INSTALLING TAG AXLE SYSTEM WITH WABCO TRAILER iABS

TECHNICAL BULLETIN





TP19030



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You will find the current edition at: www.wabco-na.com/literature

General Information

1 General Information

1.1 Symbols Used in this Document

\Lambda DANGER

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

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

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

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 wnacustomercare@wabco-auto.com, or visit our website: www.wabco-na.com.

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: wnacustomercare@wabco-auto.com, wabconaorders@ wabco-auto.com or wabconaspecs@wabco-auto.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.



WABCO Literature Center <u>www.wabco-na.com/literature</u>

1.5 WABCO Academy



1.6 WABCO Online Product Catalog



www.wabco-customercenter.com/

General Information

1.7 Your Direct Contact to ZF CVCS

ZF CV Systems North America LLC 1220 Pacific Drive Auburn Hills, MI 48326

Customer Care Center: (855) 228-3203

www.wabco-na.com

Safety Information

2 Safety Information

2.1 Provisions for a safe work environment

- Only trained and qualified auto technicians and automotive 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.

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

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.

🗥 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.

Introduction

3 Introduction

The WABCO Trailer iABS Tag Axle Option uses the generic I/O capability to control the tag axle function of a trailer that is in compliance with FMCSA 393.207. It controls the operation of a tag axle by using driver input from the tractor cab as well as wheel speeds to exhaust air out of the tag axle air bags to maneuver the trailer with ease around corners at low speeds.

By activating a cab-mounted switch, the driver signals the ECU to deflate the tag axle bags when the vehicle is below 10 mph (16 kph). Once the vehicle exceeds 10 mph (16 kph), the bags automatically reinflate to the correct ride height. If the switch is activated and the vehicle speed exceeds 30 mph (48 kph) for 30 seconds or more, the ECU will not allow the driver to deflate the air bags unless the switch is cycled and the speed is less than 10 mph (16 kph).

Kits and Supplies

4 Kits and Supplies

Kit Part Number 400 612 042 0

Description	Part Number	Quantity
Tag Axle - 1 meter tag axle cable	400 612 042 0	1
3/2 solenoid valve	472 170 997 0	1
1 meter tag axle valve cable	449 408 010 0	1
Generic I/O cable	449 827 060 0	1

Kit Part Number 400 612 043 0

Description	Part Number	Quantity
Tag Axle - 4 meter tag axle cable	400 612 042 0	1
3/2 solenoid valve	472 170 997 0	1
4 meter tag axle valve cable	449 408 040 0	1
Generic I/O cable	449 827 180 0	1

4.1 Other Components Sold Separately

Description	Part Number
SEALCO lift axle control valve (required)*	110591
Optional – 6 meter solenoid valve cable	449 408 060 0
Optional – Residual pressure valve*	1300-05
Optional – Check valve*	715152

*Call SEALCO Commercial Vehicle Products at 602-253-1007 to obtain this part.

5

Installation

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

AWARNING

Remove all pressure from the air system before you disconnect any component. 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.

When you work on an electrical system, the possiblity of electrical shock exists, and sparks can ignite flammable substances. You must always disconnect the battery ground cable before you work on an electrical system to prevent serious personal injury and damage to components.

Ensure the trailer has correct electrical grounding; refer to SAE Specification J1908.

- 1. Wear safe eye protection.
- 2. Park the vehicle on a level surface. Block the wheels to prevent the vehicle from moving.
- 3. Raise the vehicle so the wheels to be serviced are off the ground. Support the axle to be serviced with safety stands.



The trailer must not be loaded during this component installation.

- 4. Drain the brake and suspension systems of air before starting this procedure.
- 5. Disconnect the electrical power before starting this procedure.



6. Refer to the figure for the complete Tag Axle system layout.

- 7. Connect the tag axle valve cable, part number 449 408 010 0 or 449 408 040 0 depending on the kit, to the 3rd modulator/GIO2 port.
- 8. Connect the 3/2 solenoid valve, part number 472 170 997 0, to the tag axle valve cable, part number 449 408 010 0 or 449 408 040 0 depending on the kit.
- 9. Ensure that the solenoid valve is installed correctly.
- 10. Connect the switch and indication lamp cable, part number 449 827 060 0 or 449 827 180 0 depending on the kit, to the GIO1 port.

- 11. The yellow wire of cable part number 449 827 060 0 or 449 827 180 0 is to be connected to one side of the switch, and the brown wire of cable part number 449 827 060 0 or 449 827 180 0 is to be connected to the other side of the switch. All connections and terminations must use some form of weatherproof protection.
- 12. If optional tag axle light indicator is used, red wire of cable part number 449 827 060 0 or 449 827 180 0 is to be connected to power side of light, and brown wire of cable part number 449 827 060 0 or 449 827 180 0 is to be connected to the ground of light.
- 13. Apply a thread sealant and install the 1/4-inch to 3/8-inch adapter fitting from the solenoid valve to the lift axle control valve, SEALCO part number 110591. Refer to the figure.
- 14. Optional: Install the residual pressure valve (SEALCO part number 1300-05) to prevent air bag damage. This will allow 5 psi (0.34 bar) of air to remain in the air bags of the tag axle.

Do not attempt to adjust or tamper with the adjustment screw on the residual pressure valve. It is preset to the correct pressure.

15. Optional: Install the check valve (SEALCO part number 715152) onto the residual pressure valve. This will prevent water and contamination from entering into the residual pressure valve.



5.1 Activating Tag Axle with TOOLBOX PLUS[™] Software

- 1. Open TOOLBOX PLUS[™] Software.
- 2. Select Trailer ABS.



3. From the top menu bar, go to the Modify pull-down menu and select **GIO Configuration**.

		a I	, Se	rvice lr	form	ation	
	ABS 1		Ti	re Calił	oration	n	
ECU Informatio	n		Re	config	ure Al	BS	
ECU Type	iABS	•	4a Pl	ant Loo	ation	/OEM	_
Configuration 4S/2M Premium St GIO Configuration							
Part Number	4005004300	9	oftware Re	vision	tat	os3-0047	
Faults		Vhee	Sensor S	peed (mph)		
Existing	0	с	0.0		е	0.0	
Stored	None	d	0.0		f	0.0	_
Operating Infor	mation						
Primary Voltage	14.0		Current Mile	∋s	0.0		
Tire Size	3250 mm		Service Mil	es	0		
essage Center:							

4. When the GIO Configuration screen is displayed, select the check box next to "Tag Axle". The necessary cable connections to the ECU will be shown in the screen.

GIO Configuration	>
Choose GIO Features To Downlo	Door Aier
Axle Load Monitoring	Integrated Speed Switch 1
OptiFlow AutoTail	Integrated Speed Switch 2
Lift Ayle Configuration	SafeStart
No Hub Coble Dominad	N2 - C
Num of Cables	PORT 2
Recommended GIO Cable Conne ECU GIO 1: Tag Axle Valve Cable,	ections P/N 449 408 xxx 0
HUB Cable Port 2:	
HUB Cable Port 1:	
ECU GID 2: Switch and Indication	Lamp Cable, P/N 449 827 xxx 0
HUB Cable Port 2:	
HUB Cable Port 1:	
Status:	
Status:	
Status:	
Status:	Close

5. After reviewing the cable connections, select the **Download** button and the "Tag Axle Lamp Type" window will appear.

Choose 610	Features To Download	
Tire Infla	tion Communication	🗖 Door Ajar
T Axe Los	d Monitoring	Integrated Speed Switch
C OptFlow	AutoTal	Integrated Speed Switch
🗖 Litt Axle	Configuration	F SaleStart
🔽 Tag Axle	C.	☐ Default · No GIO
lo Hub Cabl	e Required	
Num of Cables	Tag Axle Lamp Type	- 0 X
Recomm	Tag Axée Status Lamp	None
CU GIO 1 IUB Cable IUB Cable	Çancel	QK
and a second		
CU GIO 2	2	
CU GIO 2		
CU GIO 2 IUB Cable Port IUB Cable Port	1:	
CU GIO 2. IUB Cable Port IUB Cable Port	1: [
CU GIO 2. IUB Cable Port IUB Cable Port atus: pymloading Ta	1:	
CU GIO 2 IUB Cable Port IUB Cable Port atus: ownloading Ta	1: Axle parameters	
CU GIO 1 IUB Cable Port IUB Cable Port atus: ovinioading Ta	1: Axle parameters	

- 6. Click on the drop down to select if a lamp is used and which type (Incandescent or LED). Click **OK** and the download of the parameters will begin.
- 7. After the download completes, the ECU will reset 2 times. Once the resets are complete, a Download Complete window will be displayed. Click **OK**. The programming is now finished.

Choose GIO Features To Downlo	ad
I fire Inflation Communication	Door Alar
Axle Load Monitoring	Integrated Speed Switch 1
🔽 OptiFlow AutoTail	Integrated Speed Switch 2
Lift Axle Configuration	🔽 SafeStart
🔽 Tag Axle	🔲 Default - No GIO
Recommended GIO (Complete
CU GIO 1: Tag Axle	
CU GIO 1: Tag Axk IUB Cable Port 2:	ОК
CU GIO 1: Tag Axk IUB Cable Port 2: IUB Cable Port 1:	ОК
CU GIO 1: Tag Axi IUB Cable Port 2: IIII IUB Cable Port 1: IIII CU GIO 2: Switch and Indication L	ок
CU GIO 1: Tag Axir IUB Cable Port 2: IUB Cable Port 1: CU GIO 2: Switch and Indication L IUB Cable Port 2:	ок .amp Cable, P/N 449 827 xxx 0
CU GIO 1: Tag Axir HUB Cable Port 2: CU GIO 2: Switch and Indication L HUB Cable Port 2: HUB Cable Port 2: HUB Cable Port 1: HUB Cable P	ок .amp Cable, P/N 449 827 жж 0
CU GIO 1: Tag Axi IUB Cable Port 2: IUB Cable Port 1: CU GIO 2: Switch and Indication L IUB Cable Port 2: IUB Cable Port 1: IUB Cable Port 1:	ОК .amp Cable, P/N 449 827 xxx 0

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.

 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 nonapproved 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.



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.

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 the figure for the ECU mounting of 2S/2M-4S/3M ABS.



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 the figure for 2S/2M-4S/3M ABS.



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. The figure illustrates the correct amount of slack in the sensor extension cables and correct attachment to the air delivery lines for ABS ECUs.



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 the following figures for air line attachment and axle attachment.



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.



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	iABS 1M Premium	iABS 2M Premium		
Part Number	400 500 350 0	400 500 430 0		
CAN Capable	Yes	Yes		
GIO Capable	Yes	Yes		

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			
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			
GIO 2	GIO Cable 2 Pin (Tag Axle Valve Cable)	449 408 010 0 449 408 040 0 449 408 060 0	1 M 4 M 6 M			
GIO 1	GIO Cable Blunt Cut 4 Wire (Switch/Indication Lamp Cable)	449 827 030 0 449 827 060 0 449 827 120 0 449 827 180 0	3 M 6 M 12M 18 M			
N/A	Tag Axle Valve	472 170 997 0	N/A			



For further product details contact your distributor or the WABCO Customer Care Center at 855-228-3203.

About ZF Friedrichshafen AG

ZF is a global technology company and supplies systems for passenger cars, commercial vehicles and industrial technology, enabling the next generation of mobility. ZF allows vehicles to see, think and act. In the four technology domains Vehicle Motion Control, Integrated Safety, Automated Driving, and Electric Mobility, ZF offers comprehensive solutions for established vehicle manufacturers and newly emerging transport and mobility service providers. ZF electrifies different kinds of vehicles. With its products, the company contributes to reducing emissions and protecting the climate.

ZF, which acquired WABCO Holdings Inc. on May 29, 2020, now has 162,000 employees worldwide with approximately 260 locations in 41 countries. In 2019, the two then-independent companies achieved sales of €36.5 billion (ZF) and \$3.4 billion (WABCO).

For more information, visit: www.wabco-na.com

