

# **Trailer EBS D**

## Retrofit Instructions

1st edition

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**Vehicle Control Systems**

An American Standard Company

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815 010 021 3

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### Legend



Additional hints, tips, information

– operation

• listing

↑ see (previous figure)

↓ see (subsequent figure)

## 1. Preparation

**!** This brochure will show qualified workshop staff with experience in pneumatic brake systems, how to easily fit Trailer EBS when replacing a conventional brake system on trailers.

- Before commencing the installation of WABCO EBS to your trailer, it is important to ensure that you have completed a Brake Calculation questionnaire.

This calculation will generate the information needed to program the installed EBS system.

**!** The document and the brake calculation can be obtained free of charge from the WABCO technical department.

For further information please refer to:

TEBS D System Description 815 000 420 3  
TEBS System Description 815 000 298 3  
TEBS Diagnostic Software 246 301 542 0

To retrofit both T EBS D and BVA (brake lining wear indicator) please refer to 820 001 150 3.

## 2. Wheel Sensors & Pole Wheels

It is also important to establish which type of ABS sensors and pole wheels are fitted to the vehicle.

The WABCO EBS system only operates with machined type toothed wheels, the number of teeth depending on the size of wheels used.

The pressed steel exciter rings found on some other systems cannot be used and must be replaced with pole wheels with the correct number of teeth. Usually 100 teeth for an axle with super single tyres.

- Please check the tyre data table in the WABCO diagnostic software help menu for further details.

The correct polewheels can be purchased from the axle manufacturer, along with WABCO wheel speed sensors 441 032 578 0 and sensor mounting brackets and bush.

- On vehicles with 3 axles and 2S/2M (2 Sensors/2 Modulators) system, sensors should be fitted on the middle axle.
- On a vehicle with 3 axles and 4S/2M (4 Sensors/2 Modulators) system, sensors should be fitted on the first and third axle or in case of lifting axle on those kept on ground.

## 3. Removing the Old System

- Before any of the pipes are removed from the existing system, it is good practice to label them.

This is to avoid problems later as some of the existing

pipe work can be reused.

A good selection of pipe fittings may be required to carry out the installation of the new system. All ports on the WABCO system are either M 16x1.5 or M 22x1.5 threads.

Remove the old unit and all relevant pipes and cables, including the green headboard warning lamp and its cable.

- Also at this point make a note of the location of the electrical junction box from where the EBS system can pick up brake light power.

Reservoir volumes need not to be considered if the vehicle has ABS before.

## 4. Checking of all new components

The new WABCO EBS system comes pre-packed as a kit. This kit contains all the components of a 2S/2M system.

For **higher driving safety**, we recommend a 4S/2M system for vehicles with more than one axle. Additional sensors and cables are to be ordered extra.

However, you can order all parts separately. This system is suitable for most 1-2 and 3 axle trailers and also 1-2 and 3 axle centre axle drawbar trailers.

**!** It is not however suitable for trailers with steered axle.

**!** WABCO recommend a 4S/3M system be used for these vehicles.

## 5. Kit content

- Unpack the system and check all components.

The kit should contain the following:

Components	Article-no.	Quantity	Length
Supply cable	449 172 120 0	1	12 m
Diagnostic cable + 24N	449 684 313 0	1	6 m cable diagnostic/ 10 m 24N
Sensor cables	449 712 030 0	2	3 m
EBS Trailer Modulator	480 102 014 0	1	
EBS Label Trailer	813 000 008 3	1	
Publication for kit	826 102 180 3	1	
Adhesive label	899 200 922 4	1	
Relay emergency	971 002 301 0	1	

# Trailer EBS D



fig. 1 449 172 120 0 Supply cable

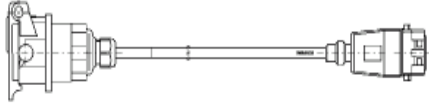


fig. 2 449 684 313 0 Diagnostic + 24N



fig. 3 449 712 030 0 Sensor cables



fig. 4 480 102 014 0 EBS Modulator



fig. 5 971 002 301 0 Relay Emergency Valve

Once you are satisfied that all the components are correct, you can continue with the installation.

## 6. Positioning of components

The position of the ECU/Modulator assembly on the trailer is critical to the operation of the EBS system.

It should be mounted in a central position above the axle or axles to be controlled (e.g. above the centre axle of a tri-axle trailer) or as near as possible.

This position is more critical when RSS function is used (↓ fig. 7). The reason for this position is to allow correct function of the internal roll sensor. This sensor will self-calibrate to take into account small variations in mounting position but will reject installation if it is outside the limits. Delivery pipes to the brake chambers on any one axle should be of the same length. Variation in length between axles is allowed.

## 7. Fitting the system

The ECU/Modulator should be fastened to a suitable bracket (not supplied by WABCO) or chassis cross member. A template for drilling the mounting holes is available.

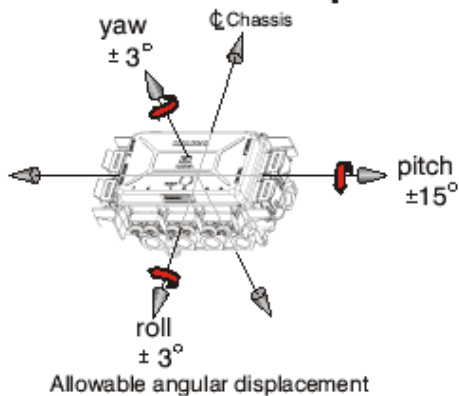
If a bracket is used, it should be **strong enough** to support the weight of the unit and the connected pipe work.

The unit can be mounted with the ECU facing forwards or backwards. This does not affect the performance of the system.

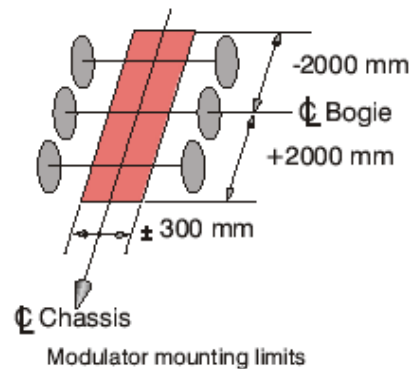


fig. 6 Modulator/ECU

## RSS Installation Requirements



Limits required to guarantee correct RSS function - for modulator 480 102 014 0



Note: use the **max. R<sub>dyn</sub>** of the brake calculation for parameter setting

fig. 7 Mounting specifications

## 8. Pneumatic Pipe connections

- The pneumatic pipes and hoses can now be connected.

The six pipes or hoses that feed the brake actuators should be connected first (tri-axle trailer).

**!** It is critical to the operation of the EBS system that these pipes and hoses are connected to the correct ports.

If the ECU is facing backward:

- The actuators on the nearside of the vehicle should be connected to ports 21.
- The actuators on the offside should be connected to ports 22. If the ECU is facing forwards, reverse the above.

These output ports are M 22x1.5 thread. Hoses, pipes and fittings with good flow characteristics should be used. The existing pipe work may be used if suitable.



fig. 8 Output ports 21 & 22

The next pipe to be connected should be the feed from the reservoir. This enters the unit at Port 1. A Port no. 1 is located at each end of the unit. Both ports are common. Either can be used.

- The redundant port should be plugged.

**!** The pipe used should be 18 mm diameter nylon pipe. However 15 mm may be used instead, if both no. 1 ports are used.

The original pipe will probably be of the correct size if an ABS system was fitted to the trailer previously.

The next pneumatic connection is to Port 4 of the unit. The pipe that connects to Port 4 is the signal pipe (usually 10 mm diameter) from the output port (Port 2) of the relay emergency valve.



fig. 9 Port 4 & Port 1

## 9. Signal from Air Suspension

- A signal pipe from the vehicle air suspension should be fitted to Port 5 of the EBS modulator.

**!** The pipe diameter should be a minimum of 6 mm.

This signal should be taken from an air bag connection on one side of the vehicle, but not from the lift axle circuit.



fig. 10 Port 5

## 10. Electrical connections

- Connect the sensor extension cables to the ends of the sensors.

**!** It is **important** to connect the extension cables to the ECU at the correct channels.

If the ECU is facing backwards:

- The nearside (left) wheel sensor should be connected into position **d** on the ECU.
- The offside (right) wheel sensor should be connected into position **c** on the ECU.

If the ECU is mounted facing forwards:

- Reverse the above.

The ECU has two sensor connections for each channel.

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! It is **important** that the blanking covers are retained, for the sensor inputs that are not used. Failure to observe this may cause water to enter the ECU.



fig. 11 Sensor d and c

An ISO 7638 power cable is provided in the kit.

- This should be installed carefully in the chassis and connected to the ECU at the connection marked POWER.
- The ISO socket should be fitted to the front of the trailer bulkhead using a suitable hole or bracket.

In some cases the socket may have to be removed in order to thread the cable down the chassis. A suitable tool is needed to remove the pins from the housing (↓ fig. 12).

An alternative power supply can be connected into the ECU using the power / diagnostic cable. One leg of the cable has the diagnostic socket fitted. The other cable has four bare wires.

- Plug this cable into the ECU at connection marked DIAGN.
- Locate the diagnostic socket on to a suitable bracket or hole in a chassis on the outside of the vehicle.

This will avoid having to gain access to the underside of the vehicle in order to carry out diagnostic work in the future.

The cable with the bare wires should be routed to a place where the alternative power supply can be connected e.g. chassis mounted junction box. The supply used is 24N. The colours of the wires are as follows:

- Red wire connects to the stop lamp feed (Pin 4 of the 24N socket).
- Brown wire connects to the earth circuit (Pin 1 of the 24N Socket).
- Green wire powers switched output 1(if used).
- Blue wire powers switched output 2 (if used).

The switched outputs (blue and green wires) are used to control external components if required, e.g. lift axle valve or colas valve etc.



fig. 12 Socket connections and function of ISO cable

## 11. Commissioning

! The system must now be programmed using WABCO diagnostic software.

- The data from the brake calculation should be entered along with other parameters, and a sign off test carried out.
- Power up the system using ISO 7638 power, connect lead and switch ignition on.

After a few seconds four clicks will be heard from the modulator valves. This is the system checking itself.

The dashboard warning lamp will come on with the ignition switch and the warning light will go out after the vehicle has moved at more than 7KPH. This is to check the function of the wheel speed sensors.

When the system is next powered and every time there after the lamp will go out after approximately three seconds, and will only come back on if a fault occurs.

The system must now be tested using the alternative power supply.

- Depress the footbrake and switch on ignition.

The self check clicks will be heard.

## 12. Fitting a separate Relay Emergency Valve (REV)

The valve has five ports. All the ports are either M 22x1.5 or M 16x1.5 thread. The ports are connected as follows:

### Port 1

Energy supply, usually the pipe that comes from Port 21 of the park/shunt valve.

! If there is no park/shunt valve fitted the pipe comes from the red coupling (emergency), 10 mm diameter pipe can be used.

## Port 2

This is the output from the REV and feeds air to either Port 4 of the LSV or Port 4 of the EBS system.

! Pipe diameter should be approximately 10 mm.

## Port 1-2

This pipe feeds the trailer reservoirs.

! Minimum pipe diameter should be 10 mm, although 12 mm is normally used.

## Port 4

! The pipe connected to this port comes from the yellow coupling (service), usually 10 mm diameter.

- After connecting all pipes to the REV the system can be charged with air, check for leaks and correct function.
- Also check the operation of the REV by disconnecting the red coupling and checking the service brakes apply.
- Also check correct operation of shunt button.

## 13. Approval of System

The following procedure is described for GB and might differ in other nations.

After installation and checking of the system the VTG10 form must be completed and the Vehicle Inspectorate (VI) informed to make sure the installation is correct. This can be done two ways:

1. If the customer has the appropriate WABCO diagnostic software, then once the installation is complete. It will produce a system sign off certificate. This is evidence of a successful installation of the EBS system.
  - Attach the certificate to the VTG10 form and send it to the VI.
2. If diagnostic software is not available, then contact WABCO technical for a list of approved WABCO service centres.
  - Contact your nearest service centre who will travel to your vehicle and sign off the EBS system.

The customer will be issued with a sign off certificate which can be attached to the VTG10 and sent to the vehicle inspectorate.

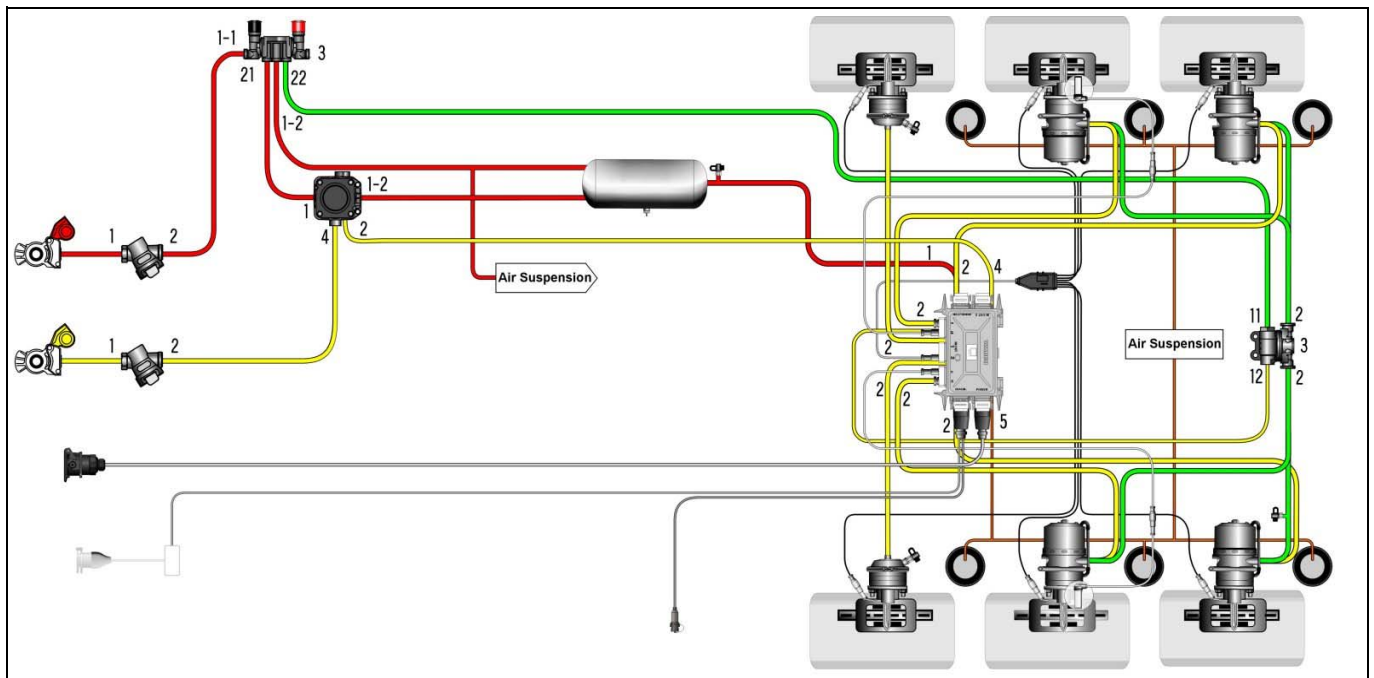


fig. 13 Semi-trailer braking system with EBS

# Trailer EBS D

Trailer Manufacturer

Trailer Model

Chassis Number(s)

				laden	unladen
<b>centre axle</b>					
	maximum mass	P	kg		
	drawbar hitch load	Pst	kg		
	axle load - axle 1	P1	kg		
	axle load - axle 2	P2	kg		
	axle load - axle 3	P3	kg		
	suspension pressure	Bp	bar		
<b>semi-trailer</b>					
	maximum mass	min max	P	kg	
	axle load - axle 1		P1	kg	
	axle load - axle 2		P2	kg	
	axle load - axle 3		P3	kg	
	C of G height		h	m	
	wheelbase		Er	m	
	suspension pressure		Bp	bar	
<b>full trailer</b>					
	maximum mass	P	kg		
	axle load - axle 1	P1	kg		
	axle load - axle 2	P2	kg		
	axle load - axle 3	P3	kg		
	C of G height	h	m		
	wheelbase	Er	m		
suspension press. - RA				Bp	bar
<b>brake data</b>				<b>axle 1</b>	<b>axle 2</b>
actuator size					
cam lever length				mm	
brake factor					
threshold torque				kgm	
brake approval number					
tyre size					
<input type="checkbox"/> drum <input type="checkbox"/> disc					
trailer modulator mounting position: <input type="checkbox"/> towards front <input type="checkbox"/> towards rear					
EBS configuration:				<input type="checkbox"/> 2S/2M <input type="checkbox"/> 4S/2M <input type="checkbox"/> 4S/2M+1 <input type="checkbox"/> 4S/3M	
sensed axle(s):				<input type="checkbox"/> c,d <input type="checkbox"/> axle 1 <input type="checkbox"/> axle 2 <input type="checkbox"/> axle 3	
				<input type="checkbox"/> e,f <input type="checkbox"/> axle 1 <input type="checkbox"/> axle 2 <input type="checkbox"/> axle 3	
lift axle(s):				<input type="checkbox"/> lift axle raised at <input type="text"/> kph ( 0 - 30kph )	
				<input type="checkbox"/> lift axle drops at <input type="text"/> % laden axle load	
output switch 1:				<input type="checkbox"/> lift axle control (ILS1) <input type="checkbox"/> speed switch (ISS)	
				ISS options: <input type="checkbox"/> standard <input type="checkbox"/> inverted <input type="checkbox"/> colas <input type="text"/> kph	
output switch 2:				<input type="checkbox"/> lift axle control (ILS2) <input type="checkbox"/> ECAS <input type="checkbox"/> ELM	
lining wear sensors				<input type="checkbox"/> indicator in every pad <input type="checkbox"/> sensor in one caliper	
roll stability support (RSS)				<input type="checkbox"/> single tyres <input type="checkbox"/> twin tyres	
connector IN/OUT1				<input type="checkbox"/> external axle load sensor	
				<input type="checkbox"/> traction help (TH) <input type="checkbox"/> traction help + solenoid (TH+)	
connector IN/OUT2				<input type="checkbox"/> ISO 7638 gateway <input type="checkbox"/> telematic (A) <input type="checkbox"/> telematic (B)	
				<input type="checkbox"/> external brake (command) pressure sensor	
warning lamp function:				<input type="checkbox"/> out after 2 sec. (ECE-R13) <input type="checkbox"/> out above 7kph	

fig. 14 Break calculation