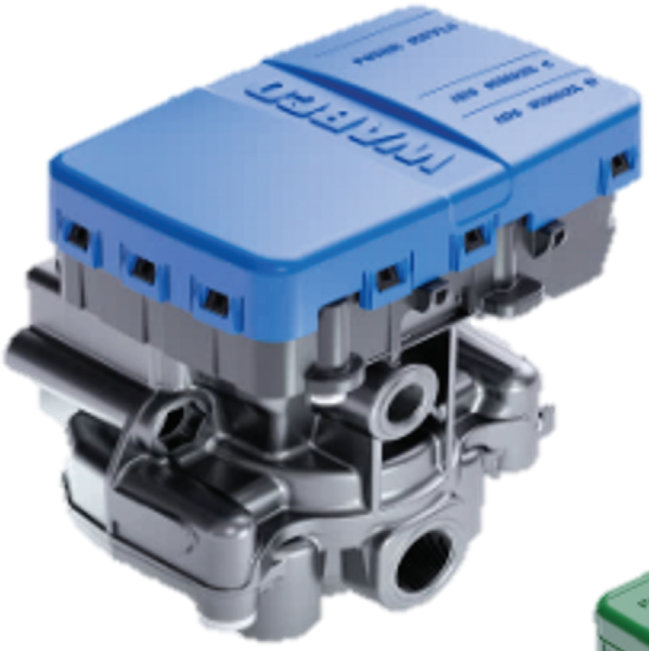
TRAILER iABS 2S/1M STANDARD AND PREMIUM

INSTALLATION INSTRUCTIONS



TP18007

WABCO

Table of Contents

1 General Information. 5

1.1 Symbols Used in this Document 5

1.2 How to Obtain Additional Maintenance, Service and Product Information 6

1.3 How to Obtain Parts and Kits 6

1.4 WABCO TOOLBOX PLUS™ Software 6

1.5 WABCO Academy 6

1.6 WABCO Online Product Catalog 6

1.7 Your Direct Contact to ZF CVS 7

2 Safety Information 8

2.1 Provisions for a safe work environment 8

3 Important Information. 9

4 Preparation. 10

5 Installation. 12

5.1 Install the ECU/Single Modulator Valve Assembly 12

5.2 Connect the Air Lines 13

5.3 Install the Two Sensor Extension Cables (ABS-Prepped Axles) 14

5.4 Install the Power or Power/Diagnostic Cable 16

5.5 End of Line Testing 20

5.6 End of Line Test with TOOLBOX PLUS™ Software 22

5.7 End of Line Test without TOOLBOX PLUS™ Software 25

6 Appendix I. 27

6.1 Installing Sensors on Non-ABS-Prepped Axles 27

7 Appendix II. 29

7.1 Cable Strain Relief Guidelines 29

7.2 Excess Cable Length 29

8 Appendix III. 34

8.1 Vehicle Electrical Grounding Guidelines 34

9 Appendix IV 35

9.1 Parts and Variant List 35

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1 General Information

1.1 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, notices and/or tips

Reference to information on the Internet

Descriptive text

– Action step

1. Action step 1 (in ascending order)
2. Action step 2 (in ascending order)

⇨ Result of an action

• Listing

Indicating the use of a tool / WABCO tool

General Information

1.2 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 wabconacustomercare@zf.com, or visit our website: www.zf.com/cv.

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.

1.3 How to Obtain Parts and Kits

Contact the WABCO Customer Care Center at 855-228-3203 (United States and Canada); 800-953-0248 (Mexico). Email: wabconacustomercare@zf.com.

1.4 WABCO TOOLBOX PLUS™ Software

TOOLBOX PLUS™ Software provides PC diagnostic for WABCO products and can be purchased and downloaded from https://wabco.snapon.com.

The software User Guide, MM19047 can be obtained by visiting our Literature Center.

Purchase and Download TOOLBOX PLUS™
https://wabco.snapon.com

ZF Commercial Vehicle Literature Center
https://zf.com/cvliterature

1.5 WABCO Academy

www.wabco-academy.com

1.6 WABCO Online Product Catalog

www.wabco-customercenter.com

1.7 Your Direct Contact to ZF CVS

ZF CV Systems North America LLC

1220 Pacific Drive
Auburn Hills, MI 48326

Customer Care Center: (855) 228-3203

www.zf.com/cv

wabconacustomercare@zf.com

2 Safety Information

2.1 Provisions for a safe work environment

- Only experienced, trained and qualified automotive technicians 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's Original Equipment Manufacturer (OEM) specifications and instructions.
- Observe all accident regulations of the repair facility 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.

⚠WARNING

This product can expose you to chemicals including Nickel, which is known to the State of California to cause cancer and birth defects or other reproductive harm. For more information, go to www.P65Warnings.ca.gov.

⚠WARNING

The Anti-lock Braking System (ABS) is an electrical system. When you work on the ABS, take the same precautions that you must take with any electrical system to avoid serious personal injury. As with any electrical system, the danger of electrical shock or sparks exists that can ignite flammable substances. You must always disconnect the battery ground cable before working on the electrical system.

3 Important Information

For more information, refer to the latest iABS Maintenance Manual MM19001, iABS Trailer ABS System with PLC and CAN 2S/1M Basic, 2S/2M, 4S/2M and 4S/3M Premium.

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.

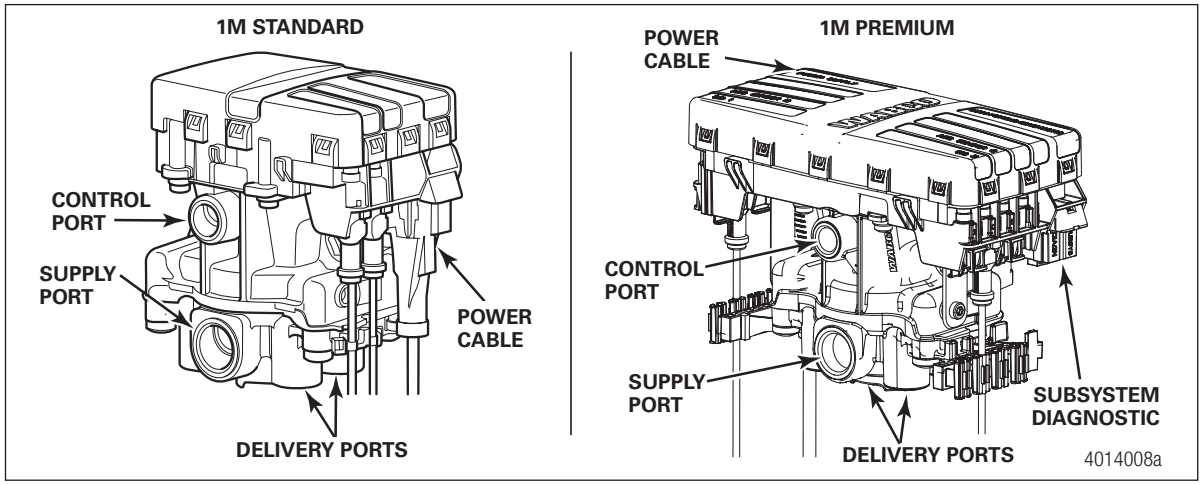
4 Preparation

3. Before beginning the installation procedure, inspect the ECU/single 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/single modulator valve assembly. Notify your supervisor, or contact WABCO if there is any apparent damage.
4. Have the following installation material available.
   - * ECU/single modulator valve assembly
   - * Power cable or power cable/power HUB cable/diagnostic cable
   - * Sensor extension cables (two pieces)
   - * Sensors (two) for non-ABS-prepped axles
   - * ABS Indicator Label (TP95172)
   - 5/8-inch O.D. nylon tubing for supply (frame mounts)
   - 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
   - SAE-standard, DOT-approved sealing paste
   - To ensure correct lamp operation, use an incandescent-type DOT-approved lamp, or an LED with integral load resistor.

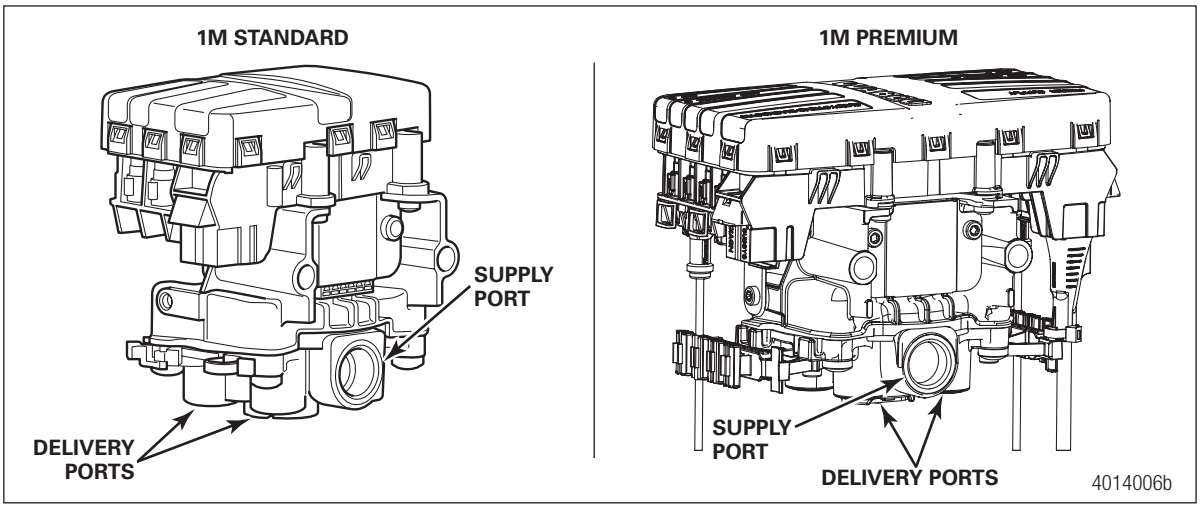
   * WABCO components

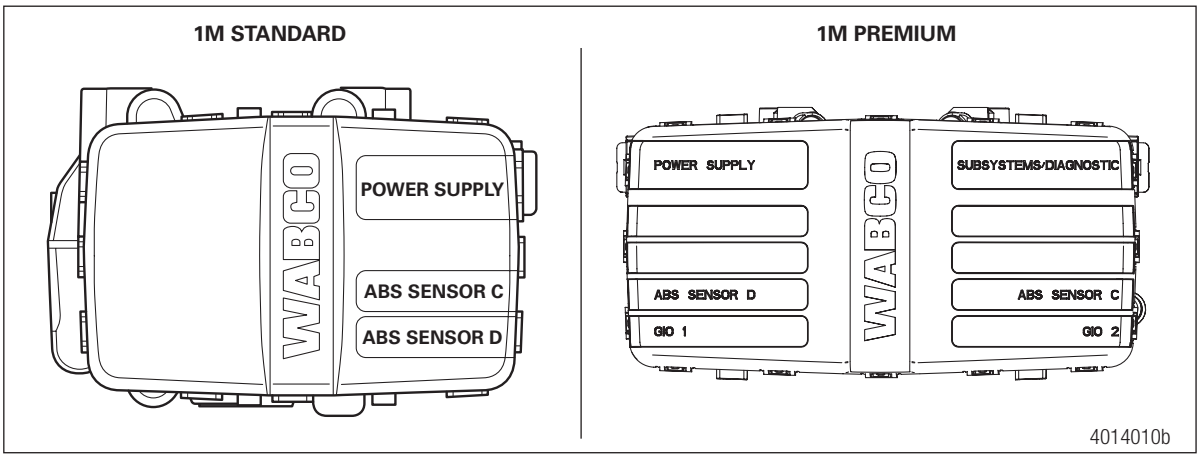
End of line testing must be done after all installations. WABCO recommends using TOOLBOX PLUS™ Software to perform this testing. If you do not have TOOLBOX PLUS™ Software, this bulletin also includes instructions for testing without the software.

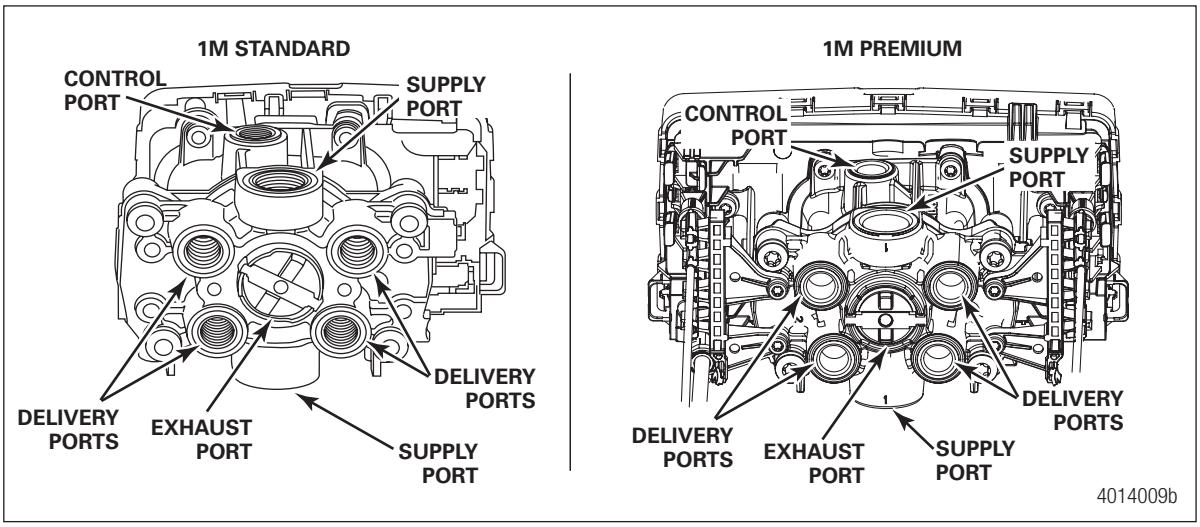
5. Study the ECU/single modulator valve assembly. Note the location of the various ports and electrical connections on the ECU.



Preparation







5 Installation

5.1 Install the ECU/Single Modulator Valve Assembly

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

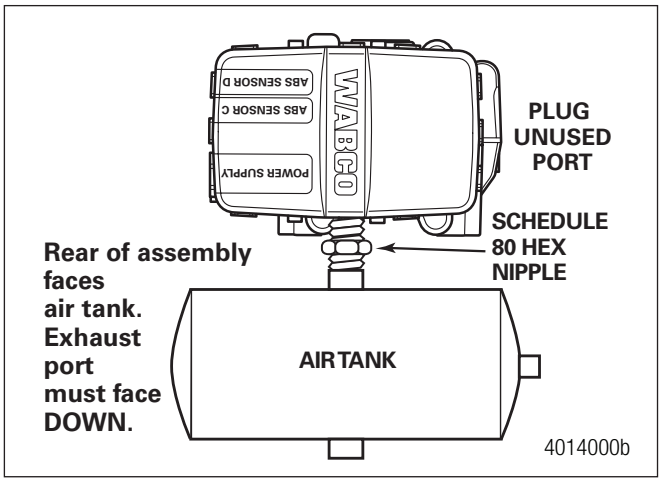
5.1.1 Tank-Mounted

⚠ WARNING

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

Use a 3/4-inch NPT Schedule 80 hex nipple to attach the ECU/single 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.**

6. 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.
7. Rotate and tighten the ECU/single 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 Bracket-Mounted to Cross Member of Vehicle

1. Install a 3/4-inch NPT fitting in the supply port (Port 1). 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.

⚠ WARNING

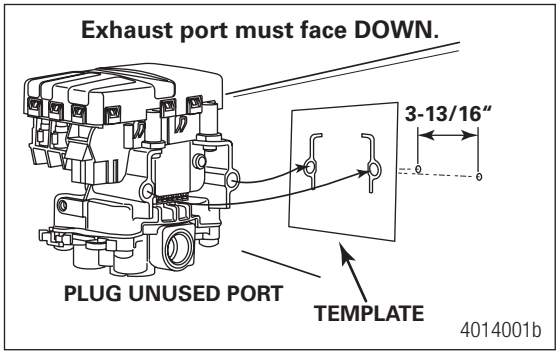
When mounting the ECU/dual modulator valve assembly to the trailer cross member, refer to SAE specification J447, Prevention of Corrosion of Motor Vehicle Body and Chassis Components. Follow all recommendations and procedures. Your supervisor should have a copy of this specification.

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 3-25/32-inches (96 mm) and mount directly to the cross member.

   OR

   - Build a mounting bracket with two 3/8-inch mounting holes spaced 3-25/32-inches (96 mm) O.D. apart.



3. Use two 3/8-inch Grade 8 bolts with prevailing torque nuts and washers to attach the assembly to the vehicle cross member. Tighten the bolts to 20 lb-ft (27 Nm).

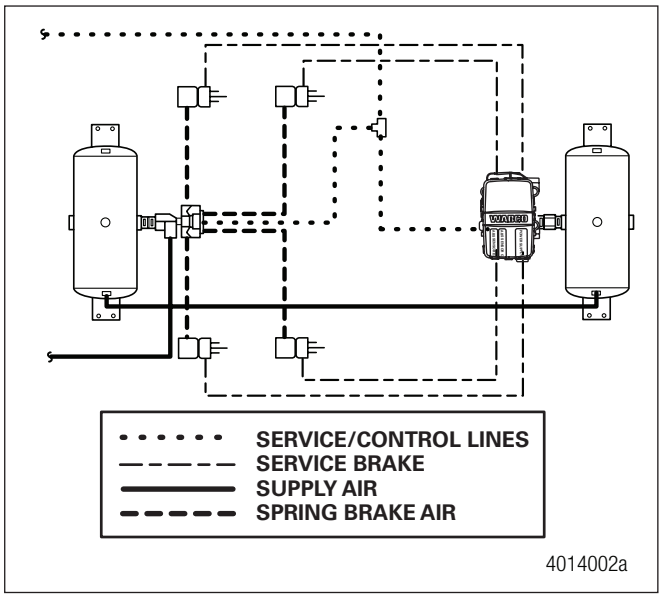
5.2 Connect the Air Lines

Plumb the spring brake relay or emergency relay valve into the system as usual.

1. For bracket mounts, connect the air supply line from the supply tank to ECU/single modulator valve assembly supply Port 1.

   Use 5/8-inch O.D. min. nylon tubing for frame mounts.

2. Connect the air delivery lines from the service chambers to the ECU/single modulator valve assembly Port 2 (3/8-inch NPT).
   - Attach the opposite ends of the air delivery lines to the appropriate brake chambers (3/8-inch NPT).



3. Connect the brake service control line to the ECU/single modulator valve assembly Port 4 (3/8-inch NPT).
4. Plug any unused delivery ports.

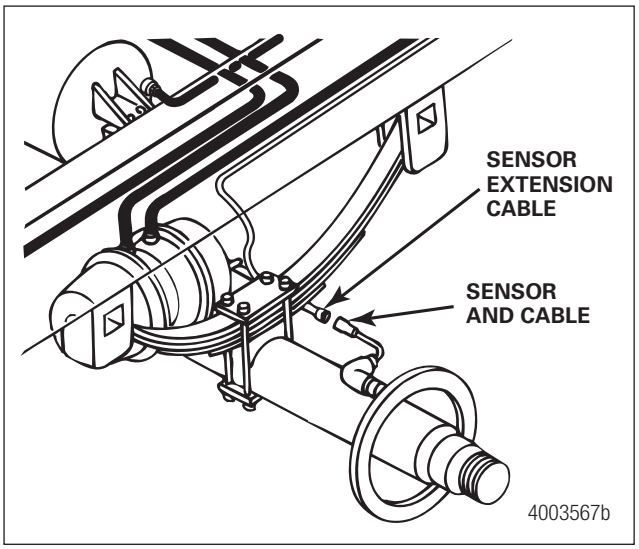
5.3 Install the Two Sensor Extension Cables (ABS-Prepped Axles)

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

WABCO recommends placing sensors on the axle that will provide the most braking performance. The suspension manufacturer can provide this information

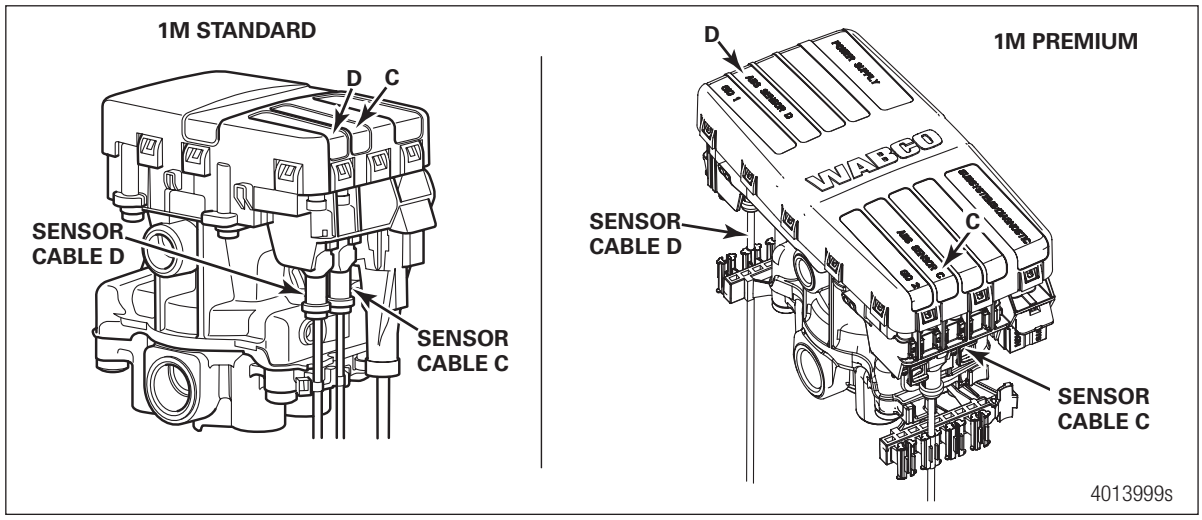
1. Visually inspect the tooth wheel and sensor to ensure no damage occurred during shipping. Perform any necessary repairs.
2. Connect the sensor and cables on the prepped axles to the sensor extension cables.

   Ensure that each connection is secure.

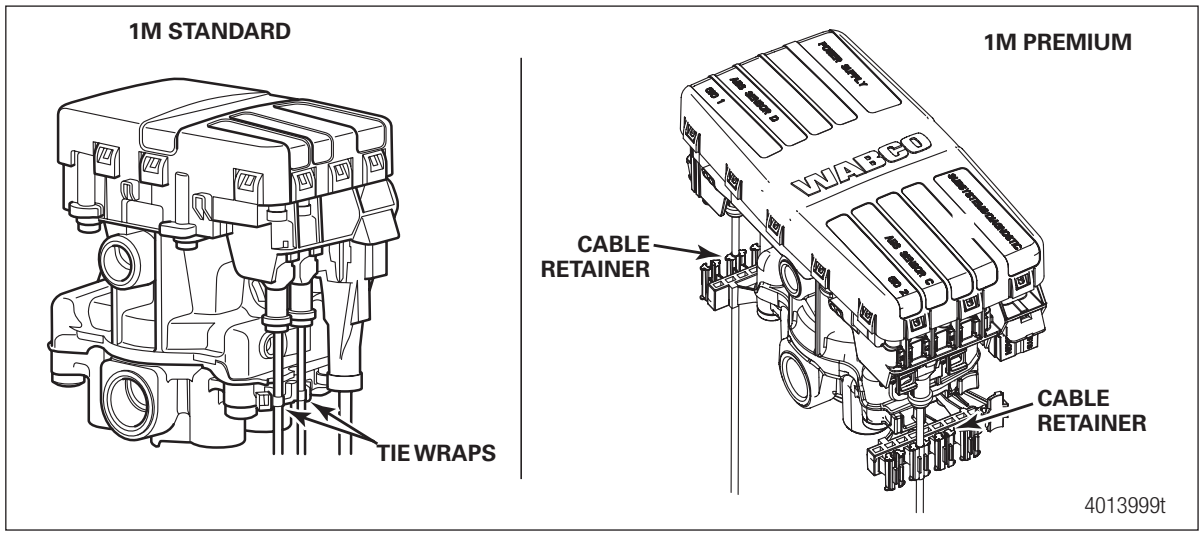


Installation

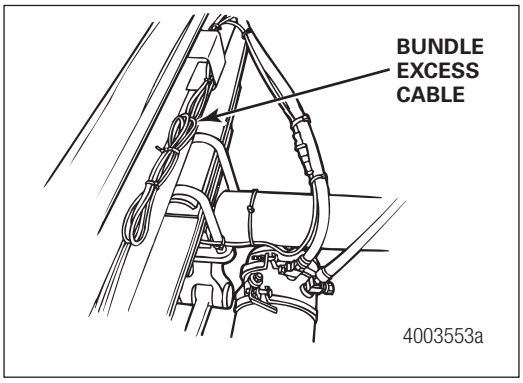
3. Route the sensor cable along the back side of the trailer axle to the ECU/single modulator valve assembly. Route the cable with the brake hose.
   Do not overtighten the tie wraps on a cable. Overtightening can damage the cable. Do not tie wrap the molded sensor plug. The sensor extension cable must follow the brake hose to the ECU/single modulator valve assembly to allow for axle jounce and rebound.
4. Secure the cables every 8 inches (203 mm) with tie wraps or cable clips.
5. 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.
   - Connect the curbside sensor at C.
   - Connect the roadside sensor at D.



6. To provide proper strain relief to the sensor extension connections, use a tie wrap to secure the cable to the built in strain relief connections points on the valve.



7. Bundle any excess cable in a “Z”-shaped loop.



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).

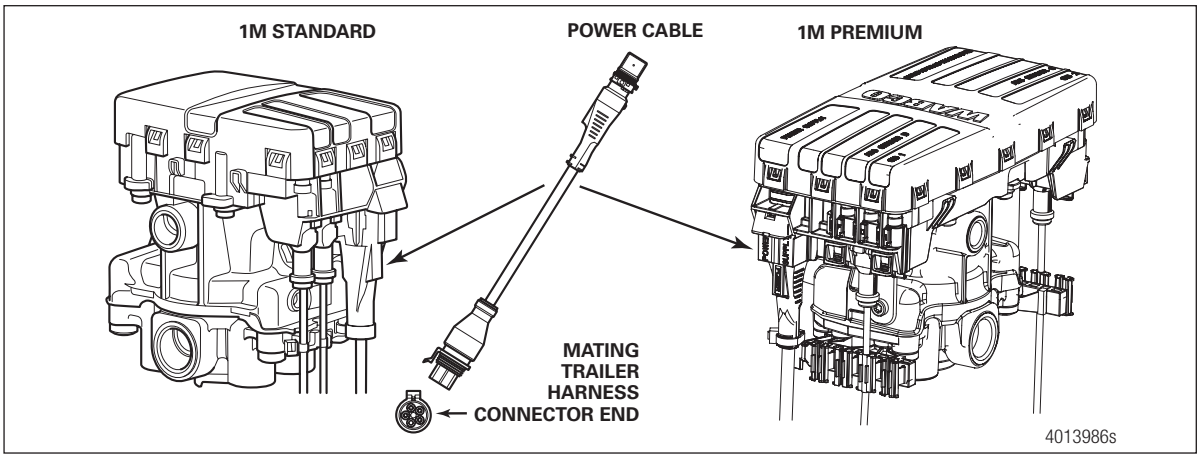
Correct strain relief of cables is discussed in Appendix II.

5.4 Install the Power or Power/Diagnostic Cable

1. Identify the type of cable to be installed.
   - ABS trailer weather pack connector cable
   - Blunt-cut power cable
2. For industry-standard weather pack cables, route the cable from the harness connector to the ECU/single modulator valve assembly and secure it to prevent damage.

   For a blunt-cut power cable, route the cable from the ECU/single 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.



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.
7. Be sure to secure the power cable with a tie wrap to the built-in strain relief connection on the valve. If you are only installing the power cable go to Step 9.
8. If you are installing the the HUB Cable Power (1M Only) P/N 894 600 151 2:

   A. Install the HUB Cable Power, p/n 894 600 151 2, by connecting it to the power connector. Be sure to secure the connection by pushing in the yellow locking tab. Note if it will not push in, make sure the cable is fully seated.

   B. Connect the power cable to the Power HUB cable, and then connect the other end of the power cable to the trailer main power supply.

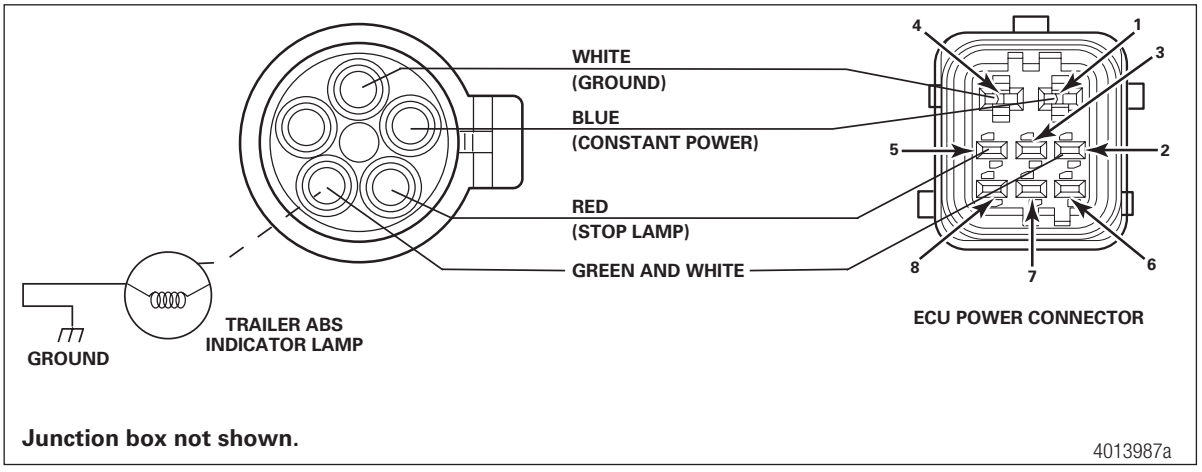
   C. Connect the diagnostic cable to the Power HUB cable, and route it to the side of the trailer. Mount it using the built in bracket to the side of the trailer for easy diagnostic access.

   D. 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.

   E. Bundle any excess cable in a loop (bow tie) and secure the cable in the sub-frame.
9. Install the ABS indicator lamp on the trailer. Refer to the vehicle specification sheet for the exact location of the indicator lamp. Use a DOT-approved lamp with ABS etched on the lens (available from major trailer parts suppliers).

   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.
10. Connect the power. Use the industry-standard connector cable or a blunt-cut power cable.
    - **For industry-standard connector cables:** Attach the power cable's round Weather Pack connector to the ABS break-out connector on the trailer power harness.
    - **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.

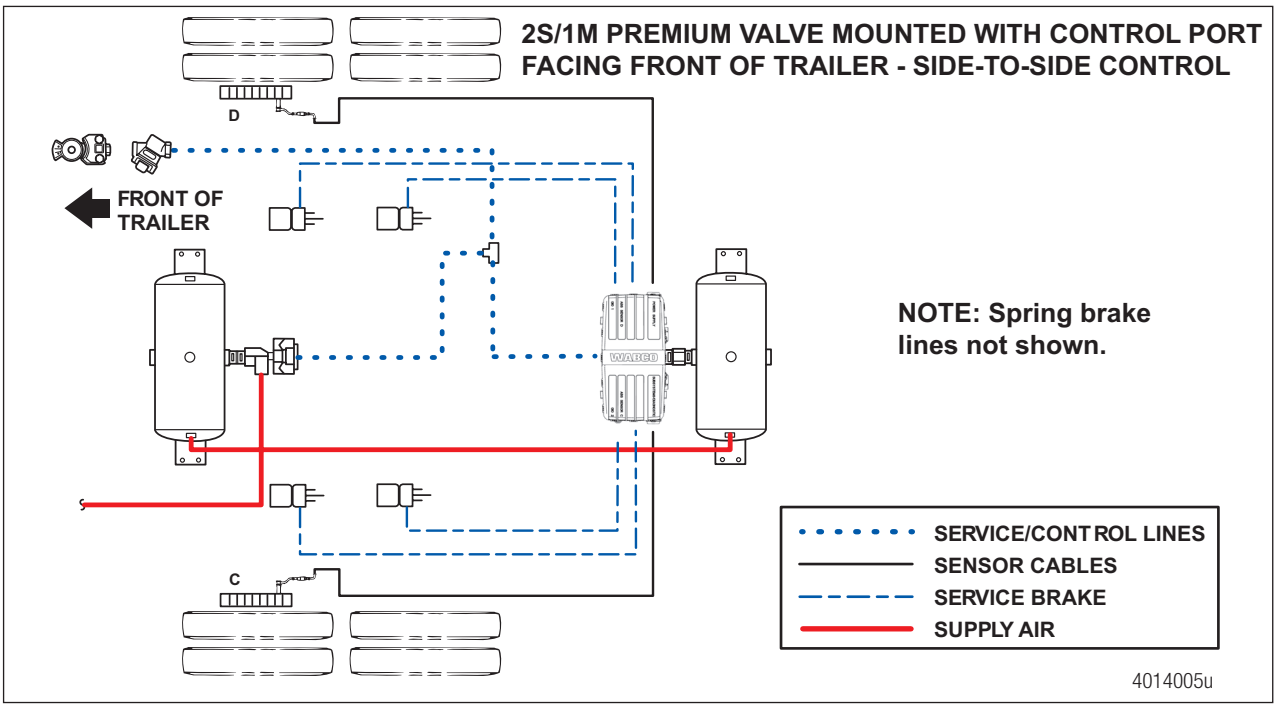


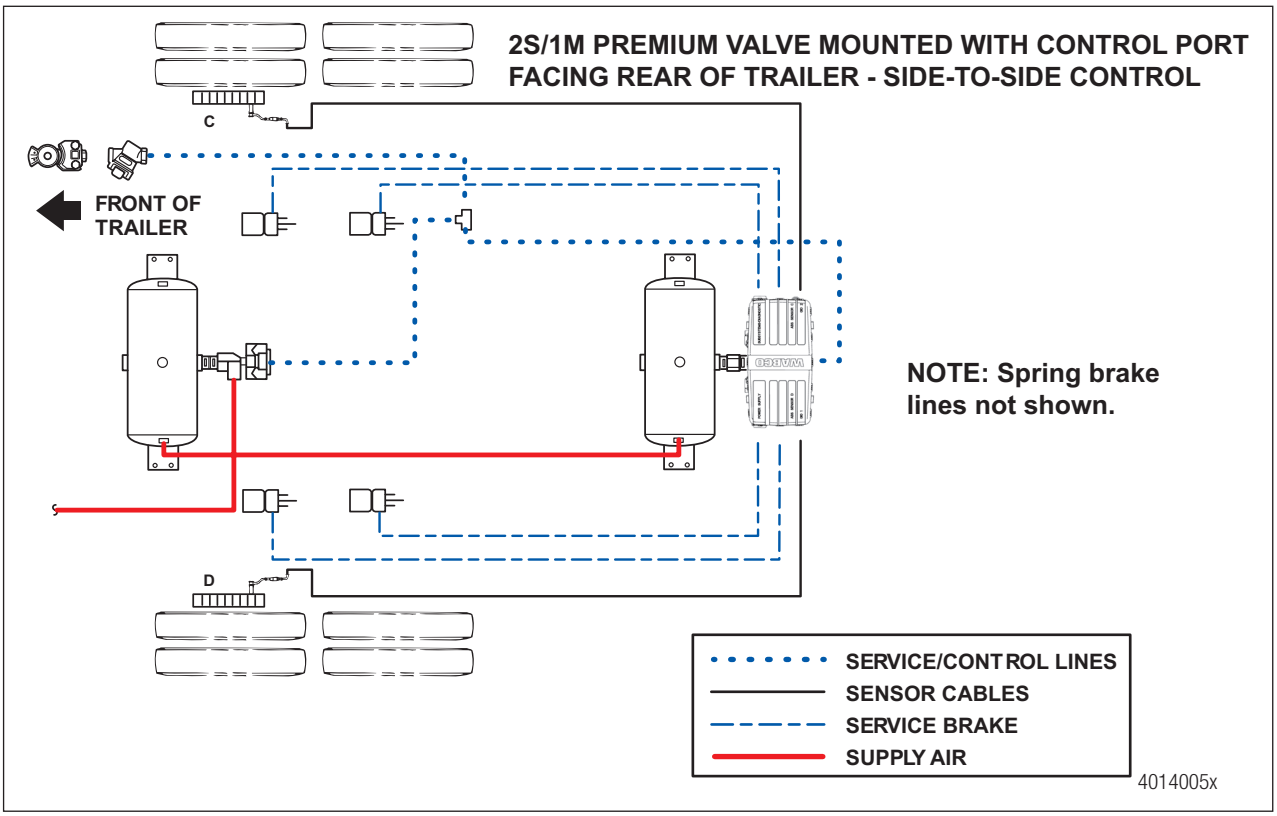
5.4.1 Typical Trailer iABS Installation

Refer to the following illustrations for typical trailer ABS installations.

WABCO recommends placing sensors on the axle that will provide the most braking performance. The suspension manufacturer can provide this information.

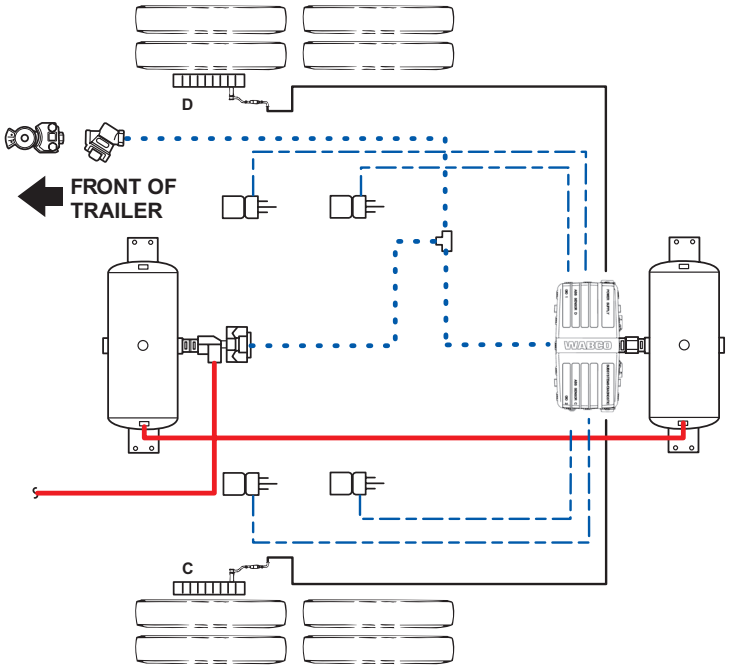
Installation





Installation

2S/1M PREMIUM VALVE MOUNTED WITH CONTROL PORT FACING FRONT OF TRAILER - SIDE-TO-SIDE CONTROL



NOTE: Spring brake lines not shown.

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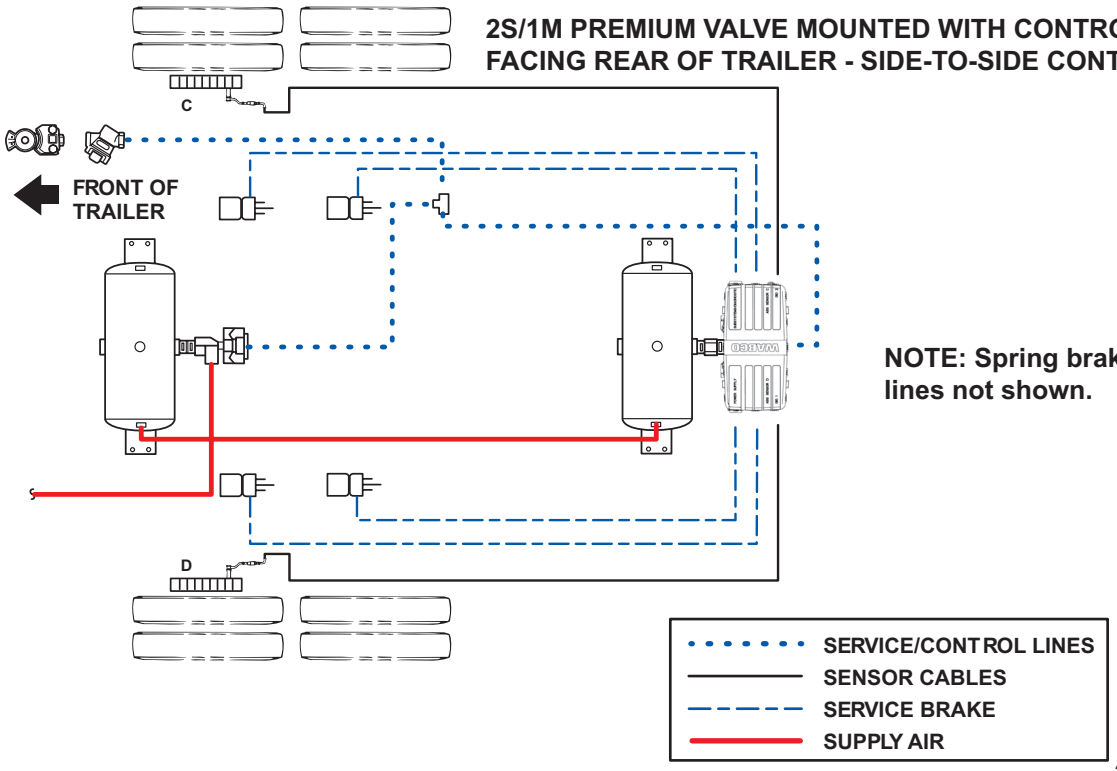
2S/1M PREMIUM VALVE MOUNTED WITH CONTROL PORT FACING REAR OF TRAILER - SIDE-TO-SIDE CONTROL



NOTE: Spring brake lines not shown.

4014005z

5.5 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™ Software and general test procedures are included in this bulletin.

5.5.1 iABS 2S/1M Basic Installation — End of Line Testing Procedure Using TOOLBOX PLUS™ Software

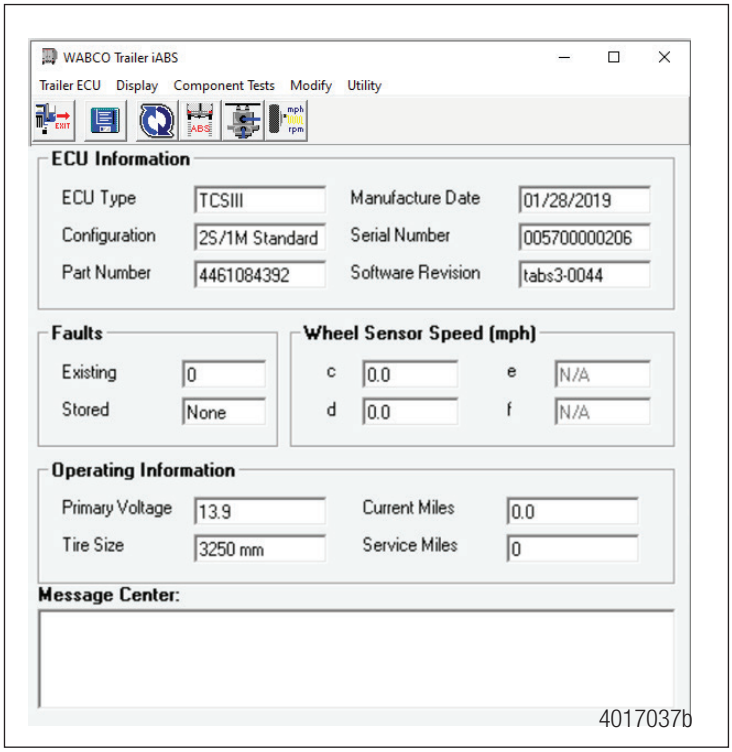
1. Connect a PLC diagnostic adapter to the PC USB port, then connect the other end of the diagnostic adapter to the Trailer main power line (J560 connection). Note a list of diagnostic adapters supported by the TOOLBOX PLUS™ Software can be found in the Owners Manual OM1618.

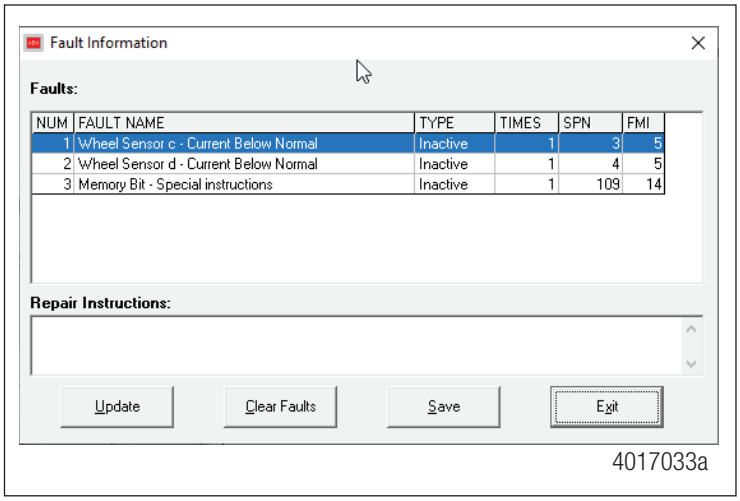
   Refer to the Software Owner's Manual, OM1618, for instructions for running TOOLBOX PLUS™ Software.

2. Open the iABS Diagnostics from the TOOLBOX PLUS™ Main Screen by clicking on the Trailer ABS selection.

3. Verify the power supply.

   - Apply 12 volts DC to the blue wire (constant). Check the screen for the correct voltage (9.4 to 14 volts). Constant power voltage is displayed in the PRIMARY field.





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.

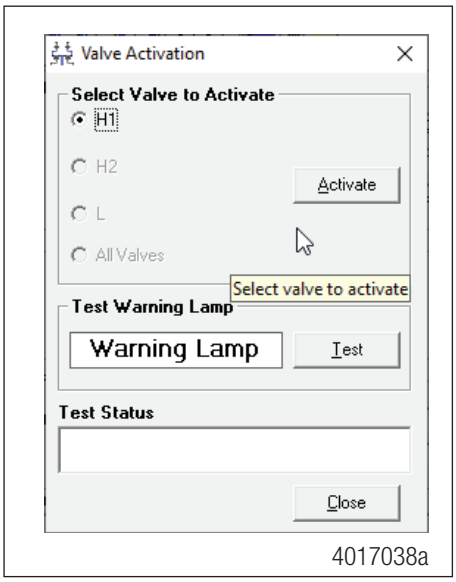
   Use the information in the Repair Instructions field to perform the necessary repairs.

5.6 End of Line Test with TOOLBOX PLUS™ Software

5.6.1 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 selected.



5. Click on the Activate button and listen for the valve to click, indicating a good installation. The Test Status box at the bottom of the menu will also display the status of this test.
6. 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 also display the status of this test.
7. Click on Close to exit.

5.6.2 Sensor Orientation Test

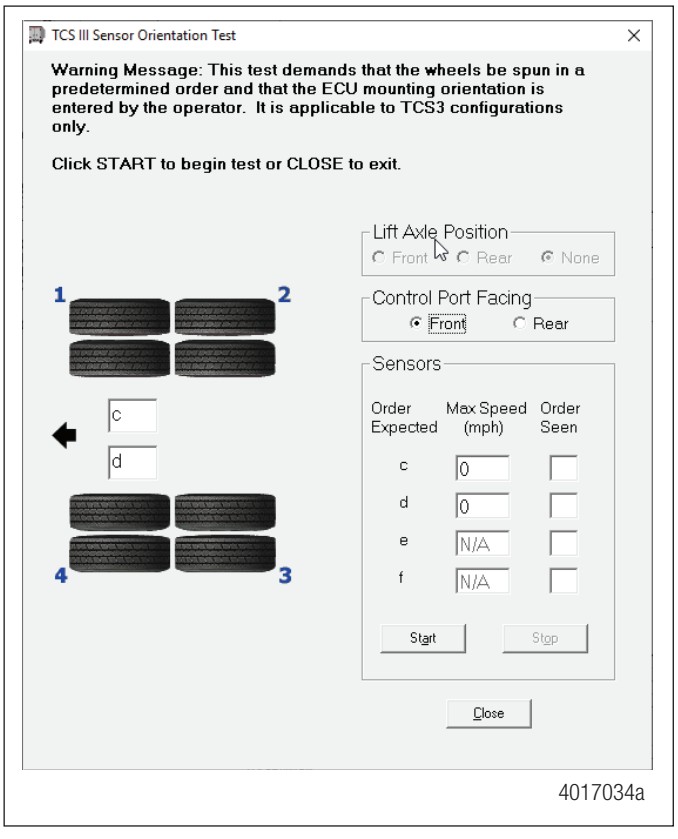
The sensor orientation test must be performed as part of the end of line testing procedure.

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:

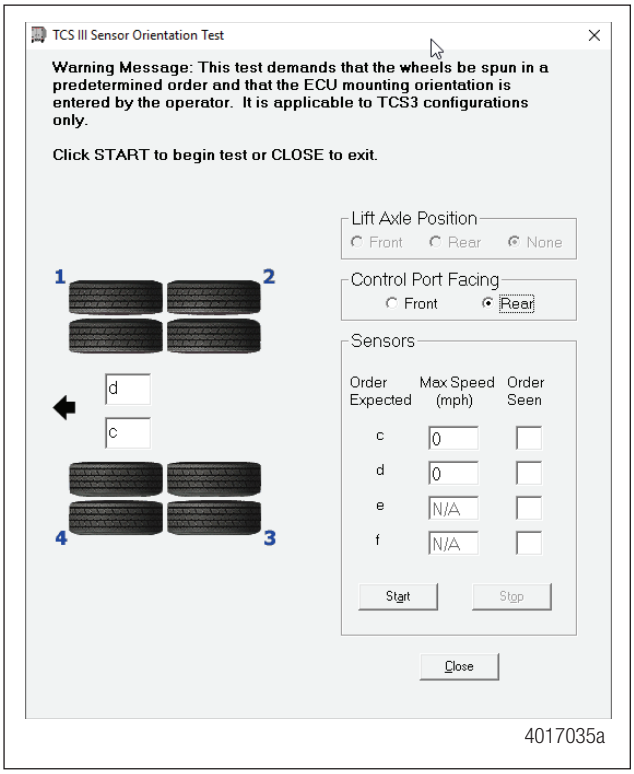
1. Raise the sensed wheel ends off the ground.
2. Apply air to the emergency (supply) line to fill the air tanks and release the spring brakes so that the wheels can be rotated.
3. Apply 12 volts DC to the ABS.
4. At the Trailer Main Menu, click on Component Test, then select Sensor Orientation Test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

   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 sensor orientation of the installation being tested.



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

   Refer to the following illustrations for the ECU mounted with sensors facing forward and rear. The correct mounting orientation must be selected prior to starting the test.



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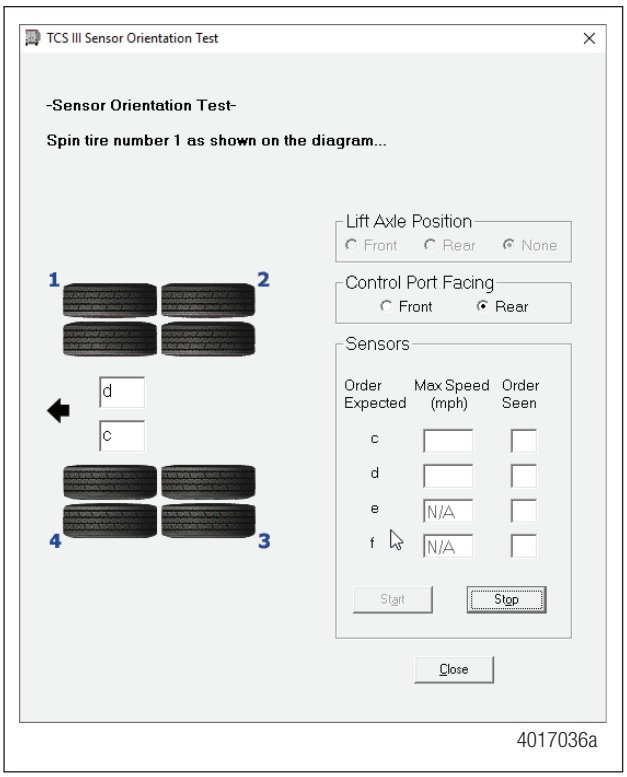
6. Click on **Start** to begin the test.



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7. 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.

   > Spinning the wheels 10 mph (16 kph) or faster may cause the software to terminate the sensor test.

   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.

8. After spinning each wheel, ensure that the wheel stops spinning before moving on to the next wheel in the test. If this is not done, it causes faults to come active and prevent the Sensor Orientation test from being completed.

9. 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 the WABCO Customer Care Center at 855-228-3203. Sensor output appears in the Sensors field located in the bottom right portion of the Sensor Orientation Test screen.

5.7 End of Line Test without TOOLBOX PLUS™ Software

1. Apply 12 volts DC power to the ABS.
2. The ECU/single modulator valve assembly should click two times.
3. If the indicator lamp **comes on** for three seconds and **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:

   A. Remove the power from the ABS and raise the sensed wheels so they may be rotated.

   B. Repeat Step 1 and Step 2.

   C. 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.

5.7.1 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.

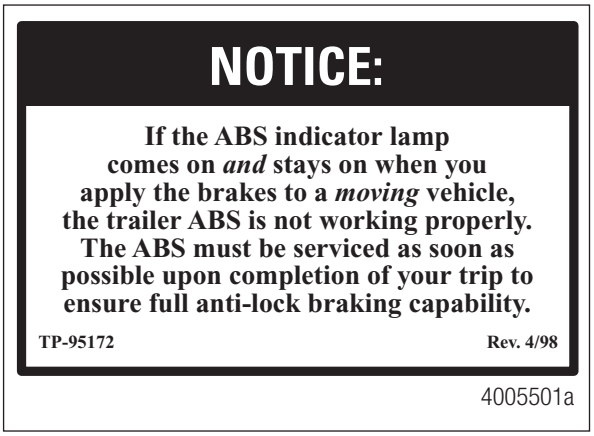
Measure the AC voltage output. The value should be 0.2 volt AC when the wheel is rotated at a rate of 1/2 revolution per second.

Perform any necessary repairs.

Repeat the sensor installation check. If the trailer lamp still does not go out, a system fault exists. Perform a fault code check.

5.7.2 Trailer Identification

After ensuring the iABS system trailer ABS has been correctly installed, attach the ABS indicator label included with the ECU/single modulator valve assembly to the trailer. Generally, this will be applied near the ABS trailer indicator lamp. Refer to the vehicle specification sheet for the correct location.



If this label is not included with the assembly, let your supervisor know. Labels are available from WABCO. Ask for part number TP95172.

A complete part listing can be found in WABCO Parts Book PB96133 available at www.zf.com/cv.

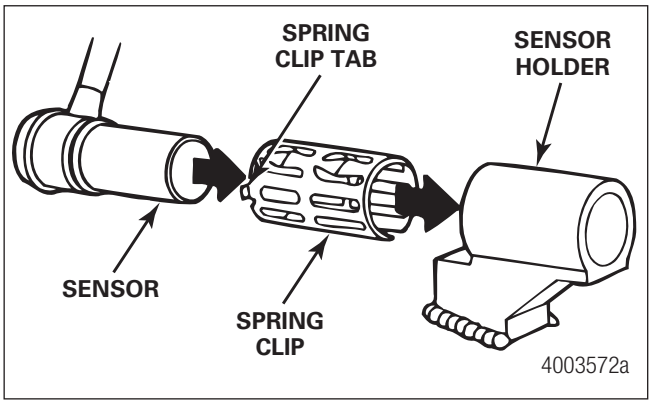
6 Appendix I

6.1 Installing Sensors on Non-ABS-Prepped Axles

Sensor locations vary due to suspension type. WABCO recommends placing the sensor on the axle that will provide the most braking performance. Contact your suspension manufacturer 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).
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.

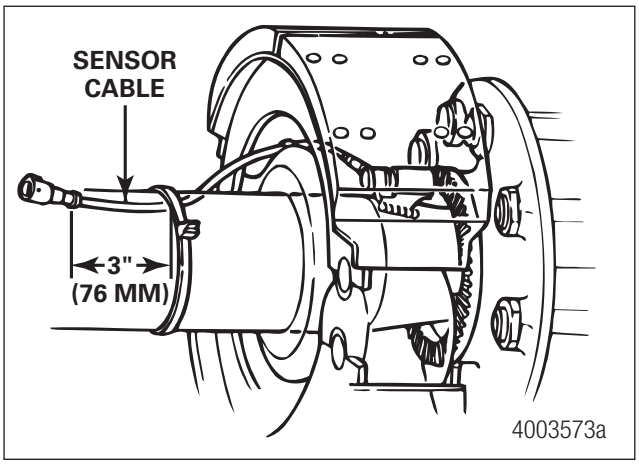


4. Route the sensor cable toward the brake chamber, over the brake spider or through the pre-stamped hole dedicated to ABS sensors. Route to the back side of the axle. Secure the cable to the axle between the brake spider and the suspension brackets. Continue to route the sensor cable behind the spring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

   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.

Appendix I

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.
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 volt AC. 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).

7.2 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.

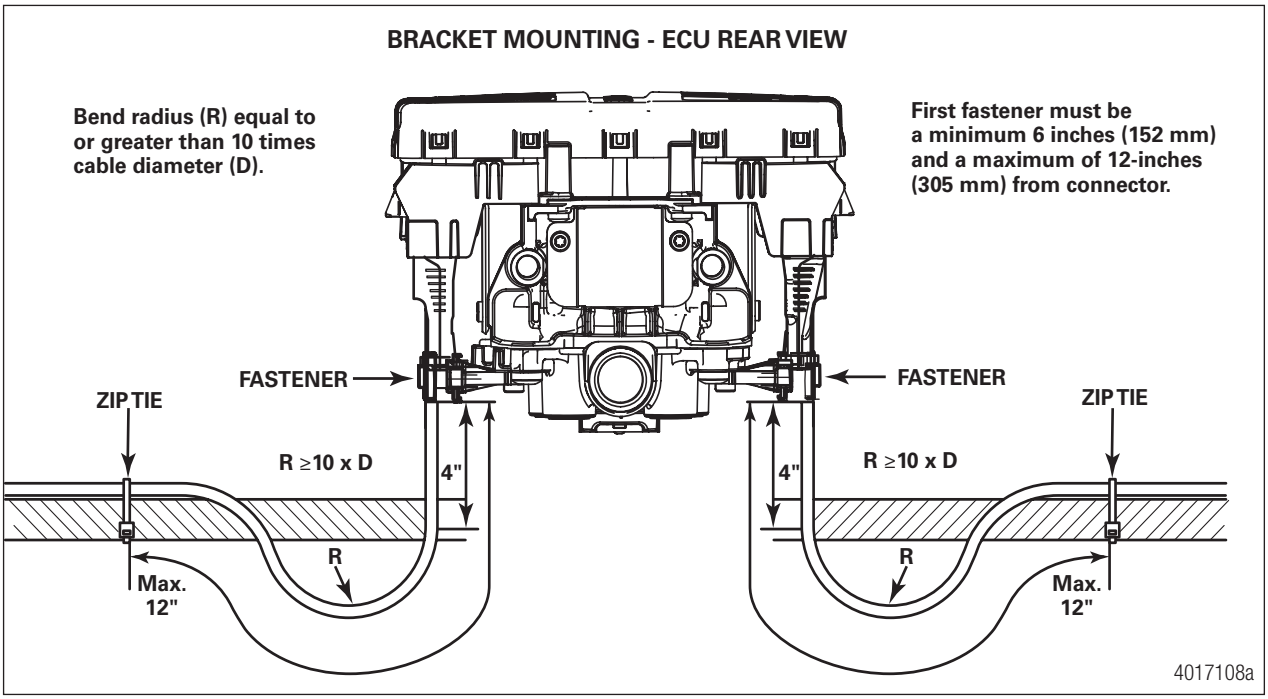
WABCO has many lengths of cables available so it is a best practice to obtain a length that best suits the requirements of the installation.

Appendix II

7.2.1 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 for the ECU mounting of 2S/1M ABS.



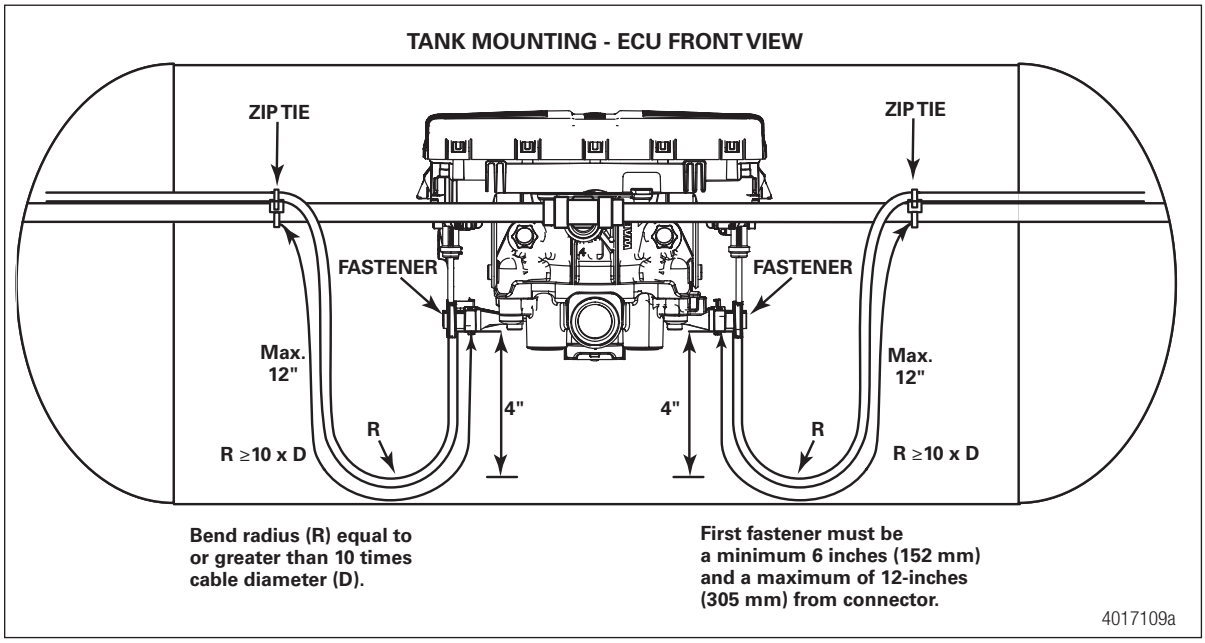
ABS 2S/1M

Appendix II

7.2.2 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 for 2S/1M ABS.

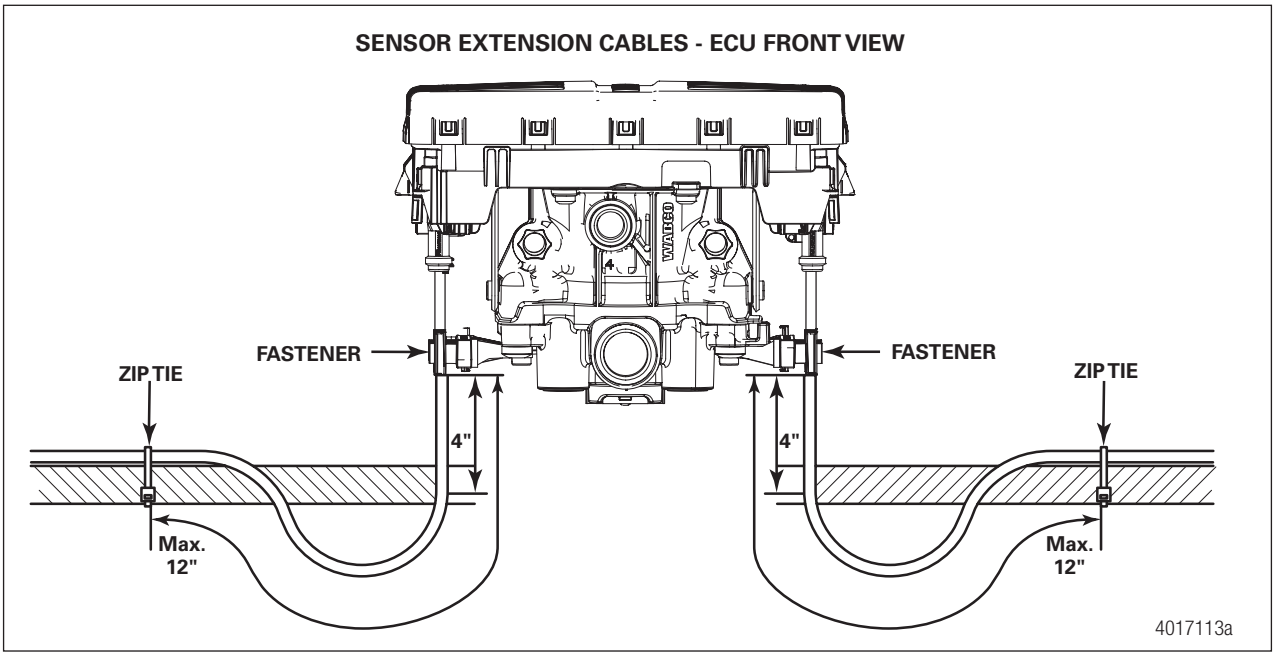


CORRECT POWER AND GIO/MODULATOR CABLE STRAIN RELIEF FOR ABS 2S/1M

Appendix II

7.2.3 Sensor Extension Cables at the ECU

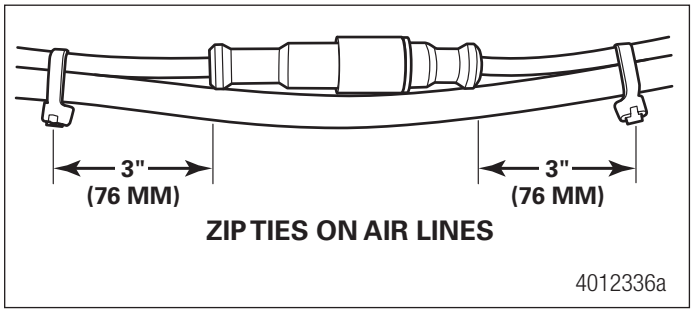
On valves that are tank mounted with no trailer structure nearby, or have remote-mounted cables, the sensor extension cables are attached to the air lines. Cable clips are preferred over zip ties. It is important to remember that cables should be fastened in a manner where the cable is secured enough 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. The figure illustrates the correct amount of slack in the sensor extension cables and correct attachment to the air delivery lines for ABS ECUs.

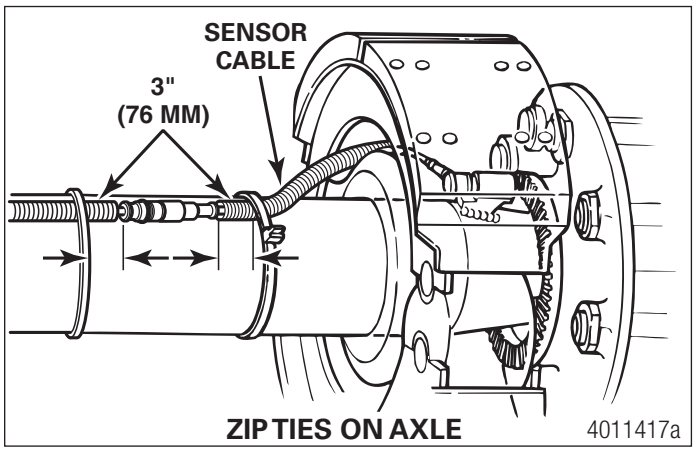


Appendix II

7.2.4 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.





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 Ω). 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.

NOTICE

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 Ω).

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

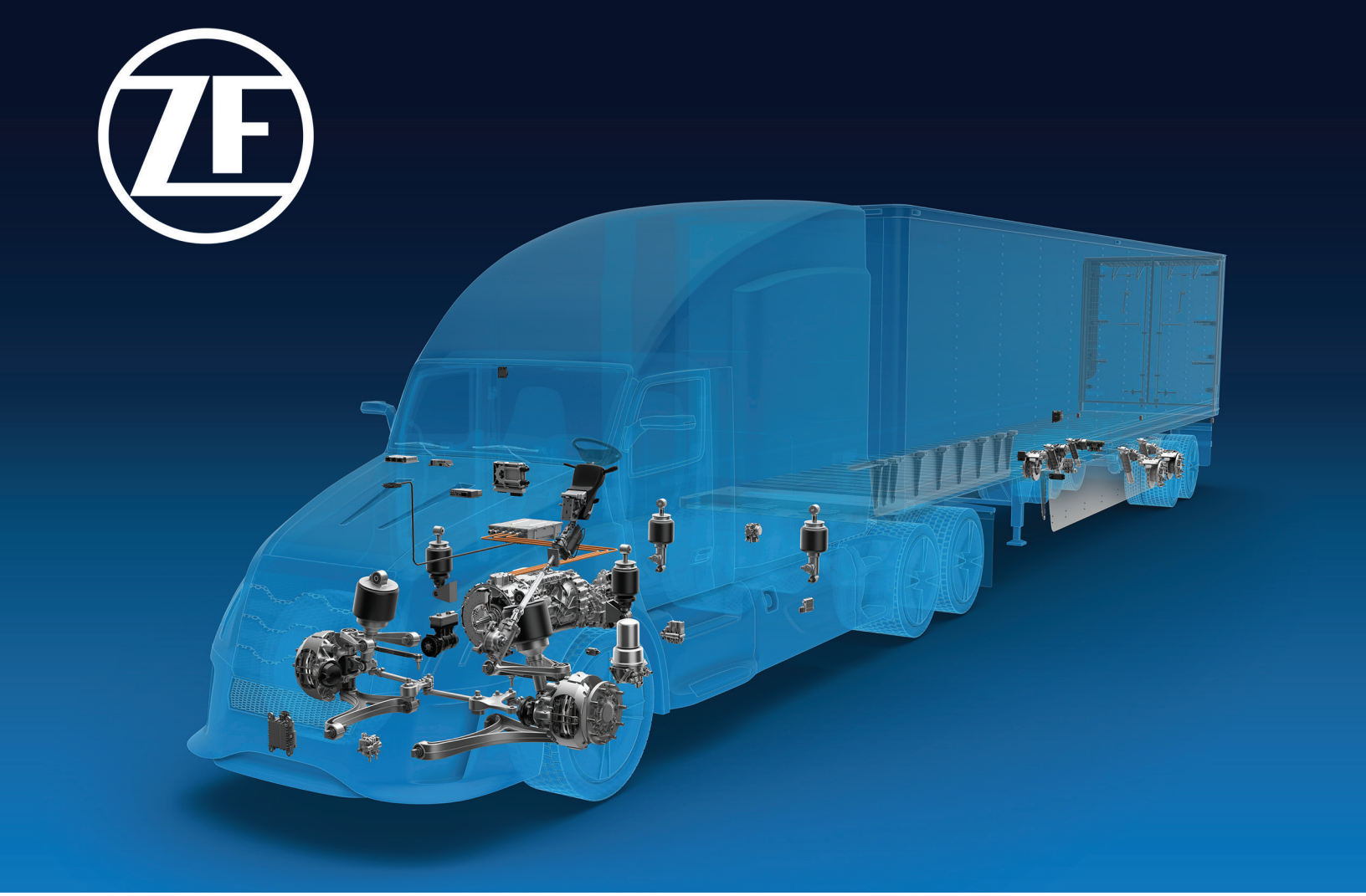
VARIANT LIST		
Variants		
System Configuration	2S/1M Standard	2S/1M Premium
Part Number	400 500 320 0	400 500 350 0
CAN Capable	Yes	Yes
GIO Capable	No	Yes
Direction of Control	Side to Side	Side to Side

Appendix IV

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
Sensor Ports C,D,E,F	 Sensor Extension Cable	449 733 008 0 449 733 013 0 449 733 018 0 449 733 030 0 449 733 050 0 449 733 070 0 449 733 090 0 449 733 120 0	0.8 M 1.3 M 1.8 M 3 M 5 M 7 M 9 M 12 M
Modulator	 GIO Cable 3 Pin (3rd Mod)	449 407 030 0 449 407 060 0 449 407 080 0 449 407 120 0	3 M 6 M 8 M 12 M
GIO 1 or 2	 GIO Cable 3 Pin	449 826 010 0 449 826 030 0 449 826 100 0	1 M 3 M 10 M
GIO 1 or 2	 GIO Cable 2 Pin	449 408 010 0 449 408 040 0 449 408 060 0	1 M 4 M 6 M
GIO 1 or 2	 GIO Cable Blunt Cut 4 Wire	449 827 030 0 449 827 060 0 449 827 120 0 449 827 180 0	3 M 6 M 12M 18 M

Appendix IV

PARTS LIST			
Slot on iABS Modulator	**Application**	**Part Number**	**Length**
GIO 1 or 2	 Brake Pad Wear Cable	449 836 013 0 449 836 030 0	1.3 M 3 M
GIO 1 or 2	 GIO Cable Tire Inflation	449 743 010 0 449 743 030 0	1 M 3 M
Subsystem	 Subsystem Cable (OptiLink/IVTM/Trailer CAST)	449 928 050 0 449 943 050 0 449 928 120 0 449 943 120 0	5 M 5 M 12 M 12 M
Subsystem	 Subsystem Cable (Smartboard II)	449 929 040 0 449 929 060 0 449 929 120 0	4 M 6 M 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



For further details, contact the
WABCO Customer Care Center at 855-228-3203.

About CVS Division

ZF's Commercial Vehicle Solutions (CVS) division is helping shape the future of commercial transportation ecosystems. Our mission is to be the preferred global technology partner to the commercial vehicle industry. Powerfully combining ZF's commercial vehicle systems expertise, extensive technology portfolio and global operations, the division serves the full commercial vehicle industry value chain. As the automotive industry progresses towards an increasingly autonomous, connected, and electrified (ACE) future, ZF's CVS division innovates, integrates and supplies components and advanced control systems that help make commercial vehicles and fleets operate more safely and sustainably. CVS unites ZF's former Commercial Vehicle Technology and Commercial Vehicle Control Systems divisions, the latter being formed following ZF's acquisition of WABCO in Spring 2020.

For more information, visit: **www.zf.com/cv**