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 VAT Registration No.:

General information

- Electronic control unit (ECU) incorporates self-diagnosis function.
- ABS warning lamp will illuminate in the event of system failure.
- Trouble codes can be accessed with suitable code reader connected to the data link connector (DLC) or diagnostic socket **Fig. 1**.
- For DLC or diagnostic socket location refer to System layout and components.

Trouble code identification

Trouble code	Fault location
00000	No fault found
00283	Wheel speed sensor, left front
00285	Wheel speed sensor, right front
00287	Wheel speed sensor, right rear
00290	Wheel speed sensor, left rear
00301	Pump motor
00526	Brake pedal position (BPP) switch
00529	Speed signal absent
00532	Supply voltage
00597	Wheel speed sensors - signal variation
00623	Electronic control unit (ECU) - not correctly coded
00646	ECU/ECM communication
00647	ECU/ECM communication
00761	Trouble code stored in ECU
01130	ABS operation
01200	Voltage supply to solenoid valves
01201	Voltage supply to pump motor
01203	Instrument panel - circuit
	<p>Electronic control unit (ECU)</p> <p>ABS warning lamp</p> <p>Correct operating sequence</p> <ul style="list-style-type: none"> • Switch ignition ON. • Lamp illuminates. • Lamp extinguishes after approximately 2 seconds. <p>General test procedures</p> <p>NOTE: Due to small size of ECU harness multi-plug pins it is advisable to use a breakout box.</p>

Warning lamp circuit

Checking

- Switch ignition ON.
- Check warning lamp illuminates.
- If not: Switch ignition OFF.
- Disconnect ECU multi-plug.
- Switch ignition ON.
- Check warning lamp illuminates.

Wheel speed sensors

Preparatory conditions

- Check wheel bearings for excessive play. Adjust or replace as necessary.
- Check wheel speed sensors for mechanical security.
- Inspect wheel speed sensor rings visually for damage and cleanliness.

Adjustment

- No adjustment of wheel speed sensor air gaps is possible.

Checking resistance - front - [Fig. 2](#) & [Fig. 3](#)

Technical Data		
Terminals	Wheel speed sensor	Resistance
6 & 7 - all models	Left hand	400-2300 Ω
3 & 5 - FWD, with TCS	Right hand	400-2300 Ω
4 & 5 - except FWD, with TCS	Right hand	400-2300 Ω

- Ensure ignition switched OFF.
- Disconnect ECU multi-plug.
- Connect breakout box to harness multi-plug.
- Check resistance between breakout box terminals [Fig. 2](#).
- If resistance not as specified:
- Disconnect relevant wheel speed sensor multi-plug.
- Check resistance between wheel speed sensor terminals [Fig. 3](#).
- If resistance as specified: Check wiring.
- If resistance not as specified: Suspect faulty wheel speed sensor.
- Repeat test for other wheel speed sensor.

Checking resistance - rear - [Fig. 3](#) & [Fig. 4](#)

Technical Data		
Terminals	Wheel speed sensor	Resistance
8 & 9 - all models	Left hand	400-2300 Ω
1 & 2 - except FWD, without TCS	Right hand	400-2300 Ω
1 & 3 - FWD, without TCS	Right hand	400-2300 Ω

- Ensure ignition switched OFF.
- Disconnect ECU multi-plug.
- Connect breakout box to harness multi-plug.

- Check resistance between breakout box terminals **Fig. 4** .
- If resistance not as specified:
- Disconnect relevant wheel speed sensor multi-plug.
- Check resistance between wheel speed sensor terminals **Fig. 3** .
- If resistance as specified: Check wiring.
- If resistance not as specified: Suspect faulty wheel speed sensor.
- Repeat test for other wheel speed sensor.

Checking voltage - front - **Fig. 5** & **Fig. 6**

Technical Data		
Terminals	Wheel speed sensor	Voltage
6 & 7 - all models	Left hand	1,6 V approx.
3 & 5 - FWD, with TCS	Right hand	1,6 V approx.
4 & 5 - except FWD, with TCS	Right hand	1,6 V approx.

- Ensure ignition switched OFF.
- Raise vehicle.
- Disconnect ECU multi-plug.
- Connect breakout box to harness multi-plug.
- Adjust voltmeter to measure alternating current.
- Turn road wheel at approximately 60 rpm.
- Check voltage between breakout box terminals **Fig. 5** .
- If voltage not as specified:
- Disconnect relevant wheel speed sensor multi-plug.
- Turn road wheel at approximately 60 rpm.
- Check voltage between wheel speed sensor terminals **Fig. 6** .
- If voltage as specified: Check wiring.
- If voltage not as specified: Suspect faulty wheel speed sensor.
- Repeat test for other wheel speed sensor.

Checking voltage - rear - **Fig. 6** & **Fig. 7**

Technical Data		
Terminals	Wheel speed sensor	Voltage
8 & 9 - all models	Left hand	0,7 V approx.
1 & 2 - except FWD, without TCS	Right hand	0,7 V approx.
1 & 3 - FWD, without TCS	Right hand	0,7 V approx.

- Ensure ignition switched OFF.
- Raise vehicle.
- Disconnect ECU multi-plug.
- Connect breakout box to harness multi-plug.
- Adjust voltmeter to measure alternating current.
- Turn road wheel at approximately 60 rpm.
- Check voltage between breakout box terminals **Fig. 7** .
- If voltage not as specified:
- Disconnect relevant wheel speed sensor multi-plug.
- Turn road wheel at approximately 60 rpm.
- Check voltage between wheel speed sensor terminals **Fig. 6** .
- If voltage as specified: Check wiring.
- If voltage not as specified: Suspect faulty wheel speed sensor.
- Repeat test for other wheel speed sensor.

Checking wave form - front - **Fig. 8**

Technical Data		
Terminals	Wheel speed sensor	Voltage
6 & 7 - all models	Left hand	1,6 V approx.
3 & 5 - FWD, with TCS	Right hand	1,6 V approx.
4 & 5 - except FWD, with TCS	Right hand	1,6 V approx.

- Ensure ignition switched OFF.
- Raise vehicle.
- Disconnect ECU multi-plug.
- Connect breakout box to harness multi-plug.
- Connect oscilloscope between breakout box terminals.
- Turn road wheel at approximately 60 rpm.
- Check wave form and voltage of wheel speed sensor.
- If wave form or voltage not as specified:
- Disconnect relevant wheel speed sensor multi-plug.
- Turn road wheel at approximately 60 rpm.
- Check wave form and voltage between wheel speed sensor terminals.
- If wave form and voltage as specified: Check wiring.
- If wave form or voltage not as specified: Suspect faulty wheel speed sensor.
- Repeat test for other wheel speed sensor.

Checking wave form - rear - [Fig. 9](#)

Technical Data		
Terminals	Wheel speed sensor	Voltage
8 & 9 - all models	Left hand	0,7 V approx.
1 & 2 - except FWD, without TCS	Right hand	0,7 V approx.
1 & 3 - FWD, without TCS	Right hand	0,7 V approx.

- Ensure ignition switched OFF.
- Raise vehicle.
- Disconnect ECU multi-plug.
- Connect breakout box to harness multi-plug.
- Connect oscilloscope between breakout box terminals.
- Turn road wheel at approximately 60 rpm.
- Check wave form and voltage of wheel speed sensor.
- If wave form or voltage not as specified:
- Disconnect relevant wheel speed sensor multi-plug.
- Turn road wheel at approximately 60 rpm.
- Check wave form and voltage between wheel speed sensor terminals.
- If wave form and voltage as specified: Check wiring.
- If wave form or voltage not as specified: Suspect faulty wheel speed sensor.
- Repeat test for other wheel speed sensor.

Relays

NOTE: Relays are integral with the electronic control unit (ECU).

Electronic control unit (ECU)

Checking supply voltage - [Fig. 10](#)

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Technical Data		
Terminals	Condition	Voltage
17 & earth	Ignition OFF	Battery voltage
18 & earth	Ignition OFF	Battery voltage
15 & earth	Ignition ON	Battery voltage

- Ensure ignition switched OFF.
- Disconnect ECU multi-plug.
- Connect breakout box to harness multi-plug.
- Check voltage between breakout box terminals and earth.
- Switch ignition ON.
- Check voltage between breakout box terminal and earth.
- If voltage not as specified: Check wiring and fuses.

Checking earth connection - [Fig. 10](#)

Technical Data	
Terminals	Resistance
16 & earth	Zero
19 & earth	Zero

- Ensure ignition switched OFF.
- Disconnect ECU multi-plug.
- Connect breakout box to harness multi-plug.
- Check resistance between breakout box terminals and earth.
- If resistance not as specified: Check wiring.

Hydraulic modulator solenoid valves

NOTE: Solenoid valves are integral with the electronic control unit (ECU).

Pump motor

Checking resistance - [Fig. 11](#)

Technical Data	
Resistance	0,1-1 Ω

- Ensure ignition switched OFF.
- Disconnect pump motor multi-plug.
- Check resistance between pump motor terminals.

Checking operation - [Fig. 12](#)

NOTE: DO NOT allow pump motor to run for more than 2 seconds.

- Ensure ignition switched OFF.
- Disconnect pump motor multi-plug.
- Connect 12 volt positive (+) battery supply to terminal 2.
- Connect 12 volt negative (-) battery supply to terminal 1.
- Pump motor should run.

Brake pedal position (BPP) switch

Checking - Fig. 10

Technical Data		
Terminals	Condition	Voltage
14 & earth	Pedal released	Zero
14 & earth	Pedal depressed	Battery voltage

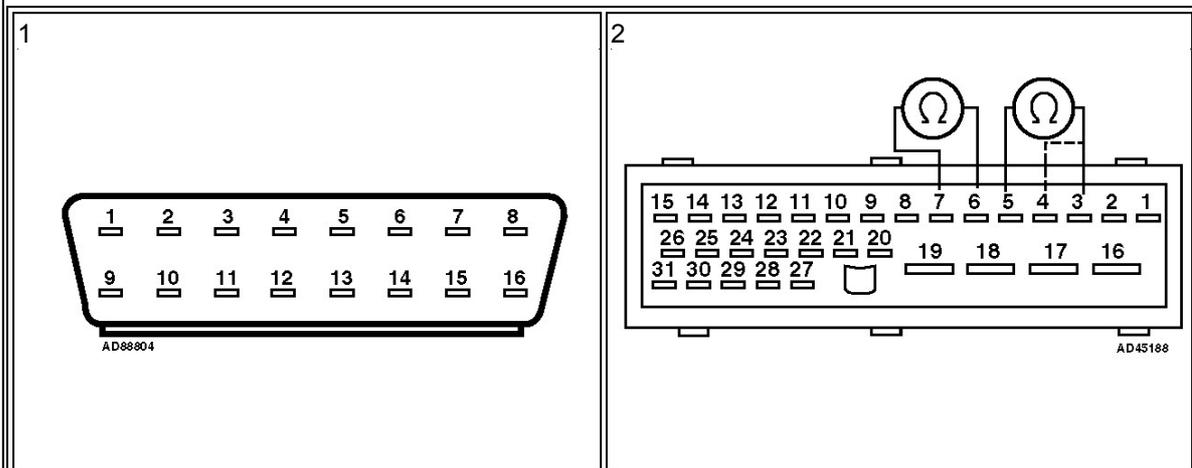
- Ensure ignition switched OFF.
- Disconnect ECU multi-plug.
- Connect breakout box to harness multi-plug.
- Check voltage between breakout box terminal and earth.
- Depress brake pedal while checking voltage.

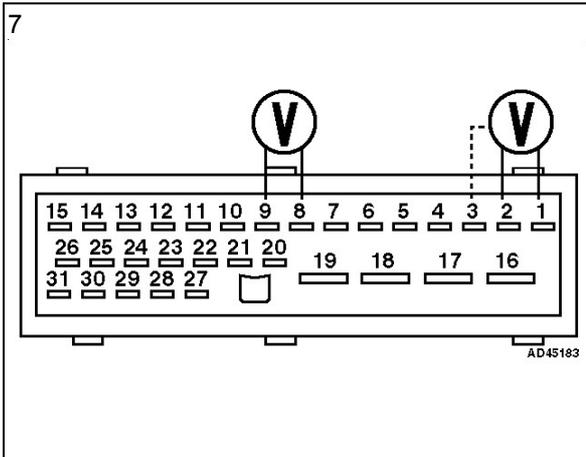
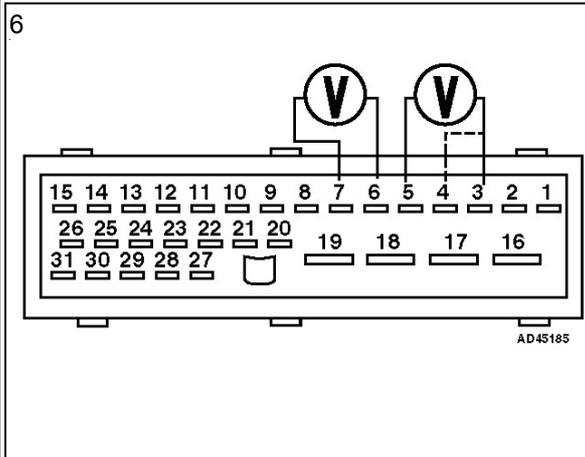
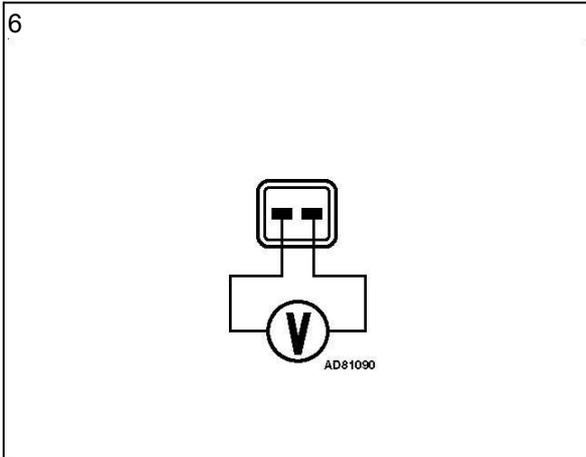
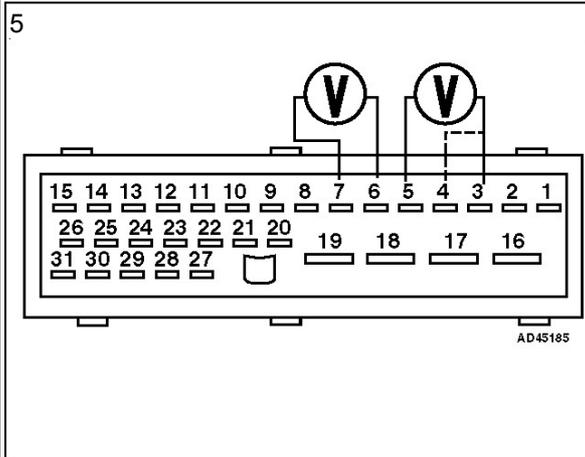
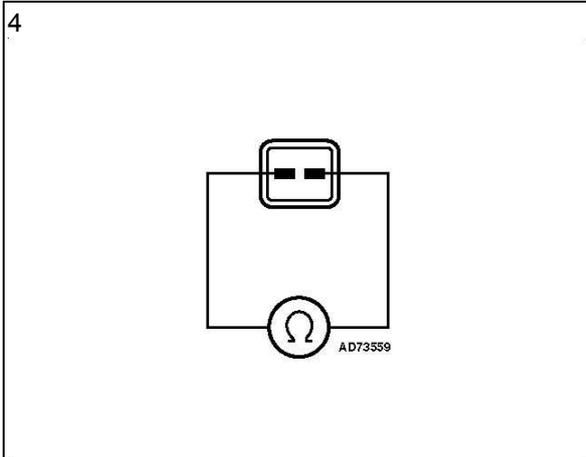
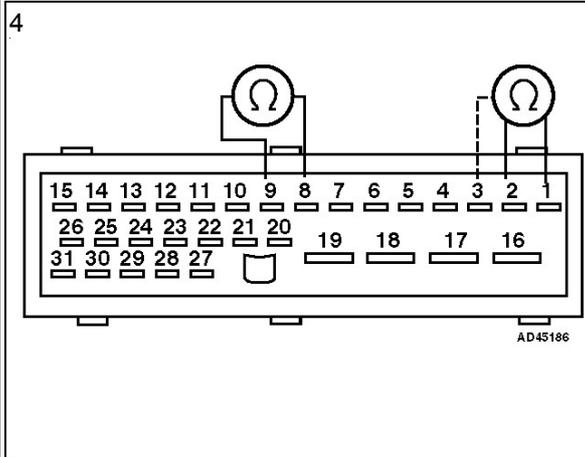
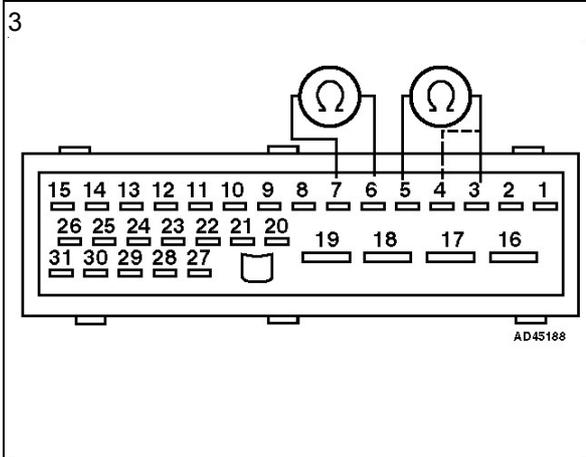
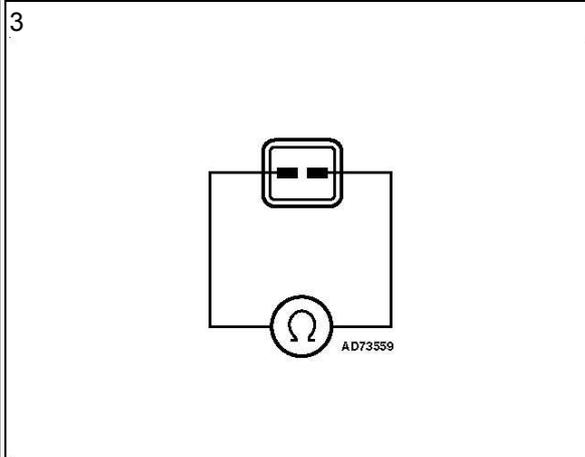
Hydraulic system

Bleeding

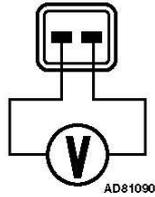
- Ensure ignition switched OFF.
- Ensure reservoir topped up to MAX.
- Bleed in sequence: RH rear, LH rear, RH front, LH front.
- Connect tube to bleed screw and immerse end in jar of clean fluid.
- Depress brake pedal firmly two or three times.
- Open bleed screw.
- Depress brake pedal fully.
- Close bleed screw.
- Allow brake pedal to return.
- Repeat process until fluid is air free.
- Maintain fluid level in reservoir during bleeding procedure.
- Top up reservoir to MAX.

NOTE: Where a load proportioning valve is fitted, this should be actuated to allow fluid through.

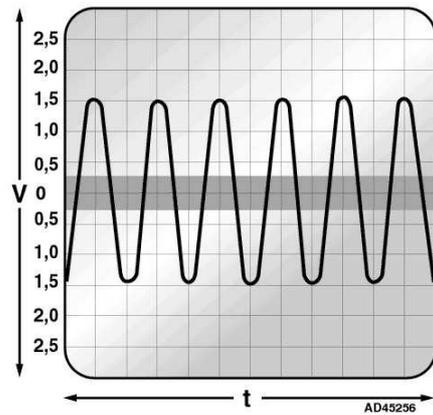




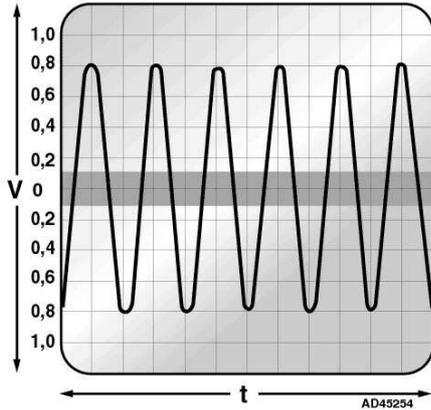
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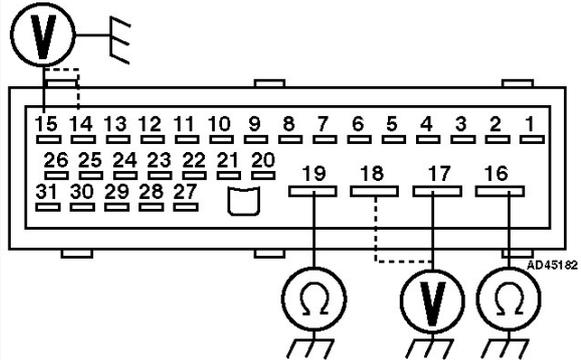
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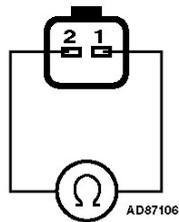
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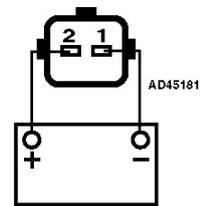
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