



User Manual

Compact Tester II
446 300 430 0



1st Edition

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WABCO

Vehicle Control Systems
An American Standard Company

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Explanation of symbols

WARNING



Potentially hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION



Potentially hazardous situation which, if not avoided, may result in minor or moderate injury.



Additional instructions, information or tips that you should always observe.

- List
- Step

1 Safety Instructions

! WABCO will only guarantee the safety, reliability and performance of the Compact Tester if you follow all of the safety instructions from this manual.

Carefully read through all the safety instructions before starting diagnosis or repair work.

Never start a diagnosis or repair work until you have read and understood all the information required for the diagnosis.

WARNING  **Before you start diagnosis or repair work, please follow the instructions to avoid situations that could result in injury or death:**

While diagnosing, always adhere to the contents of this user manual.

Only trained and qualified personnel may use the Compact Tester or do repair work.

Always follow the specifications and instructions of the vehicle manufacturer.

Comply with the company and national accident prevention/health & safety regulations.

Please make sure that the vehicle cannot move away.

Wear any necessary protective clothing.

Attach a clearly marked note on the steering wheel that repair work / diagnosis is being performed on the vehicle.

Do not touch any vehicle components that are hot.

Make sure that nobody stays in danger areas.

Keep your hands and hair away from moving parts.

Do not wear a tie, wide clothing, open hair, bracelets or watches, etc. when working on the vehicle.

CAUTION  **Please do the following to ensure trouble-free operation of your Compact Tester:**

Never use the Compact Tester in the area of:

- Sources of heat (such as ovens),
- Exhaust gases,
- Magnetic fields,
- Sources of electricity.

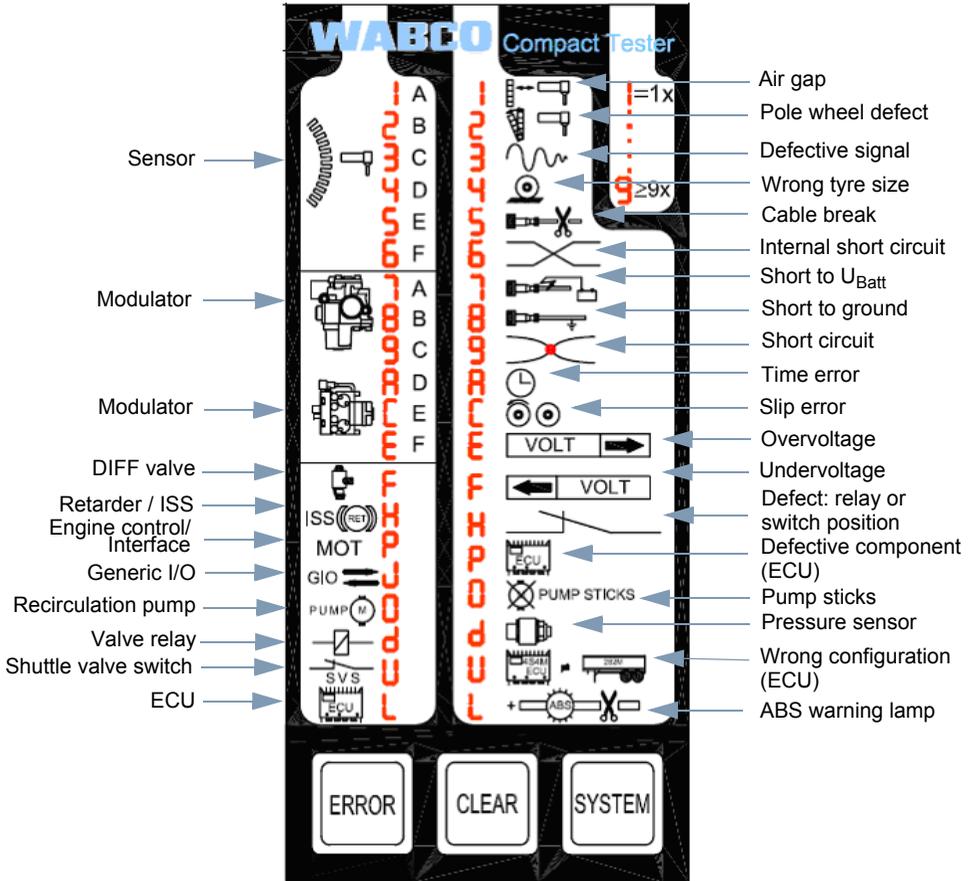
Otherwise, trouble-free functioning could be impaired.

Do not expose the Compact Tester to impact, shock or moisture (water or other liquids).

Never repair or service the internal components yourself, but take it to your WABCO dealer.

2 Meaning of pictograms

Front panel



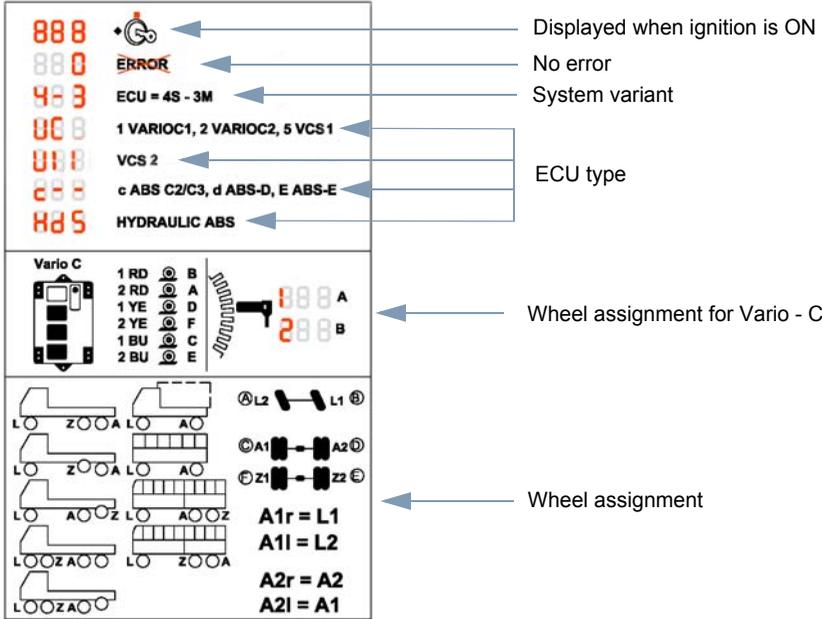
Abbreviations

ECU = Electronic Control Unit

ISS = Integrated Speed Switch

I/O = Input/Output

Back panel



3 WABCO ECUs supported by the Compact Tester

Compact Tester 446 300 430 0 is an easy-to-use diagnostic tool, which can be used to diagnose all WABCO ECUs for Truck, Trailer and Hydraulic ABS systems.

The ECUs, supported by the Compact Tester are listed below:

Part Number	Data Link Layer	Version / Type
Truck ECUs		
446 004 0xx 0	JED 677	ABS - C version
446 003 0xx 0		
446 004 3xx 0	JED 677	ABS - D version
446 004 4xx 0		
446 003 4xx 0		
446 004 3xx 0	KWP 2000	
446 004 3xx 0	SAE J 1587	
446 004 4xx 0		
446 003 4xx 0		
446 004 3xx 0	JED 677	ABS - E version
446 004 6xx 0		
446 003 7xx 0	KWP 2000	
446 004 3xx 0		
446 004 6xx 0		
446 003 7xx 0		
446 004 6xx 0		
446 003 7xx 0		
Hydraulic ABS ECUs		
446 044 070 0	KWP 2000	
446 044 074 0		
446 044 075 0		
446 044 076 0		
446 044 077 0		
446 044 078 0		
446 044 079 0		
446 044 080 0		
446 044 088 0		
446 044 089 0		
446 044 092 0		
446 044 093 0		
Trailer ECUs		
446 105 001 0 to 446 105 052 0	JED 677	Vario C
446 108 030 0 to 446 108 050 0	JED 677	VCS I
400 500 030 0 to 400 500 067 0		
472 500 001 0 to 472 500 021 0	SAE J 1587	TCS I
400 500 101 0 to 400 500 106 0		TCS II
446 108 070 0 to 446 108 089 0	KWP 2000	VCS II
400 500 070 0 to 400 500 089 0		

4 Functions

- Error display
- Deletion of stored errors
- Display of system configuration
- Functional testing of components
- Re-setting system and system initialisation
- Odometer (VCS I, VCS II and TCS)
- Speed threshold display ISS (VCS I)
- Reset service interval (VCS I)
- Display of Compact Tester II software version
- PIN compatible to Diagnostic Controller and Diagnostic Interface. You can use existing diagnostic cables.

5 Startup

- Push the nine-pole socket of the WABCO diagnostic cable (e.g. 446 300 401 0 for truck) into the connector on the Compact Tester.
- Push plug on the vehicle side of the diagnostic cable into the diagnostic socket on the vehicle.
- Switch on ignition.

The tester's display will be illuminated immediately (display: '888'). After approx. 1 second, the tester tries to establish the diagnostic connection with the ECU, which is indicated by running dashes on the display:

- Upper three dashes:
Searching inside Truck ECUs
- Middle three dashes:
Searching inside Trailer ECUs
- Lower three dashes:
Searching inside Hydraulic ABS ECUs.

When the connection has been successfully established, the type of system identified will be displayed.

Display	Comment
Truck Systems	
AbS	If Compact Tester establishes a connection with the ECU
ASR	Only if D/E-version or above is being used and ASR has been identified
C	C2/C3-Version
c-u	C-version with v limiter
d	D-Version
d-u	D-version with v limiter
E	E-Version
Trailer Systems	
UC1	Vario C1
UC2	Vario C2
UCS	VCS I
U II	VCS II
tCS	TCS I
t II	TCS II
Hydraulic ABS	
HdS	

! Due to repeated searching of ECUs, the display shows the running dashes when a system which cannot be tested by the Compact Tester is connected.

6 Buttons

6.1 Readout error memory (ERROR button)

- Push ERROR button to read out the actual (RAM) and the historical (EEPROM) error memory.

The error is shown as follows:

1 st digit	2 nd digit	3 rd digit
Path of error	Type of error	Occurrences

On the front panel of the Compact Tester, the errors are decoded with the help of pictograms. Groups of errors, which are related, are marked with a horizontal line (sensor, modulator or system). Different combinations of path and type of error may occur.

Examples

Display	Meaning
4 1 1	Sensor wheel D, air gap too large, has detected once
8 7 2	(Hydraulic/pneumatic) modulator wheel B, short to U_{Batt} , has detected twice
H 5 9	Retarder/ISS, cable break, has detected 9 or more times
O O 1	Recirculation pump, pump sticks, has detected once
L E 1	ECU, overvoltage, has detected once

Error allocation on housing sticker

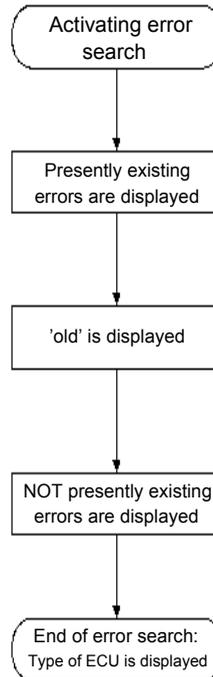
Left side of the front panel:

Number or character	Path of error	
1	Sensor	Wheel A (L2)
2		Wheel B (L1)
3		Wheel C (A1)
4		Wheel D (A2)
5		Wheel E (Z2)
6		Wheel F (Z1)
7	Modulator	Wheel A
8		Wheel B
9		Wheel C
A (10)		Wheel D
C (11)		Wheel E
E (12)		Wheel F
F (13)		DIFF valve
H (14)		Retarder/ISS
P (15)		Engine control/Interface
J (16)		Generic I/O
O (17)		Recirculation pump
d (18)		Valve relay
U (19)		Shuttle valve switch
L (20)		ECU

Right side of the front panel:

Number or character	Type of error
1	Air gap too large
2	Pole wheel defect
3	Defective signal
4	Wrong tyre size
5	Cable break
6	Internal short circuit
7	Short to U _{Batt}
8	Short to ground
9	Short/outside energy source/shorted coil
A (10)	Time error
C (11)	Slip error
E (12)	Overvoltage
F (13)	Undervoltage
H (14)	Defective relay, switch position
P (15)	Defective component (ECU)
O (17)	Pump sticks
d (18)	Pressure sensor
U (19)	Wrong configuration of ECU
L (20)	ABS warning lamp

While the ECU's error memory is being searched and sorted by the tester, a running display is shown.



By continuing to push the ERROR button, each subsequent error will be displayed¹.

First any existing errors (RAM) are displayed¹.

When all existing errors have been displayed, 'old' will appear¹.

This is followed by all non current (historical) errors (EEPROM) being displayed¹.

When the last error has been displayed, the type of ECU identified by the tester will be shown once again (e.g. 'Abs').

! ¹ When a button other than ERROR is pressed the error search is aborted and the type of ECU identified by the system is displayed.

6.1.1 Error search - Hydraulic ABS

Hydraulic ABS has two options for error display. After initialization of the Hydraulic ABS ECU, the display option will be:

1 st digit	2 nd digit	3 rd digit
Path of error	Type of error	'-'

- Simultaneously press SYSTEM and ERROR button for changing the display option.

Change of display option will be indicated by flashing of '- - -' for 2 seconds. Now the error display will be Failure Number corresponds to individual failure memory.

e.g. "011" for error code 1.1

"070" for error code 7.0

"104" for error code 10.4

- Simultaneously press SYSTEM and CLEAR button for changing the display option again to the previous one.

6.2 Clearing error memory (CLEAR button)

- Switch the ignition off and then on again.
- Push the CLEAR button for more than 0.5 seconds to clear the whole error memory of the ECU (RAM + EEPROM).

The deletion of error memory will be indicated by "Clr" on the display.

- Push ERROR button again to make sure that no error is in the memory.

! However, this is only done if there are no existing errors.

After this, the display once again shows the type of ECU identified (e.g. 'Abs').

6.3 System information (SYSTEM button)

- Push the SYSTEM button.

The configuration of the system identified by the ECU will be displayed. The indications for various ECU types are given below:

6.3.1 ABS-C (C2/C3)

For ABS-C the system is displayed as 4-channel or 6-channel.

WABCO Part Number

446 003 0XX 0 - 6-channel ABS

446 004 0XX 0 - 4-channel ABS

Display of the system for ABS-C:

	1 st digit	2 nd digit	3 rd digit
4-channel ABS	4	-	-
6-channel ABS	6	-	-

6.3.2 ABS-D & E

Display of system for ABS-D & E:

1 st digit	2 nd digit	3 rd digit
number of sensors	number of modulators if 1 modulator at front	number of modulators if 1 modulator at rear (if nS-3M)

System	Display
4S2M	4 - 2
4S3M-V	4 3 -
6S3M	6 3 -
4S3M-H	4 - 3
4S3+1M	4 3 1
4S4M	4 - 4
4S4Mx4	4 4 -
6S3+1M	6 3 1
6S4Mx4	6 4 -
6S4+1M	6 4 1
6S6M	6 - 6
6S6Mx4	6 6 -

6.3.3 Hydraulic ABS

1 st digit	2 nd digit	3 rd digit
number of sensors	-	number of modulators

System	Display
4S4M	4 - 4

6.3.4 Trailer

Display of the systems (only for VCS1)

1 st digit	2 nd digit	3 rd digit
number of sensors	'r' for retarder 'U' for ISS	number of modulators

System	Display
2S1M	2 - 1
2S1M + retarder	2 r 1
2S1M + ISS	2 U 1
2S2M	2 - 2
2S2M + retarder	2 r 2
2S2M + ISS	2 U 2
4S2M	4 - 2
4S2M + retarder	4 r 2
4S2M + ISS	4 U 2
4S3M	4 - 3
4S3M + retarder	4 r 3
4S3M + ISS	4 U 3

Display of the systems for Vario C, VCS II, TCS I and TCS II:

1 st digit	2 nd digit	3 rd digit
number of sensors	-	number of modulators

System	Display
2S1M	2 - 1
2S2M	2 - 2
4S2M	4 - 2
4S3M	4 - 3

7 Functional testing

! This menu item should be addressed only if no error is present.

After the initial installation of the ABS system or any modifications done to that system, the proper pneumatic/hydraulic and electrical allocations of the components must be checked.

7.1 Truck system - without brake pressure

The functional test is activated by pushing the following buttons:

- Push SYSTEM button and release. System used (e.g. '4 - 2') is displayed.
- Push CLEAR button for more than 2 seconds.

After 2 seconds, 'SYS' appears on the display. If the warning lamp was on, it will be go off before the CLEAR button is released. The ASR lamp (if present) will then come on for 1 second.

Pushing the CLEAR button for longer than 0.5 second causes the next test step to be addressed. If any other button is pushed for longer than 0.5 second, the functional test is aborted and the type of ECU identified appears on the display ('ABS').

7.1.1 Testing engine control

For 10 seconds, the Compact Tester transmits the request for idle operation. This is done to test engine control for ASR and any speed limiter.

- During that time, push the accelerator pedal down.

The engine speed will not increase within the 10 seconds. The display will show the remaining actuation time in seconds.

If no ASR is identified, the first digit of the display shows a dash in place of zero.

After this test the display shows 'SYS'.

! If a button other than CLEAR is pressed, the functional testing is aborted and the display shows 'AbS'.

7.1.2 Testing retarder control

When the CLEAR button is pushed again for longer than 0.5 second, the retarder is inactive for 5 seconds (display: '005'...'000'). Depending on the type of retarder used, the effect of this will vary. For more information, please refer to the test instructions for the appropriate retarder.

If no retarder is identified, the first digit of the display shows a dash in place of a zero.

7.1.3 Allocation testing

During allocation testing ASR is disabled, to enable ASR function the ignition must be switch off and on again.

After testing retarder control, any wheel can be turned without pressing the CLEAR button again. The display then shows the actual speed of the wheel being turned in km/h. This is done in full figures.

Example: If the speed of wheel A is 5.6 km/h the display shows 'A 0 5'.

! If the ECU detects a speed on more than one wheel, the display shows '- - -'. In this case, the functional test cannot be initiated, as the Compact Tester does not know which modulator valve to address.

A speed of more than 4 km/h must have been measured to allow the modulator valves to be actuated.

When the wheel, which had previously been turned, is once again stationary, the appropriate modulator is actuated.

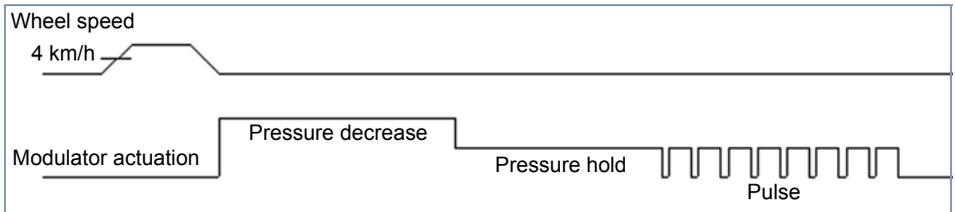
The sensor/modulator allocation is checked by determining that the correct sensor/modulator has been paired by way of listening or feeling.

! The functional test is aborted by pressing any button.

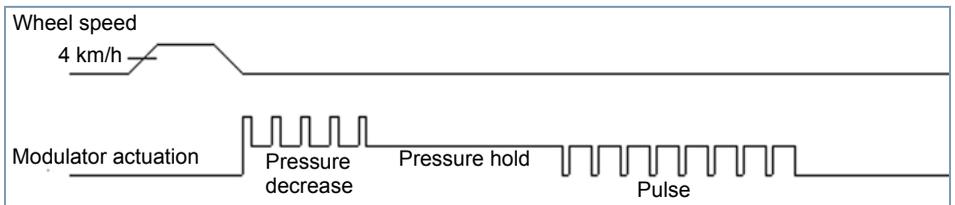
If wheels C or E are being turned, any DIFF valve, which may have been installed, is actuated during the pulse program.

If any of the wheels B, D or F are rotated, the pulse program 1 shall be followed.

If any of the wheels A, C or E are rotated, the pulse program 2 shall be followed. This cycle can be repeated if required by rotating the wheel. Pictorial representation of the pulse programs is shown in following diagrams.



Pulse program 1: Commissioning cycle of wheels B, D & F (if 6S6M) with control pressure



Pulse program 2: Commissioning cycle of wheels A, C & E (if 6S6M) with control pressure

7.1.4 Assignment of pulse program

System configuration	Rotated wheel	Actuated modulator valve	Pulse program no.
4S2M	A	A	2 (5x briefly)
1M front	B	A	1 (once prolonged)
1M rear	C	C	2
	D	C	1
4S3M	A	A	2
1M front	B	A	1
	C	C	2
	D	D	1
4S3M	A	A	2
1M rear	B	B	1
	C	C	2
	D	C	1
4S4M	A	A	2
	B	B	1
	C	C	2
	D	D	1
6S3M	A	A	2
	B	A	1
	C	C	2
	D	D	1
	E	D	1
	F	C	2
6S4M	A	A	2
	B	B	1
	C	C	2
	D	D	1
	E	D	1
	F	C	2
6S5M	A	A	2
	B	B	1
	C	C	2
	D	D	1
	E	F	1
	F	F	2
6S6M	A	A	2
	B	B	1
	C	C	2
	D	D	1
	E	E	1
	F	F	2

After successful functional testing, the system is operable.

7.2 Trailer ABS (not available in Vario C) - without brake pressure

Activating the functional testing:

- Press SYSTEM button.

System configuration is displayed.

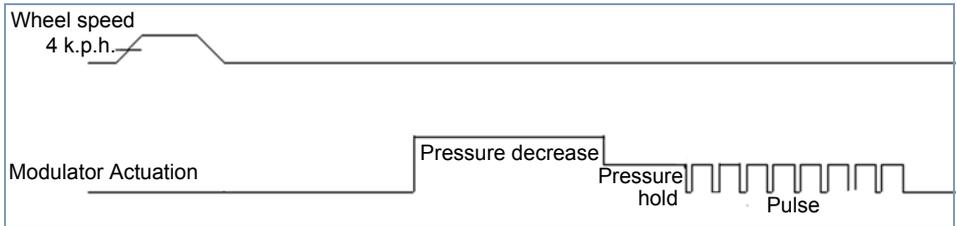
- Press CLEAR button for more than 2 seconds.

After 2 seconds, 'SYS' appears on the display.

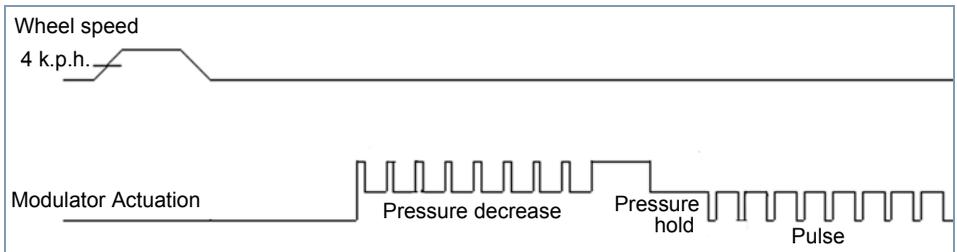
7.2.1 System check

The system check should only be done when there are no errors present. When a single wheel is rotated and stopped, the appropriate modulator valve is triggered.

This cycle can be repeated if required by rotating the wheel.



Pulse program 1: Startup cycle for wheels Z1, Z2 and L2 without brake pressure



Pulse program 2: Startup cycle for wheels H1, H2 and L1 (d, c) without brake pressure

7.2.2 Assignment of pulse program

System configuration	Rotated wheel	Actuated modulator valve	Pulse program No.
2S1M	Z1	H1	1
	H1	H1	2
2S2M	H2	H2	2
	H1	H1	2
4S2M	H2	H2	2
	H1	H1	2
	Z2	H2	1
	Z1	H1	1
4S3M	H2	H2	2
	H1	H1	2
	Z2	L	1
	Z1	L	2

7.3 Hydraulic ABS

Activating the functional testing:

- Press SYSTEM button.
- Press CLEAR button for more than 2 seconds.

After 2 seconds, 'SYS' appears on the display.

7.3.1 Allocation testing

! If the tester is directly fed from the battery, whenever the ECU is switched off and then on again the tester also needs to be switched off and on again.

When the system enters allocation test mode, all inlet valves will be continuously closed.

- Depress the brake pedal constantly.

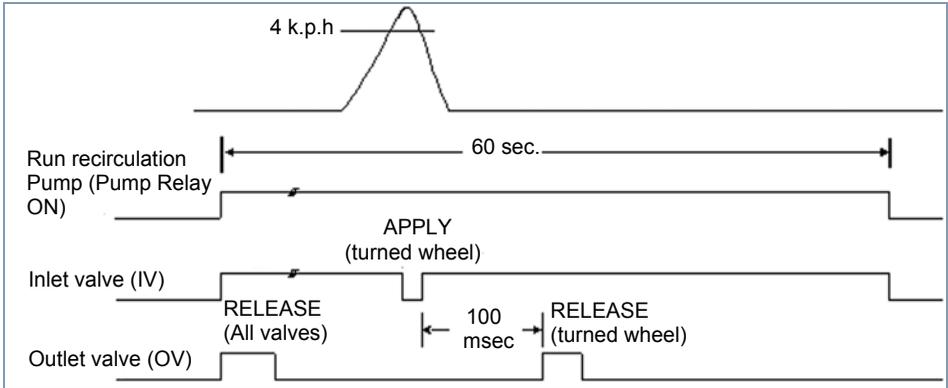
If one wheel is turned by hand faster than 4 km/h the system responds with a short pressure increase phase at the related wheel.

Therefore, the turned wheel stops and can be turned freely again after the pressure phase has finished. This test can be performed at all four wheels.

! It is especially important with driven axles that only one wheel spins. If necessary, other wheels must be blocked.

The display always shows the wheel indicator (A ... D) and the actual speed of the turned wheel in km/h.

If the ECU detects a speed on more than one wheel, the display shows '- - -' and the allocation test cannot be continued because the compact tester does not know which modulator valve to address.



Pulse program of HABS valve actuation

8 System reconfiguration / initialisation

! Do not activate the reconfiguration / initialisation if you have present errors because the system could be changed.

Activating the reconfiguration / initialisation:

- Press SYSTEM button.

The actual system is displayed.

- Press SYSTEM button for more than 2 seconds.

8.1 Truck ABS

The ABS system can be made to once again recognize the components connected to it (ASR, engine control). The new status is stored in the parameters of the ECU. This function is available only for ABS-D/E systems.

In Truck ABS, when the system reconfiguration / initialisation is activated, the display will be cleared and after a short period the type of ECU identified shall appear in the display.

- Switch the ignition OFF and ON again.

! If the display shows '- - -', after activating the system reconfiguration / initialisation, it indicates that the system cannot be reconfigured.

8.2 Trailer ABS

In Trailer ABS, when the system reconfiguration / initialisation is activated, the display starts to flash with the acknowledged system. It is automatically recognised, the error memory is cleared and then the recognised system is displayed.

8.3 Hydraulic ABS

The Hydraulic ABS system can be made to once again recognise the retarder connected to it. The new status is stored in the parameters of the ECU.

In Hydraulic ABS, when the system reconfiguration / initialisation is activated, the display will be cleared and after a short period the type of ECU identified shall appear in the display.

- Now the ignition should be switched OFF and ON again.

! If the display shows '- -' after the button is pressed, it indicates that the system cannot be reconfigured.

! During functional testing if any other button is pressed for more than 0.5 sec the tester displays the type of ECU detected.

9 Special functions (only for trailer ABS)

9.1 Odometer reading

With the Compact Tester the total number of km can be read out. The necessary tyre parameters (tyre diameter, polewheel tooth no.) are already set in the memory of the ECU.

The number of km can be displayed with the following button combination:

- Simultaneously press CLEAR and SYSTEM button.

The starting signal for the km display is 3 horizontal lines ('- - -'). The km covered is displayed to 6 places. The digits are displayed 3 at a time, starting with the 3 highest figures.

- Press any button to display the first 3 places.
- Press again any button to display the next 3 places.

Example:

149 322 = 149,322 total km travelled.

If all figures one after another have been asked for, ECU type is displayed.

9.2 Display speed threshold (only for VCS I)

Display the speed threshold value (in k.p.h.):

- Simultaneously press ERROR and CLEAR button.

If no speed threshold is present the display shows OFF.

9.3 Reset Service Interval

An additional feature in future VCS electronic units is a service interval counter (in km).

When this service interval is exceeded the driver is informed by the rapid blinking (8 flashes) of the dash warning lamp after the ignition is switched on.

To reset the service signal:

- Press simultaneously ERROR and SYSTEM button.

Acceptance of command is indicated by rapid blinking of '- - -'.

10 Summary for trailer

Key	Display (example)	Function	Comments
ERROR	471	Fault display	4: Path of error 7: Type of error 1: Occurrences
CLEAR	Clr	Clear memory	Requirement: no actual fault present
SYSTEM	(4-2)	System display	e.g. 4S/2M
	4r2		e.g. 4S/2M with retarder
	4U2		e.g. 4S/2M with ISS
Special functions: see sequence			
1. SYSTEM	(2-2)		Press and release key.
2. SYSTEM	2-2 (flash)	System configuration	Hold key 2 seconds. See detected system.
1. SYSTEM	(2-2)		Press and release key.
2. CLEAR	SyS	System check	Hold key 2 seconds to start system check.
1. CLEAR + SYSTEM	(---	total km display	
2. Any key	149		Read as:
3. Any key	322		149,322 km
ERROR + CLEAR	OFF or 060 (k.p.h.)	Speed threshold	Display of speed threshold in k.p.h. (only VCS I)
ERROR + SYSTEM	--- (rapid blinking)	Reset Service Interval	

11 Appendix

List of WABCO Diagnostic cables/adaptors

ECU Type	Part number WABCO Adaptor	Part number WABCO Diagnostic cable
ABS - C	446 300 327 0 (35-pole) 446 300 319 0 (54-pole)	894 604 303 2 (ISO 9141)
ABS - D/E	446 300 404 0 (ISO 9141) 446 300 405 0 (SAE J1587) 446 300 408 0 Basic (ISO 9141) 446 300 407 0 Basic (SAE J1587)	
Hydraulic ABS	446 300 327 0 (35-pole)	
Vario - C	446 300 318 0	446 300 329 2 Trailer
VCS I	446 300 329 2 Trailer	449 612 020 0 with connecting box (length: 1 m) 446 300 401 0 directly to the test device (length: 6 m)
VCS II		449 615 010 0 with connecting box (length: 1 m) 446 300 455 0 directly to the test device (length: 6 m)

! WABCO recommends to you the diagnostic accessory case (Part number 446 301 020 0).

In this case, all important adaptors for diagnosis on WABCO's electrical systems are clearly arranged:

- Diagnostic Interface Set
- 35 pin adaptor for ABS, EPS und ECAS
- Adaptor ABS-D
- Central diagnostic plug DaimlerChrysler
- Diagnostic cable EBS Euro
- Diagnostic cable trailer
- Diagnostic connection for Trailer ABS (VCS)
- Diagnostic connection for Trailer EBS

