

MERITOR WABCO

Technical Bulletin

R955426 or R955427 Meritor WABCO Enhanced Easy-Stop™ Trailer ABS 2S/2M Replacement Kits for Wabash National MBS-2 Equipped Trailers

Hazard Alert Messages

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

About This Manual

Overview

Effective March 2004, Wabash National made Meritor WABCO trailer ABS the standard product for use with their trailers. Wabash National's MBS-1, MBS-1P, and MBS-2 products are no longer available. Meritor WABCO's Enhanced Easy-Stop™ trailer ABS can be used to replace Wabash National's MBS-1, MBS-1P, and MBS-2 products.

This bulletin covers the replacement of MBS-2 products with Meritor WABCO Enhanced Easy-Stop™ 2S/2M. For MBS-1 or MBS-1P product replacement, please contact the ArvinMeritor Customer Service Center at 800-535-5560.

To complete the MBS-2 ABS replacement for the trailer you will need the following:

- One trailer ABS replacement kit
- Two replacement hubs with tone rings **only** if hubs are not already machined
- One sensor mounting block fixture will be needed at the point of installation. This tool may be reused from trailer to trailer. (Refer to the Special Tools section at the back of this publication.)
- Meritor WABCO recommends an in-line filter (432 500 005 0) be installed at the gladhands to protect the trailer ABS components.
- A Meritor WABCO trailer ABS wall chart (TP-0692) is available to further identify Meritor WABCO components correctly for future service needs. This wall chart is available from our literature fulfillment center (800-535-5560).

Trailer ABS Replacement Kit

Replacement Kit for 2S/2M Slider or 4S/1M MBS-2 Equipped Trailers — R955426

NOTE: R955427 includes the same bill of material, but excludes tone rings for retrofits where new hub assemblies will be used.

- 12-volt integrated electronic control unit (ECU)/modulator valve assembly, 400 500 102 0
- 4.7-meter power cable, 449 326 047 0
- 1.0-meter sensors (2), 441 032 808 0
- Sensor clips (2), 899 759 815 4
- Lubricant packets for sensors (2), 884 490 307 4
- 1.8-meter sensor extension cables (2), 449 713 018 0
- 1/2 - 14 NPTF filler plug (top of axle) with pre-applied sealant (2), P-48S
- Spindle end plugs for WP style axle spindles (4), 1250F526
- Sealant for spindle end plugs (4), 2297B7048
- Sensor mounting blocks (2), 2255-T-1346
- Tone rings (2), 09001867
- Installation Guide, TP-0710
- Meritor WABCO Trailer ABS Quick Reference Guide, TP-0173
- Trailer ABS sticker, TP-95172
- Wabash National offered the MBS-2 platform in 2S/1M, 4S/1M and 2S/2M configurations. Replacement kits R955426 and R955427 are designed to retrofit a MBS-2, 2S/1M or 4S/1M equipped trailer to an Enhanced Easy-Stop™ 2S/2M equipped trailer. For 2S/1M configurations, order replacement kit R955423 or R955425.

Replacement Hubs (Hub, Cup, Studs, Tone Ring)

Replacement hubs with tone rings will be needed if the existing hubs are not machined to allow for insertion of tone rings. Tone rings are provided in the replacement kit and do not need to be ordered separately. Please consult Meritor Parts Book PB-2006 for additional information on replacement hubs.

- Meritor WABCO offers two versions of this kit; R955426 for retrofits that the existing hubs will use after tone rings are installed, and R955427 for retrofits that will use new hub assemblies. The existing hubcaps can be reused with either the existing hubs or the new hub assemblies.

Table A: WP Axles — Stud Piloted

Wheel Type	Drum Type	Hand	Hub Number
Steel/Aluminum	Cast	Right-Hand	04-15968-014
Steel/Aluminum	Cast	Left-Hand	04-15968-015

Table B: WP Axles — Hub Piloted

Wheel Type	Drum Type	Hand	Hub Number
Steel/Aluminum	Cast	Left/Right	04-15968-007
Aluminum	Cast/X30	Left/Right	04-15968-009

Removal and Installation

Remove the Wabash National MBS-2 Electronic Control Module (ECM) and Pneumatic Control Module (PCM)

WARNING

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

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.

Release all pressure from the air system before you disconnect any components. Pressurized air can cause serious personal injury.

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 and fall over. Serious personal injury and damage to components can result.

CAUTION

Use the following procedures to avoid damage to the electrical system and ABS components.

When welding on an ABS-equipped vehicle is necessary, disconnect the power connector from the ECU.

1. Wear safe eye protection.
2. Park the vehicle on a level surface. Block the wheels to prevent the vehicle from moving.
3. Discharge all of the pressure from the air system.
4. Attach labels to identify all air lines.
5. Disconnect and remove the air lines from the ECM/PCM.
6. Disconnect the power/diagnostic cable from the ECM/PCM.
7. Disconnect the axle feed-through cable (cable for in-axle sensors) from the ECM/PCM.
8. Disconnect the accessory cable from the ECM/PCM.
9. Remove the ECM/PCM from its mounting location (either on the air tank or on the frame of the vehicle).

Remove the Wabash National MBS-2 Axle Feed-Through Cables

1. Pull the axle feed-through cable from the axle and cut the cable near the Y-intersection of this cable. Refer to Figure 3.
2. Remove the axle feed-through cable.
3. Disconnect the sensors from the axle feed-through cable, pushing the sensor cables back into the axle.

Prepare the Axle for Removal of the In-Axle Sensors and Installation of Spindle End Plugs

CAUTION

Use a clean towel to cover the wheel ends at both ends of the axle during system installation to prevent contaminants from entering the wheel end. Contaminants may damage the bearings and seals.

1. Place a container under the hubcap to receive the draining oil. Then, remove the hubcap and hubcap gasket from both ends of the axle. Figure 1. Do not reuse either the hubcap gasket or the oil.

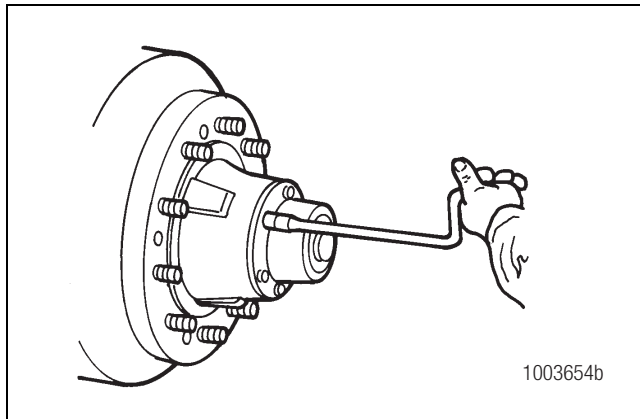


Figure 1

2. Cover the wheel ends at both ends of the axle with a clean towel. Figure 2.

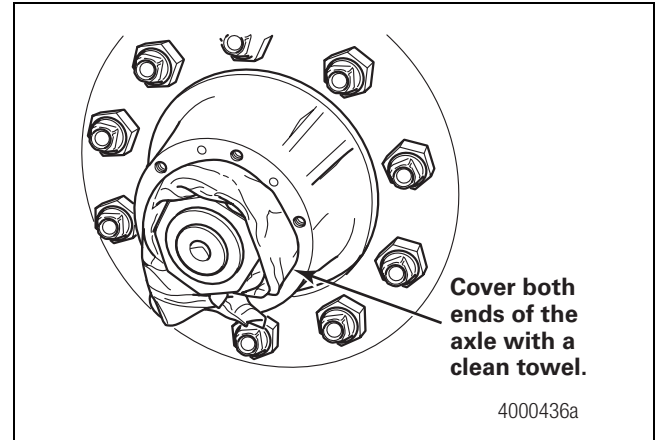
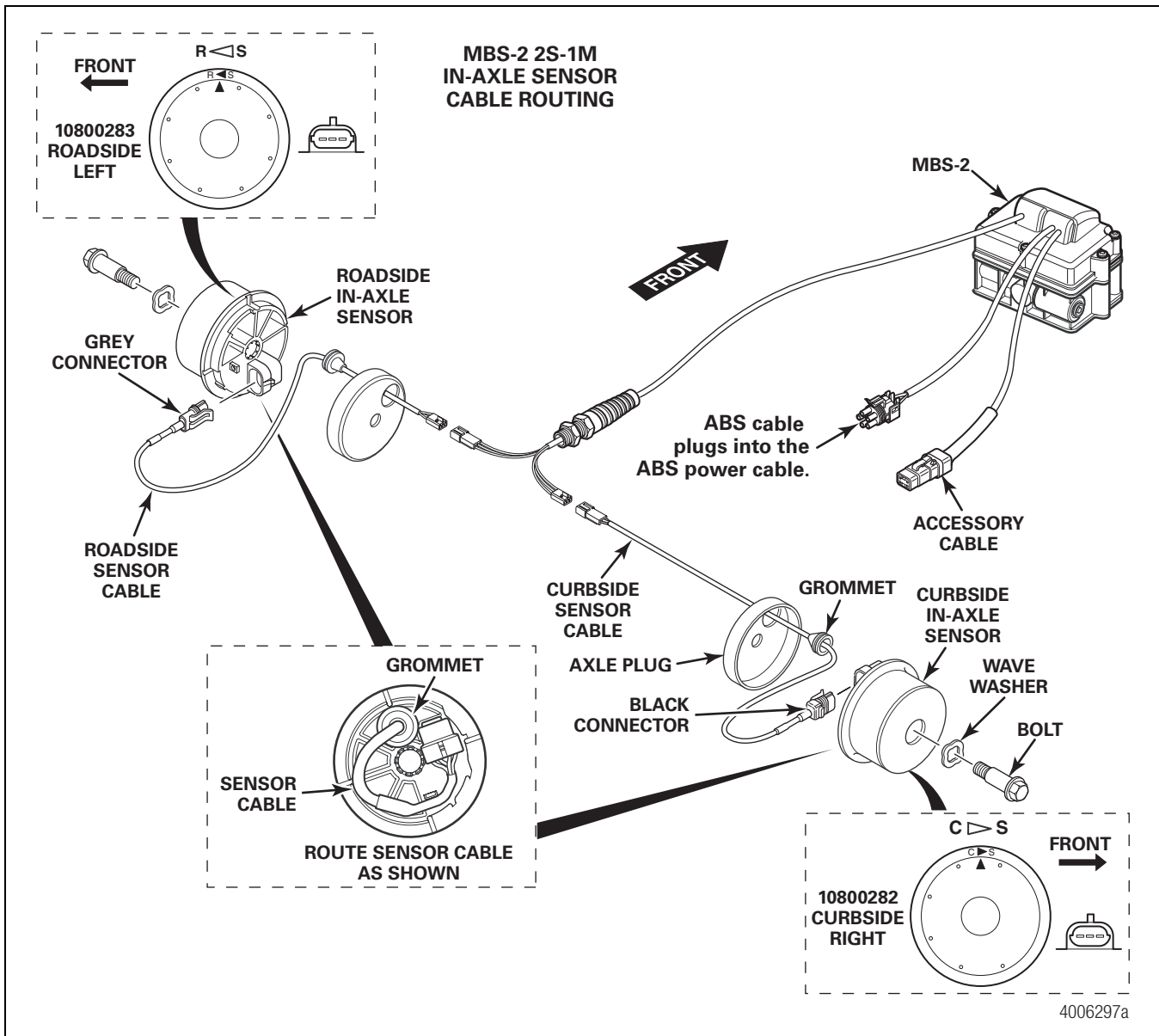


Figure 2

NOTE: If the trailer is also equipped with the Meritor Tire Inflation System (MTIS) by P.S.I.™, you will need to remove the existing stator and press plug from the axle spindle. Each MTIS press plug will need to be replaced with a TP-style press plug, part number 32184-01A, while the stator can be reused. Refer to Step 5 for the correct procedure to remove the press plug.

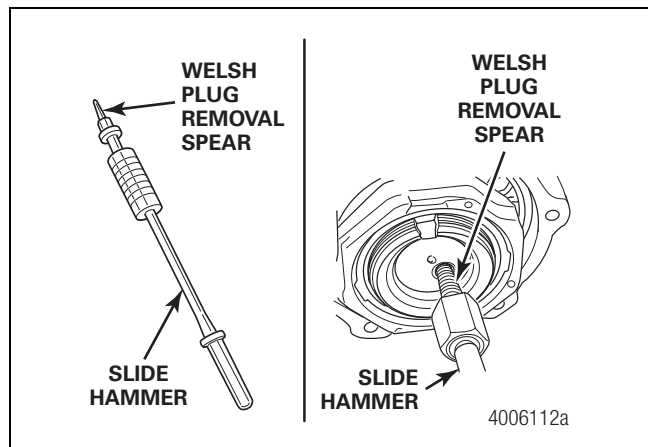
3. Remove the 1/2-inch bolt and wave washer from the in-axle sensor. Then remove the in-axle sensor from the axle spindle, unplugging the grey (roadside) or black (curbside) connector from the back of the sensor. Figure 3.



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Figure 3

4. Remove the sensor cable and grommet from the axle spindle.
5. Use a slide hammer fitted with the spindle end plug removal spear to remove the spindle end plugs from both ends of the axle. Use care not to score the inside diameter of the spindle bore. Figure 4. A slide hammer with spindle end plug removal spear to help remove these plugs is available from ArvinMeritor. Refer to the Special Tools section at the back of this document for part numbers of special tools and supplies.



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Figure 4

⚠ CAUTION

Use a bore polisher to remove all old adhesive from the spindle bore before you apply retaining compound to install the press plug. Retaining compound must contact a bare metal surface or it will not harden. Damage to components can result.

6. Choose the correct size bore polisher by matching the axle manufacturer and model to the bore polishing tools listed in the back of this publication. Figure 5.

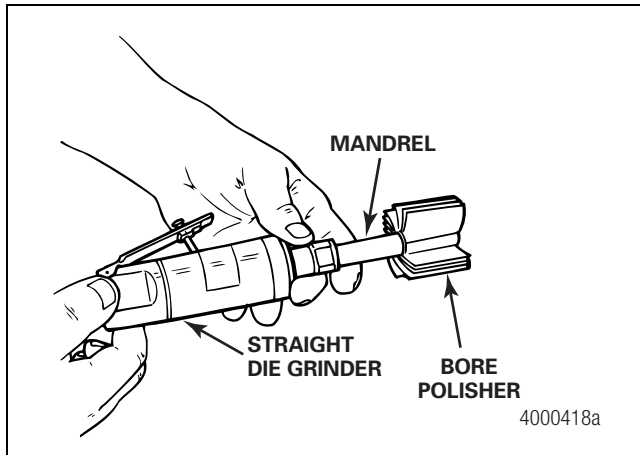


Figure 5

7. Polish the spindle bore to remove all adhesive residue left from the old spindle plug and any metal burrs or sharp edges from the spindle bore surface. Figure 6.
 - If the axle spindle is equipped with cotter pin holes: Use a round abrasive tool to remove all metal burrs and sharp edges from the spindle bore side of the cotter pin holes. Figure 7.

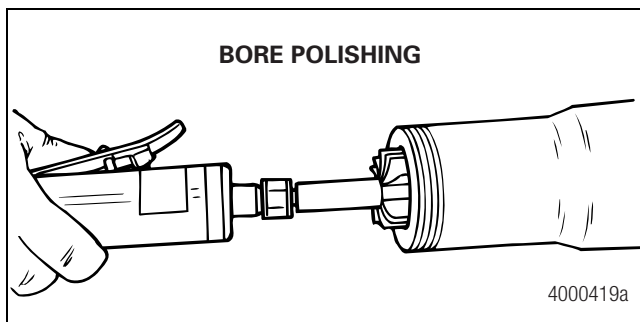


Figure 6

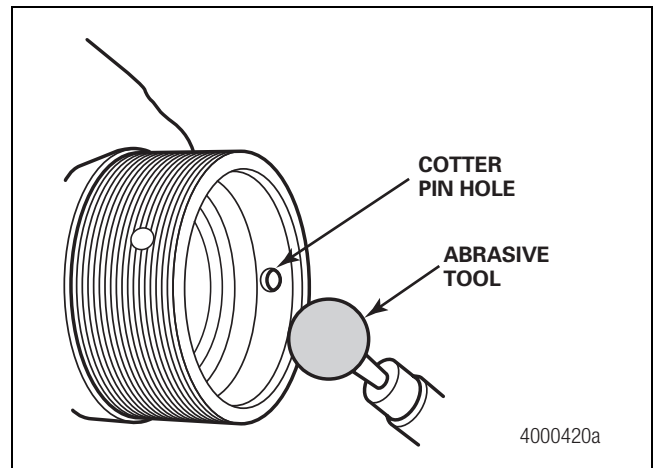


Figure 7

⚠ CAUTION

Use a cleaning wand and high-volume air to clean debris from the axle interior before you install the spindle end plugs. Check that the axle is clear of debris, including loose rust, scale, liquid, and machining residue.

8. Connect a cleaning wand to a high-volume air supply. Refer to Figure 8 for information on building a cleaning wand. Slowly push the wand through the axle until it exits the opposite end. During this operation, a steady stream of air will flow from the opposing axle spindle. Figure 9.

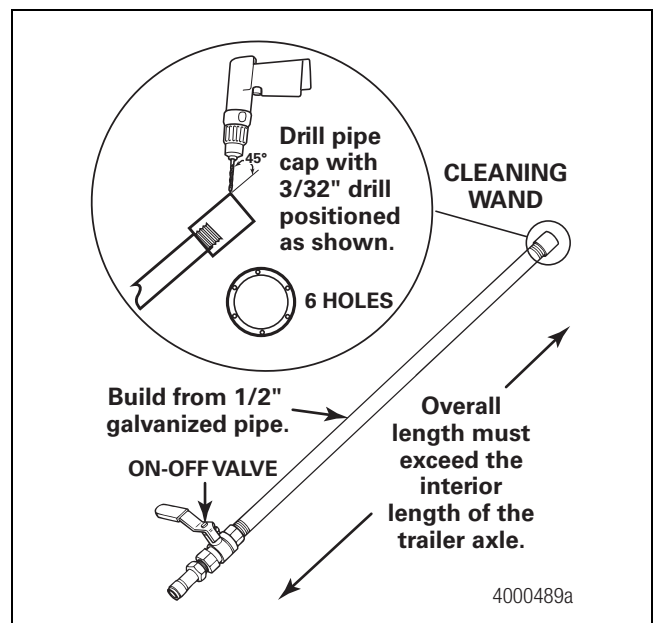


Figure 8

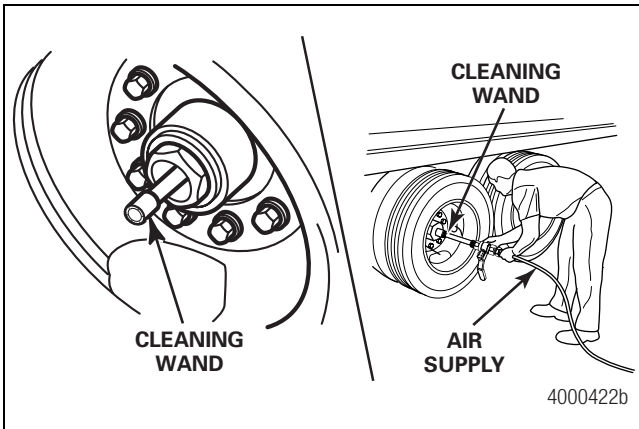


Figure 9

9. Check the inside of the axle tube with a flashlight by shining the light into one end of the spindle and looking through the opposite end. Confirm that all debris, including loose rust, scale, liquid and machining residue has been removed. Figure 10.

- **If necessary:** Repeat the cleaning procedure until the axle is clear of debris. For debris that's difficult to remove, it may be helpful to push the cleaning wand through the axle from the opposite end.

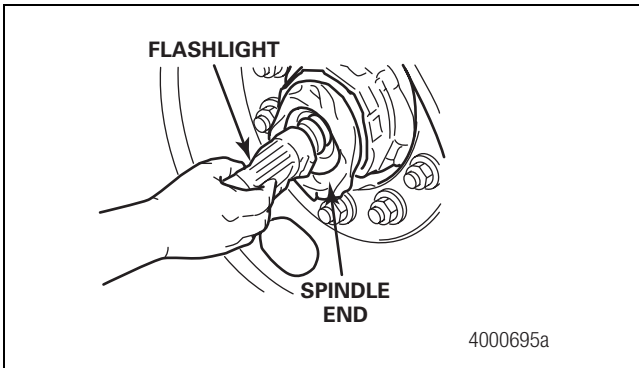


Figure 10

10. Choose the correct press plug drive adaptor by matching the axle manufacturer and model to the press plug drive adaptors. Refer to the special tools section at the back of this document for part numbers of special tools and supplies. Figure 11.

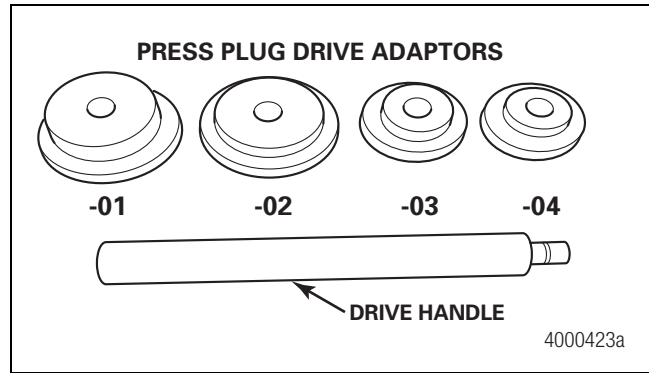


Figure 11

11. Install the press plug drive adaptor onto the drive handle. Figure 12.

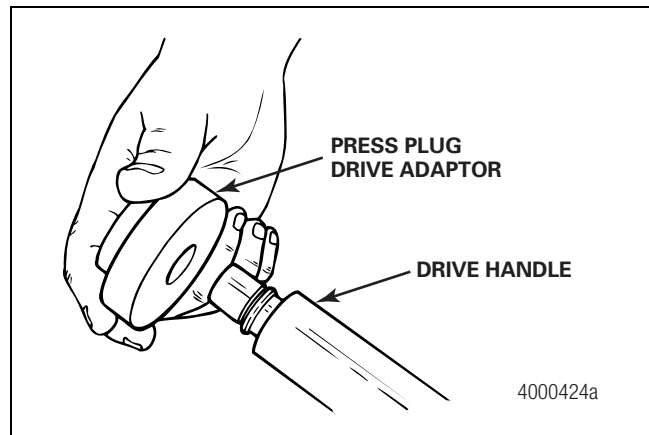


Figure 12

12. Use a moist towelette to clean one spindle bore of contaminants such as grinding dust, dirt, and wheel-end lubricant. Protect the cleaned bore from additional contaminants. Figure 13.

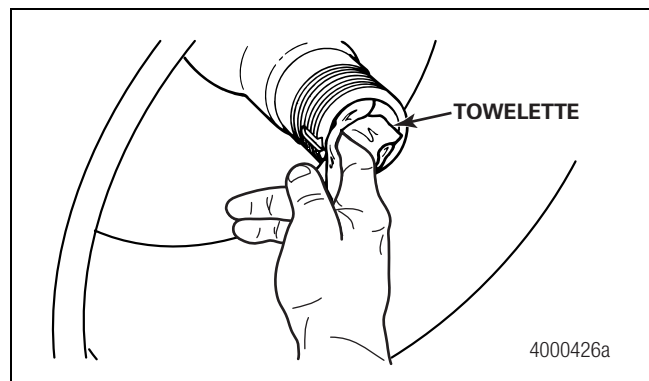


Figure 13

CAUTION

Use the retaining compound supplied in the installation kit only when you install the press plug. Apply retaining compound to the **OUTSIDE** diameter of the press plug only. Do not apply it to the inside diameter of the spindle bore, press plug stator threads or axle spindle threads. Damage to components can result.

- Put on a new pair of latex gloves. Apply the retaining compound included in the installation kit evenly to the **OUTSIDE** diameter of the press plug. The installation kit contains enough retaining compound for four wheel ends. The press plug must be installed within 10 minutes of applying the hardening compound to ensure that the compound hardens correctly. Figure 14.

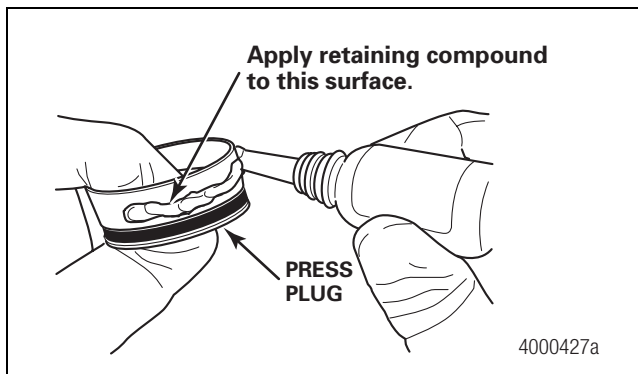


Figure 14

- Insert the press plug into the spindle bore until the plug stops in the bore. Figure 15.

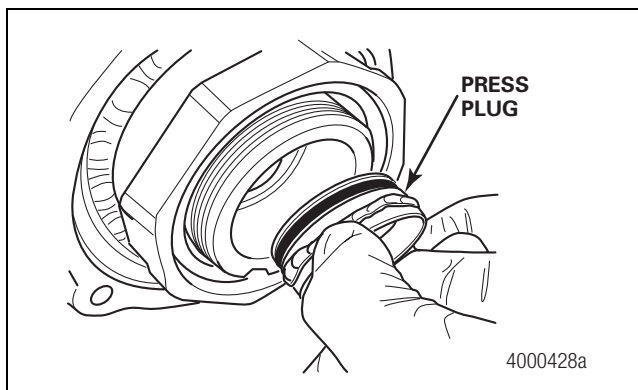


Figure 15

- Check that the press plug protrudes from 1/8-1/4-inch (3.175-6.35 mm) from the end of the spindle. Figure 16.

- If the press plug protrudes outside this acceptable range: Before proceeding, contact ArvinMeritor's Customer Service Center at 800-535-5560.

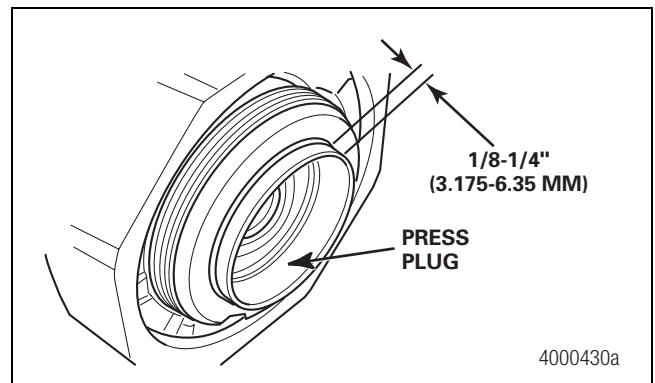


Figure 16

NOTE: If the trailer is equipped with a 2S/1M or 2S/2M set-up, continue to Install the Sensor Mounting Blocks in this section. If the trailer is equipped with a 4S/1M set-up, repeat Steps 1-16 for the other trailer axle to remove the existing MBS-2 sensors.

- Insert the press plug drive adaptor into the press plug. Figure 17.

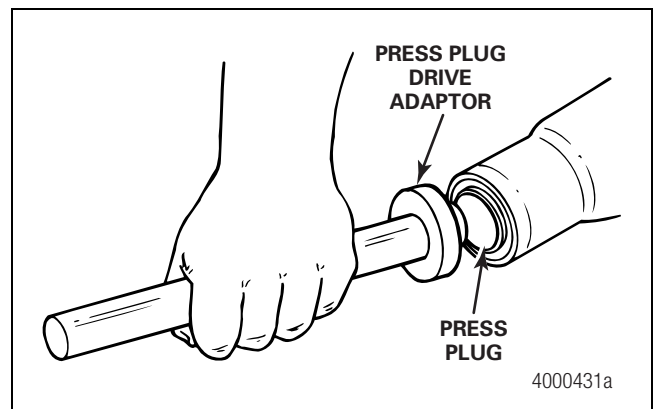


Figure 17

Install the Sensor Mounting Blocks

CAUTION

You must follow your company's safety procedures when installing sensor mounting blocks. An arc-type welding device will be used during installation so make sure all fire safety regulations are followed. Serious personal injury can occur if safety procedures are not followed.

NOTE: Sensors may be installed on either axle, depending upon suspension and other vehicle characteristics.

1. Ensure your axles are correctly supported by jack stands.
2. Access axle spindles by removing tires, drums, rotors, (this only applies to disc brake applications), hub and bearing assembly, and brake assembly.
3. Clean spindle from oil or grease.
4. Install locating fixture onto the axle spindle inboard bearing surface.
5. Secure rubber strap around bearing surface and attach it to the eyelet on the other side of the fixture.
6. Slide the fixture inward until it stops at the rear-bearing stop.
7. Turn the locating fixture to the recommended correct clock positions: 2, 4, 8, 10 o'clock.
8. Install sensor mounting block onto the locator, making sure the fixture has not moved from the desired position.
9. Place an approximate 1/8-inch (3.175 mm) weld along the side of the sensor mounting block to secure.
10. Remove fixture, let cool then continue.
11. After cool down, install sensor spring clip and sensor.

Install a Tone Ring

CAUTION

When installing an ABS system, Meritor WABCO recommends the use of new manufactured ABS hub assemblies. Machining an older hub with insufficient hub wall thickness could result in serious property or personal injury. Extreme care should be taken when using open flame heating devices.

1. Clean the hub area to accept the tone ring.
2. Heat the tone ring to 230-250°F (110-121°C).

NOTE: Meritor WABCO recommends the use of an oven type heating device. An open flame device can be used, with the following precautions.

- Place the ring on a 1/4-inch thick X 12-inch wide X 12-inch long plate.
 - Mount a heating device under the plate.
 - With the ring on the plate, check the tone ring temperature using a weld stick registered at 230°F (110°C).
 - When the weld stick starts melting, the tone ring is ready to be installed onto the machined hub.
3. Using pliers and/or welding gloves, remove the tone ring from the heat source and center it onto the machined surface area of the hub bore.
 4. While the tone ring is still hot, make sure that it is correctly centered on to the machine surface and seated to the bottom surface. The hub assembly should be placed so the ring can be installed in a horizontal position.
 5. The tone ring should slide into the hub until it bottoms out. If needed, use a rubber mallet to tap the ring onto the hub until it bottoms out. Let the assembly cool naturally.

CAUTION

Do not use any cold substance to cool off the hub assembly, as this could damage the hub and tone ring and possibly cause personal injury.

6. Once the hub assembly cools, install the hub assembly onto the wheel end to the manufacturer's specifications. Use a dial indicator to check the runout of the tone ring teeth.
7. Rotate the hub assembly. **The runout should not exceed ±0.005-inch (0.127 mm).**
8. Repeat as necessary for other ABS sensed wheel ends.

Install the New ECU/Valve Assembly

Attach the replacement ECU/modulator valve assembly to a cross member of the trailer or to the air tank. If possible, mount the replacement assembly in the same location as the old assembly. Contact ArvinMeritor's Customer Service Center at 800-535-5560 for more information.

NOTE: Based on the existing lengths and positions of the MBS-2 ECM/PCM and air tank on the trailer, it may be necessary to install new air hose lines including but not limited to the control line. Union-tee fittings should not be used to extend an existing air hose line.

Air Tank-Mounted

⚠ WARNING

Release all pressure from the air system before you disconnect any components. Pressurized air can cause serious personal injury.

You must use a Steel Schedule 80 hex nipple fitting (3/4-inch [19.05 mm] NPTF) to mount the ECU/modulator valve assembly securely to the air tank to avoid possible serious personal injury and damage to the component.

⚠ CAUTION

Meritor 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/modulator valve assembly.

Refer to Figure 18. Refer to Figure 26 for port locations.

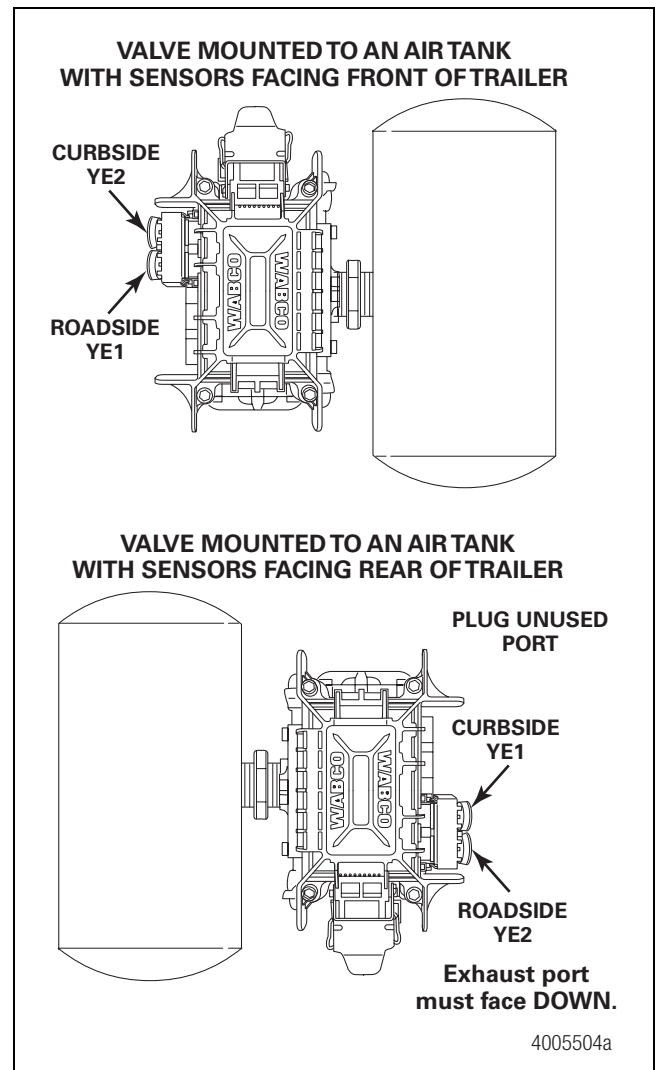


Figure 18

1. Use a 3/4-inch NPTF Schedule 80 hex nipple to attach the ECU/modulator valve assembly to a reinforced air tank. Do not overtighten.
2. Use a 3/4-inch NPTF pipe plug to plug the unused supply port. Apply SAE-standard, DOT-approved Teflon tape or paste-type thread sealant to all pipe threads beyond the first two threads. Pipes with pre-applied thread sealant may also be used.
3. Rotate and tighten the ECU/modulator 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.

Cross Member-Mounted

Refer to Figure 19. Refer to Figure 26 for port locations.

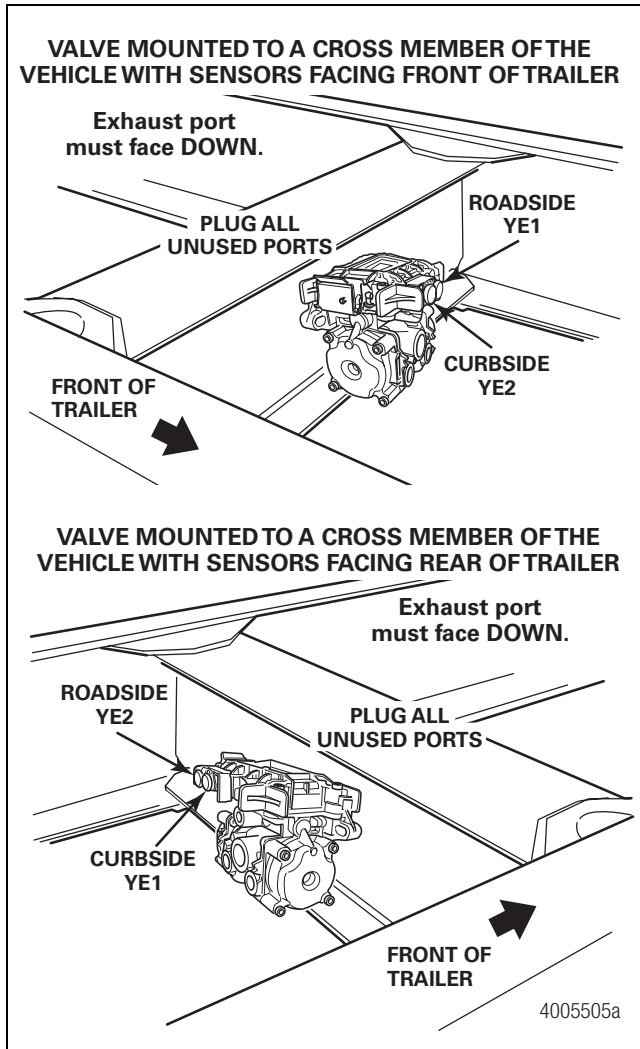


Figure 19

When mounting the ECU/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 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 Teflon tape or paste-type thread sealant to all pipe plugs beyond the first two threads. Pipes with pre-applied thread sealant may also be used.

2. Attach the assembly to the vehicle cross member midway between the side rails, close to the brake chambers served by the valves.

- Drill two 3/8-inch mounting holes. The distance between the two holes (O.D.) must be 6.06-inches (154 mm) and mount directly to the cross member.

OR

- Build a mounting bracket with two 3/8-inch mounting holes spaced 6.06-inches (154 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 18 lb-ft (24 N•m). 

Attach the Air Lines to the Replacement Assembly

NOTE: Refer to Figure 26 for port locations. Refer to page 13, Attach the Sensor Extension Cables to the ECU/Valve Assembly, for sensor mounting locations.

1. If bracket mounting, connect the air supply line from the supply tank to ECU/modulator valve assembly supply Port 1. Plug the unused port. Refer to Figure 26 for port locations.

If mounting directly to the supply tank, use 5/8-inch O.D. min. nylon tubing or heavy-walled Schedule 80 pipe nipple (3/4-inch NPTF).

2. Connect the air delivery lines to the ECU/modulator valve assembly Port 2 (3/8-inch NPTF).
3. Connect the air delivery lines to the appropriate brake chambers (3/8-inch NPTF). Figure 20 and Figure 21.

The valve portion of this assembly contains two separate valves; one dedicated to roadside wheel ends, the other dedicated to curbside wheel ends.

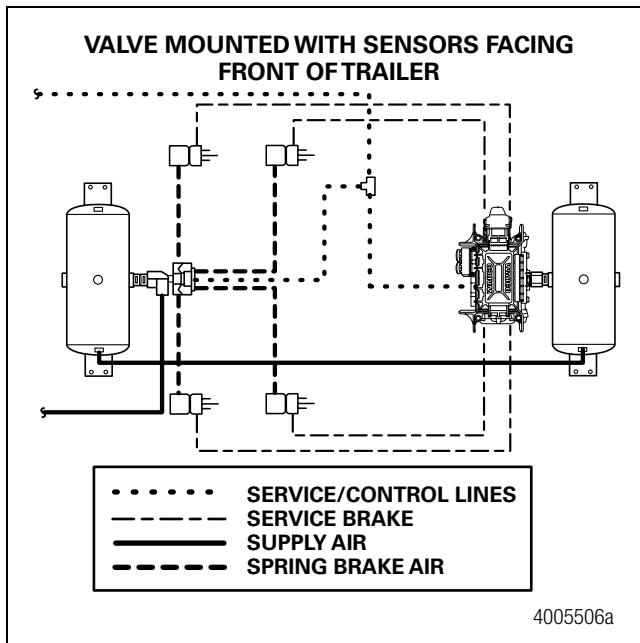


Figure 20

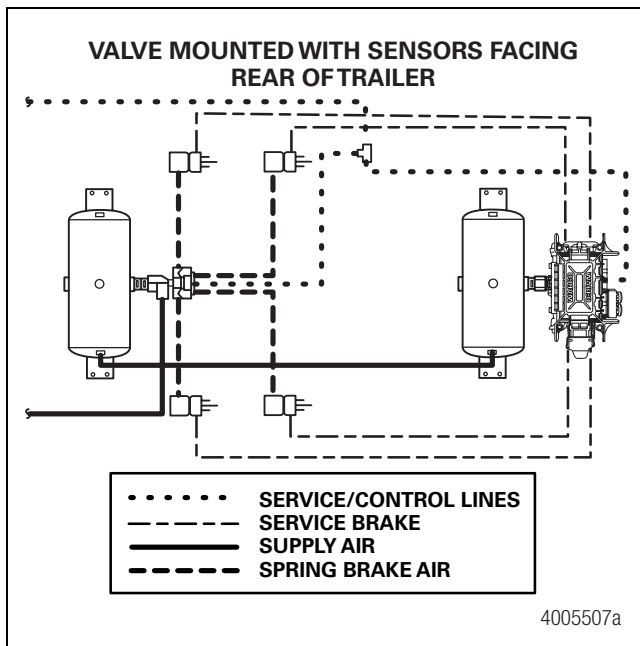


Figure 21

4. Connect the brake service (control) line to the ECU/modulator valve assembly Port 4 (1/4-inch NPTF).
5. Plug any unused delivery ports.

Install the Power and Lamp or Power and Lamp/Diagnostic Cable

1. Identify the type of cable to be installed. Figure 22.
 - ABS trailer industry-standard pigtail connector power cable
 - Blunt-cut power cable (not shown)

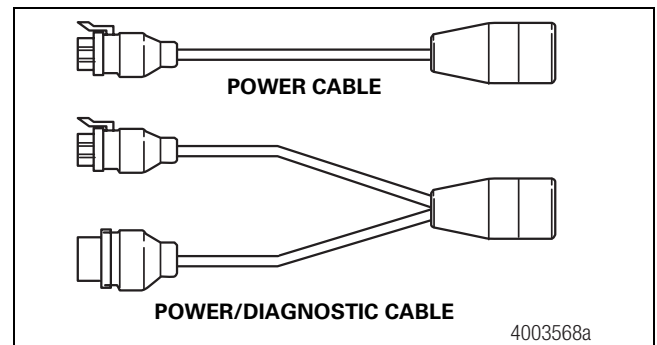


Figure 22

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

For a blunt-cut power cable, route the cable from the ECU/modulator valve assembly to the 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. Push the hinged power/diagnostic connector retainer clip UP and remove the protective cap from the ECU/modulator valve assembly. Figure 23.

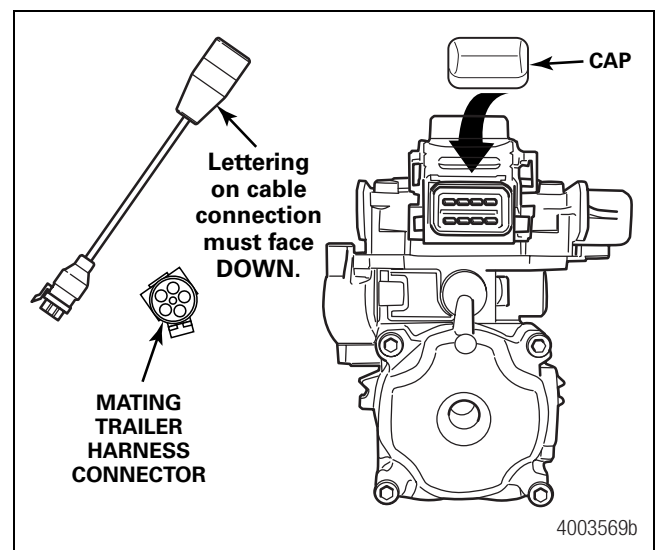


Figure 23

5. Plug the power 8-pin connector on the power or power/diagnostic cable into the ECU/modulator valve assembly. WABCO identification on the cable connection must face DOWN. Figure 23.
 6. Pull the hinged power/diagnostic connector retainer clip on the ECU/modulator valve assembly DOWN to secure the connection.
 7. If you are installing the power cable only, go to Step 9.
 8. If you are installing the power/diagnostic "Y" 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. Route the diagnostic cable from the ECU/modulator valve assembly to the diagnostic cable bracket.
 - C. 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.
 - D. Bundle any excess cable in a loop (bow tie) and secure the cable in the sub-frame. Figure 27.
 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 to the harness on the trailer. Figure 23.

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 24.

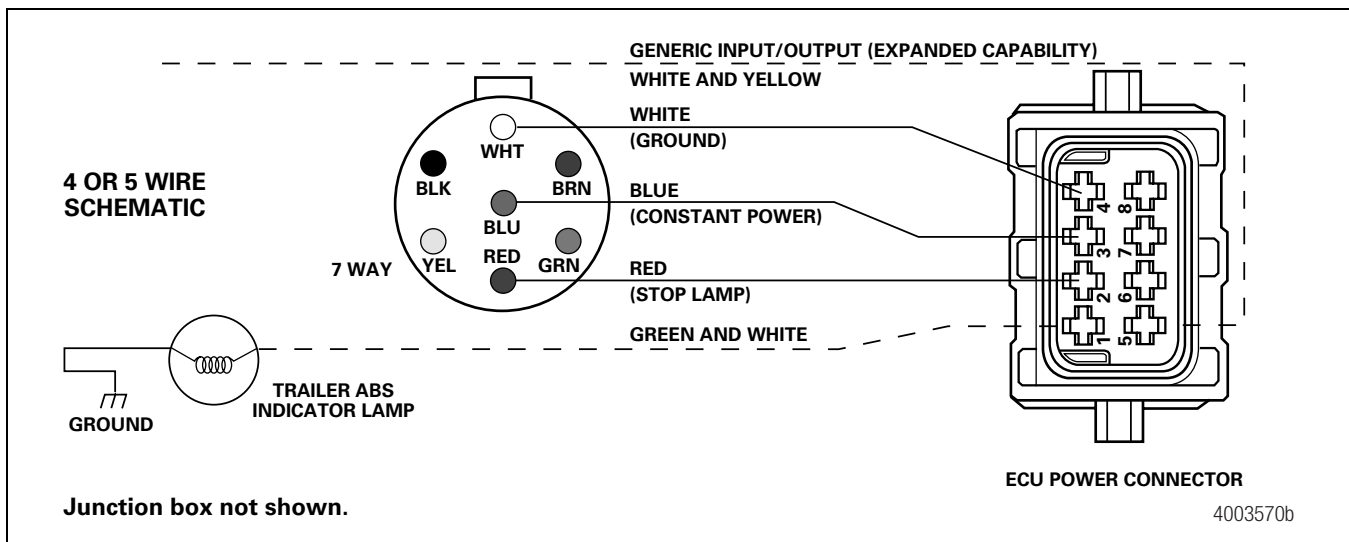


Figure 24

Attach the Sensor Extension Cables to the ECU/Valve Assembly

Meritor 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 sensors and cables on the ABS-prepped axles to the sensor extension cables. Figure 25.

Ensure that each connection is secure.

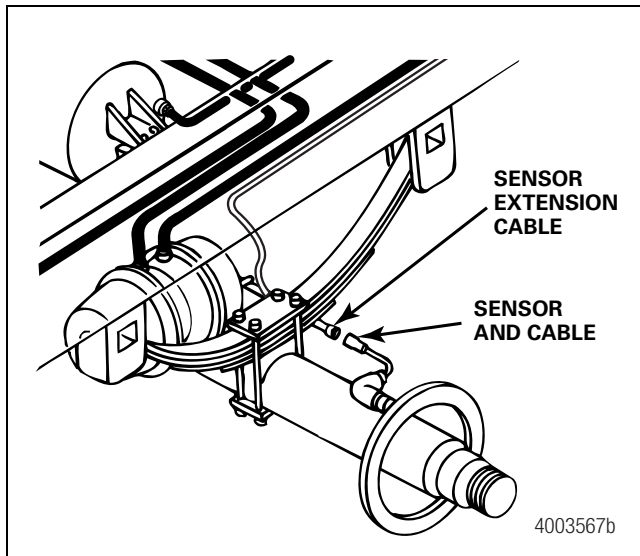


Figure 25

⚠ CAUTION

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/modulator valve assembly to allow for axle jounce and rebound.

3. Route the sensor cable along the back side of the trailer axle to the ECU/modulator valve assembly. Route the cable with the brake hose.
4. Secure the cables every eight inches (203 mm) with tie wraps or cable clips.
5. Push the sensor retainer clip on the ECU/modulator valve assembly UP.
6. Remove the protective caps from the YE2 and YE1 sensor connectors.

7. Plug the sensor extension cables into the sensor connectors on the ECU/modulator valve assembly. To secure the connection, push the sensor retainer clip DOWN. Retainer clips must fit in the groove of the sensor connectors to ensure correct connection.

- Forward Mounted (Sensors facing front of trailer)
 - Connect curbside sensor at YE2.
 - Connect roadside sensor at YE1.
- Rear Mounted (Sensors facing rear of trailer)
 - Connect curbside sensor at YE1.
 - Connect roadside sensor at YE2.

NOTE: Figure 26 illustrates a strain relief.

8. Create a strain relief to protect the sensor extension connector terminals. Without this strain relief, normal trailer jounce and vibration will cause the terminals to spread and loosen. Use a tie wrap or clip to secure the cable to the air hose as close to the fitting as possible. Figure 26.

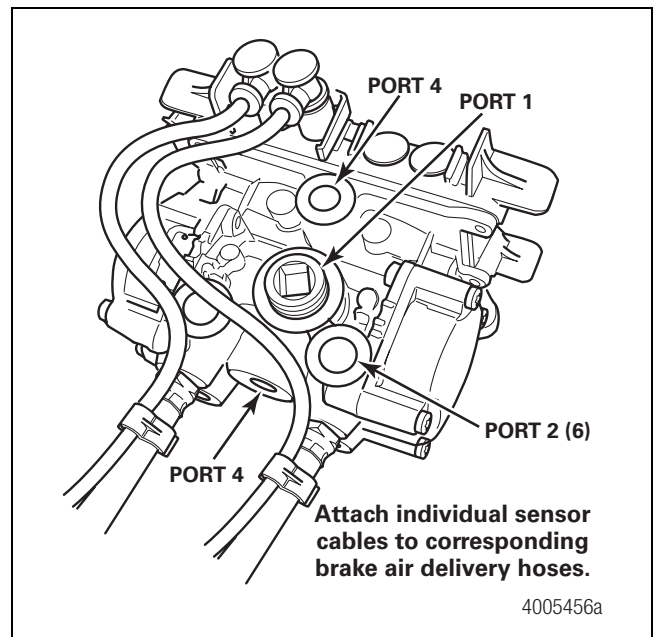


Figure 26

- Bundle any excess cable in a loop (bow tie). Figure 27.

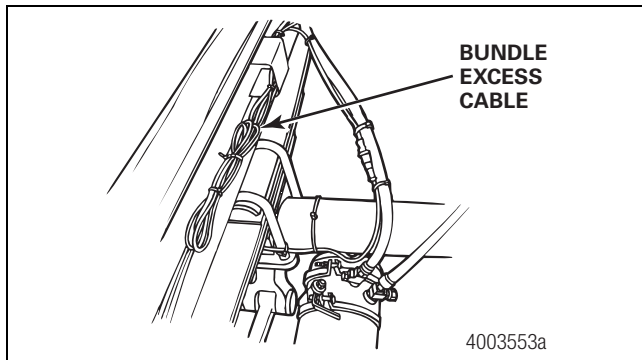


Figure 27

- 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.

Install the Wheel Speed Sensors on the Trailer Axles

- Apply the Meritor WABCO lubricant included in the replacement kit to the sensor spring clip, sensor and in the bore of the sensor mounting block. This is the bore where the spring clip and sensor will be installed.

NOTE: Use Meritor WABCO spring clips to ensure a correct fit.

- Push the spring clip into the sensor holder from the inboard side until the spring clip tabs are against the sensor holder.

NOTE: After installation, there should be no gap between the sensor and the tone ring. During normal operation, a gap of up to 0.04-inch (6.35 mm) is allowed.

- Push the sensor completely into the sensor spring clip until it contacts the tone ring. Figure 28.

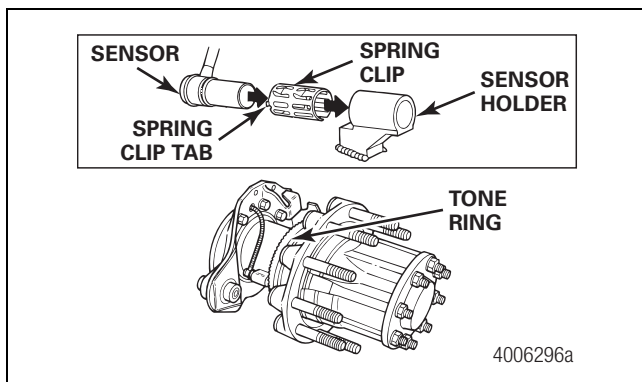


Figure 28

- Use a clean, soft rag to wipe any excess lubricant from the back and front of the sensor.

⚠ CAUTION

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.

- Route the sensor cable toward the brake chamber, either over the brake spider or through the pre-stamped hole dedicated to ABS sensors. Route to the back side of the axle. Use black tie wraps to 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 29.

Brake hose clips with a provision for the sensor extension cable are recommended. Do not use tie wraps. Meritor WABCO does not supply brake hose clips.

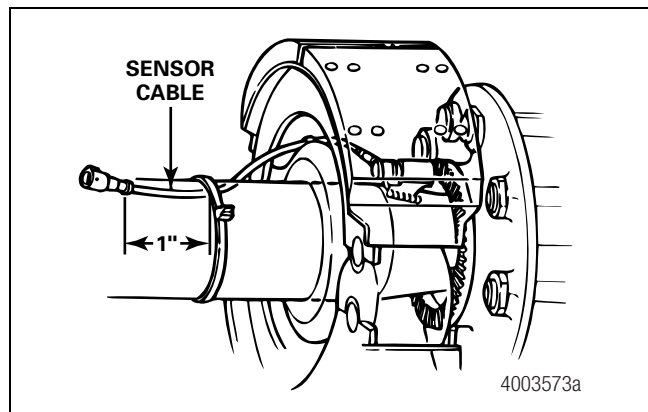


Figure 29

- 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.
- Install the fasteners that hold the sensor cable in place, supporting the cable every 8 to 12-inches (203-304 mm). Excess cable should be secured lengthwise in the frame rail. Do not coil excess cable.
- Install the brake drum on the wheel hub.
- 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.
- Adjust the trailer axle brakes per the trailer manufacturer's specifications.
- Remove the block and safety stands.

Enhanced Easy-Stop™ Blink Code Diagnostics

Meritor WABCO recommends using TOOLBOX™ Software version 7.0 or higher to troubleshoot Enhanced Easy-Stop™ Trailer ABS. If TOOLBOX™ Software is not available, you can use blink code diagnostics. The new ECU does not have an LED on top of the ECU, but blink codes are easily displayed on the ABS indicator lamp mounted on the side of the trailer. Refer to Maintenance Manual MM-0180, Enhanced Easy-Stop™ Trailer ABS, for more information about diagnostic procedures, including blink code diagnostics.

NOTE: A copy of technical publication TP-0173 is included in this replacement kit. This document details the Meritor WABCO blink codes and resolutions for these instances as well as service part number information for the ABS components.

Diagnostics can be located utilizing a combination power/diagnostic “Y” style cable, part number 449 364 153 0, that plugs directly into the ECU/modulator valve assembly. This cable allows for the use of TOOLBOX™ Software, blink codes, and other diagnostic options.

End of Line Testing

End of line testing is required on all Enhanced Easy-Stop™ installations. To run these tests, Meritor WABCO recommends you use TOOLBOX™ Software.

TOOLBOX™ Software and general test procedures are included in this bulletin. If you are using a Pro-Link, refer to the operating manual for test instructions.

Enhanced Easy-Stop™ 2S/2M Standard Installation — End of Line Testing Procedure with TOOLBOX™ Software

If you are testing an installation that has a power only cable, temporarily install a Meritor WABCO combination power/diagnostics “Y” style cable.

1. Connect the diagnostic connector on the cable to the PC serial port/SAE diagnostic interface (J1587/J1708 to RS232 interface).

Refer to the Software Owner’s Manual, TP-99102, for instructions for running TOOLBOX™ Software.

2. Display the **Trailer ABS Main Screen**.
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. Figure 30.

- Apply 12 volts DC to the red wire (stoplight power). Check the screen for the correct voltage (9.4 to 14 volts). Stoplight power voltage is displayed in the **Secondary** field. Figure 30.

The **Internal** field is not applicable to this test.

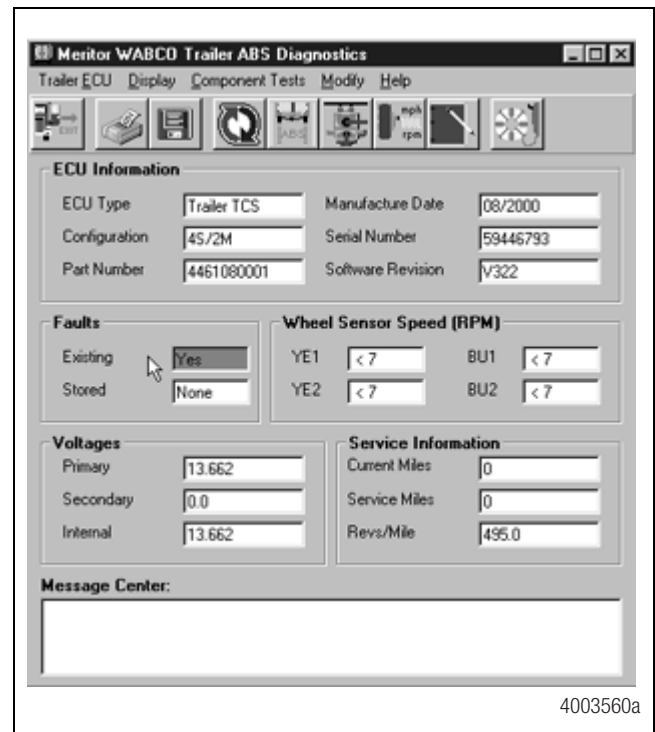


Figure 30

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. Figure 31.

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

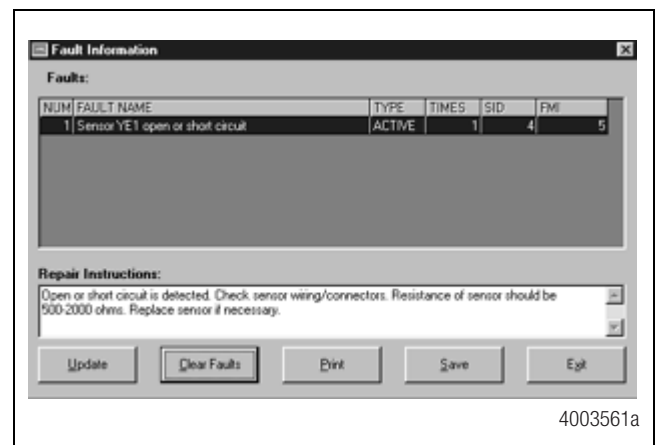


Figure 31

End of Line Test with TOOLBOX™ Software

Verify Correct Valve and Lamp Installation

To verify valve and lamp installations with TOOLBOX™ 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 **Yellow** valve indicator will be highlighted. Figure 32.

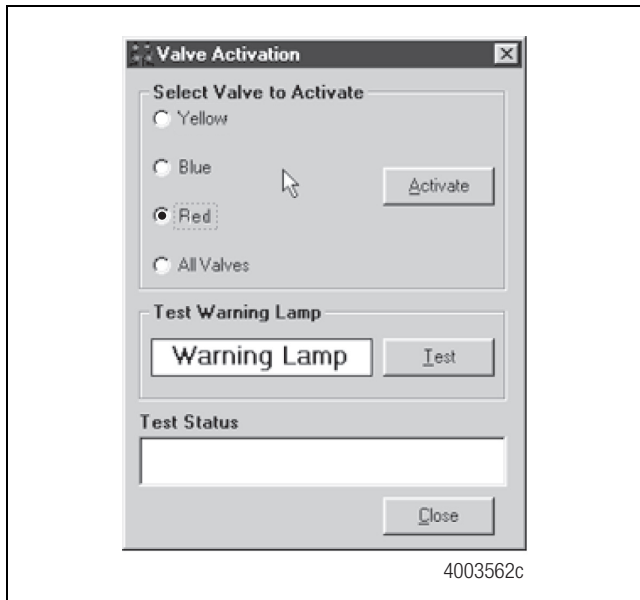


Figure 32

5. Click on the **Activate** button.
6. Check for correct air line installation. To accomplish this, observe the slack adjusters.
 - If the ECU faces the **FRONT** of the trailer, the slack adjusters will move in and out as the **CURBSIDE** portion of the modulator valve cycles. If this does not happen, the air lines are not correctly connected. Perform the necessary repairs.
 - If the ECU faces the **REAR** of the trailer, the slack adjusters will move in and out as the **ROADSIDE** portion of the 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 **Blue** valve.
 - A. Repeat Steps 1-3.
 - B. Select the **Blue** valve from the valve activation screen.
 - C. Click on the **Activate** button to verify correct valve installation (**Blue**).
 - D. Check for correct air line installation. To accomplish this, observe the slack adjusters.
 - If the ECU faces the **FRONT** of the trailer, the slack adjusters will move in and out as the **ROADSIDE** portion of the modulator valve cycles. If this does not happen, the air lines are not correctly connected. Perform the necessary repairs.
 - If the ECU faces the **REAR** of the trailer, the slack adjusters will move in and out as the **CURBSIDE** portion of the modulator valve cycles. If this does not happen, the air lines are not correctly connected. Perform the necessary repairs.
8. 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 eight times, indicating lamp installation is OK. The **Test Status** box at the bottom of the menu will display the status of this test. Figure 32.
9. Click on **Close** to exit.

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 ECU to see if the wheel end sensors face the front or rear of the trailer. TOOLBOX™ 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 33.

When the **Sensor Orientation Test** screen first appears, the **Sensors Facing** field will display the default — **Front**. This will occur regardless of the actual sensor orientation of the installation being tested.

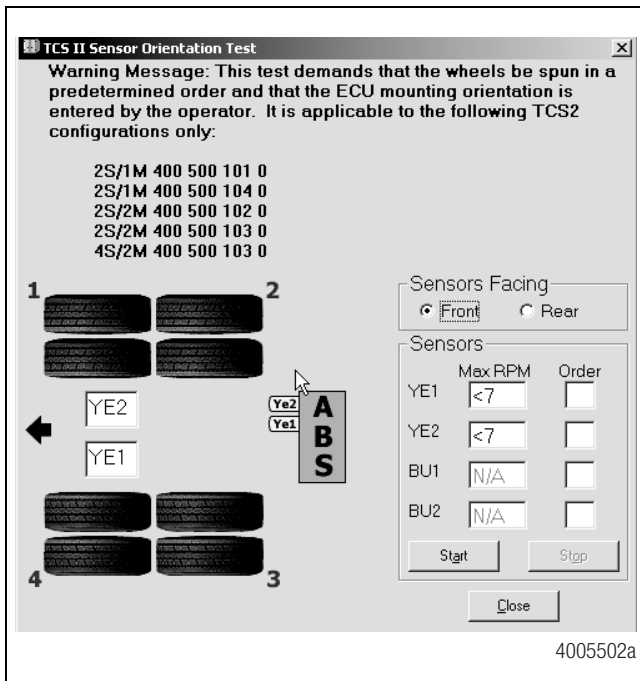


Figure 33

- Click on **Front** or **Rear** in the **Sensors Facing** field to select the mounting orientation of the ECU/modulator valve assembly. Refer to Figure 33 and Figure 34 for illustrations of the ECU mounted with sensors facing forward and rear. The correct mounting orientation must be selected prior to starting the test.

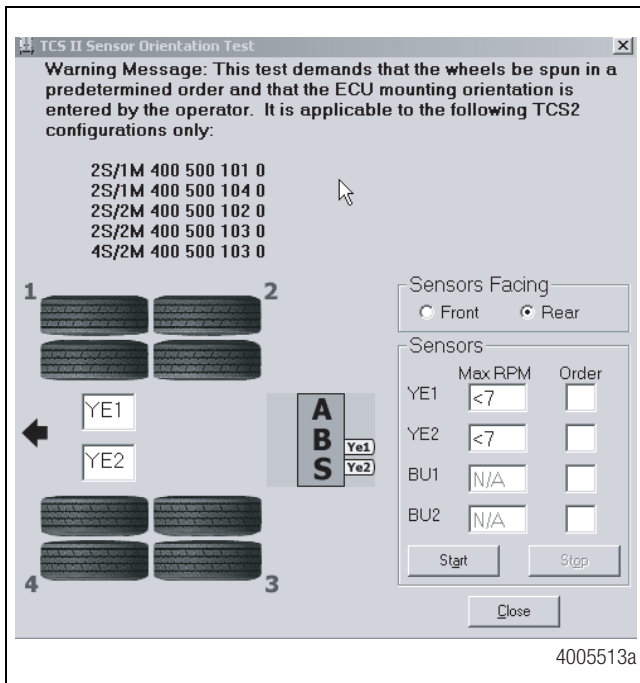


Figure 34

- Click on **Start** to begin the test. Figure 35.

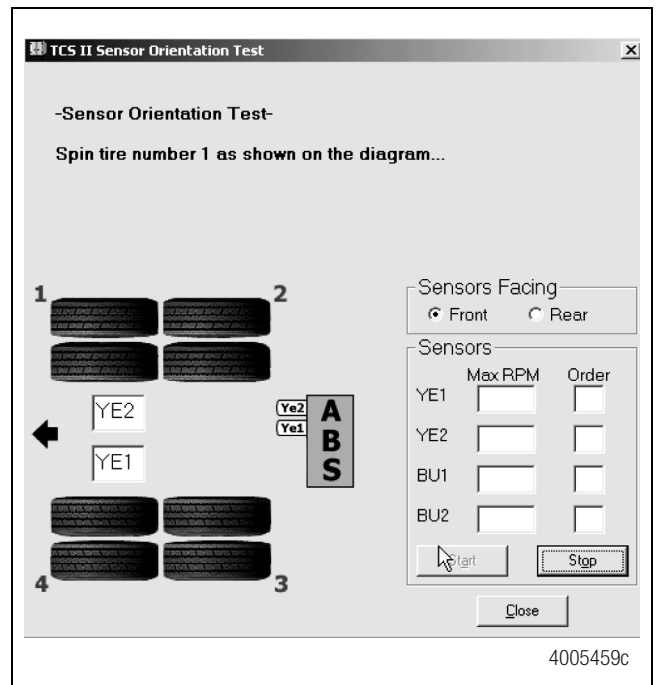


Figure 35

- 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 34.
 - Green background:** Correct sensor location. Spin the next sensed wheel as indicated by the screen prompt.
 - Red background:** Incorrect sensor location. Stop the test (click on **Stop**). Reinstall the sensors per the instructions given in Attach the Sensor Extension Cables to the ECU/Valve Assembly in this bulletin. Repeat Steps 3 through 6.
- To finish the Sensor Orientation Test, click on **Stop**, then on **Close**.
- 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. If the problem persists, contact Meritor WABCO (800-535-5560). Sensor output appears in the Sensors field located in the bottom right portion of the **Sensor Orientation Test** screen. Figure 33 and Figure 34.

End of Line Test without TOOLBOX™ Software

Inspect the Sensor and Air Line Installation.

Sensor Installation

1. Look at the YE2 and YE1 sensor connectors on the ECU/modulator valve assembly. Ensure that the connectors are routed to the correct wheel end location, as follows:
 - If the ECU/modulator valve assembly is mounted with the sensors facing the front of the trailer:
 - Sensor YE2 must be routed to the curbside wheel end location.
 - Sensor YE1 must be routed to the roadside wheel end location.
 - If the ECU/modulator valve assembly is mounted with the sensors facing the rear of the trailer:
 - Sensor YE2 must be routed to the roadside wheel end location.
 - Sensor YE1 must be routed to the curbside wheel end location.
2. If sensors are not correctly installed, perform the necessary repairs.

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/modulator valve assembly is mounted with the sensors facing the FRONT of the trailer, the air lines for the three delivery ports located under the YE2 sensor connector must be routed to CURBSIDE; the air lines for the three delivery ports on the opposite side of the valve must be routed to ROADSIDE. Figure 36.
 - If the ECU/modulator valve assembly is mounted with the sensors facing the REAR of the trailer, the air lines for the three delivery ports located under the YE2 sensor connector must be routed to ROADSIDE; the air lines for the three delivery ports on the opposite side of the valve must be routed to CURBSIDE. Figure 37.

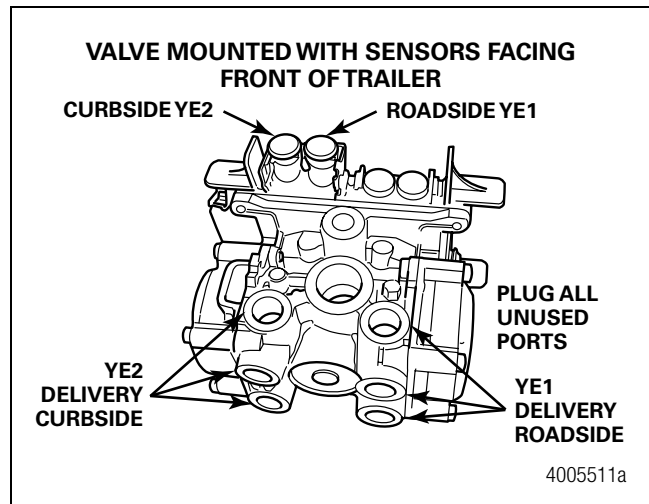


Figure 36

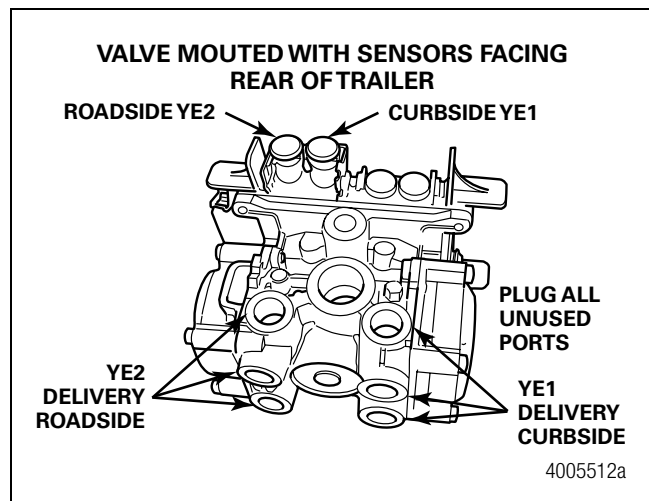


Figure 37

3. If the air lines are not correctly routed, perform the necessary repairs.

Perform End of Line Test

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

- A. Remove power from the ABS and raise the sensed wheels so they may be rotated.
- B. Apply emergency air to fill the air tanks and release the spring brakes so that the wheels may be rotated.
- C. Repeat Steps 1 and 2.
- D. 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 according to the Sensor Gap Adjustment procedures. If necessary, perform a fault code check.

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.

Fault Code Check

Use constant power activation to perform the following fault code check.

1. Apply constant power to the ECU/modulator valve assembly for more than one, but less than five seconds.
2. Remove the power.
3. Reapply the power.
4. Check the trailer ABS indicator lamp on the side of the trailer. The fault code will be displayed three times.

5. Find the fault on the chart and take the necessary actions.
6. After performing the repairs, repeat the end of line test.

NOTE: Refer to Maintenance Manual MM-0180, Enhanced Easy-Stop™ Trailer ABS with PLC, for repair instructions.

Blink Code Chart		
Blink Code	Problem Area	Action
4	Sensor YE1	Determine sensor location. Check sensor installation. Perform necessary repairs.
6	Sensor YE2	Determine sensor location. Check sensor installation. Perform necessary repairs.
9	Internal modulator failure, inlet valve #2	Verify correct installation. If code continues, contact Meritor WABCO for assistance.
10	Internal modulator failure, inlet valve #1	Verify correct installation. If code continues, contact Meritor WABCO for assistance.
11	Internal modulator failure, outlet valve	Verify correct installation. If code continues, contact Meritor WABCO for assistance.
14	Power Supply	Verify correct electrical installation. Check power supply. Perform necessary repairs.
15	ECU Failure	Verify correct installation. If code continues, contact Meritor WABCO for assistance.
16	SAE J1708 Failure	Internal failure, contact Meritor WABCO.
17	SAE J2497 Failure	Internal failure, contact Meritor WABCO.
18	Generic I/O Failure	Verify correct electrical installation. Check power supply. Perform necessary repairs.

Trailer Identification (Required by Federal Motor Vehicle Safety Standard 121)

NOTE: The trailer indicator label must be attached to the vehicle.

After ensuring the Enhanced Easy-Stop™ trailer ABS has been correctly installed, attach the ABS indicator label included with the ECU/modulator valve assembly to the trailer. Generally, this will be applied near the ABS trailer indicator lamp. Figure 38. Refer to the vehicle specification sheet for the correct location.

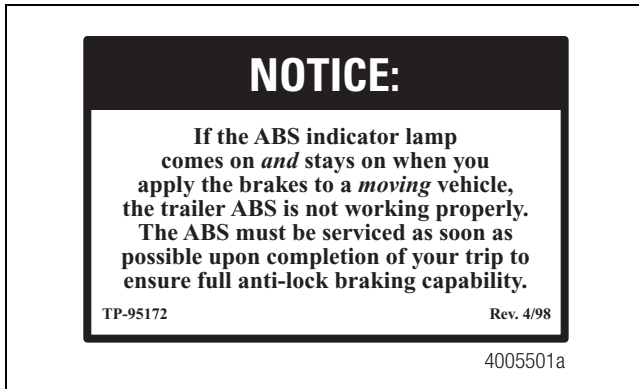


Figure 38

If this label is not included with the assembly, let your supervisor know. Labels are available from Meritor WABCO. Ask for part number TP-95172.

For additional assistance, contact Meritor WABCO at 800-535-5560.

Special Tools

Sensor Mounting Block Fixture	Part Number	Supplier
Meritor TP/WP	S100 100 101 0	Meritor

Press Plug Drive Adaptors	Part Number	Supplier
Meritor WP	51011-07	Meritor
Drive Handle	51011-10	Meritor

Spindle Bore Polishers	Part Number	Supplier
Meritor TP/TB/WP	3T534	Grainger

Specialty Tools and Supplies	Part Number	Supplier
Slide Hammer Kit	81044-00	Meritor
Spindle End Plug Removal Spear	81044-01	Meritor
Bore Polishing Mandrel	3T564	Grainger
Sensor Tester	J-42883	SPX

Cleaning Wand

Refer to Figure 39 to make a cleaning wand.

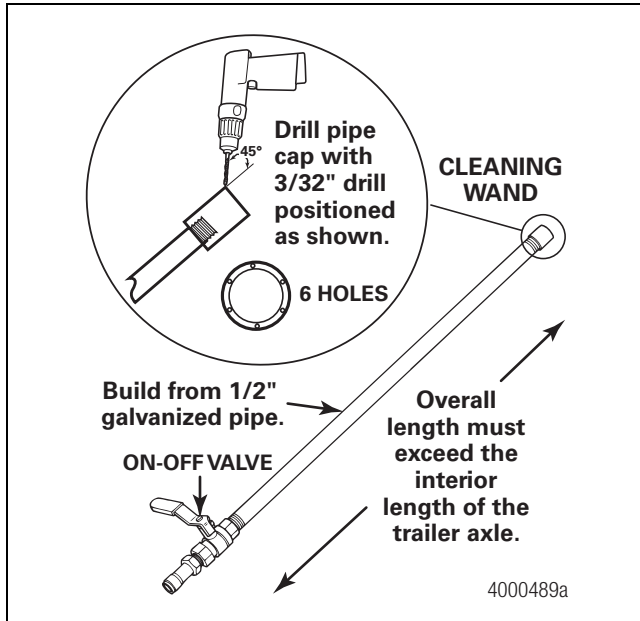


Figure 39

MERITOR WABCO

Meritor WABCO Vehicle Control Systems
2135 West Maple Road
Troy, MI 48084-7121
800-535-5560
meritorwabco.com

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