wheel speed sensor for correct voltage output. (Is voltage output sufficient?) • If sensor and air gap are correct, contact WABCO North America Customer Care at 855-228-3203.
520514 - 9 = Wheel Speed Sensing and Polewheel - Axle 7 Right - abnormal update rate	Wheel Speed Jump Down Detection at Axle 7 Right	Jump down failure is detected when wheel speed drops suddenly to standstill from higher speeds. The failure can happen because of larger air gap between tooth wheel and sensor or due to sensor getting misaligned while driving.	• Check the relevant wheel speed sensor and its fitting. Is the distance between tooth wheel and sensor (air gap) too wide or is the sensor fitting loose? • If sensor and air gap are correct, contact WABCO North America Customer Care at 855-228-3203.
520514 - 10 = Wheel Speed Sensing and Polewheel - Axle 7 Right - abnormal rate of change	Wheel Speed Jump Up Detection at Axle 7 Right	Larger air gap between sensor and tooth wheel will lead to jump up failure. Jump up failure will be detected when wheels start rotating from standstill.	• Check the relevant wheel speed sensor and its fitting. (Is the sensor fitting loose?) • If sensor and air gap are correct, contact WABCO North America Customer Care at 855-228-3203.

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DTC SPN FMI	Failure Detection Name	Failure Detection Description	Repair
520514 - 13 = Wheel Speed Sensing and Polewheel - Axle 7 Right - out of calibration	Impermissable Tire Size Detected at Axle 7 Right	When deviation of tire size is greater than the allowable limit, the impermissible tire size error shall be set for the concerned wheel. The software shall report 'impermissible tire size error' for a wheel if the minimum of all uncorrected wheel speeds in the vehicle is greater than 20 km/h.When the preconditions are satisfied with any of the following conditions, then the impermissible tire size error shall be set for the concerned wheel: - The difference in correction values between the left and right wheels of an axle exceeds 10%. - Correction value of the wheel is more than 14%. - Wheel speed deviation between the left and right wheels of an axle exceeds 10%. - Wheel speed deviation of the wheel compared to the average front axle wheel speed is greater than 14%.	• Check all tires of the vehicle concerning correct size. • Check the EOL parameters (tire circumference, tooth wheel teeth numbers).
520514 - 14 = Wheel Speed Sensing and Polewheel - Axle 7 Right - special instructions	Impermissable Deviation of Tire Size Detected at Axle 7 Right	When wheel speed deviates from the fastest wheel by more than the allowable limit, the impermissible deviation error shall be reported for the concerned wheel. The software shall monitor the wheel speeds only when the minimum wheel speed is 20 km/h or higher. The software shall report 'impermissible deviation' error for a wheel if the compensated speed of concerned wheel deviates from the maximum compensated wheel speed by more than 10%.	• Check all tires of the vehicle concerning correct size. • Check the EOL parameters (tire circumference, tooth wheel teeth numbers).
520515 - 2 = Wheel Speed Sensing and Polewheel - Axle 8 Left - data erratic, intermittent or incorrect	Wheel Speed Chattering Failure at Axle 8 Left	Undesirable jumps in wheel speed is recognized as chattering. When this behavior of chattering is active for certain time period, the wheel speed chattering fault will be recognized. Detection is only active if vehicle reference speed is more than 15 km/h.	• Check the fitting and mounting of the relevant wheel speed sensor. (Can vibrations cause chattering?) • Check the relevant foundation brake for inadmissible vibrations (return spring defect? brake linings loosened?).
520515 - 7 = Wheel Speed Sensing and Polewheel - Axle 8 Left - mechanical system not responding properly or out of adjustment	Wheel Speed Permanent Slip Failure at Axle 8 Left	When a sensor is left unconnected from tooth wheel assembly, no wheel speeds are measured in this particular wheel resulting in larger slip value on this wheel. This condition will result in permanent slip failure on this wheel. This error detection is possible in three different ways: Source 1: Based on wheel slip signal (lambda signal) from ABS control function. Source 2: Based on wheel speed values. Source 3: When sensor status is invalid due to high frequency signal measured by sensor.	• Check the relevant wheel speed sensor and its fitting. Is the distance between tooth wheel and sensor (air gap) too wide? • Check the wheel speed sensor for correct voltage output. (Is voltage output sufficient?) • Contact WABCO North America Customer Care at 855-228-3203.
520515 - 9 = Wheel Speed Sensing and Polewheel - Axle 8 Left - abnormal update rate	Wheel Speed Jump Down Detection at Axle 8 Left	Jump down failure is detected when wheel speed drops suddenly to standstill from higher speeds. The failure can happen because of larger air gap between tooth wheel and sensor or due to sensor getting misaligned while driving.	• Check the relevant wheel speed sensor and its fitting. Is the distance between tooth wheel and sensor (air gap) too wide or is the sensor fitting loose? • Contact WABCO North America Customer Care at 855-228-3203.
520515 - 10 = Wheel Speed Sensing and Polewheel - Axle 8 Left - abnormal rate of change	Wheel Speed Jump Up Detection at Axle 8 Left	Larger air gap between sensor and tooth wheel will lead to jump up failure. Jump up failure will be detected when wheels start rotating from standstill.	• Check the relevant wheel speed sensor and its fitting. Is the sensor fitting loose? • Contact WABCO North America Customer Care at 855-228-3203.

DTC SPN FMI	Failure Detection Name	Failure Detection Description	Repair
520515 - 13 = Wheel Speed Sensing and Polewheel - Axle 8 Left - out of calibration	Impermissable Tire Size Detected at Axle 8 Left	When deviation of tire size is greater than the allowable limit, the impermissible tire size error shall be set for the concerned wheel. The software shall report 'impermissible tire size error' for a wheel if the minimum of all uncorrected wheel speeds in the vehicle is greater than 20 km/h. When the preconditions are satisfied with any of the following conditions, then the impermissible tire size error shall be set for the concerned wheel: - The difference in correction values between the left and right wheels of an axle exceeds 10%. - Correction value of the wheel is more than 14%. - Wheel speed deviation between the left and right wheels of an axle exceeds 10%. - Wheel speed deviation of the wheel compared to the average front axle wheel speed is greater than 14%.	• Check all tires of the vehicle concerning correct size. • Check the EOL parameters (tire circumference, tooth wheel teeth numbers).
520515 - 14 = Wheel Speed Sensing and Polewheel - Axle 8 Left - special instructions	Impermissable Deviation of Tire Size Detected at Axle 8 Left	When wheel speed deviates from the fastest wheel by more than the allowable limit, the impermissible deviation error shall be reported for the concerned wheel. The software shall monitor the wheel speeds only when the minimum wheel speed is 20 km/h or higher. The software shall report 'impermissible deviation' error for a wheel if the compensated speed of concerned wheel deviates from the maximum compensated wheel speed by more than 10%.	• Check all tires of the vehicle concerning correct size. • Check the EOL parameters (tire circumference, tooth wheel teeth numbers).
520516 - 2 = Wheel Speed Sensing and Polewheel - Axle 8 Right - data erratic, intermittent or incorrect	Wheel Speed Chattering Failure at Axle 8 Right	Undesirable jumps in wheel speed is recognized as chattering. When this behavior of chattering is active for certain time period, the wheel speed chattering fault will be recognized. Detection is only active if vehicle reference speed is more than 15 km/h.	• Check the fitting and mounting of the relevant wheel speed sensor. (Can vibrations cause chattering?) • Check the relevant foundation brake for inadmissible vibrations (return spring defect? brake linings loosened?).
520516 - 7 = Wheel Speed Sensing and Polewheel - Axle 8 Right - mechanical system not responding properly or out of adjustment	Wheel Speed Permanent Slip Failure at Axle 8 Right	When a sensor is left unconnected from tooth wheel assembly, no wheel speeds are measured in this particular wheel resulting in larger slip value on this wheel. This condition will result in permanent slip failure on this wheel. This error detection is possible in three different ways: Source 1: Based on wheel slip signal (lambda signal) from ABS control function. Source 2: Based on wheel speed values. Source 3: When sensor status is invalid due to high frequency signal measured by sensor.	• Check the relevant wheel speed sensor and its fitting. Is the distance between tooth wheel and sensor (air gap) too wide? • Check the wheel speed sensor for correct voltage output. (Is voltage output sufficient?) • If sensor and air gap are correct, contact WABCO North America Customer Care at 855-228-3203.
520516 - 9 = Wheel Speed Sensing and Polewheel - Axle 8 Right - abnormal update rate	Wheel Speed Jump Down Detection at Axle 8 Right	Jump down failure is detected when wheel speed drops suddenly to standstill from higher speeds. The failure can happen because of larger air gap between tooth wheel and sensor or due to sensor getting misaligned while driving.	• Check the relevant wheel speed sensor and its fitting. Is the distance between tooth wheel and sensor (air gap) too wide or is the sensor fitting loose? • If sensor and fitting are correct, contact WABCO North America Customer Care at 855-228-3203.
520516 - 10 = Wheel Speed Sensing and Polewheel - Axle 8 Right - abnormal rate of change	Wheel Speed Jump Up Detection at Axle 8 Right	Larger air gap between sensor and tooth wheel will lead to jump up failure. Jump up failure will be detected when wheels start rotating from standstill.	• Check the relevant wheel speed sensor and its fitting. (Is the sensor fitting loose?) • If sensor and fitting are correct, contact WABCO North America Customer Care at 855-228-3203.

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DTC SPN FMI	Failure Detection Name	Failure Detection Description	Repair
520516 - 13 = Wheel Speed Sensing and Polewheel - Axle 8 Right - out of calibration	Impermissable Tire Size Detected at Axle 8 Right	When deviation of tire size is greater than the allowable limit, the impermissible tire size error shall be set for the concerned wheel. The software shall report 'impermissible tire size error' for a wheel if the minimum of all uncorrected wheel speeds in the vehicle is greater than 20 km/h. When the preconditions are satisfied with any of the following conditions, then the impermissible tire size error shall be set for the concerned wheel: - The difference in correction values between the left and right wheels of an axle exceeds 10%. - Correction value of the wheel is more than 14%. - Wheel speed deviation between the left and right wheels of an axle exceeds 10%. - Wheel speed deviation of the wheel compared to the average front axle wheel speed is greater than 14%.	• Check all tires of the vehicle concerning correct size. • Check the EOL parameters (tire circumference, tooth wheel teeth numbers).
520516 - 14 = Wheel Speed Sensing and Polewheel - Axle 8 Right - special instructions	Impermissable Deviation of Tire Size Detected at Axle 8 Right	When wheel speed deviates from the fastest wheel by more than the allowable limit, the impermissible deviation error shall be reported for the concerned wheel. The software shall monitor the wheel speeds only when the minimum wheel speed is 20 km/h or higher. The software shall report 'impermissible deviation' error for a wheel if the compensated speed of concerned wheel deviates from the maximum compensated wheel speed by more than 10%.	• Check all tires of the vehicle concerning correct size. • Check the EOL parameters (tire circumference, tooth wheel teeth numbers).
520517 - 13 = Tire Size Compensation - Memorybit or Parameterfailure - out of calibration	Parameter error of wheel diameters and polewheel teeth number	When the configured tire circumference of a wheel is beyond the defined limits for the configured tooth wheel teeth count or if the tooth wheel teeth count is invalid, this error shall be set.	• Check the relevant EOL parameters and correct them.
520517 - 31 = Tire Size Compensation - Memorybit or Parameterfailure - condition exists	Tire Size Compensation Memory Bit	If an 'impermissible Tire Size' error is detected by Tsc in the current ignition cycle, the error information should be stored for use in future ignition cycles. The module shall report 'TscMemoryBitError' if the storage parameter 'PRMstTireAdjmtMemBit' is set and if any of the following conditions is satisfied: 1. A correction value reset request is not received till 120 ms since ignition ON. 2. A correction value reset request is present even after 480 ms since ignition ON.	• This DTC only indicates that another failure in the wheel speed sensing was detected before. It is necessary to repair the wheel speed failures that are stored in the failure memory.
520520 - 3 = ABS Ground (Front Axle) - voltage above normal or shorted high	Failure detection 'ShortUb' at AbsGround (Front Axle)	A short circuit to high level at the relevant lowside-switch is detected after 150 ms.	• Check wiring of relevant valves/actuators. (Is there a short circuit?) • Contact WABCO North America Customer Care at 855-228-3203.
520520 - 4 = ABS Ground (Front Axle) - voltage below normal or shorted low	Failure detection 'ShortGnd' at AbsGround (Front Axle)	A short circuit to permanent GND-level at the relevant lowside-switch is detected: - After 150 ms (if the lowside switch is open). - After 2000 ms (if the lowside switch is closed).	• Check wiring of relevant valves/actuators. (Is there a short circuit?) • Check relevant valves/actuators. (Is there an internal short circuit?) • Contact WABCO North America Customer Care at 855-228-3203.
520521 - 3 = ABS Ground (Drive Axle) - voltage above normal or shorted high	Failure detection 'ShortUb' at AbsGround (Drive Axle)	A short circuit to high level at the relevant lowside-switch is detected after 150 ms.	• Check wiring of relevant valves/actuators. (Is there a short circuit?) • Contact WABCO North America Customer Care at 855-228-3203.

DTC SPN FMI	Failure Detection Name	Failure Detection Description	Repair
520521 - 4 = ABS Ground (Drive Axle) - voltage below normal or shorted low	Failure detection 'ShortGnd' at AbsGround (Drive Axle)	A short circuit to permanent GND-level at the relevant lowside-switch is detected: - After 150 ms (if the lowside switch is open). - After 2000 ms (if the lowside switch is closed).	• Check wiring of relevant valves/actuators. (Is there a short circuit?) • Check relevant valves/actuators. (Is there an internal short circuit?) • Contact WABCO North America Customer Care at 855-228-3203.
520522 - 3 = ABS Ground (Intermediate Axle) - voltage above normal or shorted high	Failure detection 'ShortUb' at AbsGround (Intermediate Axle)	A short circuit to high level at the relevant lowside-switch is detected after 150 ms.	• Check wiring of relevant valves/actuators. (Is there a short circuit?) • Contact WABCO North America Customer Care at 855-228-3203.
520522 - 4 = ABS Ground (Intermediate Axle) - voltage below normal or shorted low	Failure detection 'ShortGnd' at AbsGround (Intermediate Axle)	A short circuit to permanent GND-level at the relevant lowside-switch is detected: - After 150 ms (if the lowside switch is open). - After 2000 ms (if the lowside switch is closed).	• Check wiring of relevant valves/actuators. (Is there a short circuit?) • Check relevant valves/actuators. (Is there an internal short circuit?) • Contact WABCO North America Customer Care at 855-228-3203.
520523 - 3 = AUX Ground (Trailer Modulator) - voltage above normal or shorted high	Failure detection 'ShortUb' at AuxGround (Trailer Modulator)	A short circuit to high level at the relevant lowside-switch is detected after 150 ms.	• Check wiring of relevant valves/actuators. (Is there a short circuit?) • Contact WABCO North America Customer Care at 855-228-3203.
520523 - 4 = AUX Ground (Trailer Modulator) - voltage below normal or shorted low	Failure detection 'ShortGnd' at Auxiliary Output Ground (Trailer Modulator)	A short circuit to permanent GND-level at the relevant lowside-switch is detected: - After 150 ms (if the lowside switch is open). - After 2000 ms (if the lowside switch is closed).	• Check wiring of relevant valves/actuators. (Is there a short circuit?) • Check relevant valves/actuators. (Is there an internal short circuit?) • Contact WABCO North America Customer Care at 855-228-3203.
520524 - 3 = AUX Ground (3/2 Valve Governor/Regen) - voltage above normal or shorted high	Failure detection 'ShortUb' at AuxGround (3/2 Valve Governor/Regen)	A short circuit to high level at the relevant lowside-switch is detected after 150 ms.	• Check wiring of relevant valves/actuators. (Is there a short circuit?) • Contact WABCO North America Customer Care at 855-228-3203.
520524 - 4 = AUX Ground (3/2 Valve Governor/Regen) - voltage below normal or shorted low	Failure detection 'ShortGnd' at Auxiliary Output Ground (3/2 Valve Governor/Regen)	A short circuit to permanent GND-level at the relevant lowside-switch is detected: - After 150 ms (if the lowside switch is open). - After 2000 ms (if the lowside switch is closed).	• Check wiring of relevant valves/actuators. (Is there a short circuit?) • Check relevant valves/actuators. (Is there an internal short circuit?) • Contact WABCO North America Customer Care at 855-228-3203.
520525 - 3 = Solenoid Valve/Diff-Valve (Drive Axle ABV) - voltage above normal or shorted high	Failure detection 'ShortUb' at SolenoidValve (Drive Axle ABV)	A short circuit to UB of the relevant actuator is detected in active and inactive states. The detection time is 200 ms.	• Check wiring of relevant valve/actuator. (Is there a short circuit?) • Contact WABCO North America Customer Care at 855-228-3203.
520525 - 4 = Solenoid Valve/Diff-Valve (Drive Axle ABV) - voltage below normal or shorted low	Failure detection 'ShortGnd' at SolenoidValve (Drive Axle ABV)	A short circuit to GND of the relevant actuator is detected in active and inactive states. The detection time is 200 ms. Remark: A shorted load also leads to a short to GND failure. A shorted load is detected: - After 200 ms after ignition-on and also if valve is activated. - After 1000 ms if valve is not activated.	• Check wiring of relevant valve/actuator. (Is there a short circuit?) • Check relevant valve/actuator. (Is there an internal short circuit?) • Contact WABCO North America Customer Care at 855-228-3203.
520525 - 5 = Solenoid Valve/Diff-Valve (Drive Axle ABV) - current below normal or open circuit	Failure detection 'Interruption' at SolenoidValve (Drive Axle ABV)	An interruption of the relevant actuator is detected in active and inactive states. The detection time is 200 ms.	• Check for correct parameter setting. (Is the relevant valve/actuator equipped?) • Check wiring of relevant valve/actuator. (Is there an interruption?) • Check relevant valve/actuator. (Is there an internal interruption?) • Contact WABCO North America Customer Care at 855-228-3203.

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DTC SPN FMI	Failure Detection Name	Failure Detection Description	Repair
520525 - 13 = Solenoid Valve/Diff-Valve (Drive Axle ABV) - out of calibration	Failure detection 'OverEquipped' at SolenoidValve (Drive Axle ABV)	A failure is detected if a component is connected to the ECU, but it is not activated in the parameter settings.	• Check for correct parameter setting. (Is the relevant valve/actuator equipped?) • Check wiring of relevant valve/actuator. (Is ECU pin open?) • Contact WABCO North America Customer Care at 855-228-3203.
520526 - 3 = Solenoid Valve/Diff-Valve (Front Axle ABV) - voltage above normal or shorted high	Failure detection 'ShortUb' at SolenoidValve (Front Axle Right)	A short circuit to UB of the relevant actuator is detected in active and inactive states. The detection time is 200 ms.	• Check wiring of relevant valve/actuator. (Is there a short circuit?) • Contact WABCO North America Customer Care at 855-228-3203.
520526 - 4 = Solenoid Valve/Diff-Valve (Front Axle ABV) - voltage below normal or shorted low	Failure detection 'ShortGnd' at SolenoidValve (Front Axle Right)	A short circuit to GND of the relevant actuator is detected in active and inactive states. The detection time is 200 ms. Remark: A shorted load also leads to a short to GND failure. A shorted load is detected: - After 200 ms after ignition-on and also if valve is activated. - After 1000 ms if valve is not activated.	• Check wiring of relevant valve/actuator. (Is there a short circuit?) • Check relevant valve/actuator. (Is there an internal short circuit?) • Contact WABCO North America Customer Care at 855-228-3203.
520526 - 5 = Solenoid Valve/Diff-Valve (Front Axle ABV) - current below normal or open circuit	Failure detection 'Interruption' at SolenoidValve (Front Axle ABV)	An interruption of the relevant actuator is detected in active and inactive states. The detection time is 200 ms.	• Check for correct parameter setting. (Is the relevant valve/actuator equipped?) • Check wiring of relevant valve/actuator. (Is there an interruption?) • Check relevant valve/actuator. (Is there an internal interruption?) • Contact WABCO North America Customer Care at 855-228-3203.
520526 - 13 = Solenoid Valve/Diff-Valve (Front Axle ABV) - out of calibration	Failure detection 'OverEquipped' at SolenoidValve (Front Axle ABV)	A failure is detected if a component is connected to the ECU, but it is not activated in the parameter settings.	• Check for correct parameter setting. (Is the relevant valve/actuator equipped?) • Check wiring of relevant valve/actuator. (Is ECU pin open?) • Contact WABCO North America Customer Care at 855-228-3203.
520527 - 3 = Solenoid Valve/Diff-Valve (Trailer ABV) - voltage above normal or shorted high	Failure detection 'ShortUb' at SolenoidValve (Trailer ABV)	A short circuit to UB of the relevant actuator is detected in active and inactive states. The detection time is 200 ms.	• Check wiring of relevant valve/actuator. (Is there a short circuit?) • Contact WABCO North America Customer Care at 855-228-3203.
520527 - 4 = Solenoid Valve/Diff-Valve (Trailer ABV) - voltage below normal or shorted low	Failure detection 'ShortGnd' at SolenoidValve (Trailer ABV)	A short circuit to GND of the relevant actuator is detected in active and inactive states. The detection time is 200 ms. Remark: A shorted load also leads to a short to GND failure. A shorted load is detected: - After 200 ms after ignition-on and also if valve is activated. - After 1000 ms if valve is not activated.	• Check wiring of relevant valve/actuator. (Is there a short circuit?) • Check relevant valve/actuator. (Is there an internal short circuit?) • Contact WABCO North America Customer Care at 855-228-3203.
520527 - 5 = Solenoid Valve/Diff-Valve (Trailer ABV) - current below normal or open circuit	Failure detection 'Interruption' at SolenoidValve (Trailer ABV)	An interruption of the relevant actuator is detected in active and inactive states. The detection time is 200 ms.	• Check for correct parameter setting. (Is the relevant valve/actuator equipped?) • Check wiring of relevant valve/actuator. (Is there an interruption?) • Check relevant valve/actuator. (Is there an internal interruption?) • Contact WABCO North America Customer Care at 855-228-3203.
520527 - 13 = Solenoid Valve/Diff-Valve (Trailer ABV) - out of calibration	Failure detection 'OverEquipped' at SolenoidValve (Trailer ABV)	A failure is detected if a component is connected to the ECU, but it is not activated in the parameter settings.	• Check for correct parameter setting. (Is the relevant valve/actuator equipped?) • Check wiring of relevant valve/actuator. (Is ECU pin open?) • Contact WABCO North America Customer Care at 855-228-3203.

DTC SPN FMI	Failure Detection Name	Failure Detection Description	Repair
520530 - 0 = OverHeating - Pressure Modulation Valve ABS (Front Axle Left) - data valid, but above normal operation range (most severe level)	Overheating at ABS Valve (Front Axle Left)/High Level	An overheating failure of the relevant ABS valve is set if the ABS valve was activated for a long time so the temperature limit (critical second level) was reached. Time for critical level: - 200 s (12V System)	• ABS valves were overheated. Reduce activation time especially of hillholder and haltbrake function.
520530 - 15 = OverHeating - Pressure Modulation Valve ABS (Front Axle Left) - data valid, but above normal operation range (least severe level)	Overheating at ABS Valve (Front Axle Left)/Low Level	An overheating failure of the relevant ABS valve is set if the ABS valve was activated for a long time so the temperature limit (prewarning level) was reached. Time for prewarning level: - 180 s (12V System)	• ABS valves were overheated. Reduce activation time especially of hillholder and haltbrake function.
520531 - 0 = OverHeating - Pressure Modulation Valve ABS (Front Axle Right) - data valid, but above normal operation range (most severe level)	Overheating at ABS Valve (Front Axle Right)/High Level	An overheating failure of the relevant ABS valve is set if the ABS valve was activated for a long time so the temperature limit (critical second level) was reached. Time for critical level: - 200 s (12V System)	• ABS valves were overheated. Reduce activation time especially of hillholder and haltbrake function.
520531 - 15 = OverHeating - Pressure Modulation Valve ABS (Front Axle Right) - data valid, but above normal operation range (least severe level)	Overheating at ABS Valve (Front Axle Right)/Low Level	An overheating failure of the relevant ABS valve is set if the ABS valve was activated for a long time so the temperature limit (prewarning level) was reached. Time for prewarning level: - 180 s (12V System)	• ABS valves were overheated. Reduce activation time especially of hillholder and haltbrake function.
520532 - 0 = OverHeating - Pressure Modulation Valve ABS (Drive Axle Left) - data valid, but above normal operation range (most severe level)	Overheating at ABS Valve (Drive Axle Left)/High Level	An overheating failure of the relevant ABS valve is set if the ABS valve was activated for a long time so the temperature limit (critical second level) was reached. Time for critical level: - 200 s (12V System)	• ABS valves were overheated. Reduce activation time especially of hillholder and haltbrake function.
520532 - 15 = OverHeating - Pressure Modulation Valve ABS (Drive Axle Left) - data valid, but above normal operation range (least severe level)	Overheating at ABS Valve (Drive Axle Left)/Low Level	An overheating failure of the relevant ABS valve is set if the ABS valve was activated for a long time so the temperature limit (prewarning level) was reached. Time for prewarning level: - 180 s (12V System)	• ABS valves were overheated. Reduce activation time especially of hillholder and haltbrake function.
520533 - 0 = OverHeating - Pressure Modulation Valve ABS (Drive Axle Right) - data valid, but above normal operation range (most severe level)	Overheating at ABS Valve (Drive Axle Right)/High Level	An overheating failure of the relevant ABS valve is set if the ABS valve was activated for a long time so the temperature limit (critical second level) was reached. Time for critical level: - 200 s (12V System)	• ABS valves were overheated. Reduce activation time especially of hillholder and haltbrake function.

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DTC SPN FMI	Failure Detection Name	Failure Detection Description	Repair
520533 - 15 = OverHeating - Pressure Modulation Valve ABS (Drive Axle Right) - data valid, but above normal operation range (least severe level)	Overheating at ABS Valve (Drive Axle Right)/Low Level	An overheating failure of the relevant ABS valve is set if the ABS valve was activated for a long time so the temperature limit (prewarning level) was reached. Time for prewarning level: - 180 s (12V System)	• ABS valves were overheated. Reduce activation time especially of hillholder and haltbrake function.
520534 - 0 = OverHeating - Pressure Modulation Valve ABS (Intermediate Axle Left) - data valid, but above normal operation range (most severe level)	Overheating at ABS Valve (Intermediate Axle Left)/ High Level	An overheating failure of the relevant ABS valve is set if the ABS valve was activated for a long time so the temperature limit (critical second level) was reached. Time for critical level: - 200 s (12V System)	• ABS valves were overheated. Reduce activation time especially of hillholder and haltbrake function.
520534 - 15 = OverHeating - Pressure Modulation Valve ABS (Intermediate Axle Left) - data valid, but above normal operation range (least severe level)	Overheating at ABS Valve (Intermediate Axle Left)/ Low Level	An overheating failure of the relevant ABS valve is set if the ABS valve was activated for a long time so the temperature limit (prewarning level) was reached. Time for prewarning level: - 180 s (12V System)	• ABS valves were overheated. Reduce activation time especially of hillholder and haltbrake function.
520535 - 0 = OverHeating - Pressure Modulation Valve ABS (Intermediate Axle Right) - data valid, but above normal operation range (most severe level)	Overheating at ABS Valve (Intermediate Axle Right)/ High Level	An overheating failure of the relevant ABS valve is set if the ABS valve was activated for a long time so the temperature limit (critical second level) was reached. Time for critical level: - 200 s (12V System)	• ABS valves were overheated. Reduce activation time especially of hillholder and haltbrake function.
520535 - 15 = OverHeating - Pressure Modulation Valve ABS (Intermediate Axle Right) - data valid, but above normal operation range (least severe level)	Overheating at ABS Valve (Intermediate Axle Right)/ Low Level	An overheating failure of the relevant ABS valve is set if the ABS valve was activated for a long time so the temperature limit (prewarning level) was reached. Time for prewarning level: - 180 s (12V System)	• ABS valves were overheated. Reduce activation time especially of hillholder and haltbrake function.
520536 - 0 = OverHeating - Pressure Modulation Valve ABS (Trailer Control) - data valid, but above normal operating range (most severe level)	Overheating at ABS Valve (Trailer Control)/High Level	An overheating failure of the relevant ABS valve is set if the ABS valve was activated for a long time so the temperature limit (critical second level) was reached. Time for critical level: - 200 s (12V System)	• ABS valves were overheated. Reduce activation time especially of hillholder and haltbrake function.
520536 - 15 = OverHeating - Pressure Modulation Valve ABS (Trailer Control) - data valid, but above normal operating range (least severe level)	Overheating at ABS Valve (Trailer Control)/Low Level	An overheating failure of the relevant ABS valve is set if the ABS valve was activated for a long time so the temperature limit (prewarning level) was reached. Time for prewarning level: - 180 s (12V System)	• ABS valves were overheated. Reduce activation time especially of hillholder and haltbrake function.
520800 - 2 = Gyro Temperature Signal - data erratic, intermittent or incorrect	Yaw Rate Temperature Range Check	The failure is detected if the valid range of the temperature sensor signal was left.	• Check and replace the ESC module.

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DTC SPN FMI	Failure Detection Name	Failure Detection Description	Repair
520800 - 10 = Gyro Temperature Signal - abnormal rate of change	Yaw Rate Temperature Gradient Check	The failure is detected if the gradient of the temperature sensor signal was too high.	• Check and replace the ESC module.
523000 - 2 = Invalid Parameters Part 1 - data erratic, intermittent or incorrect	Generic Check for implausible EOL Parameters	The generic parameter plausibility check evaluates if the EOL parameters are complete and plausible. If a parameter incompatibility was detected, detailed information about the incompatible parameter value will be stored. This parameter incompatibility information can be read out to identify the faulty parameter.	• Check the EOL parameters and correct them. • Remark: If an incompatibility was detected, special information about implausible parameter value is stored. This information can be read out by diagnosis to localize the faulty parameter (service 22 1C 08 'PrmPlausy Failure Code'). The description of the numbers can be found in a separate list 'Parameter Plausibility Failure ID'.
523000 - 22 = Invalid Parameters Part 1 - reserved (22)	Invalid Parameter Setting for COG-function (center of gravity)	The parameters for the COG function (calculation of center of gravity) are not set correctly.	• Check the relevant EOL parameters and correct them.
523000 - 23 = Invalid Parameters Part 1 - reserved (23)	Invalid Parameter Setting for RSC-function (roll stability control)	This parameter failure is set if the following condition exists: - PRDstVehWithAwd.value = 1	• Check the relevant EOL parameters and correct them.
523000 - 28 = Invalid Parameters Part 1 - reserved (28)	Parameter error of supply voltage level thresholds	It is checked if the thresholds for the different voltage levels are in correct order.	• Check the relevant EOL parameters and correct them.
523000 - 29 = Invalid Parameters Part 1 - reserved (29)	Parameter error of accelerator pedal low idle switch thresholds	It is checked if the thresholds for the hysteresis are set correctly. The software sets a parameter error when the thresholds are not in the following order 'ThdOn < ThdOff'.	• Check the relevant EOL parameters and correct them.
523000 - 30 = Invalid Parameters Part 1 - reserved (30)	Parameter error of accelerator pedal position thresholds	It is checked if the thresholds for the hysteresis are set correctly. The software sets a parameter error when the thresholds are not in the following order 'ThdOff < ThdOn'.	• Check the relevant EOL parameters and correct them.
523100 - 22 = Safety Monitor - Wheel Speed Signals - reserved (22)	Safety Monitor for Wheelspeed Calculation (Front Axle Left)	A monitor failure of the relevant wheel speed calculation is detected if: - Counter value is 0 and wheel speed value is not between 0 m/s and 1 m/s. - Counter value is constant for more than 180 ms and wheel speed value is not between 0m/s and 1 m/s. - Counter value is not constant for more than 180 ms and not 0 and wheel speed value is not between min_Wheel speed and max_Wheel speed. Remark: The monitor (on/off) and its sensibility can be changed by a parameter.	• Safety Monitor has detected a SW-problem. • Contact WABCO North America Customer Care at 855-228-3203.
523100 - 23 = Safety Monitor - Wheel Speed Signals - reserved (23)	Safety Monitor for Wheelspeed Calculation (Front Axle Right)	A monitor failure of the relevant wheel speed calculation is detected if: - Counter value is 0 and wheel speed value is not between 0 m/s and 1 m/s. - Counter value is constant for more than 180 ms and wheel speed value is not between 0m/s and 1 m/s. - Counter value is not constant for more than 180 ms and not 0 and wheel speed value is not between min_Wheel speed and max_Wheel speed. Remark: The monitor (on/off) and its sensibility can be changed by a parameter.	• Safety Monitor has detected a SW-problem. • Contact WABCO North America Customer Care at 855-228-3203.

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DTC SPN FMI	Failure Detection Name	Failure Detection Description	Repair
523100 - 24 = Safety Monitor - Wheel Speed Signals - reserved (24)	Safety Monitor for Wheelspeed Calculation (Drive Axle Left)	A monitor failure of the relevant wheel speed calculation is detected if: - Counter value is 0 and wheel speed value is not between 0 m/s and 1 m/s. - Counter value is constant for more than 180 ms and wheel speed value is not between 0m/s and 1 m/s. - Counter value is not constant for more than 180 ms and not 0 and wheel speed value is not between min_Wheel speed and max_Wheel speed. Remark: The monitor (on/off) and its sensibility can be changed by a parameter.	• Safety Monitor has detected a SW-problem. • Contact WABCO North America Customer Care at 855-228-3203.
523100 - 25 = Safety Monitor - Wheel Speed Signals - reserved (25)	Safety Monitor for Wheelspeed Calculation (Drive Axle Right)	A monitor failure of the relevant wheel speed calculation is detected if: - Counter value is 0 and wheel speed value is not between 0 m/s and 1 m/s. - Counter value is constant for more than 180 ms and wheel speed value is not between 0m/s and 1 m/s. - Counter value is not constant for more than 180 ms and not 0 and wheel speed value is not between min_Wheel speed and max_Wheel speed. Remark: The monitor (on/off) and its sensibility can be changed by a parameter.	• Safety Monitor has detected a SW-problem. • Contact WABCO North America Customer Care at 855-228-3203.
523100 - 26 = Safety Monitor - Wheel Speed Signals - reserved (26)	Safety Monitor for Wheelspeed Calculation (Intermediate Axle Left)	A monitor failure of the relevant wheel speed calculation is detected if: - Counter value is 0 and wheel speed value is not between 0 m/s and 1 m/s. - Counter value is constant for more than 180 ms and wheel speed value is not between 0m/s and 1 m/s. - Counter value is not constant for more than 180 ms and not 0 and wheel speed value is not between min_Wheel speed and max_Wheel speed. Remark: The monitor (on/off) and its sensibility can be changed by a parameter.	• Safety Monitor has detected a SW-problem. • Contact WABCO North America Customer Care at 855-228-3203.
523100 - 27 = Safety Monitor - Wheel Speed Signals - reserved (27)	Safety Monitor for Wheelspeed Calculation (Intermediate Axle Right)	A monitor failure of the relevant wheel speed calculation is detected if: - Counter value is 0 and wheel speed value is not between 0 m/s and 1 m/s. - Counter value is constant for more than 180 ms and wheel speed value is not between 0m/s and 1 m/s. - Counter value is not constant for more than 180 ms and not 0 and wheel speed value is not between min_Wheel speed and max_Wheel speed. Remark: The monitor (on/off) and its sensibility can be changed by a parameter.	• Safety Monitor has detected a SW-problem. • Contact WABCO North America Customer Care at 855-228-3203.
523101 - 22 = Safety Monitor - ABS Function - reserved (22)	Safety Monitor for ABS Function (Part 1)	The ABS Monitor shall prevent the ABS function from activating ABS control on any wheel without necessity.	• Safety Monitor has detected a SW-problem. • Contact WABCO North America Customer Care at 855-228-3203.
523101 - 23 = Safety Monitor - ABS Function - reserved (23)	Safety Monitor for ABS Function (Part 2)	The ABS Monitor ensures that ABS function shall not switch off ABS control at the RA without switching off ABS control at the FA.	• Safety Monitor has detected a SW-problem. • Contact WABCO North America Customer Care at 855-228-3203.
523102 - 22 = Safety Monitor - ATC Function - reserved (22)	Safety Monitor for ATC Function	This safety monitor checks the correct function of the automatic traction control.	• Safety Monitor has detected a SW-problem. • Contact WABCO North America Customer Care at 855-228-3203.

DTC SPN FMI	Failure Detection Name	Failure Detection Description	Repair
523103 - 22 = Safety Monitor - RSC Function - reserved (22)	Safety Monitor for RSC Function	This safety monitor checks the correct function of the roll stability control.	• Safety Monitor has detected a SW-problem. • Contact WABCO North America Customer Care at 855-228-3203.
523104 - 22 = Safety Monitor - YC Function - reserved (22)	Safety Monitor for YC Function	This safety monitor checks the correct function of the yaw control.	• Safety Monitor has detected a SW-problem. • Contact WABCO North America Customer Care at 855-228-3203.
523105 - 22 = Safety Monitor - ARB Function - reserved (22)	Safety Monitor for ARB Function	This safety monitor checks the correct function of the anti-roll brake.	• Safety Monitor has detected a SW-problem. • Contact WABCO North America Customer Care at 855-228-3203.
523106 - 22 = Safety Monitor - XBR Function - reserved (22)	Safety Monitor for XBR Function	This safety monitor checks the correct function of the external brake request.	• Safety Monitor has detected a SW-problem. • Contact WABCO North America Customer Care at 855-228-3203.
523107 - 22 = Safety Monitor - BM Function - reserved (22)	Safety Monitor for BM Function	This safety monitor checks the correct function of the brake management.	• Safety Monitor has detected a SW-problem. • Contact WABCO North America Customer Care at 855-228-3203.
523108 - 22 = Safety Monitor - CSC Function - reserved (22)	Safety Monitor for CSC Function	This safety monitor checks the correct function of the combination stability control.	• Safety Monitor has detected a SW-problem. • Contact WABCO North America Customer Care at 855-228-3203.
523109 - 22 = Safety Monitor - Friction Brake Decider Function - reserved (22)	Safety Monitor for Friction Brake Decider Function	This safety monitor checks the correct function of the friction brake decider.	• Safety Monitor has detected a SW-problem. • Contact WABCO North America Customer Care at 855-228-3203.
523110 - 22 = Safety Monitor - Valve Combi Function - reserved (22)	Safety Monitor for Valve Combi Function (Part 1a)	This safety monitor checks generic system functions (Part 1a/ FSR_02). Check maximum pressure difference (left/right) at front axle (at speeds higher than 20 km/h). TSR_02.1: Monitor detects failure if: - All three diff-valves are powered-off for a time T1=2000 ms before they are powered-on, - And then all diff-valves remain in powered-on state for T2≤500 ms, - And parallelly during time span T2, the front axle left and right inlet valves are powered (closed) with a time span (not simultaneously) for time T3>300 ms.	• Safety Monitor has detected a SW-problem. • Contact WABCO North America Customer Care at 855-228-3203.
523110 - 23 = Safety Monitor - Valve Combi Function - reserved (23)	Safety Monitor for Valve Combi Function (Part 1b)	This safety monitor checks generic system functions (Part 1b/ FSR_02). Check maximum pressure difference (left/right) at front axle (at speeds higher than 20 km/h). TSR_02.2: Monitor detects failure if: - The front axle outlet valve remains powered-on (open) and the inlet valve is powered-off (open) for time T4≥100 ms.	• Safety Monitor has detected a SW-problem. • Contact WABCO North America Customer Care at 855-228-3203.
523110 - 24 = Safety Monitor - Valve Combi Function - reserved (24)	Safety Monitor for Valve Combi Function (Part 2)	This safety monitor checks generic system functions (Part 2/ FSR_16). Fault detection if FA and RA are braked suddenly without TCV.	• Safety Monitor has detected a SW-problem. • Contact WABCO North America Customer Care at 855-228-3203.
523110 - 25 = Safety Monitor - Valve Combi Function - reserved (25)	Safety Monitor for Valve Combi Function (Part 3)	This safety monitor checks generic system functions (Part 3/ FSR_21.2). Monitor shall switch to safe state if ABS valve activation is done without request from the decider.	• Safety Monitor has detected a SW-problem. • Contact WABCO North America Customer Care at 855-228-3203.
523110 - 26 = Safety Monitor - Valve Combi Function - reserved (26)	Safety Monitor for Valve Combi Function (Part 4)	This safety monitor checks generic system functions (Part 4/ FSR_35). Plausibility check of brake valve control to avoid sudden braking (10 bar/sec) of truck and trailer.	• Safety Monitor has detected a SW-problem. • Contact WABCO North America Customer Care at 855-228-3203.

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DTC SPN FMI	Failure Detection Name	Failure Detection Description	Repair
523110 - 27 = Safety Monitor - Valve Combi Function - reserved (27)	Safety Monitor for Valve Combi Function (Part 5a)	This safety monitor checks generic system functions (Part 5a/ FSR_43). Check maximum pressure difference left/right at rear axle TSR_43.1: Monitor detects failure if: - All three diff-valves are powered-off for a time T1=2000 ms before they are powered-on, - And then all diff-valves remain in powered-on state for T2≤500 ms, - And parallelly during time span T2, the rear axle left and right inlet valves are powered with different voltages for time T3>300 ms.	• Safety Monitor has detected a SW-problem. • Contact WABCO North America Customer Care at 855-228-3203.
523110 - 28 = Safety Monitor - Valve Combi Function - reserved (28)	Safety Monitor for Valve Combi Function (Part 5b)	This safety monitor checks generic system functions (Part 5b/ FSR_43). Check maximum pressure difference left/right at rear axle. TSR_43.2: Monitor detects failure if: - The rear axle outlet valve remains powered-on (open) and the inlet valve is powered-off (open) for time T4≥100 ms.	• Safety Monitor has detected a SW-problem. • Contact WABCO North America Customer Care at 855-228-3203.
523110 - 29 = Safety Monitor - Valve Combi Function - reserved (29)	Safety Monitor for Valve Combi Function (Part 6)	This safety monitor checks generic system functions (Part 6/ FSR_47.1). Valve control monitor shall check if the whole rear axle is blocked and at least 1 front wheel is not blocked. In this case, the monitor shall also switch off the ABS control on front axle.	• Safety Monitor has detected a SW-problem. • Contact WABCO North America Customer Care at 855-228-3203.
523110 - 30 = Safety Monitor - Valve Combi Function - reserved (30)	Safety Monitor for Valve Combi Function (Part 7)	This safety monitor checks generic system functions (Part 7/ FSR_49). Monitoring of switching ON of one or more ABS-IV (OV switched OFF) for a time longer than 100 seconds. (Pressure blocked in wheel -> overheating.)	• Safety Monitor has detected a SW-problem. • Contact WABCO North America Customer Care at 855-228-3203.
523110 - 31 = Safety Monitor - Valve Combi Function - condition exists	Safety Monitor for Valve Combi Function (Part 8a)	This safety monitor checks generic system functions (Part 8a/ FSR_139). Monitor detects failure if: - Both diff-valves and all ABS inlet valves are powered-off for a time T1=2000 ms, - And then within a time span of T2=100 ms, FA+TCV diff valve, RA diff valve and FA and RA ABS inlet valve are powered-on while ABS TCV valve remains powered-off, - And after that, for time T3=500 ms, the same state is maintained.	• Safety Monitor has detected a SW-problem. • Contact WABCO North America Customer Care at 855-228-3203.
523111 - 22 = Safety Monitor - Valve Combi Function (Continuation) - reserved (22)	Safety Monitor for Valve Combi Function (Part 8b)	This safety monitor checks generic system functions (Part 8b/ FSR_139). Monitor detects failure if: - Both diff-valves and all ABS inlet valves are powered-off for a time T1=2000 ms, - And then within a time span of T2=100 ms, FA+TCV diff valve and FA ABS inlet valve are powered-on, while ABS TCV valve remains powered-off, - And after that, for time T3=500 ms, the same state is maintained.	• Safety Monitor has detected a SW-problem. • Contact WABCO North America Customer Care at 855-228-3203.
523112 - 22 = Safety Monitor - Reference Speed - reserved (22)	Safety Monitor for Wheel Reference Speed	This safety monitor checks the correct function of the Wheel Reference Speed.	• Safety Monitor has detected a SW-problem. • Contact WABCO North America Customer Care at 855-228-3203.
523112 - 23 = Safety Monitor - Reference Speed - reserved (23)	Safety Monitor for Vehicle Reference Speed	This safety monitor checks the correct function of the Wheel Reference Speed.	• Safety Monitor has detected a SW-problem. • Contact WABCO North America Customer Care at 855-228-3203.
523112 - 24 = Safety Monitor - Reference Speed - reserved (24)	Safety Monitor for ABS Reference Speed	This safety monitor checks the correct function of the Wheel Reference Speed.	• Safety Monitor has detected a SW-problem. • Contact WABCO North America Customer Care at 855-228-3203.

DTC SPN FMI	Failure Detection Name	Failure Detection Description	Repair
523114 - 22 = Safety Monitor - Steering Angle Sensor - reserved (22)	Safety Monitor for Steering Angle	This safety monitor checks the correct function of the Steering Angle Sensor.	• Safety Monitor has detected a SW-problem. • Contact WABCO North America Customer Care at 855-228-3203.
523115 - 22 = Safety Monitor - Yaw Rate - reserved (22)	Safety Monitor for Yaw Rate	This safety monitor checks the correct function of the Yaw Rate.	• Safety Monitor has detected a SW-problem. • Contact WABCO North America Customer Care at 855-228-3203.
523116 - 22 = Safety Monitor - Lateral Acceleration - reserved (22)	Safety Monitor for Lateral Acceleration	This safety monitor checks the correct function of the lateral acceleration.	• Safety Monitor has detected a SW-problem. • Contact WABCO North America Customer Care at 855-228-3203.
523117 - 22 = Safety Monitor - Target Yaw Rate - reserved (22)	Safety Monitor for Target Yaw Rate	This safety monitor checks the correct function of the target yaw rate.	• Safety Monitor has detected a SW-problem. • Contact WABCO North America Customer Care at 855-228-3203.
523118 - 22 = Safety Monitor - ESC Sensor External - reserved (22)	Safety Monitor for ESC Sensor External (Lateral Acceleration)	This safety monitor checks the correct function of the ESC Sensor External (Lateral Acceleration).	• Safety Monitor has detected a SW-problem. • Contact WABCO North America Customer Care at 855-228-3203.
523118 - 23 = Safety Monitor - ESC Sensor External - reserved (23)	Safety Monitor for ESC Sensor External (Yaw Rate)	This safety monitor checks the correct function of the ESC Sensor External (Yaw Rate).	• Safety Monitor has detected a SW-problem. • Contact WABCO North America Customer Care at 855-228-3203.
523119 - 22 = Safety Monitor - Request Blender - reserved (22)	Safety Monitor for Request Blender Function	This safety monitor checks the correct function of the request blender.	• Contact WABCO North America Customer Care at 855-228-3203.
524270 - 0 = EEPROM - NVMem Checksum failure (Part 1) - data valid, but above normal operating range (most severe level)	Checksum Error of Parameter group 'Accelerator Pedal'	A faulty checksum was detected in the relevant parameter group in the non-volatile memory (EEPROM). Remark: This checksum is internally calculated by the software after the parameters were transmitted to the EEPROM.	• Contact WABCO North America Customer Care at 855-228-3203.
524270 - 1 = EEPROM - NVMem Checksum failure (Part 1) - data valid, but below normal operating range (most severe level)	Checksum Error of Parameter group 'Antiblocking System'	A faulty checksum was detected in the relevant parameter group in the non-volatile memory (EEPROM). Remark: This checksum is internally calculated by the software after the parameters were transmitted to the EEPROM.	• Contact WABCO North America Customer Care at 855-228-3203.
524270 - 2 = EEPROM - NVMem Checksum failure (Part 1) - data erratic, intermittent or incorrect	Checksum Error of Parameter group 'Automatic Traction Control'	A faulty checksum was detected in the relevant parameter group in the non-volatile memory (EEPROM). Remark: This checksum is internally calculated by the software after the parameters were transmitted to the EEPROM.	• Contact WABCO North America Customer Care at 855-228-3203.
524270 - 3 = EEPROM - NVMem Checksum failure (Part 1) - voltage above normal or shorted high	Checksum Error of Parameter group 'Axle Configuration'	A faulty checksum was detected in the relevant parameter group in the non-volatile memory (EEPROM). Remark: This checksum is internally calculated by the software after the parameters were transmitted to the EEPROM.	• Contact WABCO North America Customer Care at 855-228-3203.
524270 - 4 = EEPROM - NVMem Checksum failure (Part 1) - voltage below normal or shorted low	Checksum Error of Parameter group 'Brake Control Assignment ABS'	A faulty checksum was detected in the relevant parameter group in the non-volatile memory (EEPROM). Remark: This checksum is internally calculated by the software after the parameters were transmitted to the EEPROM.	• Contact WABCO North America Customer Care at 855-228-3203.

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DTC SPN FMI	Failure Detection Name	Failure Detection Description	Repair
524270 - 5 = EEPROM - NVMem Checksum failure (Part 1) - current below normal or open circuit	Checksum Error of Parameter group 'Brake Pedal'	A faulty checksum was detected in the relevant parameter group in the non-volatile memory (EEPROM). Remark: This checksum is internally calculated by the software after the parameters were transmitted to the EEPROM.	• Contact WABCO North America Customer Care at 855-228-3203.
524270 - 6 = EEPROM - NVMem Checksum failure (Part 1) - current above normal or grounded circuit	Checksum Error of Parameter group 'Derived Parameter'	A faulty checksum was detected in the relevant parameter group in the non-volatile memory (EEPROM). Remark: This checksum is internally calculated by the software after the parameters were transmitted to the EEPROM.	• Contact WABCO North America Customer Care at 855-228-3203.
524270 - 7 = EEPROM - NVMem Checksum failure (Part 1) - mechanical system not responding correctly or out of adjustment	Checksum Error of Parameter group 'Differential Slip Control'	A faulty checksum was detected in the relevant parameter group in the non-volatile memory (EEPROM). Remark: This checksum is internally calculated by the software after the parameters were transmitted to the EEPROM.	• Contact WABCO North America Customer Care at 855-228-3203.
524270 - 8 = EEPROM - NVMem Checksum failure (Part 1) - abnormal frequency, pulse width or period	Checksum Error of Parameter group 'Drag Torque Control'	A faulty checksum was detected in the relevant parameter group in the non-volatile memory (EEPROM). Remark: This checksum is internally calculated by the software after the parameters were transmitted to the EEPROM.	• Contact WABCO North America Customer Care at 855-228-3203.
524270 - 9 = EEPROM - NVMem Checksum failure (Part 1) - abnormal update rate	Checksum Error of Parameter group 'Drive Train'	A faulty checksum was detected in the relevant parameter group in the non-volatile memory (EEPROM). Remark: This checksum is internally calculated by the software after the parameters were transmitted to the EEPROM.	• Contact WABCO North America Customer Care at 855-228-3203.
524270 - 10 = EEPROM - NVMem Checksum failure (Part 1) - abnormal rate of change	Checksum Error of Parameter group 'Electronic Brake Limitation'	A faulty checksum was detected in the relevant parameter group in the non-volatile memory (EEPROM). Remark: This checksum is internally calculated by the software after the parameters were transmitted to the EEPROM.	• Contact WABCO North America Customer Care at 855-228-3203.
524270 - 11 = EEPROM - NVMem Checksum failure (Part 1) - failure mode not identifiable/root cause not known	Checksum Error of Parameter group 'Interface Configuration'	A faulty checksum was detected in the relevant parameter group in the non-volatile memory (EEPROM). Remark: This checksum is internally calculated by the software after the parameters were transmitted to the EEPROM.	• Contact WABCO North America Customer Care at 855-228-3203.
524270 - 12 = EEPROM - NVMem Checksum failure (Part 1) - bad intelligent device or component	Checksum Error of Parameter group 'Mass Calculation'	A faulty checksum was detected in the relevant parameter group in the non-volatile memory (EEPROM). Remark: This checksum is internally calculated by the software after the parameters were transmitted to the EEPROM.	• Contact WABCO North America Customer Care at 855-228-3203.
524270 - 13 = EEPROM - NVMem Checksum failure (Part 1) - out of calibration	Checksum Error of Parameter group 'System Configuration'	A faulty checksum was detected in the relevant parameter group in the non-volatile memory (EEPROM). Remark: This checksum is internally calculated by the software after the parameters were transmitted to the EEPROM.	• Contact WABCO North America Customer Care at 855-228-3203.
524270 - 14 = EEPROM - NVMem Checksum failure (Part 1) - special instructions	Checksum Error of Parameter group 'Tire Size Compensation'	A faulty checksum was detected in the relevant parameter group in the non-volatile memory (EEPROM). Remark: This checksum is internally calculated by the software after the parameters were transmitted to the EEPROM.	• Contact WABCO North America Customer Care at 855-228-3203.
524270 - 15 = EEPROM - NVMem Checksum failure (Part 1) - data valid, but above normal operating range (least severe level)	Checksum Error of Parameter group 'Tire Size Compensation/ Storage'	A faulty checksum was detected in the relevant parameter group in the non-volatile memory (EEPROM). Remark: This checksum is internally calculated by the software after the parameters were transmitted to the EEPROM.	• Contact WABCO North America Customer Care at 855-228-3203.

DTC SPN FMI	Failure Detection Name	Failure Detection Description	Repair
524270 - 16 = EEPROM - NVMem Checksum failure (Part 1) - data valid, but above normal operating range (moderately severe level)	Checksum Error of Parameter group 'Total Vehicle Configuration'	A faulty checksum was detected in the relevant parameter group in the non-volatile memory (EEPROM). Remark: This checksum is internally calculated by the software after the parameters were transmitted to the EEPROM.	• Contact WABCO North America Customer Care at 855-228-3203.
524270 - 17 = EEPROM - NVMem Checksum failure (Part 1) - data valid, but below normal operating range (least severe level)	Checksum Error of Parameter group 'Yaw Rate Control Storage'	A faulty checksum was detected in the relevant parameter group in the non-volatile memory (EEPROM). Remark: This checksum is internally calculated by the software after the parameters were transmitted to the EEPROM.	• Contact WABCO North America Customer Care at 855-228-3203.
524270 - 18 = EEPROM - NVMem Checksum failure (Part 1) - data valid, but below normal operating range (moderately severe level)	Checksum Error of Parameter group 'Deceleration Control ABS'	A faulty checksum was detected in the relevant parameter group in the non-volatile memory (EEPROM). Remark: This checksum is internally calculated by the software after the parameters were transmitted to the EEPROM.	• Contact WABCO North America Customer Care at 855-228-3203.
524270 - 19 = EEPROM - NVMem Checksum failure (Part 1) - received network data in error	Checksum Error of Parameter group 'Hill Start Aid'	A faulty checksum was detected in the relevant parameter group in the non-volatile memory (EEPROM). Remark: This checksum is internally calculated by the software after the parameters were transmitted to the EEPROM.	• Contact WABCO North America Customer Care at 855-228-3203.
524270 - 20 = EEPROM - NVMem Checksum failure (Part 1) - data drifted high	Checksum Error of Parameter group 'Platform'	A faulty checksum was detected in the relevant parameter group in the non-volatile memory (EEPROM). Remark: This checksum is internally calculated by the software after the parameters were transmitted to the EEPROM.	• Contact WABCO North America Customer Care at 855-228-3203.
524270 - 21 = EEPROM - NVMem Checksum failure (Part 1) - data drifted low	Checksum Error of Parameter group 'RSC'	A faulty checksum was detected in the relevant parameter group in the non-volatile memory (EEPROM). Remark: This checksum is internally calculated by the software after the parameters were transmitted to the EEPROM.	• Contact WABCO North America Customer Care at 855-228-3203.
524270 - 22 = EEPROM - NVMem Checksum failure (Part 1) - reserved (22)	Checksum Error of Parameter group 'Yaw Control'	A faulty checksum was detected in the relevant parameter group in the non-volatile memory (EEPROM). Remark: This checksum is internally calculated by the software after the parameters were transmitted to the EEPROM.	• Contact WABCO North America Customer Care at 855-228-3203.
524270 - 23 = EEPROM - NVMem Checksum failure (Part 1) - reserved (23)	Checksum Error of Parameter group 'Steering Angle'	A faulty checksum was detected in the relevant parameter group in the non-volatile memory (EEPROM). Remark: This checksum is internally calculated by the software after the parameters were transmitted to the EEPROM.	• Contact WABCO North America Customer Care at 855-228-3203.
524270 - 24 = EEPROM - NVMem Checksum failure (Part 1) - reserved (24)	Checksum Error of Parameter group 'Steering Wheel Angle Storage'	A faulty checksum was detected in the relevant parameter group in the non-volatile memory (EEPROM). Remark: This checksum is internally calculated by the software after the parameters were transmitted to the EEPROM.	• Contact WABCO North America Customer Care at 855-228-3203.
524270 - 25 = EEPROM - NVMem Checksum failure (Part 1) - reserved (25)	Checksum Error of Parameter group 'Vehicle Acceleration Storage'	A faulty checksum was detected in the relevant parameter group in the non-volatile memory (EEPROM). Remark: This checksum is internally calculated by the software after the parameters were transmitted to the EEPROM.	• Contact WABCO North America Customer Care at 855-228-3203.
524270 - 26 = EEPROM - NVMem Checksum failure (Part 1) - reserved (26)	Checksum Error of Parameter group 'Hill Start Aid Storage'	A faulty checksum was detected in the relevant parameter group in the non-volatile memory (EEPROM). Remark: This checksum is internally calculated by the software after the parameters were transmitted to the EEPROM.	• Contact WABCO North America Customer Care at 855-228-3203.

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DTC SPN FMI	Failure Detection Name	Failure Detection Description	Repair
524270 - 27 = EEPROM - NVMem Checksum failure (Part 1) - reserved (27)	Checksum Error of Parameter group 'Trailer Detection'	A faulty checksum was detected in the relevant parameter group in the non-volatile memory (EEPROM). Remark: This checksum is internally calculated by the software after the parameters were transmitted to the EEPROM.	• Contact WABCO North America Customer Care at 855-228-3203.
524270 - 28 = EEPROM - NVMem Checksum failure (Part 1) - reserved (28)	Checksum Error of Parameter group 'Steering Angle Storage'	A faulty checksum was detected in the relevant parameter group in the non-volatile memory (EEPROM). Remark: This checksum is internally calculated by the software after the parameters were transmitted to the EEPROM.	• Contact WABCO North America Customer Care at 855-228-3203.
524270 - 29 = EEPROM - NVMem Checksum failure (Part 1) - reserved (29)	Checksum Error of Parameter group 'External Brake'	A faulty checksum was detected in the relevant parameter group in the non-volatile memory (EEPROM). Remark: This checksum is internally calculated by the software after the parameters were transmitted to the EEPROM.	• Contact WABCO North America Customer Care at 855-228-3203.
524270 - 30 = EEPROM - NVMem Checksum failure (Part 1) - reserved (30)	Checksum Error of Parameter group 'External Brake Storage'	A faulty checksum was detected in the relevant parameter group in the non-volatile memory (EEPROM). Remark: This checksum is internally calculated by the software after the parameters were transmitted to the EEPROM.	• Contact WABCO North America Customer Care at 855-228-3203.
524270 - 31 = EEPROM - NVMem Checksum failure (Part 1) - condition exists	Checksum Error of Parameter group 'Switch'	A faulty checksum was detected in the relevant parameter group in the non-volatile memory (EEPROM). Remark: This checksum is internally calculated by the software after the parameters were transmitted to the EEPROM.	• Contact WABCO North America Customer Care at 855-228-3203.
524271 - 0 = EEPROM - NVMem Checksum failure (Part 2) - data valid, but above normal operating range (most severe level)	Checksum Error of Parameter group 'Brake Pressure'	A faulty checksum was detected in the relevant parameter group in the non-volatile memory (EEPROM). Remark: This checksum is internally calculated by the software after the parameters were transmitted to the EEPROM.	• Contact WABCO North America Customer Care at 855-228-3203.
524271 - 1 = EEPROM - NVMem Checksum failure (Part 2) - data valid, but below normal operating range (most severe level)	Checksum Error of Parameter group 'Center of Gravity'	A faulty checksum was detected in the relevant parameter group in the non-volatile memory (EEPROM). Remark: This checksum is internally calculated by the software after the parameters were transmitted to the EEPROM.	• Contact WABCO North America Customer Care at 855-228-3203.
524271 - 2 = EEPROM - NVMem Checksum failure (Part 2) - data erratic, intermittent or incorrect	Checksum Error of Parameter group 'Function System Configuration'	A faulty checksum was detected in the relevant parameter group in the non-volatile memory (EEPROM). Remark: This checksum is internally calculated by the software after the parameters were transmitted to the EEPROM.	• Contact WABCO North America Customer Care at 855-228-3203.
524271 - 3 = EEPROM - NVMem Checksum failure (Part 2) - voltage above normal or shorted high	Checksum Error of Parameter group 'Hardware Configuration'	A faulty checksum was detected in the relevant parameter group in the non-volatile memory (EEPROM). Remark: This checksum is internally calculated by the software after the parameters were transmitted to the EEPROM.	• Contact WABCO North America Customer Care at 855-228-3203.
524271 - 4 = EEPROM - NVMem Checksum failure (Part 2) - voltage below normal or shorted low	Checksum Error of Parameter group 'Speedometer Adjustment'	A faulty checksum was detected in the relevant parameter group in the non-volatile memory (EEPROM). Remark: This checksum is internally calculated by the software after the parameters were transmitted to the EEPROM.	• Contact WABCO North America Customer Care at 855-228-3203.
524271 - 5 = EEPROM - NVMem Checksum failure (Part 2) - current below normal or open circuit	Checksum Error of Parameter group 'Speedometer Adjustment Storage'	A faulty checksum was detected in the relevant parameter group in the non-volatile memory (EEPROM). Remark: This checksum is internally calculated by the software after the parameters were transmitted to the EEPROM.	• Contact WABCO North America Customer Care at 855-228-3203.

DTC SPN FMI	Failure Detection Name	Failure Detection Description	Repair
524271 - 6 = EEPROM - NVMem Checksum failure (Part 2) - current above normal or grounded circuit	Checksum Error of Parameter group 'Supply Voltage'	A faulty checksum was detected in the relevant parameter group in the non-volatile memory (EEPROM). Remark: This checksum is internally calculated by the software after the parameters were transmitted to the EEPROM.	• Contact WABCO North America Customer Care at 855-228-3203.
524271 - 7 = EEPROM - NVMem Checksum failure (Part 2) - mechanical system not responding correctly or out of adjustment	Checksum Error of Parameter group 'Vehicle CAN'	A faulty checksum was detected in the relevant parameter group in the non-volatile memory (EEPROM). Remark: This checksum is internally calculated by the software after the parameters were transmitted to the EEPROM.	• Contact WABCO North America Customer Care at 855-228-3203.
524271 - 8 = EEPROM - NVMem Checksum failure (Part 2) - abnormal frequency, pulse width or period	Checksum Error of Parameter group 'Auxiliary Parkbrake'	A faulty checksum was detected in the relevant parameter group in the non-volatile memory (EEPROM). Remark: This checksum is internally calculated by the software after the parameters were transmitted to the EEPROM.	• Contact WABCO North America Customer Care at 855-228-3203.
524271 - 9 = EEPROM - NVMem Checksum failure (Part 2) - abnormal update rate	Checksum Error of Parameter group 'Emergency Stop Signal'	A faulty checksum was detected in the relevant parameter group in the non-volatile memory (EEPROM). Remark: This checksum is internally calculated by the software after the parameters were transmitted to the EEPROM.	• Contact WABCO North America Customer Care at 855-228-3203.
524271 - 10 = EEPROM - NVMem Checksum failure (Part 2) - abnormal rate of change	Checksum Error of Parameter group 'Global Variant Coding'	A faulty checksum was detected in the relevant parameter group in the non-volatile memory (EEPROM). Remark: This checksum is internally calculated by the software after the parameters were transmitted to the EEPROM.	• Contact WABCO North America Customer Care at 855-228-3203.
524271 - 11 = EEPROM - NVMem Checksum failure (Part 2) - failure mode not identifiable/root cause not known	Checksum Error of Parameter group 'MBT Specific Parameters'	A faulty checksum was detected in the relevant parameter group in the non-volatile memory (EEPROM). Remark: This checksum is internally calculated by the software after the parameters were transmitted to the EEPROM.	• Contact WABCO North America Customer Care at 855-228-3203.
524271 - 12 = EEPROM - NVMem Checksum failure (Part 2) - bad intelligent device or component	Checksum Error of Parameter group 'Platform Storage'	A faulty checksum was detected in the relevant parameter group in the non-volatile memory (EEPROM). Remark: This checksum is internally calculated by the software after the parameters were transmitted to the EEPROM.	• Contact WABCO North America Customer Care at 855-228-3203.
524271 - 13 = EEPROM - NVMem Checksum failure (Part 2) - out of calibration	Checksum Error of Parameter group 'Model Diagnostics Storage'	A faulty checksum was detected in the relevant parameter group in the non-volatile memory (EEPROM). Remark: This checksum is internally calculated by the software after the parameters were transmitted to the EEPROM.	• Contact WABCO North America Customer Care at 855-228-3203.
524271 - 14 = EEPROM - NVMem Checksum failure (Part 2) - special instructions	Checksum Error of Parameter group 'Auxiliary Axles'	A faulty checksum was detected in the relevant parameter group in the non-volatile memory (EEPROM). Remark: This checksum is internally calculated by the software after the parameters were transmitted to the EEPROM.	• Contact WABCO North America Customer Care at 855-228-3203.
524271 - 15 = EEPROM - NVMem Checksum failure (Part 2) - data valid, but above normal operating range (least severe level)	Checksum Error of Parameter group 'Combination Stability Control'	A faulty checksum was detected in the relevant parameter group in the non-volatile memory (EEPROM). Remark: This checksum is internally calculated by the software after the parameters were transmitted to the EEPROM.	• Contact WABCO North America Customer Care at 855-228-3203.

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DTC SPN FMI	Failure Detection Name	Failure Detection Description	Repair
524271 - 16 = EEPROM - NVMem Checksum failure (Part 2) - data valid, but above normal operating range (moderately severe level)	Checksum Error of Parameter group 'Eapu'	A faulty checksum was detected in the relevant parameter group in the non-volatile memory (EEPROM). Remark: This checksum is internally calculated by the software after the parameters were transmitted to the EEPROM.	• Contact WABCO North America Customer Care at 855-228-3203.
524271 - 17 = EEPROM - NVMem Checksum failure (Part 2) - data valid, but below normal operating range (least severe level)	Checksum Error of Parameter group 'Eapu Storage'	A faulty checksum was detected in the relevant parameter group in the non-volatile memory (EEPROM). Remark: This checksum is internally calculated by the software after the parameters were transmitted to the EEPROM.	• Contact WABCO North America Customer Care at 855-228-3203.
524271 - 18 = EEPROM - NVMem Checksum failure (Part 2) - data valid, but below normal operating range (moderately severe level)	Checksum Error of Parameter group 'Esc Sensor'	A faulty checksum was detected in the relevant parameter group in the non-volatile memory (EEPROM). Remark: This checksum is internally calculated by the software after the parameters were transmitted to the EEPROM.	• Contact WABCO North America Customer Care at 855-228-3203.
524271 - 19 = EEPROM - NVMem Checksum failure (Part 2) - received network data in error	Checksum Error of Parameter group 'Esc Sensor Storage'	A faulty checksum was detected in the relevant parameter group in the non-volatile memory (EEPROM). Remark: This checksum is internally calculated by the software after the parameters were transmitted to the EEPROM.	• Contact WABCO North America Customer Care at 855-228-3203.
524271 - 20 = EEPROM - NVMem Checksum failure (Part 2) - data drifted high	Checksum Error of Parameter group 'GvcTime Stamp Storage'	A faulty checksum was detected in the relevant parameter group in the non-volatile memory (EEPROM). Remark: This checksum is internally calculated by the software after the parameters were transmitted to the EEPROM.	• Contact WABCO North America Customer Care at 855-228-3203.
524271 - 21 = EEPROM - NVMem Checksum failure (Part 2) - data drifted low	Checksum Error of Parameter group 'Open Loop Pressure Control'	A faulty checksum was detected in the relevant parameter group in the non-volatile memory (EEPROM). Remark: This checksum is internally calculated by the software after the parameters were transmitted to the EEPROM.	• Contact WABCO North America Customer Care at 855-228-3203.
524271 - 22 = EEPROM - NVMem Checksum failure (Part 2) - reserved (22)	Checksum Error of Parameter group 'Safety Monitors'	A faulty checksum was detected in the relevant parameter group in the non-volatile memory (EEPROM). Remark: This checksum is internally calculated by the software after the parameters were transmitted to the EEPROM.	• Contact WABCO North America Customer Care at 855-228-3203.
524271 - 23 = EEPROM - NVMem Checksum failure (Part 2) - reserved (23)	Checksum Error of Parameter group 'Yaw Rate'	A faulty checksum was detected in the relevant parameter group in the non-volatile memory (EEPROM). Remark: This checksum is internally calculated by the software after the parameters were transmitted to the EEPROM.	• Contact WABCO North America Customer Care at 855-228-3203.
524271 - 24 = EEPROM - NVMem Checksum failure (Part 2) - reserved (24)	Checksum Error of Parameter group 'RSC Storage'	A faulty checksum was detected in the relevant parameter group in the non-volatile memory (EEPROM). Remark: This checksum is internally calculated by the software after the parameters were transmitted to the EEPROM.	• Contact WABCO North America Customer Care at 855-228-3203.
524271 - 25 = EEPROM - NVMem Checksum failure (Part 2) - reserved (25)	Checksum Error of Parameter group 'Load Change Detection Storage'	A faulty checksum was detected in the relevant parameter group in the non-volatile memory (EEPROM). Remark: This checksum is internally calculated by the software after the parameters were transmitted to the EEPROM.	• Contact WABCO North America Customer Care at 855-228-3203.
524271 - 26 = EEPROM - NVMem Checksum failure (Part 2) - reserved (26)	Checksum Error of Parameter group 'Brake Cylinder Pressure Estimator Storage'	A faulty checksum was detected in the relevant parameter group in the non-volatile memory (EEPROM). Remark: This checksum is internally calculated by the software after the parameters were transmitted to the EEPROM.	• Contact WABCO North America Customer Care at 855-228-3203.

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DTC SPN FMI	Failure Detection Name	Failure Detection Description	Repair
524271 - 27 = EEPROM - NVMem Checksum failure (Part 2) - reserved (27)	Checksum Error of Parameter group 'Steering Wheel Angle'	A faulty checksum was detected in the relevant parameter group in the non-volatile memory (EEPROM). Remark: This checksum is internally calculated by the software after the parameters were transmitted to the EEPROM.	• Contact WABCO North America Customer Care at 855-228-3203.
524271 - 28 = EEPROM - NVMem Checksum failure (Part 2) - reserved (28)	Checksum Error of Parameter group 'Axle Modulator Interface'	A faulty checksum was detected in the relevant parameter group in the non-volatile memory (EEPROM). Remark: This checksum is internally calculated by the software after the parameters were transmitted to the EEPROM.	• Contact WABCO North America Customer Care at 855-228-3203.
524271 - 29 = EEPROM - NVMem Checksum failure (Part 2) - reserved (29)	Checksum Error of Parameter group 'Brake Control Assignment'	A faulty checksum was detected in the relevant parameter group in the non-volatile memory (EEPROM). Remark: This checksum is internally calculated by the software after the parameters were transmitted to the EEPROM.	• Contact WABCO North America Customer Care at 855-228-3203.
524271 - 30 = EEPROM - NVMem Checksum failure (Part 2) - reserved (30)	Checksum Error of Parameter group 'Brake Control Assignment EBS'	A faulty checksum was detected in the relevant parameter group in the non-volatile memory (EEPROM). Remark: This checksum is internally calculated by the software after the parameters were transmitted to the EEPROM.	• Contact WABCO North America Customer Care at 855-228-3203.
524271 - 31 = EEPROM - NVMem Checksum failure (Part 2) - condition exists	Checksum Error of Parameter group 'Closed Loop Pressure Control'	A faulty checksum was detected in the relevant parameter group in the non-volatile memory (EEPROM). Remark: This checksum is internally calculated by the software after the parameters were transmitted to the EEPROM.	• Contact WABCO North America Customer Care at 855-228-3203.
524272 - 0 = EEPROM - NVMem Checksum failure (Part 3) - data valid, but above normal operating range (most severe level)	Checksum Error of Parameter group 'ECU Supply Voltage'	A faulty checksum was detected in the relevant parameter group in the non-volatile memory (EEPROM). Remark: This checksum is internally calculated by the software after the parameters were transmitted to the EEPROM.	• Contact WABCO North America Customer Care at 855-228-3203.
524272 - 1 = EEPROM - NVMem Checksum failure (Part 3) - data valid, but below normal operating range (most severe level)	Checksum Error of Parameter group 'Hardware Configuration Axle Modulator'	A faulty checksum was detected in the relevant parameter group in the non-volatile memory (EEPROM). Remark: This checksum is internally calculated by the software after the parameters were transmitted to the EEPROM.	• Contact WABCO North America Customer Care at 855-228-3203.
524272 - 2 = EEPROM - NVMem Checksum failure (Part 3) - data erratic, intermittent or incorrect	Checksum Error of Parameter group 'Parameter Plausibility Storage'	A faulty checksum was detected in the relevant parameter group in the non-volatile memory (EEPROM). Remark: This checksum is internally calculated by the software after the parameters were transmitted to the EEPROM.	• Contact WABCO North America Customer Care at 855-228-3203.
524272 - 3 = EEPROM - NVMem Checksum failure (Part 3) - voltage above normal or shorted high	Checksum Error of Parameter group 'Pressure Increase Assist'	A faulty checksum was detected in the relevant parameter group in the non-volatile memory (EEPROM). Remark: This checksum is internally calculated by the software after the parameters were transmitted to the EEPROM.	• Contact WABCO North America Customer Care at 855-228-3203.
524272 - 4 = EEPROM - NVMem Checksum failure (Part 3) - voltage below normal or shorted low	Checksum Error of Parameter group 'System Bus Configuration'	A faulty checksum was detected in the relevant parameter group in the non-volatile memory (EEPROM). Remark: This checksum is internally calculated by the software after the parameters were transmitted to the EEPROM.	• Contact WABCO North America Customer Care at 855-228-3203.
524272 - 5 = EEPROM - NVMem Checksum failure (Part 3) - current below normal or open circuit	Checksum Error of Parameter group 'Brake Pedal Storage'	A faulty checksum was detected in the relevant parameter group in the non-volatile memory (EEPROM). Remark: This checksum is internally calculated by the software after the parameters were transmitted to the EEPROM.	• Contact WABCO North America Customer Care at 855-228-3203.

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DTC SPN FMI	Failure Detection Name	Failure Detection Description	Repair
524272 - 6 = EEPROM - NVMem Checksum failure (Part 3) - current above normal or grounded circuit	Checksum Error of Parameter group 'Modulator Identification'	A faulty checksum was detected in the relevant parameter group in the non-volatile memory (EEPROM). Remark: This checksum is internally calculated by the software after the parameters were transmitted to the EEPROM.	• Contact WABCO North America Customer Care at 855-228-3203.
524272 - 7 = EEPROM - NVMem Checksum failure (Part 3) - mechanical system not responding correctly or out of adjustment	Checksum Error of Parameter group 'Parameter Plausibility'	A faulty checksum was detected in the relevant parameter group in the non-volatile memory (EEPROM). Remark: This checksum is internally calculated by the software after the parameters were transmitted to the EEPROM.	• Contact WABCO North America Customer Care at 855-228-3203.

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