

INSTALLING AND CONFIGURING THE WABCO TRAILER iABS WITH AXLE LOAD MONITORING OPTION

TECHNICAL BULLETIN



TP18055

WABCO

Table of Contents

| | | |
|----------|---|-----------|
| 1 | General Information | 4 |
| 2 | Safety Information | 6 |
| 3 | Important Information | 6 |
| 4 | Introduction | 6 |
| 5 | Installation | 7 |
| 5.1 | Installation of the Axle Load Monitoring System | 7 |
| 5.2 | Activating the Axle Load Monitoring System with TOOLBOX PLUS™ Software | 10 |
| 5.3 | Displaying Trailer Bogie Load and Bellow Pressure with TOOLBOX PLUS™ Software | 18 |
| 6 | Appendix I | 19 |
| 6.1 | Installing Sensors on Non-ABS-Prepped Axles | 19 |
| 7 | Appendix II | 20 |
| 7.1 | Cable Strain Relief Guidelines | 20 |
| 8 | Appendix III | 23 |
| 8.1 | Vehicle Electrical Grounding Guidelines | 23 |
| 8.2 | Excess Cable Length | 23 |
| 9 | Appendix IV | 24 |
| 9.1 | Variant and Part Lists | 24 |

1 General Information

Symbols used in this document

DANGER

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

WARNING

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

CAUTION

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

NOTICE

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



Important information, notes and/or tips



Reference to information on the internet

1. Action step

- Action step
- ⇒ Consequence of an action

■ List

- List

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

General Information

How to Obtain Additional Maintenance, Service and Product Information

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

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

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

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

WABCO TOOLBOX PLUS™ Software

The TOOLBOX PLUS™ Software provides PC diagnostic for WABCO products and can be purchased and downloaded from www.wabco-na.com. Also the Software Owners Manual OM1618 can be found on the WABCO web page.

WABCO Academy



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

WABCO Online product catalog



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

Your direct contact to WABCO

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2 Safety Information

Provisions for a safe work environment

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

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

WARNING

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

WARNING

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

3 Important Information

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

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

4 Introduction

The WABCO axle load monitoring system, designed specifically for trailers with air suspensions, maximizes trailer load capacity while helping to avoid overloading which can result in fines.

The axle load monitoring system uses a pressure sensor (Figure 1) to record the main bellow pressure. This bellow pressure value is then converted into a corresponding trailer bogie load value by the ECU which can be displayed in TOOLBOX PLUS™ Software. In addition, WABCO axle load monitoring system is compatible with several other telematics systems (via CAN and/or PLC communication). This allows user to also access individual trailer axle load information via telematics through CAN.

Fig. 1



5 Installation

5.1 Installation of the Axle Load Monitoring System

For correct installation, refer to Figure 2 for 2S/1M premium ECUs and Figure 3 for 4S/2M premium ECUs.

WARNING

Drain the brake and suspension systems of air before starting this procedure. Otherwise it may result in serious personal injury or damage to product.

1. Connect power cable, part number 449 306 047 0, to the power supply port on the ECU. Make sure the power cable is fully seated, then secure it with a yellow locking tab.
2. Install the pressure sensor, part number 441 044 106 0, onto the air line on the main bellow.
3. Connect the pressure sensor cable, part number 449 826 XXX X, to the GIO 2 port on the iABS unit.
4. Tighten the pressure sensor to 27 ± 1.47 lb-ft (37 ± 2 Nm). Make sure the pressure sensor is not under or overtightened which can result in air leakage. The air leakage would impact the accuracy of the system or it may damage the pressure sensor as well.

Fig. 2

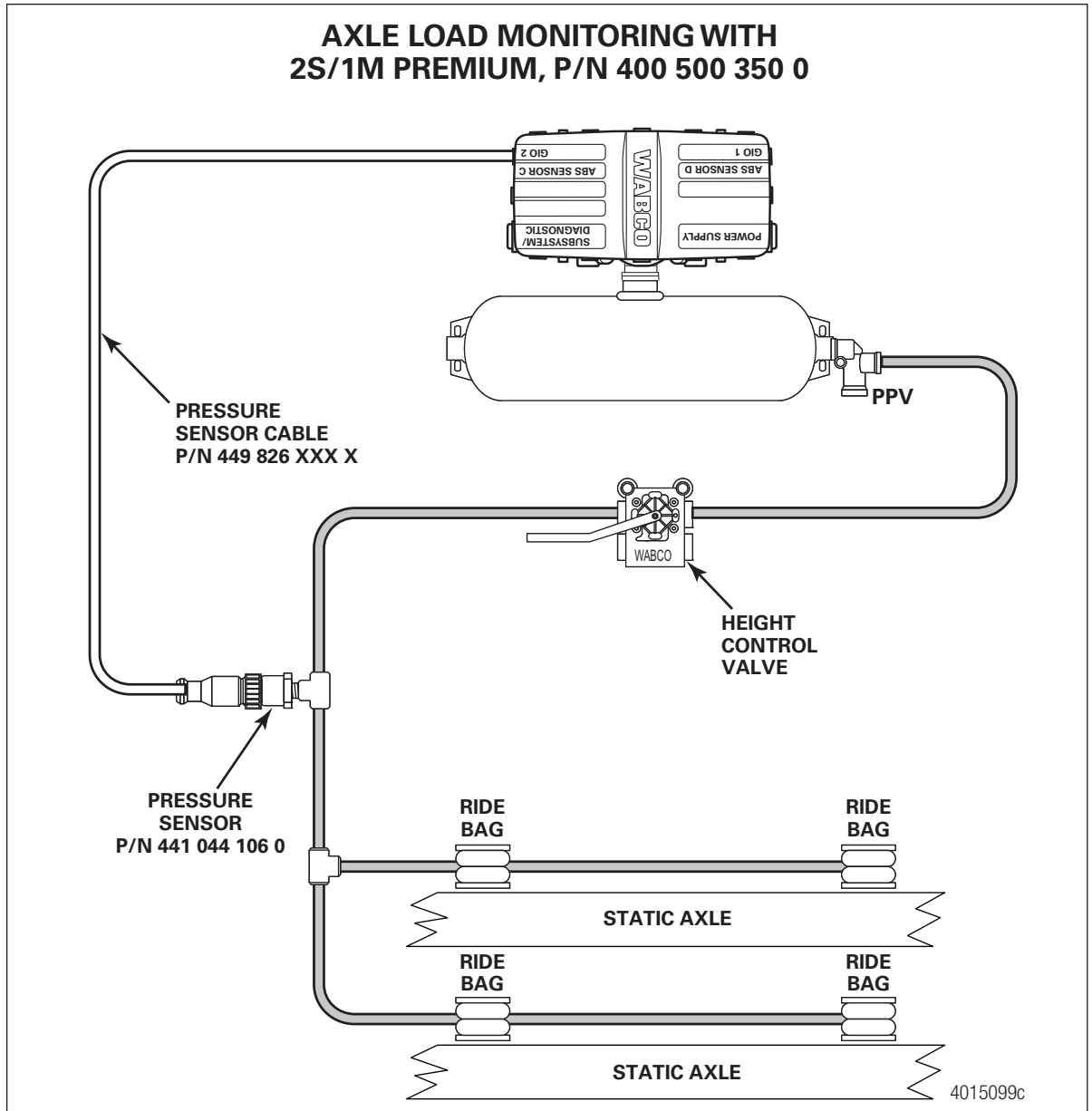
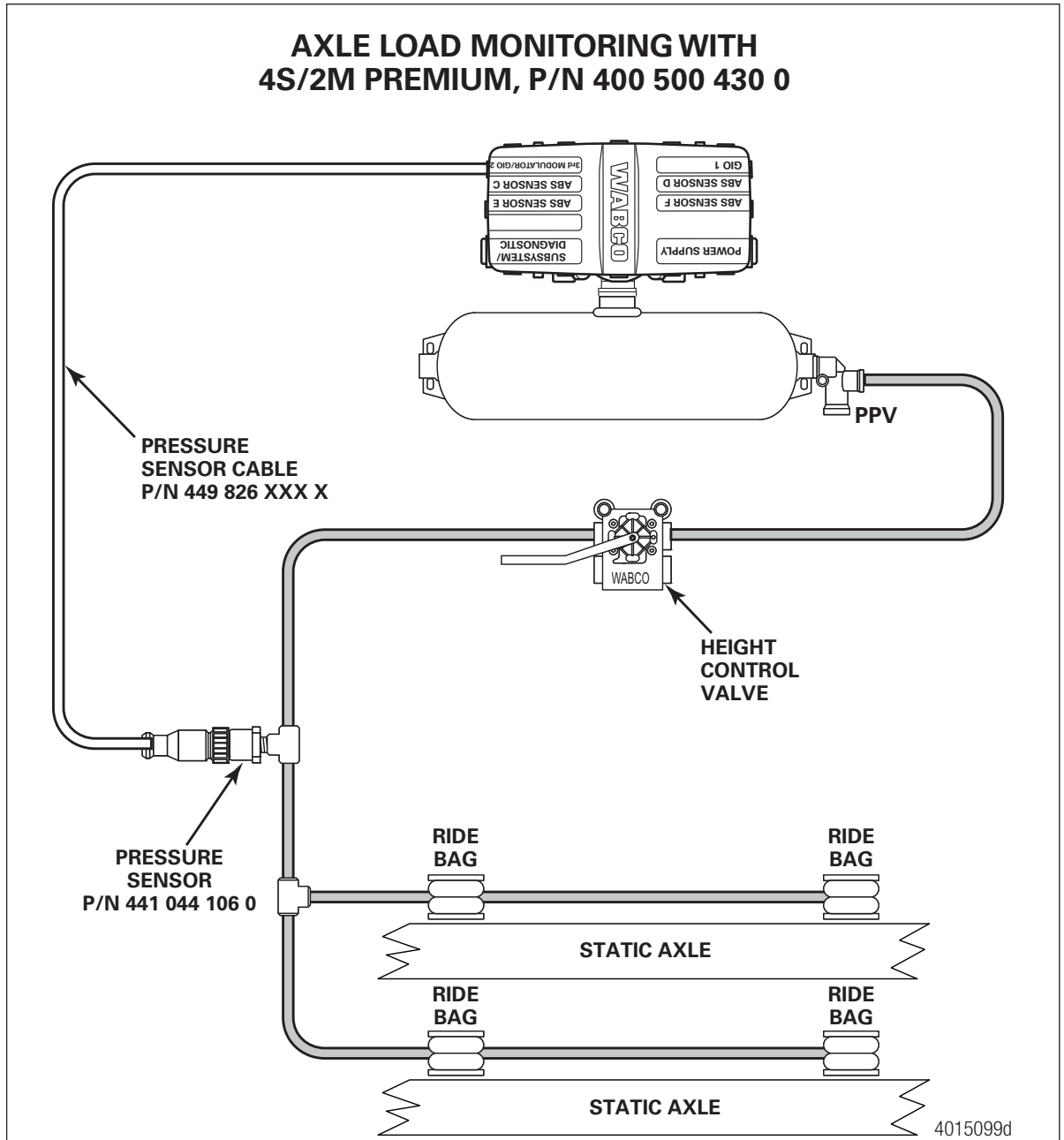


Fig. 3



5.2 Activating the Axle Load Monitoring System with TOOLBOX PLUS™ Software

There are two ways of activating and calibrating the axle load: Standard Calibration and Advanced Calibration.

In standard calibration, the system calculates the axle load using values entered by the customer for pressure and trailer bogie load.

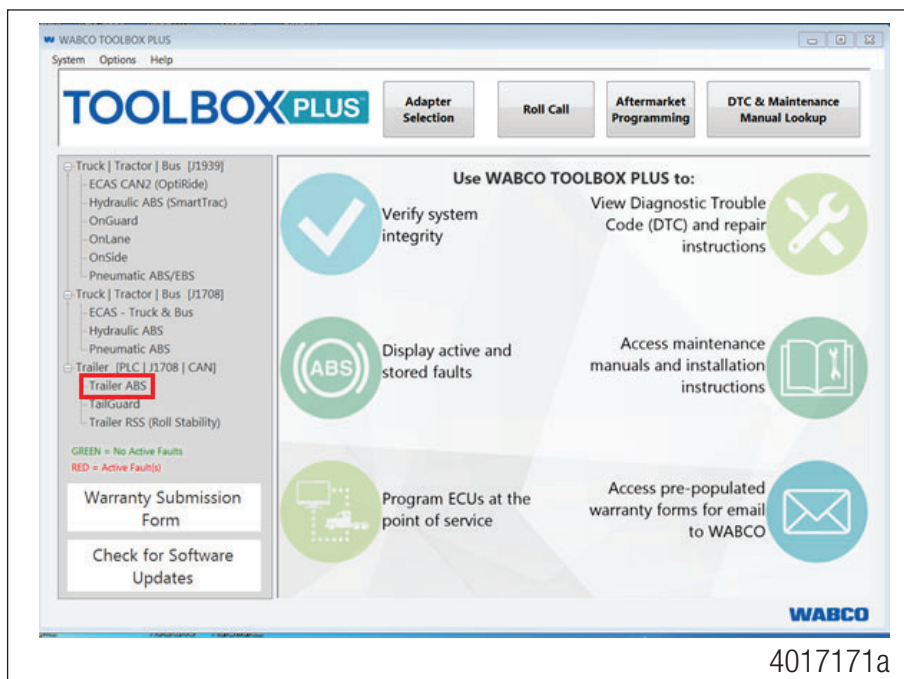
i The values for pressure and axle load per axle (trailer bogie load) are obtained from the Pressure-Load scale provided by the suspension manufacturer, not WABCO. Please contact suspension manufacturer before installation.

In advanced calibration, in addition to the values for pressure and trailer bogie load, the customer has the ability to calibrate the system by entering the load values at three points which are unladen, partially laden and laden. The three points represent different states of trailer as empty, partially loaded and fully loaded trailer respectively. This calibration is recommended, but not mandatory.

5.2.1 Standard Calibration

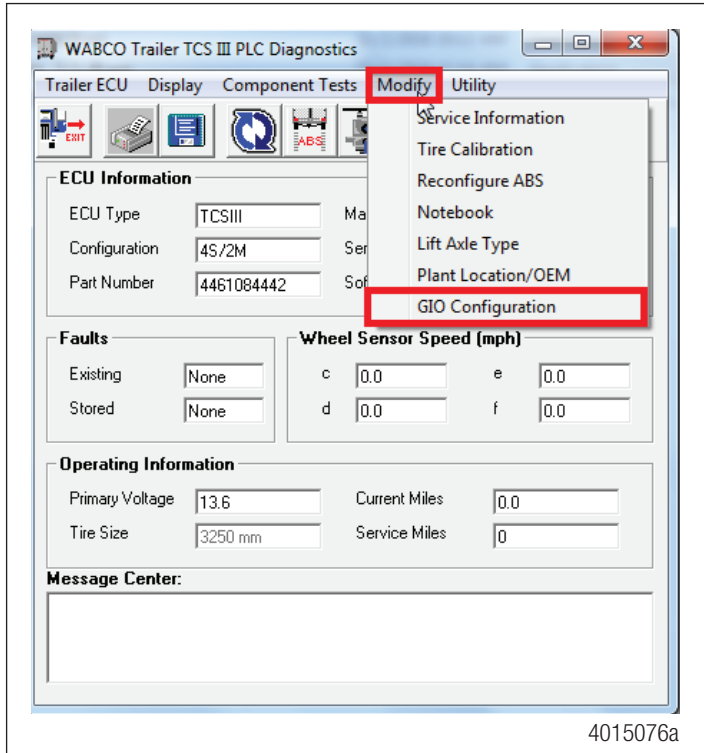
1. Open the iABS diagnostics from the TOOLBOX PLUS™ main screen by selecting the Trailer ABS diagnostic section. Figure 4.

Fig. 4



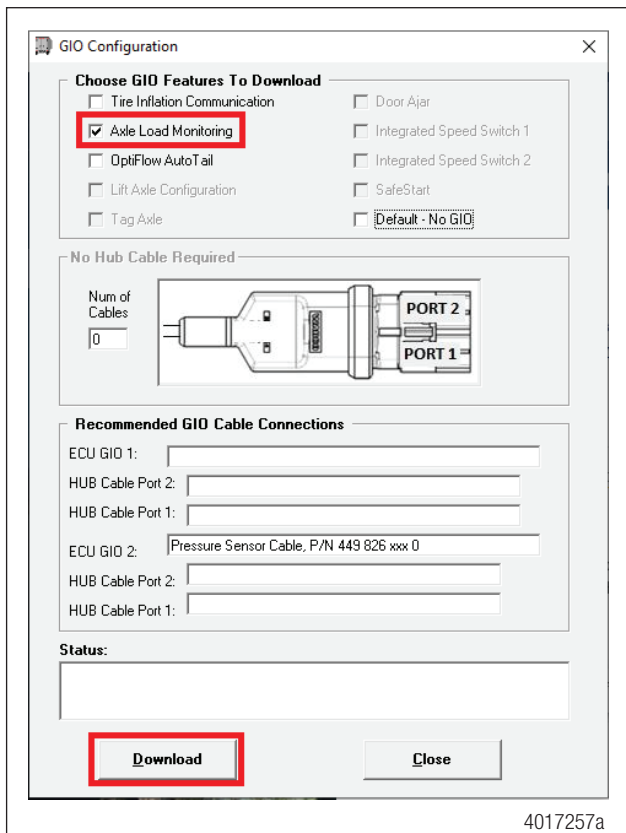
2. From the top menu bar, go to the Modify pull-down menu and select "GIO Configuration". Figure 5.

Fig. 5

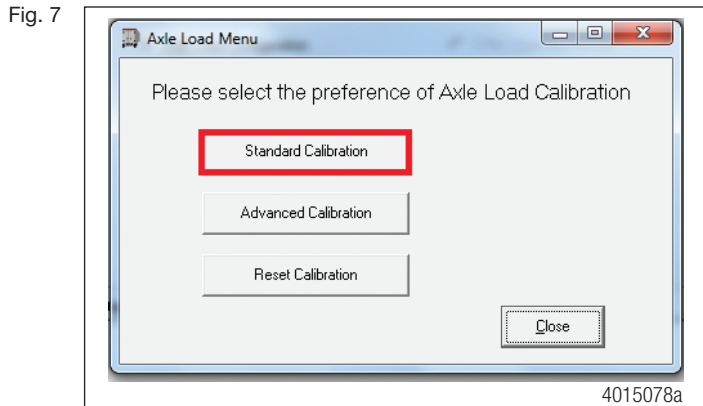


3. When the GIO Configuration screen is displayed, click "Axle Load Monitoring". Press the "Download" button at the bottom of the screen. Figure 6.

Fig. 6



- When prompted, select the "Standard Calibration" option. Figure 7.



- In the Standard Calibration screen, enter the number of trailer axles in the "Number of Axles on Trailer" field. The maximum permitted value for the number of axles is 6.
- Enter the bellow pressure (in PSI) and trailer bogie load (in LBS) for both the unladen and laden conditions. The acceptable range for bellow pressure is 1-150 PSI. The acceptable range for bogie load is 1-60000 LBS. When finished, click "Save". Figure 8.



The values for pressure and axle load per axle (trailer bogie load) are obtained from the Pressure-Load scale provided by the suspension manufacturer, not WABCO. Please contact suspension manufacturer before installation.

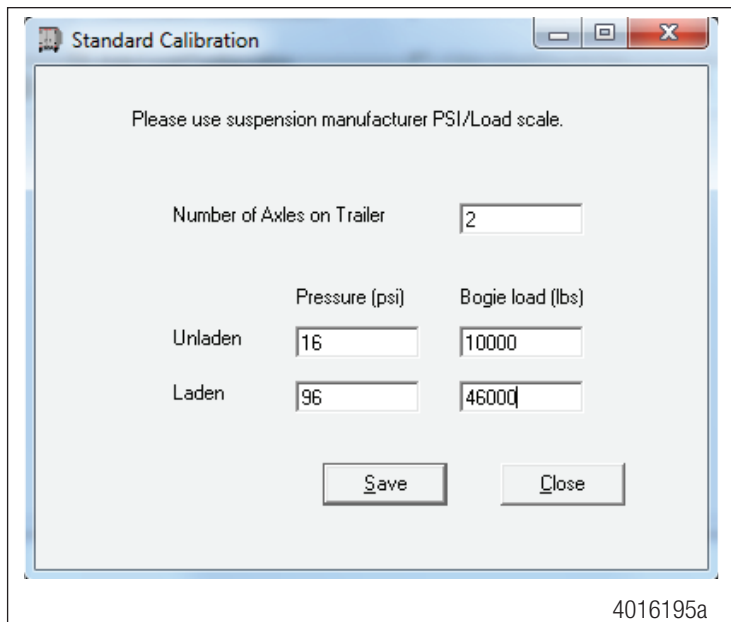
However, for better accuracy, WABCO recommends using an external pressure gauge to obtain the bellow pressure and a weigh scale to obtain the corresponding trailer bogie load.



The trailer axle load values provided by the suspension manufacturer for its corresponding pressures are per axle. To get the accurate results, make sure to enter the total trailer bogie load (load per axle x number of axles) in the "Bogie Load" field for the unladen and laden condition.

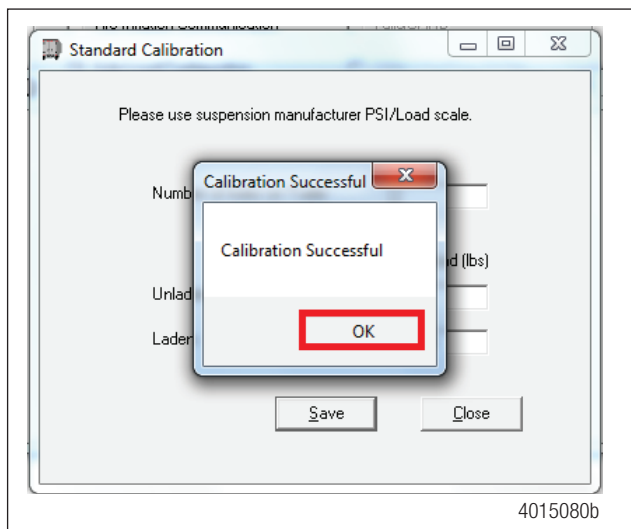
In Figure 8, for the unladen pressure of 16 psi, the suspension manufacturer provided an axle load of 5000 lbs per axle. As the number of axles is 2, the trailer bogie load will be 10000 lbs.

Fig. 8



8. The "Calibration Successful" message will be displayed to confirm correct calibration of the system. Click "OK" to exit. Figure 9.

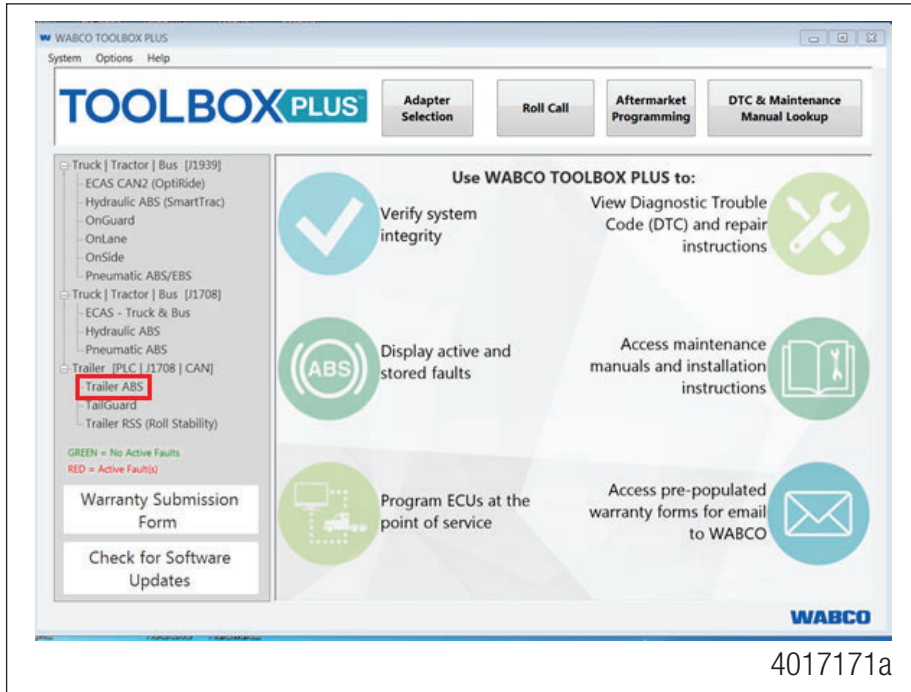
Fig. 9



5.2.2 Advanced Calibration

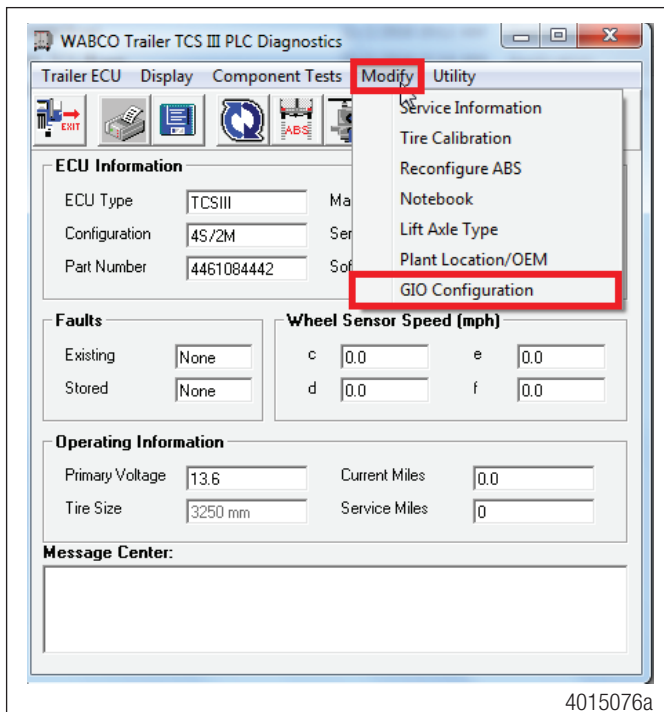
1. Open the iABS diagnostics from the TOOLBOX PLUS™ main screen by selecting the Trailer ABS diagnostic section. Figure 10.

Fig. 10



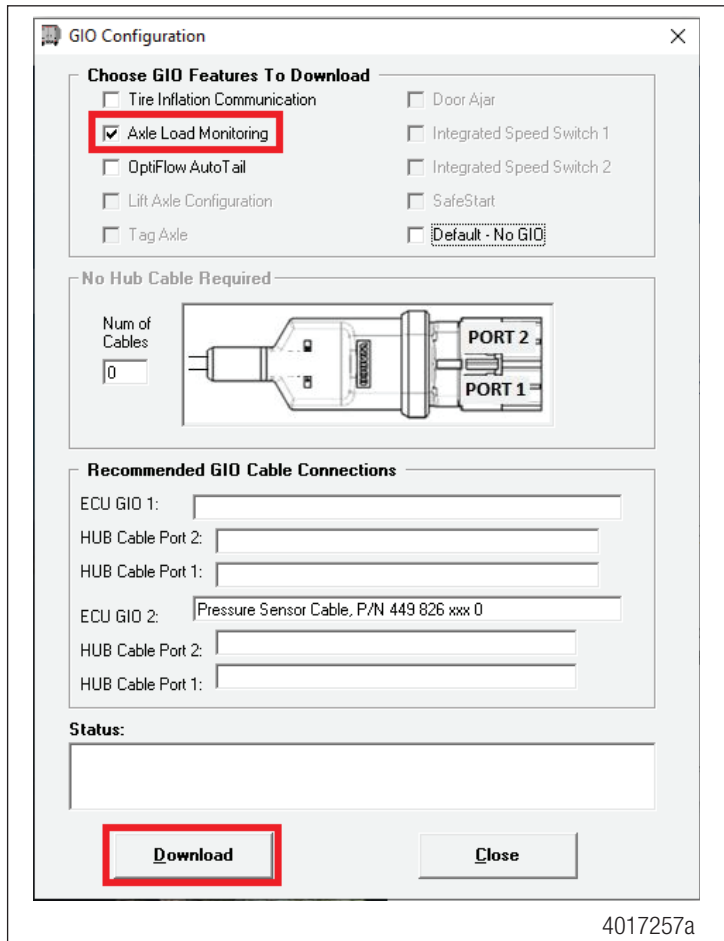
2. From the top menu bar, go to the Modify pull-down menu and select "GIO Configuration". Figure 11.

Fig. 11



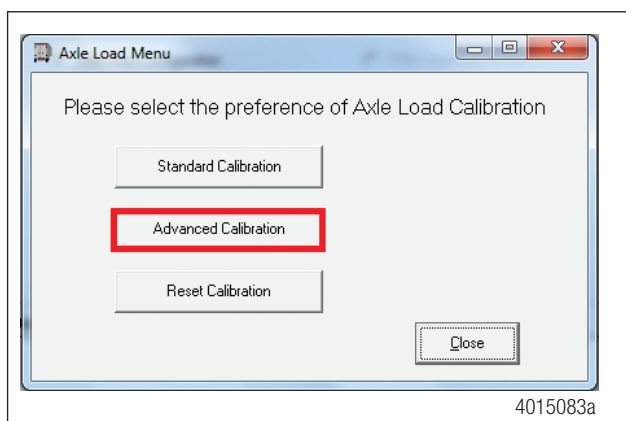
3. When the GIO Configuration screen is displayed, click "Axle Load Monitoring". Press the "Download" button at the bottom of the screen. Figure 12.

Fig. 12



4. When prompted, select the "Advanced Calibration" option. Figure 13.

Fig. 13



5. In the Advanced calibration screen, enter the number of trailer axles in the "Number of Axles on Trailer" field. The maximum permitted value for the number of axles is 6.

6. Enter the bellow pressure (in PSI) and trailer bogie load (in LBS) for both the unladen and laden conditions. The acceptable range for bellow pressure is 1-150 PSI. The acceptable range for bogie load is 1-60000 LBS. When finished, click "Save". Figure 14.



The values for pressure and axle load per axle (trailer bogie load) are obtained from the Pressure-Load scale provided by the suspension manufacturer, not WABCO. Please contact suspension manufacturer before installation.

However, for better accuracy, WABCO recommends using an external pressure gauge to obtain the bellow pressure and a weigh scale to obtain the corresponding trailer bogie load.



The trailer axle load values provided by the suspension manufacturer for its corresponding pressures are per axle. To get the accurate results, make sure to enter the total trailer bogie load (load per axle x number of axles) in the "Bogie Load" field for the unladen and laden condition.

In Figure 14, for the unladen pressure of 16 psi, the suspension manufacturer provided an axle load of 5000 lbs per axle. As the number of axles is 2, the trailer bogie load will be 10000 lbs.

Fig. 14

| | Pressure (psi) | Bogie load (lbs) |
|----------------------------|----------------|------------------|
| Number of Axles on Trailer | 2 | |
| Unladen | 16 | 10000 |
| Laden | 96 | 46000 |

7. From the pull-down menu, select the "State of Trailer" (Unladen, Partially Laden or Laden) for which you are calibrating the system and enter the corresponding trailer bogie load from the weigh scale. When finished, click "Save".

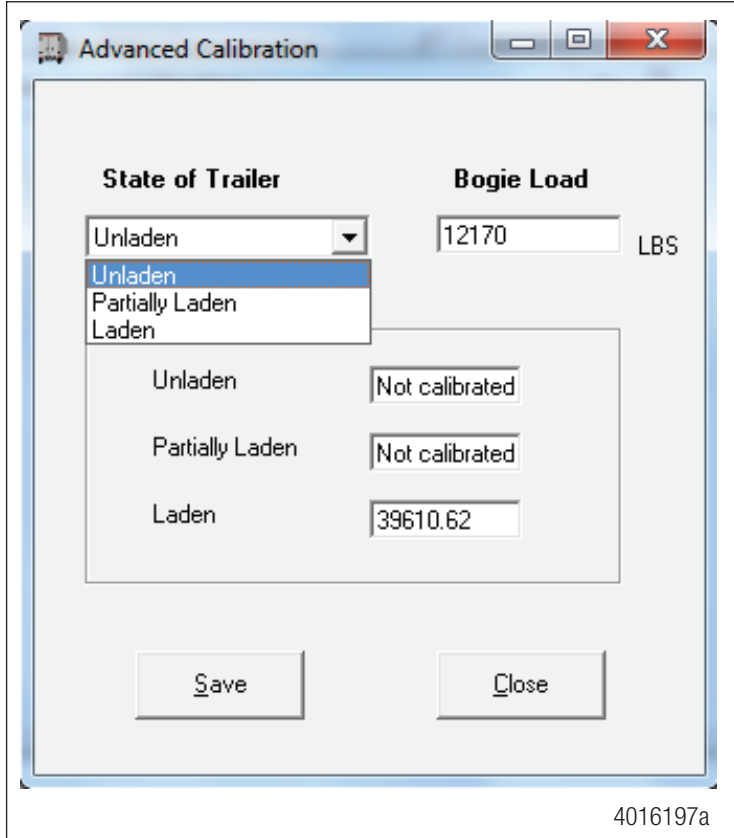


While entering the calibration value for any state of trailer, the trailer must be in that particular state. It is very important to calibrate the system at the correct state of trailer in order to complete the calibration successfully.

You can calibrate the system at either any one state of the trailer or at all three states. The accuracy will increase as the number of calibration states are increased.

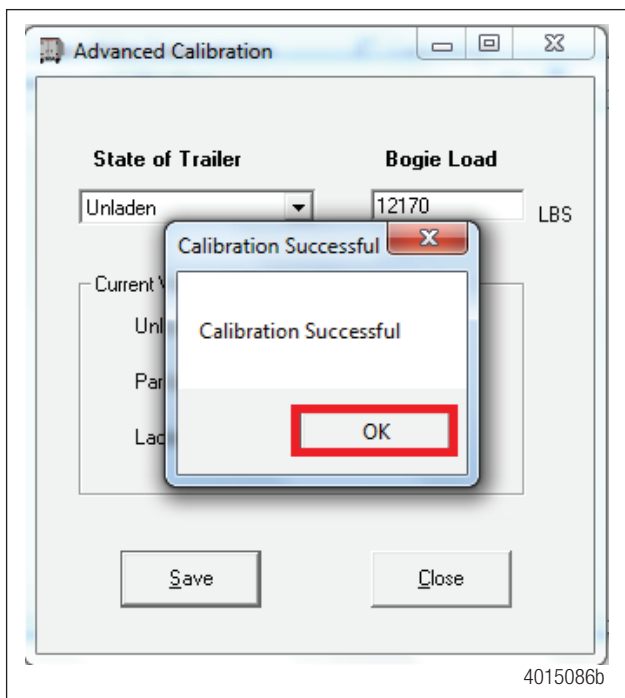
Figure 15 shows calibration of the system in an unladen state with a trailer bogie load of 12170 pounds from the weigh scale.

Fig. 15



8. The "Calibration Successful" message will be displayed to confirm correct calibration of the system. Click "OK" to exit. Figure 16.

Fig. 16

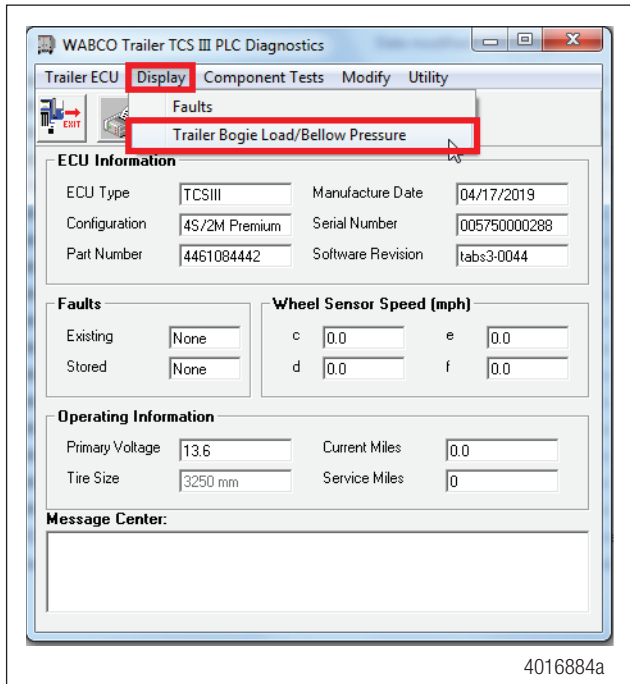


5.3 Displaying Trailer Bogie Load and Bellow Pressure with TOOLBOX PLUS™ Software

Once the axle load configuration is enabled, Trailer Bogie Load and Bellow Pressure information can be accessed through the Display tab in TOOLBOX PLUS™ software.

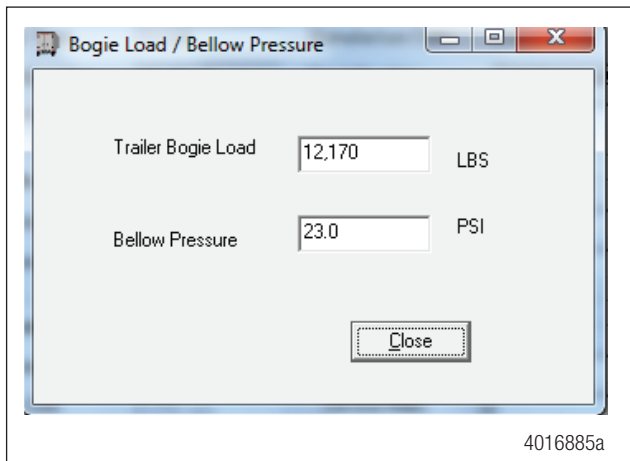
From the top menu bar, go to the "Display" pull-down menu (Figure 17) and select "Trailer Bogie Load/Bellow Pressure" (Figure 18).

Fig. 17



4016884a

Fig. 18



4016885a

i The accuracy of Trailer Bogie Load and Bellow Pressure values displayed by TOOLBOX PLUS™ software is solely dependent upon the values entered by the customer during calibration of the system. If the wrong values are entered then there is a risk of inaccurate results being displayed by the system.

6 Appendix I

6.1 Installing Sensors on Non-ABS-Prepped Axles

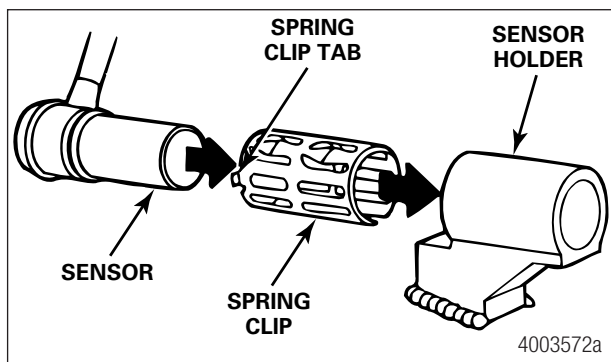
Sensor locations vary due to suspension type. WABCO recommends placing the sensors on the axle that will provide the most braking performance. The trailer manufacturer, suspension manufacturer, along with WABCO, work together to determine this information. Contact the necessary party for further information.

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

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

- Mobilith SHC-220 (Mobil)
 - TEK 662 (Roy Dean Products)
 - Staburags NBU 30 PTM (Kluber Lubrication)
 - Valvoline EP 633
2. Push the spring clip into the sensor holder from the inboard side, until the spring clip tabs are against the sensor holder. Push the sensor into the spring clip as far as possible. Use WABCO spring clips to ensure a correct fit.
 3. Push the spring clip into the sensor holder from the inboard side until the spring clip tabs are against the sensor holder. Push the sensor into the spring clip as far as possible. Figure 19.

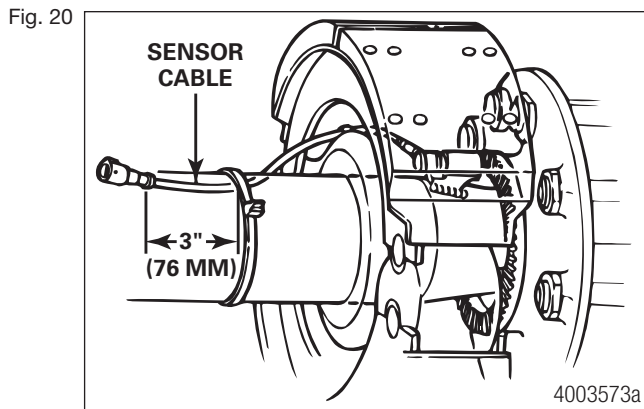
Fig. 19



4. Route the sensor cable toward the brake chamber, over the brake spider or through the prestamped hole dedicated for ABS sensors. Route to the back side of the axle. Secure the cable to the axle between the brake spider and the suspension brackets. Continue to route the sensor cable behind the spring seats. Secure the cable to the axle one inch from the molded sensor plug. Figure 20.

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

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



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

7 Appendix II

7.1 Cable Strain Relief Guidelines

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

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

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

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

7.1.1 Excess Cable Length

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

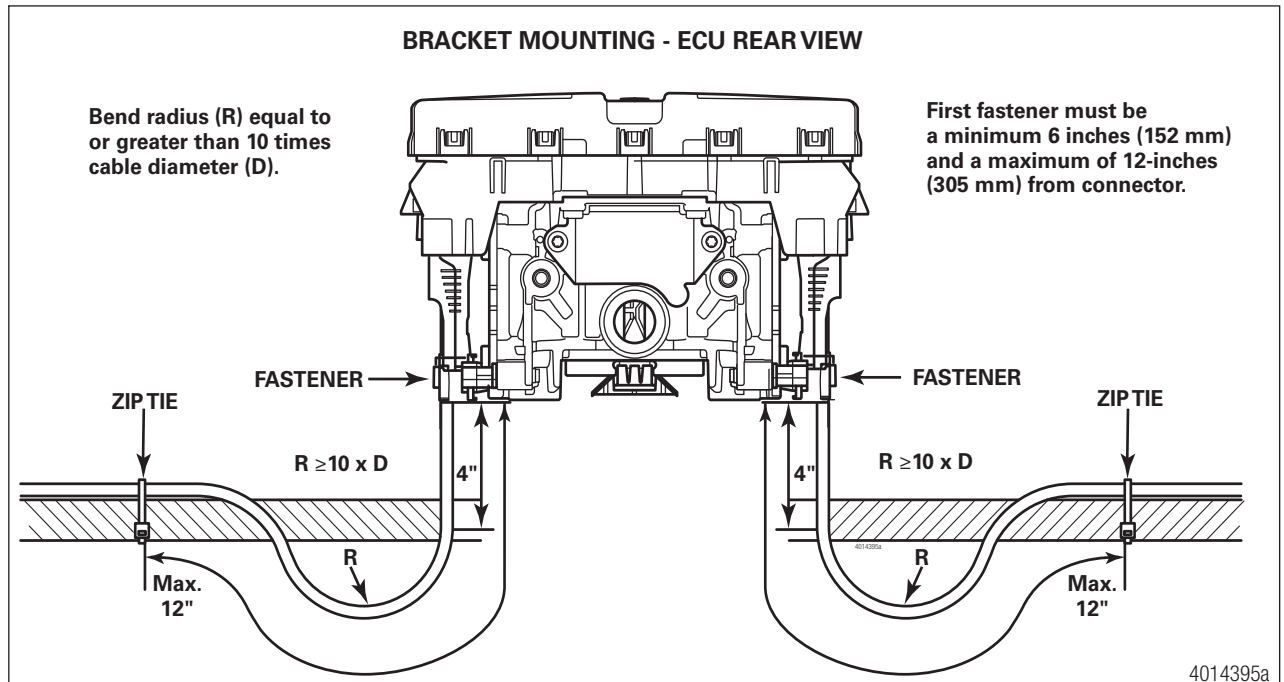
WABCO has many lengths of cables available so it is a best practice to obtain a length that best suits the requirements of the installation. Refer the Parts List in Appendix IV to find the different cable lengths that WABCO offers.

7.1.2 Strain Relief at the ECU – Bracket Mounting

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

Ideally, cables should be affixed to the rigid structure of the trailer. A good rule of thumb is to have the bend of the cable, also known as bend radius, be greater than or equal to ten times the diameter of the cable. If the cable is 1/4-inch (6.35 mm) in diameter, then the bend should be a minimum of 2-1/2-inches (64 mm). Refer to Figure 21 for the ECU mounting of 2S/2M-4S/3M ABS.

Fig. 21



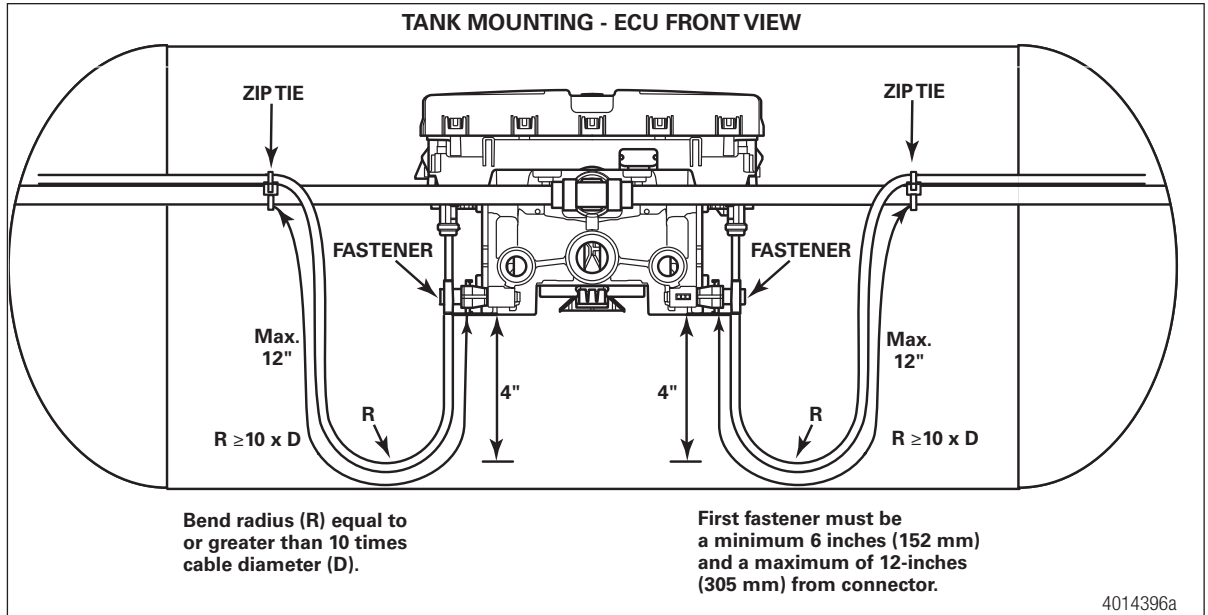
ABS 2S/2M-4S/3M

7.1.3 Strain Relief at the ECU – Tank Mounting

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

Ideally, cables should be affixed to the rigid structure of the trailer. However, structure is not always available on tank-mounted installations. In these cases, securing the cable may be accomplished by fastening the cable to nearby air lines. It is important to note that cables should be secured only to the extent that the cable is held sufficiently in place. Refer to Figure 22 for 2S/2M-4S/3M ABS.

Fig. 22

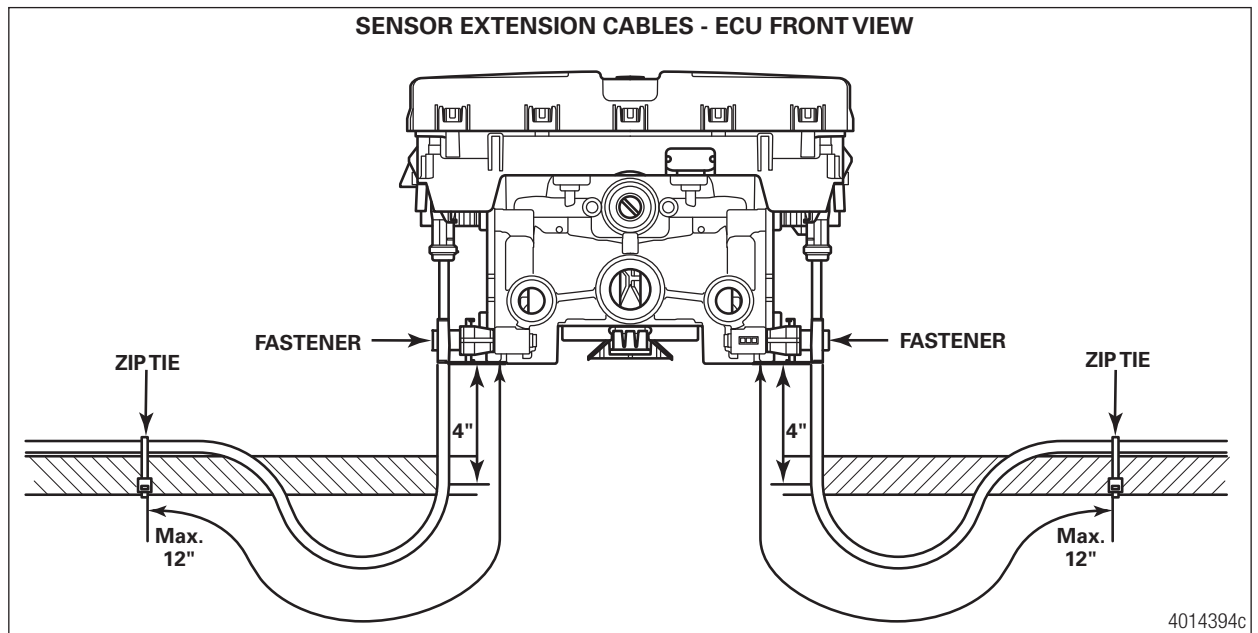


CORRECT POWER AND GIO/MODULATOR CABLE STRAIN RELIEF FOR ABS 2S/2M-4S/3M

7.1.4 Sensor Extension Cables at the ECU

On valves that are tank mounted with no trailer structure nearby, or have remote-mounted cables, the sensor extension cables are attached to the air lines. Cable clips are preferred over zip ties. It is important to remember that cables should be fastened in a manner where the cable is secured enough where the cable will not move or chafe against what it is mounted to. A small amount of slack should be present to ensure that the cables do not become taut after installation or the servicing of components. Figure 23 illustrates the correct amount of slack in the sensor extension cables and correct attachment to the air delivery lines for ABS ECUs.

Fig. 23



7.1.5 Cable-to-Cable Connections

It is important to ensure all cable-to-cable connections maintain good strain relief. Cable restraints must be placed between 2- and 4-inches (51-102 mm) from the cable connector to ensure correct strain relief. Regardless of whether zip ties or cable clips are used, cables should be secured at intervals not greater than 18-inches (457 mm) to avoid cable vibration. Refer to Figure 24 for air line attachment and Figure 25 for axle attachment.

Fig. 24

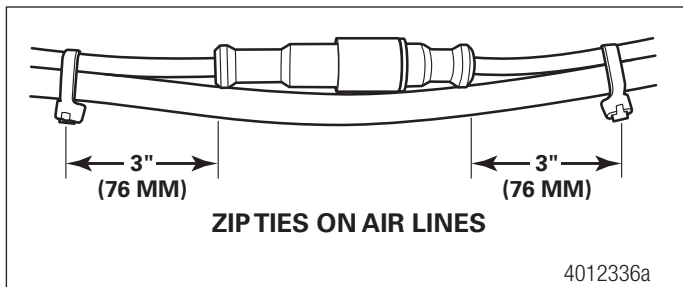
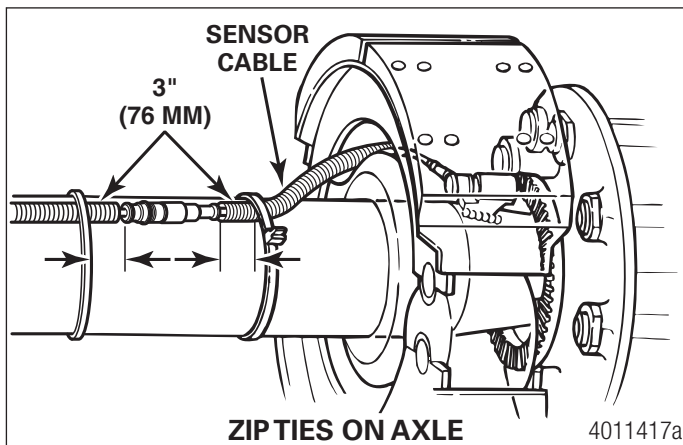


Fig. 25



8 Appendix III

8.1 Vehicle Electrical Grounding Guidelines

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

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

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

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

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

Note during welding work on the trailer:



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





Note during electrostatic painting the trailer frame or bogie:

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

9 Appendix IV

9.1 Parts and Variant List

| VARIANT LIST | | |
|---------------------|---|---|
| |  |  |
| Variants | iABS 1M Premium | iABS 2M Premium |
| Part Number | 400 500 350 0 | 400 500 430 0 |
| CAN Capable | Yes | Yes |
| GIO Capable | Yes | Yes |
| Multivoltage | Yes | Yes |

| PARTS LIST | | | | |
|------------------------|--|---------------|--------|--|
| Slot on iABS Modulator | Application | Part Number | Length | |
| Power |  Power Cable | 449 306 005 0 | 0.5 M | |
| | | 449 306 010 0 | 1 M | |
| | | 449 306 030 0 | 3 M | |
| | | 449 306 047 0 | 4.7 M | |
| Sensor Ports C,D,E,F |  Sensor Extension Cable | 449 733 008 0 | 0.8 M | |
| | | 449 733 013 0 | 1.3 M | |
| | | 449 733 018 0 | 1.8 M | |
| | | 449 733 030 0 | 3 M | |
| | | 449 733 050 0 | 5 M | |
| | | 449 733 070 0 | 7 M | |
| | | 449 733 090 0 | 9 M | |
| | | 449 733 120 0 | 12 M | |
| N/A |  Pressure Sensor | 441 044 106 0 | N/A | |
| GIO2 |  Pressure Sensor Cable | 449 826 030 0 | 3 M | |
| | | 449 826 060 0 | 6 M | |

WABCO

Mobilizing Vehicle Intelligence



ACE AUTONOMOUS
CONNECTED
ELECTRIC

About WABCO

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



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