

TRAILER iABS 2S/2M, 4S/2M AND 4S/3M

INSTALLATION INSTRUCTIONS



TP18006

WABCO



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1 General Information

Symbols used in this document

DANGER

Description of an immediate situation which will result in irreversible injury or death if the warning is ignored.

WARNING

Description of a possible situation which may result in irreversible injury or death if the warning is ignored.

CAUTION

Description of a possible situation which may result in irreversible injury if the warning is ignored.

NOTICE

Description of a possible situation which may result in material damage if the warning is ignored.



Important information, notes and/or tips



Reference to information on the internet

1. Action step

- Action step
- ⇒ Consequence of an action

■ List

- List

 **Note on the use of a tool/WABCO tool**

General Information

How to Obtain Additional Maintenance, Service and Product Information

If you have any questions about the material covered in this publication, or for more information about the WABCO product line, please contact WABCO Customer Care Center at 855-228-3203, by email at wnacustomercenter@wabco-auto.com, or visit our website: www.wabco-na.com.

Refer to the latest iABS Maintenance Manual MM19001. To obtain this publication, visit our website at wabco-na.com/literature, or call WABCO North America Customer Care at 1-855-228-3203.

Refer to the Society of Automotive Engineers (SAE) website to find all current SAE documents and standards applicable to WABCO products (such as SAE J447 and SAE J908 at www.sae.org).

Refer to the National Highway Traffic Safety Administration (NHTSA) website to find all current documents referenced in the manual at www.nhtsa.gov.

WABCO TOOLBOX PLUS™ Software

The TOOLBOX PLUS™ Software provides PC diagnostics for WABCO products can be purchased and downloaded from <https://wabco.snapon.com>. For complete instructions for using TOOLBOX PLUS™ refer to User's Guide MM19047. To obtain this literature, visit www.wabco-na.com/literature.

WABCO Academy



<https://www.wabco-academy.com/home/>

WABCO Online product catalog



<http://www.wabco-customercenter.com>

Your direct contact to WABCO

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2 Safety Information

Provisions for a safe work environment

- Only trained and qualified auto technicians and auto mechanics may carry out work on the vehicle.
- Read this publication carefully.
- Follow all warnings, notices and instructions to avoid personal injury and property damage.
- Always abide by the vehicle manufacturer's specifications and instructions.
- Observe all accident regulations of the respective company as well as regional and national regulations.
- The workplace should be dry, sufficiently lit and ventilated.
- Use personal protective equipment if required (safety shoes, protective goggles, respiratory protection and ear protectors).

Read and observe all Danger, 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

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

WARNING

Park the vehicle on a level surface. Block the wheels to prevent the vehicle from moving. Support the vehicle with safety stands. Do not work under a vehicle supported only by jacks. Jacks can slip or fall over. Serious personal injury and damage to components can result.

3 Important Information

Use only genuine WABCO components. Other manufacturers' parts are not designed for use with a WABCO ABS system and may not function correctly.

WABCO recommends that a control line filter, part number 432-500-005-0, be installed on the air system's control line, upstream of the ABS ECU/valve assembly.

4 Preparation

1. Before beginning the installation procedure, inspect the ECU/dual modulator valve assembly for damage that may have occurred during shipping or storage.
 - Look for damaged or broken connectors.
 - Do not install a damaged ECU/dual modulator valve assembly. Notify your supervisor, or contact WABCO if there is any apparent damage.
2. Have the following installation material available.

WABCO Components:

- ECU/dual modulator valve assembly
- ABS relay valve and relay valve extension cable (3M system only)
- Power cable or power/diagnostic cable
- Sensor extension cables (two pieces for 2S systems, four pieces for 4S systems)
- ABS sensors (two or four) for non-ABS prepped axles
- ABS Indicator Label (TP-95172)

Non-WABCO Components:

- 5/8-inch O.D. nylon tubing for supply (frame mount)
- Pipe plug (3/4-inch NPT)
- Schedule 80 hex pipe nipple (3/4-inch NPT) for air tank mounts or two Grade 8 bolts (3/8-inch) and prevailing torque nuts for frame mounts
- ABS sensor clip lubricant (the following are approved by WABCO):
 - Mobilith SHC-220 (Mobil)
 - TEK 662 (Roy Dean Products)
 - Staburags NBU 30 PTM (Kluber Lubrication)
 - Valvoline EP 633
- SAE-standard, DOT-approved sealing paste
- ABS indication lamp (to ensure correct lamp operation, use an incandescent-type DOT-approved lamp, or an LED with integral load resistor)

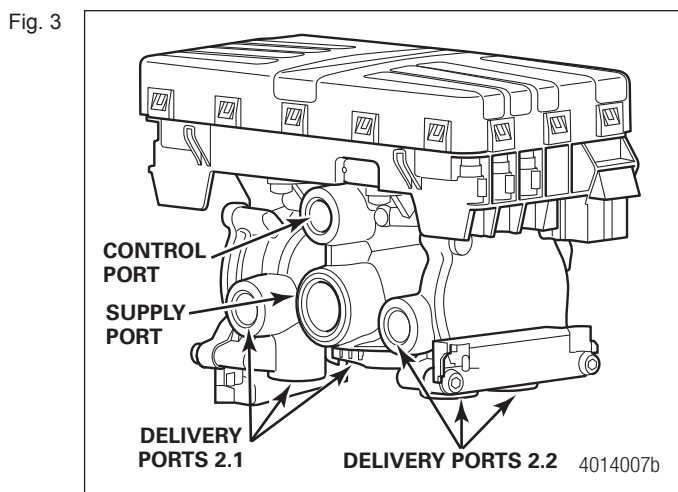
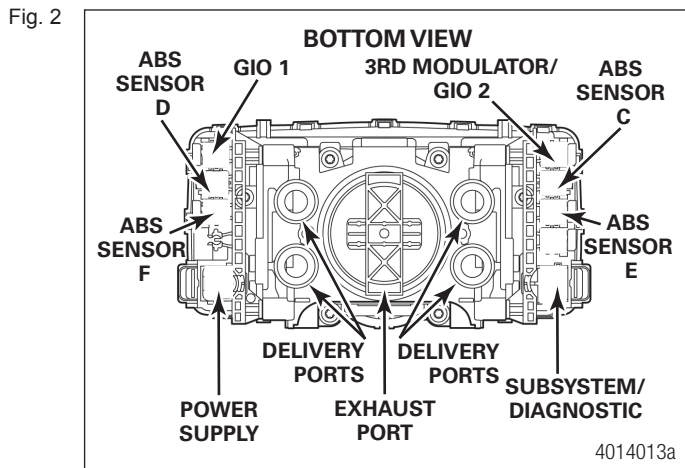
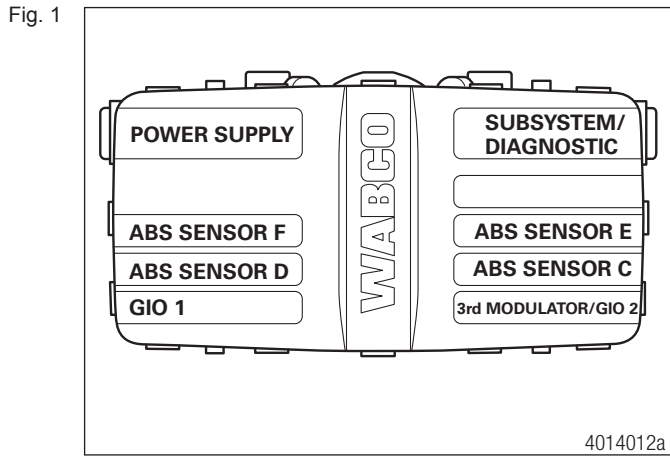


All WABCO component part number information can be found in Appendix IV.

End of line testing must be done after all installations. WABCO recommends using TOOLBOX PLUS™ Software to perform this testing. If you do not have TOOLBOX PLUS™ Software, this bulletin also includes instructions for testing without the software. The TOOLBOX PLUS™ Software can be purchased and downloaded from www.wabco-snapon.com.

Preparation

3. Study the ECU/single modulator valve assembly. Note the location of the various ports and electrical connections on the ECU. Figure 1, Figure 2, and Figure 3.



5 Installation

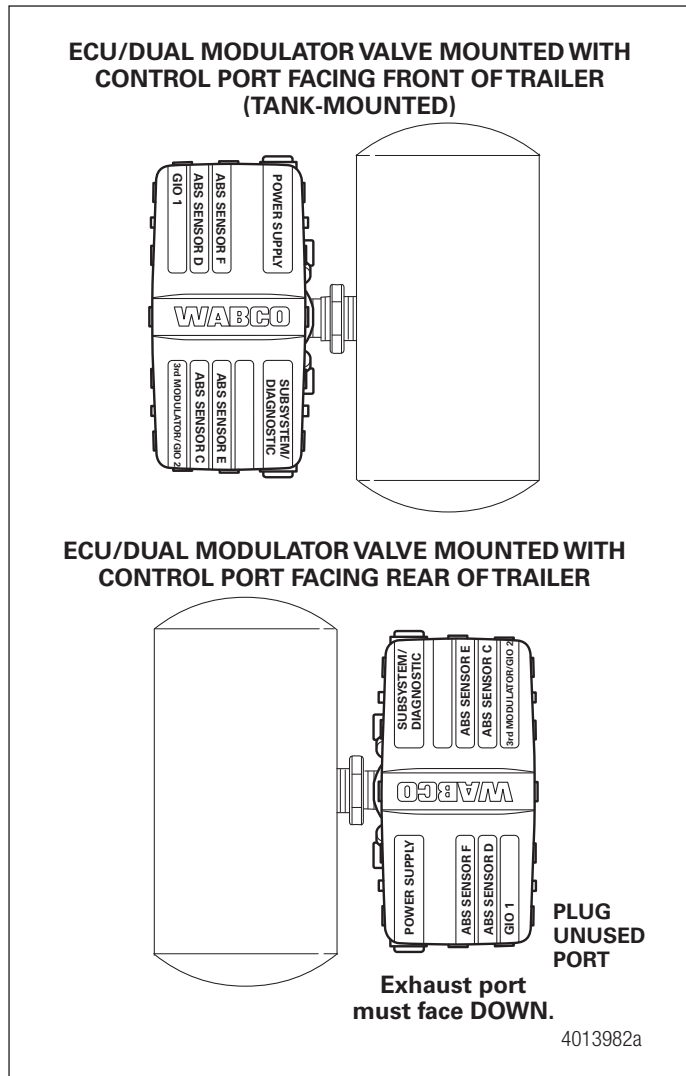
5.1 Install the ECU/Dual Modulator Valve Assembly

The assembly may be mounted on the air tank or on the cross member of the vehicle.

5.1.1 Tank-Mounted

Refer to Figure 4.

Fig. 4



⚠ WARNING

You must use a Schedule 80 hex nipple (3/4-inch NPT) to mount the ECU/dual modulator valve assembly securely to the air tank to avoid possible serious personal injury and damage to the component.

1. Use a 3/4-inch NPT Schedule 80 hex nipple to attach the ECU/dual modulator valve assembly to a reinforced air tank. Apply SAE-standard, DOT-approved sealing paste to either the first few threads or over the whole length. Hand-tighten it with a minimum of 2.5 turns. **Note if a minimum of 2.5 turns cannot be achieved, remove and inspect.**

NOTICE

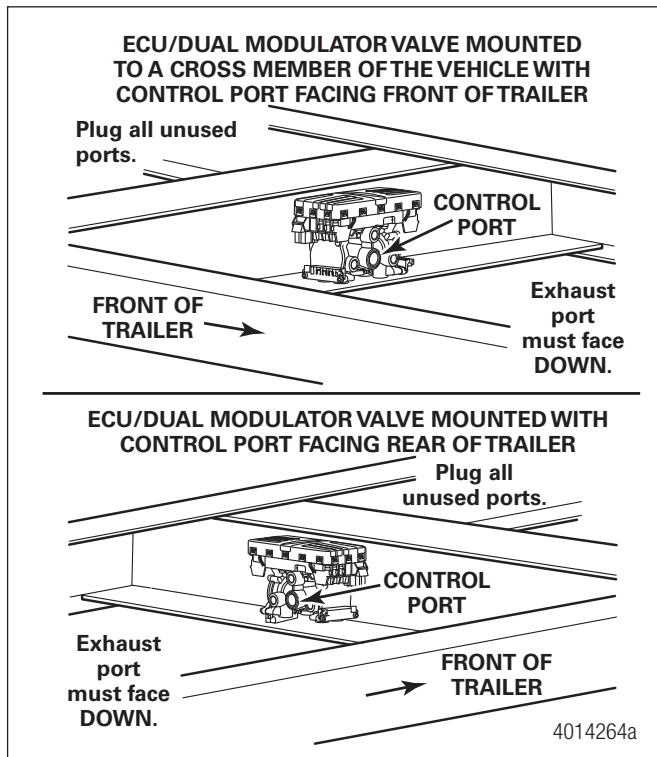
WABCO does not recommend the use of a vise when installing the hex nipple. Use of a vise may cause overclamping. Overclamping may damage the internal components of the ECU/dual modulator valve assembly.

2. Use a 3/4-inch NPT pipe plug to plug the unused supply port. Apply SAE-standard, DOT-approved sealing paste to either the first few threads or over the whole length. Pipes with pre-applied thread sealant may also be used.
3. Rotate and tighten the ECU/dual modulator valve assembly a minimum of 3 turns and verify the exhaust port faces DOWN and the connection is secure. Use a torque wrench on the 3/4-inch pipe plug installed on the front supply port to verify the valve is tightened to 59-148 lb-ft (80-200 Nm).

5.1.2 Mounted to Cross Member of Vehicle (Mounting Bracket Not Supplied)

Refer to Figure 5.

Fig. 5



When mounting the ECU/dual modulator valve assembly to the trailer cross member, refer to SAE specification J447, Prevention of Corrosion of Motor Vehicle Body and Chassis Components. Follow all recommendations and procedures. Your supervisor should have a copy of this specification.

1. Install a 3/4-inch NPT fitting in the supply port. Use a 3/4-inch NPT pipe plug to plug the unused supply port (Port 1). Apply SAE-standard, DOT-approved sealing paste to either the first few threads or over the whole length. Pipes with pre-applied thread sealant may also be used.
 2. Locate a position for mounting the assembly to the vehicle cross member midway between the side rails, close to the brake chambers the valve serves.
 - Drill two 3/8-inch mounting holes. The distance between the two holes (O.D.) must be 3-13/16-inches (97.2 mm) and mount directly to the cross member.
- OR
- Build a mounting bracket with two 3/8-inch mounting holes spaced 3-13/16-inches (97.2 mm) O.D. apart.
 3. Use two 3/8-inch Grade 8 bolts with prevailing torque nuts to attach the assembly. Tighten the bolts to 26 lb-ft (35 ± 3 Nm).

5.1.3 Attach the ABS External Relay Valve (4S/3M Systems Only)

The ABS external relay valve, part number 472 195 033 0, may be mounted on the air tank or on the cross member of the vehicle.

5.1.4 Tank-Mounted

WARNING

You must use a **Schedule 80 hex nipple (3/4-inch NPTF)** to mount the **ABS external relay valve assembly** securely to the air tank to avoid possible serious personal injury and damage to the component.

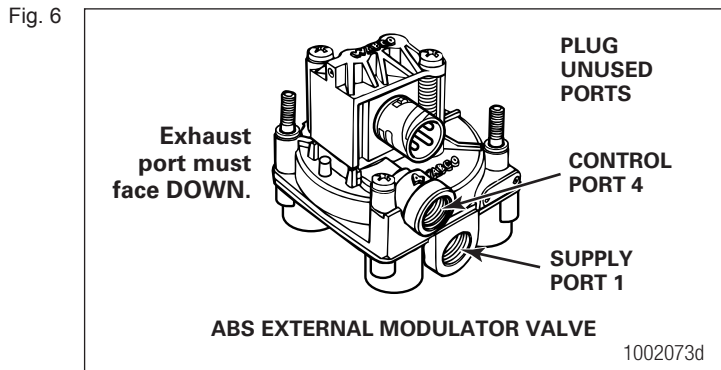
1. Use a 3/4-inch NPTF Schedule 80 hex nipple to attach the relay valve assembly to a reinforced air tank. Do not overtighten, potential damage to the valve could occur.

NOTICE

WABCO does not recommend the use of a vise when installing the hex nipple. Use of a vise may cause overclamping. Overclamping may damage the internal components of the ECU/dual modulator valve assembly.

2. Use a 3/4-inch NPTF pipe plug to plug the unused supply port. Apply SAE-standard, DOT-approved sealing paste to either the first few threads or over the whole length. Pipes with pre-applied thread sealant may also be used.

3. Rotate and tighten the relay valve assembly until the exhaust port faces down and the connection is secure. Use a torque wrench or ratchet with an extension at the 3/4-inch pipe plug installed on the front supply port. Figure 6.



5.1.5 Mounted to Cross Member of Vehicle (Mounting Bracket Not Supplied)

When mounting the relay valve assembly to the trailer cross member, refer to SAE specification J447, Prevention of Corrosion of Motor Vehicle Body and Chassis Components. Follow all recommendations and procedures.

1. Install a 3/4-inch NPTF fitting in the supply port. Use a 3/4-inch NPTF pipe plug to plug the unused supply port (Port 1). Apply SAE-standard, DOT-approved sealing paste to either the first few threads or over the whole length. Pipes with pre-applied thread sealant may also be used.
2. Install the valve with two locknuts and washers as required. Tighten the locknuts to 18 lb-ft (24 Nm).

5.1.6 Connect the Air Lines

Before connecting the air lines, plumb the spring brake relay or emergency brake relay into the system as usual.

- If you are mounting on a bracket, connect the air supply line from the supply tank to the supply Port 1. Plug the unused port.
 - Use 5/8-inch O.D. min. nylon tubing or heavy-walled Schedule 80 pipe nipple (3/4-inch NPTF) if you are mounting directly to the supply tank.
1. Connect the air delivery lines to the ECU/dual modulator valve assembly Port 2. For 4S/3M installations, connect the air delivery lines to Port 2 on the external relay valve (3/8-inch NPTF).
 2. Connect the air delivery lines to the appropriate brake chambers (3/8-inch NPTF). Figure 16.
 - The valve portion of the ECU/dual modulator valve assembly contains two separate valves: one dedicated to roadside wheel ends, the other dedicated to curbside wheel ends. Each valve has three delivery ports.
 - The external relay valve is an axle control valve. It controls brake chambers on one or two axles. It is important that delivery lines from Port 2 are plumbed as shown. Refer to Figure 12 through Figure 18.
 3. Connect the brake service (control) line to the ECU/dual modulator valve assembly Port 4 (3/8-inch NPTF).

4. For 4S/3M installations, perform the following procedures.
 - Connect the brake service (control) line to the ECU/dual modulator valve assembly Port 4 (3/8-inch NPTF) and ABS external relay valve control Port 4 (3/8-inch NPTF).
 - Use an ABS relay valve connection cable to connect the ECU/dual modulator valve assembly with the ABS external relay valve.
5. Plug any unused delivery ports.

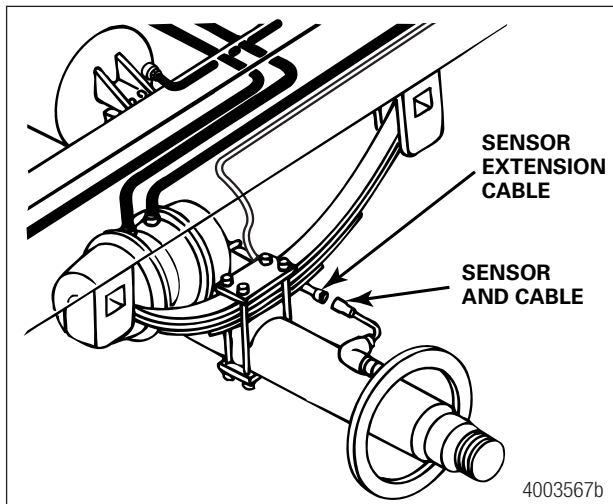
5.1.7 Install the Sensor Extension Cables (ABS-prepped Axles)

Instructions for installing sensors on non-ABS-prepped axles are included in Appendix I.

1. Visually inspect the tooth wheel and sensor to ensure no damage occurred during shipping. Perform any necessary repairs before starting any installation.
2. Connect the sensors and cables on the prepped axles to the sensor extension cables. Figure 7.

Ensure that each connection is secure.

Fig. 7

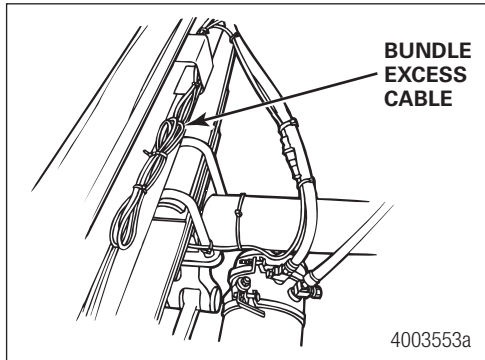


3. Route the sensor cable along the back side of the trailer axle to the ECU/dual modulator valve assembly. Route the cable with the brake hose.

Do not overtighten the tie wraps on a cable. Overtightening can damage the cable. Do not tie wrap the molded sensor plug. The sensor extension cable must follow the brake hose to the ECU/dual modulator valve assembly to allow for axle jounce and rebound.

4. Secure the cables every eight inches (203 mm) with tie wraps or cable clips.
5. Remove the protective plugs from sensors E and F for a 4S system.
6. Plug the sensor extension cables into the ECU/dual modulator valve assembly. To secure push the sensor extension connection in until the locking tab seats.
7. Bundle any excess cable in a "Z"-shaped loop. Figure 8.

Fig. 8



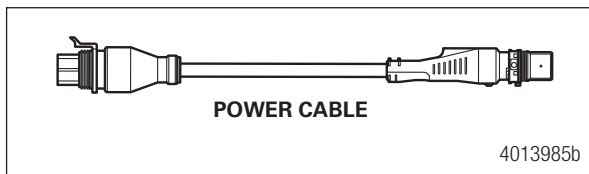
8. Secure excess cable in the sub-frame of the vehicle or along the air hoses as appropriate. Excess cable should not exceed two feet (0.61 meter).

Various cable lengths are available, see Appendix IV.

5.1.8 Install the Power Cable

1. Identify the type of cable to be installed. Figure 9.
 - ABS trailer industry-standard pigtail connector power cable
 - Blunt-cut power cable (not shown)

Fig. 9



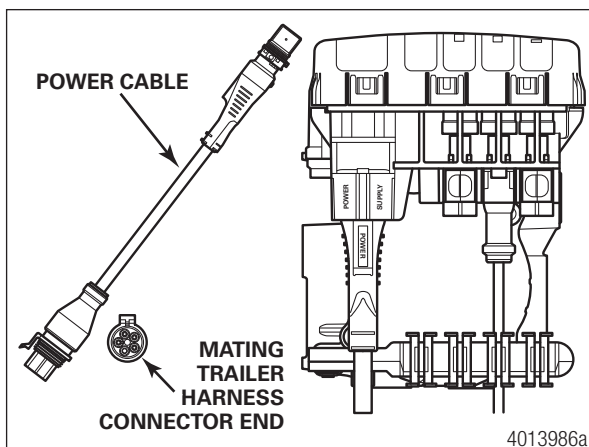
2. For industry-standard weather pack power cables, route the cable from the harness connector to the ECU/dual modulator valve assembly and secure it to prevent damage.

For blunt-cut power cables, route the cable from the ECU/dual modulator valve assembly to a junction box which interfaces with the seven-way connector at the front of the trailer.

Leave enough slack in the cable to compensate for flexing of the trailer and sub-frame.

3. Bundle any excess cable in a loop (bow tie) and secure it in the sub-frame of the trailer body to prevent cable damage.
4. Pull the yellow locking tab OUT to allow the power cable to be plugged in. Figure 10.

Fig. 10



Installation

5. Plug the power connector into the power supply port of the ECU/Modulator valve assembly.
6. Push the yellow locking tab IN to secure the connection. Note: If it will not push in, make sure the power cable is fully seated. Once the locking clip is secured, install a cable tie to secure the cable to the cable mounting bracket.
7. Fasten the power cable with a cable tie.
8. If you are installing the power cable only, go to Step 10.
9. If you are installing the diagnostic cable:
 - A. Install the diagnostic cable bracket so that the diagnostic plug is accessible. The normal location is on the right front corner of the sub-frame, but will vary depending on the type of trailer.
 - B. Pull the yellow locking tab OUT to allow the diagnostic cable to be plugged in.
 - C. Plug the diagnostic cable into the Subsystem Port of the ECU/modulator valve assembly.
 - D. Push the yellow locking tab IN to secure the connection. Note: If it will not push in make sure the cable is fully seated.
 - E. Fasten the cable with a cable tie.
 - F. Route the diagnostic cable from the Subsystem Port on the ECU/dual modulator valve assembly to the diagnostic cable bracket.
 - G. Correctly secure the cable in the sub-frame to prevent cable damage. Leave enough slack in the cable to compensate for flexing of the trailer and sub-frame
 - H. Bundle excess cable in a loop (bow tie) and secure the cable in the sub-frame. Figure 10.
10. Install the ABS indicator lamp on the trailer. Refer to the the Federal Moter Vehicle Safety Standard (FMVSS) 121 Regulation from NHTSA for the exact location of the indicator lamp. Use an approved lamp with ABS etched on the lens (available from major trailer parts suppliers).

To ensure correct lamp operation, use an incandescent-type DOT-approved lamp or an LED with integral load resistor.

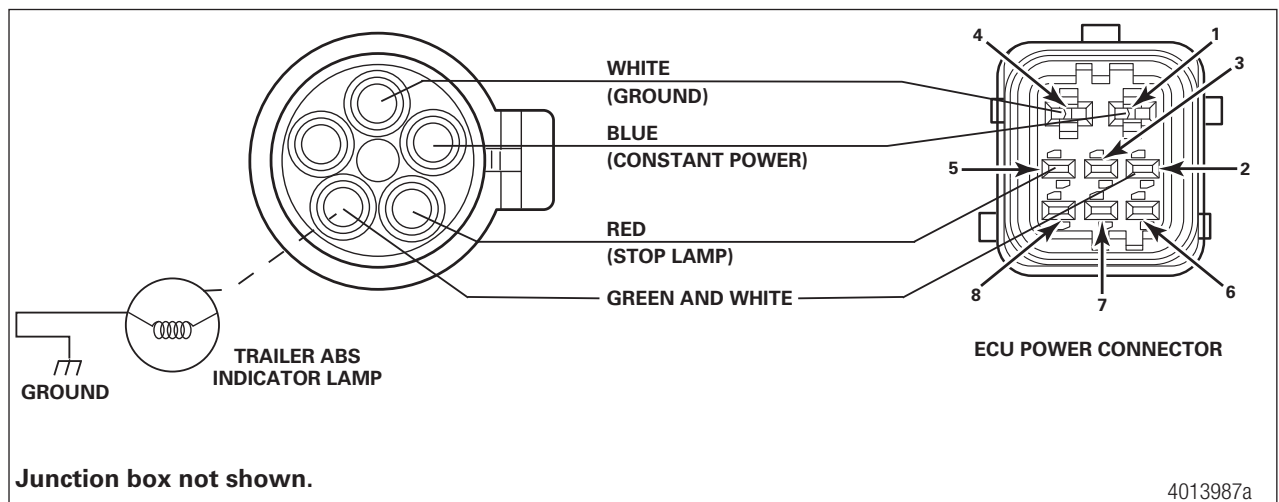
If you are using the industry-standard connector cable and do not have access to the mating trailer harness, mask the open connector to protect it from paint or grease.

11. Connect the power. Use the industry-standard connector cable or a blunt-cut power cable.

For industry-standard connector cables: Attach the power cable to the harness on the trailer.

For an optional blunt-cut power cable: Wire the cable and ABS indicator lamp to the seven-way connector on the trailer according to the following diagram. Figure 11.

Fig. 11

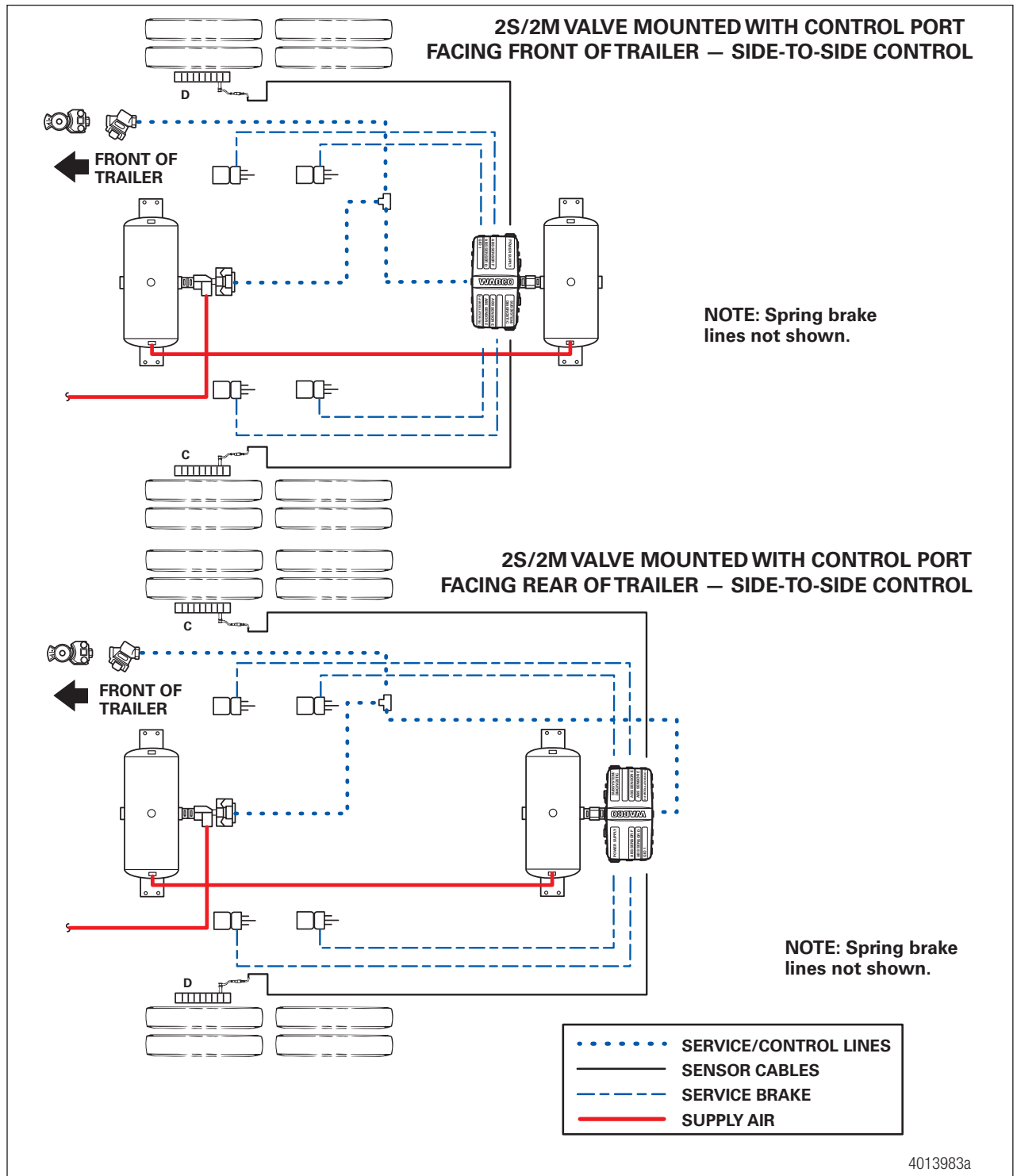


Typical Trailer iABS Installations

Refer to Figure 12 through Figure 18 for typical trailer ABS installations.

WABCO recommends placing the sensors on the axle that will provide the most braking performance. This is based on the way the suspension reacts during heavy braking applications. The trailer manufacturer can help provide this information. The following Figures 12 through 18 are recommendations for many of the standard trailers built in North America.

Fig. 12



4013983a

Fig. 13

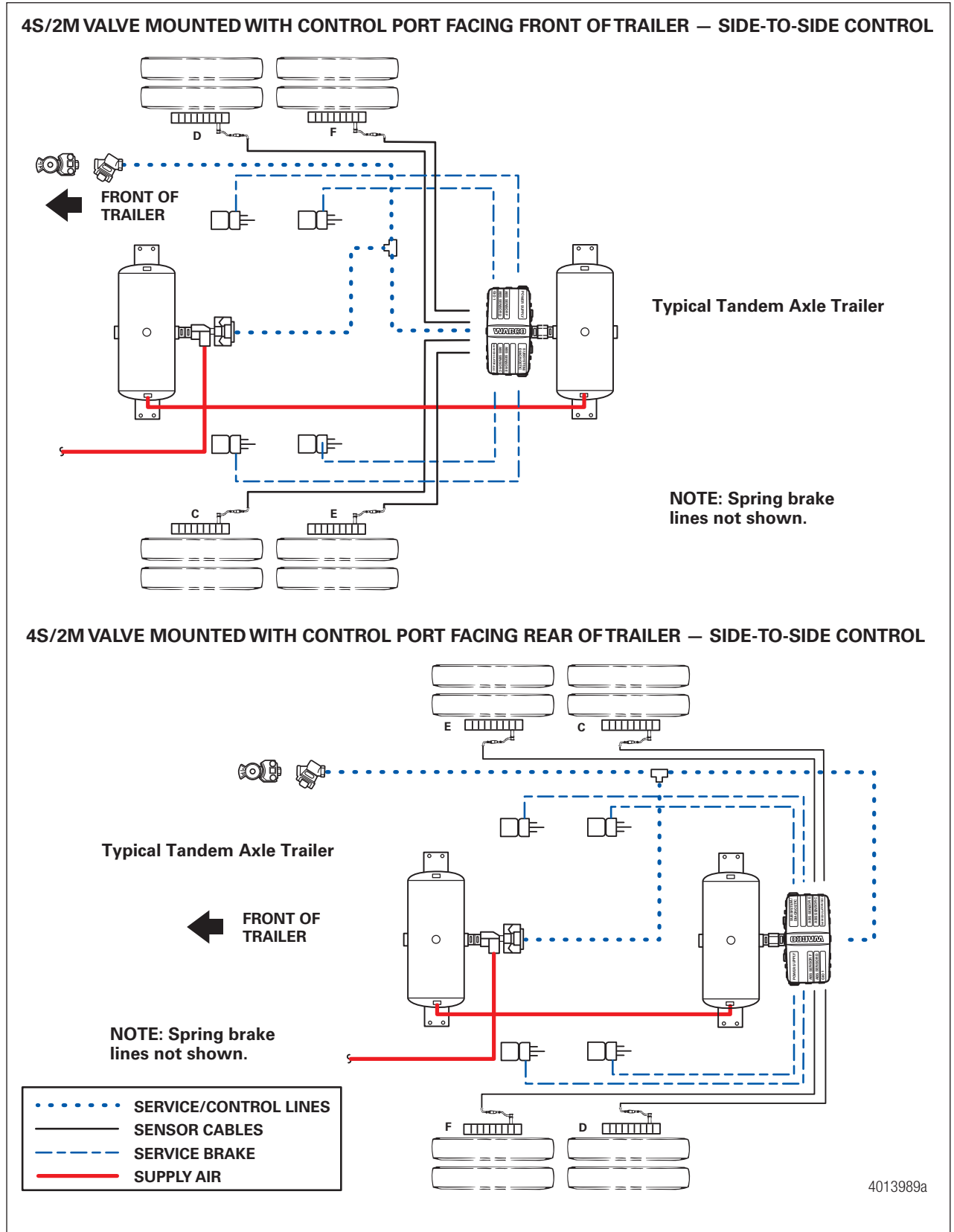


Fig. 14

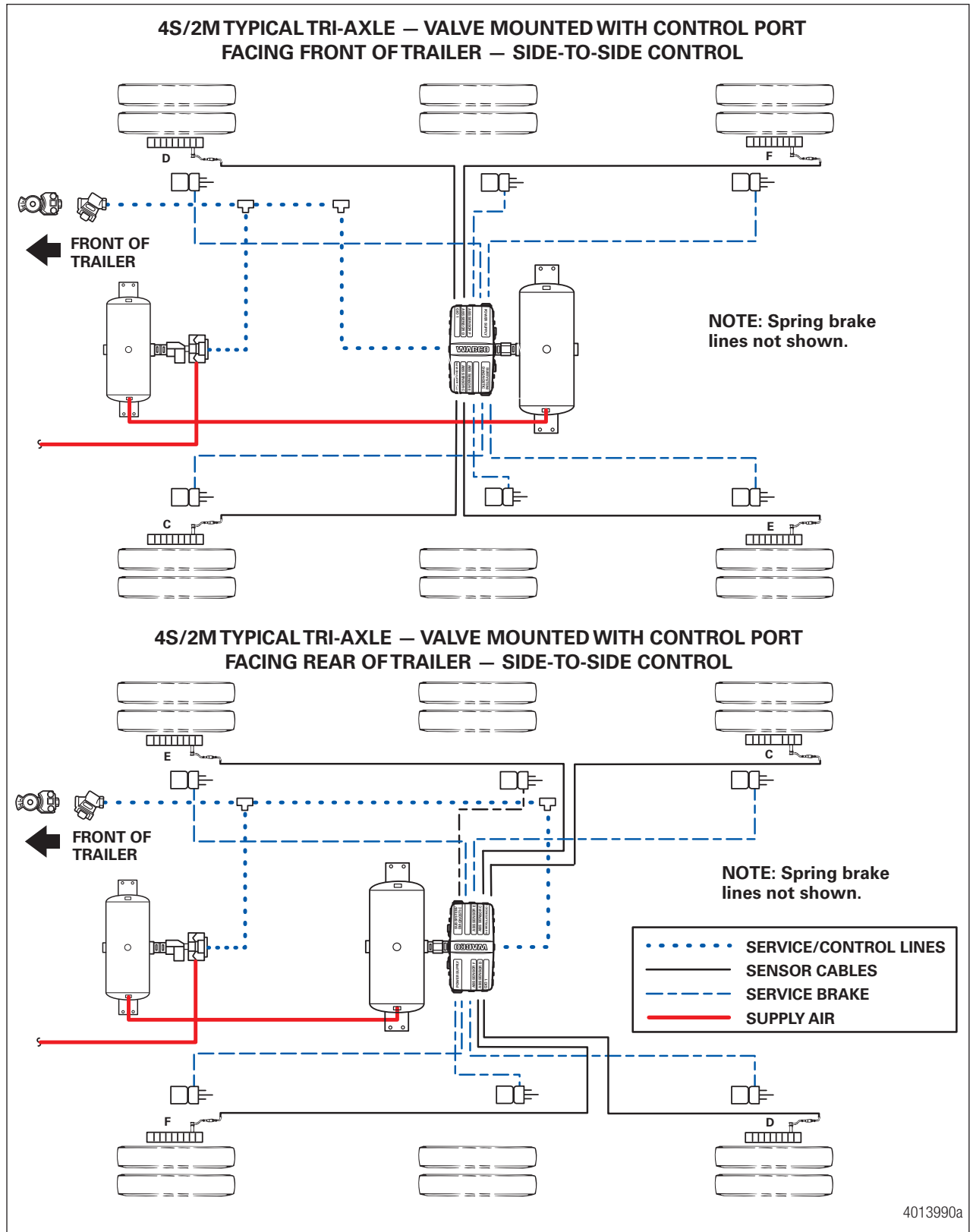
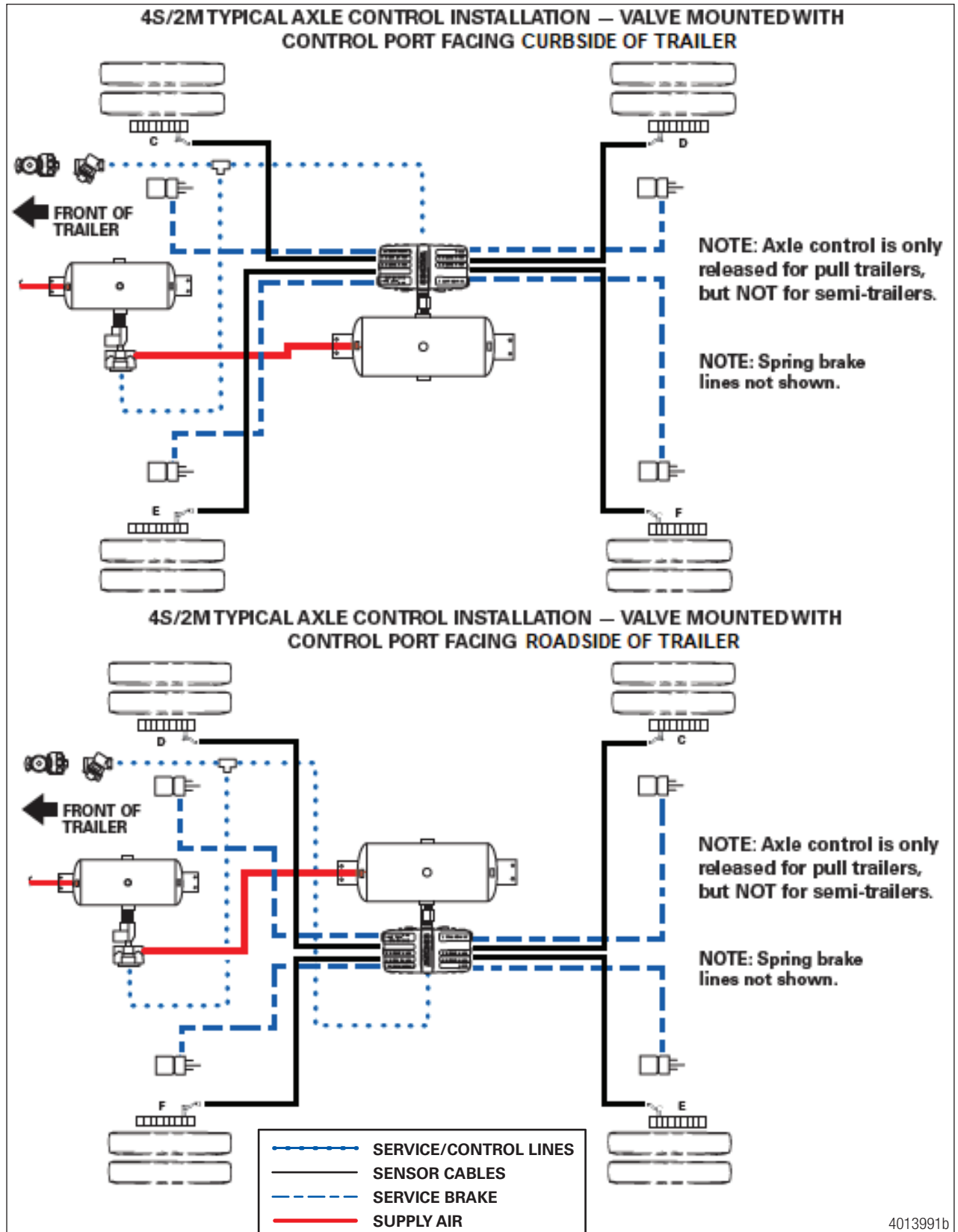


Fig. 15



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Fig. 16

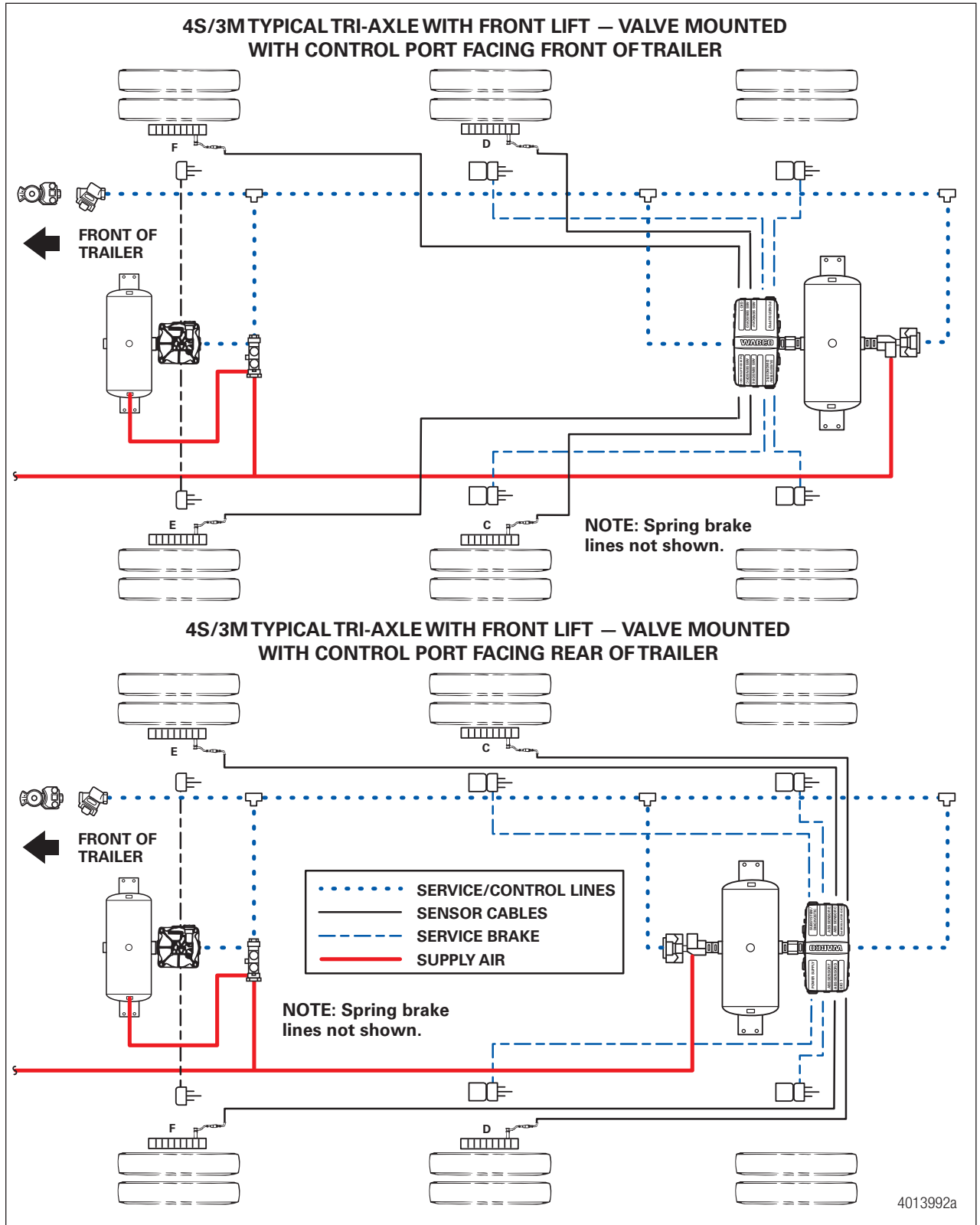


Fig. 17

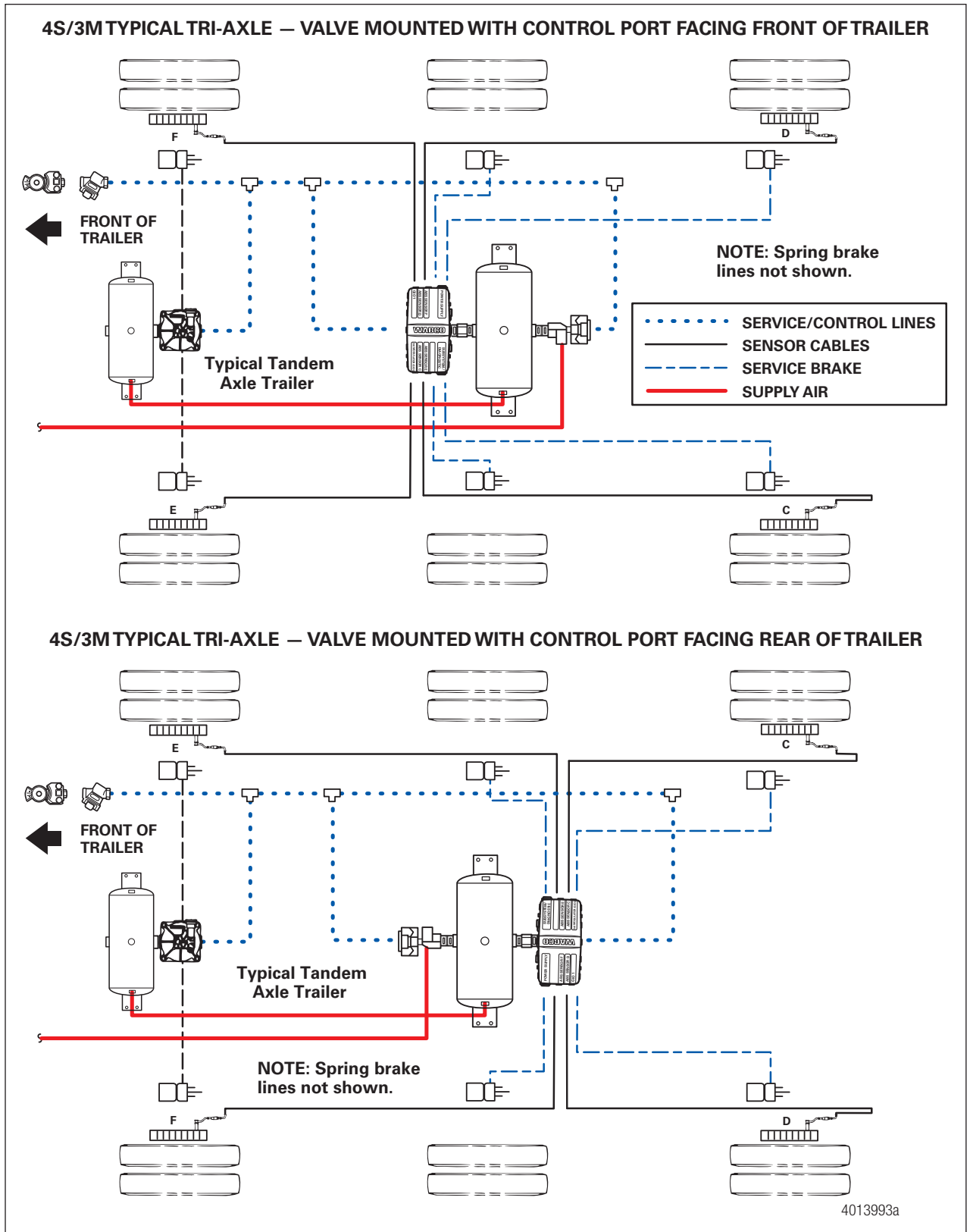
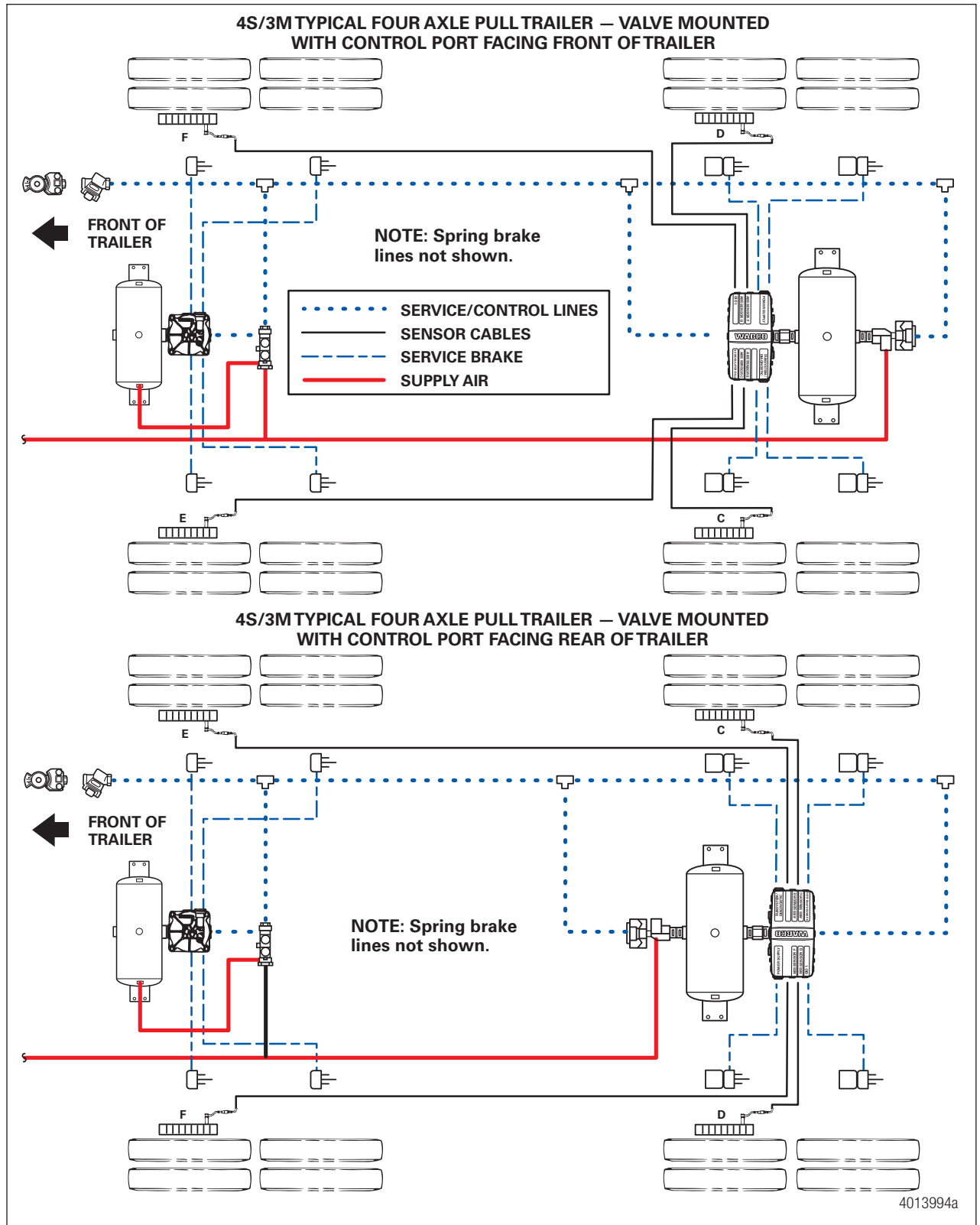


Fig. 18



5.2 End of Line Testing

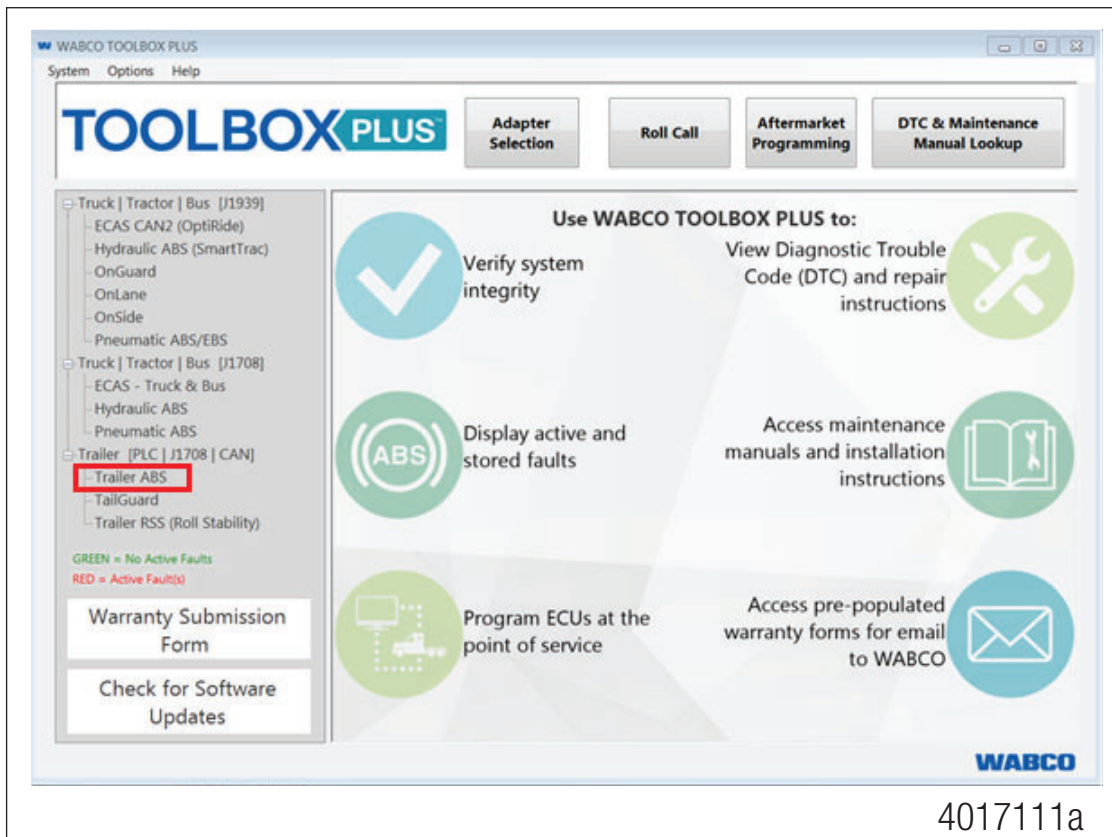
End of line testing is required on all iABS installations. To run these tests, WABCO recommends you use TOOLBOX PLUS™ Software.

TOOLBOX PLUS™ general test procedures are included in this document.

5.2.1 Trailer iABS 2S/2M, 4S/2M and 4S/3M Installation — End of Line Testing Procedure with TOOLBOX PLUS™ Software

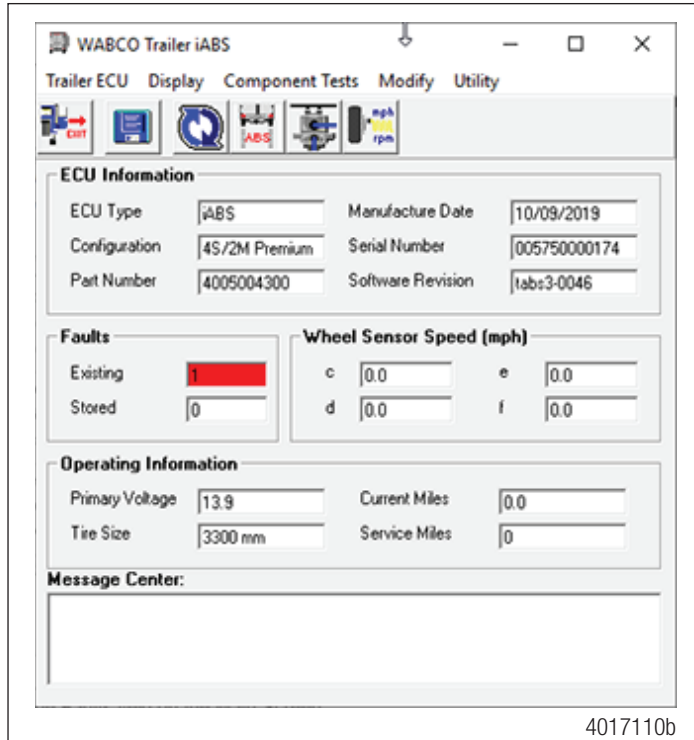
1. Connect the diagnostic adapter (RP1210 and/or RP1210B compliant) to the PC USB port. Then connect the other end of the diagnostic adapter to either the Trailer main power line (J560 connection), or to the separately installed diagnostic cable, part number 449 606 030 0.
2. Open the iABS Diagnostics from the TOOLBOX PLUS™ Main Screen by selecting the Trailer ABS diagnostic section. Figure 19.

Fig. 19



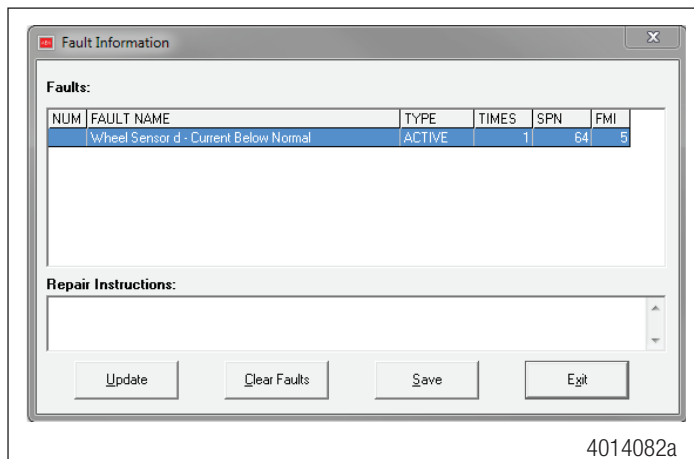
3. Verify the power supply.
 - Apply 12 (9.5 to 14 is acceptable) volts DC to the blue wire (constant power). Check the screen for the correct voltage, it is displayed in the Primary Voltage field. Figure 20.

Fig. 20



4. Check the Faults field on the Main Screen.
 - NONE = No faults present, proceed with end of line test.
 - YES = Faults present, double-click on "YES" to bring up the fault information screen. You may also select the Display menu at the top and then click on Faults to bring up the Fault Information Screen.
5. Use the information in the Repair Instructions field to perform the necessary repairs. Figure 21.

Fig. 21



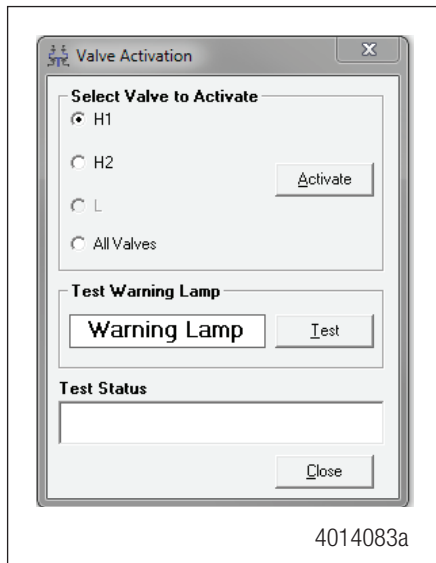
5.2.2 End of Line Test with TOOLBOX PLUS™ Software

5.2.2.1 Verify Correct Valve and Lamp Installation

To verify valve and lamp installations with TOOLBOX PLUS™ Software:

1. Apply 12 volts DC to the ABS.
2. Apply air to the emergency line to fill the air tanks and release the spring brakes.
3. Apply air to the control line.
4. At the Trailer Main Screen, click on Component Test, then select Valves/Lamp to display the Valve Activation Screen. The H1 Valve indicator will be highlighted. Figure 22.

Fig. 22



5. Click on the Activate button.
6. Check for correct air line installation. To accomplish this, observe the slack adjusters.
 - **If the control port faces the FRONT of the trailer**, the slack adjusters will move in and out as the CURBSIDE portion of the dual modulator valve cycles. If this does not happen, the air lines are not correctly connected. Perform the necessary repairs.
 - **If the control port faces the REAR of the trailer**, the slack adjusters will move in and out as the ROADSIDE portion of the dual modulator valve cycles. If this does not happen, the air lines are not correctly connected. Perform the necessary repairs.

The Test Status box at the bottom of the menu will display the status of this test.

7. Repeat this test for the H2 valve.
 - A. Repeat Steps 1-4, but select H2 Valve. Figure 22.
 - B. Select the Blue valve from the valve activation screen.
 - C. Click on the Activate button to verify correct valve installation (H2).
 - D. Check for correct air line installation. To accomplish this, observe the slack adjusters.
 - **If the control port faces the FRONT of the trailer**, the slack adjusters will move in and out as the ROADSIDE portion of the dual modulator valve cycles. If this does not happen, the air lines are not correctly connected. Perform the necessary repairs.
 - **If the control port faces the REAR of the trailer**, the slack adjusters will move in and out as the CURBSIDE portion of the dual modulator valve cycles. If this does not happen, the air lines are not correctly connected. Perform the necessary repairs.

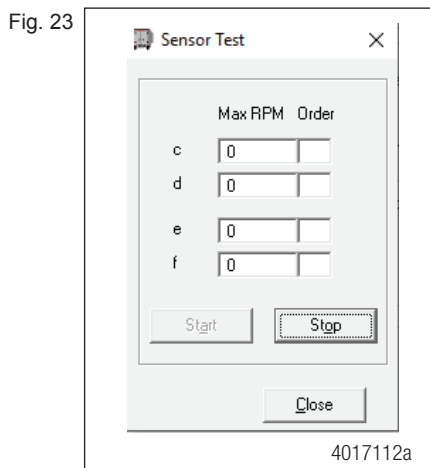
8. For 4S/3M installations: Repeat this test for the L valve.
 - L Valve: The external relay valve designated L valve is an axle control valve. It controls brake chambers on one or two axles. It is important that delivery lines from Port 2 are plumbed as shown on the installation drawings. The 4S/3M system is designed to be used with a variety of trailer configurations. Refer to Figures 16-18.
9. Click on the Test button to activate the ABS indicator lamp — this is the lamp that is mounted on the side of the trailer. The lamp will flash multiple times, indicating lamp installation is OK. The Test Status box at the bottom of the menu will display the status of this test. Figure 22.
10. Click on Close to exit.

5.2.3 Sensor Orientation Test

This test is not for use on 4S/3M installations.

For 4S/3M installations, use the standard Sensor Test. To run the standard test, select Sensor Test from the Components Test Menu.

The sensor orientation test must be performed as part of the end of line testing procedure. Figure 23.



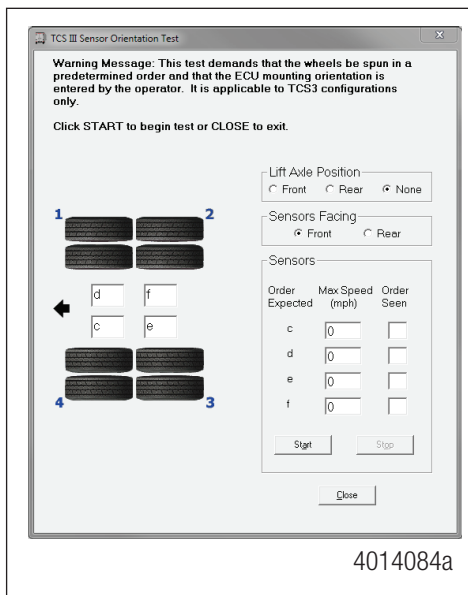
5.2.3.1 Sensor Orientation Test Screen

Before beginning this test, look at the control port to see if it faces the front or rear of the trailer. TOOLBOX PLUS™ will ask for this information to start the test (Step 5). To perform the sensor orientation test:

1. Raise the sensed wheel ends off the ground.
2. Apply air to the emergency line to fill the air tanks and release the spring brakes so that the wheels can be rotated.
3. Apply 12 volts DC to the ABS.
4. At the Trailer Main Menu, click on Component Test, then select Sensor Orientation Test to display the Sensor Orientation Test screen. Figure 24.

When the Sensor Orientation Test screen first appears, the Control Port Facing field will display the default Front. This will occur regardless of the actual control port orientation of the installation being tested.

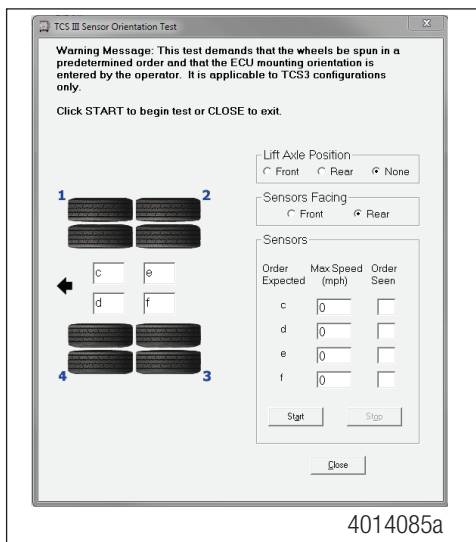
Fig. 24



5. Click on Front or Rear in the Control Port Facing field to select the mounting orientation of the ECU/dual modulator valve assembly. Figure 25.

Refer to Figure 24 and Figure 25 for illustrations of the ECU/dual modulator assembly mounted with the control port facing forward and rear. The correct mounting orientation must be selected prior to starting the test (Step 5).

Fig. 25

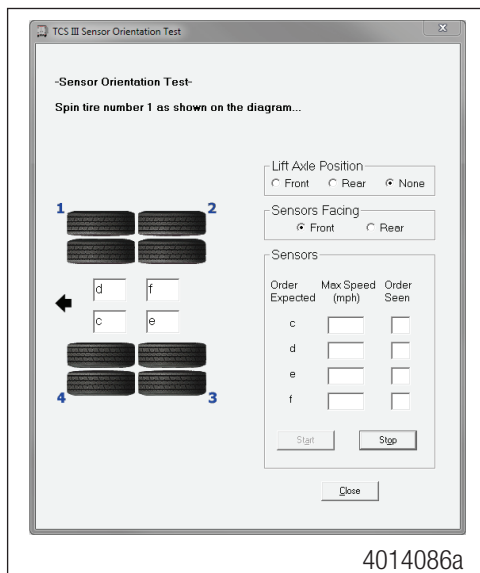




2S/2M installations use C and D locations.

6. Click on Front, Rear or None in the Lift Axle Position field to note if a lift axle is installed on an ABS sensed axle. NOTE: Sensors E and F should always be installed on the lift axle to prevent unwanted sensor faults.
7. Click on Start to begin the test. Figure 26.

Fig. 26



8. Follow the screen prompts, starting with 1, to rotate each sensed wheel end at a rate of 1/2 revolution per second. This rate equals a wheel speed of approximately 4 mph (7 kph). As each sensed wheel is rotated, check the color of the sensor identification block on the screen for results. Sensor identification boxes are located in the bottom left portion of the Sensor Orientation Test screen. Figure 24.
 - Green background: Correct sensor location. Spin the next sensed wheel as indicated by the screen prompt.
 - Red background: Incorrect sensor location. If you get a red background, you must stop the test (click on stop), make the necessary corrections and repeat Steps 3 through 6.
9. To finish the Sensor Orientation Test, click on Stop, then on Close.
10. Verify there is sensor output. If there is no sensor output, verify that a tone ring has been installed and that the sensor is pushed all the way in against the tone ring. Perform the necessary repairs and repeat the test. If the problem persists, contact WABCO North America Customer Care at 855-228-3203. Sensor output appears in the Sensors field located in the bottom right portion of the Sensor Orientation Test screen. Figure 25.

5.2.4 End of Line Testing without TOOLBOX PLUS™ Software

5.2.4.1 Sensor Installation

1. Look at the control port on the ECU/dual modulator valve assembly. Ensure that the connectors are routed to the correct wheel-end location for a standard semi-trailer, as follows:

ECU/Dual Modulator Valve Assembly Mounted with Control Port Facing Front of Trailer

- 2S/2M
 - Connect curbside sensor at D.
 - Connect roadside sensor at C.
- 4S/2M*
 - Connect curbside front sensor at D.
 - Connect curbside rear sensor at F.
 - Connect roadside front sensor at C.
 - Connect roadside rear sensor at E.
- 4S/3M*— Sensor locations vary by type of installation. Refer to the diagrams for specific sensor locations.
 - Connect curbside sensor at D.
 - Connect curbside sensor at F.
 - Connect roadside sensor at C.
 - Connect roadside sensor at E.

ECU/Dual Modulator Valve Assembly Mounted with Control Port Facing Rear of Trailer

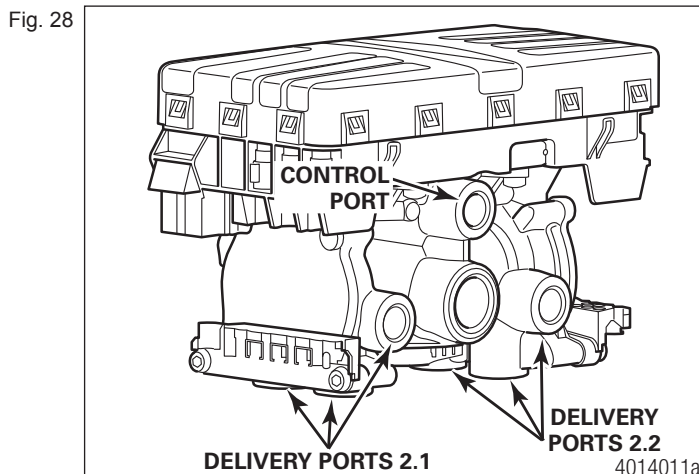
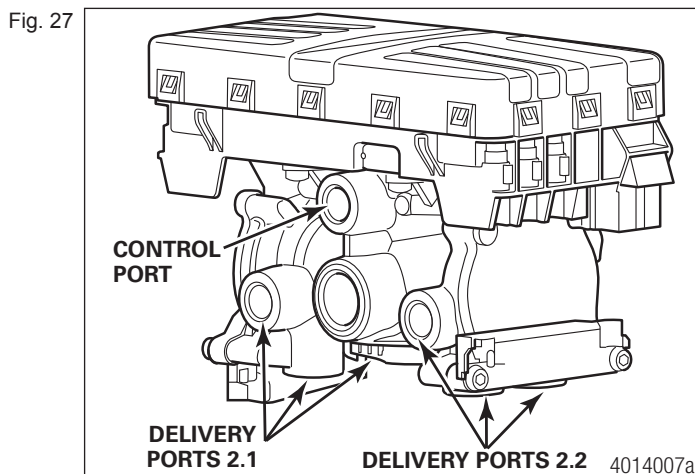
- 2S/2M
 - Connect curbside sensor at C.
 - Connect roadside sensor at D.
- 4S/2M*
 - Connect curbside front sensor at C.
 - Connect curbside rear sensor at E.
 - Connect roadside front sensor at D.
 - Connect roadside rear sensor at F.
- 4S/3M*— Sensor locations vary by type of installation. Refer to the diagrams for specific sensor locations.
 - Connect curbside sensor at C.
 - Connect curbside sensor at E.
 - Connect roadside sensor at D.
 - Connect roadside sensor at F.

* If the lift axle is sensed in 4S/2M and 4S/3M installations: Sensors E and F must always be used on the lift axle to avoid an unwanted ABS indicator lamp illumination.

2. If sensors are not correctly installed, perform the necessary repairs.

5.2.4.2 Air Line Installation

1. Ensure that all unused air ports are plugged and that the exhaust port is facing DOWN.
2. Look at the air line installation to verify that all air lines are correctly installed.
 - If the ECU/dual modulator valve assembly is mounted with the control port facing the FRONT of the trailer, the air lines for the three delivery ports labeled 2.1 must be routed to CURBSIDE; the air lines for the three delivery ports labeled 2.2 on the opposite side of the valve must be routed to ROADSIDE. Figure 27.
 - If the ECU/dual modulator valve assembly is mounted with the control port facing the REAR of the trailer, the air lines for the three delivery ports labeled 2.1 must be routed to ROADSIDE; the air lines for the three delivery ports labeled 2.2 on the opposite side of the valve must be routed to CURBSIDE. Figure 28.



3. **For 4S/3M installations:** Repeat this test for the external modulator valve. The external relay valve is an axle control valve. It controls the brake chambers on one or two axles. It is important that delivery lines from Port 2 are plumbed as shown in Figure 16, Figure 17 and Figure 18. The 4S/3M system is designed to be used with a variety of trailer configurations.
4. If the air lines are not correctly routed, perform the necessary repairs.

5.2.4.3 Perform End of Line Test

1. Apply 12 volts DC power to the ABS.
2. Listen for the ECU/dual modulator valve assembly to click four times (six times for a 4S/3M).

3. If the indicator lamp comes on for three seconds then goes out, this indicates a correct installation. The end of line test is complete.
 - If the ABS indicator lamp comes on and stays on, check the sensor installation.
 - Remove the power from the ABS and raise the sensed wheels so they may be rotated.
 - Apply emergency air to fill the air tanks and release the spring brakes so that the wheels may be rotated. Repeat Steps 1 and 2.
 - Rotate each sensed wheel — one at a time — at a rate of 1/2 revolution per second. This rate equals a wheel speed of approximately 4 mph (7 kph).

The ABS indicator lamp should now go out and stay out indicating a correct installation. The end of line test is complete.

4. If the ABS lamp does not go out, there is a sensor gap problem or hardware fault. Adjust the sensor and, if necessary, perform a fault code check.

5.2.4.4 Sensor Gap Adjustment

Push the sensor into its holder until it contacts the tooth wheel. At installation, there must be no gap between the sensor and the tooth wheel.

Measure the AC voltage output. The value should be 0.2 volt AC when the wheel is rotated at a rate of 1/2 revolution per second.

Perform any necessary repairs.

Repeat the end of line test. If the trailer lamp still does not go out, a system fault exists. Perform a fault code check.

6 Appendix I

6.1 Installing Sensors on Non-ABS-Prepped Axles

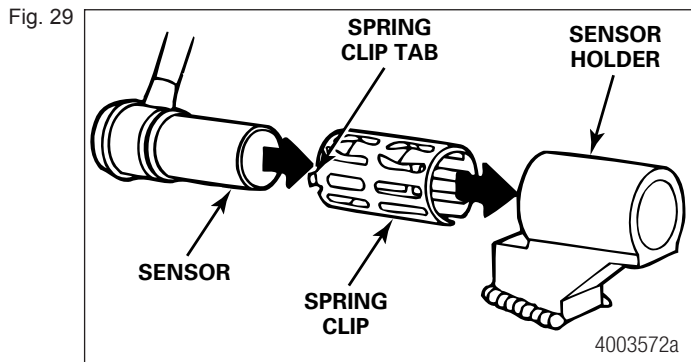
Sensor locations vary due to suspension type. WABCO recommends placing the sensors on the axle that will provide the most braking performance. The trailer manufacturer, suspension manufacturer, along with WABCO, work together to determine this information. Contact the necessary party for further information.

1. Apply a mineral oil-based grease that contains molydisulfide to the sensor spring clip, the body of the sensor and the bore of the sensor block. The grease must be anti-corrosive and contain adhesive properties that will continuously endure temperatures from -40° to 300°F (-40° to 150°C).

Lubricants approved for use on WABCO sensors and spring clips are as follows. The use of non-approved lubricants is at your own risk. Please note that non-approved lubricants can reduce the performance of the parts or lead to damage of the product that may not be covered under warranty.

- Mobilith SHC-220 (Mobil)
 - TEK 662 (Roy Dean Products)
 - Staburags NBU 30 PTM (Kluber Lubrication)
 - Valvoline EP 633
2. Push the spring clip into the sensor holder from the inboard side, until the spring clip tabs are against the sensor holder. Push the sensor into the spring clip as far as possible. Use WABCO spring clips to ensure a correct fit.

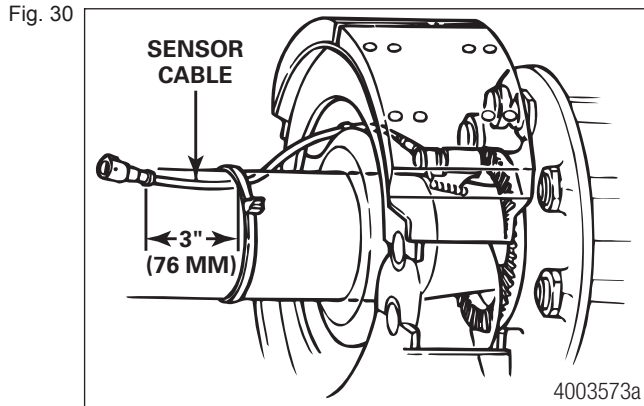
3. Push the spring clip into the sensor holder from the inboard side until the spring clip tabs are against the sensor holder. Push the sensor into the spring clip as far as possible. Figure 29.



4. Route the sensor cable toward the brake chamber, over the brake spider or through the prestamped hole dedicated for ABS sensors. Route to the back side of the axle. Secure the cable to the axle between the brake spider and the suspension brackets. Continue to route the sensor cable behind the spring seats. Secure the cable to the axle one inch from the molded sensor plug. Figure 30.

Do not overtighten tie wraps on a cable. Overtightening can damage the cable. Do not tie wrap the molded sensor plug. The sensor extension cable must follow the brake hose to the ECU/valve assembly to allow for axle jounce and rebound.

Brake hose clips with a provision for the sensor extension cable are recommended as opposed to tie wraps. WABCO does not supply this part.



5. Install the wheel hub carefully so that the tooth wheel pushes against the sensor as the wheel bearings are adjusted. There should be no gap between the sensor and the tooth wheel. If the gap is too large, this can cause the ECU to log a fault code.
6. Test the sensor output voltage. Use a volt/ohm meter to check the output voltage of the sensors while rotating the wheel at approximately 1/2 revolution per second. Minimum output must be 0.2 volts AC, though if the wheel is spun faster than 1/2 of a revolution per second, the reading will likely be higher. It is important to spin the wheel at the correct speed to determine the output is in fact correct. If minimum output is less than 0.2 volt AC, push the sensor toward the tooth wheel. Recheck the sensor output.

7 Appendix II

7.1 Cable Strain Relief Guidelines

It is important that cabling follow good strain relief practices to ensure maximum performance and durability. Failure to provide adequate strain relief on the cables can result in future maintenance that is not covered under warranty.

Strain relief is defined as a small amount of slack in the cable at the area of connection. This lack of cable tension allows for slight movement of the cable during times when components of the suspension and air system may be in motion. A small amount of slack also eases access to other system components.

A taut cable can affect the lifespan of the cable. Cables without adequate strain relief can potentially stress a cable connection enough that moisture could intrude. Unnecessary wear at bend points can be the result of a cable under tension.

Cable strain relief is a universal practice. It applies to all WABCO product lines from Anti-Lock Brake Systems (ABS) to Roll Stability Systems (RSS).

7.1.1 Excess Cable Length

In cases where the length of cable exceeds what is required, the excess must be bundled in an efficient manner. It should not be draped or wrapped around components or left unsecured. Any slack remaining in the cable once the connections are made can be gathered up in a Z-shaped loop. Do not coil the cable and pinch into a bowtie or dog-bone shape. All cable zip ties should be tightened in a manner only to the extent that the cable is held sufficiently in place. Fasten the excess cable to an area that is free of sharp edges and moving components.

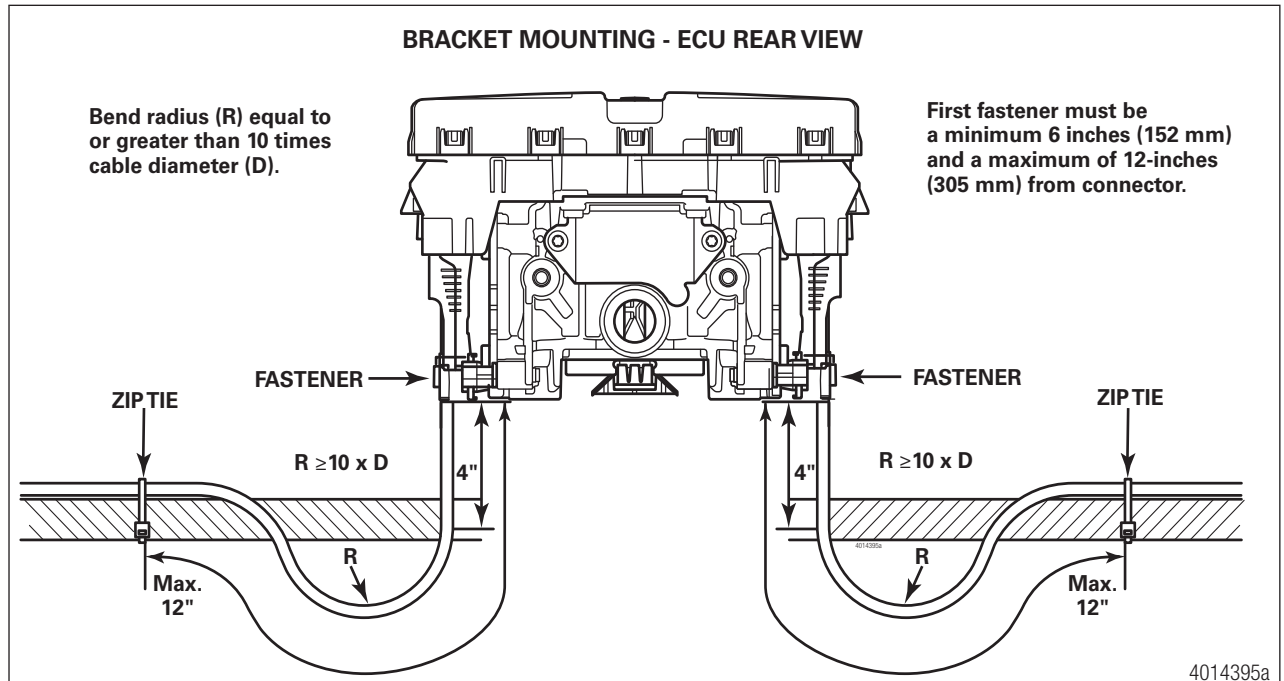
WABCO has many lengths of cables available so it is a best practice to obtain a length that best suits the requirements of the installation. Refer to the Parts List in Appendix IV to find the different cable lengths that WABCO offers.

7.1.2 Strain Relief at the ECU — Bracket Mounting

WABCO recommends that cable connections to a component, such as an ECU valve assembly, display a visible amount of slack in the cable up to the first tie or clip that secures the cable to the trailer structure or air line. This first anchor point should be a minimum 6-inches (152 mm) of cable length from the cable/component connection and maximum of 12-inches (305 mm). This applies to all sensor, power, valve and GIO cables. Regardless of whether zip ties or cable clips are used, cables should be secured at intervals not greater than 18-inches (457 mm) to avoid cable vibration.

Ideally, cables should be affixed to the rigid structure of the trailer. A good rule of thumb is to have the bend of the cable, also known as bend radius, be greater than or equal to ten times the diameter of the cable. If the cable is 1/4-inch (6.35 mm) in diameter, then the bend should be a minimum of 2-1/2-inches (64 mm). Refer to Figure 31 for the ECU mounting of 2S/2M-4S/3M ABS.

Fig. 31



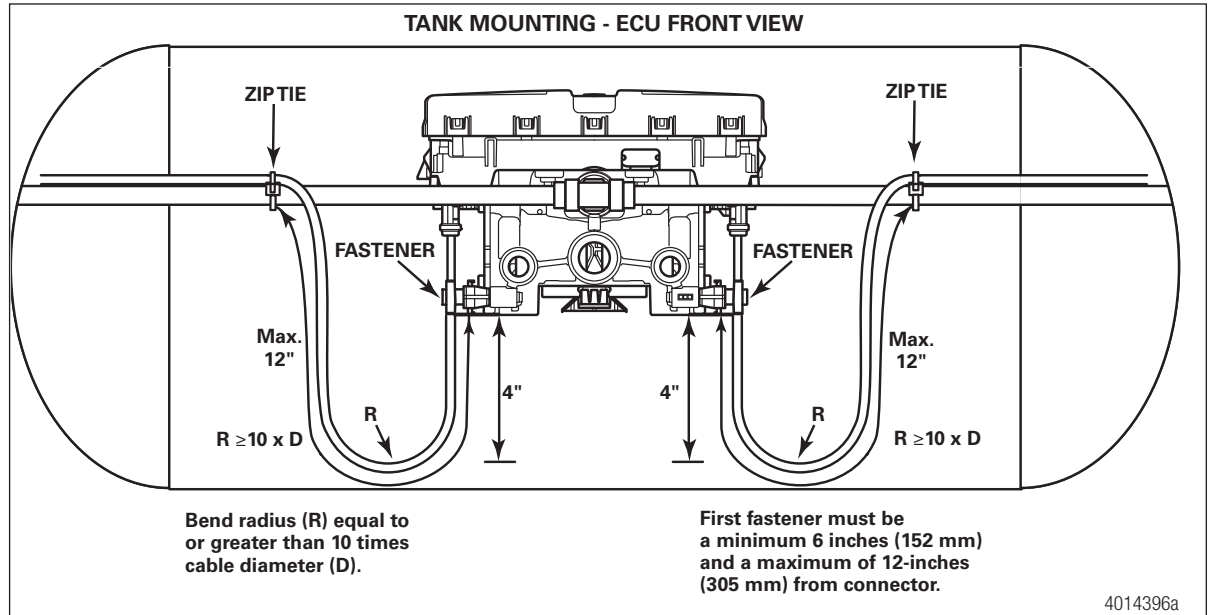
ABS 2S/2M-4S/3M

7.1.3 Strain Relief at the ECU — Tank Mounting

It is necessary that cable connections to a component, such as an ECU valve assembly, display a visible amount of slack in the cable up to the first tie or clip that secures the cable to the trailer structure or air line. This first anchor point should be a minimum 6-inches (152 mm) of cable length from the cable/component connection and a maximum of 12-inches (305 mm). This applies to all sensor, power, valve and GIO cables. Regardless of whether zip ties or cable clips are used, cables should be secured at intervals not greater than 18-inches (457 mm) to avoid cable vibration.

Ideally, cables should be affixed to the rigid structure of the trailer. However, structure is not always available on tank-mounted installations. In these cases, securing the cable may be accomplished by fastening the cable to nearby air lines. It is important to note that cables should be secured only to the extent that the cable is held sufficiently in place. Refer to Figure 32 for 2S/2M-4S/3M ABS.

Fig. 32

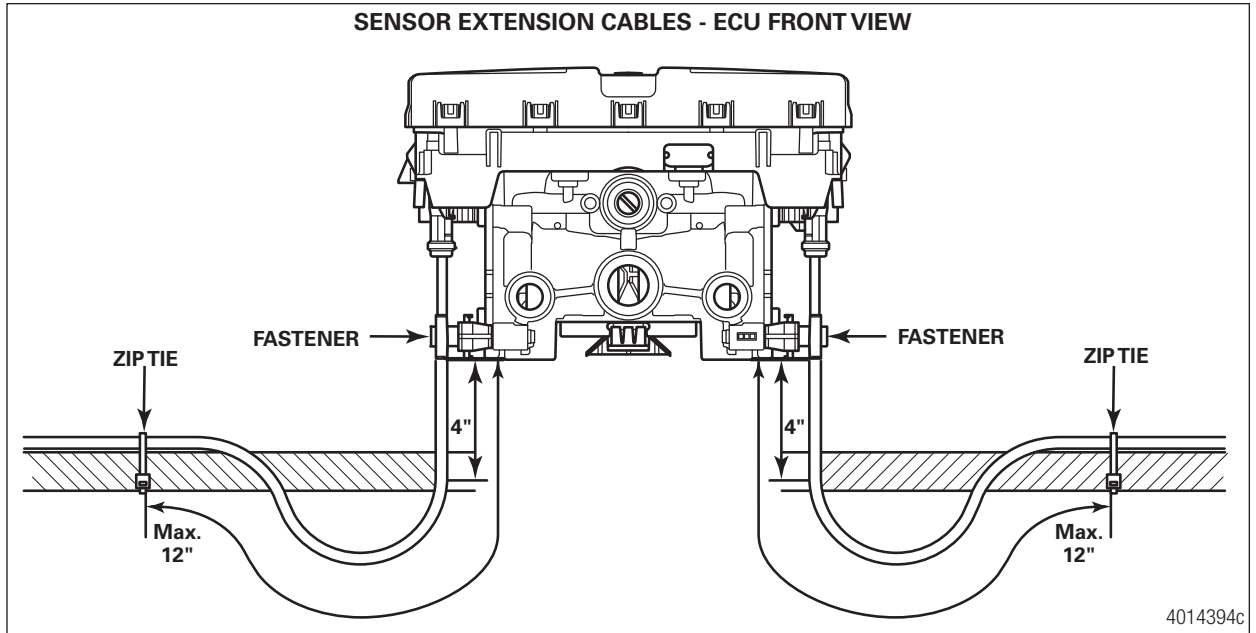


CORRECT POWER AND GIO/MODULATOR CABLE STRAIN RELIEF FOR ABS 2S/2M-4S/3M

7.1.4 Sensor Extension Cables at the ECU

On valves that are tank mounted with no trailer structure nearby, or have remote-mounted cables, the sensor extension cables are attached to the air lines. Cable clips are preferred over zip ties. It is important to remember that cables should be fastened in a manner where the cable is secured enough where the cable will not move or chafe against what it is mounted to. A small amount of slack should be present to ensure that the cables do not become taut after installation or the servicing of components. Figure 33 illustrates the correct amount of slack in the sensor extension cables and correct attachment to the air delivery lines for ABS ECUs.

Fig. 33



7.1.5 Cable-to-Cable Connections

It is important to ensure all cable-to-cable connections maintain good strain relief. Cable restraints must be placed between 2- and 4-inches (51-102 mm) from the cable connector to ensure correct strain relief. Regardless of whether zip ties or cable clips are used, cables should be secured at intervals not greater than 18-inches (457 mm) to avoid cable vibration. Refer to Figure 34 for air line attachment and Figure 35 for axle attachment.

Fig. 34

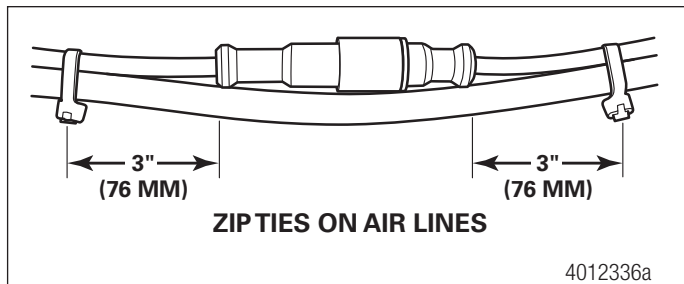
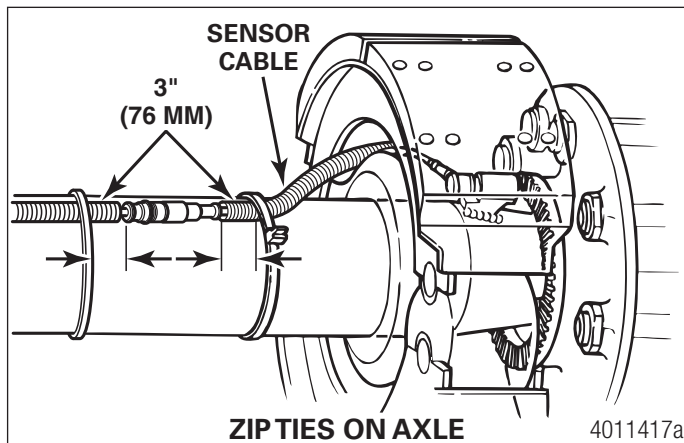


Fig. 35



8 Appendix III

8.1 Vehicle Electrical Grounding Guidelines

Ensure that the vehicle includes a correct common chassis ground point. A common chassis ground point connects the trailer frame/chassis to the ground pin of the J560 seven-way connector and will protect the vehicle electrical system from unwanted electrical noise.

Common chassis ground can be verified by measuring the resistance between the J560 ground pin and the vehicle chassis (or frame) and confirming that the resistance is less than 10 Ohm ($<10 \Omega$). If this is not the case, the electrical contact at the common chassis ground point is not sufficient or not present. If a common chassis ground point is present, but not sufficient, ensure that there is no paint or debris inhibiting electrical contact at the ground point. If a common chassis ground point is not present, WABCO recommends adding one.

NOTE: Do not add more than one common chassis ground point (connecting the J560 ground pin to the chassis) to avoid potential ground shifts within the vehicle electrical system.

Additionally, all standard trailer components, such as axles, should also be electrically connected to the common chassis ground. If the axles are not correctly grounded to the chassis, a ground strap electrically connecting the axle to the chassis may be added to ensure adequate protection from unwanted electrical noise. This can be verified by measuring the resistance between the vehicle chassis/frame and the other trailer component, then confirming that the resistance is less than 10 Ohm ($< 10 \Omega$).

For more details concerning correct vehicle grounding, reference SAE standard J1908.

Note during welding work on the trailer:

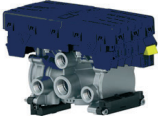
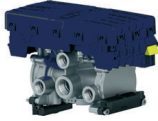
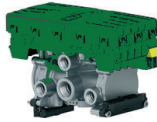
- Disconnect power to the trailer.
- Disconnect all cable connections to devices and components and protect the plug-ins and connections from contamination and humidity.
- Always connect the grounding electrode directly with the metal next to the welding position when welding, to prevent magnetic fields and current flow via the cable or components.
- Make sure that grounding connections are robust by removing paint or rust at the connection points.
- Prevent heat influences from the welding activity on devices and cabling when welding.





Note during electrostatic painting the trailer frame or bogie:

- Disconnect all cable connections to devices and components and protect the plug-ins and connections from contamination and humidity.













9 Appendix IV

9.1 Parts and Variant List

VARIANT LIST			
Variants	 iABS 2M Standard Semi Trailer	 iABS 2M Standard Full Trailer	 iABS 2M Premium
Max System Configuration	4S/2M	4S/2M	4S/3M
Part Number	400 500 420 0	400 500 425 0	400 500 430 0
CAN Capable	Yes	Yes	Yes
GIO Capable	No	No	Yes
Multivoltage	No	No	Yes
Direction of Control	Side to Side	Axle to Axle	Side to Side

PARTS LIST			
Slot on iABS Modulator	Application	Part Number	Length
Power	 Power Cable	449 306 005 0 449 306 010 0 449 306 030 0 449 306 047 0	0.5 M 1 M 3 M 4.7 M
Power	 Power Cable Blunt Cut	449 307 010 0 449 307 030 0	1 M 3 M
Subsystem	 Diagnostic Cable Blunt Cut 4 Wire	449 608 047 0	4.7 M
Subsystem	 Diagnostic Cable	449 606 030 0	3 M

Appendix IV

PARTS LIST			
Slot on iABS Modulator	Application	Part Number	Length
Sensor Ports C,D,E,F	 Sensor Extension Cable	449 733 008 0	0.8 M
		449 733 013 0	1.3 M
		449 733 018 0	1.8 M
		449 733 030 0	3 M
		449 733 050 0	5 M
		449 733 070 0	7 M
		449 733 090 0	9 M
		449 733 120 0	12 M
Modulator	 GIO Cable 3 Pin (3rd Mod)	449 407 030 0	3 M
		449 407 060 0	6 M
		449 407 080 0	8 M
		449 407 120 0	12 M
GIO 1 or 2	 GIO Cable 3 Pin	449 826 010 0	1 M
		449 826 030 0	3 M
		449 826 100 0	10 M
GIO 1 or 2	 GIO Cable 2 Pin	449 408 010 0	1 M
		449 408 040 0	4 M
		449 408 060 0	6 M
GIO 1 or 2	 GIO Cable Blunt Cut 4 Wire	449 827 030 0	3 M
		449 827 060 0	6 M
		449 827 120 0	12M
		449 827 180 0	18 M
GIO 1 or 2	 Brake Pad Wear Cable	449 836 013 0	1.3 M
		449 836 030 0	3 M
GIO 1 or 2	 GIO Cable Tire Inflation	449 743 010 0	1 M
		449 743 030 0	3 M
Subsystem	 Subsystem Cable (OptiLink/IVTM)	449 928 050 0	5 M
		449 928 120 0	12 M
Subsystem	 Subsystem Cable (Smartboard II)	449 929 040 0	4 M
		449 929 060 0	6 M
		449 929 120 0	12 M
Subsystem	 HUB Cable Subsystem	894 600 161 2	0.5 M
Power	 HUB Cable Power (1M Only)	894 600 151 2	0.5 M
GIO 1 or 2	 HUB Cable GIO	894 600 121 2	0.5 M

WABCO

Mobilizing Vehicle Intelligence



ACE AUTONOMOUS
CONNECTED
ELECTRIC

About WABCO

WABCO (NYSE: WBC) is the leading global supplier of braking control systems and other advanced technologies that improve the safety, efficiency and connectivity of commercial vehicles. Originating from the Westinghouse Air Brake Company founded 150 years ago, WABCO is powerfully “Mobilizing Vehicle Intelligence” to support the increasingly autonomous, connected and electric future of the commercial vehicle industry. WABCO continues to pioneer innovations to address key technology milestones in autonomous mobility and apply its extensive expertise to integrate the complex control and fail-safe systems required to efficiently and safely govern vehicle dynamics at every stage of a vehicle’s journey – on the highway, in the city and at the depot. Today, leading truck, bus and trailer brands worldwide rely on WABCO’s differentiating technologies. Powered by its vision for accident-free driving and greener transportation solutions, WABCO is also at the forefront of advanced fleet management systems and digital services that contribute to commercial fleet efficiency. In 2019, WABCO reported sales of over \$3.4 billion and had nearly 14,000 employees in 40 countries. For more information, visit www.wabco-na.com.



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