

Information for model year 1982
Extract from introductory brochure



Positive crankcase ventilation

The positive crankcase ventilation system is maintenance free.

The engine blow-by gases and crankcase vapors flow across the vent insert (1) and connection fitting (2) to the cyclone oil separator (3) which is attached to the intake manifold.

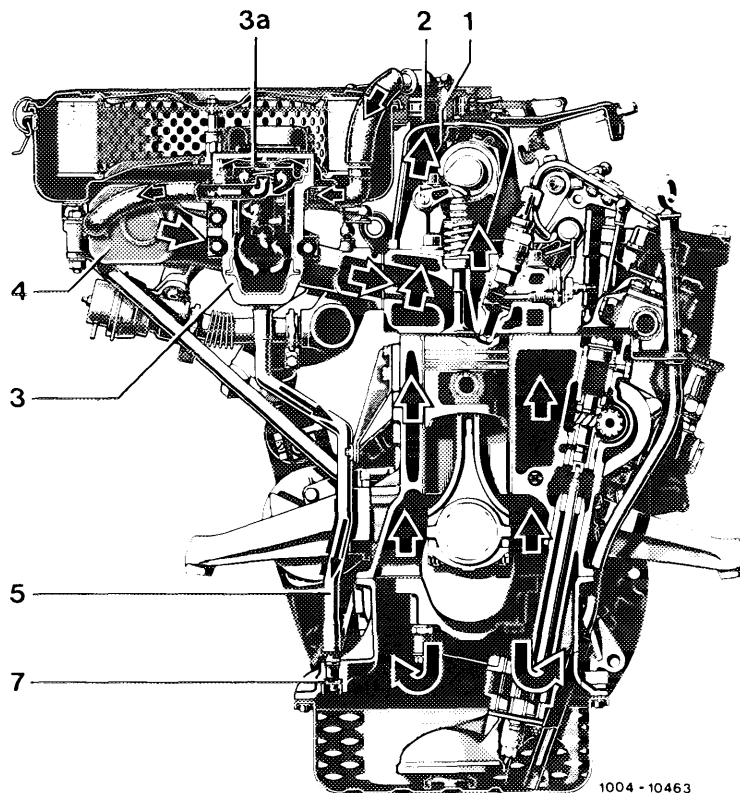
From here, they flow through the air intake duct (4) to the intake manifold and with the intake air into the combustion chambers.

At a very high intake manifold vacuum (caused by

the throttle valve) the diaphragm in the differential pressure valve (3a) is pulled down, restricting the flow cross section to the intake manifold.

During this period, only a limited amount of blow-by gases will flow to the intake manifold.

The oil separated in the cyclone oil separator (3) flows through the return line (6) and the check valve (7), installed in the oil pan upper half, back into the oil pan. The check valve insures that no oil vapors from the oil pan are drawn into the intake system due to the existing vacuum.



1004 - 10463

Fig 12

- | | |
|--------------------------------|-------------------|
| 1 Vent insert | 4 Intake manifold |
| 2 Connection fitting | 6 Return line |
| 3 Cyclone oil separator | 7 Check valve |
| 3a Differential pressure valve | |

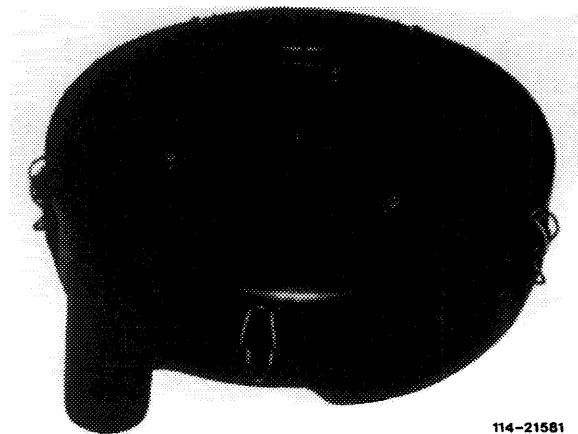
Cylinder head cover

Similar to engine 617.95 (turbodiesel) with EGR, the breather pipe screwed to the inside of the cylinder head cover has been replaced by a vent insert which is riveted into the cylinder head cover and sealed with silicone rubber.

As a result, the oil separating chamber (calm region) included in the engine ventilation system has been increased in volume.

Air cleaner

Air cleaner housings are made of both, aluminium or plastic, and either one may be installed.



114-21581

Fig. 13

Exhaust gas recirculation (EGR)

Engine 616 is provided with EGR, which is different in function and operation from that on engines 617.912 and 617.95.

In addition, the engine speed and the driving speed are monitored by an electronic control unit, which in turn activates a switchover valve. As a result, EGR is switched off when necessary.

EGR is controlled by way of a throttle valve housing attached to the intake manifold, as well as by an EGR valve.

Functional diagram with automatic transmission

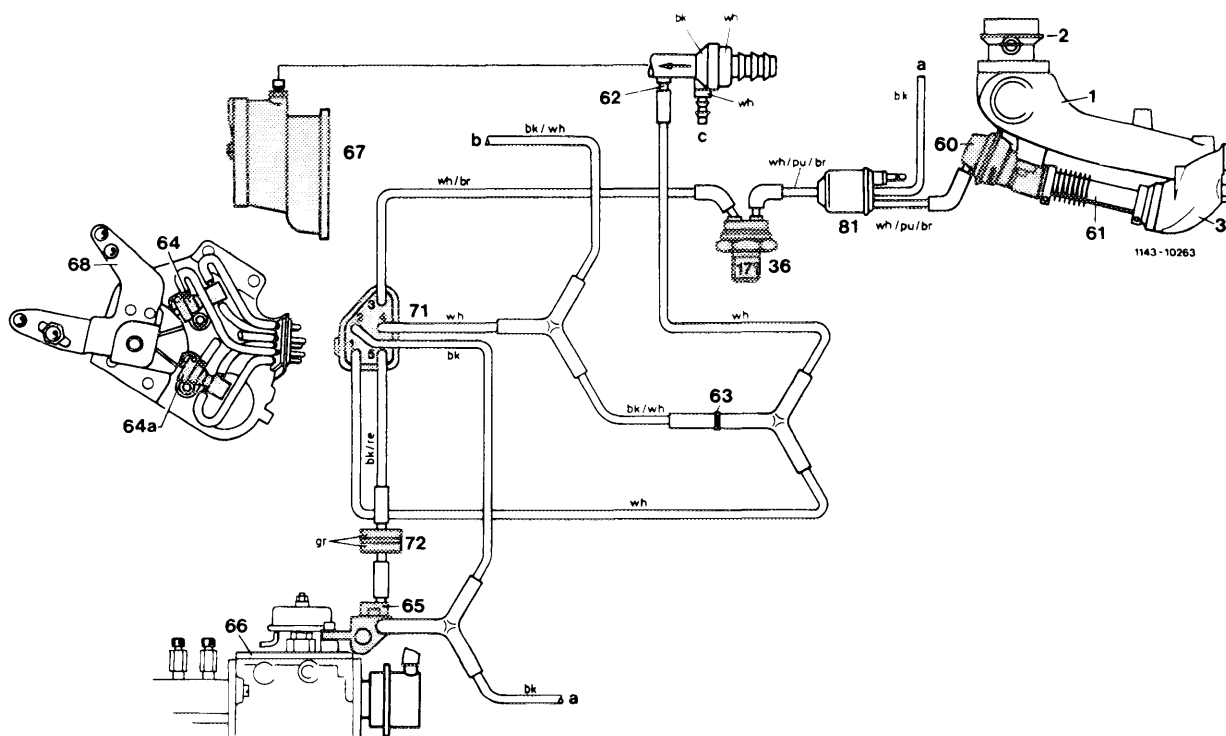


Fig. 14

- 1 Intake manifold
- 2 Throttle valve housing
- 31 Exhaust manifold
- 36 Thermo-vacuum valve 17 °C
- 60 EGR valve
- 61 Corrugated tube
- 62 Orifice
- 63 Orifice
- 64 Switchover valve, mechanical, EGR
- 64a Switchover valve, mechanical, automatic transmission

- 65 Vacuum control valve
- 66 Injection pump
- 67 Vacuum pump
- 68 Lever with cam
- 71 Central plug
- 72 Surge damper, vacuum
- 81 Switchover valve, electric

- Color code
- bk = black
 - br = brown
 - gr = green
 - pu = purple
 - re = red
 - wh = white

- a Vent to passenger compartment
- b To automatic transmission
- c To additional vacuum consumers

Functional diagram with manual transmission

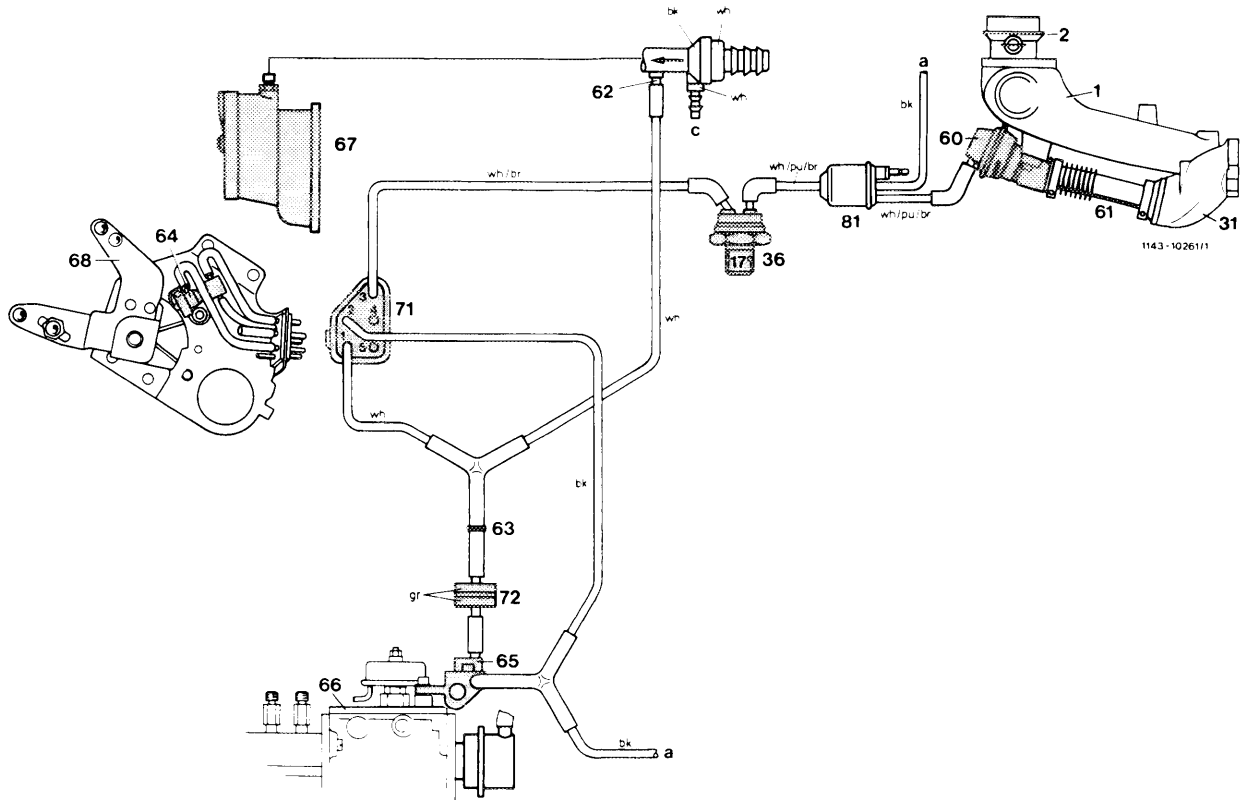


Fig. 15

- 1 Intake manifold
- 2 Throttle valve housing
- 31 Exhaust manifold
- 36 Thermo-vacuum valve 17 °C
- 60 EGR valve
- 61 Corrugated tube
- 62 Orifice
- 63 Orifice
- 64 Switchover valve, mechanical, EGR
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- 72 Surge damper, vacuum
- 81 Switchover valve, electric
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- c To additional vacuum consumers

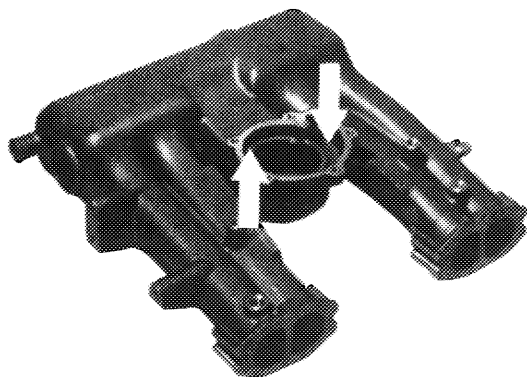
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EGR components

The EGR valve, vacuum control valve, thermo-vacuum valve 17 °C and switchover valve, mechanical are identical with those of engine 617 of model year 1981.

Intake manifold

A spiral-shaped channel (arrows) is located around the intake opening of the intake manifold, through which the recirculated exhaust gas is routed and mixed with the intake air. The EGR valve is attached to the intake manifold as on engine 617 in model year 1981 (arrow, Fig. 17).



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Fig. 16

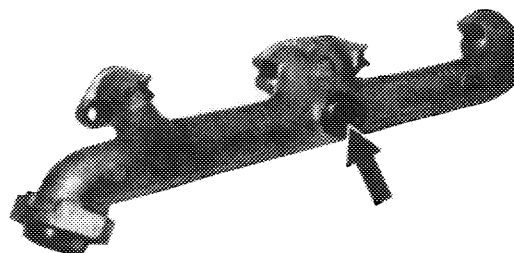


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Fig. 17

Exhaust manifold

An outlet connection (arrow) is attached to the exhaust manifold to provide the exhaust gases for recirculation.

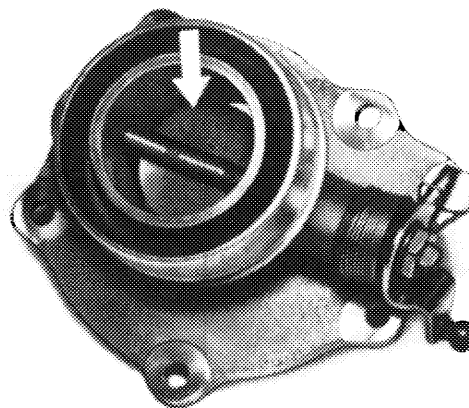


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Fig. 18

Throttle valve housing

The throttle valve housing is required to increase the amount of EGR in the partial load range.



114-21376

Fig. 19

Depending on the position of the regulating linkage (load condition of engine) the position of the throttle valve (arrow) and thereby the pressure difference between exhaust manifold and intake manifold are changed.

High pressure differential = high EGR

The OD of the throttle valve is designed so that in its closed position an annular cross section remains open. As a result, the engine will idle smoothly at high altitudes with the driving position engaged, the air conditioning system switched on and the power steering activated.

The lower half of the throttle valve housing is provided with guide vanes (arrows). These vanes insure complete mixing of intake air and recirculated exhaust gas, so that each cylinder is provided with the same quantity of exhaust gas.

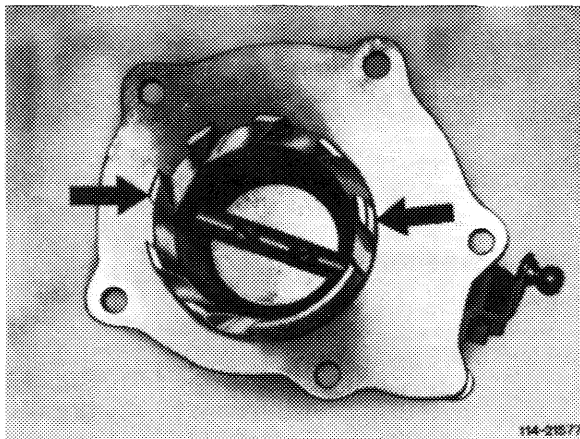


Fig. 20

Corrugated tube

Exhaust gases are returned through a corrugated tube installed between exhaust manifold and EGR valve.



Fig. 21

Electric switchover valve

The switchover valve controls the vacuum to the EGR valve. It opens or closes by way of an electronic control unit depending on engine rpm and vehicle speed.

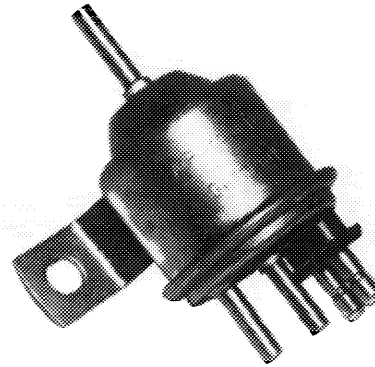


Fig. 22

Control unit

The control unit processes input data such as engine rpm from the TDC transmitter and driving speed from the impulse transmitter of the speedometer (refer to electric wiring diagram).

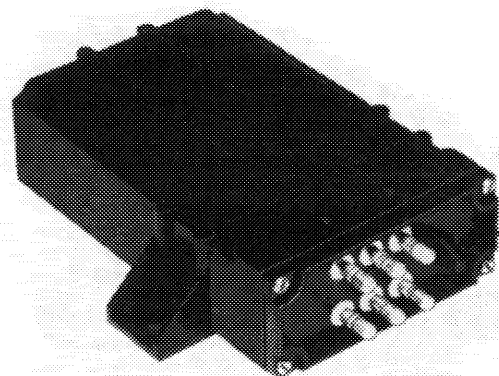


Fig. 23

Orifice

To the existing orifices

green	0.7 mm	
white	0.8 mm	
blue	1.0 mm	
red	1.1 mm	
yellow	2.0 mm,	the orifice
brown	0.9 mm	has been added.

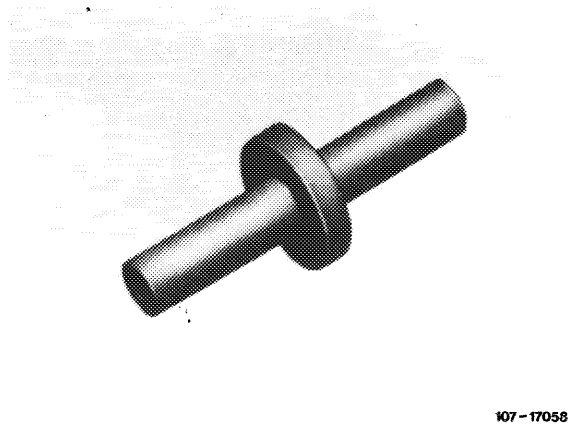


Fig. 24

TDC transmitter

A TDC transmitter is attached to the front of the cylinder block and transmits the engine rpm to the control unit for EGR.

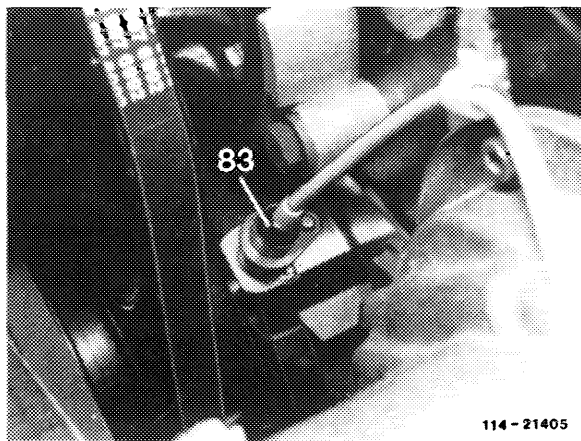


Fig. 25

Description of Operation

EGR operates under the following conditions:

- Coolant temperature above 17 °C
- Engine speed above $\begin{matrix} +100 \\ -130 \end{matrix}$ rpm
(+100 with increasing rpm, -130 with decreasing rpm)
- Speed below 73 ± 8 km/h
- Under partial load.

Thermo-vacuum valve (36) opens at a coolant temperature above approx. 17 °C. The vacuum can now reach the electric switchover valve (81).

Idle speed

The electric switchover valve (81) is not energized and the EGR valve is externally vented. There is no EGR.

Engine speed above 1300 rpm

Starting at an engine speed of 1300 rpm the impulses from the TDC transmitter are converted into a control signal. The switchover valve (81) is energized and opens. The vacuum arrives at the EGR valve and opens the valve against its spring force. The EGR valve opens a certain amount, depending on engine load.

Depressing the accelerator pedal will overcome the free travel on the drag lever and will start to open the throttle valve via a connecting rod. The pressure differential between the intake and exhaust manifolds is progressively reduced. As a result, less exhaust gases are drawn into the intake manifold.

The vacuum control valve (65) determines the amount of vacuum at the EGR valve depending on engine load. This amount of vacuum serves as controlling factor for EGR (position of EGR valve) and the shifting of the automatic transmission.

Shortly before full throttle, the lever with cam (68) switches the mechanical switchover valve (64) to external venting. The vacuum on the EGR valve is completely vented and there is no more EGR.

Speed above approx. 73 ± 8 km/h

At a speed above approx. 73 ± 8 km/h the impulses transmitted from impulse transmitter on the speedometer are converted into a control signal. The current to the electric switchover valve (81) is interrupted. The EGR valve is switched to external venting, there is no more EGR.

Vacuum flow at an engine speed above 1300 rpm (automatic transmission)

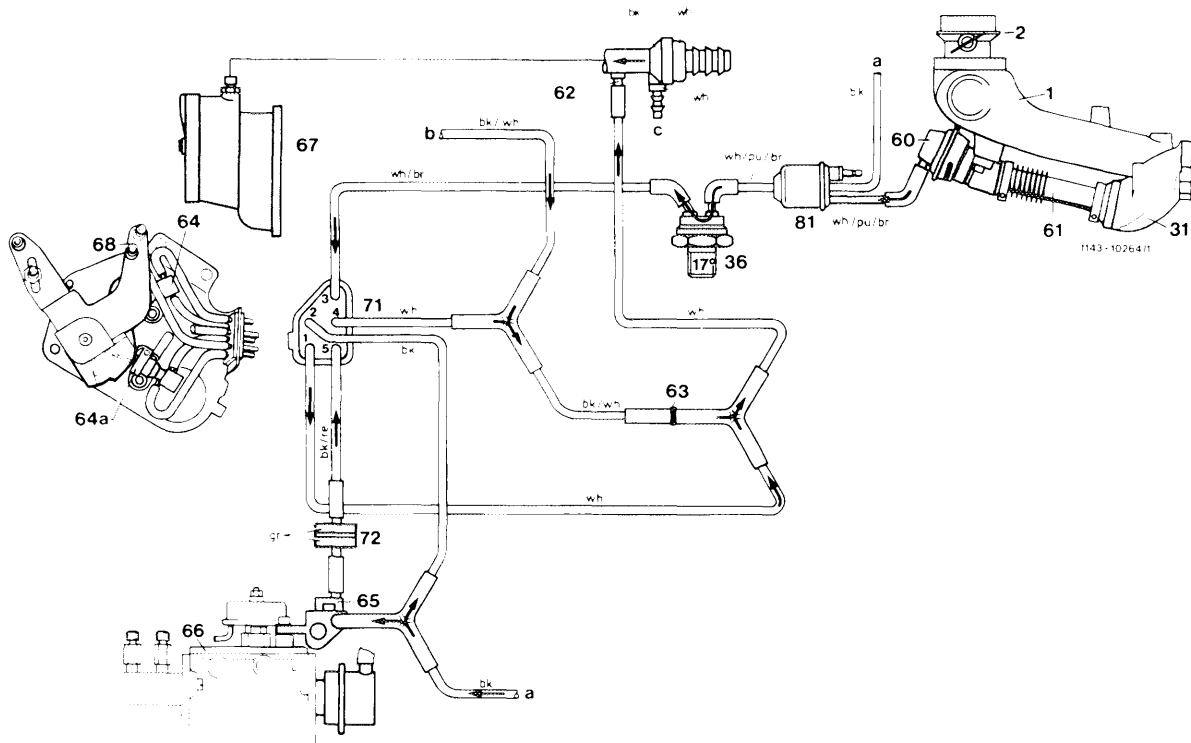


Fig. 26

- 1 Intake manifold
- 2 Throttle valve housing
- 31 Exhaust manifold
- 36 Thermo-vacuum valve 17 °C
- 60 EGR valve
- 61 Corrugated tube
- 62 Orifice
- 63 Orifice
- 64 Switchover valve, mechanical, EGR
- 64a Switchover valve, mechanical, automatic transmission

- 65 Vacuum control valve
- 66 Injection pump
- 67 Vacuum pump
- 68 Lever with cam
- 71 Central plug
- 72 Surge damper, vacuum
- 81 Switchover valve, electric

- Color code
- bk = black
 - br = brown
 - gr = green
 - pu = purple
 - re = red
 - wh = white

- a Vent to passenger compartment
- b To automatic transmission
- c To additional vacuum consumers

Vacuum flow at an engine speed above 1300 rpm (manual transmission)

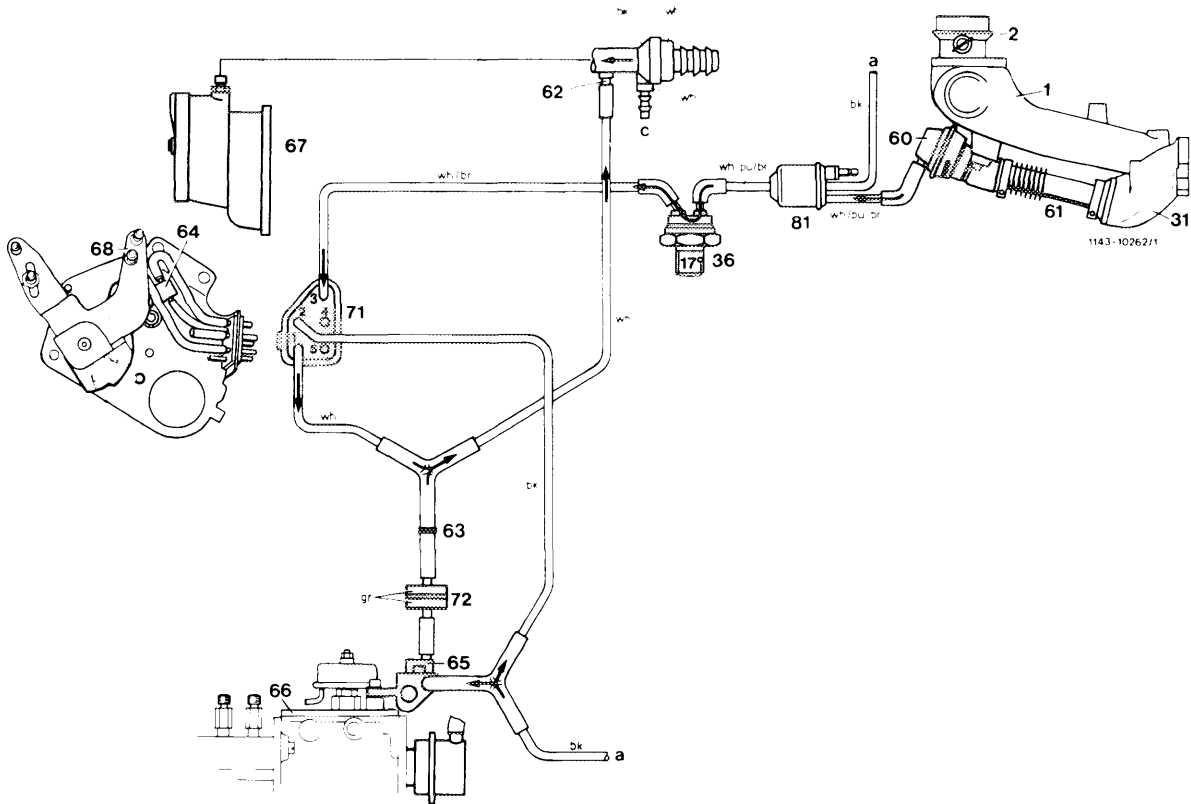


Fig. 27

- 1 Intake manifold
- 2 Throttle valve housing
- 31 Exhaust manifold
- 36 Thermo-vacuum valve 17 °C
- 60 EGR valve
- 61 Corrugated tube
- 62 Orifice
- 63 Orifice
- 64 Switchover valve, mechanical, EGR
- 65 Vacuum control valve

- 66 Injection pump
- 67 Vacuum pump
- 68 Lever with cam
- 71 Central plug
- 72 Surge damper, vacuum
- 81 Switchover valve, electric
- a Vent to passenger compartment
- c To additional vacuum consumers

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Location of new EGR components

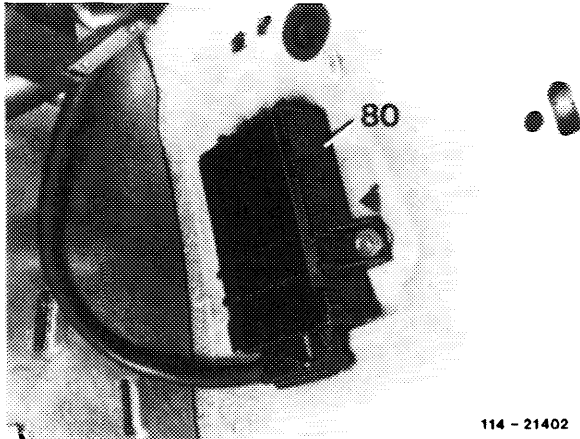


Fig. 28
80 Electronic control unit

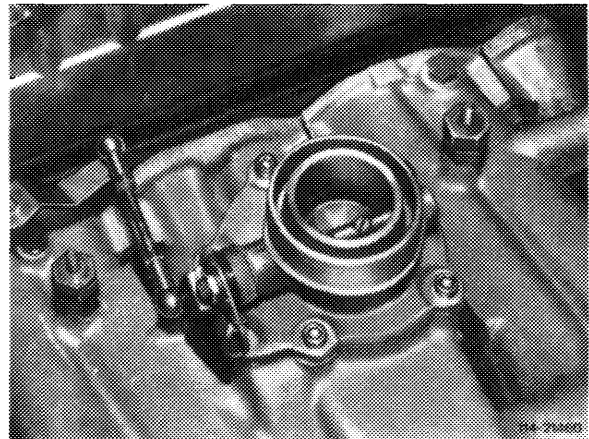


Fig. 31 Throttle valve housing

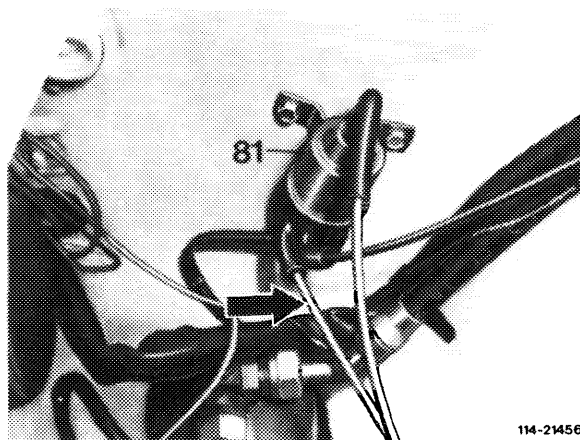


Fig. 29
81 Switchover valve, electric

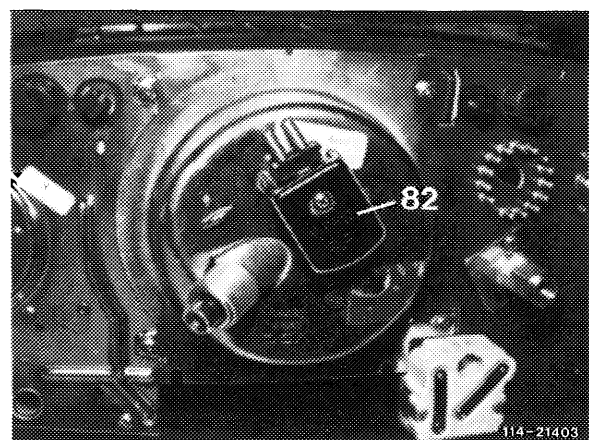


Fig. 32
82 Impulse transmitter, speedometer

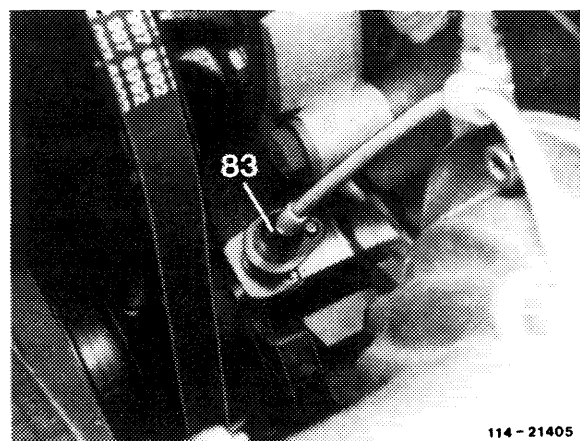


Fig. 30
83 TDC transmitter

Information concerning trouble diagnosis

For complaints such as:

High fuel consumption, poor performance excessive smoke and knocking at full load, check the throttle valve for proper function and free movement.

If in order, perform the test program for the emission control system.

14 – 100 Test program, emission control system

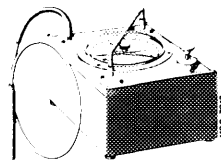
For complaints such as: Very poor engine performance, black or blue smoke, combustion knocking at full load, poor cold starting with smoking and rough idle.

Test conditions: Throttle linkage correctly adjusted, connect tachometer, engine at operating temperature, run engine at idle (750 ± 50 rpm) (idle speed control turned down), steering in straightahead position, climate control turned off, selector lever of automatic transmission in position „P“.

Tested: Exhaust gas recirculation (EGR).

Special tool

Vacuum tester 0–1000 mbar



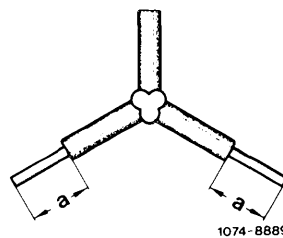
116 589 25 21 00

Commercially available tools

Tachometer, multimeter (volt-ohmmeter)

Test connection – self-made

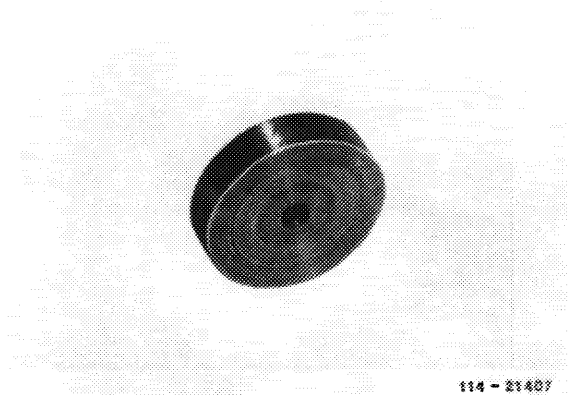
Distributor fitting
a Vacuum line 4 x 1 x 40 mm



117 078 01 45

Test line 4 x 1 x 400 mm

Adjusting roller for vacuum test on vacuum control valve



916 589 00 21 00

114 - 21427

Functional diagram vacuum line layout

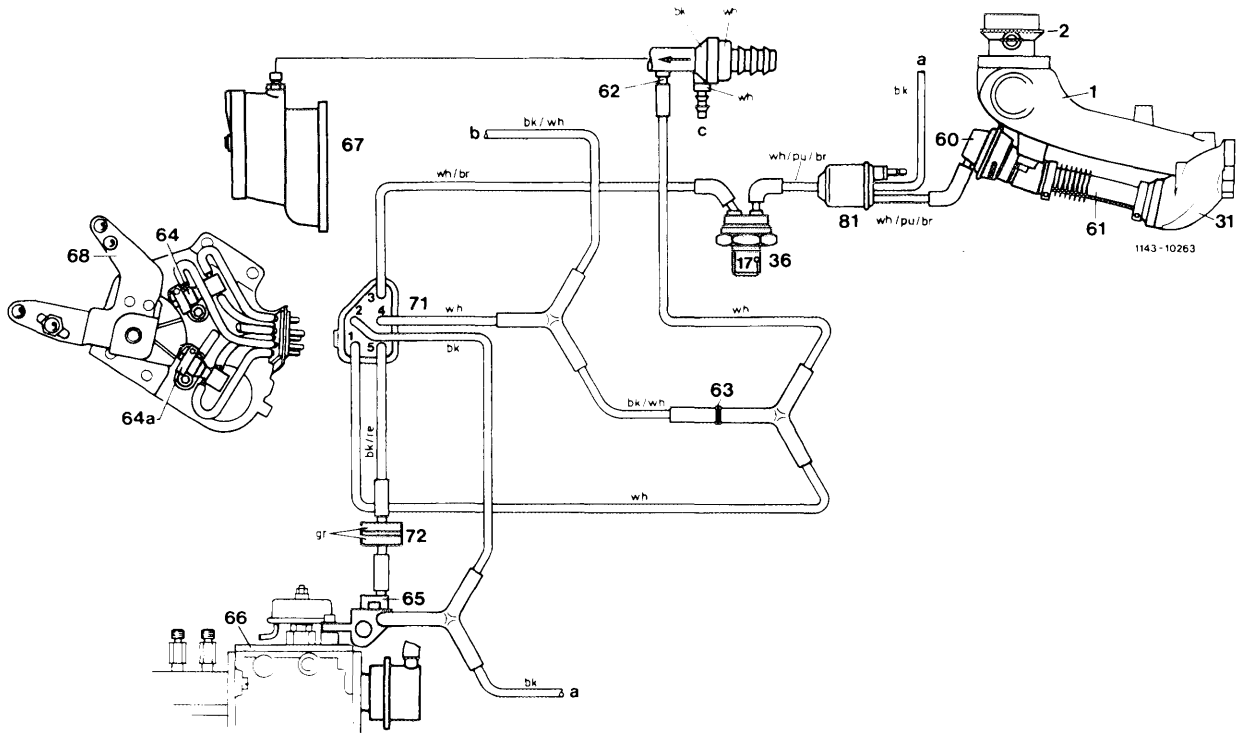


Fig. 33 Automatic transmission

- 1 Intake manifold
- 2 Throttle valve housing
- 31 Exhaust manifold
- 36 Thermo-vacuum valve 17 °C
- 60 EGR valve
- 61 Corrugate tube
- 62 Orifice
- 63 Orifice
- 64 Switchover valve, mechanical, EGR
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- 65 Vacuum control valve
- 66 Injection pump
- 67 Vacuum pump
- 68 Lever with cam
- 71 Central plug
- 72 Surge damper, vacuum
- 81 Switchover valve, electric

- Color code
- bk = black
 - br = brown
 - gr = green
 - pu = purple
 - re = red
 - wh = white

- a Vent to passenger compartment
- b To automatic transmission
- c To additional vacuum consumers

Functional diagram with manual transmission

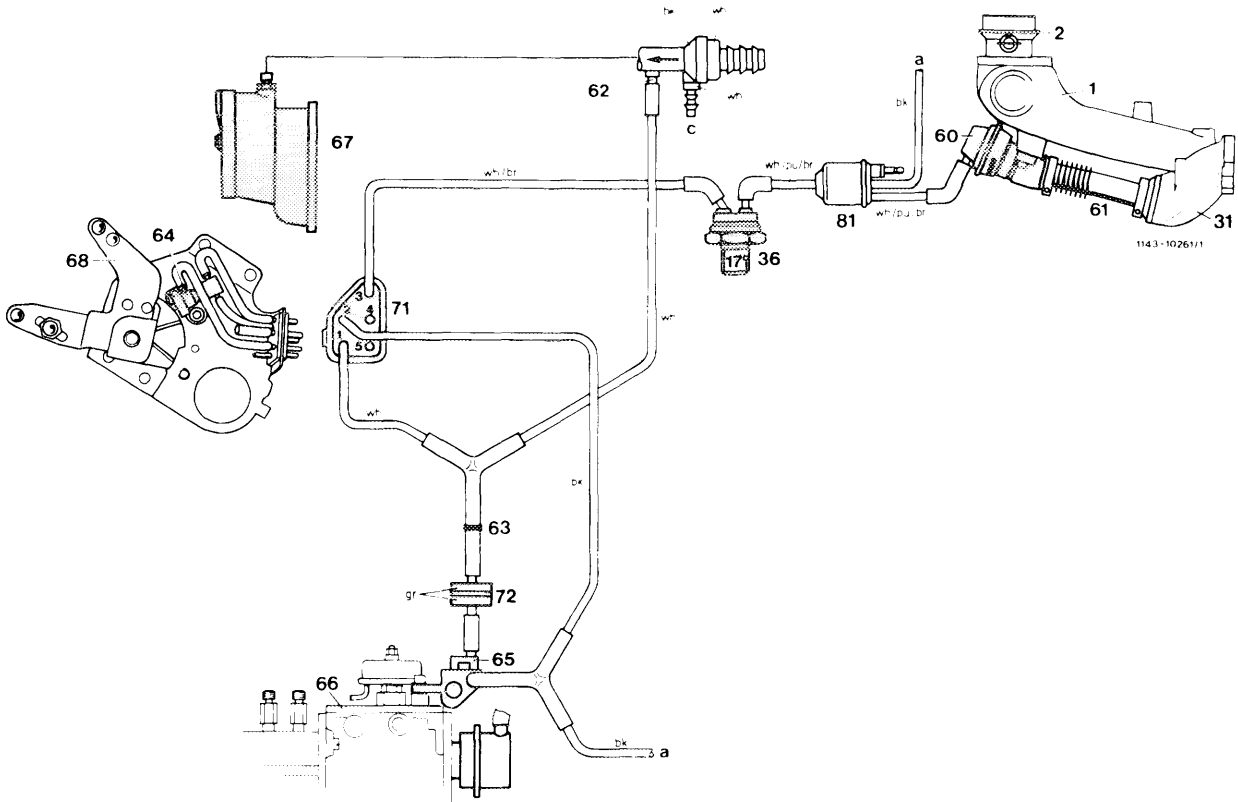


Fig. 34 Manual transmission

- 1 Intake manifold
- 2 Throttle valve housing
- 31 Exhaust manifold
- 36 Thermo-vacuum valve 17 °C
- 60 EGR valve
- 61 Corrugated tube
- 62 Orifice
- 63 Orifice
- 64 Switchover valve, mechanical, EGR
- 65 Vacuum control valve

- 66 Injection pump
- 67 Vacuum pump
- 68 Lever with cam
- 71 Central plug
- 72 Surge damper, vacuum
- 81 Switchover valve, electric

- a Vent to passenger compart
- b To additional vacuum consumers

- Color code
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Test

Note: The yellow orifice (63) should be installed at beginning of test.

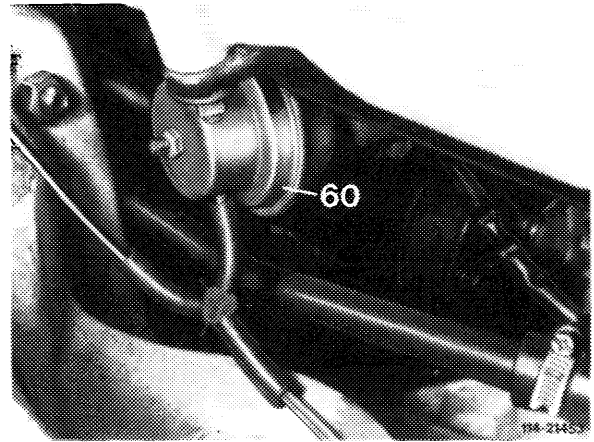
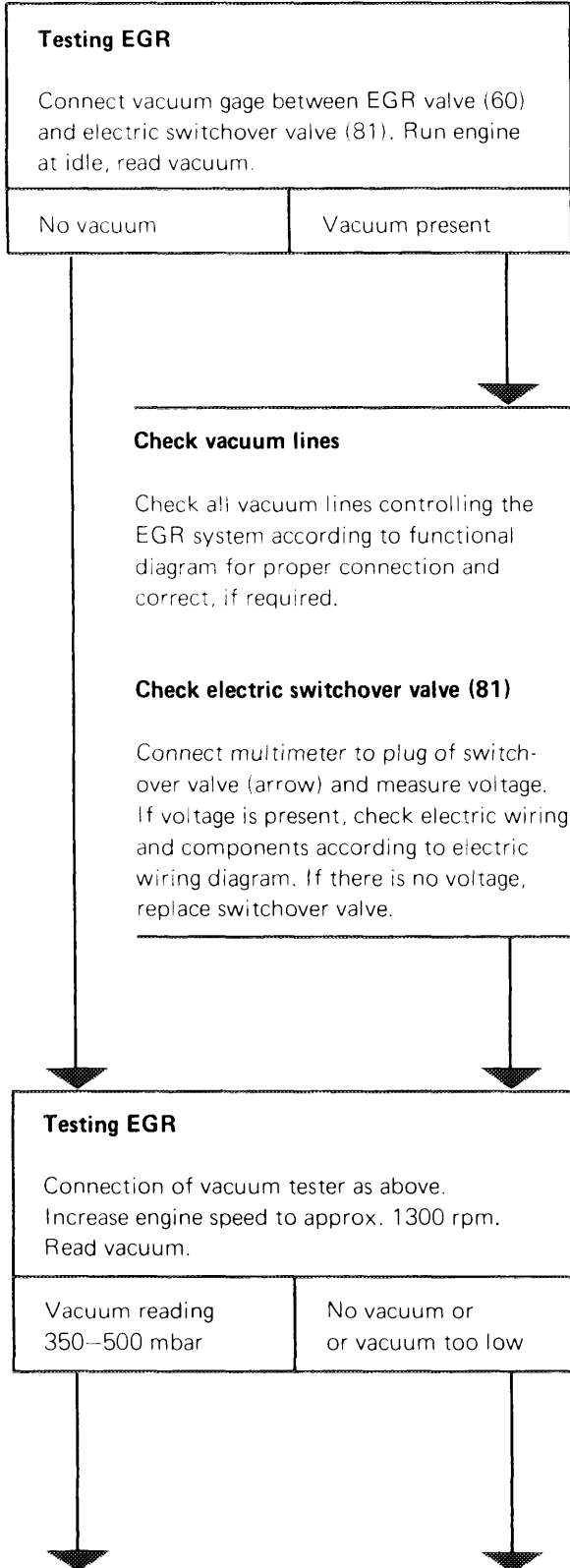


Fig. 35

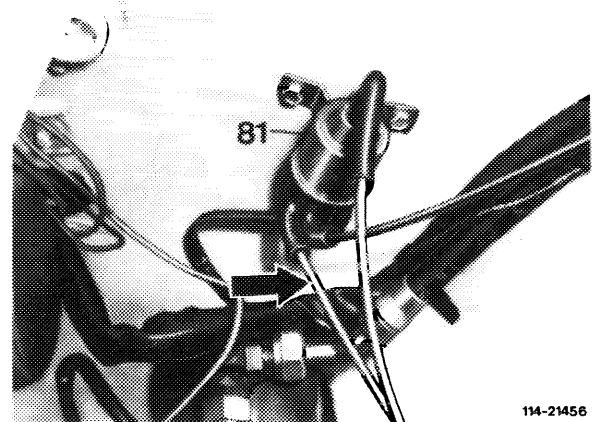


Fig. 36