SmartBoard

System Description

WABCO

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Edition 3

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WABCO

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1 Important instructions and safety instructions

This publication is meant for commercial vehicle workshop personnel with knowledge of automotive electronics.

The document provides all the information required to install and set-up the SmartBoard.

Carefully read all safety instructions in this document before you start performing diagnostics or you replace and set-up a device or other similar activities.

These safety instructions must be observed to avoid personal injury or material loss.

WABCO only guarantees the safety, reliability and performance of its products and systems if all instructions, notes and safety instructions in this document are observed.

Before you perform any work on the vehicle (repair, replacing parts, diagnostics etc.), you must ensure the following:
Only trained and qualified technicians are to perform any work on the vehicle.
Make sure to follow the specifications and instructions of the vehicle manufacturer.
Always comply with the company and national accident prevention guidelines and Health and Safety regulations.
Wear suitable protective clothing when necessary.
The workplace has to be dry, as well as sufficiently lit and ventilated.

CAUTION **Danger of injury due to vehicle rolling!**

Danger of injury by actuating the brake while work is being performed on the vehicle.

- Make sure that the transmission is in neutral and the hand brake has been pulled.
- Secure the vehicle against rolling with chocks.
- Attach a clearly marked note on the steering wheel saying that work is being performed on the vehicle and that the brake must not be touched.

A short introduction to operating the SmartBoard is called "SmartBoard Operating Instructions" and is available under WABCO number 815 xx0 138 3.

SmartBoard Operating Instructions
Open the WABCO website *www.wabco-auto.com*.
Click on *Product Catalogue INFORM => Index*.
Enter *SmartBoard* into the search field.
Click the *Start* button.

1.1 Measures for avoiding electro-static charge and uncontrolled discharging (ESD)

Note during construction and building the vehicle:

- Prevent potential differences between components (e. g. axles) and the vehicle frame (Chassis).
  Make sure that the resistance between metallic parts of the components to the vehicle frame is lower than 10 Ohm (< 10 Ohm). Connect moving or insulated vehicle parts such as axles electrically conductive with the frame.
- Prevent potential differences between the towing vehicle and the trailer.
  Make sure that an electrically conductive connection is made via the coupling (king pin, fifth wheel, claws with pins), even with no cable connection.
- Use electrically conductive bolted connections when fastening the ECUs to the vehicle frame.
- Use only cable conforming to WABCO specifications or WABCO original cable.
- Run the cable in metallic casing if at all possible (e. g. inside the U-beam) or behind metallic and grounded protective plating, to minimize the influence of electro-magnetic fields.
- Avoid the use of plastic materials if they can cause electrostatic charging.

Note during repair and welding work on the vehicle:

- Disconnect the battery - if installed in the vehicle.
- Disconnect 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 current is well conducted by removing paint or rust.
- Prevent heat influences on devices and cabling when welding.

2 Introduction

Monitoring a wide range of trailer functions is important when trying to improve the performance of haulage companies operations and reducing the costs of the vehicle fleet.

By integrating a number of control and indicator devices in a single, easy-to-handle multifunctional system, the SmartBoard helps to make trailer vehicles safer and more effective.

fig. 2-1: SmartBoard

The SmartBoard combines the following functions:

- Display of distance driven (operates without power supply from the towing vehicle)
- Immobilizer operation
- Brake lining wear indicator (in connection with WABCO BVA)
- Current axle load indicator
- Tyre pressure indicator (in connection with WABCO IVTM)
- Display of diagnostics and system messages
- Information on the operation of the electronic air suspension (in connection with Trailer EBS E)
- Information on the operation of the lifting axle(s)
- Operating the relaxation function
- Operating the brake release function
- Operating the road finisher brake
- Indication of the vehicle inclination
- Operation of the freely configurable GIO functions
- Display of selected operating data (ODR) and the measured values of the braking system

It therefore serves as a universal information and control system for implementing efficient trailer vehicle operation.

A SmartBoard can be used to replace the following separate display and control units:

- Odometer Status
- Brake lining indicator
- Lifting axle and traction help switch
- Axle load indication
- ECAS control box and/or unit
- Relaxation function
- Brake release function
- Road Finisher Brake

The SmartBoard is designed to be mounted on the outside of the vehicle frame with a connection to Trailer EBS D or E.

2.1 SmartBoard for ADR (GGVS) vehicles

WABCO have developed a new SmartBoard version that allows trailers that carry dangerous goods to take advantage of SmartBoard functions. A SmartBoard suitable for GGVS vehicles is available under the product number 446 192 111 0.

Operation of the SmartBoard is identical to the standard version. Some functions are restricted, however, due to the operation without a battery:

- No date and time function is available. For this reason it is not possible to store messages.
- The odometer reading of the Trailer EBS is displayed. The internal odometer is without function.
- Information is displayed when the trailer is supplied with power.

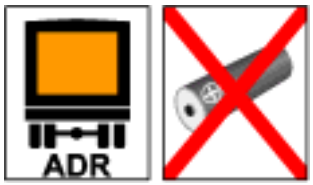
SmartBoard 446 192 110 0	SmartBoard for ADR vehicles 446 192 111 0
	

Table: 2-1: SmartBoard versions

The fitting dimensions and cable connections are unchanged. The SmartBoard is installed in compliance with the approval certificate TUEH - TB 2007 - 132.00. The certificate can be obtained from the product catalogue INFORM on the Internet at www.wabco-auto.com by entering the product number or the index words “SmartBoard“ or “certificate“.

3 System Description

3.1 System configuration

As standard, the SmartBoard is operated in combination with Trailer EBS and displays the data transmitted by Trailer EBS.

The SmartBoard is connected to Trailer EBS. The tyre pressure monitoring system IVTM and the BVA (brake lining wear indicator) are connected to Trailer EBS and so transmit their data to the SmartBoard via the Trailer EBS.

The odometer obtains information from the Trailer EBS. In order to operate the SmartBoard's internal odometer independently of the Trailer EBS D function (and also without an ABS plug connection to the towing vehicle), the SmartBoard must be connected directly to the wheel sensor via the Y-cable. This is not required if there is a connection to Trailer EBS E: the wheel sensor signal is transmitted to the SmartBoard even when not supplied with power from the towing vehicle.

Control of the air suspension functions (e. g. lifting and lowering the lifting axle or the chassis/vehicle body) requires the Trailer EBS E to be configured accordingly.

fig. 3-1: System configuration in combination with Trailer EBS D

fig. 3-2: System configuration in combination with Trailer EBS E

3.2 System prerequisites

The SmartBoard is a device used for operating the Trailer EBS. The range of SmartBoard functions therefore depends on the Trailer EBS version and on the installed components. The WABCO System BVA is required, i. e. for indicating the brake pad wear. The SmartBoard detects the installed components automatically and shows the available functions as menu symbols.

If the system or component from which information is to be retrieved or that is to be controlled by the SmartBoard is not available, the corresponding menu item or symbol is not displayed.

The SmartBoard is used in combination with the Trailer EBS D or E as of generation D Premium (480 102 014 0).

The software version of the SmartBoard is shown in the menu <Tools> <System Info> <SmartBoard> (see page *32*). A number of functions are not available in the ADR version of the SmartBoard (see chapter 2.1 "SmartBoard for ADR (GGVS) vehicles", page *9*).

Symbol	Function	Components / Prerequisites
	**Odometer Status** Automatic display of odometer reading without EBS connection (where the 7-pin ISO cable is not plugged in), or with EBS connection for tamper-proof total distance indication.	• SmartBoard as of software version SB010109 • If Trailer EBS D Premium is used, the internal odometer of the SmartBoard can only be used if an ABS sensor is also connected (see page *42*).
	**Immobilizer** The wheels of the parked tow vehicle can be blocked with the immobilizer.	• SmartBoard as of software version SB010309A • Trailer EBS E Premium 480 102 06. 0 (as of version E 1.5) and • the function must be defined in the TEBS E modulator • pulse-controlled lift axle valve 463 084 100 0 • Tristop® cylinder • PUK Access Code 813 000 049 3 • Immobilizer cannot be used if an ECAS double-valve block is installed.
	**Brake wear** BVA – Status display for the brake linings – assists safe operation and prevents costly repairs.	• SmartBoard as of software version SB010109 • Trailer EBS E • Brake pad wear indicator WABCO BVA
	**Loading** The axle load display shows axle loads and any overloading for efficient utilisation and safe operation.	• SmartBoard as of software version SB010109 • Trailer EBS E • for drawbar trailers: second external bellows pressure sensor
	**Tyre pressure** Detailed tyre information such as current tyre pressure and nominal pressure (in combination with WABCO IVTM).	• SmartBoard as of software version SB010109 • Trailer EBS E • the function must be defined in the TEBS E modulator • Tire pressure monitoring system WABCO IVTM
	**Diagnostic memory** Diagnostics and system messages provide important information on the status of the installed WABCO systems without having to take the vehicle to the workshop.	• SmartBoard as of software version SB010109
	**Air suspension** Operating status of the air suspension – e.g. lifting and lowering of the vehicle body and the lifting axle Controller for manoeuvring aid OptiTurn™ and drawbar load reduction OptiLoad™. The menu symbol is greyed out with Ignition OFF.	• Trailer EBS E with integrated electronic air suspension / lift axle controller OptiTurn™, OptiLoad™: • SmartBoard as of software version SB010207A • Trailer EBS E1 as of software version TE14013 • the function must be defined in the TEBS E1 modulator

Symbol	Function	Components / Prerequisites
	**Relaxation function** The relaxation function prevents the chassis from suddenly springing up, a behaviour that can be caused by tensions in the trailer during unloading.	• SmartBoard as of software version SB010207A • Trailer EBS E (as of version E1)
	**Brake release function** The brake release function can be used to release the service brake in the trailer while the vehicle is at a standstill.	• SmartBoard as of software version SB010207A • Trailer EBS E (as of version E1)
	**Road Finisher Brake** The road finisher brake is used for targeted braking of tipper trailers when used ahead of road finishers.	• SmartBoard as of software version SB010109 • Trailer EBS E (as of version E1)
	**Vehicle inclination** This function can monitor the inclination of the trailer.	• SmartBoard as of software version SB010207A • Trailer EBS E (as of version E1)
	**GIO function 1 / 2** The freely configurable GIO functions can be used to set GIO functions on the Trailer EBS Modulator.	• SmartBoard as of software version SB010109 • Trailer EBS E (as of version E1)
	**Language** Easy switching between 8 or 9 languages means the SmartBoard can be used in many countries. The available languages depend on whether the language package (A or B) is installed.	
	**Tools** Many other functions such as the displaying of system data and Operating Data Recorder (ODR) data, support for TEBS modulator replacement, as well as SmartBoard settings.	

Since the display may be illegible under –20° C, WABCO recommends using the SmartBoard only in regions with temperatures ranging above –20° C.

Trailer EBS E system description
Open the WABCO website *www.wabco-auto.com*.
Click on *Product Catalogue INFORM => Index*.
Enter *Trailer EBS E* into the search field.
Click the *Start* button.

4 Operation and Functions

The following chapters describe how the different functions are operated as well as other properties of the SmartBoard.

4.1 Switching On / Off

To be able to use the SmartBoard, it must be supplied with power via the 5-pin or 7-pin plug connection according to ISO 7638 or a battery supply connected on the Trailer EBS E modulator.

The SmartBoard can still be used without a plugged-in ISO 7638 connection. Here the SmartBoard is supplied with power by the internal battery (not in the ADR version 446 192 111 0).

The SmartBoard is switched on by pressing any button for longer than two seconds.

Power supply	Event	Consequence
Trailer vehicle hitched		
ISO 7638 / Battery	Ignition ON	Display on Indication of the Trailer EBS functions
	Ignition OFF	Display off (in the case of IVTM, after max. 20 min)
Trailer vehicle unhitched		
Internal battery of the SmartBoard (not in ADR version 446 192 111 0)	Pressing a button (>2 s)	Display on Standard indications of the SmartBoard
	Pressing a button	Display updated

Table: 4-1: Switching on and off

When the ignition is switched off, the SmartBoard switches itself off automatically after the time periods listed in the table below.

The background illumination switches off automatically after 30 seconds without user activity or upon reaching a speed above 10 km/h.

Trailer Status	In connection with Trailer EBS Standard	In connection with Trailer EBS E with air suspension components
	45 seconds	75 seconds
	15 seconds	15 seconds

Table: 4-2: Switch-off times

4.2 Key assignment

Individual keys have the same function throughout the entire menu structure.

Key	Function
 <Arrow right>:	Selection of the next menu item (e.g. symbol or text) or the next option
 <OK>	Confirmation and / or execution of the currently selected function
 <Back>	Back one menu level In the main menu: back one menu item

Table: 4-3: Standard key assignment

Exceptions

Exceptions from the standard button assignments are available in different function groups, for example when operating the immobilizer, the air-suspension system and the settings.

With these exceptions, the functions for the individual buttons are shown in the lower portion of the display.

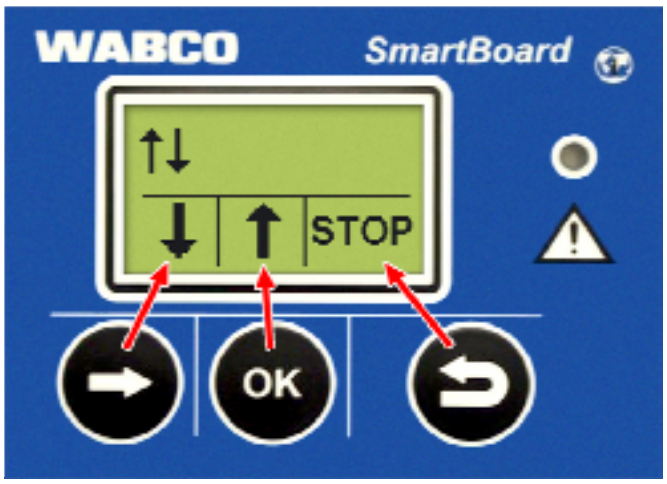


fig. 4-1: Button assignment for operating the air suspension

With exceptions from the standard button allocations, the symbols in the lower portion of the display show the functions for the respective buttons below and not the current status.

4.3 Menu Structure

The Menus Structure is clear and simple. The main functions can be accessed from the top level menu and are represented by symbols. Symbols are identical regardless of which language has been selected.

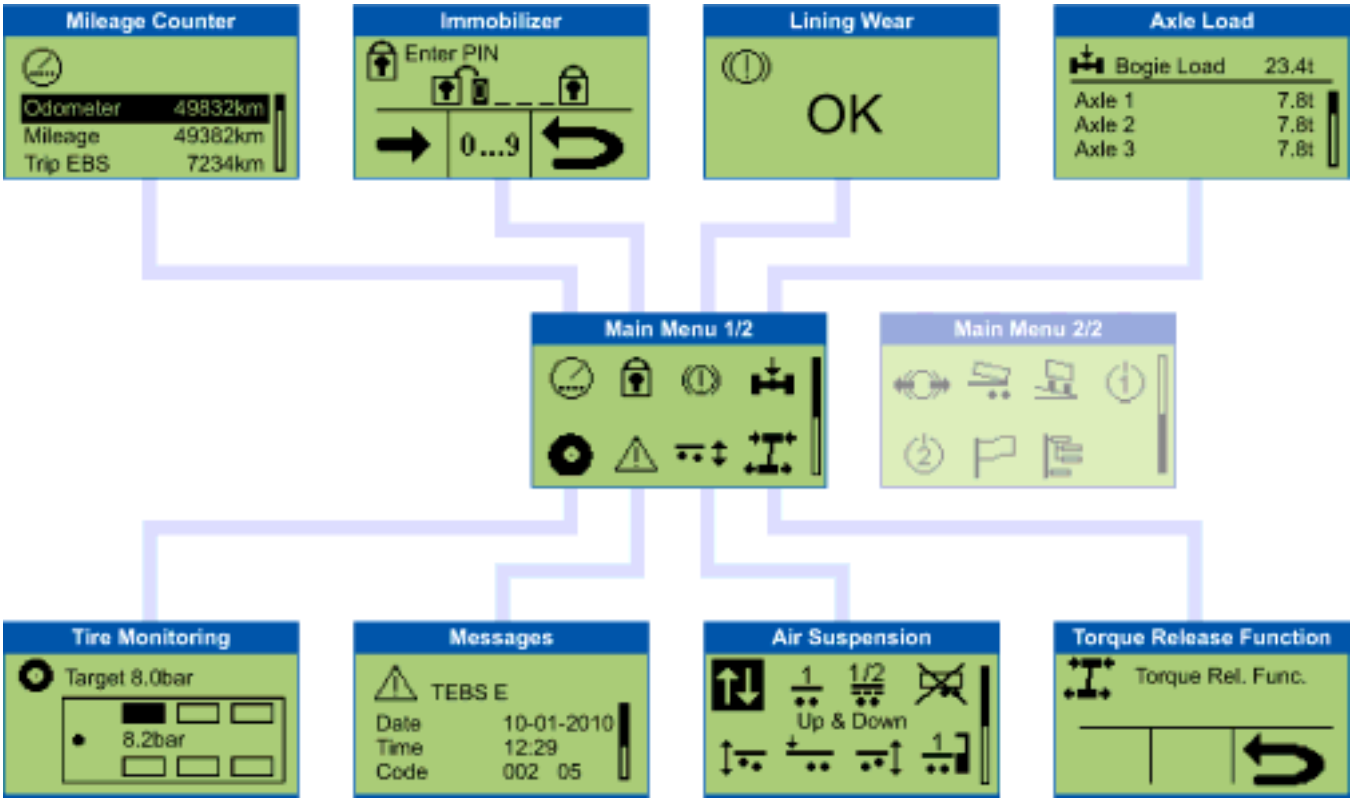


fig. 4-2: Menu structure of main menu (1/2)

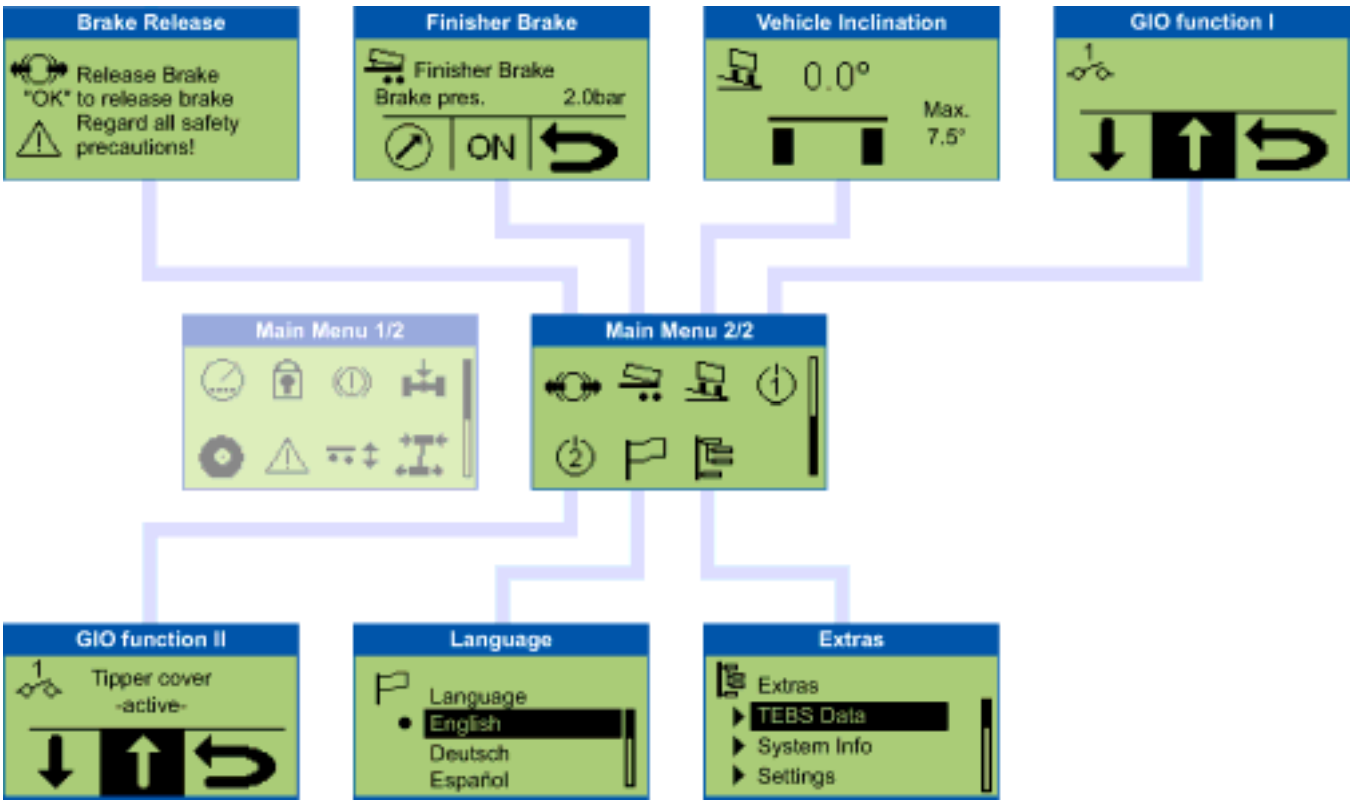


fig. 4-3: Menu structure of main menu (2/2)

4.4 Functions

The SmartBoard provides a wide range of functions that can be accessed via symbols from the main menu. The chapters below describe the various functions.

The following rules apply:

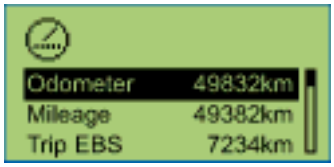
- If a system is not available and no information can be retrieved from it, the corresponding menu symbol is not displayed.
- When the vehicle is at a standstill, the values that were last saved are displayed. These may deviate from the actual values (e. g. the tyre pressure if a leak is present).

For an overview of which functions are available in combination with Trailer EBS D or E, see chapter 3.2 "System prerequisites", page *11*.

fig. 4-4: Main menu

4.4.1 Odometer Status

The odometer reading from the Trailer EBS and the SmartBoard is displayed in this functional group.



Notation	Description	Note
Odometer (internal odometer SmartBoard)	The SmartBoard determines the mileage/kilometrage directly from the ABS sensor signal.	• The option is only displayed after the SmartBoard has detected that an ABS sensor is available. • The distance counter functions even when the ISO connection is not plugged in. • Differences between Trailer EBS odometer and the internal odometer occur due to: Driving without the ISO plug connection (TEBS not operating, SmartBoard supplied by battery). Different tyre sizes and going around corners (TEBS computes the average wheel speed, the SmartBoard only records sensor c). • If the tyre settings stored in the SmartBoard are inconsistent with those of the TEBS, an exclamation mark <!> is displayed in the odometer bar.
Mileage/Kilometrage	The total mileage/kilometrage is recorded by the Trailer EBS modulator.	Record since the Trailer EBS system start-up.
Trip EBS	Kilometre count with ISO supply connected.	Can be reset via the diagnostic software.

Notation	Description	Note
Trip km	Kilometre count with ISO supply connected.	Can be reset in the SmartBoard. • To reset, select the option "Trip km" and press <OK>. • Select "Yes" when the message "Reset trip km" appears and press <OK>.

4.4.2 Immobilizer

The immobilizer is for reducing the risk of theft. The function can be activated or deactivated by entering a self-defined PIN key via the SmartBoard.

Enabling

A PUK is necessary for each vehicle for enabling the first time. This requires the document "PUK Access Code 813 000 049 3" with an individual voucher code. With this voucher code, you can apply for the PUK on the internet under **www.wabco-auto.com/immobilizer**.

The job of the PUK is:

- Releasing the immobilizer function in the TEBS E modulator
- Defining / changing the user PIN
- Master key, to also release the vehicle without a PIN

The PUK is reserved only for the end user. Handle the PUK with care and protect it from access to third-parties and unauthorized persons. Store the PUK in a safe location. WABCO will not be held responsible for the loss or misuse of the PUK.

– Select the menu <Tools> <Settings> <New PIN>.<with PUK>.

– Please enter the PUK.

– Define a PIN and enter it.

– Re-enter PIN to confirm.

➔ Upon successful release, a confirmation appears on the display.

Operation

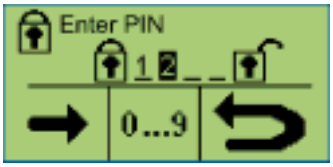
Before deactivating the immobilizer, the park brake (red button of PREV) of the trailer must be activated.
With Trailer EBS as of generation E2, the park brake of the tow vehicle must be activated when deactivating the immobilizer and brake pressure must be applied on the yellow hose coupling.

If the PIN is entered incorrectly 5 times, the PIN entry can only be made again after a 10 second delay. Another incorrect entry will double the duration of the delay. After 20 incorrect entries, the function is locked and must be enabled again using the PUK.

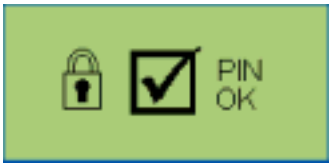
– Select menu <Immobilizer>.

– Enter the self-defined PIN.

Button <OK>: Selecting numbers 0 … 9
Button <Arrow right>: Jump to the next digit position.
Button <Back>: Confirmation of input

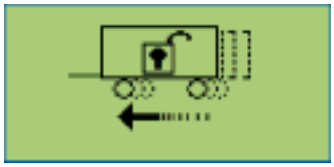


➔ After entering the correct PIN, a confirmation window appears.



If the vehicle was been locked, the window "Activated immobilizer" appears. The driver is also notified of the activated immobilizer by a continuous flashing of the yellow warning light in the tow vehicle (with ignition ON).

If the vehicle was been unlocked, the window "Deactivated immobilizer" appears.

Activated immobilizer	Deactivated immobilizer
	

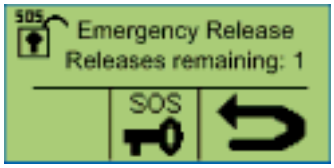
Emergency release function

The "Emergency trigger function“ menu appears if the function is defined and activated in the TEBS E modulator.

The emergency release function is defined for three release procedures. After using the procedure, deactivating the immobilizer is only possible after entering the PIN. After renewed PIN entry, the counter for the emergency release function is set up to three again.

– Select menu <Emergency release>.

– Press the <OK> button for the emergency release of the vehicle.



➔ A confirmation message appears.
As long as the immobilizer is deactivated via the emergency release function, the respective icon disappears from the main menu. If the vehicle is stopped for a period of >60 seconds, the immobilizer is reactivated.

4.4.3 Brake lining wear indication (BVA)

The status of the brake lining wear is displayed in this functional group.

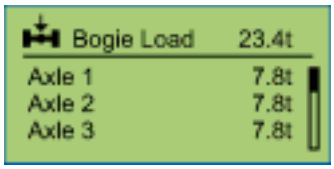
When the brake lining has reached the wear limit (2 mm residual lining thickness), the warning LED and the menu item for this functional group flash in the main menu.
Messages are only output via warning LEDs and flashing menu items if the "Event LED" functions is activated (see page *33*).

Notation	Description	Note
	All brake linings have a residual thickness of more than the 2 mm wear limit.	
	At least one brake lining has reached a wear limit <2 mm (the wire of the end value indication in the brake lining is worn through).	Check the brake linings as soon as possible and replace worn brake linings.

4.4.4 Axle load indication

Information on the axle loads is indicated in this functional group.

For example: Semitrailer



In addition, a message can also be shown in the display. The warning thresholds can be set in the SmartBoard.

WABCO suggestion for a 3-axle semitrailer with 9 t axle load on each axle.

- The initial warning threshold is to be set to a 8 t axle load: When there is an axle load of 8 t, the menu item "axle load" flashes in the display. The driver is informed that further loading is not advised.
- The secondary warning threshold is set to 9 t axle load: When an axle load of 9 t is exceeded, the red warning LED flashes and the menu item "axle load" flashes in the display. The driver is informed of overloading (see chapter 4.5 "Output of messages", page *37*).

The SmartBoard is supplied with the initial and the secondary warning threshold both set to 15 t. The warning thresholds are therefore not activated.

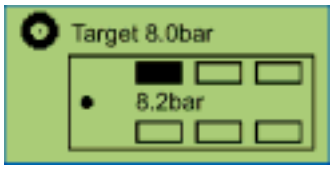
Notation	Size	Configuration
Total axle load	Total of the separate axle loads.	Trailer EBS D/E Modulator
Axle 1 to axle n	Axle loads of the separate axles.	Trailer EBS E Modulator

With drawbar trailers, the axle load information is only displayed if second pressure sensor is installed. In the case of semitrailers with lifting axle, the lifting axle must be connected to the Trailer EBS Modulator.

4.4.5 Tyre-pressure monitoring

The tyre pressures for the individual tyres, the nominal tyre pressure, and the configuration is displayed in this functional group.

The key <Arrow right> is used to switch between the different tyres.



The tyre symbol flashes if the tyre pressure is too low.
If the tyre has a fault, the warning LED and the menu item for this functional group flashes in the main menu.
Messages are only output via warning LEDs and flashing menu items if the "Event LED" functions is activated (see page *33*).

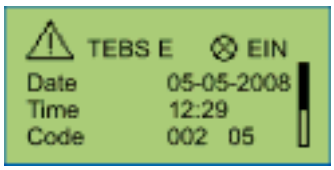
Notation	Description	Note
Nominal pressure	The nominal pressure is set in the parameters of the IVTM electronic control unit.	The value applies to a cold tyre.
	Currently saved pressure for the selected tyre.	
	Warning when the battery of the selected IVTM wheel module is low.	Only with wheel module II IVTM 1B

The IVTM tire pressure monitoring system is no longer available for the latest vehicle designs.

4.4.6 Information

Messages from available systems are displayed in this functional group. The following systems are capable of message output:

- Trailer EBS D and E
- IVTM

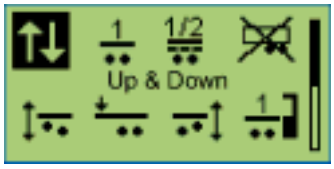


Messages are only output via warning LEDs and flashing menu items if the "Event LED" functions is activated (see page *33*).
Current messages are displayed first, then the messages that are no longer current.
When a current message is present, the menu item for this functional group flashes in the main menu and the warning LED also flashes.
With the ADR version, the internal clock is not active. No time entries are made in the ODR operating data memory or the diagnostic memory.

Notation	Size	Please note
System	System responsible for output of the message (example: TEBS E).	The key <Arrow right> is used to navigate through the different messages.
Warning light status	Status of warning light (current or no longer current message).	There are current messages with a warning light symbol available. The fault must be rectified. Messages without a warning light symbol are not current (old) and are still stored in the diagnostics memory of the ECU.
Date	Date at the time of message output.	This information is only provided in combination with Trailer EBS E.
Time	Time of message output.	This information is only provided in combination with Trailer EBS E.
Code	Message code.	For plain text of diagnostics codes see chapter 8.1 "Diagnostic messages", page *50*.

4.4.7 Air suspension

Functions for operating the air suspension system are available in this functional group.



The air suspension group is only available if the integrated electronic air suspension of Trailer EBS E is installed.

The <Arrow right> key is used to navigate through the different functions and the <OK> key selects one.

Notation	Description	Note
	Lifting and lowering the vehicle body.	
	Return the vehicle to normal level.	
	Change normal level	Modification of the automatic status change of the lifting axle(s) to the saved level.
	Unladen level	Changing the level to a previously defined level.
	Status change regarding lifting axle(s). Manual lifting or lowering of the lifting axle(s).	• The lifting axles are controlled via the Trailer EBS E. • Press <OK> once for lifting / lowering (depending on the lifting axle status). • Forced lowering of the lifting axles: Press <OK> for 5 seconds.
	Activation/Deactivation of traction help.	• Activate traction help by selecting the symbol and pressing <OK>. • Traction help is deactivated by selecting the symbol once more and pressing <OK>.
	Activation/deactivation of manoeuvring aid (see chapter 4.4.7.1 "Manoeuvring aid, drawbar load reduction", page *23*).	Lifting the rear axle: • Switch between automatic and manual modes by pressing the <Right arrow>. • Manual activation/deactivation of manoeuvring aid by pressing <OK>.
	Set and save memory level 1.	To save the current level as a retrievable memory level, press <OK> for 5 seconds.
	Set and save memory level 2.	To save the current level as a retrievable memory level, press <OK> for 5 seconds.
Activation and deactivation of stand-by operation	Select any function from the air suspension menu within 30 seconds after the ignition is switched off. The Trailer EBS E then goes into stand-by mode with level control when loading / unloading for the time period set in the parameters. If the operator exits the SmartBoard air suspension menu, stand-by operation is cancelled prematurely.	This function requires that stand-by operation is a parameter in the Trailer EBS E.

4.4.7.1 Manoeuvring aid, drawbar load reduction

Manoeuvring aid OptiTurn™

The OptiTurn™ manoeuvring aid improves the capability of the truck-semi-trailer combination to travel around curves and traffic circles and to manoeuvre around loading ramps.

Travelling on narrow streets, curves and traffic circles causes excessive tyre wear and damage to tyre edges on curbstones. The limited area around loading ramps also hinders the manoeuvrability of the tractor-trailer combination.

OptiTurn™ automatically detects tight curves and traffic circles and relieves or raises the third axle of the semitrailer. This decreases the turning radius of the tractor-trailer combination and improves manoeuvrability. The tyres also have less friction on the street and damages to the tyre edges on curbstones are prevented. After travelling through the curve, the relieved or raised axle is put back down into its initial position again.

OptiTurn™ can be an inexpensive alternative to steering axles.

Using OptiTurn™:

- Reduction of tyre wear and tyre edge damage
- Improvement in manoeuvrability of the tractor-trailer combination
- Easier travel around curves and traffic circles
- Reduction in axle tension
- In many cases is an alternative to steering axles

Drawbar load reduction OptiLoad™

The OptiLoad™ drawbar load reduction automatically distributes the weight of the load on the supporting axles of the tractor-semitrailer combination without having to actually shift the load in the trailer.

If a trailer load is to be distributed to multiple delivery addresses, the remaining load can become unevenly distributed on the semitrailer. This can exceed the permitted axle load of the tractor drive axle.

OptiLoad™ redistributes the load with targeted changed air-pressures in the air bellows of the semitrailer to the tractor- and semitrailer axles without having to change the position of the load on the semitrailer. OptiLoad™ supports the driver in preventing an overload on the tractor drive axle this way.

OptiLoad™ is designed for loads up to 24 tonnes and works independent of the speed.

Preventing overloading the tractor drive axle helps with:

- Preventing damage to the tractor drive axle
- Decreasing of tyre wear
- Avoiding overload fines

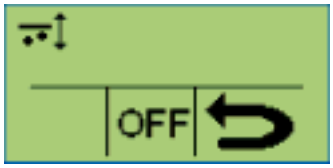
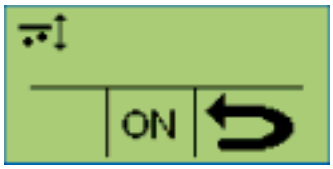
Operation

The menu for controlling the manoeuvring aid and the drawbar load reduction is called up via menu <Air Suspension>, menu point <Manoeuvring aid>

Manual control

The SmartBoard is used as a switch in manual control.

The function is activated or deactivated with the <OK> button.

Notation	Description	Note
	Function: activated	Automatic mode not defined in Trailer EBS E1, mode-change not possible.
	Function: deactivated	

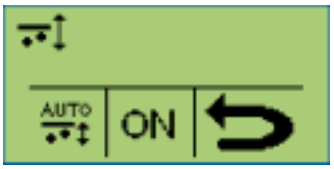
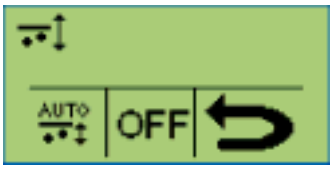
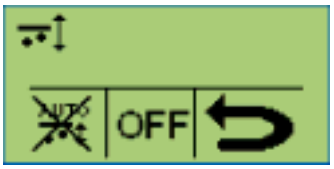
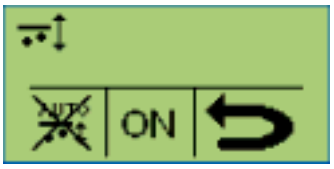
Controlling automatic functionality

If automated functionality is activated in the Trailer EBS E1, the icon "Auto" will be shown in the <Manoeuvring aid> menu in SmartBoard:

The "Automatic" mode is activated or deactivated with the <Right arrow> button. By pressing the <OK> button, the function can also be activated manually e. g. to actuate the OptiLoad function while the vehicle is at a standstill.

The manually activated function is deactivated again if the shut-off values (speed or bellows pressure) defined in the Trailer EBS E1 are achieved or the ignition of the vehicle is started again.

The symbols in the lower portion of the display do not show the current status, they show the function of the respective buttons located underneath.

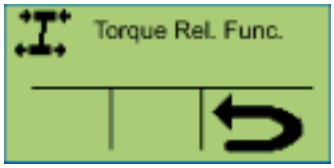
Notation	Description	Note
	Manually deactivate function (trip function) in automatic mode	Button <Arrow right>: Deactivate automatic mode Button <OK>: Manual activation of the function (until achieving the defined speed or until ignition OFF)
	Manually activate function in automatic mode	Button <Arrow right>: Deactivate automatic mode Button <OK>: Manually deactivating function (until ignition OFF)
	Manually activate function (trip function) with automatic mode switched off	Button <Arrow right>: Activate automatic mode Button <OK>: Manually deactivating the function
	Manually deactivate function with automatic mode switched off	Button <Arrow right>: Activate automatic mode Button <OK>: Manual activation of the function (until achieving the defined speed or until ignition OFF)

4.4.8 Relaxation function

WARNING **Risk of injury due to moving vehicle.**

- Make sure that no persons are in the trailer danger zone when actuating the relaxation function!
- Attach a clearly marked note on the steering wheel that work is being performed on vehicle!

During loading and unloading procedures of semitrailers, the axle assembly is stressed if the brakes are applied on the entire unit. If the handbrake is released after the unloading process for example, the chassis can spring up suddenly because the air suspension lifts immediately with the still full air suspension bellows and the lack of a load on the vehicle. The new relaxation function prevents the chassis from suddenly springing up.



The relaxation function is activated by switching on the function in the TEBS E1 modulator. The tension on the applied brakes is released with the respective actuation of the brake cylinder from the modulator. The brakes are released by side (semitrailer/central axle trailer) or by axle (drawbar trailer) for this purpose. Braking the vehicle is always performed at over 18 %, because the brake cylinder is used for releasing the vehicle.

4.4.9 Brake release function

The service brake in the trailer can be released by actuating the functions and with the vehicle at a standstill. A typical application for this function is for vehicle transporters. In this case the length of the trailer is changed via a hydraulic tension strut for simple loading of the entire vehicle. When releasing the button switch, the brake is immediately ventilated again causing the brake to be applied.

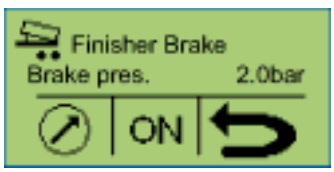
Requirements for the brake release functions

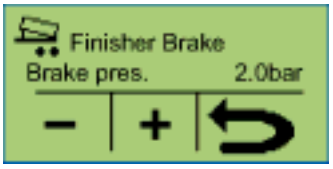
- The parking brake in the towing vehicle is actuated.
- The pressure on the coupling head "yellow" must be greater than 6.5 bar. The brake release function will be aborted when the pressure on the coupling head "yellow" drops.
- The vehicle must not roll. The brake release function will be aborted at a speed V > 1.8 km/h.

A TÜV certificate for the brake release function can be obtained from the product catalogue INFORM on the Internet at www.wabco-auto.com by entering the product number or the index words “SmartBoard“ or “certificate“.

4.4.10 Road Finisher Brake

The road finisher brake serves to brake tipper body vehicles when operating behind road finishers. The tipper body vehicle with the asphalt is pushed forward by the road finisher. To prevent the vehicle from rolling away it is braked slightly (e. g. with 0.7 … 1.5 bar).

Notation	Description	Note
	Function deactivated	Button <Arrow right>: Setting the nominal brake pressure Button <OK>: Activating the function

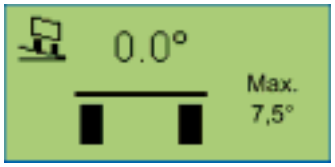
Notation	Description	Note
	Function activated	Button <Arrow right>: Setting the nominal brake pressure Button <OK>: Deactivating the function
	Setting range of the nominal brake pressure: 0,5 … 6.5 bar	Button <Arrow right>: Decreasing the nominal brake pressure Button <OK>: Increasing the nominal brake pressure

This function is activated via the Smartboard (finisher operation ON/OFF). The speed must be below 10 km/h, and the tipping body must be raised (limit switch or roller sensor on the tipping body).

The function is deactivated again via the Smartboard (road finisher brake ON/OFF) or at a speed exceeding 10 km/h. A further setting in the Finisher brake menu permits setting the nominal braking pressure for the finisher brake by means of the +/- buttons.

4.4.11 Vehicle inclination

This function is used to indicate the inclination/tilt of the trailer.



In every Trailer TEBS E1 modulator a lateral acceleration sensor is integrated for the RSS function. This sensor simultaneously provides information on the inclination of the vehicle to the body reference plane. The inclination of the vehicle can be monitored in the Trailer EBS E1 Modulator.

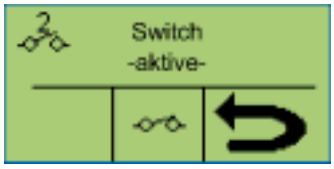
If an inclination of the chassis frame defined in the diagnostics is exceeded, a warning can be output to the driver by the Trailer EBS E1. An electrical output of the Trailer EBS E1 is connected to a horn or a rotary beacon for this purpose. This warning is also shown on the SmartBoard (E1).

This function is meant for tipper vehicles.

4.4.12 GIO function

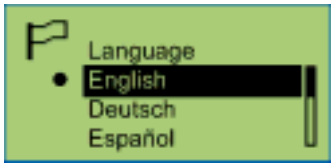
This function can be used to set the freely configurable GIO functions on the Trailer EBS.

Three options are available in this case. The function title and the function symbol are displayed according to the Trailer EBS parameter settings.

Notation	Configuration options
	Switching function (On/Off)
	Button function (hold/release)
	Open / Close function (e. g. rear end-gate)

4.4.13 Language

The language for the SmartBoard is selected in this functional group.



The SmartBoard is equipped with a language package. The language package can be changes in the Diagnostic Software (see chapter 6.4 "Diagnostic Software „SmartBoard"", page *45*).

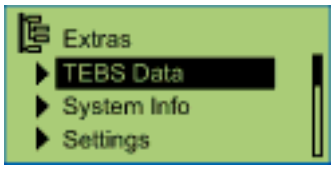
To do so, select the menu item <Parameter settings> from the <System> menu.

In the <Language> menu, the language package A or B can be selected. Click <Write to ECU> to start the download.

Notation		Description	Note
Language package A	**Language package B**		
English German Español Nederlands Français Русский Italiano Türkçe Polski	English German Français Ελληνικά Česky Svenska Suomi Português	Available languages.	• The key <Arrow right> is used to navigate through the different languages. • Press <OK> to activate the selected language. • The currently selected language is marked by a ●.

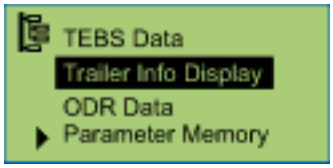
4.4.14 Tools

In this functional group it is possible to retrieve further data and to change the SmartBoard settings.



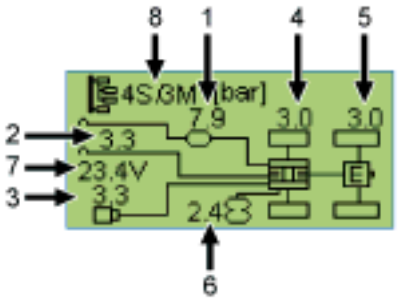
Notation	Description
TEBS data	Service information and functions such as measured values and ODR data.
System Info	System information about the SmartBoard and available systems.
Settings	Adjusting the SmartBoard settings.
AutoConfig	Automatic adjustment of the main menu to the system configuration.

4.4.14.1 TEBS data



- Setting the sensors and modulators.
- Overview of data stored in the ODR.
- The information shown was continuously recorded since the Trailer EBS system start-up and the data displayed may deviate from the data displayed in the EBS PC diagnostics.

Trailer Info. display



Position	Information	Description	Note
1	P_Supply	Current supply pressure.	
2	Pm_pneu	Current pneumatic control pressure.	Yellow hose coupling
3	Pm_CAN	Current "electrical control pressure" via CAN.	

Position	Information	Description	Note
4	Braking pressure c, d	Braking pressure of the TEBS modulator, axle c, d	
5	Braking pressure e, f	Braking pressure of the EBS relay valve.	Only available in 4S /3M systems.
6	Bellows pressure	Bellow pressure, axle e, f	
7	Voltage, Trailer EBS	System voltage	
8	ABS con-figuration	Number of sensors and solenoid valves	

ODR data

With the ADR version, the internal clock is not active. No time entries are made in the ODR operating data memory or the diagnostic memory.

Information	Description	Note
Operating hours	Trailer EBS operating hours since start of production.	
Distance driven	Distance driven of the Trailer EBS since fitment.	
Trips	Number of trips.	A trip is defined as a drive >30 km/h and >5 km.
Average Axle load (kg)	Mean axle load value over all trips.	The combined multi-axle load is saved.
Average Axle load (%)	Mean value of axle loads over all trips.	
Pm_mean	Mean control pressure over all brake actions.	
Braking frequency	Number of brake actions every 100 kilometres.	
Brake actions	Number of brake actions.	Brake actions when driving.
Brake 24N	Number of brake actions with stop light activation only.	Brake actions when driving.
Braking pm	Number of brake actions via pneumatic control line only (CAN not available).	Brake actions when driving.
ABS interventions	Number of ABS control interven-tions.	
RSS stage 1	Number of RSS test brake ac-tions.	

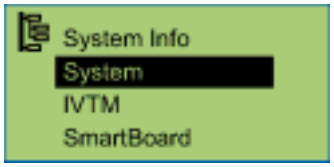
Information	Description	Note
RSS stage 2	Number of RSS interventions.	

Transfer TEBS parameters (parameter memory)

see chapter 7.2 "EBS parameters", page *47*

Information	Description	Note
Read-out parameters	Read-out of Trailer EBS parameters.	
Write parameters	Restoring previous Trailer EBS parameters.	This menu is activated when the SmartBoard is connected to a new Trailer EBS modulator.

4.4.14.2 System Info



System

The key <Arrow right> is used to navigate through the different systems.

Information	Size	Please note
Part no.	WABCO part number	Information on available systems.
SW-version	ECU software version.	

IVTM

The key <Arrow right> is used to switch between the different tyres.

Information	Size	Please note
	ID of the IVTM wheel modules.	Unique number of the IVTM wheel module (ID: identification number).
	Field strength of the IVTM wheel modules.	Indicates the field strength with which the IVTM ECU receives the signals from the respective IVTM wheel modules.

SmartBoard

Information	Size	Please note
Battery	Status of the remaining battery capacity.	Indicates the available remaining battery power (not in the ADR version 446 192 111 0).
Part no.	WABCO part number	
SW-version	ECU software version.	

4.4.14.3 Settings

System of units

Press <OK> to activate. The currently applied system of units is marked by a ●.

Information	Description	Note
Metric system (km and bar) Anglo-Saxon system (mls and PSI)	Available systems of units.	The key <Arrow right> is used to switch between the different systems of units.

Clock

With the ADR version, the internal clock is not active.

The key <Arrow right> is used to switch between the different options. Press <OK> to apply the changes.

Information	Description	Note
Time	Time	
GMT	Deviation of the time zone relative to GMT (Greenwich Mean Time)	
Date	Date	
Dat. For.	Date format	yyyy-mm-dd or dd.mm.yyyy

Splash Image

This function is used to activate the display time of the start screen, as well as a screen saver. If a screen saver has been activated, the delay time can be set.

The key <Arrow right> is used to switch between the different options. Press <OK> to apply the changes.

Information	Description	Note
Display time	The length of time that the start screen is displayed after the SmartBoard has been switched on	X … XX seconds
Screen saver	Activation/Deactivation of the screen saver	
Idle time	Delay time after which the screen saver becomes active	1 … 99 seconds

Event LED

The key <Arrow right> is used to switch between the different options. Press <OK> to apply the changes.

Information	Description	Note
Function	Activation/Deactivation of the warning LED	
Stand-by time	Length of time for which the warning LED flashes after the message has occurred	Only available if the warning LED function is switched on. X … XXX hours
Start menu	Definition of the menu in the event that a message occurs after the SmartBoard is switched on	Start menu or freely definable menu

Tyre size for internal odometer (tyres)

The key <Arrow right> is used to switch between the different options. Press <OK> to apply the changes.

The driven distance is counted and displayed by the SmartBoard. This information can also be retrieved with the "Auto Config" function from the Trailer EBS Modulator (see chapter 4.4.14.4 "Auto Config", page *36*).

Information	Description	Note
Number of pole wheel teeth	Number of pole wheel teeth.	
Tire circumference	Setting the tyre data.	Adjustable in 50 mm-steps (or steps of 2 inches).

Start menu

The key <Arrow right> is used to switch between the different options. Press <OK> to activate.

The currently selected menu is marked by a ●.

Information	Description	Note
Main menu Odometer Status Brake wear Loading Tyre pressure Diagnostic memory Air suspension Language Tools Lifting & lowering Lifting & lowering front Lifting & lowering rear	Menus that can be displayed instead of the main menu after starting the SmartBoard.	Definition of the menu to be displayed after starting the SmartBoard.

Loading

Setting the warning thresholds for load warnings. As soon as the axle load exceeds the advance warning or overload warning threshold, the SmartBoard outputs the relevant message (see chapter 4.4.4 "Axle load indication", page *20*).

The <Arrow right> key is used to switch between the different settings. Press <OK> to apply the changes.

Information	Description	Note
Advance warning (flashing) 	First warning threshold of the load warnings.	The default value is 15 t. This means that if a 9 t axle is input as a parameter, the warning is initiated at 6 t overload.
Overload (flashing) 	Secondary warning threshold of the load warnings for the individual axles.	The default value is 15 t. This means that if a 9 t axle is input as a parameter, the warning is initiated at 6 t overload.

Pressure sensor calibration

DANGER 

Rolling vehicle

– Position the vehicle on an even surface and secure it against rolling away with brake wedges.
– Only use approved devices to jack up and secure the vehicle.

CAUTION 

Risk of injury due to brake actuation while working on the vehicle

– Attach a clearly marked note on the steering wheel saying that work is being performed on the vehicle and that the brake must not be touched.

The SmartBoard makes it possible to calibrate the pressure sensors for the axle load display of the Trailer EBS E (see chapter 4.4.4 "Axle load indication", page *20*).

This improves the precision of the axle load indication. The more precise the vehicle weight is determined and the pressure sensors can be calibrated, the more precise the axle load indication will be. With an incorrect calibration, the axle load indication also shows incorrect values!

The brake pressure output is not affected by this calibration, in this case, the values defined by the vehicle manufacturer apply.

The calibration is performed in three different load states (trailer physically laden). The exact vehicle weight must be determined using a calibrated scale.

The calibration must then be performed again if air-suspension or Trailer EBS E modulator is replaced.

Calibration points

The greater the weight difference between the individual calibration points, the more precise the axle load is displayed. Calibration point "Partially laden" is optional and does not have to be performed.

- Unladen
- Partially laden (optional)

  In partially laden status, the vehicle weight should be centered between the vehicle weight in unladen and fully laden status.
- Fully laden

Prerequisites

- Trailer EBS E1 with software version TE14013
- SmartBoard with software as of version SB010207
- With drawbar trailers, another pressure sensor must be installed on the axle that brakes via the 3rd modulator.

While calibrating, the parking brake and the service brake must be released.

Calibration on the semitrailer

– Determine the weight of the semi-trailer on a calibrated scale in unladen, partially laden (optional) and fully laden status.
  Make sure that all axles of the semi-trailer are on the scale.

– Select the menu <Extras> <Settings> <Sensor calibration>.

– With vehicles having raised lift axle(s), you are requested to lower it.
  Lower the lift axle(s) by pressing the <Right arrow>
  If all lift axle(s) are lowered, the calibration is continued.

– Select menu point <Calibrate unladen> and enter the weight of the unladen semi-trailer.
  Button <Arrow right>: Changes the digit position
  Button <OK>: Changing the value
  Button <Back>: Confirmation of input

– Confirm saving the entered calibration data by pressing the <OK> button.
  A successful calibration is indicated with the symbol and checkmark.

– Repeat the last two steps for partially laden (optional) and for fully laden semi-trailer.
  Select the respective menu points <Calibrate part. laden> and <Calibrate fully laden> for this however..

Calibration on the drawbar trailer

– Determine the weight of the drawbar trailer on a calibrated scale in unladen, partially laden (optional) and fully laden status.
  Make sure that the axle loads on the front and rear axles are determined separate from one another.

– Select the menu <Extras> <Settings> <Sensor calibration>.

– With vehicles having raised lift axle(s), you are requested to lower it.
  Lower the lift axle(s) by pressing the <Right arrow>

If all lift axle(s) are lowered, the calibration is continued.

– Select menu point <Front axle>.
– Select menu point <Calibrate unladen> and enter the weight of the front axle of the unladen drawbar-trailer.
  Button <Arrow right>: Changes the digit position
  Button <OK>: Changing the value
  Button <Back>: Confirmation of input
– Confirm saving the entered calibration data by pressing the <OK> button.
  A successful calibration is indicated with the symbol and checkmark.
– Repeat the last two steps for calibrating the front axle for the partially laden (optional) and for the fully laden drawbar trailer.
  Select the respective menu points <Calibrate part. laden> and <Calibrate fully laden> for this however..
– Repeat steps 4 to 7 for calibrating the rear axle(s) of the drawbar trailer.
  Select the respective menu point <Rear axle(s)> for this.

IVTM

This function serves to change the ID of the IVTM wheel modules e. g. after replacing the wheel module) and to change the nominal tyre pressure for each axle.

The <Arrow right> button is used to select the option "Wheel module ID" or "Nominal pressure" and the selection is confirmed with the <OK> button.

Information	Description	Note
wheel module ID	Changing the IVTM wheel module ID.	The <Arrow right> button is used to select the wheel module and the axle and the <OK> button to confirm. The <Arrow right> button is used to select the digit position and the <OK> button to change the value. The <Back> button is used to end input and the <OK> button to save the changes.
Nominal pressure	Changing the nominal tyre pressure (for an axle).	

New PIN

This function serves in changing the personal PIN code for operation of the immobilizer (see page *18*).

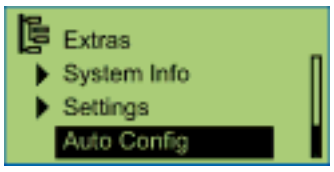
Information	Description	Note
with old PIN	Change the PIN	Button <Arrow right>: Jump to the next digit position. Button <OK>: Selecting numbers 0 ... 9 Button <Back>: Confirmation of entry.
with PUK	Initial immobilizer activation Entering and changing the PIN with PUK	

4.4.14.4 Auto Config

WARNING **Risk of injury due to lowering of the lifting axles.**

– Make sure that no persons are in the trailer danger zone when actuating the function!

This function can be used to adjust the main menu and other configurations (e. g. the number of pole wheel teeth) to the current system configuration, when, for example, the SmartBoard is fitted intro a different trailer or a system is not applicable.



For further information see chapter 4.6.2 "Configuration of the main menu", page *39*.

Information	Description	Note
Automatic configuration of the main menu	Adjusting the main menu to the current system configuration	Ignition (terminal 15) must be switched on and the trailer vehicle must be supplied with power.

4.5 Output of messages

The SmartBoard outputs messages optically.

- The corresponding menu item flashes in the display.
- The warning LED flashes according to the message type.

fig. 4-5: Output of messages

1 Flashing menu item (e. g., for overloading in this case)

2 Red flashing warning LED

Messages are only output via warning LEDs and flashing menu items if the "Event LED" functions is activated (see page *33*).
The warning LED is deactivated once a speed of 10 km/h is reached. It is activated again once the speed drops below 8 km/h.

Messages are outputted for the following functional groups:

- **Brake lining wear (end point indication BVA)**
  One or more than one brake linings have reached their wear limit.

- **Axle load indication**

  Loading exceeds the set limit value. When the first limit value is exceeded, the menu item "Axle load" flashes in the display. When the second limit value is exceeded, the menu item "Axle load" and the warning LED flashes (only in the case of 15) in the display.
- **Tyre monitoring (IVTM only)**

  A tyre pressure is outside the permissible range.
- **Vehicle inclination**

  The parameterised trailer inclination is exceeded.
- **Messages**

  A connected system is currently sending a diagnostics message.

Diagnostic messages

The messages displayed in the menu "Messages" are represented as combinations of numbers. These numbers can be translated into plain text by means of the "Diagnostics messages" listed in the appendix.

The messages always consist of four elements:

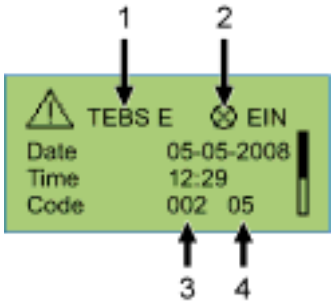


fig. 4-6: Example for the "Messages" menu

1 The system that triggered the message
2 Current message: yes/no
3 The component concerned
4 The type of fault

In the example shown above, a message with the following content is displayed:

"Fault 05 (fault type: "Supply line interrupted") has occurred at component 002 "Wheel sensor b“) of TEBS E.

If it is not possible to easily remedy the fault using your own resources, the vehicle must be driven carefully to the workshop, or it must be repaired on the spot (e. g. where there are acute tyre problems).

4.6 Extended settings

4.6.1 Start Screen (Splash Image)

The SmartBoard Diagnostic Software can be used to load one picture into the SmartBoard. This image is then displayed for one second when the software is started.

A start screen template and a WABCO suggestion for editing the file is available for download at: www.wabco-auto.com <Service & Support> <Download-Center> <SmartBoard Splash Image Example>.

This file can be modified using suitable software. It is also possible to create your own start screen. The file must have the following properties:

File properties	Values
File format:	*.BMP (BMP = **B**it**m**a**p**)
Image size:	128 × 64 pixels
Shading depth:	2 bit (black / white)

Table: 4-4: Start screen properties

4.6.2 Configuration of the main menu

During start-up procedures for the SmartBoard and each time the menu item <Tools> <Auto Config> is called up, the main menu is adapted for the installed components (see chapter 3.2 "System prerequisites", page *11*).

- Any new components that the SmartBoard detects are immediately added to the display configuration.
- If a component is no longer available, the last valid status is displayed - the component is not automatically hidden.

  The "Air Suspension" component is an exception in this regard because it is no longer available with the ignition OFF.

If the lining wear indicator (BVA) or the tyre monitoring system (IVTM) is removed from the overall system, it is necessary to initiate an automatic configuration. The menu item <Tools> <Auto Config> must be used for this purpose (see chapter 4.4.14.4 "Auto Config", page *36*).

5 Assembly and installation

Prior to installation, retrofitting, or repair of the SmartBoard, ensure the following instructions are observed:
Only trained and qualified personnel may perform this work.
Make sure to follow the specifications and instructions of the vehicle manufacturer.
Always comply with the company and national accident prevention guidelines and Health and Safety regulations.
When working on the brake system, the vehicle must be secured against rolling away.
Wear suitable protective clothing when necessary.
The workplace has to be dry, as well as sufficiently lit and ventilated.

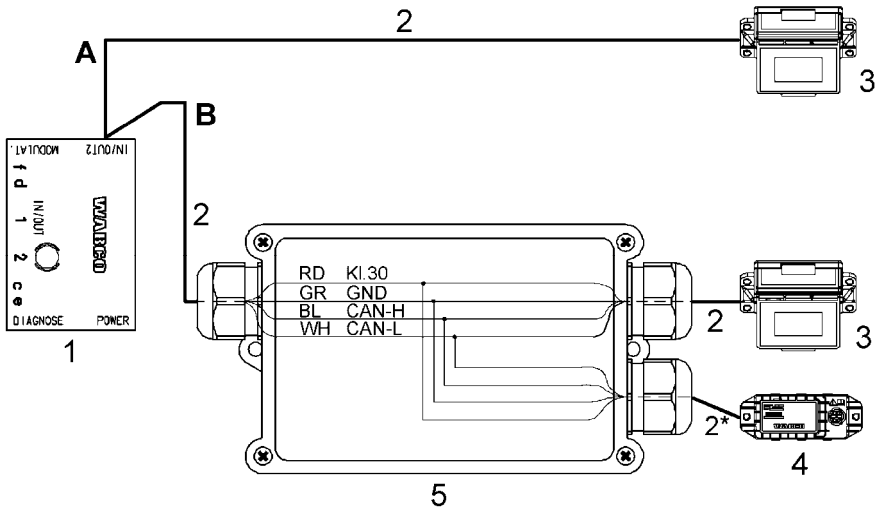
- Make sure that you install the ADR version (446 192 111 0) of the SmartBoard in ADR vehicles (see chapter 2.1 "SmartBoard for ADR (GGVS) vehicles", page *9*).
- Disconnect the power supply to the towing vehicle. Consider any risks with regard to the short circuiting of batteries in the vehicle see chapter 1.1 "Measures for avoiding electro-static charge and uncontrolled discharging (ESD)", page *7*.
- Select the appropriate wiring diagram according to your system configuration (see chapter 8.3 "Circuit diagrams", page *54*).
- Select an installation location on the frame that is easily accessible for the user and that can be reached by the planned connecting cable.
  The installation location should be protected from spray water or be located on the operating console.
- Use the drilling template for performing any drilling (see chapter 8.4 "Drilling template", page *56*).
- Fasten the device on vehicle frames with four M8 bolts and tighten the bolts securely. Tightening torque: 15 Nm +/-15 %.
- Install cables according to the circuit diagram in parallel with already existing wiring harnesses. Form large loops from ample lengths.
- Cable the SmartBoard with the Trailer EBS modulator. Press the cable plug-connector into the slot applying a little initial force. All connections must be assigned a cable or have a closing cap.
- Fasten the cable only on solid elements that are connected with the components, e. g. the vehicle frame. Fastening to flexible elements can cause cable breaks and the seal can be broken.
  Fasten the cable and plug so that no tension or lateral forces affect the plug-in connections. Avoid laying cables across sharp edges or near aggressive media (acids for example).
  Fasten the cable a maximum of 30 cm after the device, e. g. with a cable tie.

The SmartBoard casing must not be opened unless the battery needs to be replaced by a specialist workshop.
It is not permitted to paint or spray the SmartBoard.

5.1 Cabling Instructions

SmartBoard connection to Trailer EBS D (circuit diagram 841 801 913 0)

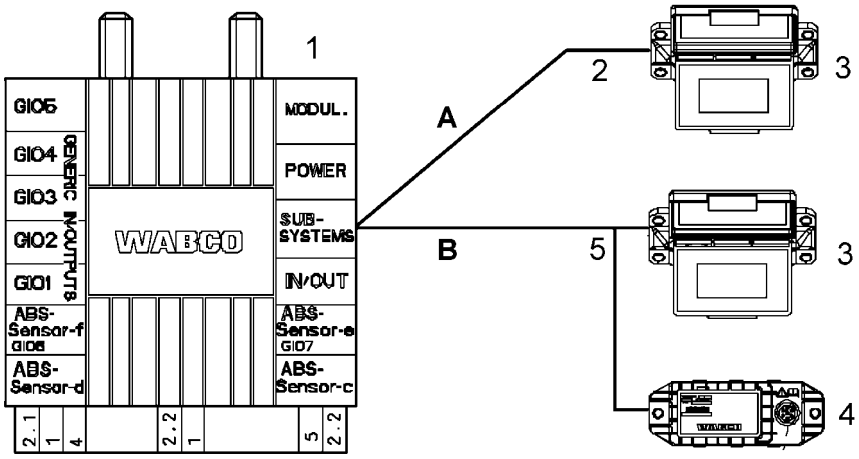
The SmartBoard is connected to connection IN/OUT2 of the Trailer EBS D modulator. CAN 2 must be activated with the diagnostic software.



B Option Trailer EBS D with SmartBoard
B Option Trailer EBS D with SmartBoard and tyre pressure monitoring (IVTM)
1 Trailer EBS D Modulator 480 102 014 0
2 Line of cables 449 377 ... 0 (* maximum length: 0,3 m, only with IVTM)
3 SmartBoard 446 192 110 0
4 Tyre pressure monitoring (IVTM) 446 220 014 0
5 Distribution box

SmartBoard connection to Trailer EBS D (circuit diagram 841 802 155 0 / 159 0)

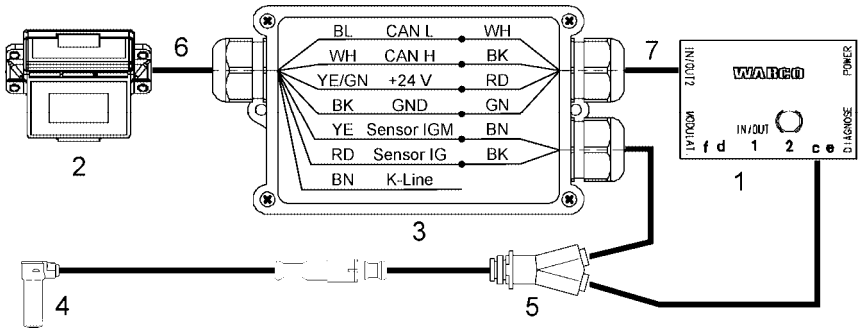
The SmartBoard is connected to connection SUBSYSTEMS of the Trailer EBS E modulator.



B Option Trailer EBS E with SmartBoard
B Option Trailer EBS E with SmartBoard and tyre pressure monitoring (IVTM)
1 Trailer EBS E modulator 480 102 ... 0
2 Line of cables 449 911 ... 0
3 SmartBoard 446 192 110 0
4 Tyre pressure monitoring (IVTM) 446 220 ... 0
5 Line of cables 449 916 ... 0

ABS sensor connection to the SmartBoard (only required with Trailer EBS D)

To operate the odometer counter of the SmartBoard in combination with Trailer EBS D, an ABS sensor must be wired to the SmartBoard using a Y-cable. Connect the cable ends in a junction box according to the diagram.



1 Trailer EBS D modulator 480 102 014 0
2 SmartBoard 446 192 110 0
3 Distribution box
4 ABS sensor 441 032 578 0 / 441 032 579 0
5 Y-cable 894 590 075 0
6 Cable 449 637 050 0
7 Line of cables 449 378 ... 0

5.2 Start-up

The SmartBoard is ready for operation immediately after it has been connected to Trailer EBS. Parameter settings are only required in special cases.

– Connect the ABS connector to the towing vehicle and switch the ignition on.

– Implement special settings according to the table below if applicable.

If no Trailer EBS D ECU data are displayed (odometer, system information), check activation of CAN 2 via diagnostics on Trailer EBS D.

Situation	Sequence
The SmartBoard was previously operated with a different Trailer EBS or the vehicle system configuration has changed.	Execute the <AutoConfig> function from the <Tools> menu (see chapter 4.4.14.4 "Auto Config", page *36*).
Ensure the correct output of the internal odometer (Trailer EBS E or Trailer EBS D and Y sensor cable)	Set the tyre parameters in the <Tyres> menu (see page *33*). This function is also available via the diagnostic software.
Setting the date and time so that messages can be linked to the correct time of their occurrence (not available in ADR version 446 192 111 0)	Set the date and time in the <Clock> menu (see page *32*). This function is also available via the diagnostic software.
Set the language	Set the language parameters in the <Language> menu (see chapter 4.4.13 "Language", page *28*). This function is also available via the diagnostic software.
Set further parameter values	Parameter setting see chapter 6.4 "Diagnostic Software „SmartBoard"", page *45*.

6 Diagnosis

Diagnostics allows the following functions:

- Display of diagnostic messages
- Setting the parameters of the Smartboard
- Updating the internal operating software of the SmartBoard
- Saving the Start Screen (Splash-Image) to the SmartBoard

6.1 Diagnostic Connection

The diagnosis is performed via the diagnostic port of the Trailer EBS E or the ISO plug-in connection via CAN. For this purpose, the SmartBoard must be connected to the Trailer EBS and the vehicle must be supplied with power via the ABS socket.

ISO7638 towing vehicle/trailer interface

For diagnosis via the ISO 7638 towing vehicle-/trailer interface, an ISO 7638 connection adapter is installed between the coiled flex-cable from the towing vehicle and the ISO 7638 plug-in socket.

Diagnostic Interface	Diagnostic cable	Connection adapter
446 301 021 0 (serial) 	CAN Converter 446 300 470 0 	446 300 360 0 
446 301 022 0 / 030 0 	446 300 361 0 or 446 301 362 0 	446 300 360 0 

Diagnostic port for Trailer EBS E

The diagnosis via the external diagnostics socket of the Trailer EBS E is only possible with Premium modulators (5 V CAN bus).

Diagnostic Interface	Diagnostic cable	Connection on the vehicle
446 301 022 / 030 0 (USB) 	446 300 348 0 	Diagnostics socket with yellow cap 

6.2 Hardware

PC / laptop

WABCO offers you a workshop-suitable, impact- and contamination-resistant laptop. This "Toughbook" with preinstalled Diagnostic Software can be obtained from WABCO.

The Diagnostic Software will run on all standard PCs with an operating system Microsoft Windows 2000 or higher however.

There are no other special requirements of the hardware. The PC should however have a free USB connector or a free serial connector (COM interface 9-pin) to connect the diagnostic interface.

Diagnostic Interface Set

To set up the diagnosis, the WABCO Diagnostic Interface Set with order number 446 301 030 0 (USB connection) is required. The set contains the Diagnostic Interface and a USB connecting cable to the PC or laptop.

The old Diagnostic Interfaces with serial connection (446 301 021 0) and with USB connection (446 301 022 0) can still be used.

6.3 Diagnostic Software

There are three ways to obtain the Diagnostic Software:

- Offline as a USB stick version
- Online as a single download
- As a part of a WABCO system diagnostics subscription

For the diagnosis of multiple WABCO systems, WABCO offers you four different Diagnostic Software subscriptions via the Internet. These contain numerous diagnostic programs at one very low price.

On the Internet, on Web page www.wabco-auto.com in the quick access area, click on "Diagnosis" and then on "WABCO System Diagnostics". There, you will find further information and can order the Diagnostic Software in your language and to load onto your PC.

6.4 Diagnostic Software “SmartBoard”

With diagnostic software "SmartBoard" (WABCO number 246 301 609 0), the SmartBoard can be configured to customer specifications.

6.4.1 Parameter setting

The parameter settings dialogue is opened via the "System" menu item.

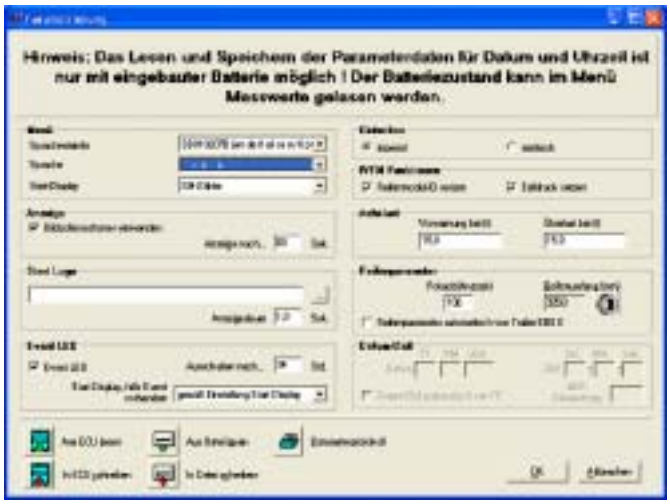


fig. 6-1: Dialogue "Parameter Settings"

The following settings can also be made in the parameter definitions.

- In the <Language> menu, the language package A or B can be selected (see chapter 4.4.13 "Language", page *28*).
- To save these settings in the SmartBoard, select the <Write to ECU> button.
- The settings can also be saved in a parameter file on a PC.

  To save the settings in a file, select the button <Write to file>.
- A parameter file previously saved in this way can be loaded into the dialogue by selecting the button <Read from file>.
- The same button is used to generate a parameter protocol.

6.4.2 Updating the internal operating software of the SmartBoard

The menu item <Download Application> from the <System> menu can be used to update the operating software of the SmartBoard. The software is provided in the form of a file.

This file can be selected using the button <Read from file>. The button <Write to ECU> must be selected to start the download.

Only official operating software approved by WABCO can be downloaded into the ECU.
In the event that the download is interrupted, it can easily be started again at a later point. However, the ECU will not function until the download has been completed successfully. The vehicle is then not permitted to be used on public roads.

6.4.3 Download of the "Splash Image"

The PC Diagnostics provides a dialogue for writing any desired flash image to the ECU.

For instructions and requirements for creating the file, see chapter 4.6.1 "Start Screen (Splash Image)", page *39*.

– Open menu item <Download Start Logo> from the <System> menu.

– Select splash image using the button <Read from file>.
After it has been selected, it appears in the preview window.

– The splash image is written to the ECU when the button <Write to ECU> is pressed.

6.4.4 SmartBoard system plate

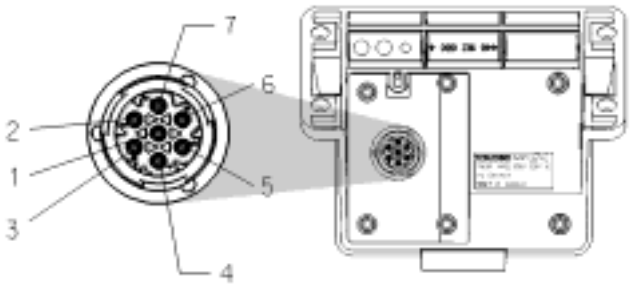
The Diagnostic Software can be used to create a SmartBoard system plate that shows the settings. Attach this system plate clearly visible next to the SmartBoard.

fig. 6-2: SmartBoard system plate

The blank foil for this system plate can be obtained from WABCO, order number 899 200 922 4. A laser printer must be used to print the date onto the foil.

7 Workshop instructions

7.1 Pin assignment



1 CAN low (ISO 11898)
2 K-line (ISO 14230)
3 Ground
4 Wheel-speed sensors (IGM)
5 Wheel-speed sensors (IG)
6 CAN high (ISO 11989)
7 Supply connection (electrical)

7.2 EBS parameters

This function permits the transfer of parameter settings from one Trailer EBS Modulator into a new modulator of the same type. This facilitates replacing a defective modulator (see page *31*).

The following conditions apply here:

- Trailer EBS D (Premium) and Trailer EBS E (Standard and Premium) are supported.
- The modulator that is to receive the parameter settings must be new.

  (Definition new: odometer reading <1 km and no initial start-up has yet been performed)

  If this requirement is not met, the menu <Write parameter> is not available.
- Only modulators with identical part numbers, software versions, and parameter versions may be the source / target for the parameter settings.

  If this requirement is not met, the message "Modulator not compatible" appears.
- The parameter set is read out from the modulator automatically. This takes place after the modulator has been commissioned (EOL test performed by customer).

  The parameter set will not be automatically read out and stored in the SmartBoard unless the commissioning test (EOL test by customer) has been carried out.
- The parameter set is read out automatically only once. Subsequent changes are not taken into account. To take those into account, the parameter set must be read out manually using the function <Read parameters>.

The commissioning test must be performed after the parameter set has been read into a modulator. The vehicle must be taken to a WABCO Service Centre as soon as possible for this purpose.

7.3 "Battery almost empty" indication

Not available in ADR version 446 192 111 0

The battery is designed to have an average life of five years; this may not be attained, however, if it is subjected to extremely frequent use with an unhitched trailer.

When the battery only has 10 % of the original charge left, the "Battery almost empty" indication is displayed for one second after the start logo and the disclaimer appears for one second after the device is switched on.

If the battery voltage is no longer sufficient to operate the internal real-time clock, the menu <Extras> <Settings> <Clock> is greyed out. It is then no longer possible to transmit the time via CAN, i. e. the ODR data of the Trailer EBS E can no longer be saved together with the time.
The internal odometer reading also does not function.

7.4 Replacing the battery

(not applicable for ADR version 446 192 111 0)

The SmartBoard has a replaceable battery. The battery status can be accessed via the menu <Extras> <System Info> <SmartBoard>. If the capacity of the battery is depleted, the SmartBoard can only be used if it is powered from a power supply provided in the towing vehicle.

A replacement of this battery must be performed by an authorised specialist workshop. A repair kit (No. 446 192 920 2) is available for this purpose; it describes the work steps in detail. Also see the spare part sheet on the Internet at www.wabco-auto.com under the menu item INFORM.

Batteries are hazardous waste.
Dispose of hazardous waste in an environmentally friendly manner and in compliance with relevant national regulations.

7.5 Care and Cleaning

Use only a damp cloth to clean the SmartBoard. Never use cleaning agents.

Detergents and other chemicals can damage the display and the keyboard and must never come into contact with the SmartBoard.

7.6 Electronic media durability

- Approved for exterior installation
  Class "Zd"
- Electronic media durability according to prior consultation

8 Annex

8.1 Diagnostic messages

The messages always consist of four elements:

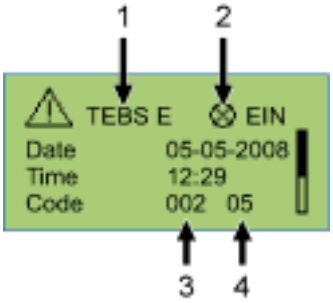


fig. 8-1: Example for the "Messages" menu

1 The system that triggered the message
2 Current message: yes/no
3 The component concerned
4 The type of fault

In the example shown above, a message with the following content is displayed:

"Fault 05 (fault type: "Supply line interrupted") has occurred at component 002 "Wheel sensor b“) of TEBS E.

System Trailer EBS D: Component

Message	Explanation
001	Wheel sensor a
002	Wheel sensor b
003	Wheel sensor c
004	Wheel sensor d
005	Wheel sensor e
006	Wheel sensor f
007/008	Trailer modulator
009	Trailer modulator / Solenoid control
010	EBS (ABS) Relay Valve
058/059	Trailer modulator
061	EBS relay valve
062	EBS relay valve / Pressure sensor
069	Axle load sensor
075	Wear sensor
076	No nominal value available
077	Desired-pressure sensor
078	Desired-pressure sensor external
081	Pneumatic control line
082	Pneumatic supply line
083	Supply pressure sensor
084	Electronic switch output 1
085	Electronic switch output 2
086	Electrical switch output 5 (IN/OUT 1)
088	Lateral acceleration sensor
220	Data link towing vehicle/ Trailer
221	Trailer modulator / Sensor power supply 24V
232	Trailer modulator / Sensor power supply 5V
246	EBS-Trailer brake valve / Switch
251	Power supply
253	Parameter setting
254	Trailer modulator

Table: 8-1: System Trailer EBS D, Messages Component

System Trailer EBS D: Type of fault

Message	Explanation
00	Value too high
01	Value too low
02	Data is irregular or incorrect
03	Overvoltage / Short circuit to 24 V
04	Undervoltage/ Short circuit to ground
05	Permanent current consumption
05	Current too high
07	Air gap too big
08	Slip
09	Data reception fault
11/12	see failure note
13	Characteristic curve error
14	Special faults / See fault info
15	Residual pressure

Table: 8-2: System Trailer EBS D, Messages Fault Type

System Trailer EBS E: Component

Message	Explanation
001	Wheel sensor a
002	Wheel sensor b
003	Wheel sensor c
004	Wheel sensor d
005	Wheel sensor e
006	Wheel sensor f
007	EBS (ABS) relay valve / Solenoid control
009	Trailer modulator / Solenoid valve control H2
010	Trailer modulator/Solenoid valve control H1
058	EBS relay valve / Redundancy
059	EBS relay valve / Pressure sensor
061	Trailer modulator / Redundancy
062	Trailer modulator / Pressure sensors H1 / H2
069	Axle load sensor internal
075	Wear sensor
076	Failure of nominal value selection / Redundant braking
077	Desired-pressure sensor internal
078	Desired-pressure sensor external
082	pneumatic supply line missing
088	Lateral acceleration sensor

Message	Explanation
089	Proximity switch
090	Freely configurable function 8
091	Freely configurable function 7
092	Freely configurable function 6
093	Freely configurable function 5
094	Freely configurable function 4
095	Freely configurable function 3
096	Freely configurable function 2
097	Freely configurable function 1
100	GIO-Freely configurable analogue function
101	GIO-Freely configurable digital function
102	Slot GIO 5
103	Slot GIO 4
104	Slot GIO 3
105	Slot GIO 2
106	Slot GIO 1
107	Slot GIO 6
108	Slot GIO 7
109	ABS sensor/ Memory bit
110	Slot Subsystems
111	Button Relaxation function
112	Button Lifting axle forced lowering
113	SmartBoard
114	Diagnostics Power supply
115	Telematics
116	IVTM
117	ECAS Remote Control Unit / Box
118	Axle load sensor external (axle c, d)
119	Axle load sensor external (axle e, f)
120	Distance sensor axle load (axle c, d)
121	Distance sensor axle load (axle e, f)
122	freely programmable function 3
123	freely programmable function 2
124	freely programmable function 1
125	Switch unloading level
126	Output speed signal
127	Distance sensor 2 (axle e, f)
128	Distance sensor 1 (axle c, d)
129	ECAS valve block
130	Output steady positive voltage 2
131	Output steady positive voltage 1
132	Output RSS active signal
133	Output ABS active signal
134	Switch road finisher brake
137	Speed switch 2 (ISS 2)
138	Speed switch 1 (ISS 1)
139	Valve residual pressure maintenance for manoeuvre assistance
140	Valve residual pressure maintenance for traction help
141	Lifting axle valve 2
142	Lifting axle valve 1
143	Pneumatic control line
144	Supply pressure sensor
145	external ELM
146	external ECAS
148	internal ECAS / Calibration
156	J2497
157	Switch normal level 2
158	Button Lift
159	Button Lower
160	Brake release function
163	Axle load calibration
167	Output Steering axle lock
168	Switch Steering axle lock
170	Output Tilt warning
178	Valve Immobilizer
179	Buzzer Immobilizer
180	Router/Repeater
220	Data link towing vehicle/ Trailer
250	J1708
251	Power supply
253	Parameter setting
254	Trailer modulator

Table: 8-3: System Trailer EBS E, Messages Component

System Trailer EBS E: Type of fault

Message	Explanation
00	Value too high
01	Value too low
02	Data is irregular or incorrect
03	Overvoltage / Short circuit to 24 V
04	Undervoltage/ Short circuit to ground
05	Permanent current consumption
06	Current too high or circuit grounded
07	Air gap too big
08	Slip
09	Signal failure
10	Jump up / Jump down
11	see failure note
12	see failure note
13	Characteristic curve error
14	Special faults / See fault info
15	Residual pressure

Table: 8-4: System Trailer EBS E, Messages Fault type

System IVTM: Component

Message	Explanation
0639	CAN (short circuit / bus off)
0927	Warning lamp 2 (optional / pin 4)
0928	Warning lamp 1 (standard / pin 2)
0929	Tyre data cannot be analysed
1121	Data on the CAN data bus

Message	Explanation
3011	Pressure in tyre on axle 1, outer wheel left
3012	Pressure in tyre on axle 1, inner wheel left
3013	Pressure in tyre on axle 1, inner wheel right
3014	Pressure in tyre on axle 1, outer wheel right
3021	Pressure in tyre on axle 2, outer wheel left
3022	Pressure in tyre on axle 2, inner wheel left
3023	Pressure in tyre on axle 2, inner wheel right
3024	Pressure in tyre on axle 2, outer wheel right
3031	Pressure in tyre on axle 3, outer wheel left
3032	Pressure in tyre on axle 3, inner wheel left
3033	Pressure in tyre on axle 3, inner wheel right
3034	Pressure in tyre on axle 3, outer wheel right
3041	Pressure in tyre on axle 4, outer wheel left
3042	Pressure in tyre on axle 4, inner wheel left
3043	Pressure in tyre on axle 4, inner wheel right
3044	Pressure in tyre on axle 4, outer wheel right
3051	Pressure in tyre on axle 5, outer wheel left
3052	Pressure in tyre on axle 5, inner wheel left
3053	Pressure in tyre on axle 5, inner wheel right
3054	Pressure in tyre on axle 5, outer wheel right
3111	Leakage at tyre or valve on axle 1, outer wheel left
3112	Leakage at tyre or valve on axle 1, inner wheel left
3113	Leakage at tyre or valve on axle 1, inner wheel right
3114	Leakage at tyre or valve on axle 1, outer wheel right
3121	Leakage at tyre or valve on axle 2, outer wheel left
3122	Leakage at tyre or valve on axle 2, inner wheel left
3123	Leakage at tyre or valve on axle 2, inner wheel right
3124	Leakage at tyre or valve on axle 2, outer wheel right
3131	Leakage at tyre or valve on axle 3, outer wheel left
3132	Leakage at tyre or valve on axle 3, inner wheel left
3133	Leakage at tyre or valve on axle 3, inner wheel right
3134	Leakage at tyre or valve on axle 3, outer wheel right
3141	Leakage at tyre or valve on axle 4, outer wheel left
3142	Leakage at tyre or valve on axle 4, inner wheel left
3143	Leakage at tyre or valve on axle 4, inner wheel right
3144	Leakage at tyre or valve on axle 4, outer wheel right
3151	Leakage at tyre or valve on axle 5, outer wheel left
3152	Leakage at tyre or valve on axle 5, inner wheel left
3153	Leakage at tyre or valve on axle 5, inner wheel right
3154	Leakage at tyre or valve on axle 5, outer wheel right
3410	Tyre pressure deviation left - right on axle 1
3420	Tyre pressure deviation left - right on axle 2
3430	Tyre pressure deviation left - right on axle 3
3440	Tyre pressure deviation left - right on axle 4
3450	Tyre pressure deviation left - right on axle 5
3500	Tyre pressure deviation relative to optimum values in the tyres of all wheels on the vehicle

Table: 8-5: System IVTM, Messages Component

System IVTM: Type of fault

Message	Explanation
00	no description of the detected fault
01	Value above the critical, maximum limit value
02	Value below the critical, minimum limit value
03	Implausible signal
04	No signal
05	Short circuit with ground
06	Short circuit with the supply voltage
07	Value below the specified limit value
08	Invalid signal
09	Device error
10	Interruption
11	Slight drift of the signal value
12	Medium drift of the signal value
13	Large drift of the signal value
14	Value above the specified limit value
15	reserved

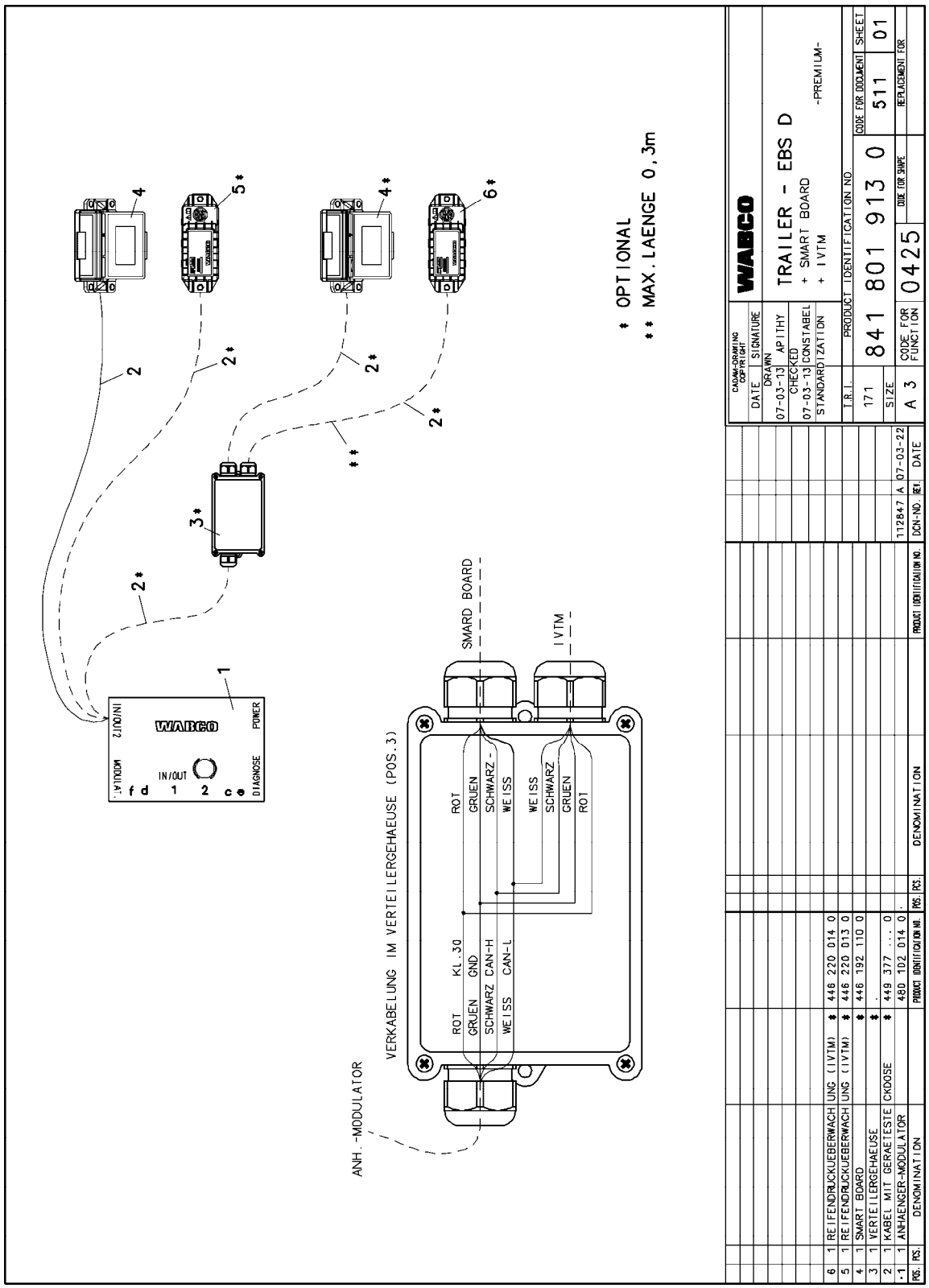
Table: 8-6: System IVTM, Messages Fault Type

8.2 Technical data

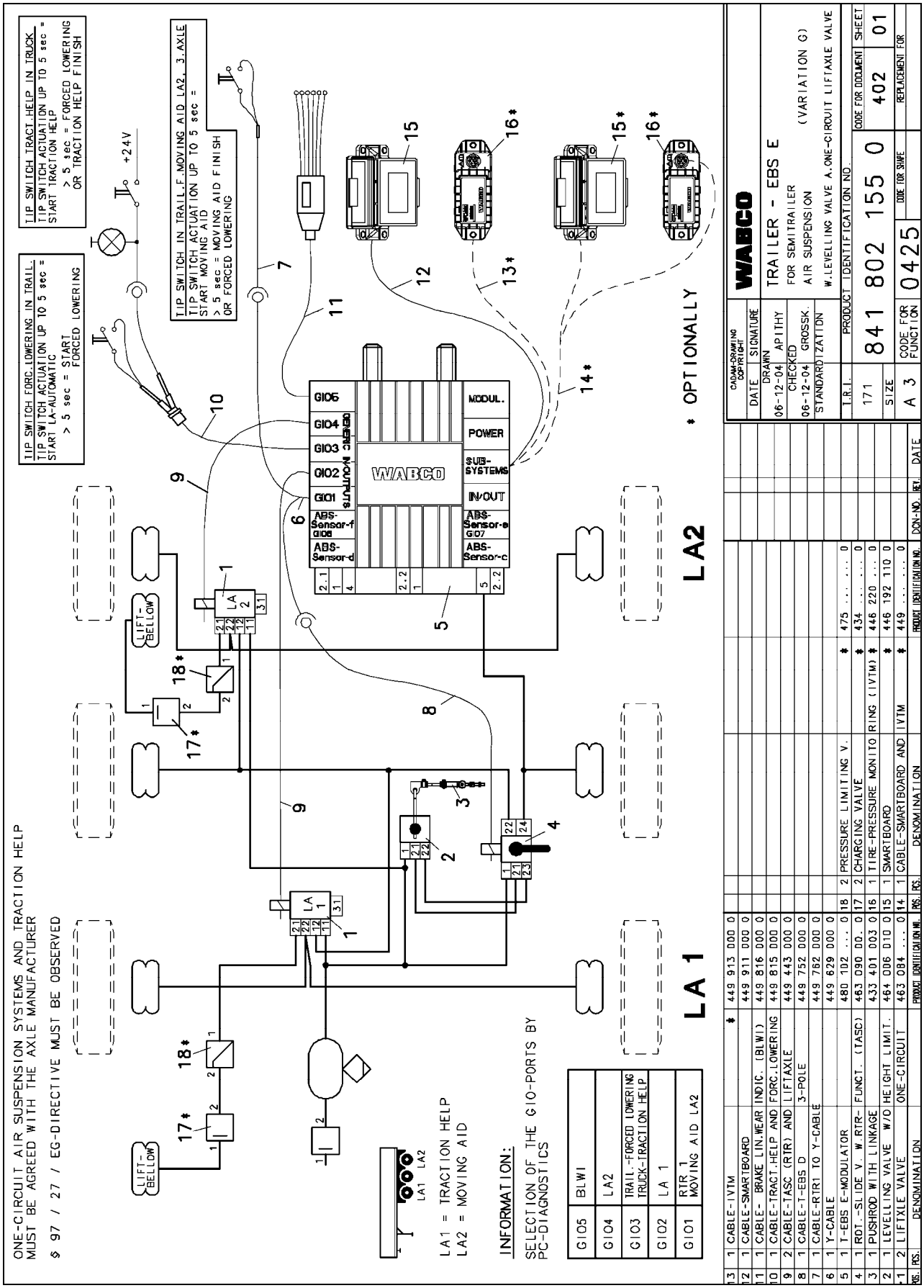
Property	Value
Protection class	The SmartBoard complies with protection class IP6k9k according to DIN 40050-9 (1993-05) even when the cover is open.
Certificates	e1*72/245*2006/28*4968*00
Operating voltage	12–24 V DC
Battery life	approx. 5 years

8.3 Circuit diagrams

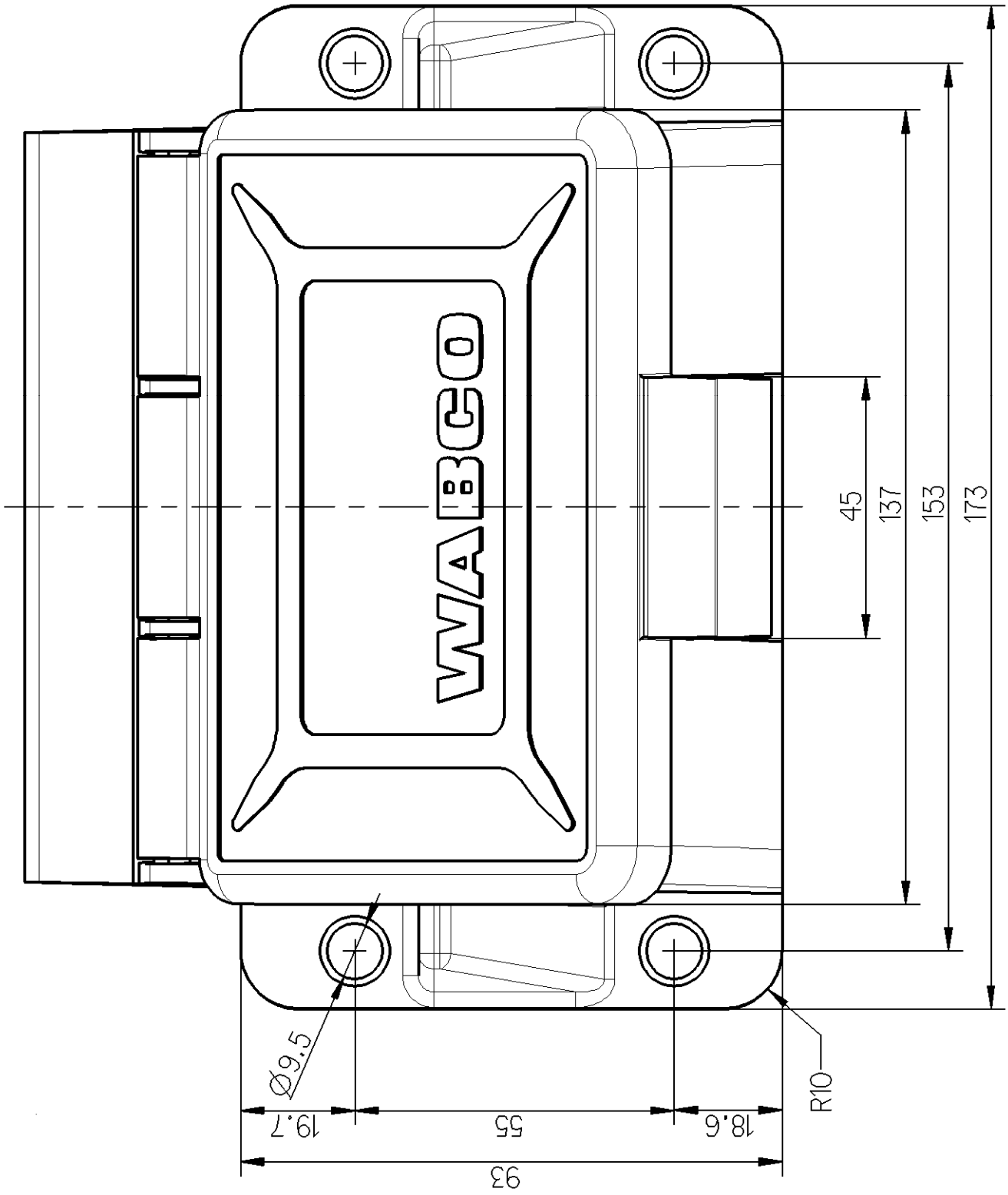
Circuit diagram 841 801 913 0: Trailer EBS D



Circuit diagram 841 802 155 0: Trailer EBS E



8.4 Drilling template



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