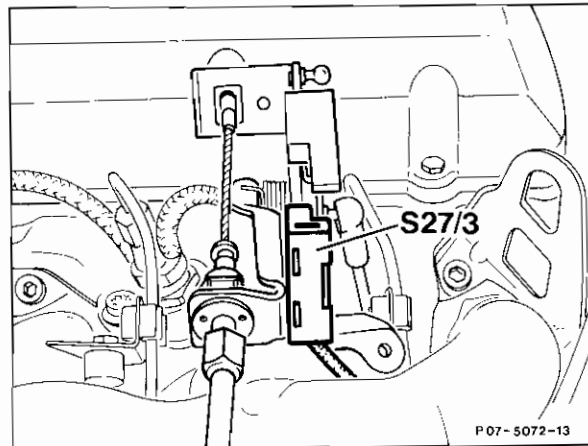


**EGR switchover valve (Y27), EGR microswitch (S27/3)**

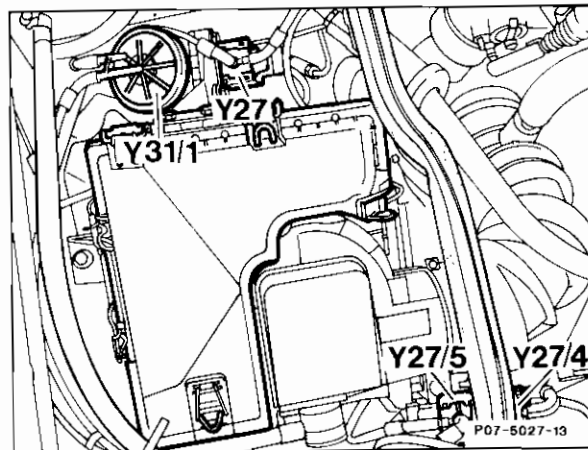
The EGR switchover valve (Y27) is activated by the control linkage microswitch (S27/3) 10° before full load, thereby closing the EGR valve.

S27/3 EGR microswitch



**Electric switchover valves (Y27/4, Y27/5)**

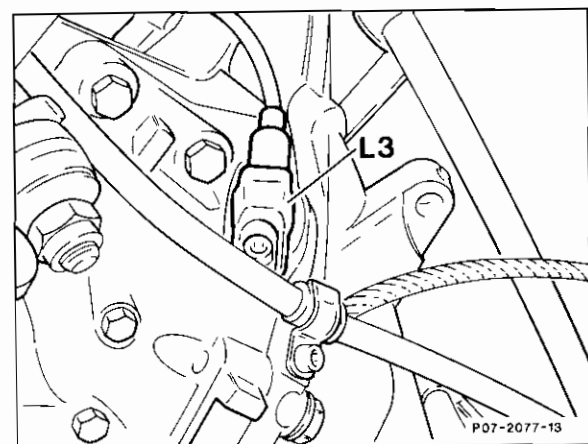
Depending on operating conditions, the electric switchover valves receive a control current from the control unit and vacuum from the vacuum transducer (Y31/5). They convey the control unit command as a pneumatic signal to the boost pressure control valve and pressure control flap.



- Y27 EGR switchover valve
- Y27/4 Boost pressure control switchover valve
- Y27/5 Pressure control flap switchover valve

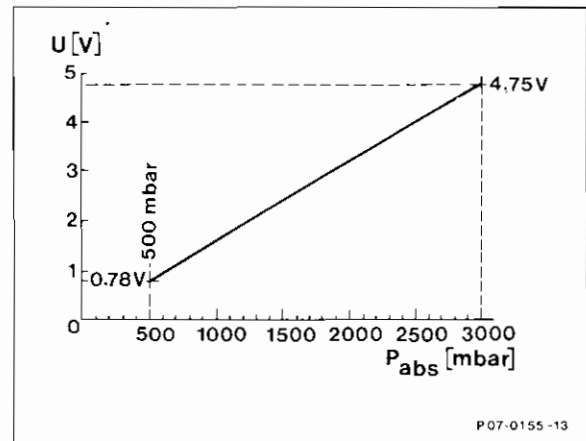
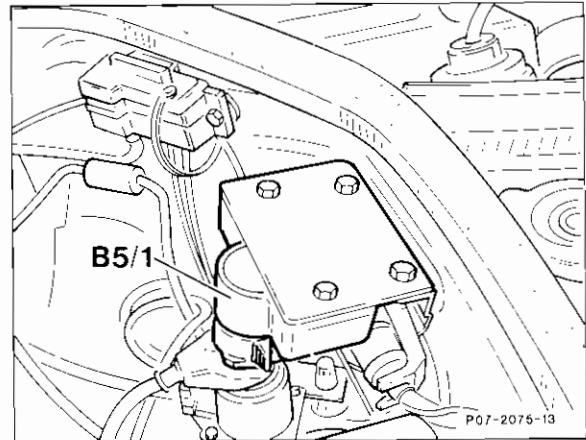
**Starter ring gear speed sensor (L3)**

Determines engine speed via the starter ring gear (144 impulses per revolution) and sends it in the form of a AC voltage signal to the control unit.



**Pressure sensor (B5/1)**

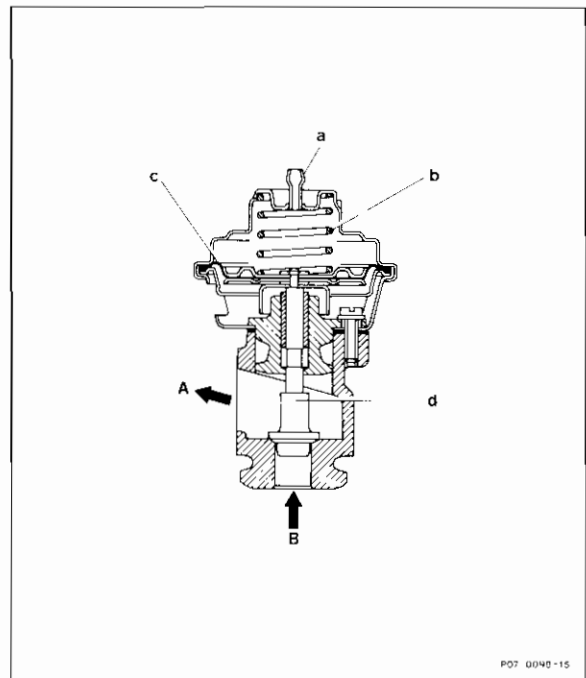
Located on the right, behind the firewall, the pressure sensor reads the pressure (P2) and converts it into a voltage signal which is used by the EDS control unit as an input signal.



P<sub>abs</sub> Absolute pressure in mbar, reference at 5 V supply voltage

**EGR valve (60)**

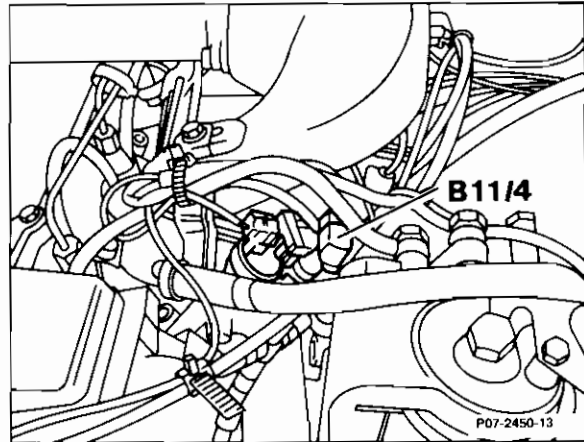
The EGR valve, together with the mixture tube, is bolted laterally to the cylinder head. It is connected to the exhaust manifold, the intake manifold crossover pipe and to a corrugated tube. Controlled vacuum from the switchover valve (Y27) and vacuum transducer (Y31/1) is applied to the EGR valve to open the valve.



- A Exhaust to the intake manifold
- B Exhaust from the exhaust manifold
- a Vacuum connection
- b Spring
- c Diaphragm
- d Valve

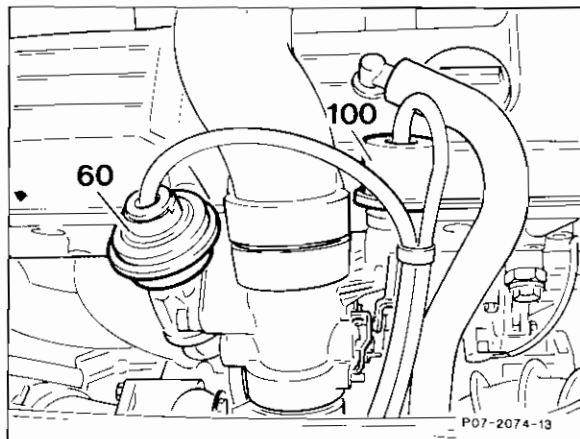
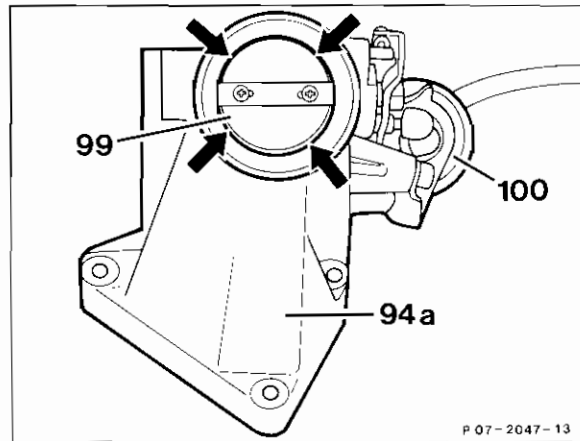
**Coolant temperature sensor (B11/4)**

Coolant temperature is determined by the coolant temperature sensor (B11/4) which is controlled by the EDS control unit. The temperature sensor resistance changes according to coolant temperature.



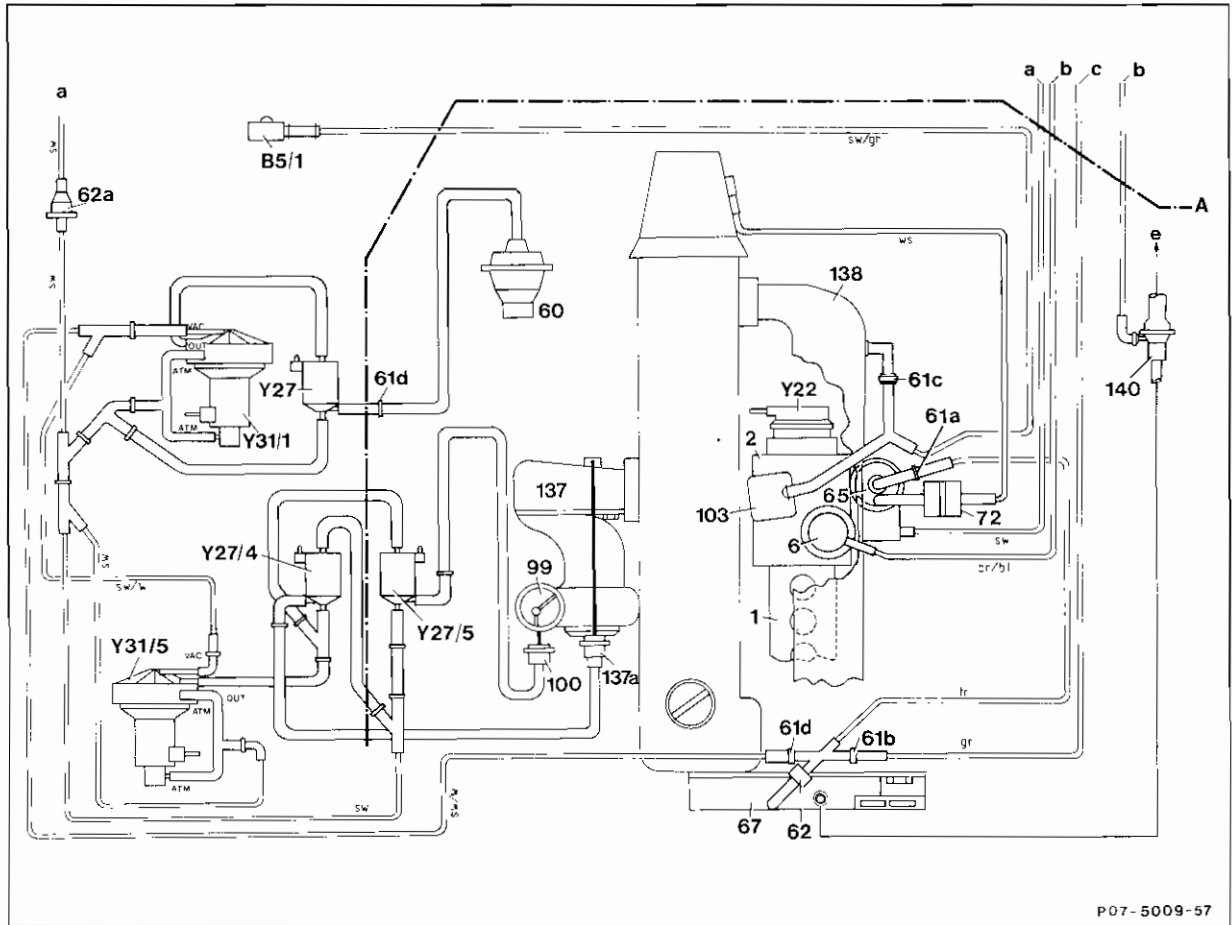
**Housing (94a) with pressure control flap (99) and vacuum actuator (100)**

A pneumatically operated pressure control flap, located in a housing on the intake manifold, adjusts boost pressure in the intake manifold. The pressure control flap closes the fresh air intake during EGR operation. A minimal opening (arrows) between the pressure control flap and the housing remains. The vacuum actuator (100) is activated by the pressure control flap switchover valve (Y27/5) and vacuum transducer (Y31/5) (see functional diagram).



- 60 EGR valve
- 100 Vacuum actuator

Vacuum line layout



P07-5009-57

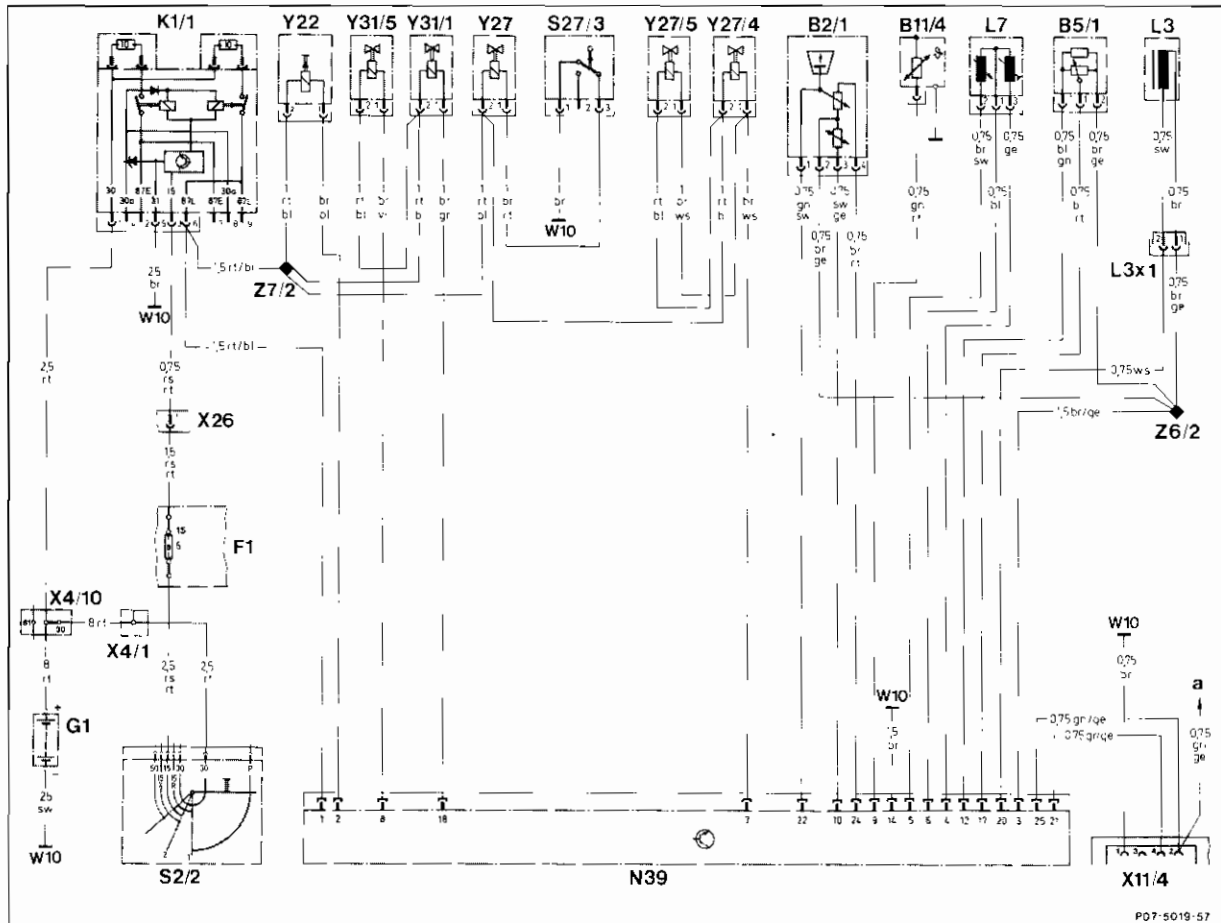
- 1 Injection pump
- 2 Governor
- 6 Vacuum shut-off unit
- 60 EGR valve
- 61b Orifice
- 61d Connection piece (without orifice)
- 62 Filter
- 62a Filter
- 65 Vacuum control valve
- 67 Vacuum pump
- 72 Damper
- 99 Pressure control flap
- 100 Pressure control flap vacuum actuator
- 103 Aneroid compensator (ALDA)
- 137 Turbocharger
- 137a Boost pressure control valve vacuum actuator
- 138 Intake manifold
- 140 Brake booster check valve
- B5/1 Pressure sensor (EDS)
- Y22 Electromagnetic actuator, electronic idle speed control (ELR)
- Y27 EGR switchover valve
- Y27/4 Boost pressure control switchover valve
- Y27/5 Pressure control flap switchover valve
- Y31/1 EGR vacuum transducer
- Y31/5 Boost pressure control/pressure control flap vacuum transducer

- A Firewall
- a Vent line to passenger compartment
- b Key shut-off
- c Remaining vacuum consumers
- e Brake booster

**Pressure and vacuum connections at vacuum transducers**

- VAC Vacuum from vacuum pump
- ATM Vent line to passenger compartment
- OUT From vacuum transducer (Y31/1) to EGR switchover valve (Y27)
- OUT From vacuum transducer (Y31/5) to switchover valves (Y27/4) and (Y27/5)
- sw black
- w or ws white
- gr grey
- br brown
- bl blue
- tr transparent

Electric wiring diagram



- |       |   |       |  |
|-------|---|-------|--|
| B2/1  | Air flow sensor with intake air temperature sensor (EDS)      | Y27/4 | Boost pressure control switchover valve                        |
| B5/1  | Pressure sensor (EDS)   | Y27/5 | Pressure control flap switchover valve                         |
| B11/4 | Coolant temperature sensor                                    | Y31/1 | EGR valve vacuum transducer                                    |
| F1    | Fuse and relay box  | Y31/5 | Boost pressure control/pressure control flap vacuum transducer |
| G1    | Battery   | Z6/2  | Connector sleeve, ground supply (solder joint in connector)    |
| K1/1  | Overvoltage protection relay, 87E (7-pole)                    | Z7/2  | Connector sleeve, terminal 87 (solder joint in harness)        |
| L3    | Starter ring gear speed sensor                                | a     | To A/C compressor control unit (N6), pin 4                     |
| L3x1  | Connector, starter ring gear speed sensor                     | b     | To A/C compressor control unit (N6), pin 4                     |
| L7    | Fuel rack position sensor                                     | sw    | black  |
| N39   | EDS control unit  | ws    | white  |
| S2/2  | Glow/starter switch   | gr    | grey   |
| S27/3 | Microswitch (EGR)   | ge    | yellow   |
| W10   | Ground, battery   | gn    | green  |
| X4/1  | Terminal block, terminal 30/interior (2-pole)                 | bl    | blue   |
| X4/10 | Terminal block, terminal 30/61, battery (3-pole)              | br    | brown  |
| X11/4 | Test connection for diagnosis (impulse readout, 8-pole)       | rt    | red  |
| X26   | Connector, interior/engine (12-pole)                          | rs    | pink   |
| Y22   | Electromagnetic actuator, electronic idle speed control (ELR) |       |  |
| Y27   | EGR switchover valve  |       |  |

## Electronic diesel system (EDS) test

The test is divided into the following:

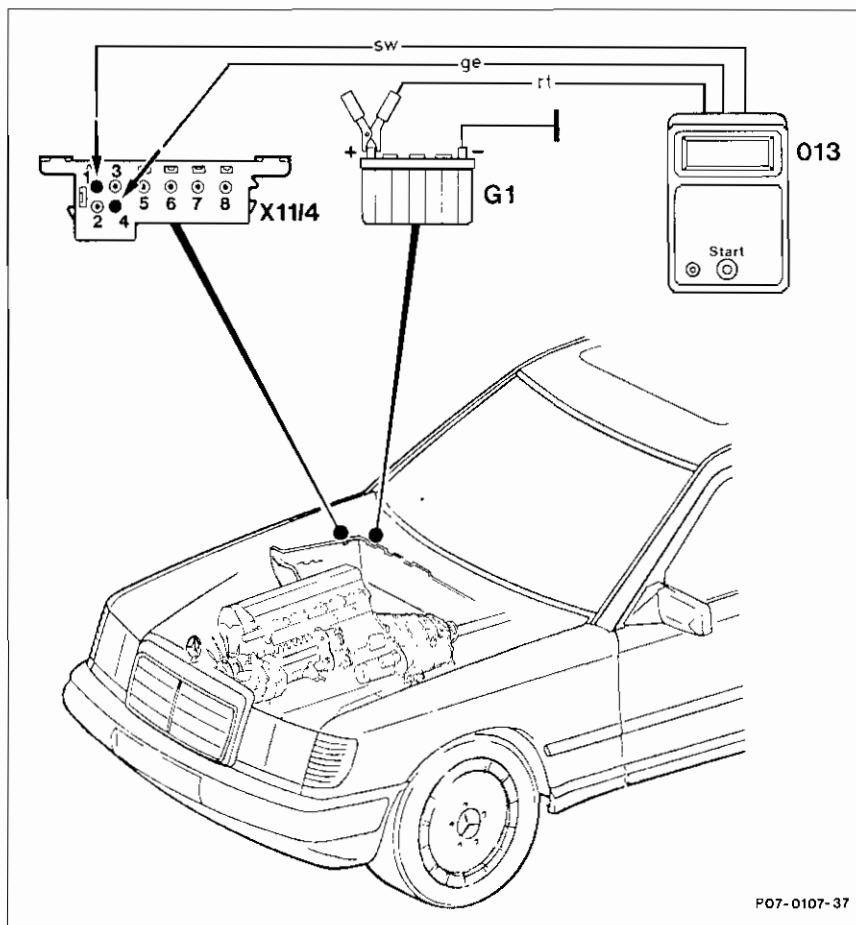
- Diagnosis,
- Electrical test program,
- Function test, electronic idle speed control, EGR, P2-control.

### Diagnosis

#### Test conditions:

- Coolant temperature 60 – 80 °C,
- Automatic climate control off,
- Selector lever in position "P",
- Overvoltage protection fuse OK,
- Battery voltage approx. 12 volts at overvoltage protection relay between sockets 1 and 5.

## Connection diagram

**Note regarding impulse readout:**

If the impulse readout does not indicate a malfunction in spite of a complaint, perform function test.

The number "1" indicates that there are no recognized malfunctions in the electronic system. All further numbers refer to a particular component or malfunction source.

Numbers ranging from 1 to 15 may be displayed on the impulse counter.

If the LED "U-Batt" lights after connecting the impulse counter, then the impulse counter and voltage supply for the impulse counter are ok.

**Testing with impulse counter**

1 Connect impulse counter according to connection diagram.

**Note:**

LED "U-Batt" in display must light up, otherwise:

- a) Check impulse counter fuse,
- b) Check socket 1 of test connection (X11/4) against the positive pole of the battery (11–14 V),
- c) Check socket 4 of test connection (X11/4) against socket 1 (6–12 V).

**2 Engine at idle.**

3 Press start button for 2 to 4 seconds.

4 Read and note impulse readout displayed.  
Display "1" = no malfunction stored,  
Greater than "1" = malfunction in system.

5 Press start button again for 2 to 4 seconds.  
If there are no further malfunctions in the system, the previously displayed number will reappear. If additional malfunctions exist, then the respective malfunction code will be displayed.

6 Repeat step 5 until the first number displayed is repeated.

7 Eliminate noted malfunctions (impulse readout) according to troubleshooting chart.

8 Perform tests of individual components.

**Erasing malfunction memory:**

After eliminating a malfunction, the respective impulse readout must be cleared as follows:

9 Press start button and read out the eliminated malfunction. Then press the start button for 6 to 8 seconds.

**Note:**

Each malfunction displayed must be **erased individually**.

If the malfunction has been eliminated and its respective readout erased, then the malfunction code will no longer be displayed when performing the impulse readout.

If the number displayed is greater than 1, then there are further malfunctions in the system.



**Malfunction table**

The respective number in the display of the impulse counter indicates whether a component is defective, which one it is, or whether or not components in the control circuit are defective.

**EDS control unit**

Impulse readout	Component/malfunction circuit
1 <sup>1)</sup>	All functions ok, no malfunction stored
2	Fuel rack position sensor (L7)
3	Air flow sensor (B2/1)
4	EDS control unit (N39), atmospheric pressure sensor
5	EGR valve vacuum transducer (Y31/1) or malfunction in EGR control circuit
6	EDS control unit (N39), internal voltage supply
7	Starter ring gear speed sensor (L3)
8	Coolant temperature sensor (B11/4)
9	Intake air temperature sensor (B2/1a)
10	Voltage supply
11 <sup>2)</sup>	Electronic idle speed control actuator or EGR valve vacuum transducer (Y31/1)
12	Not used
13	EDS control unit (N39) defective (internal memory)
14	EDS pressure sensor (B5/1) defective
15	Boost pressure control/pressure control flap vacuum transducer (Y31/5) or defect in boost pressure control circuit.

1) If there are complaints nonetheless, perform function tests for electronic idle speed control, EGR and P2-control.

2) Displayed only if there a short circuit.

Function test, electronic idle speed control (ELR), EGR, P2-control

**Note:**

This test should be performed if, in spite of a complaint, the impulse readout does not indicate a malfunction.

**Engine 602.96**

Test step/ test scope	Test connection/ equipment	Test condition	Nominal value	Possible cause/ remedy
1.0 Idle speed control	Connect tachometer to test connection (X11/4).	Engine: <b>at Idle</b> Coolant temperature approx. 80 °C.	680 ± 20 rpm	Actuator, Injection pump, Starter ring gear speed sensor (L3), EDS control unit (N39), see test steps 7 and 11 (EDS test).
		Connector on actuator unplugged.	610 ± 20 rpm	Adjust engine speed at injection pump, Injection pump.
2.0 EGR control circuit	Connect vacuum tester with Y-distributor to EGR valve.	Engine at 900 ± 50 rpm and approx. 300 mbar, briefly apply full throttle.	Vacuum decreases	Vacuum transducer (Y31/1), Vacuum switchover valve (Y27), Mechanically check air flow sensor (B2/1), EDS control unit (N39), EGR valve, Pneumatic connections.
3.0 EGR valve	Connect vacuum tester directly to EGR valve.	Engine: <b>OFF</b> Apply 300 mbar vacuum to EGR valve. Pull off vacuum line.	EGR valve closes audibly	Replace EGR valve.

Test step/ test scope	Test connection/ equipment	Test condition	Nominal value	Possible cause/ remedy
4.0 Boost pressure control	Connect vacuum tester (20) with Y- distributor to outlet (OUT) of vacuum transducer (Y31/3).	Engine: <b>at Idle</b>	> 300 mbar	Vacuum supply, Vacuum line, Vacuum transducer (Y31/3), EDS control unit (N39).
Boost pressure control valve vacuum actuator		Slowly increase engine speed to approx. 2000 rpm.	Vacuum decreases	
4.1 Pressure control flap vacuum actuator (100)	Connect vacuum tester (20) with Y- distributor to pressure control flap vacuum actuator (100).	Engine: <b>at Idle</b>	< 100 mbar	Vacuum supply, Vacuum line.
		Slowly increase engine speed to approx. 2000 rpm.	Vacuum increases	Vacuum transducer (Y31/2), Pressure line at pressure sensor (B5/1), EDS control unit (N39).