



## **Operating Instructions**

for WABCO Diagnostic Controller

446 300 320 0

with

Program Card ABS/ASR C1/C2

446 300 516 0



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Ein Unternehmensbereich  
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#### LIST OF ABBREVIATIONS USED:

ABS	Anti-Lock Braking System
ASR	Anti-Spin Regulation (Drive-Slip Control)
ECU	Electronic Control Unit
L1/L2	Wheels on steered axle (diagonals 1/2)
A1/A2	Wheels on driven axle (diagonals 1/2)
Z1/Z2	Wheels on third axle (diagonals 1/2)
MRV	Modulator valve (ASR)
Diff. valves	Differential brake valve (ASR)
IV	Inlet valve which when energized prevents further pressure increase at the wheel brake
OV	Outlet valve which when energized allows pressure at the wheel brake to be released
PIN	Individual connector in the ECU plug
MOT-valve	Engine valve with on/off control for ASR (also known as black / white valve)
PROP-valve	Engine valve with proportional control for ASR operation
>	greater than
<	less than
$\Omega$	ohm
k $\Omega$	kilo ohm

The following abbreviations are protected trade names of engine control systems from certain manufacturers:

EMR	Electronic motor regulation (ASR engine control)
ESW	Electronic set-point emitter (ASR engine control)
PRI0	Priority signal emitter (ASR engine control)
PWMR	Pulse-width modulated acknowledgement signal (ASR engine control)
PWMV	Pulse-width modulated adjustment signal (ASR engine control)
EMS	Electronic engine control (ASR engine control)
EDC	Electronic Diesel Control

**DIAGNOSTIC CONTROLLER SET 446 300 331 0**



**Contents of Diagnostic Controller Set:**

- |                          |               |
|--------------------------|---------------|
| 1. Diagnostic Controller | 446 300 320 0 |
| 2. Carrying Case         | 446 300 022 0 |

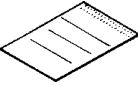
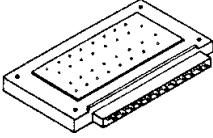
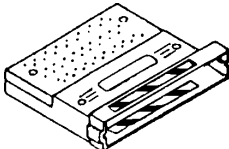
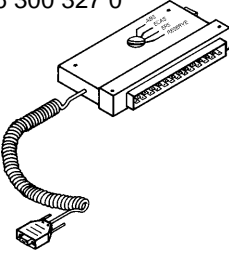
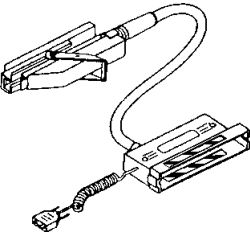
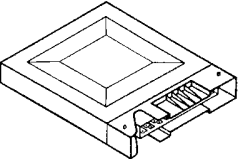
**Additional Test Equipment**

- |                                |               |
|--------------------------------|---------------|
| 3. Connector Cable (ISO 9141)  | 894 604 303 2 |
| 4. Measuring-Adapter (35 pins) | 446 300 314 0 |
| 5. Measuring-Adapter (54 pins) | 446 300 309 0 |
| 6. Multimeter Cable (black)    | 894 604 301 2 |
| Multimeter Cable (red)         | 894 604 302 2 |
| 7. Bridging Cable              | 894 604 300 2 |
| 8. Program Card                | 446 300 516 0 |

## WHICH SYSTEMS CAN BE TESTED?

This program card can be used to test certain ABS/ASR systems which are identified by the part number of the ABS/ASR control unit.

### ABS/ASR C1/C2 (ISO)

system/plug	4-channel/35 poles	6-channel/54 poles
program card	446 300 516 0 	446 300 516 0
measuring adapter application: fault search	446 300 314 0 	446 300 309 0 
inter-adapter application: if no diagnostic plug (to ISO 9141) on vehicle	446 300 327 0 	446 300 319 0 
ECUs which can be tested 	446 004 031 0 to 037 0 041 0 043 0 044 0 046 0 051 0 to 054 0 064 0* 066 0* 068 0* 073 0*	446 003 034 0 038 0 039 0 044 0 051 0 054 0 058 0* 064 0* 066 0* 068 0*

\* no support for settings

As per June '95. Additional ECUs may be suitable for testing.

The program card will refuse to perform any test if it cannot identify the ECU.

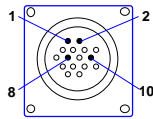
## CONNECTING THE DIAGNOSTIC CONTROLLER

### 1a. Diagnostic socket to ISO 9141 available on vehicle

The allocation of PINs in the diagnostic socket must correspond to the ISO 9141 standard as shown below. Connect Diagnostic Cable to diagnostic socket on vehicle.

Allocation of diagnostic socket:

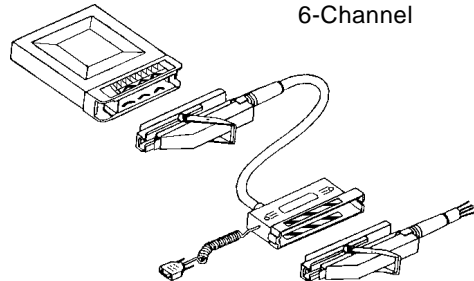
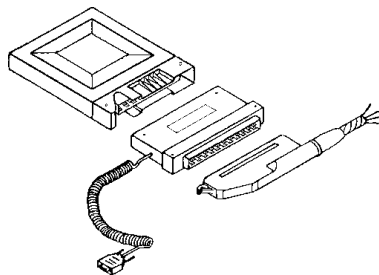
- 1 battery positive (terminal 30 )
- 2 battery negative (terminal 31)
- 8 diagnostic K-linie
- 10 diagnostic L-linie



### 1b. No diagnostic socket to ISO 9141 available

If there is no ISO diagnostic socket on the vehicle, an inter-adapter (accessories) can be fitted between the ECU and the vehicle harness connector (see diagram).

4-Channel



6-Channel

2. Connect the 9-pin plug of the connector cable (or the adapter cable) to the Diagnostic Controller, thus establishing both the diagnostic connection and voltage supply. Switch on ignition. The display will show black bars until a program card is inserted. If an inter-adapter is used, the red toggle switch must be in position „1” to establish a voltage supply to the ECU.

3. Insert program card, pushing it fully home (contact side first, black surface facing upwards). The display will now show which card has been inserted.

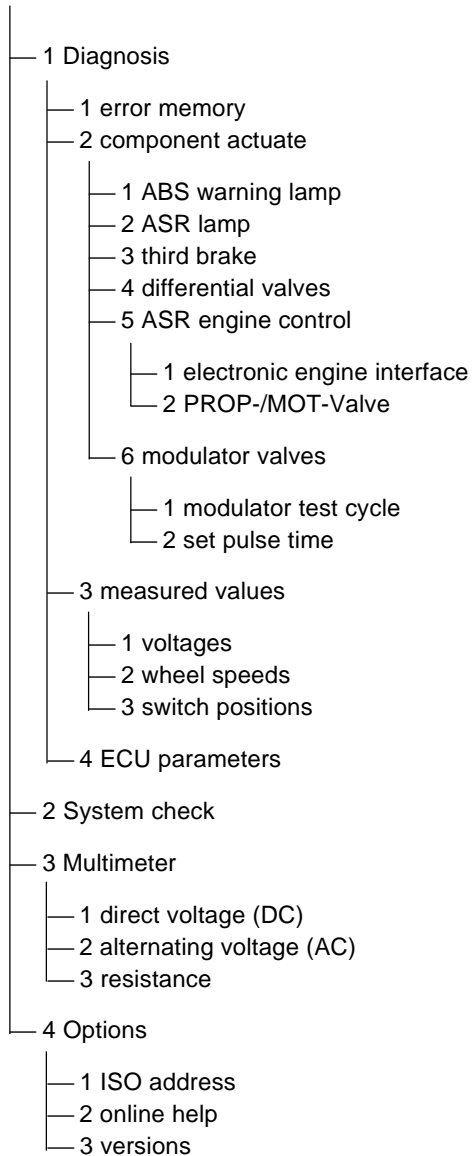
## OPERATING THE DIAGNOSTIC CONTROLLER

The Controller is operated by means of three push-buttons on its front panel. Their allocation is shown via the instructions appearing on the display directly above the respective push-button.

1 Diagnosis	4 Multimeter
2 System check	5 Options
Select function!	EXIT    ↓    START
<input type="button" value=" "/>	<input type="button" value=" "/> <input type="button" value=" "/>

Push-button	Function
START :	Initiate programme.
RETURN :	The display will return to the last main menu.
(ARROW):	Select an item from the main menu.
↓	Scroll forward one item at the time by pressing the push-button. The item selected will blink.
CONTINUE:	The item selected is activated or released.
REPAIR	This command will activate the failure search for the displayed error. However, by pressing CONTINUE you may display all errors first.

## PROGRAMME STRUCTURE ABS/ASR C1/C2



## 1. DIAGNOSIS

1 Diagnosis	3 Multimeter
2 System check	4 Options
Select function!	EXIT    ↓    START

<input type="text"/>	<input type="text"/>	<input type="text"/>
----------------------	----------------------	----------------------

When selecting the Diagnosis function, communication with the ABS control is established.

A	ECU type	: ABS/ASR-C2
WABCO	Part No.	: 446 004 054 0
S	Prod. date	: week / year
	Software No.	: 83 CONTINUE

<input type="text"/>	<input type="text"/>	<input type="text"/>
----------------------	----------------------	----------------------

The WABCO data of the ABS ECU is displayed.

1 Error memory	3 Measured values
2 Component actuate	4 ECU parameters
Select function	EXIT    ↓    START

<input type="text"/>	<input type="text"/>	<input type="text"/>
----------------------	----------------------	----------------------

In the Diagnosis mode, the following functions are available for selection:

- 1.1 Error memory
- 1.2 Component actuate
- 1.3 Measured values
- 1.4 ECU parameters

### 1.1 Error memory

If the ABS control unit has recognized a fault in the system (safety lamp on), this function helps locate the fault (example see Page 15). Depending on the type of ABS system used and the type of error encountered, the following advice will appear on the display.

– cause and location in plain writing, e.g. sensor error wheel A (steering axle S2), short circuit or broken wire.

– frequency at which the fault occurred.  
**Note:** The ECU can recognize the error only **once** each time the ignition is switched on.

– „error exists at present” means that when the diagnosis mode was selected the error existed. This is followed by a detailed fault location routine with specific instructions on how to proceed in locating the error. If „error does not exist at present” appears on the display, this means that the fault did **not** exist at the time the diagnostic mode was selected, i.e. it cannot be located by way of electrical measurement.

– Integrated multimeter function. The tester is instructed to carry out electrical measurements (e.g. resistance measurements) with the aid of the inter-adaptor. Both prescribed and actual values appear on the display and can be compared.

– When correction of the fault is confirmed, that fault is deleted from the ECU.

– The fault location routine can be left only when all faults have been corrected.

### 1.2 Component Actuate

With „Component Actuate”, certain components within the ABS system can be actuated and tested. For this the respective components must, of course, have been fitted.

#### 1.2.1 Warning lamp

The ABS warning lamp can be switched on or off at the push of a button.



### 1.2.2 ASR lamp

The ASR lamp can be switched on or off at the push of a button.

### 1.2.3 Third brake

The relay of the third brake (e.g. retarder) can be actuated at the push of a button (possible to hear the click sound of the relay on some installations).

### 1.2.4 Different valves

The differential brake valves of the ASR system can be individually actuated at the push of a button. By pressing the respective button, the valve is actuated briefly. If the button remains pushed, the valve is continuously actuated with short cycles.

### 1.2.5 ASR engine control

With this function, the electronic or pneumatic ASR engine control fitted in the vehicle can be actuated. Select the system fitted.

#### 1.2.5.1 Electronic engine interfaces:

- VDO ESW/PRI0 (is recognized automatically)
- VDO PWMR/PWMV
- Bosch EMS
- Bosch EDC

**Test:** start engine, increase engine speed and hold constant. Using the push-button, reduce engine speed, then increase to original level. When test is active an increase of engine torque should not be possible.

#### 1.2.5.2 Pneumatic engine interfaces

- MOT Valve on/off characteristic (black / white)
- PROP Valve proportional characteristic

**Test:** start engine, increase engine speed and hold constant. Reduce speed via push-button „ON“. After releasing the button, engine speed is returned to its original level.

### 1.2.6 ABS modulator valves

#### 1.2.6.1 Pulse programme

Both function and allocation of the ABS modulator valves can be individually checked by means of a pulse programme. For pressures, see diagram on Page 20.

#### 1.2.6.2 Time settings

The times T1 and T5 for pressure build-up and pressure reduction are adjustable (compare diagram on Page 20). For vehicles with large brake chambers, it may be of assistance to increase pulse times to ensure that sufficient (visible) pressurization and venting takes place. The value is preset at 51 milliseconds.

### 1.3 Measured values

This part of the programme is used to display values and switch positions.

#### 1.3.1 Voltages

The actual voltages measured by the ECU are displayed. The valve relay voltages are slightly below the supply voltage. Figures for 12 volt systems are in brackets.

#### 1.3.2 Wheel speeds

The speeds of the ABS-controlled wheels are displayed. As soon as the wheel speed is more than 1.8 km/h, it will appear on the display.

When the wheel is stationary, the display will show < 1.8 km/h.

**Note:** The diagnosis will be interrupted if all wheels are driven.

The ASR-controlled wheels must not turn at speeds in excess of approx. 3.5 km/h since this would cause the ASR function to initiate.

### 1.3.3 Switch positions

The positions of the ABS and ASR switches and the status of the ASR lamp are displayed.

### 1.4 Controller data

The following system-specific ECU parameters are displayed:

- WABCO ECU data
- ABS configuration
- ECU parameters
  - limiting speed: preset top speed
  - MIR definition: ABS bias factor on steering axle
  - ISO address:  
„Telephone number“ defined for vehicle electronics. The address of ECU and Controller (see 4.1) must correspond.
  - Fixed address for motor vehicle  
ABS = 8.

## 2. SYSTEM CHECK

System check permits a complete ABS test including print-out of a test log (e.g. after initially fitting the system, or after extensive repairs).

System check is divided into 3 sections:

- component test
- functional test
- print results

### Important notes:

Once a test section has been initiated, this has to be processed step by step. It is not possible to return to, or skip, individual steps.

If the supply voltage to the Diagnostic Controller is interrupted, all data measured and stored for the print log up to that point in time are destroyed. Thus it is important that the supply to the Diagnostic Controller is not interrupted if a print log is required.

### Components Test

The ABS components fitted are checked for their electrical specifications. This test is carried out without the ECU. Instead, the inter-adapter is plugged into the cable socket permitting the required measurements to be taken using the multimeter cable.

### Procedure:

- replace ECU by inter-adapter
- inquiry 24 volt-/12 volt-system
- measure the supply voltage
- inquiry: number of sensors and modulators (MRV), e.g. full-air 4-channel, generally 4S/ 4M
- measure:
  - resistance of relays
  - resistance of MRVs
  - resistance of diff. valves
  - resistance of PROP-/MOT-valves
  - resistance of PROP-/MOT-valves against earth
  - resistance of sensors against earth

- inquiry sensor type:
  - cone-type sensor  
imprint „K” (from approx. '89)
  - step-type sensor  
imprint „S” (from approx. '93)
  - cylinder-type sensor  
no imprint (before '89)
- measurement sensors resistance  
sensors voltage inquiry
- replace inter-adapter by ECU

### Functional Testing

This test is carried out with the ECU connected. The Controller instructs the ECU to follow certain control instructions. The tester is confronted with individual yes/no inquiries.

#### Procedure:

- actuate warning lamp  
ASR lamp  
third brake  
ABS/ASR switch
- pulse programme  
modulators: for time setting, see 1.2.6.2; for pulse programme, see Page 20.
- actuate  
diff. valves of ASR-controlled driving wheels
- actuate  
pneumatic engine control (PROP- or MOT-valve) or alternatively electrical interface
- For testing optional ABS features, see Page 13.

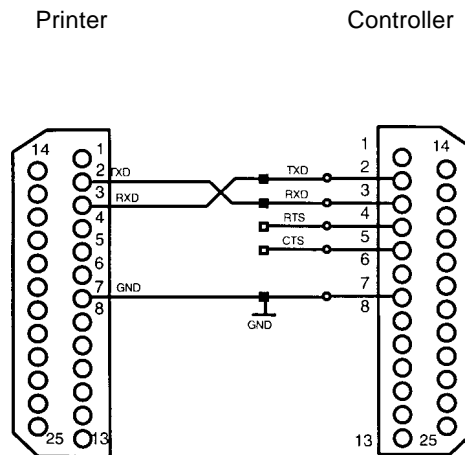
### Print System Check

At the end of the test, the results can be printed.

As mentioned above, the Controller has to be connected to the voltage supply at all times. Any interruption will destroy all data stored.

Connection with the printer is established via the 25-pin socket on the rear and a serial printer cable. The cable must have a DB 25-plug (not socket !) at both ends.

The programme works with EPSON FX-compatible printers with a serial interface (RS 232). The transmission parameters of the printer must be set to the configuration shown below:



Speed: 1200 baud  
 Data bits: 8  
 Stop bit: 1  
 Parity bit: X ON/X OFF

### 3. MULTIMETER

The integrated multimeter function permits electrical measurements on the vehicle. Only the desired measuring function (direct voltage, alternating voltage or resistance) needs to be selected. The measuring range is automatically set by the unit.

range	display resolution	Accuracy of measuring range. Final Value at 20°C	
DC-voltage			
2.0 volts	0.1 volt	± 0.2 %	± 0.0 volt
20.0 volts	0.1 volt	± 0.2 %	± 0.1 volt
50.0 volts	0.1 volt	± 0.2 %	± 0.1 volt
AC-voltage			
2.0 volts	0.01 volt	± 0.6 %	± 0.02 volt
35.0 volts	0.1 volt	± 0.6 %	± 0.4 volt
resistance			
20.0 Ω	0.1 Ω	± 0.3 %	± 0.1 Ω
200.0 Ω	0.1 Ω	± 0.2 %	± 0.1 Ω
2.0K Ω	1.0 Ω	± 0.2 %	± 1.0 Ω
20.0K Ω	10.0 Ω	± 0.1 %	± 10.0 Ω
95.0K Ω	100.0 Ω	± 0.2 %	± 100.0 Ω

#### Application:

direct voltage: supply voltage on vehicle  
 alternating voltage: sensor voltage  
 resistance: valves, relays, sensors, wiring

#### NOTE:

The measuring instrument is designed only for the vehicle range (low voltage). It must not be used outside the above measuring range.

### 4. OPTIONS

#### 4.1 ISO Address

The ISO Address is an international code for vehicle electronics suitable for diagnosis.

The value which can be modified is the „selection number“ from the Controller to the ECU (see also 1.4).

Preset addresses			
motor vehicle	ABS:	8	
trailer	ABS:	10	
motor vehicle	ECAS:	16	
trailer	ECAS:	18	

- Program card with software creation date and check total

**Testing Optional ABS Features (24 volts)**  
(only for vehicles with trailer facility)

The following optional ABS features are **not** included in the 35-pole or 54-pole ABS-ECU wiring and can, therefore, not be tested by means of the Diagnostic Controller:

- ABS trailer socket to ISO 7638
- Info module
- Info lamp
- ABS trailer warning lamp

**4.2 Online Help**

This function enables the user to obtain additional information on the programme. When the function is switched on, more detailed information will appear in suitable places. When the card is used for the first time, the function will be switched on.

**4.3 Versions**

This function will show the initial values of the test facilities:

- Controller hardware
- Controller operating system with creation date
- Multimeter

**Equipment needed:**

- test plug for 24N socket 446 007 310 0
- test plug for ABS trailer socket 446 007 316 0

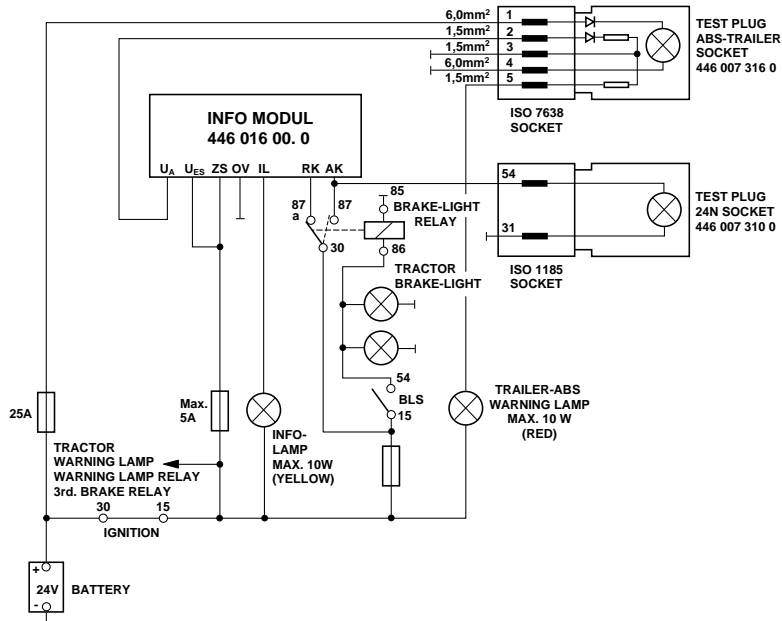
One additional person is required for part of the testing process.

**Testing Procedure:**

Test step	Ignition	Brake actuated	Test plug in 24N socket	Test plug in ABS socket	Info lamp	Trailer warning lamp
1.	on	no	no	no	off	off
2.	on	no	yes lamp off	no	on	off
3.	on	yes	yes lamp on	no	on	off
4.	on	no	yes lamp off	yes lamp on	off	on
5.	off	no	yes lamp off	yes lamp on	off	off

**Faults:**

Test step	Fault	Cause
1.	Info lamp on	- Consumer at Contact AK of info module or at terminal 54 of 24N socket - Defective info module - Line and/or contact fault
2.	Info lamp stays off	- Info module or info lamp defective - Line and/or contact fault - ABS trailer plug-in connection/test plug not released
3.	24N test plug lamp off	- Stop-light relay defective - Lamp of 24N test plug defective
4.	ABS trailer test plug lamp off	- Line and/or contact fault between Contacts 1 or 4 of ABS socket - Lamp of ABS trailer test plug defective
5.	ABS trailer test plug lamp not longer on	- Lines between 1 and 2 and ABS socket mixed up



**Example for Locating the Fault  
„Sensor Cable Break”**

The ABS control unit has stored 1 error(s) in the error memory.

CONTINUE

Displays number of errors found.

Sensor error wheel A (steer axle L2)  
(Short circuit or broken wire)

Error occurred 1x    NEXT            REPAIR

Display of **location** of fault (sensor wheel A, steering axle diagonal 2) and **type** of error encountered (parted or broken cable). The display also shows if the fault still existed at the time the diagnosis was initiated. Every time the ignition is switched on, the value is incremented by one. Start fault locating procedure by pressing REPAIR or display any other faults by pressing the CONTINUE button.

Check sensor at wheel A (steer axle L2), connecting cable and connector for damage

Fault found ?            NO                            YES

Visual check of the components for damage. If no errors found, continue to Step No. 4 by pressing „NO”.

Switch ignition off!  
THEN disconnect ABS control unit, connect measuring adapter and switch ignition on again. CONTINUE

**NOTE:**

When using the inter-adapter, switch off ignition only using read toggle switch.  
4-channel: inter-adapter 35 pins  
6-channel: inter-adapter 54 pins

Check resistance: PIN 15 / 32  
SHOULD BE: 0.7–3.0 kΩ ACTUAL: 0.02 kΩ  
Check actual value!

LOW    CORRECT    HIGH

Connect multimeter cable (red and black) to the multimeter sockets on the Controller. Push measuring pins into sockets 15 and 32 on the inter-adapter. Compare actual value measured with desired value. Using the respective button, indicate whether the actual reading is LOW, CORRECT (within the tolerance range) or HIGH (in this case: reading is **LOW** compared with desired value).

Disconnect sensor from connecting cable!  
Check resistance: PIN 15 / 32  
SHOULD BE: > 45 kΩ ACTUAL: 0.1 kΩ  
Actual value O.K.?    NO                            YES

To narrow down the fault, separate the sensor from the extension cable and again indicate whether reading is LOW, HIGH or CORRECT (in this case: reading is **LOW** again).

Sensor connecting cable to wheel A (steer axle L2) faulty.  
Exchange faulty cable.

CONTINUE

Sensor connecting cable was isolated as the defective part.

No FURTHER errors stored in the ABS control unit.

CONTINUE

No FURTHER errors have been stored.

Switch ignition off!  
THEN disconnect measuring pin adapter,  
connect ABS control unit and switch  
ignition on again. CONTINUE

Proceed as described in Step No. 4 but in reverse sequence.

All RECTIFIED errors  
are cleared in the ABS control unit!

CONTINUE

Switch ignition off and on again!

CONTINUE

After switching the ignition off and then on, the ECU will check the wiring once again. When using the inter-adapter the ignition must be switched off using the red toggle switch.

NO errors stored in the ABS control unit.

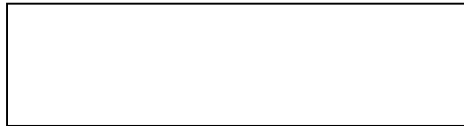
CONTINUE

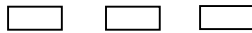
Error memory was read again. The display shows that no errors are stored in the ECU. If this is not the case, the fault locating procedure will commence again. To leave the fault locating procedure, press „CONTINUE“.



## FUNCTIONAL FAULT IN DIAGNOSTIC SYSTEM



no display



Cause

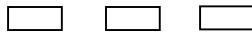
- no voltage supply
- undervoltage (less than about 7 volts)

Remedy

- a) ISO diagnostic plug:
  - Check plug allocation
  - Voltage between PIN1 and PIN2 = supply voltage on vehicle
- b) Inter-adapter:
  - Switch on ignition at adapter
  - Check all plug-in connections



black „bars“

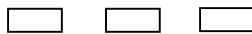
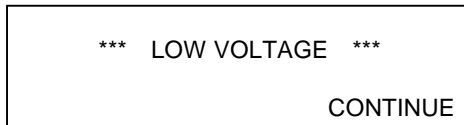


Cause

- program card not inserted

Remedy

- Insert program card, pushing it fully home



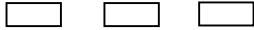
Cause

- insufficient supply voltage (only during diagnosis)

Remedy

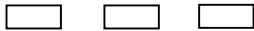
- Check condition of battery and ensure sufficient supply

\*\*\* Initialisation error \*\*\*  
 Switch ignition on!  
 Check diagnostic connection!  
 CONTINUE



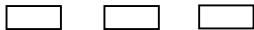
Cause	Remedy
<ul style="list-style-type: none"> <li>- insufficient supply voltage (&lt; 18 volts)</li> <li>- no supply voltage (ignition off)</li> <li>- ISO address set incorrectly</li>   <li>- no ECU or wrong ECU connected</li> <li>- Diagnostic lines switched or disconnected</li> </ul>	<ul style="list-style-type: none"> <li>- Ensure supply</li> <li>- Switch on ignition</li> <li>- Reset ISO address. Preset ABS/ASR address 8 (see 4.1 „ISO Adress“)</li>   <li>- Check ECU and connection</li> <li>- Check lines and connections for function and proper allocation</li> </ul>

\*\*\* Wrong key word \*\*\*  
 Diagnosis impossible!  
 CONTINUE



Cause	Remedy
<ul style="list-style-type: none"> <li>- wrong ECU connected</li> <li>- wrong „WABCO Data“ in ECU or defective ECU</li> </ul>	<ul style="list-style-type: none"> <li>- Check ECU part number</li> <li>- Change ECU and check ECU part number</li> </ul>

Defective Program Card !  
 CONTINUE



Cause	Remedy
<ul style="list-style-type: none"> <li>- defective program card</li> <li>- wrong program card</li> </ul>	<ul style="list-style-type: none"> <li>- Change program card</li> </ul>

\*\*\* COMMUNICATION  
BREAKDOWN \*\*\*  
Restart diagnosis procedure!  
CONTINUE

Cause	Remedy
<ul style="list-style-type: none"> <li>- Data transmission aborted during diagnosis Line or voltage disconnection during diagnosis</li> </ul>	<ul style="list-style-type: none"> <li>- Check all connections</li> <li>a) ISO socket on vehicle:               <ul style="list-style-type: none"> <li>- switch on ignition</li> </ul> </li> <li>b) inter-adapter:               <ul style="list-style-type: none"> <li>- move red toggle</li> <li>- switch to „1” position</li> </ul> </li> </ul>

\*\*\* Unknown control unit \*\*\*  
Diagnosis not possible  
with this program card!  
CONTINUE

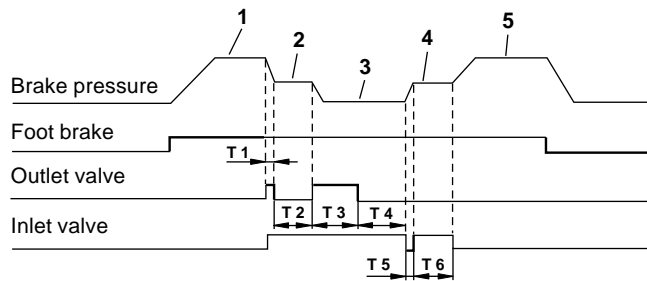
Cause	Remedy
<ul style="list-style-type: none"> <li>- ECU cannot be tested with this program card</li> </ul>	<ul style="list-style-type: none"> <li>- Use right program card</li> </ul>

\*\*\* Error during self-test \*\*\*  
EEPROM of Diagnostic Controller faulty

Cause	Remedy
<ul style="list-style-type: none"> <li>- EEPROM (Diagnostic Controller's) nonvolatile memory defective</li> </ul>	<ul style="list-style-type: none"> <li>- Repair Diagnostic Controller</li> </ul>

## PULSE PROGRAMME SEQUENCE: MODULATOR VALVES



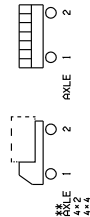
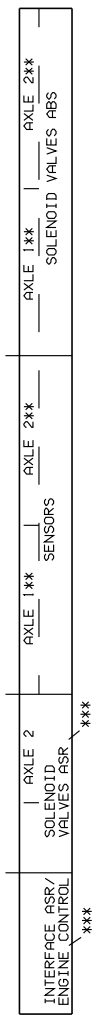
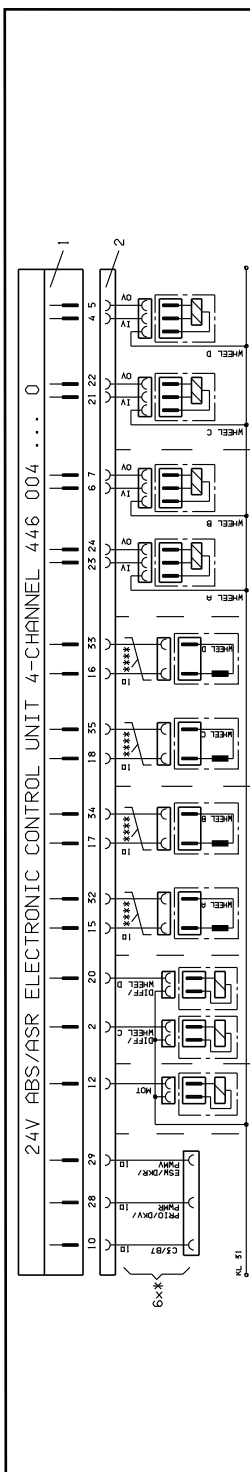
### Testing procedure:

- Connect pressure gauge to brake chambers, or
- Use brake test bench with independent wheel facility
- Actuate and hold brake !
- Start pulse programme and observe pressure readings !

**Gauge** (according to above pulse programme sequence):

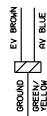
1. maximum brake pressure \*)  
holding phase
2. pressure reduction  
holding phase
3. pressure reduction to 0 bar  
holding phase
4. pressure increase  
holding phase
5. pressure increase to braking pressure \*)

\*) Can vary from axle to axle ( e.g. due to load sensing ). The initial brake pressure will fall in the course of testing ( air consumption ).



** AXLE	LEFT	RIGHT
T1 STEERING	A (L2)	B (L1)
Z1 DRIVING	C (D1)	D (D2)

\* SOLENOID CABLE: WARCO 874 601 0...2



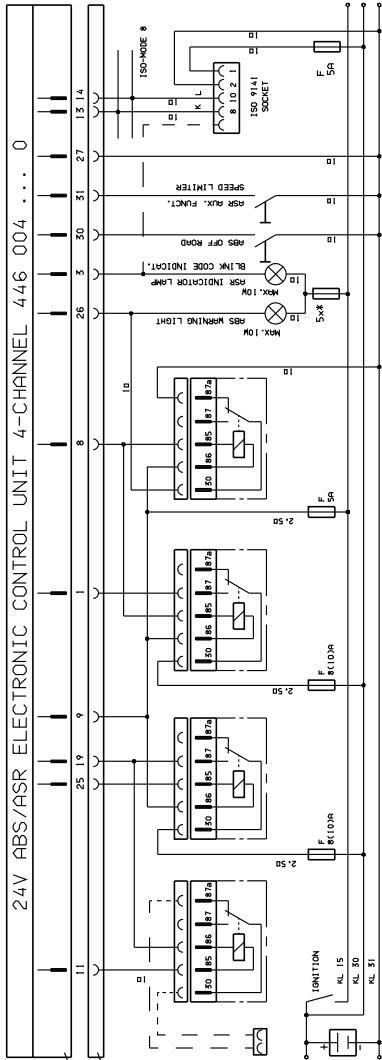
EV=INLET VALVE  
AV=OUTLET VALVE

- CROSS SECTION OF NON-INDICATED WIRES: 1mm<sup>2</sup> OR 1.5mm<sup>2</sup>

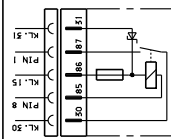
- FUSES SPECIFIED BY THE VEHICLE MANUFACTURER (VIN 72581)

\*\*\* - ASR-OPTION  
\*\*\*\* - TWISTED WIRE  
5x4 - COMMON FUSE OF THE VEHICLE E.G. HEAD LAMPS

6x4 - NON-CONNECTED WIRES Max.1m



RETARDER BRAKE	DIAGONAL 2	DIAGONAL 1	WARNING LIGHT RELAY	CONTROL LIGHTS	DIAGNOSTIC INTERFACE ISO 9141
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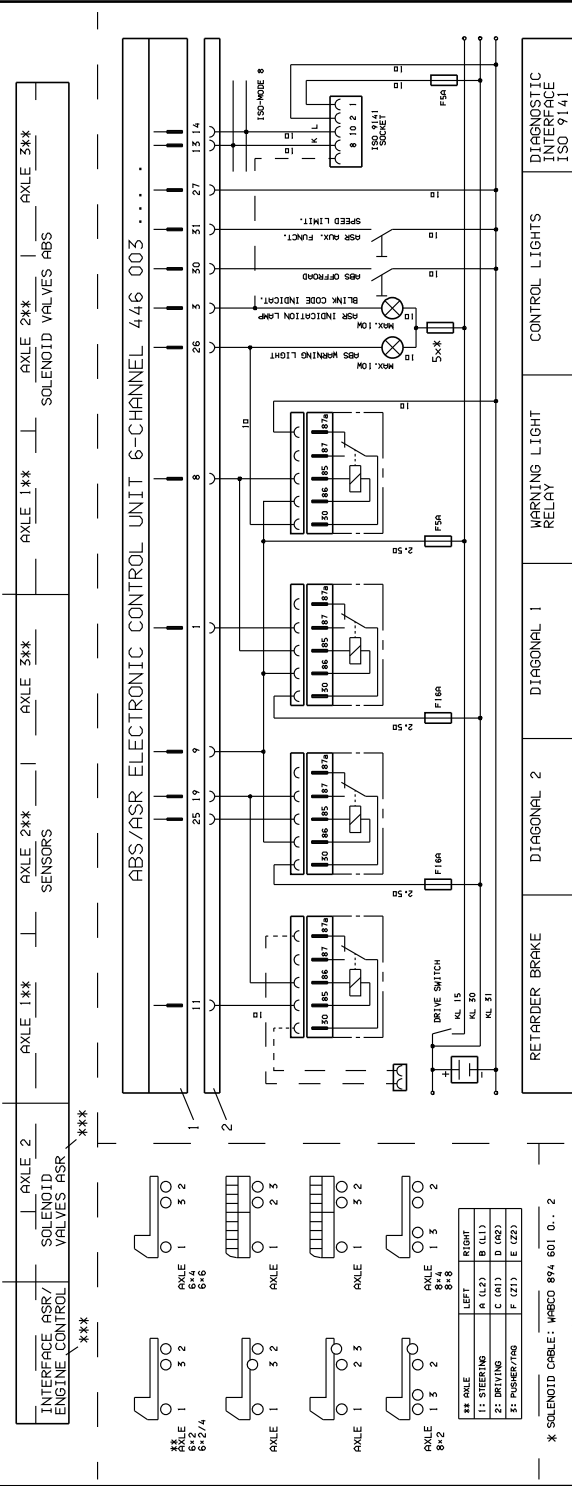
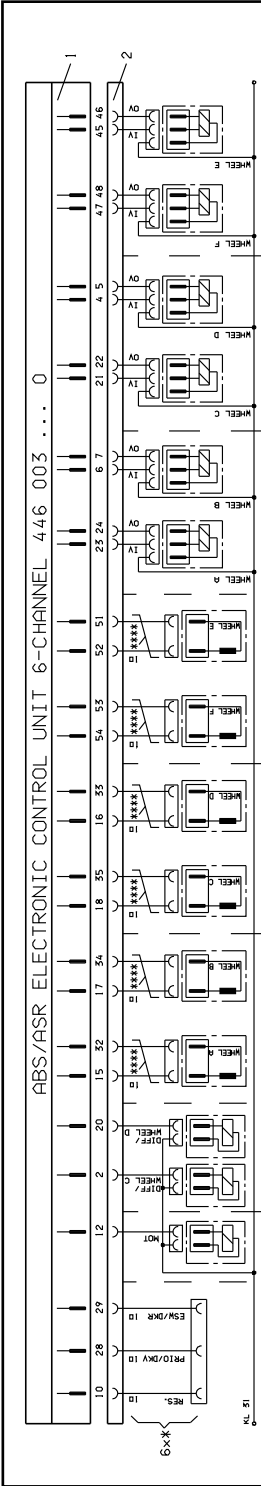
OVERVOLTAGE PROTECTION RELAY 446 036 00...0 AS OPTION. PLEASE SEE PRODUCT SPEC. ECU 446 004...0 / PARAGRAPH 8

DATE	DESCRIPTION	WORKSHEET NO.	REVISION
89-09-10	INITIAL		
89-09-10	REVISION		
89-09-10	REVISION		
89-09-10	REVISION		
89-09-10	REVISION		
89-09-10	REVISION		

**WARCO**  
24V ABS/ASR  
4-CCHANNEL "C"

ISO 9141 IDENTIFICATION NO.	DATE	REV.	DESCRIPTION
046521	81-08-20		INITIAL
046521	81-08-20		REVISION
046521	81-08-20		REVISION
046521	81-08-20		REVISION
046521	81-08-20		REVISION
046521	81-08-20		REVISION

DOC NO.	REV.	DATE	CODE FOR FUNCTION	WORKSHEET FOR
030088	P	89-10-30	A 2	
	A 2	81-08-20		
	A 2	81-08-20		
	A 2	81-08-20		
	A 2	81-08-20		
	A 2	81-08-20		



NO.	DATE	DESCRIPTION	BY	CHKD.
05.01.11	12.06.22	REVISION		
05.01.11	08.08.11	REVISION		
05.01.11	02.02.12	REVISION		
04.76.37	01.02.21	REVISION		
04.76.20	01.02.21	REVISION		
04.65.54	01.10.10	REVISION		
04.65.52	01.10.25	REVISION		
04.65.51	01.10.25	REVISION		
04.65.50	01.10.25	REVISION		
04.65.49	01.10.25	REVISION		
04.65.48	01.10.25	REVISION		
04.65.47	01.10.25	REVISION		
04.65.46	01.10.25	REVISION		
04.65.45	01.10.25	REVISION		
04.65.44	01.10.25	REVISION		
04.65.43	01.10.25	REVISION		
04.65.42	01.10.25	REVISION		
04.65.41	01.10.25	REVISION		
04.65.40	01.10.25	REVISION		
04.65.39	01.10.25	REVISION		
04.65.38	01.10.25	REVISION		
04.65.37	01.10.25	REVISION		
04.65.36	01.10.25	REVISION		
04.65.35	01.10.25	REVISION		
04.65.34	01.10.25	REVISION		
04.65.33	01.10.25	REVISION		
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04.65.25	01.10.25	REVISION		
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04.65.07	01.10.25	REVISION		
04.65.06	01.10.25	REVISION		
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04.65.04	01.10.25	REVISION		
04.65.03	01.10.25	REVISION		
04.65.02	01.10.25	REVISION		
04.65.01	01.10.25	REVISION		

OVERVOLTAGE PROTECTION  
 RELAY 446 036 00. 0  
 AS-OPTION  
 PLEASE SEE PRODUCT SPEC  
 ECU 446 004 ... 0 / PARAGRAPH 8

\*\*\* SOLENOID CABLE: WABCO 894 601 0... 2  
 GROUND (L27) BROWN  
 YELLOW (L28)  
 BLUE (L29)  
 RED (L30)  
 GREEN (L31)  
 INDICATED WIRE: 1.5 mm<sup>2</sup>  
 - FUSES SPECIFIED BY THE VEHICLE MANUFACTURER  
 \*\*\* - AS-OPTION  
 \*\*\*\* - TWISTED WIRES: >20 TURNS PER METER  
 5x\* - COMMON USE OF THE VEHICLE E.G. HEAD LAMPS  
 6x\* - NOT CONNECTED WIRES MAX. 1 m

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05.01.11	12.06.22	REVISION		
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04.76.37	01.02.21	REVISION		
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04.65.02	01.10.25	REVISION		
04.65.01	01.10.25	REVISION		

SYSTEM CHECK PROTOCOL  
Motor vehicle ABS/ASR-C

.....  
Vehicle No.

.....  
ECU No.

Component test

Component	Should be	Actual	Unit	Value
!ECU power-supply voltage	21.6 - 32.0	_____	volts	_____
!ABS-relay 1 and SILA-relay	105 - 215	_____	ohms	_____
!ABS-relay 2	210 - 430	_____	ohms	_____
!3.Brake-relay	210 - 430	_____	ohms	_____
! INLET valve	Steer-axle	11.7 - 16.5	ohms	_____
!OUTLET valve	Steer-axle	11.7 - 16.5	ohms	_____
! INLET valve	Wheel C (D1)	11.7 - 16.5	ohms	_____
!OUTLET valve	Wheel C (D1)	11.7 - 16.5	ohms	_____
! INLET valve	Wheel D (D2)	11.7 - 16.5	ohms	_____
!OUTLET valve	Wheel D (D2)	11.7 - 16.5	ohms	_____
!Sensor resistance	Wheel A (S2)	1.4 - 2.0	kohms	_____
!Sensor to ground	Wheel A (S2)	> 45	kohms	_____
!Sensor voltage	Wheel A (S2)	> 0.10	volts	_____
!Sensor resistance	Wheel B (S1)	1.4 - 2.0	kohms	_____
!Sensor to ground	Wheel B (S1)	> 45	kohms	_____
!Sensor voltage	Wheel B (S1)	> 0.10	volts	_____
!Sensor resistance	Wheel C (D1)	1.4 - 2.0	kohms	_____
!Sensor to ground	Wheel C (D1)	> 45	kohms	_____
!Sensor voltage	Wheel C (D1)	> 0.10	volts	_____
!Sensor resistance	Wheel D (D2)	1.4 - 2.0	kohms	_____
!Sensor to ground	Wheel D (D2)	> 45	kohms	_____
!Sensor voltage	Wheel D (D2)	> 0.10	volts	_____
!DIFF valve	Wheel C (D1)	29.5 - 42.0	ohms	_____
!DIFF valve	Wheel D (D2)	29.5 - 42.0	ohms	_____
!PROP/MOT valve		15.2 - 22.6	ohms	_____

Function test

!No errors stored in the electronic control unit (ECU)	_____
!ABS warning light	_____
!ASR light	_____
!3. Brake	_____
!ABS offroad switch	_____
!ASR function switch	_____
!Modulator	Wheel A (S2)
!Modulator	Wheel B (S1)
!Modulator	Wheel C (D1)
!Modulator	Wheel D (D2)
!DIFF valve	Wheel C (D1)
!DIFF valve	Wheel D (D2)
!PROP/MOT Engine control	_____
!Electronic Engine control	_____

.....  
Place

.....  
Date

.....  
Sign

---

**NOTIZEN**



**WABCO**

**WABCO  
Fahrzeuginnenräume**

Ein Unternehmensbereich  
der WABCO Standard GmbH

Am Lindener Hafen 21  
30453 Hannover  
Telefon (0511) 922-0  
Teletex 511 886 WABCO  
Telefax (0511) 2102357

# WABCO



**Operating Instructions**  
for WABCO Diagnostic Controller  
with Program Card ABS/ASR C1/C2  
446 300 516 0

