About This Manual
This manual provides service information for WABCO's Electronic Air Processing (EAP).

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

⚠️ 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.

How to Obtain Additional Maintenance, Service and Product Information
Contact the WABCO Customer Care Center at 855-228-3203.

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.
Overview

Electronic Air Processing or EAP is a control function that resides in the anti-lock braking system or other vehicle electronic control unit (ECU). The ECU electronically monitors the vehicle engine status and pneumatic pressure levels to enable preferential compressor operation cycle. It controls the solenoid valves that govern desiccant regeneration and compressor control. EAP products include the following:

- The electronically controlled air dryer (ECAD)
- The System Saver Plus with integrated solenoid
- The System Saver MCP with integrated solenoid

Electrical Schematics

Air Dryer Solenoid
**Figure 1.3**

EAP — 1200 Plus with Integrated Solenoids and 1200 Plus with Integrated Solenoids and MCP

**Figure 1.4**

For Volvo applications, see the Volvo Body Controller Manual.
Pneumatic Layouts

ECAD

1200 Plus with Electronic Solenoids and Multi-Circuit Protection

Refer to Maintenance Manual 34 for troubleshooting and installation instructions for the pressure relief valve, outlet check valve, heater assembly, purge valve assembly and turbo cut-off valve assembly.

Exploded Views
Figure 1.8

SYSTEM SAVER SERIES ELECTRONICALLY CONTROLLED AIR DRYER (ECAD)

DESICCANT CARTRIDGE

HEATER ASSEMBLY

PURGE VALVE ASSEMBLY

OUTLET CHECK VALVE ASSEMBLY
Figure 1.10

SYSTEM SAVER PLUS SERIES AIR DRYER WITH MULTI-CIRCUIT PROTECTION

- DRain Valve
- TURBO Cut-Off VALVE ASSEMBLY
- HEATER ASSEMBLY
- PRESSURE RELIEF VALVE
- OUtLET CHECK VALVE ASSEMBLY
- PURGE VALVE ASSEMBLY
- DESICCANT CARTRIDGE
- O-RING
Functionality Tests

**TOOLBOX™ Software Diagnostics**


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 Diagnostic Trouble Codes (DTCs), as well as the appropriate repair instructions.
- Manual activation of system components to verify system integrity, correct component operation and installation wiring.

Using TOOLBOX™ Software to Access EAP Information

1. Connect the computer to the vehicle:
   - Attach the USB cable from your computer’s USB port to a RP 1210 compact diagnostic adapter.
   - Attach the Deutsch diagnostic cable from the adapter to the vehicle. Figure 2.1.

2. Select the TOOLBOX™ Software icon from the desktop or from the Windows® Start Menu to display the Main Menu. Figure 2.2.

3. Verify the TOOLBOX™ Software adapter settings are correct for the device and communication protocol that will be used as follows.

   To access “Adapter Selection” for TOOLBOX™ Software 11 or newer, click on “Utilities” from the main TOOLBOX™ page. Figure 2.2.

   Make sure the “Vendor:” and “Adapter:” drop-downs are set for the device being used and the “Protocol:” is set to J1939, then click “OK”. Figure 2.3.
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 are up to date.
- Check all the powers and grounds coming to the ECU including load testing.
- Check J1939 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™ 12 or higher and a vehicle with Software ECU E8 or higher, diagnostics over J1939 communications can be possible. Figure 2.2.

5. In the Main Menu, select J1939 Tractor ABS, then Pneumatic ABS. The E8 Pneumatic ABS Main Screen will appear. Figure 2.4.

Check the Purge Solenoid

On the EAP home screen with the truck running and at full system pressure, click on the “Activate Air Dryer Solenoid” button. You should hear the air dryer purge. This shows that the purge valve and control solenoid are working correctly. Figure 2.6.

Check the Compressor Load/Unload Solenoid

On the EAP home screen with the truck running, charge the air system to full pressure and use the brakes to bleed off pressure until the dash gauges read 120 psi. Click on the “Activate Air Compressor Solenoid” button. The compressor should go “onload” for 15 seconds and the system pressure should raise three or more psi, depending on system layout. After the 15 seconds, the compressor will “unload”. This verifies that the air dryer is triggering the compressor correctly. Figure 2.6.
Manual Testing of the Electronically Controlled Air Dryer

Tools and Supplies Required

- Air gauge — 200 psi (13.8 bar) minimum
- Power supply — 12 volt
- Air supply — 120-140 psi (8.27-9.7 bar) with shut-off valve
- Air tank — one gallon (3.8 l) minimum
- Multimeter (Volt/Ohm meter)
- Optional wire test harness

Testing the Electronically Controlled Air Dryer

This procedure is for testing the electronically controlled air dryers, independently of other vehicle systems. It is not intended to replace existing service diagnostic and repair procedures.

If the air dryer does not pass any of the tests described in the following procedure, refer to Maintenance Manual 34 for troubleshooting and repair instructions. If the problem could not be corrected, contact the WABCO North America Customer Care Center at 855-228-3203.

1. Disconnect the air dryer solenoid electrical 4-way connector from the air dryer. Figure 2.7.

2. Check for water contamination and physical damage to the electrical pins on both the air dryer solenoid electrical 4-way and on the vehicle’s wiring harness 4-way connector.

3. Connect the Wire Test Harness 4-way connector to the solenoid electrical 4-way using the alligator clips or probes. Figure 2.8.

4. Use a volt/ohm meter to test solenoid resistance as follows. Select electrical resistance (Ω Ohm), and set the scale according to the range values measured in the following steps. Figure 2.9 and Figure 2.10.

For ECAD:

A. Test between Pin 6.1 and Pin 6.4 on the solenoid pack. The measured resistance should be within the range of 12.5-14.3 ohms.

B. Test between Pin 6.3 and Pin 6.4 on the solenoid pack. The measured resistance should be within the range of 18.2-20.2 ohms.

C. Test between Pin 6.4 and ECAD valve body for ground. The measured resistance should be open (OL).

For EAP:

A. Test between Pin 6.1 and Pin 6.4. The measured resistance should be within the range of 19-20 ohms.

B. Test between Pin 6.2 and Pin 6.4. The measured resistance should be within the range of 19-20 ohms.

- If the resistance in any of the tests is not within specification: Stop further testing. Refer to Maintenance Manual 34 for troubleshooting and repair instructions. If the problem could not be resolved, call the WABCO Customer Care Center at 855-228-3203.
5. Disconnect the air dryer inlet (port 1), signal (port 4) and outlet (port 2) lines. Figure 2.7, Figure 2.11 and Figure 2.12.

6. Connect shop air with a closed shut-off valve to the inlet (port 1). The shut-off valve must be mounted between the air supply and ECAD inlet (port 1).

7. Connect an air gauge to signal (port 4).

8. Connect a one-gallon (3.8 l) or larger air tank to the dryer outlet (port 2).

9. Open the inlet valve supplying shop air to the dryer and verify the following.
   - There are no air leaks from the dryer.
   - The air tank fills with air.
   - The signal gauge does not move.
10. Close the inlet shut-off valve and supply 12 volts to Pin 6.1 and
ground to the dryer body on ECAD or 12 volts to Pin 6.2 and
ground to Pin 6.4 on EAP. Verify the following.

- The dryer purges, then stops leaking.
- The signal gauge rises to the tank pressure.

11. Remove the pin from green test lead Pin 6.3 (ECAD) or Pin 6.1
(EAP), then verify that the signal gauge falls to 0 psi.

12. For ECAD, ground green test lead Pin 6.3 and brown test lead
Pin 6.1 of the solenoid connector (with 12 volts on red test lead
Pin 6.4 still in place). For EAP, connect power to Pin 6.1 and
ground to Pin 6.4. Verify the following.

- The tank drains through the purge valve slowly (desiccant
  regeneration). For ECAD, the purge valve will close at its
  minimum setting, retaining some pressure on the air
gauges, generally around 35-70 psi (2.41-4.8 bar). For
  EAP, remove power from Pin 6.1 and the EAP will stop
  regenerating.

13. If the dryer passes the above tests, the dryer is functioning
correctly. Replace the connections to the air dryer and return to
service.

If the air dryer did not pass any of the tests, refer to
Maintenance Manual 34 for troubleshooting and repair
instructions. If the problem could not be corrected, call the
WABCO Customer Care Center at 855-228-3203.
3 Diagnostic Trouble Codes

EAP Diagnostic Trouble Codes

EAP DTCs can be checked in TOOLBOX™ Software using the following procedure.

1. In the E8 Pneumatic ABS portion of TOOLBOX, select Display from the menu bar. Figure 3.1.

![Figure 3.1]

2. From the pull-down menu, select Faults or Diagnostic Trouble Codes. This will open the Fault Information screen. Figure 3.2 and Figure 3.3.

![Figure 3.2]

3. 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 12 also provides links to the appropriate system schematic which are also provided in this maintenance manual.

Use the information in the screen and the following DTC list to troubleshoot any problems that may occur with WABCO’s EAP. 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 adapter settings (Vendor, Protocol, Adapter) in TOOLBOX™ Software are correct.
- Verify the device software and firmware are up-to-date.
## EAP Error Codes

<table>
<thead>
<tr>
<th>SPN</th>
<th>FMI</th>
<th>Description</th>
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<th>Action</th>
</tr>
</thead>
</table>
| 520310 | 2   | CAN data erratic, intermittent or incorrect      | At least one pressure sensor value is not plausible when compared to the other value. | - Ensure that the pressure sensor is fully connected and no lose wires are present.  
- Ensure pressure sensor is functioning correctly.  
- See the sensor supplier for troubleshooting information. |
| 520310 | 9   | CAN messages are not updating at an expected rate | One of the received CAN messages from the engine system has timed out or one data is no longer valid. | - Check to make sure all connectors are connected and wires locked into connector shells on the ECU and the air dryer.  
- Contact WABCO Customer Care Center at 855-228-3203 if the problem persists. |
| 520310 | 14  | CAN message is missing                           | The ambient condition message has timed out or one data is no longer valid. | - Contact WABCO Customer Care Center at 855-228-3203 if the problem persists. |
| 520310 | 7   | Mechanical system not responding as expected     | The system pressure does not drop during regeneration.              | - Ensure purge valve is not damaged.  
- Ensure debris is not blocking the purge valve from opening.  
- Ensure if silencer is equipped, that it is not blocking air flow.  
- Use TOOLBOX™ Software to fire regeneration solenoid and ensure it is opening/closing.  
- Replace purge valve assembly if it will not open/close with TOOLBOX™ Software. |
| 520310 | 10  | The system pressure reaches an elevated pressure level too quickly. | System blockage or external pressure source.                        | - Ensure external air sources are disconnected.  
- Ensure no blockages are present in air system.  
- Ensure the pressure sensors are functioning correctly. |
| 1052   | 13  | Parameter file conflict                          | A pressure sensor was detected in signal output #2 although it was not activated via the parameter setting. | - Contact WABCO Customer Care Center at 855-228-3203 if this issue arises. |
| 1055   | 13  | Parameter file conflict                          | A pressure sensor was detected in signal output #3 although it was not activated via the parameter setting. | - Contact WABCO Customer Care Center at 855-228-3203 if this issue arises. |
| 1052   | 5   | Current below normal or open circuit             | The sensor signal #2 is below the lower limit value.                | - Ensure that the sensor connector is plugged correctly into the harness.  
- Contact WABCO Customer Care Center at 855-228-3203 if replacement parts are needed. |
### EAP Error Codes

<table>
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<th>Cause</th>
<th>Action</th>
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</thead>
<tbody>
<tr>
<td>1052</td>
<td>3</td>
<td>Voltage above normal</td>
<td>The sensor signal #2 is higher than the upper limit value.</td>
<td>• Ensure that the sensor connector is plugged correctly into the harness.</td>
</tr>
<tr>
<td></td>
<td></td>
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<td></td>
<td>• Ensure no blockages exist down stream of the sensor in the air system.</td>
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<td></td>
<td>• Contact WABCO Customer Care Center at 855-228-3203 if replacement parts are needed.</td>
</tr>
<tr>
<td>1055</td>
<td>5</td>
<td>Current below normal or open circuit</td>
<td>The sensor signal #3 is below the lower limit value.</td>
<td>• Ensure that the sensor connector is plugged correctly into the harness.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Contact WABCO Customer Care Center at 855-228-3203 if replacement parts are needed.</td>
</tr>
<tr>
<td>1055</td>
<td>3</td>
<td>Voltage above normal or shorted high</td>
<td>The sensor signal #3 is higher than the upper limit value.</td>
<td>• Ensure that the sensor connector is plugged correctly into the harness.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Ensure no blockages exist down stream of the sensor in the air system.</td>
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<td></td>
<td>• Contact WABCO Customer Care Center at 855-228-3203 if replacement parts are needed.</td>
</tr>
<tr>
<td>812</td>
<td>5</td>
<td>Current below normal or open circuit</td>
<td>System short</td>
<td>• Ensure all wiring connections are solid and no obvious shorts exist.</td>
</tr>
<tr>
<td></td>
<td></td>
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<td></td>
<td>• Contact WABCO Customer Care Center at 855-228-3203 if the problem persists.</td>
</tr>
<tr>
<td>1351</td>
<td>0</td>
<td>Data valid, but above normal operation range</td>
<td>The system pressure is above the set max. value.</td>
<td>• Ensure all air lines and wiring connections are tight an inserted.</td>
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<td>• Contact WABCO Customer Care Center at 855-228-3203 if the problem persists.</td>
</tr>
<tr>
<td>1351</td>
<td>6</td>
<td>Current above normal or grounded circuit</td>
<td>The system pressure continues to rise after the compressor as been shut off.</td>
<td>• Ensure no outside sources of air are connected to the air system.</td>
</tr>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>• Contact WABCO Customer Care Center at 855-228-3203 if the problem persists.</td>
</tr>
<tr>
<td>1351</td>
<td>11</td>
<td>Failure mode not identifiable/root cause not known</td>
<td>The system pressure does not build after a long period of pumping. No regeneration possible.</td>
<td>• Refer to Section 2 in this manual for testing instructions.</td>
</tr>
<tr>
<td></td>
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<td></td>
<td>• Contact WABCO Customer Care Center at 855-228-3203 for troubleshooting.</td>
</tr>
<tr>
<td>520310</td>
<td>8</td>
<td>Abnormal frequency, pulse width or period</td>
<td>Input pressure to generate system pressure is not available.</td>
<td>• Ensure all air lines are connected/check for leaks.</td>
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<td>• Refer to Section 2 in this manual for testing instructions.</td>
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<td>--------------------------------------------</td>
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<tr>
<td>1052</td>
<td>3</td>
<td>Pressure Sensor 2/Analog Input 2</td>
<td>Voltage above normal or shorted high</td>
<td>Short Circuit to UBatt Detection/Sensor 2</td>
</tr>
<tr>
<td>1052</td>
<td>5</td>
<td>Pressure Sensor 2/Analog Input 2</td>
<td>Current below normal or open circuit</td>
<td>Open Circuit or Short Circuit to GND Detection/Sensor 2</td>
</tr>
<tr>
<td>1055</td>
<td>3</td>
<td>Pressure Sensor 3/Analog Input 3</td>
<td>Voltage above normal or shorted high</td>
<td>Short Circuit to UBatt Detection/Sensor 3</td>
</tr>
</tbody>
</table>
## Hardware-Related Error Codes

<table>
<thead>
<tr>
<th>SPN</th>
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</thead>
<tbody>
<tr>
<td>1055 5</td>
<td>Pressure Sensor 3/Analog Input 3</td>
<td>Current below normal or open circuit</td>
<td>Open Circuit or Short Circuit to GND Detection/Sensor 3</td>
<td>With the key in the Off position, disconnect the sensor and inspect both the connector and component for damage, contamination or corrosion. If the sensor is supplied by WABCO, the following voltage and resistance values will be correct. If the sensor is not provided by WABCO, please contact the supplier for assistance. Turn the key on and check for DC voltage from Pin 6.1 - 6.2 on the sensor connector = 8 - 30 v. Also, verify the resistance from X4.8 - X4.15 is 140-155 ohms. After testing, re-insert the ends and ensure the connection is sound.</td>
<td></td>
</tr>
<tr>
<td>705 3</td>
<td>Auxiliary I/O #05</td>
<td>Voltage above normal or shorted high</td>
<td>AUX5-Output, Shorted to UB Detection</td>
<td>With the key in the Off position, verify the resistance from X4.4 – X4.18 and X4.5 – X4.18 = 285-295 ohms. Also, verify that the resistance between Pin 6.4 and Pin 6.2 on the solenoid pack that is attached to the dryer is 15-25 ohms. After testing, re-insert the ends and ensure the connection is sound.</td>
<td></td>
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<td>705 3</td>
<td>Auxiliary I/O #05</td>
<td>Voltage above normal or shorted high</td>
<td>AUX5-Output, Short Circuit Detection</td>
<td>With the key in the Off position, verify the resistance from X4.4 – X4.18 and X4.5 – X4.18 = 285-295 ohms. Also, verify that the resistance between Pin 6.4 and Pin 6.2 on the solenoid pack that is attached to the dryer is 15-25 ohms. After testing, re-insert the ends and ensure the connection is sound.</td>
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</tr>
<tr>
<td>705 4</td>
<td>Auxiliary I/O #05</td>
<td>Voltage below normal or shorted low/shorted to ground</td>
<td>AUX5-Output, Shorted to GND Detection</td>
<td>With the key in the Off position, verify the resistance from X4.4 – X4.18 and X4.5 – X4.18 = 285-295 ohms. Also, verify that the resistance between Pin 6.4 and Pin 6.2 on the solenoid pack that is attached to the dryer is 15-25 ohms. After testing, re-insert the ends and ensure the connection is sound.</td>
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<td>705 5</td>
<td>Auxiliary I/O #05</td>
<td>Current below normal or open circuit</td>
<td>AUX5-Output, Open Circuit Detection</td>
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<tr>
<td>706</td>
<td>3</td>
<td>Auxiliary I/O #06</td>
<td>Voltage above normal or shorted high</td>
<td>AUX6-Output, Shorted to UB Detection</td>
<td>With the key in the Off position, verify the resistance from X4.4 – X4.18 and X4.5 – X4.18 = 285-295 ohms. Also, verify that the resistance between Pin 6.4 and Pin 6.2 on the solenoid pack that is attached to the dryer is 15-25 ohms. After testing, re-insert the ends and ensure the connection is sound.</td>
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<tr>
<td>706</td>
<td>3</td>
<td>Auxiliary I/O #06</td>
<td>Voltage above normal or shorted high</td>
<td>AUX6-Output, Short Circuit Detection</td>
<td>With the key in the Off position, verify the resistance from X4.4 – X4.18 and X4.5 – X4.18 = 285-295 ohms. Also, verify that the resistance between Pin 6.4 and Pin 6.2 on the solenoid pack that is attached to the dryer is 15-25 ohms. After testing, re-insert the ends and ensure the connection is sound.</td>
</tr>
<tr>
<td>706</td>
<td>4</td>
<td>Auxiliary I/O #06</td>
<td>Voltage below normal or shorted to ground</td>
<td>AUX6-Output, Shorted to GND Detection</td>
<td>With the key in the Off position, verify the resistance from X4.4 – X4.18 and X4.5 – X4.18 = 285-295 ohms. Also, verify that the resistance between Pin 6.4 and Pin 6.2 on the solenoid pack that is attached to the dryer is 15-25 ohms. After testing, re-insert the ends and ensure the connection is sound.</td>
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<tr>
<td>706</td>
<td>5</td>
<td>Auxiliary I/O #06</td>
<td>Current below normal or open circuit</td>
<td>AUX6-Output, Open Circuit Detection</td>
<td>With the key in the Off position, verify the resistance from X4.4 – X4.18 and X4.5 – X4.18 = 285-295 ohms. Also, verify that the resistance between Pin 6.4 and Pin 6.2 on the solenoid pack that is attached to the dryer is 15-25 ohms. After testing, re-insert the ends and ensure the connection is sound.</td>
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WABCO (NYSE: WBC) is a leading global supplier of technologies and services that improve the safety, efficiency and connectivity of commercial vehicles. Founded nearly 150 years ago, WABCO continues to pioneer breakthrough innovations for advanced driver assistance, braking, stability control, suspension, transmission automation and aerodynamics. Partnering with the transportation industry as it maps a route toward autonomous driving, WABCO also uniquely connects trucks, trailers, cargo, drivers, business partners and fleet operators through advanced fleet management systems and mobile solutions. WABCO reported sales of $2.8 billion in 2016. Headquartered in Brussels, Belgium, WABCO has 13,000 employees in 40 countries. For more information, visit: www.wabco-na.com