

Herrmann & Kraemer

Testvorlage für die Mikroverfilmung

Vorlagengröße A 4

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0.10 mm

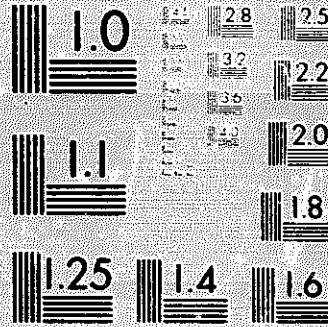
0.20 mm

0.40 mm

0.80 mm

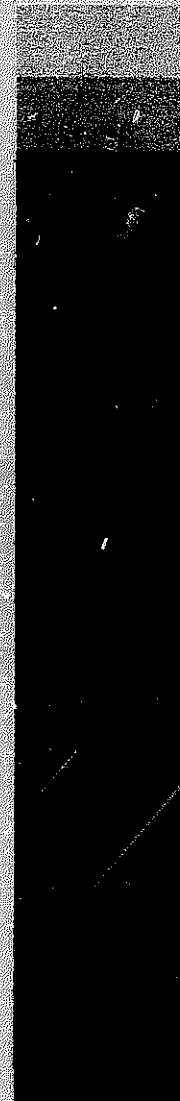
2.50 mm

0.20 mm



MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

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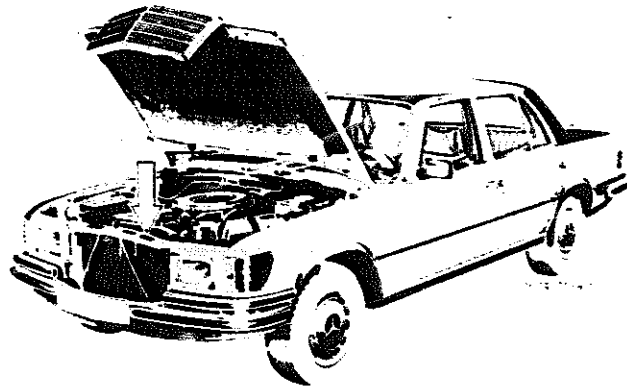
AUS

C2

14-001 Functional characteristics

Model year 1979/80

An information plate (arrow) for emission control system in English is attached to the cross member in front of radiator.

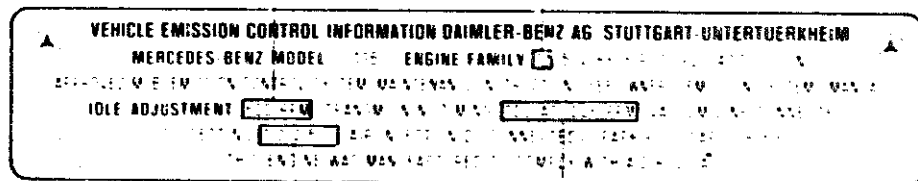


Information plate

This plate bears the most important engine tuning data, its basic color is silver with black lettering.

2

1



1024-B01/81

4

3

- 1 Model year
- 2 Idle . . . rpm
- 3 Timing . . . at idle
- 4 Emission value at idle

Model year 1979/80

A. General

Identification of vacuum lines

The basic color of vacuum lines for emission control system is transparent (white).

Additional color stripes are used to facilitate identification of the individual functions.

Lines originating at a vacuum source (suction lines) have only one color stripe.

Lines terminating at a vacuum-operated device (operating lines) have two color stripes. Purple is always the second color.

Emission control system	Color coding of originating vacuum line	Color coding of terminating vacuum line
EGR	brown	red/purple
Air injection	blue	blue/purple
Ignition Advance	red	red/purple
Retard	yellow	yellow/purple

B. Ignition timing

Vacuum advance

The advance unit of the ignition distributor is connected to the vacuum connection of the throttle valve housing which is on atmospheric side when the throttle valve is closed, but is interrupted by thermovalve 40 °C (60). With the throttle valve lifted and at a coolant temperature above 40 °C the ignition is adjusted in direction of "advance" in addition to centrifugal adjustment and independent of the vacuum. A delay of the vacuum adjustment up to 40 °C coolant temperature will shorten the warm-up stage.

A delay valve (77) is additionally installed between thermovalve (60) and vacuum control unit. When the throttle valve is quickly opened, the delay valve will delay the abrupt vacuum increase in direction of advance unit. As a result, the CH values of the exhaust gas will be reduced.

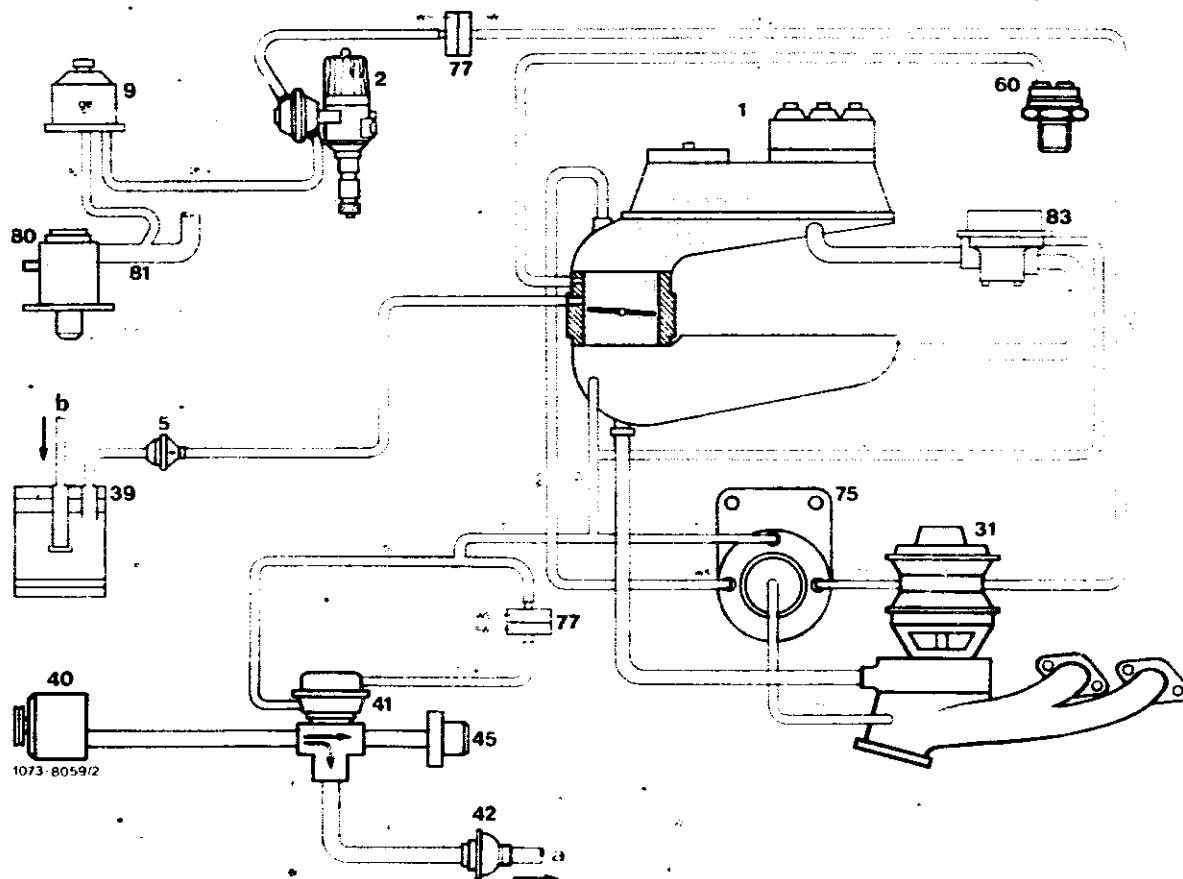


C. EGR (exhaust gas recirculation)

To reduce nitrogen oxides in exhaust gases, a portion of the gases from the exhaust manifold is returned to the intake manifold by means of a valve.

The quantity of the returned exhaust gas is limited and is stopped in some driving conditions, so that the driving characteristics will not be influenced.

Function diagram



- 1 Throttle valve housing and intake manifold
- 2 Ignition distributor
- 5 Purge valve
- 9 Switchover valve (on vehicles with air conditioning system)
- 31 EGR valve
- 39 Charcoal canister
- 40 Air pump
- 41 Decel diverter valve
- 42 Check valve

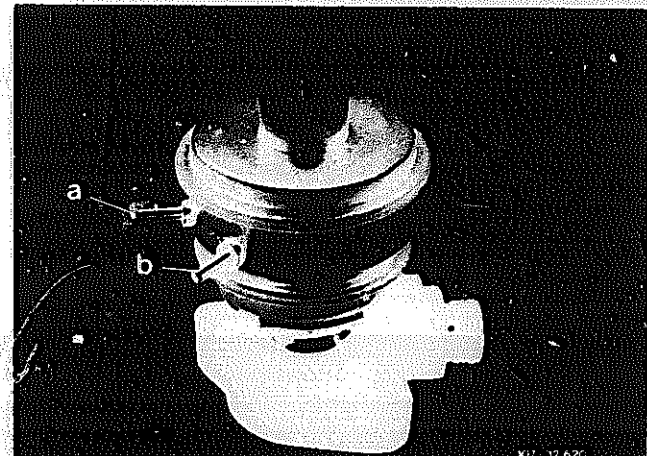
- 45 Air cleaner for silencing
- 60 Thermo valve 40 °C
- 75 Transducer
- 77 Delay valve
- 80 Auxiliary air valve
- 81 Contour hose
- 83 Decel air valve

- Color code:
- bl = blue
 - br = brown
 - ge = yellow
 - or = orange
 - rt = red
 - vi = purple
 - sw = black
 - ws = white

EGR components:

EGR valve

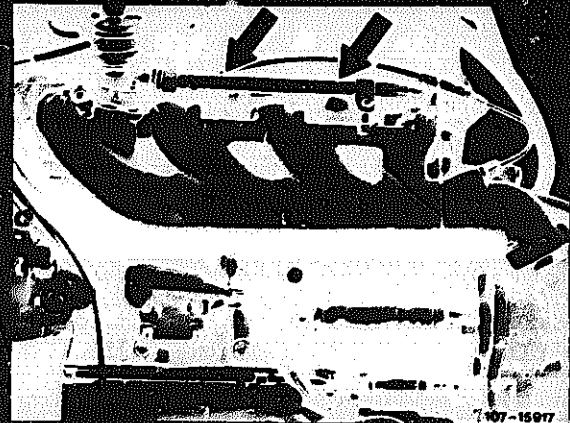
For better adaptation of EGR the EGR valve is designed as a three-diaphragm valve.



K7-12 620

EGR line (arrows)

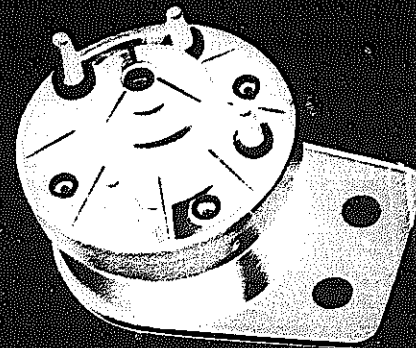
The exhaust gases are routed from EGR valve through EGR line into intake manifold.



107-15 017

Transducer

The transducer controls the EGR volume in dependence of exhaust backpressure.



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Therموالve 40 °C (color code black)

The therموالve is screwed into coolant-cooled portion of intake pipe and opens at approx. 40 °C coolant temperature.

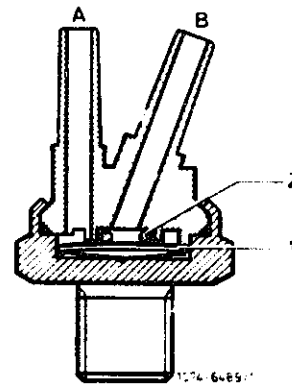
At 40 °C coolant temperature the bimetallic spring will snap down: under influence of heat so that both connections are connected with each other.



107-10 895

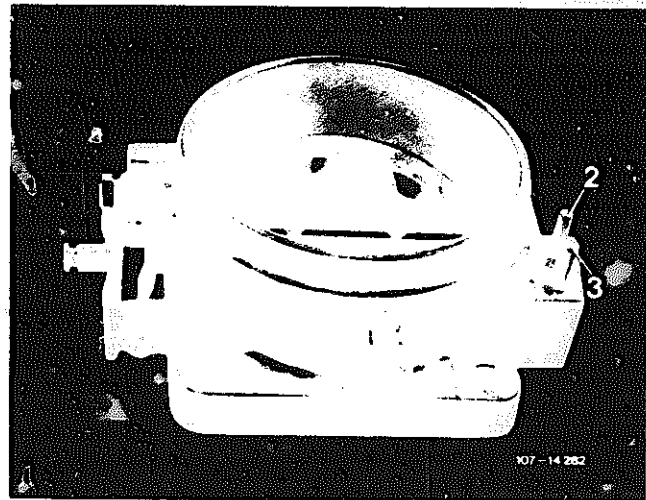
The vacuum line to intake manifold should be plugged to connection "B", since this alone guarantees absolute sealing between bimetallic plate and O-ring.

- 1 Bimetallic plate
- 2 O-ring
- A To EGR valve
- B To throttle valve housing



Throttle valve housing

A tapping pipe (2) is attached to throttle valve housing for drawing off vacuum required for controlling EGR and vacuum advance of firing point.



Operation:

EGR is activated:

- Above 40 °C coolant temperature.
 - During acceleration.
 - During partial load operation.
 - During transition to deceleration (coasting).

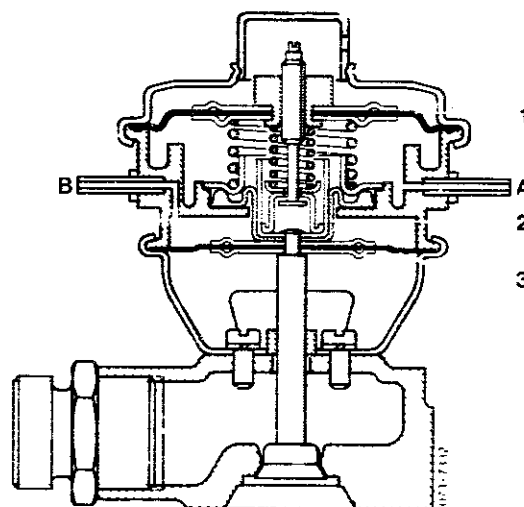
Above 40 °C, in the driving ranges named above, a part of the exhaust gases is returned from the exhaust manifold to the intake manifold.

The amount of the recirculated exhaust gases depends on the throttle valve position (vacuum tapped at throttle valve housing) and the exhaust back-pressure in exhaust manifold. Depending on throttle valve position the center diaphragm chamber of the EGR valve is more or less supplied with vacuum via thermovalve 40 °C (60) in intake manifold.

The upper diaphragm chamber is continuously connected to atmosphere by means of a vent bore.

Depending on vacuum, the shutoff diaphragm (1) is pushed with coupling pin downwards against spring force and the valve can open.

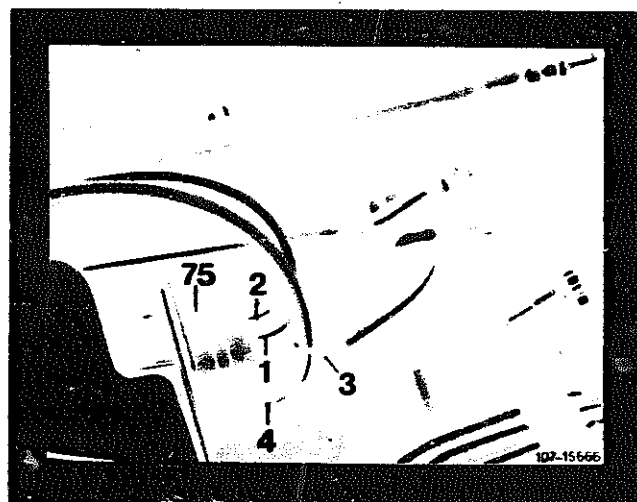
Opening and closing of valve is controlled by transducer which provides the positive or negative ventilation for diaphragm chamber above working diaphragm (3) depending on pressure of exhaust gases in exhaust manifold.



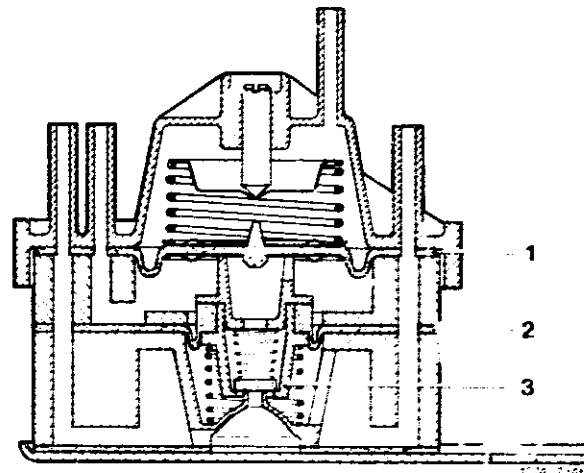
- 1 Shutoff diaphragm
- 2 Cup-type diaphragm
- 3 Working diaphragm
- A Connection vacuum line to thermostatic valve
- B Connection vacuum line from transducer

Transducer

The transducer (75) is subdivided into three chambers by means of two spring-loaded diaphragms, the upper diaphragm (1) and the lower diaphragm (2). Both diaphragms are connected to each other by means of a diaphragm cup.



- 1 Connection intake manifold vacuum (blue)
- 2 Connection positive vent line (white)
- 3 Connection exhaust gas backpressure line (orange)
- 4 Connection vacuum control line to EGR valve (brown)



- 1 Upper diaphragm
- 2 Lower diaphragm
- 3 Diaphragm cup

The exhaust gas backpressure is effective in upper diaphragm chamber.

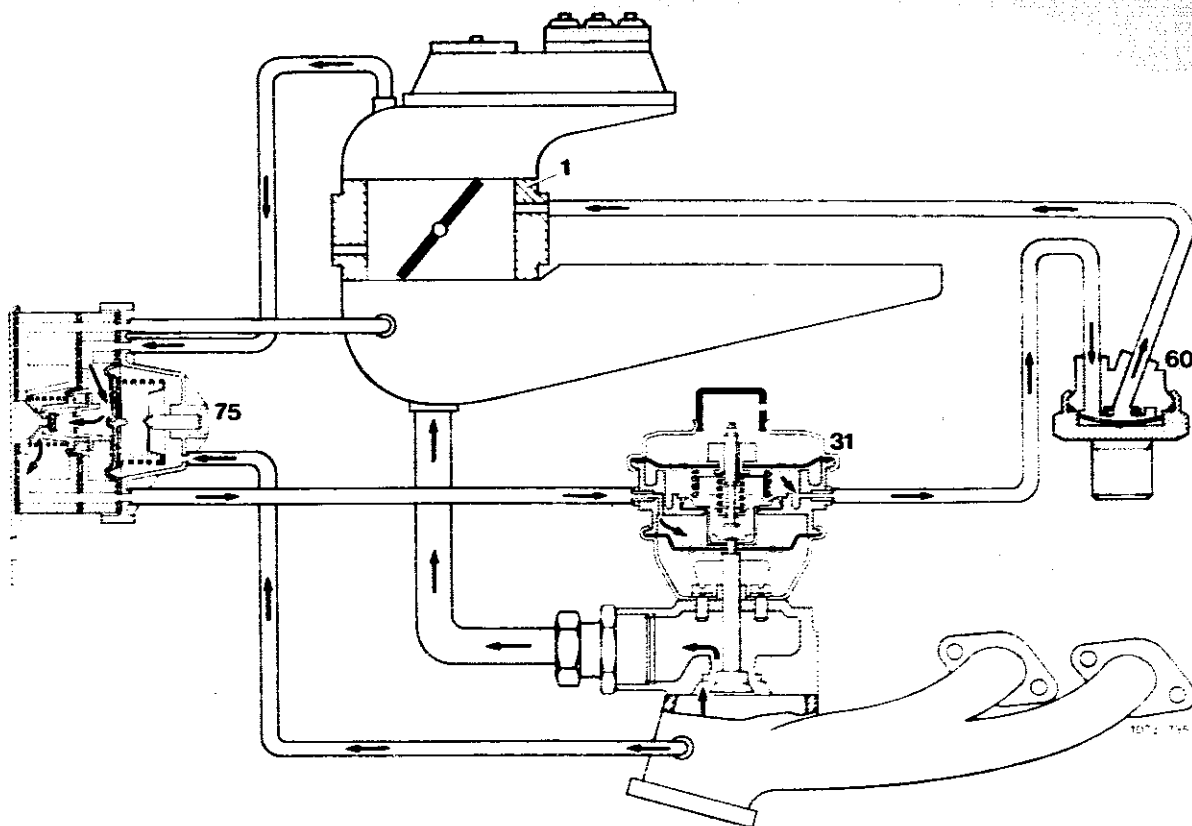
The center diaphragm chamber is continuously and positively vented through air guide housing. This will not influence position of diaphragms

The lower diaphragm chamber is positively or negatively vented depending on exhaust gas backpressure.

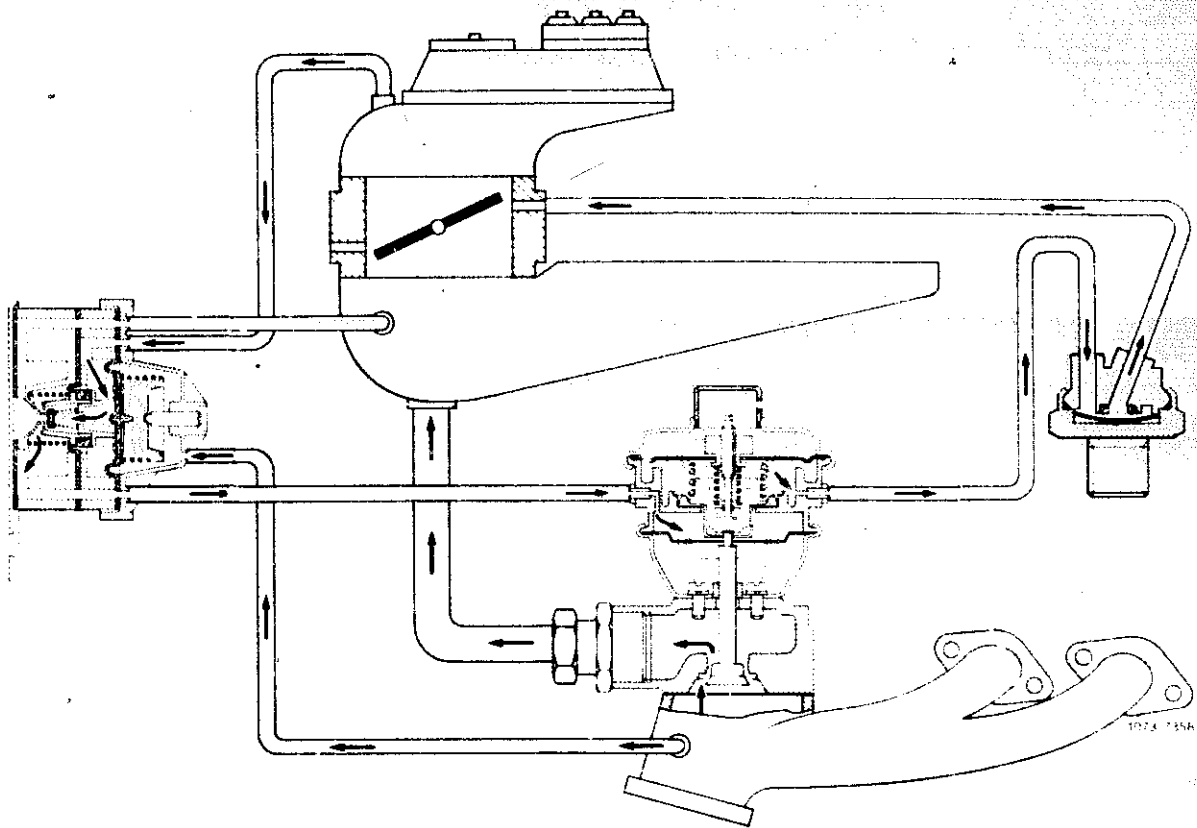
The different driving conditions provide three positions for transducer:

1. During acceleration the exhaust gas backpressure increases and forces the upper diaphragm with diaphragm cup and the lower diaphragm in downward direction.

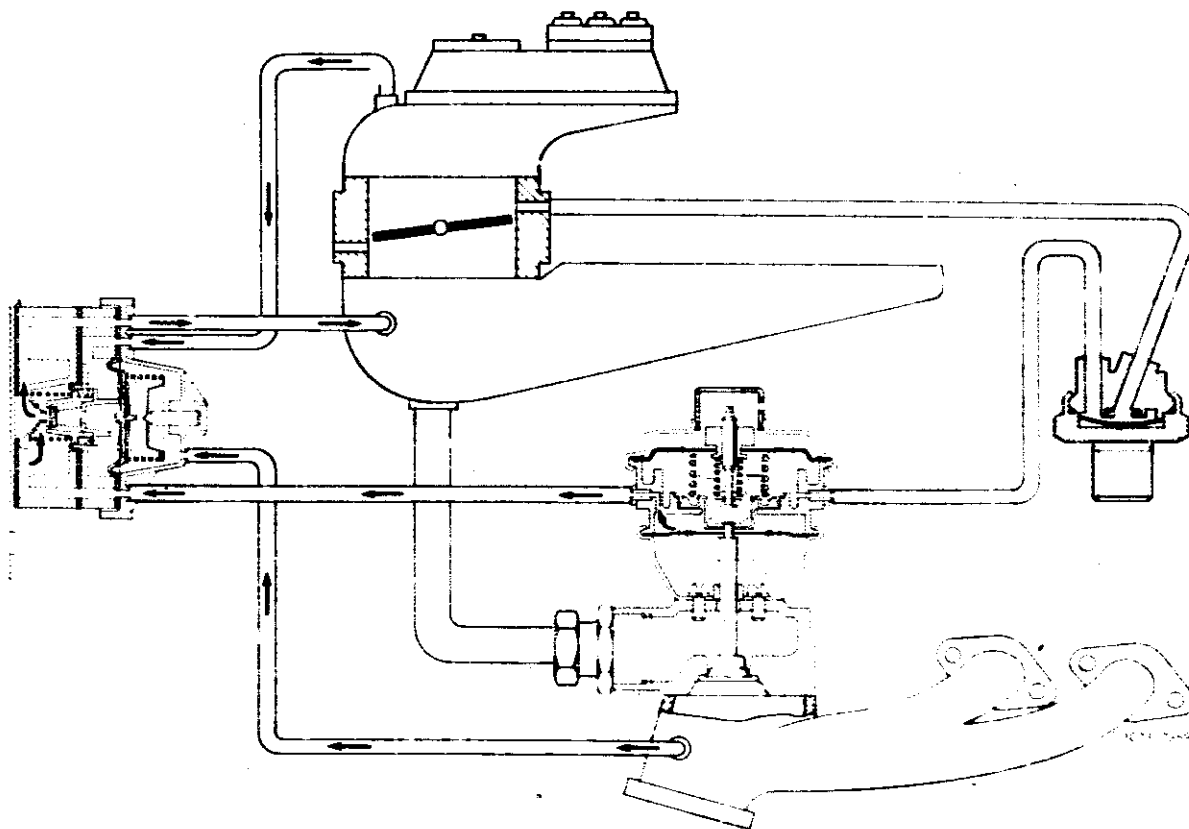
The valve reed in diaphragm cup closes the intake manifold vacuum line in lower diaphragm chamber. Simultaneously, the valve reed opens the positive venting bore from center to lower diaphragm chamber. The lower diaphragm chamber in EGR valve is positively vented by means of the vacuum control line coming from lower diaphragm chamber. The spring in EGR valve pushes the working diaphragm with valve down. The valve opens completely and the largest possible quantity of exhaust gases flows to intake manifold.



2. During transition to deceleration (coasting) the exhaust gas backpressure decreases. The upper diaphragm (1) including the diaphragm cup and the lower diaphragm are returning to their starting position. The valve reed opens the intake pipe vacuum line and seats on lower part of diaphragm cup. This will interrupt the positive venting of the lower diaphragm chamber. The intake manifold vacuum now prevailing in this diaphragm chamber provides the negative ventilation for the lower diaphragm chamber in EGR valve via vacuum control line. Depending on size of vacuum the valve is pulled in closing direction against the spring force. The quantity of fed exhaust gases decreases.



3. During constant driving the pressure conditions in upper and lower diaphragm chamber are in balance. The EGR valve remains in its momentary position. The recirculated quantity of exhaust gases remains constant.



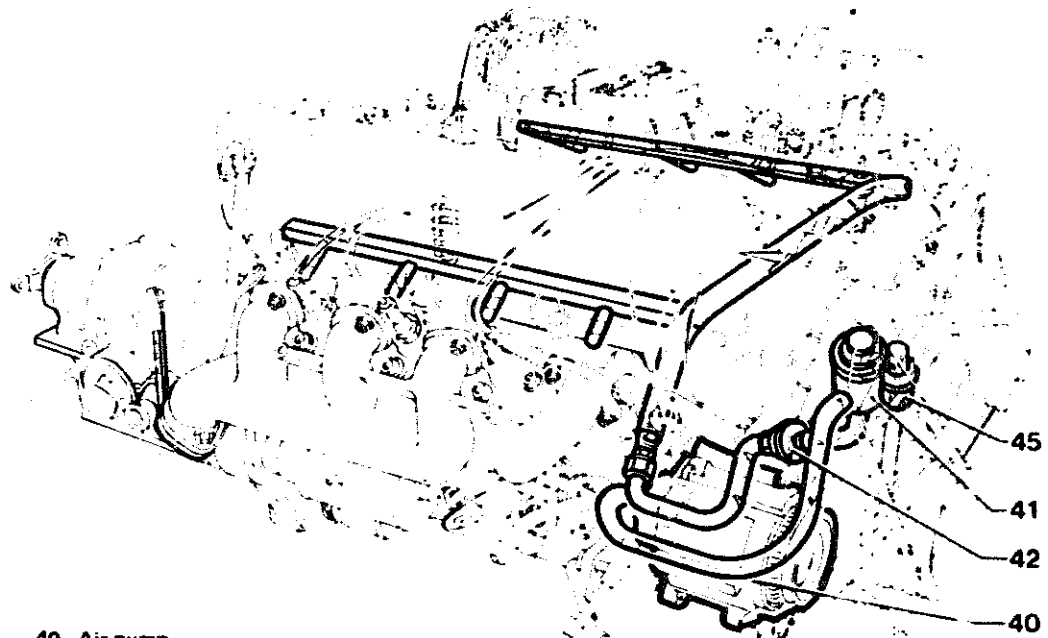
D. Air injection

To reduce the incompletely burnt components in the exhaust gases, air is injected into hot zone behind exhaust valves.

Afterburning is controlled by way of the engine temperature and pressure conditions in intake pipe.

To avoid back firing in exhaust, the air injection is shut off in given driving ranges.

Function diagram



- 40 Air pump
- 41 Decel diverter valve
- 42 Check valve
- 45 Air cleaner for silencing

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Components of air injection:

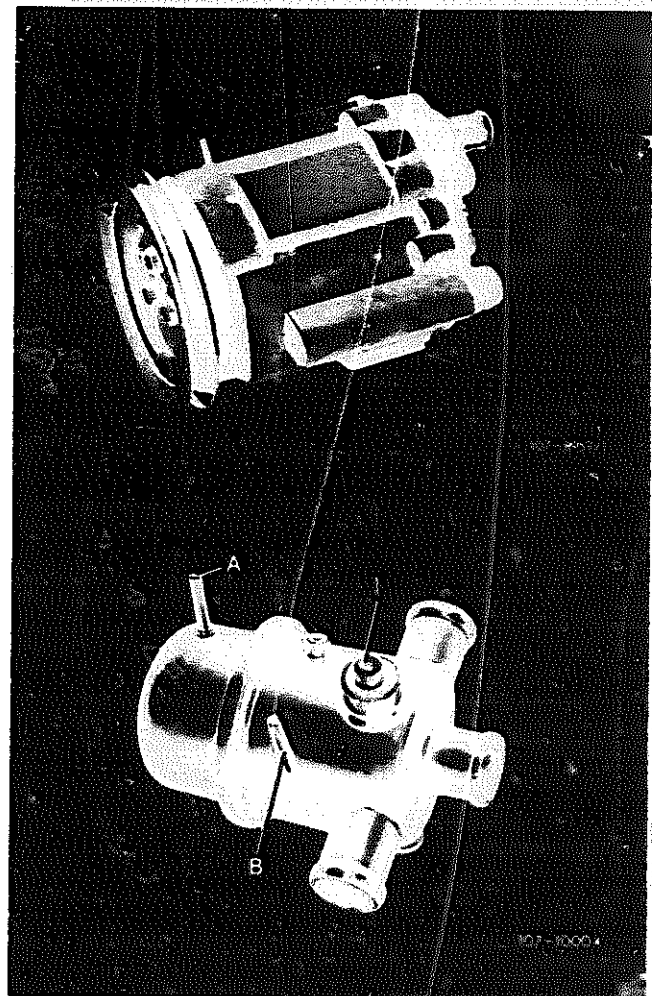
Air pump

The air pump is a vane-type pump with maintenance-free rotation cleaner, which cleans the drawn-in air.

Decel diverter valve

The decel diverter valve serves the purpose of controlling the air volume dependent on operating condition of engine.

- 1 Safety valve
- A Connection to delay valve (blue/purple)
- B Connection to intake manifold (blue)



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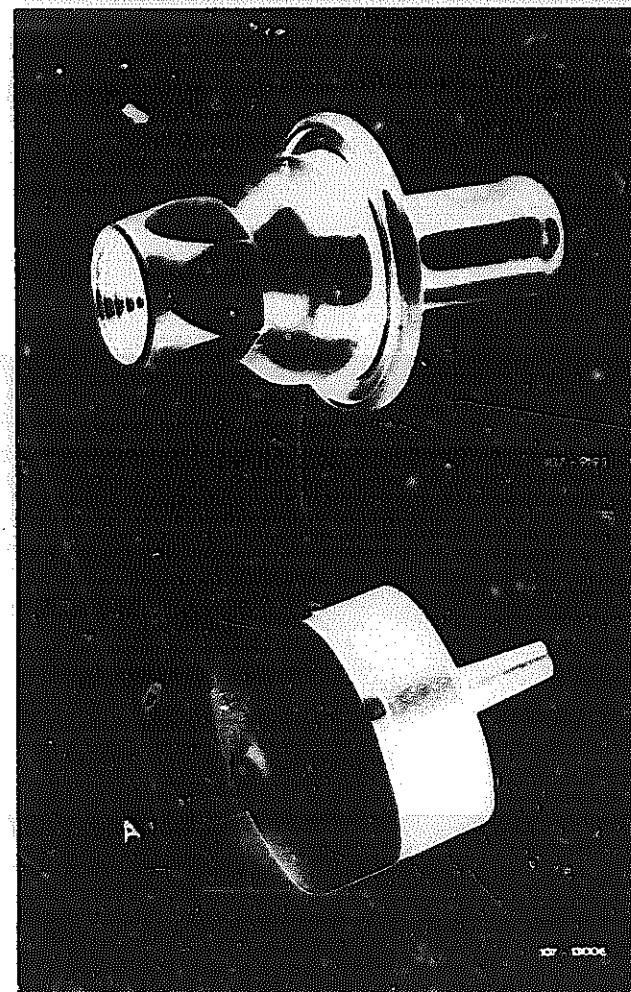
Check valve

The check valve prevents hot exhaust gases from flowing into air line.

Delay valve

During transition to deceleration (coasting) the delay valve interrupts the air injection for a given time while the system switches to air relief (discharge).

A White housing member for vacuum connection (suction end)



Operation

Air is injected in all operating conditions, except during transition to deceleration (coasting).

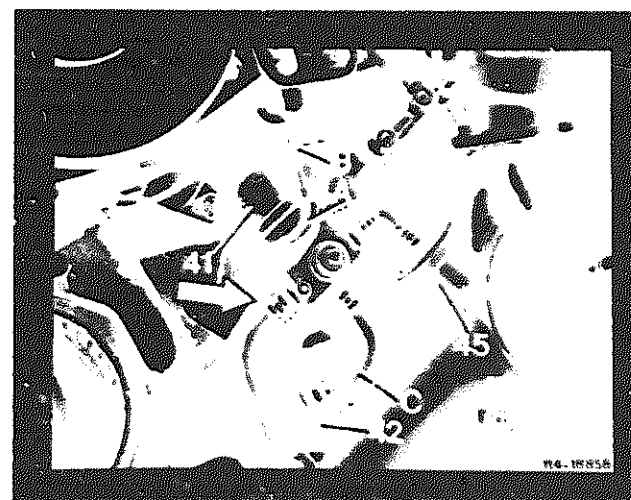
The air pump is driven via crankshaft by means of a V-belt and, with the engine running, supplies continuously air which flows through a contour hose to decel diverter valve (41). A safety valve integrated in decel diverter valve opens at a given pressure so that the excess air can be discharged into the atmosphere.

The decel diverter valve has two control functions:

1. Air injection

The lower diaphragm chamber (b) of the decel diverter valve (41) is connected directly to the intake pipe and the upper diaphragm chamber (a) is likewise connected via a delay valve (77).

- 41 Decel diverter valve
- 42 Check valve
- 45 Air cleaner for silencing

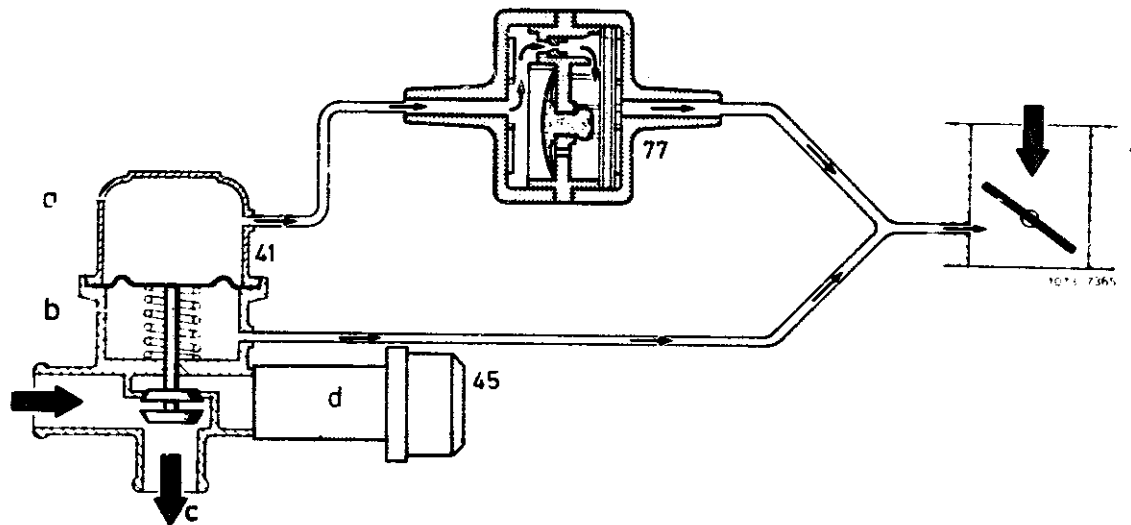


The vacuum tapping bore is on intake manifold under throttle valve.

In the operating modes described, the lower and the upper diaphragm chamber are evacuated more or less depending on the throttle valve position. Since there is the same vacuum in both diaphragm chambers, the spring pushes the two-sided valve disc in upward direction, opens the air injection line (c) while closing the air relief line (d) at the same time.

The injected air flows through a distributing pipe to the cylinder heads and through cross bores into exhaust ducts.

To prevent hot exhaust gases from flowing into the air injection line, a check valve (42) is installed in the line between decel diverter valve and cylinder head.



2. Air relief (discharge) during transition to deceleration (coasting)

During the closing of the throttle valve the vacuum in the lower diaphragm chamber (b) increases very rapidly. On the other hand, the vacuum in the upper diaphragm chamber (a) cannot be built up as rapidly due to the calibrated bore in the front-mounted delay valve (77). The difference in vacuum causes the valve disc to be drawn downwards against the spring force and the air relief line will open.

The supplied air is vented to the atmosphere via air cleaner (45). This process continues until the same vacuum conditions exist again in both diaphragm chambers. The time required for equalization depends on the size of the calibrated bore and the volume of the upper diaphragm chamber (a).

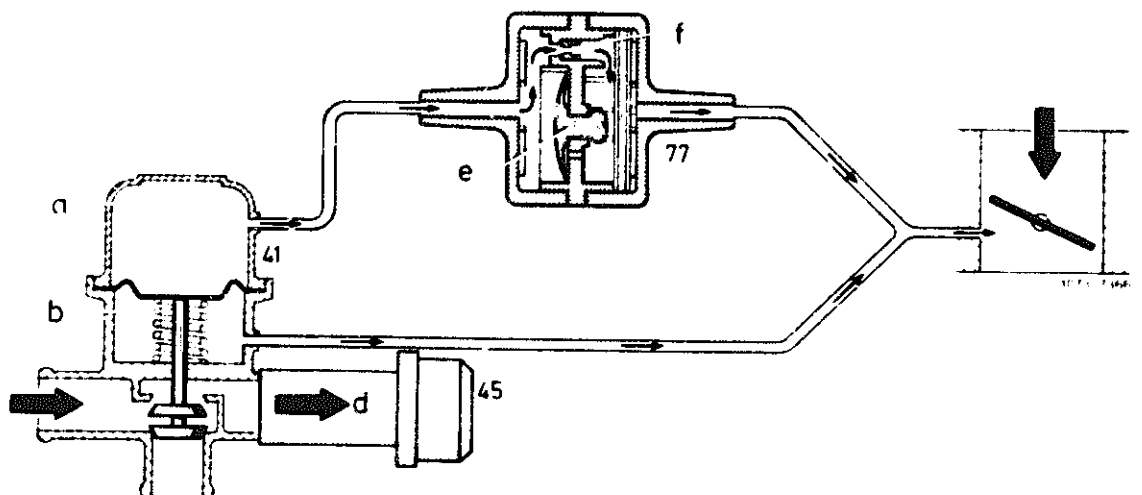
This measure prevents exhaust "backfiring" during transition to deceleration.

To reduce the vacuum in upper diaphragm chamber (a) just as rapidly as in the lower diaphragm chamber (b) while the vehicle is accelerated, the upper diaphragm chamber, in addition to calibrated bore (f), is additionally positively vented via valve reed (e) in delay valve.

This is necessary so that during a subsequent change to deceleration the decal diverter valve can immediately switch over to air relief (discharge).

Without positive venting the desired switchover would not be possible, since in such a case a high vacuum would still exist in the upper diaphragm chamber.

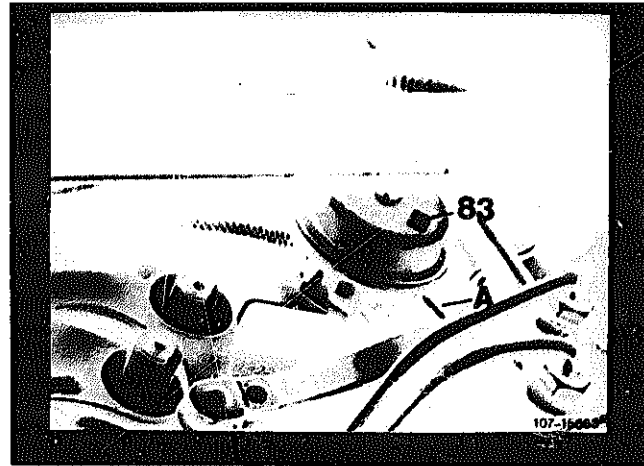
Note: The delay valve (77) should be installed with white housing member (suction end) in direction of intake manifold.



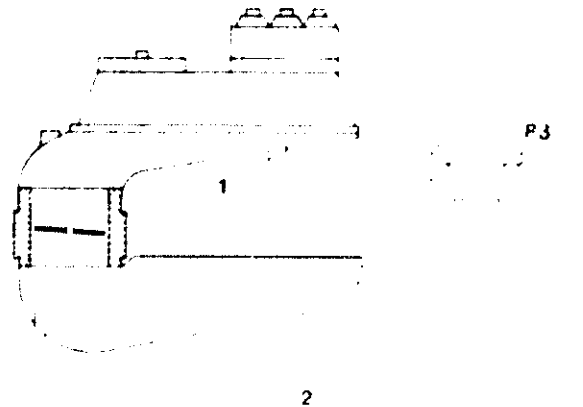
A decel air valve (83) is additionally installed to increase engine speed after starting and to provide better combustion during deceleration. The valve is located behind mixture regulator and is attached to holder of slotted lever for gas linkage.

The decel air valve is controlled by intake manifold vacuum and connects air guide housing to intake manifold.

Function diagram



- 1 Connection air guide housing
- 2 Vacuum line
- 83 Decel air valve



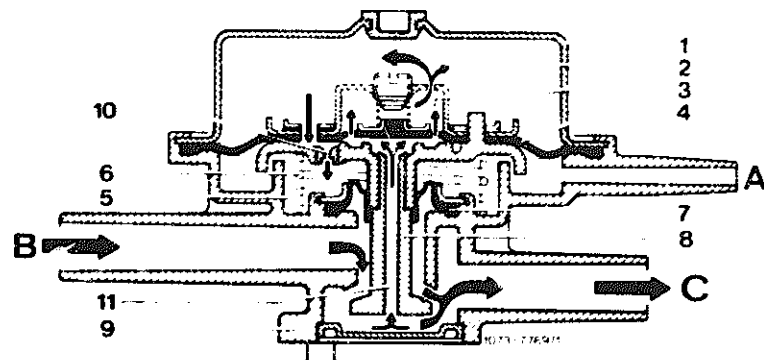
Operation

Increasing engine speed upon starting

With the engine stopped, the upper and the lower diaphragm chamber are under influence of a uniform, atmospheric pressure. When engine is started, a high vacuum is established in lower diaphragm chamber (5) for a short period, which overcomes the pressure of compression spring (6). Valve (8) is pushed down and the path for the bypass air from air guide housing to intake manifold is cleared.

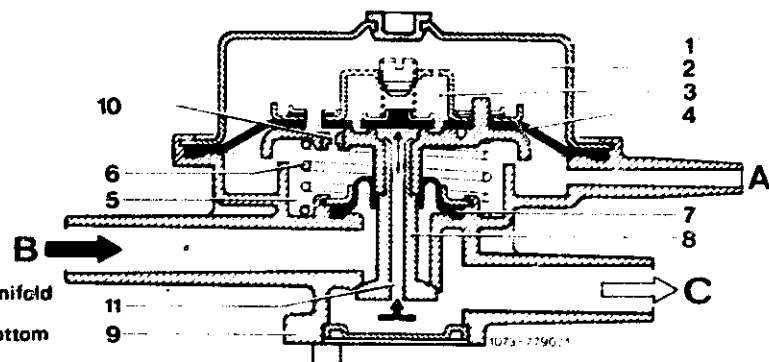
The addition of bypass air will increase the idle speed for a short period, as a result of which the idle speed is stabilized.

- 1 Housing top
- 2 Upper diaphragm chamber
- 3 Positive vent bore
- 4 Diaphragm
- 5 Lower diaphragm chamber
- 6 Compression spring
- 7 Sealing diaphragm
- 8 Valve
- 9 Housing bottom
- 10 Throttle bore
- 11 Positive vent bore
- A Vacuum connection intake manifold
- B Connection air guide housing
- C Connection intake pipe bottom



As soon as the vacuum in the two diaphragm chambers has been balanced again through throttle bore (10), compression spring (6) will push valve (8) in upward direction and the valve is thereby closed.

- 1 Housing top
- 2 Upper diaphragm chamber
- 3 Positive vent bores
- 4 Diaphragm
- 5 Lower diaphragm chamber
- 6 Compression spring
- 7 Sealing diaphragm
- 8 Valve
- 9 Housing bottom
- 10 Throttle bore
- 11 Positive vent bore
- A Vacuum connection intake manifold
- B Connection air guide housing
- C Connection intake manifold bottom



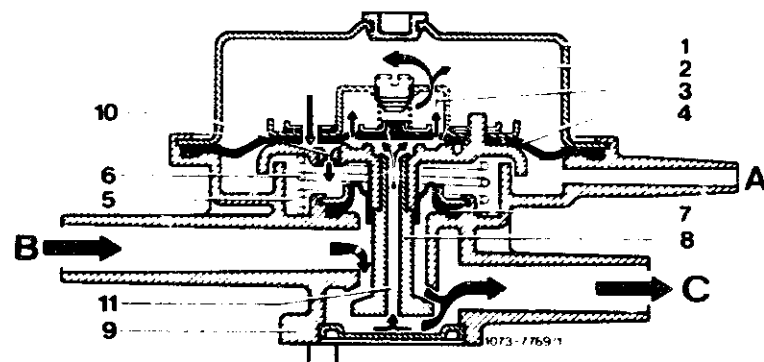
Air supply during deceleration (coasting)

Through balanced pressure ratio in upper and lower diaphragm chamber during constant driving, compression spring will close valve (8).

During deceleration, the vacuum in lower diaphragm chamber (5) increases faster than the throttle bore (10) to upper diaphragm chamber will be able to balance. The adjusting force of the high vacuum will overcome the contact pressure of compression spring (6). Valve (8) is pushed down and the bypass air can flow from air guide housing into intake manifold.

The air feed while bypassing the throttle valve during deceleration will provide a more stable combustion and thereby a reduction of hydrocarbon emissions.

- 1 Housing top
- 2 Upper diaphragm chamber
- 3 Positive vent bores
- 4 Diaphragm
- 5 Lower diaphragm chamber
- 6 Compression spring
- 7 Sealing diaphragm
- 8 Valve
- 9 Housing bottom
- 10 Throttle bore
- 11 Positive vent bore
- A Vacuum connection intake manifold
- B Connection air guide housing
- C Connection intake manifold bottom

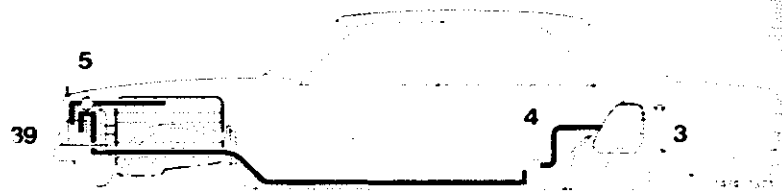


F. Fuel evaporation control system

A fuel evaporation control system is installed to improve emissions which are not directly connected with engine combustion.

Function diagram

- 3 Fuel tank
- 4 Vent valve
- 5 Purge valve
- 39 Charcoal canister

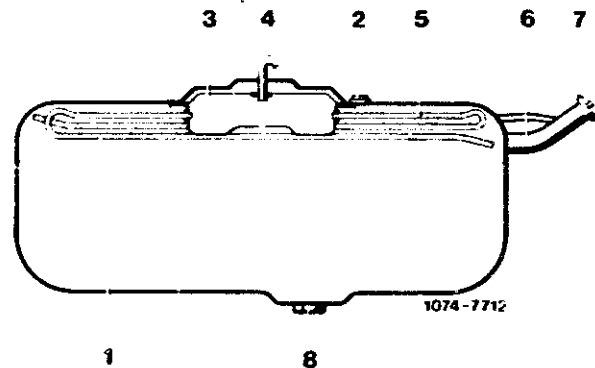


Components of fuel evaporation control system:

Fuel tank

A collecting tray connected to pipe system is installed in fuel tank, with connection (4) to vent valve entering tray.

- 1 Fuel tank
- 2 Immersion tube transmitter
- 3 Expanding tank
- 4 Connection vent valve
- 5 Pipe system
- 6 Filler neck
- 7 Closing cap
- 8 Connection fuel feed line



Vent valve (vent valve unit)

Vent valve (4) is mounted underneath vehicle at level of rear legroom.

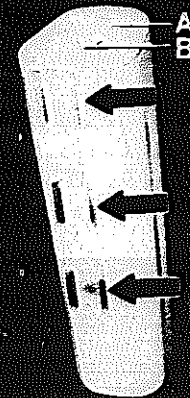
The vent valve unit comprises a negative vent valve and a positive vent valve.

In model year 1979, the vent valve unit (4) is replaced by a vent valve unit which is smaller in diameter. Function and operation are the same.



Charcoal canister

The fuel evaporation vapors from fuel tank are stored in charcoal canister and are drawn again out of canister when driving.



A Draw-off connection
B Tank vent connection

Purge valve

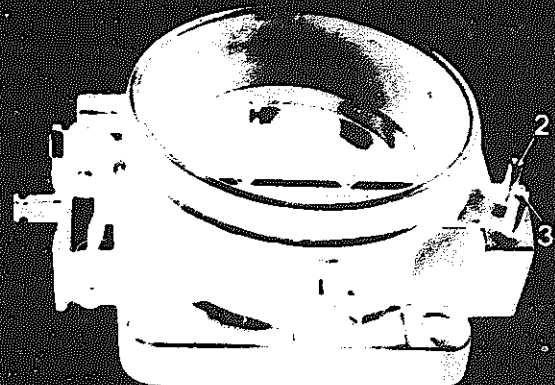
The purge valve (5) is located in purge line from charcoal canister to throttle valve housing.

Beginning in model year 1979, an additional purge valve (5) smaller in diameter is released for installation. Function and operation are the same and the valve is therefore exchangeable.



Throttle valve housing

To prevent mixing-up of vacuum connections, the OD of the vacuum connection (3) to charcoal canister has been increased from 4 to 5 mm. To draw evaporation vapors from charcoal canister two purge bores were therefore fitted above throttle valve.

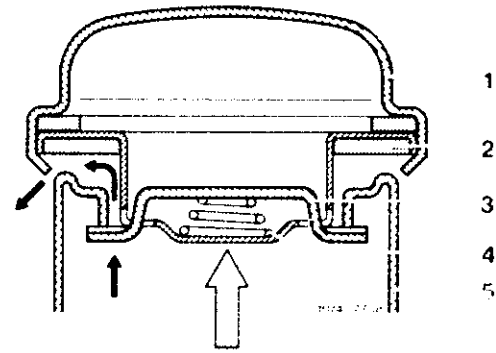


2 Vacuum connection ignition advance
3 Vacuum connection charcoal canister

Fuel tank closing cap

To avoid increased overpressure in fuel tank, the fuel tank cap has been modified.

- | | |
|----------------|----------------------|
| 1 Closing cap | 4 Compression spring |
| 2 Sealing ring | 5 Filler neck |
| 3 Clamp | |



Operation

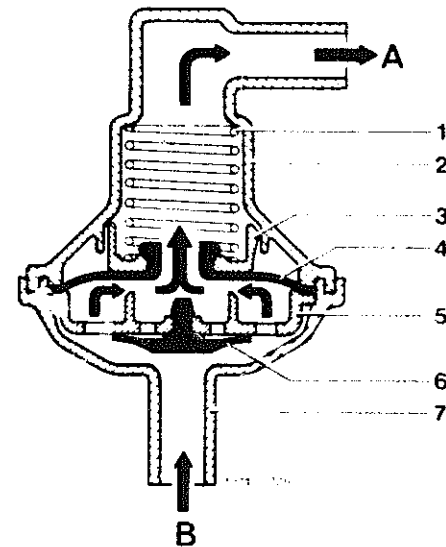
Evaporation control system

The vent valve unit (4) increases the pressure in fuel tank to 30–50 mbar. As a result, less fuel evaporation vapors can escape from fuel tank.

When the pressure in the fuel tank reaches 30–50 mbar the positive vent valve (4) opens, allowing the fuel vapors to flow to charcoal canister where they are stored with the engine stopped.

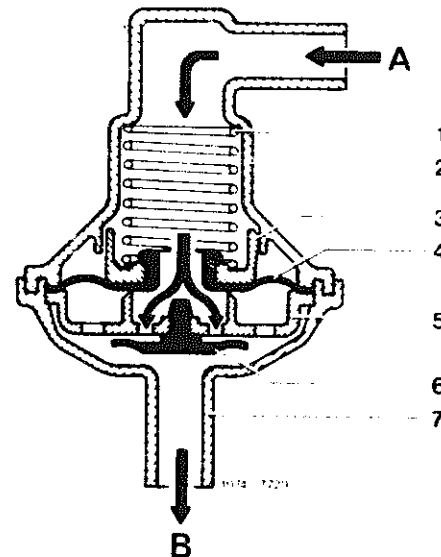
Vent valve unit open to charcoal canister

- | | |
|-----------------------|--------------------------------|
| 1 Compression spring | 6 Positive vent valve |
| 2 Valve housing | 7 Connection |
| 3 Spring seat | A Connection charcoal canister |
| 4 Negative vent valve | B Connection fuel tank |
| 5 Valve disc | |



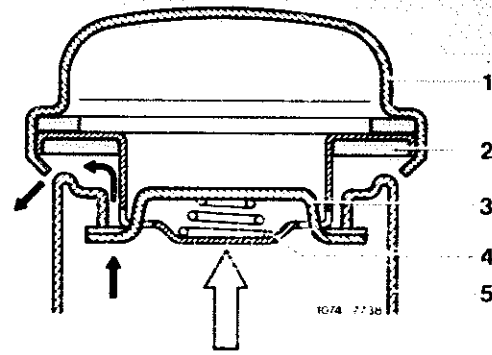
When the fuel cools down, the intake of air or fuel evaporation vapors from charcoal canister is compensated via the positive vent valve (6) starting at a vacuum of 1–16 mbar. When the vacuum in fuel tank drops below 1 mbar, the positive vent valve (6) will close.

Vent valve unit open to fuel tank



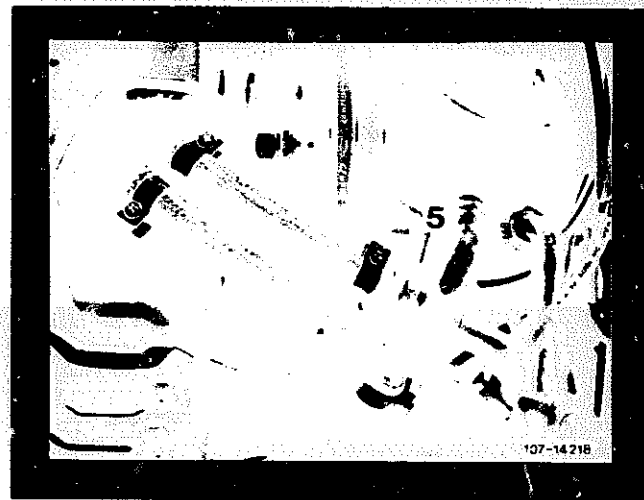
If the pressure in the fuel tank increases above 0.1–0.3 bar due to a malfunction in the fuel evaporation system, the fuel vapors escape from fuel tank via fuel tank cap.

- | | |
|----------------|----------------------|
| 1 Cap | 4 Compression spring |
| 2 Sealing ring | 5 Filler neck |
| 3 Clamp | |



Purge system

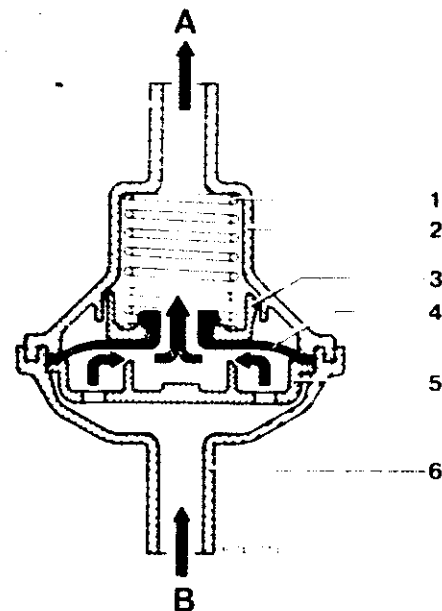
The charcoal canister is connected to throttle valve housing by means of a line, in which the purge valve (5) is installed.



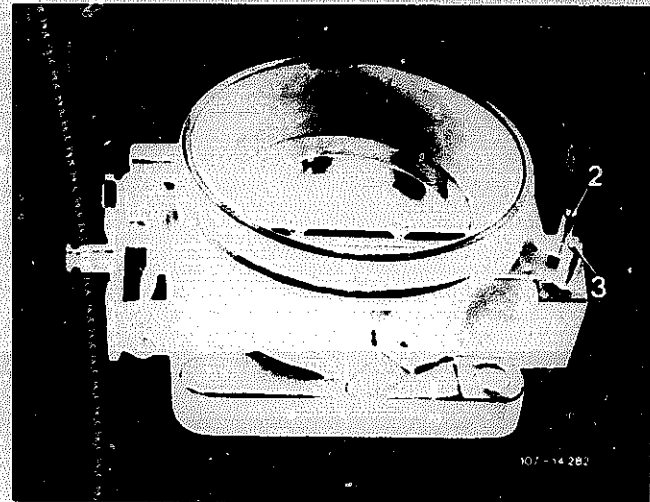
If with the engine running the vacuum in purge line exceeds 30–50 mbar, the purge valve will open. The fuel evaporation vapors stored in charcoal canister can be drawn off depending on position of throttle valve.

Purge valve open

- | |
|-------------------------------------|
| 1 Compression spring |
| 2 Valve housing |
| 3 Spring seat |
| 4 Negative vent valve |
| 5 Valve disc |
| 6 Connection |
| A Connection throttle valve housing |
| B Connection charcoal canister |



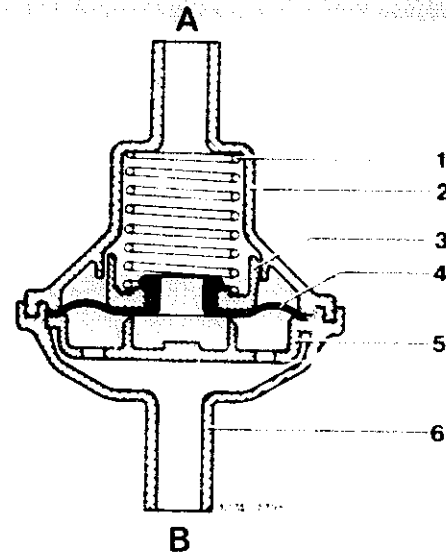
When the throttle valve opens, the two purge bores in throttle valve housing, which are entering a common duct, are both passed over one after the other. As a result, purging in lower partial load range begins in dosages which are not influencing the driving characteristics.



At idle and during deceleration (throttle valve closed) the two purge bores are at atmospheric side of throttle valve. The purge valve is closed, there is no purging of charcoal in canister.

Purge valve closed

- 1 Compression spring
- 2 Valve housing
- 3 Spring seat
- 4 Negative vent valve
- 5 Valve plate
- 6 Connection
- A Connection throttle valve housing
- B Connection charcoal canister



Vent valve unit

New vent valve unit



14-100 Test program

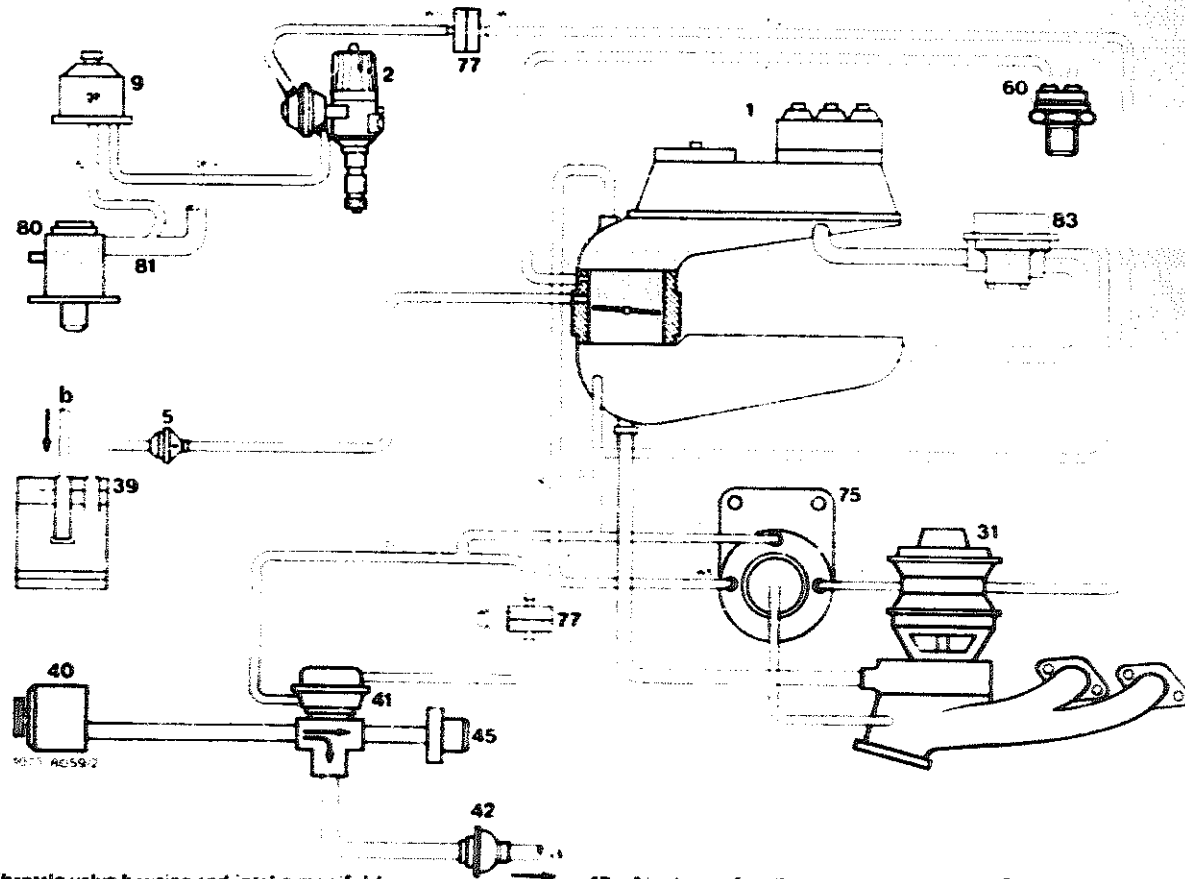
Model year 1979/80

For complaints such as: Poor warming-up characteristics of engine, poor idle speed, engine not accelerating or splashing during acceleration, check emission control system for function.

Test conditions: Engine at operating temperature, run engine at idle speed.

Test the following: EGR, air injection, rpm increase upon start and fuel evaporation control system.

Function diagram



- | | | |
|---|--|---|
| <ul style="list-style-type: none"> 1 Throttle valve housing and intake manifold 2 Ignition distributor 5 Purge valve 9 Switchover valve (on vehicles with air conditioning) 31 EGR valve 39 Charcoal canister 40 Air pump 41 Decel diverter valve 42 Check valve | <ul style="list-style-type: none"> 45 Air cleaner for silencing 60 Thermovalve 40 °C 75 Transducer 77 Delay valve 80 Auxiliary air valve 81 Contour hose 83 Decel air valve a To cylinder head b From fuel tank | <p>Color code:</p> <ul style="list-style-type: none"> bl = blue br = brown ge = yellow or = orange rt = red vi = purple sw = black wh = white |
|---|--|---|

Test line

To check emission control system, make vacuum line according to illustration.

700 mm vacuum line 4 x 1 mm
100 mm hose 8 x 2 mm



Checking EGR

Pull brown vacuum line (b) from EGR valve and slowly increase idle speed.

Engine runs irregularly starting at 800/min or stops.

Engine operation not changing.

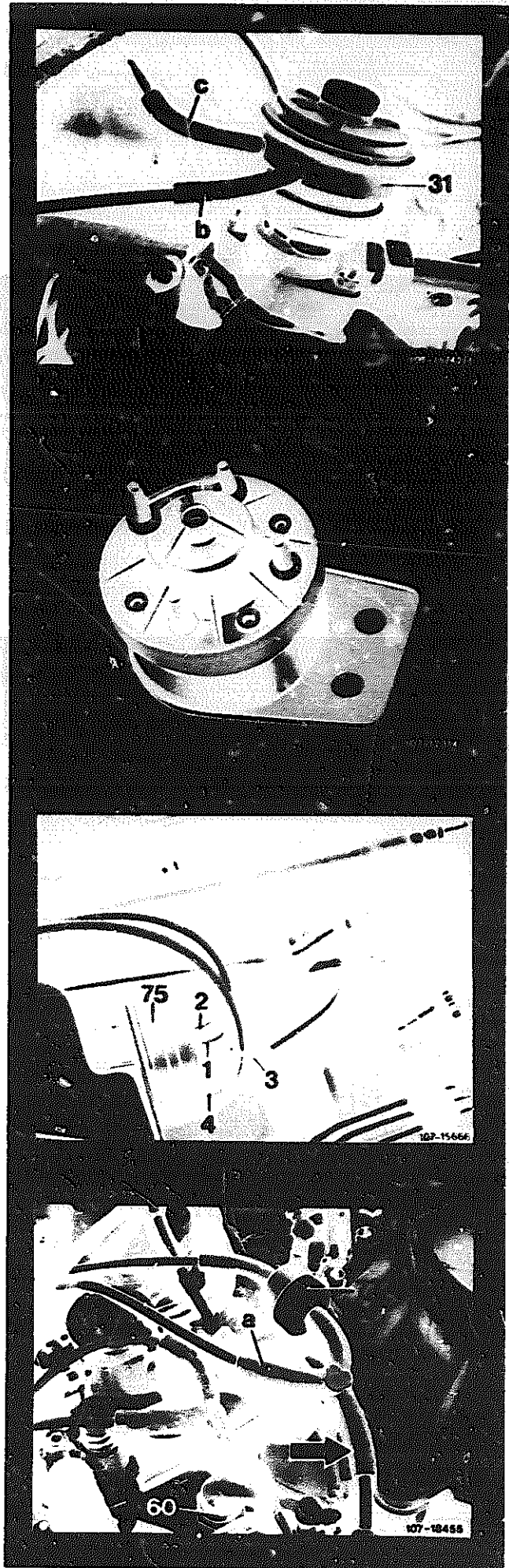
Check vacuum lines

Check layout of vacuum lines on transducer and intake manifold.

Make sure that the connections on transducer are identified by color rings. The plugged-on vacuum lines should have the same color.

- 1 Connection intake manifold vacuum (blue)
- 2 Connection positive vent line (white)
- 3 Connection exhaust backpressure line (orange)
- 4 Connection vacuum control line to EGR valve (brown)

On thermostatic valve 40 °C (60) the red vacuum line should be plugged to diagonal connection and the red/purple vacuum line by way of triple distributor to straight connection. Check all connected vacuum lines for leaks and blow through vacuum tapping connections.



Check thermovalve 40 °C (60)

The thermovalve is identified by black plastic section and by the designation "50 AA 4" punched into metal section.

Pull triple distributor from thermovalve (straight connection) and slowly increase idle speed.

A vacuum should be present at free connection of thermovalve with increasing speed.

If there is no vacuum, replace thermovalve.

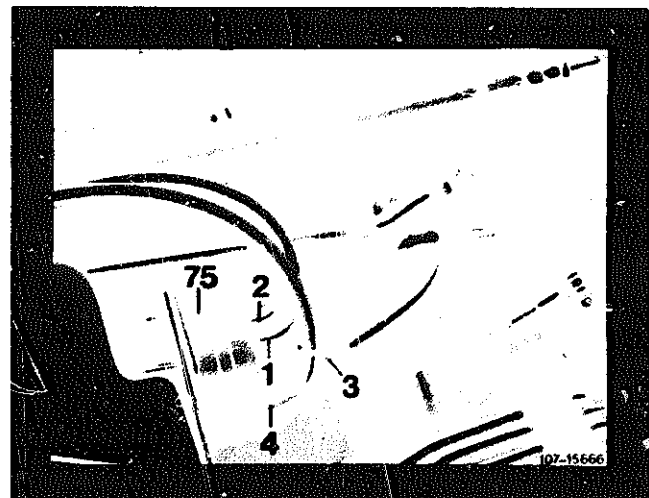
Check transducer (75)

Run engine at idle. Pull brown vacuum line from EGR valve. Connect vacuum gauge or keep vacuum line closed with a finger.

Vacuum should be present at idle speed.

If there is no vacuum, replace transducer.

- 1 Connection intake manifold vacuum (blue)
- 2 Connection positive vent line (white)
- 3 Connection exhaust gas backpressure line (orange)
- 4 Connection vacuum control line to EGR valve (brown)



Run engine at idle. Pull both vacuum lines from EGR valve.
 Plug brown vacuum line (b) to connection for red/purple vacuum line (c). Engine should run irregularly or stop.

If engine operation is not changing, replace EGR valve.

Checking air injection

Connect CO measuring instrument. Pull vacuum line from black housing section of delay valve (77).

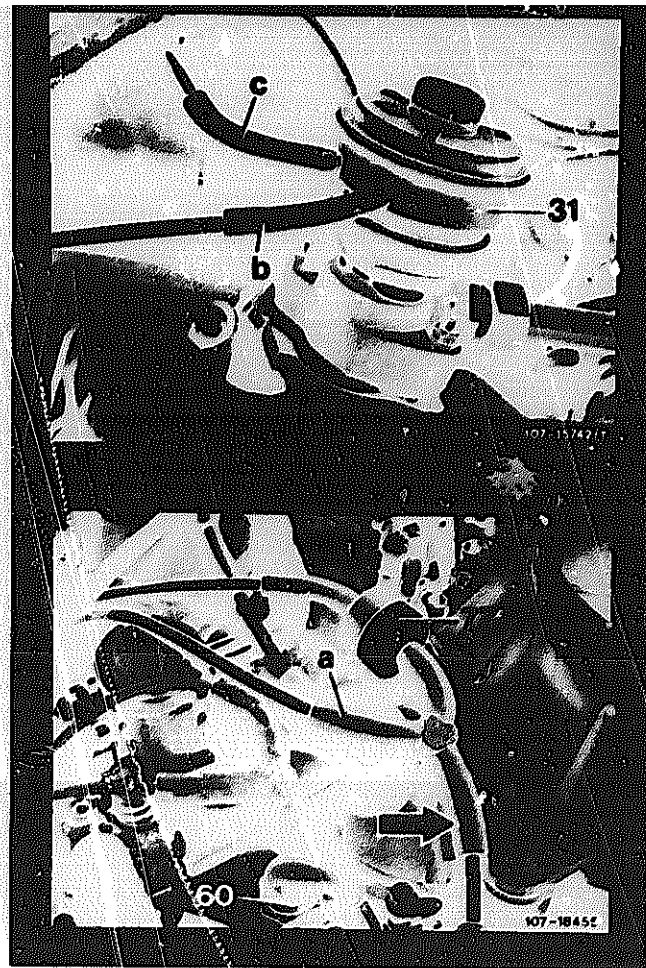
Emission value increases, relief noise heard on air cleaner (45).

Emission value not increasing, no relief noise heard

Check vacuum lines

The blue vacuum line to decel diverter valve (lower connection) should be plugged to triple distributor (a). The delay valve (77) is inserted in vacuum line blue/purple between upper connection of decel diverter valve (41) and triple distributor.

The triple distributor should be connected to white housing section (suction end).



Check vacuum at decel diverter valve

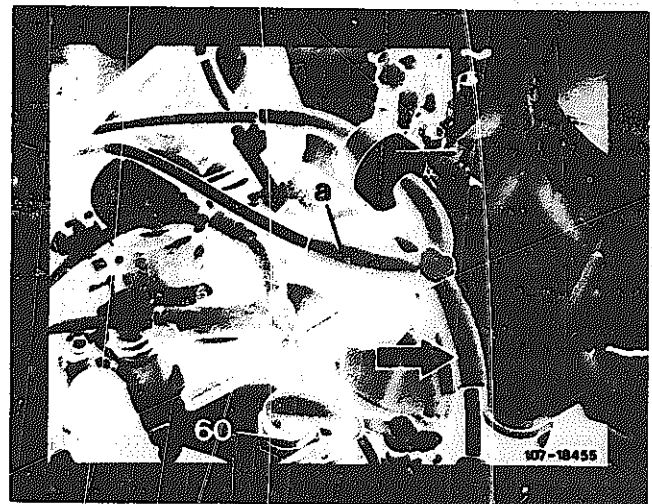
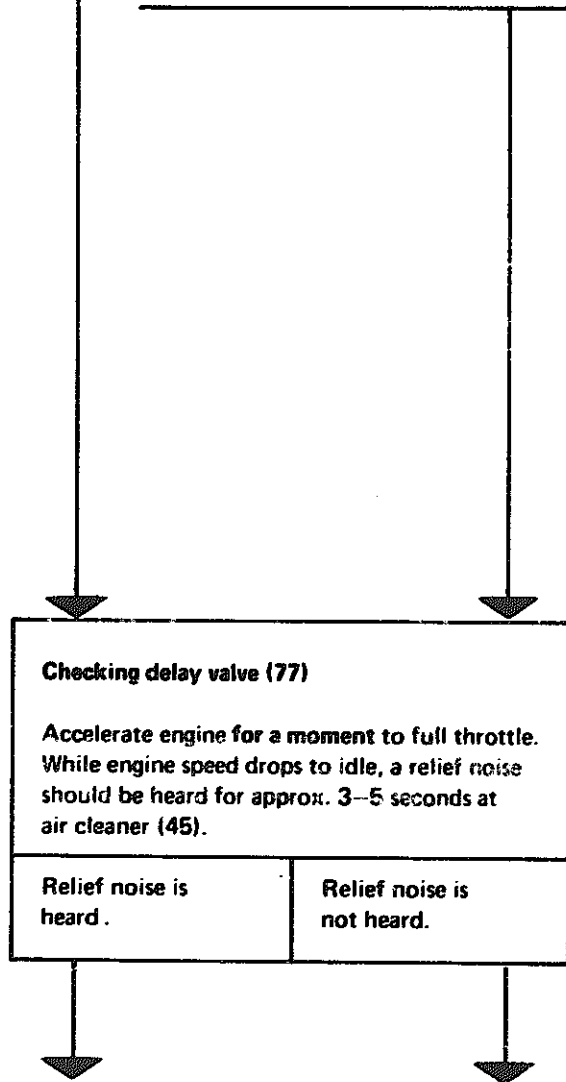
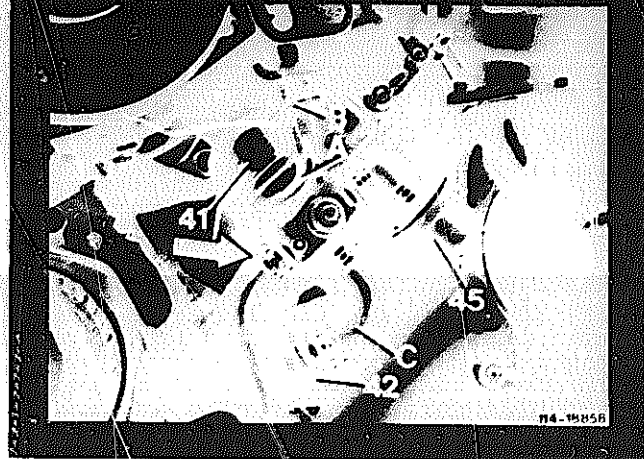
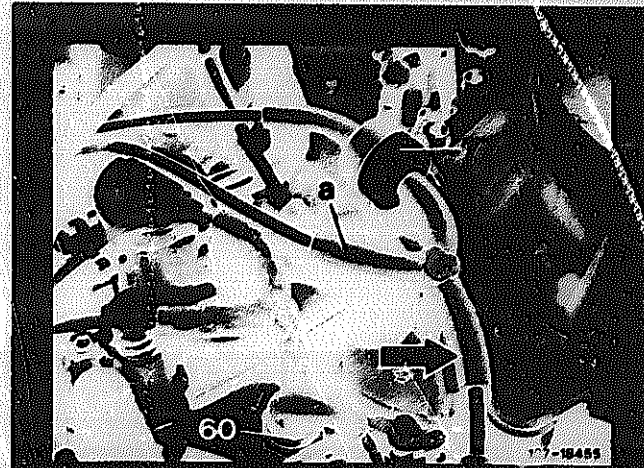
Pull vacuum line from triple distributor (arrow). Connect vacuum gauge or keep vacuum line closed with a finger. Vacuum should be present at idle. If there is no vacuum, check vacuum line for leaks and blow through vacuum tapping connection on intake manifold.

If vacuum is present, check decel diverter valve (41).

Check decel diverter valve (41)

Pull vacuum line blue/purple from black housing section of delay valve (77). CO value should increase and relief noise should be heard on air cleaner (45). If not, check V-belt tension and air pump. Replace air pump, if required.

If CO value is still not increasing and if no relief noise is heard, renew decel diverter valve.

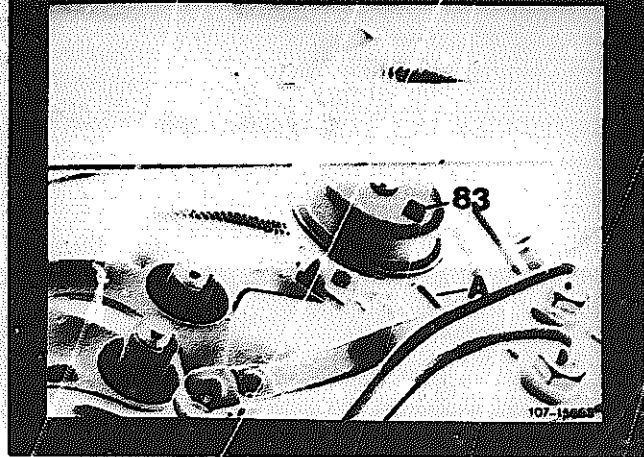
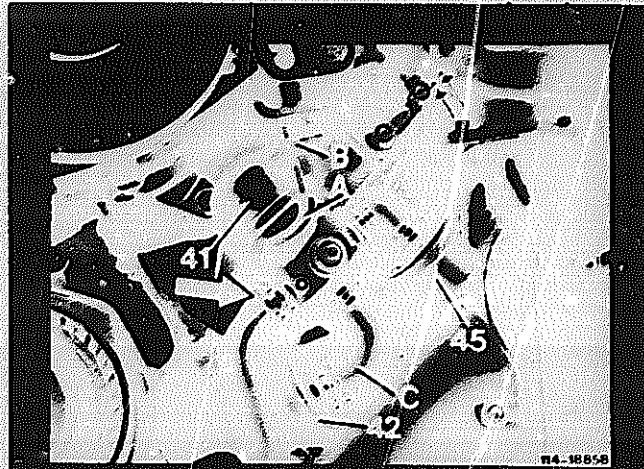


Replace delay valve (77).

Checking speed increase following start and air supply during deceleration

Pull vacuum hose from connection (A) of decel air valve (83) and plug-on after a short wait.

Idle speed of engine increasing for a short moment.	Idle speed not increasing.
---	----------------------------



Check vacuum line and recirculated air lines for leaks. If all lines are in order, replace decel air valve.

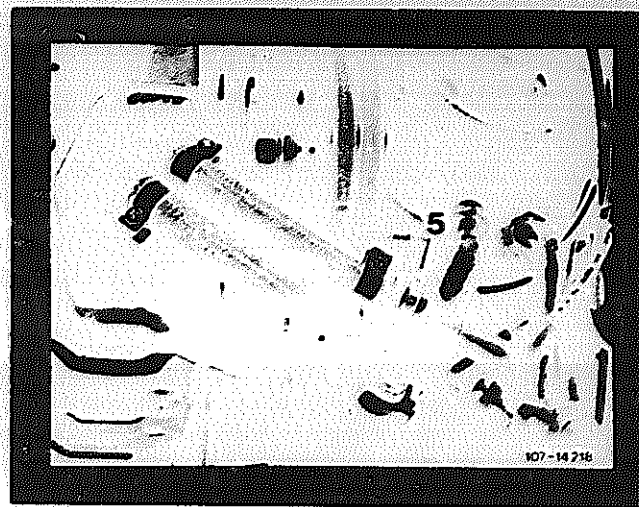
Checking fuel evaporation control system

Pull black plastic line (draw-off line) to throttle valve housing on charcoal canister and keep closed with a finger or connect vacuum gauge.

Slowly increase engine speed to approx. 2000/min.

No vacuum at idle.
Vacuum increases
with increasing
speed.

No vacuum increase
at increasing
speed

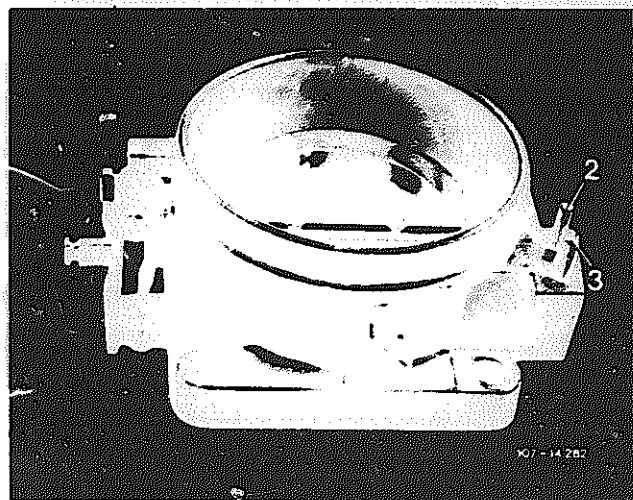


Check draw-off hose and purge valve (5)

Draw-off hose should be plugged-on to throttle valve housing (3). Check hose for leaks and blow through connection on throttle valve housing.

If there is still no vacuum, pull off draw-off hose in front of purge valve (5) and repeat test.

If vacuum is present, replace purge valve (5).



End of test

14-250 Removal and installation of air pump

Adjusting values

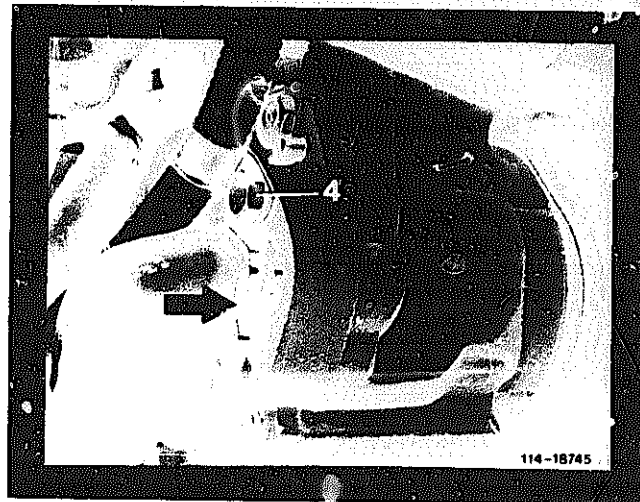
V-belt (depth of profile in mm)	New V-belt (KG scale on measuring instrument)	Used V-belt (KG scale on measuring instrument)
9.5	30	20-25

Conventional tool

Measuring instrument (Krikitt)	Federal Republic of Germany	e.g. made by Gates GmbH Gravener Straße 191-193, D-4018 Langenfeld 2
	remaining countries	e.g. made by Gates Rubber Company, 999 S. Broadway, USA-80217 Denver/Colorado

Removal

- 1 Disconnect battery.
- 2 Remove alternator.
- 3 Compress hose clipped on contour hose (arrow) with combination pliers and pull off contour hose.
- 4 Unscrew fastening screw (4) for clamp holding cable harness of alternator, put cable harness together with clamp aside.
- 5 Loosen clamping screw (1), slightly unscrew tensioning screw (2) until V-belt is loose.
- 6 Unscrew clamping screw (1) and remove V-belt.
- 7 Loosen fastening screw (4) and unscrew, remove air pump.



Installation

- 8 For installation proceed vice versa.
- 9 Check tension of V-belts, for handling instruments refer to operating instructions.

The adjusting values named above refer to KG-scale of measuring instrument (arrow).

Note: Starting model year 1980, the threads of the air pump have been changed from inch threads to metric threads.

On vehicles with air pump in metric version, only an air pump with the same threads may be installed as a spare part.

After using up stocks of air pumps with inch threads, only air pumps with metric threads will be available.

From this date, if air pumps with metric threads will be installed as a replacement for an air pump with inch threads, the required screws, nuts, holders or flange bushings will be included in shipment.

In such a case, it is absolutely necessary to include the chassis number in order.

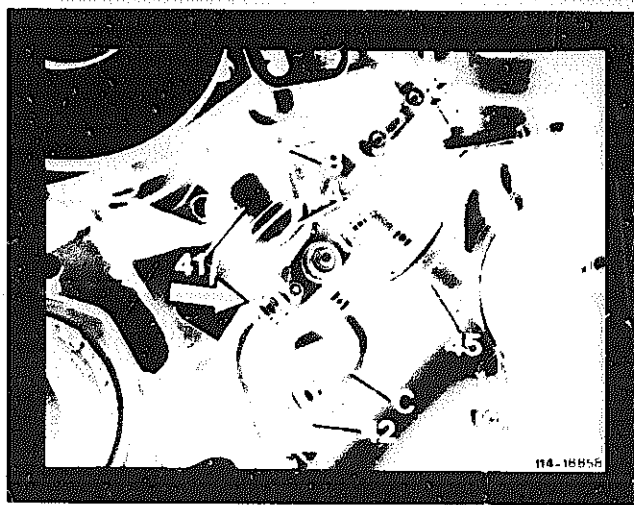


14-300 Removal and installation of decel diverter valve

Model year 1979/80

Removal

- 1 Disconnect battery.
- 2 Remove alternator.
- 3 Remove contour hose of air pump/decel diverter valve on decel diverter valve (arrow).
- 4 Pull vacuum lines blue (A) and blue/purple (B) from decel diverter valve.
- 5 Remove contour hose (C) of decel diverter valve/injection line on decel diverter valve.
- 6 Unscrew fastening screws on decel diverter valve and remove decel diverter valve.

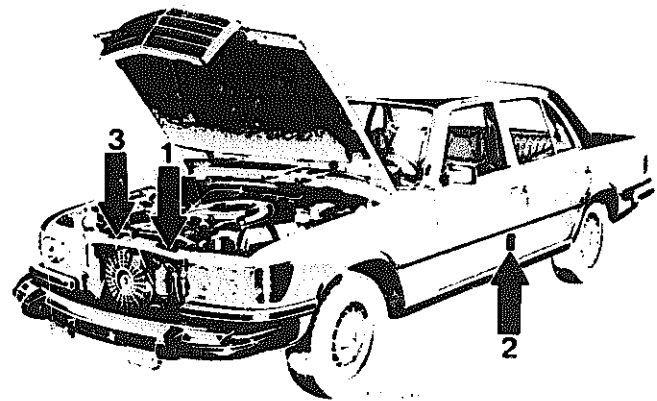


Installation

- 7 Transfer contour hose with filter for silencing (45) from removed decel diverter valve to decel diverter valve about to be installed.
- 8 Install decel diverter valve with cleaner for silencing.
- 9 Attach contour hoses of air pump (arrow) and injection line (C) to decel diverter valve.
- 10 Plug blue vacuum line (A) to lower connection and blue/purple vacuum line (B) to upper connection.
- 11 Install alternator, tension V-belt.
- 12 Connect battery.

USA

The individual emission control systems of the vehicle are identified by respective information plate (1) on cross member in front of radiator.

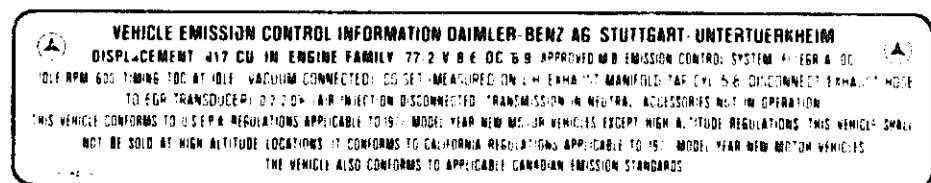


Recognizing emission control system from color of information plate -- basic color/lettering

Model year	Federal version	California version	Federal version high altitudes	Federal version tourist vehicles	California version tourist vehicles
1977	black/silver	yellow/black	red/black	black/silver	yellow/black
1978			---		
1979			---		

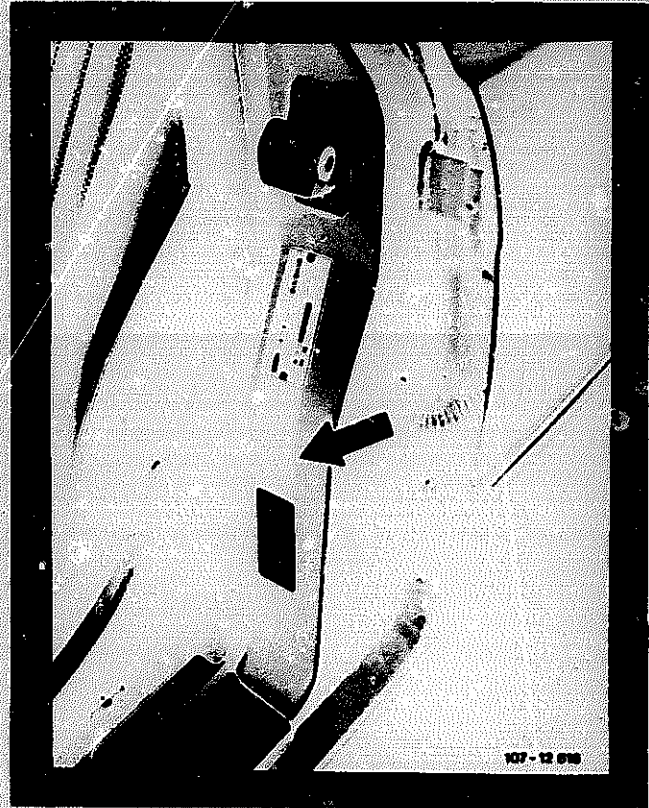
Information plate (1)

This plate shows the identification data, as well as the most important engine tuning data.



Information plate (2) on door post of driver's door

This plate (arrow) shows whether vehicle is provided with or without catalyts.



Recognizing identification colors of information plates for catalyts – basic color/lettering

Model year	Federal version	California version	Federal version high altitudes	Federal version tourist vehicles	California version tourist vehicles
1977		green/silver	black/silver		blue/silver
1978	black/silver			red/silver	
1979		black/silver	—		red/silver

Information plates

This vehicle is provided with catalyts.



1074 - 6259

Tourist vehicles

These vehicles are not provided with catalysts by manufacturer.

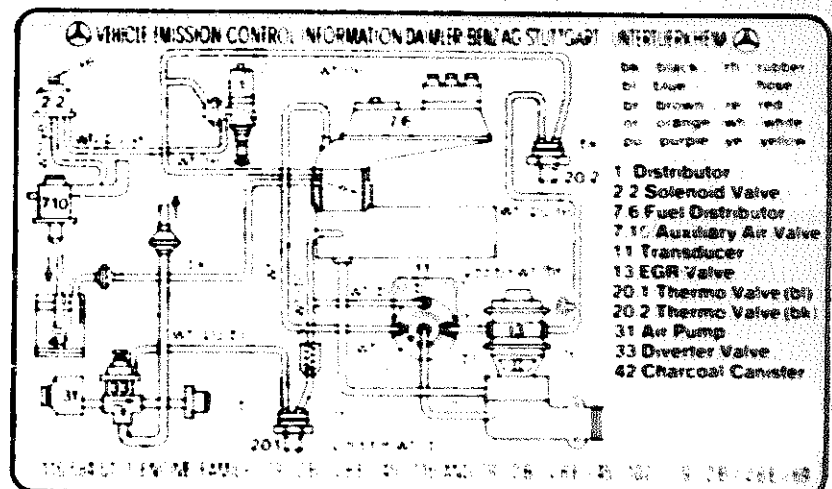
Catalysts must be installed prior to importation into USA.



1074 - 8260

Information plate (3, California model year 1979 only)

This plate shows a diagram of the vacuum line layout for all emission components in engine compartment.



14-050 Operation

Federal and California version model year 1977/78/79

A. General

Identification of vacuum lines

The basic color of vacuum lines for emission control system is transparent (white).

Additional color stripes are used to facilitate identification of the individual functions.

Lines originating at a vacuum source (originating lines) have only one color stripe.

Lines terminating at a vacuum-operated device (terminating lines) have two color stripes. Purple is always the second color.

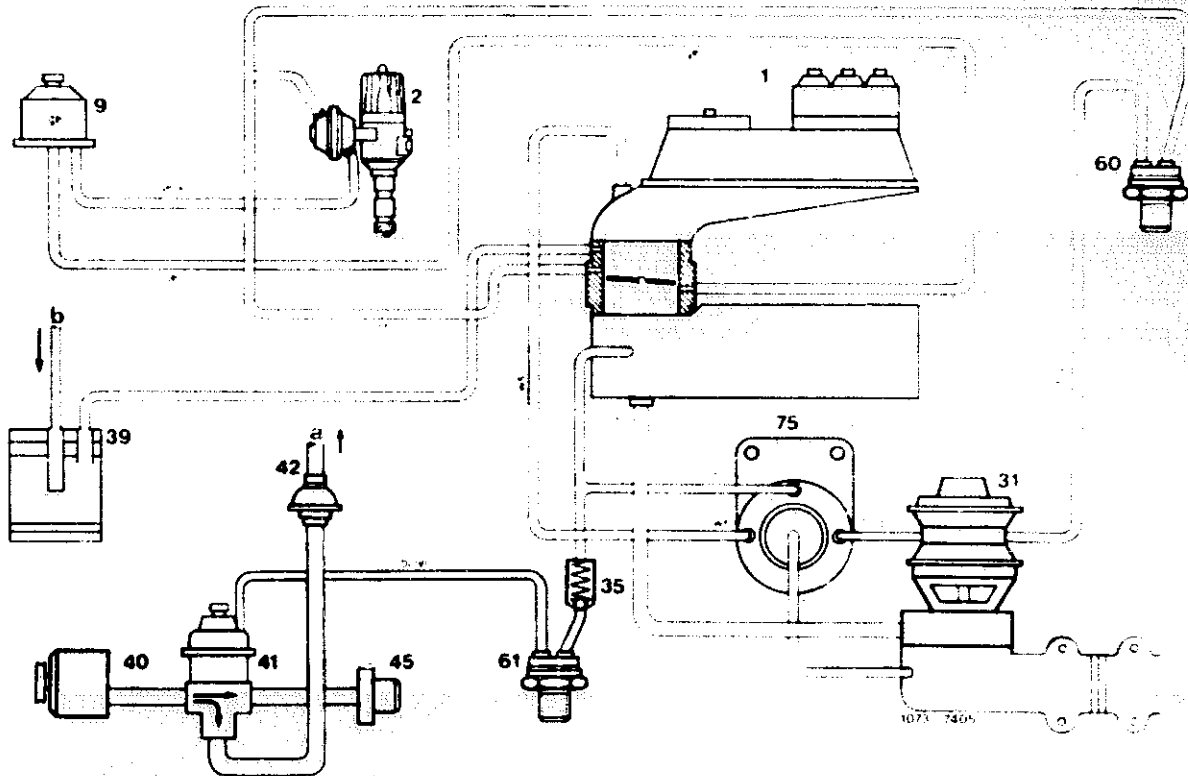
Emission control system	Color coding of originating vacuum line	Color coding of terminating vacuum line
Ignition		
Advance	red	—
Retard	yellow	yellow/purple
EGR	brown	red/purple
Air injection	blue	blue/purple

B. EGR (exhaust gas recirculation)

To reduce nitrogen oxides in exhaust gases, a portion of the gases from the exhaust manifold is returned to the intake manifold by way of a valve.

The quantity of the returned exhaust gas is limited and is stopped in some driving conditions, so that the driving characteristics will not be influenced.

Function diagram model year 1977



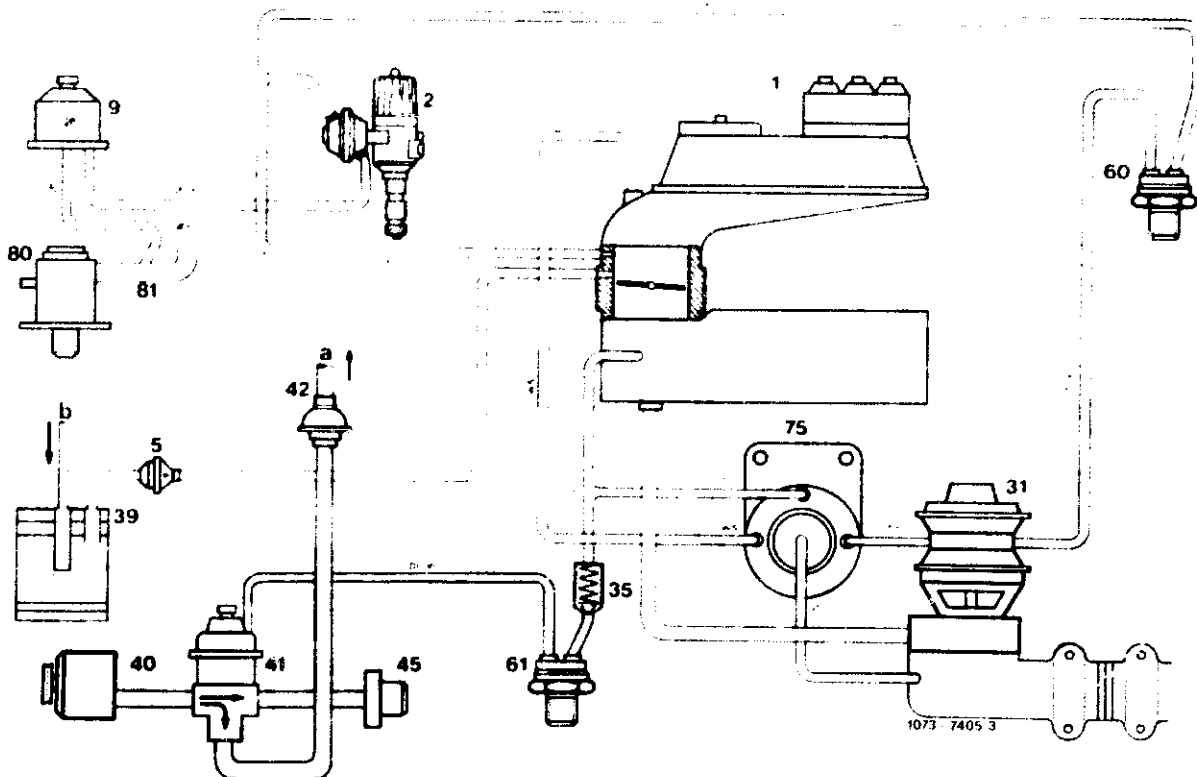
- 1 Mixture regulator
- 2 Ignition distributor
- 5 Purge valve
- 9 Switchover valve ignition
- 31 EGR valve
- 35 Check valve vacuum

- 39 Charcoal canister
- 40 Air pump
- 41 Air relief valve
- 42 Check valve
- 45 Air cleaner for silencing
- 60 Thermovent 40 5C

- 61 Thermovent 17 C
- 75 Transducer
- 80 Auxiliary air valve
- 81 Contour hose
- a Air injection cylinder head
- b Connection tank vent

- Color code:
- bl = blue
 - br = brown
 - ge = yellow
 - or = orange
 - rt = red
 - vi = purple
 - ws = white

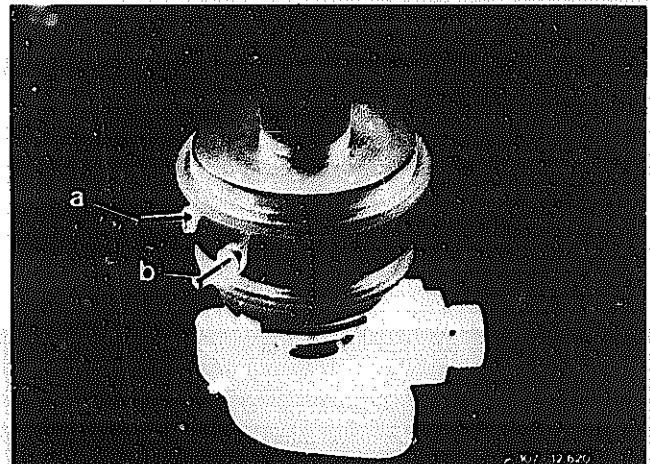
Function diagram model year 1978/1979



EGR components:

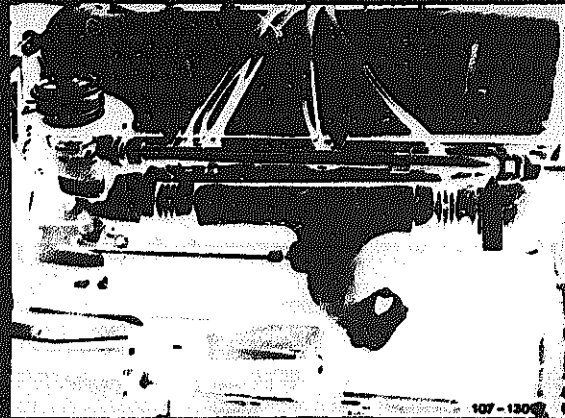
EGR valve

For better adaptation of EGR the EGR valve is designed as a three-diaphragm valve.



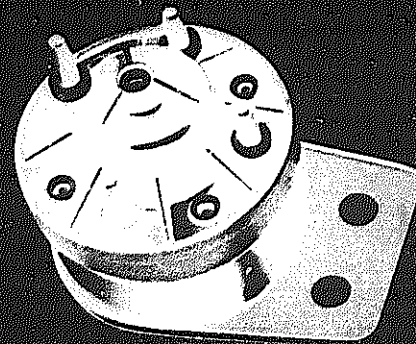
EGR line (arrows)

The exhaust gases are routed from EGR valve through EGR line into intake manifold.



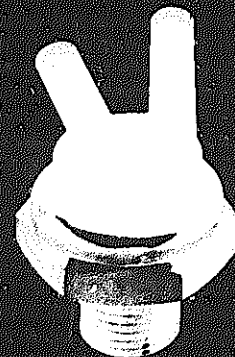
Transducer

The transducer controls the EGR volume in dependence of exhaust backpressure.



Thermovealve 40 °C (color code black)

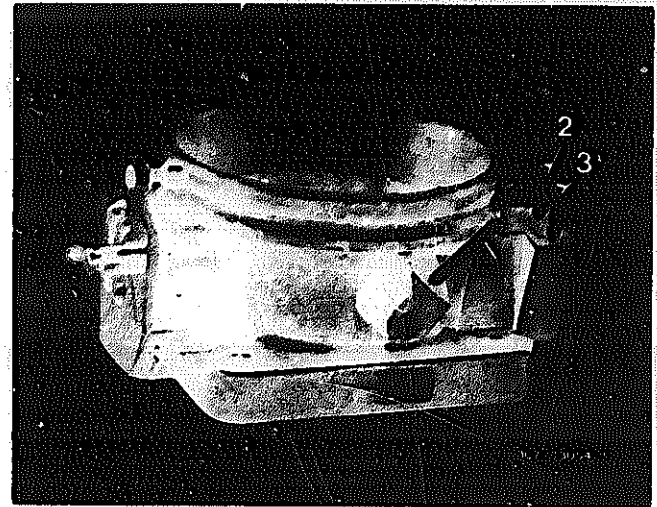
The thermovealve is screwed into coolant-controlled portion of intake manifold and opens at approx. 40 °C coolant temperature.



Throttle valve housing

A tapping pipe (2) is attached to throttle valve housing for drawing off the vacuum required for controlling EGR and vacuum advance of firing point.

- 1 Vacuum connection ignition retard
- 2 Vacuum connection ignition advance
- 3 Vacuum connection charcoal canister



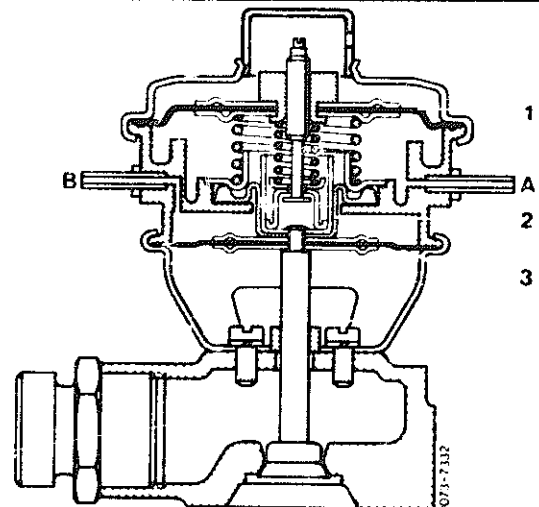
Operation

EGR is activated:

- Above 40 °C coolant temperature.
During acceleration.
During partial load operation.
During transition to deceleration (coasting).

Above 40 °C, in the driving ranges named above, a part of the exhaust gases is returned from the exhaust manifold to the intake manifold.

The amount of recirculated exhaust gases depends on the throttle valve position (vacuum tapped at throttle valve housing) and the exhaust backpressure in exhaust manifold. Depending on throttle valve position the center diaphragm chamber of the EGR valve is more or less supplied with vacuum via thermovalve 40 °C (60) in intake manifold.



- 1 Shutoff diaphragm
- 2 Cup-type diaphragm
- 3 Working diaphragm
- A Connection vacuum line to thermovalve
- B Connection vacuum line from transducer

The upper diaphragm chamber is continuously connected to atmosphere by means of a vent bore.

Depending on vacuum, the shutoff diaphragm (1) is pushed with coupling pin downwards against spring force and the valve can open.

Opening and closing of valve is controlled by transducer, which provides the positive or negative ventilation for diaphragm chamber above working diaphragm (3) depending on pressure of exhaust gases in exhaust manifold (exhaust gas backpressure).

Transducer

The transducer is subdivided into three chambers by means of two spring-loaded diaphragms, the upper diaphragm (1) and the lower diaphragm (2). Both diaphragms are connected to each other by means of a diaphragm cup.

- 1 Connection intake manifold vacuum (blue)
- 2 Connection vent line (white)
- 3 Connection exhaust gas backpressure line (orange)
- 4 Connection vacuum control line to EGR valve (brown)

The exhaust gas pressure is effective in upper diaphragm chamber. The center diaphragm chamber is continuously and positively vented through air guide housing. This will not influence the position of the diaphragms. The lower diaphragm chamber is positively or negatively vented depending on exhaust gas backpressure.

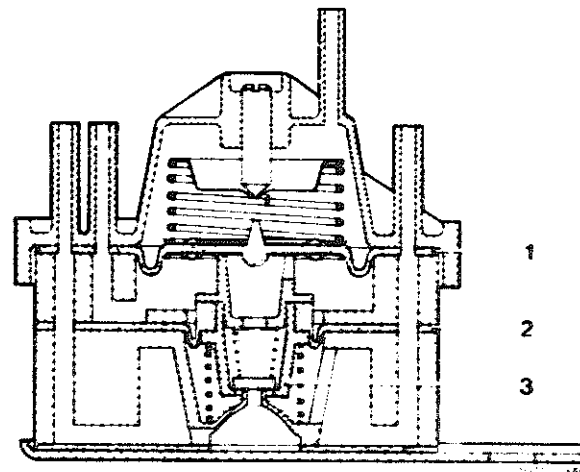
The different driving conditions provide three positions for transducer:

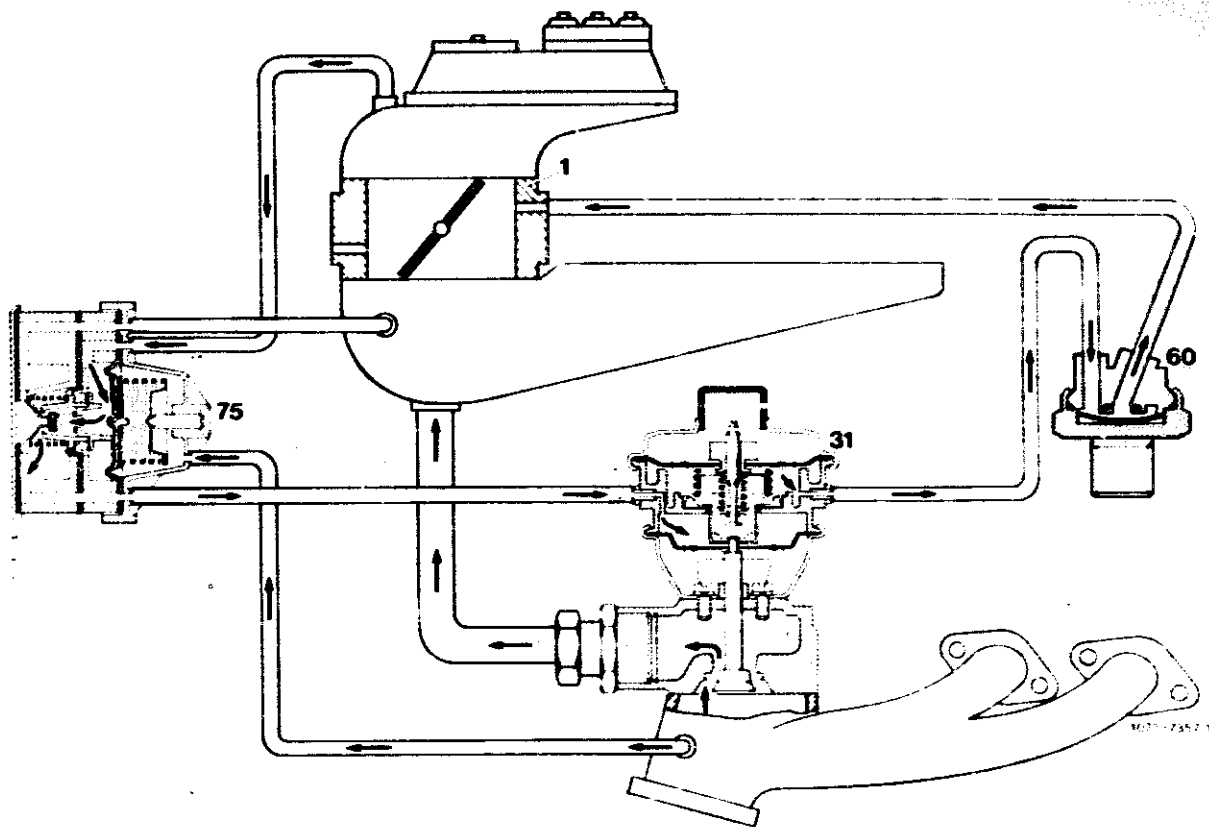
- 1 Upper diaphragm
- 2 Lower diaphragm
- 3 Diaphragm cup

1. During acceleration the exhaust gas backpressure increases and forces the upper diaphragm with diaphragm cup and the lower diaphragm in downward direction.

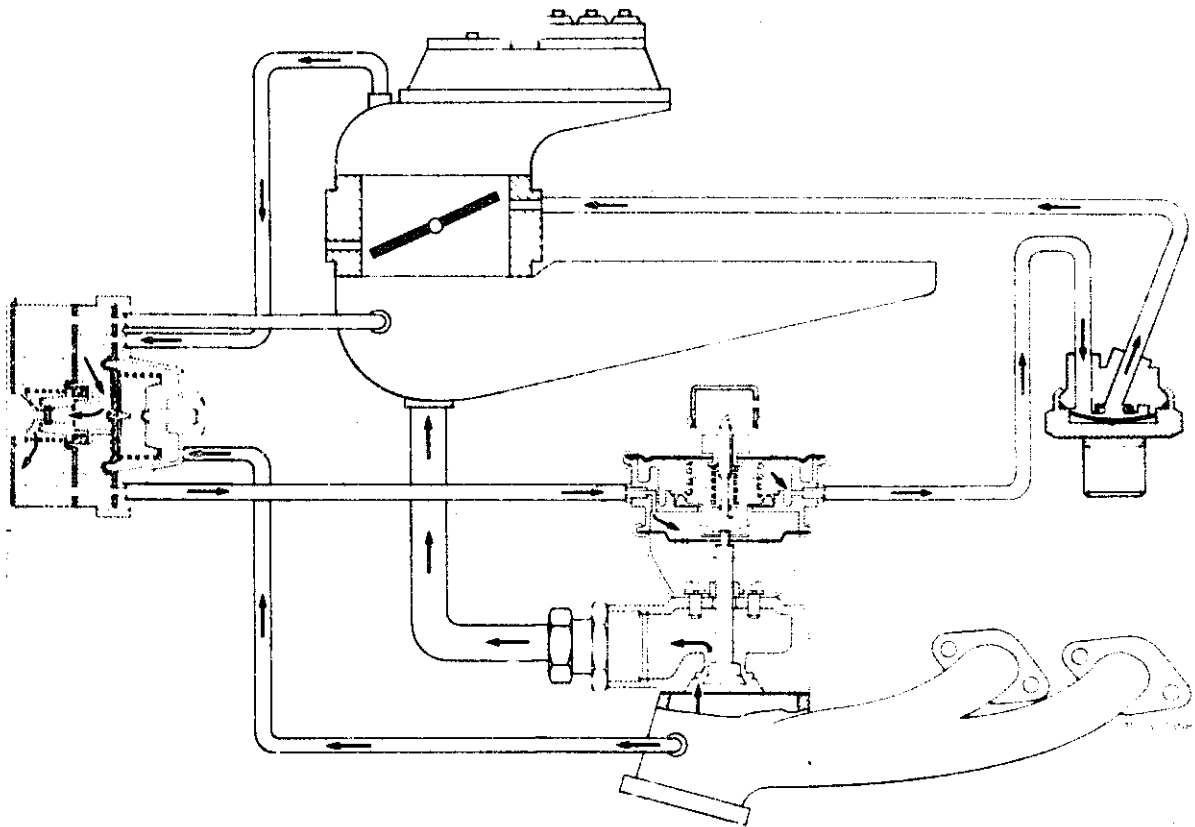
The valve reed in diaphragm cup closes the intake pipe vacuum line in lower diaphragm chamber. Simultaneously, the valve reed opens the positive venting bore from center to lower diaphragm chamber. The lower diaphragm chamber in EGR valve is positively vented by means of the vacuum control line coming from lower diaphragm chamber. The spring in EGR valve pushes the working diaphragm with valve down. The valve opens completely and the largest possible quantity of exhaust gases flows to intake manifold.

14.5-050/5 USA 1977/78/79

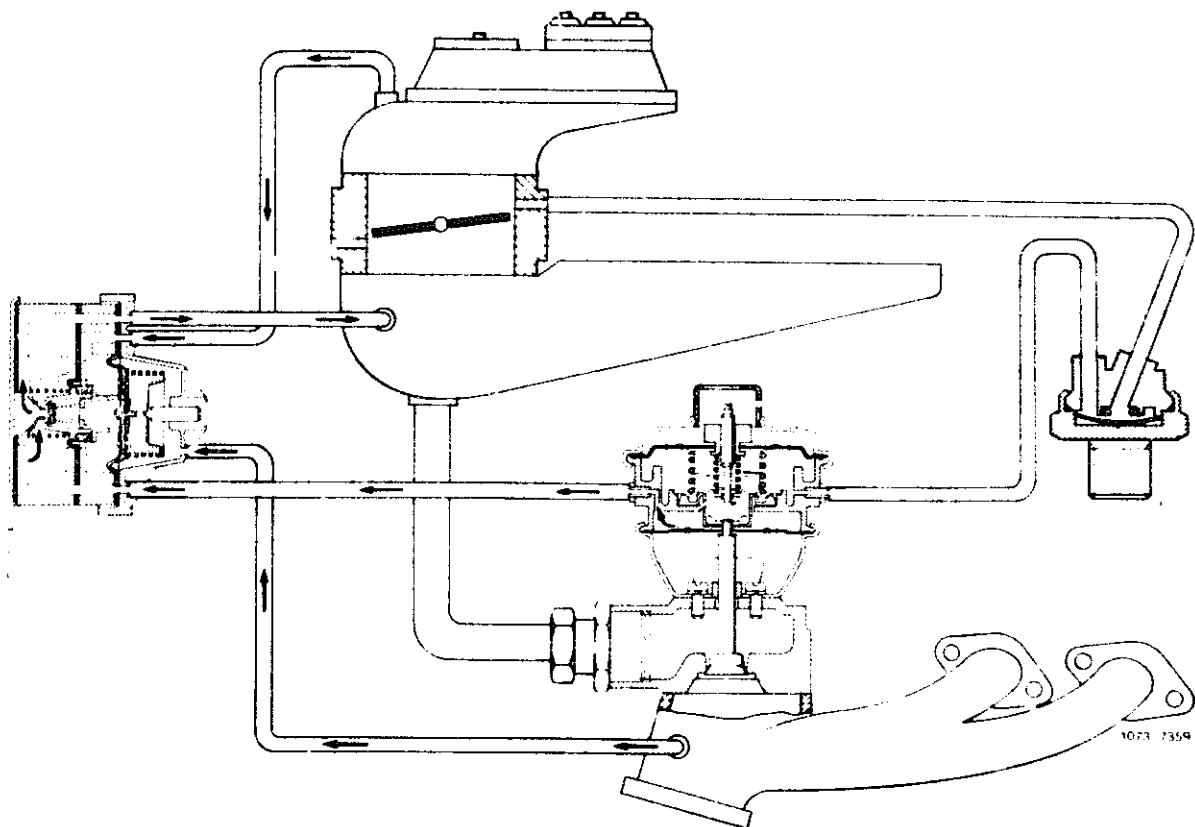




2. During transition to deceleration (coasting) the exhaust gas backpressure decreases. The upper diaphragm (1) including the diaphragm cup and the lower diaphragm are returning to their starting position. The valve reed opens the intake manifold vacuum line and seats on lower part of diaphragm cup. This will interrupt the positive venting of the lower diaphragm chamber. The intake pipe vacuum now prevailing in this diaphragm chamber provides the negative ventilation for the lower diaphragm chamber in EGR valve via vacuum control line. Depending on size of vacuum the valve is pulled in closing direction against the spring force. The quantity of fed exhaust gases decreases.



3. During constant driving the pressure conditions in upper and lower diaphragm chamber are in balance. The EGR valve remains in its momentary position. The returned quantity of exhaust gases remains constant.



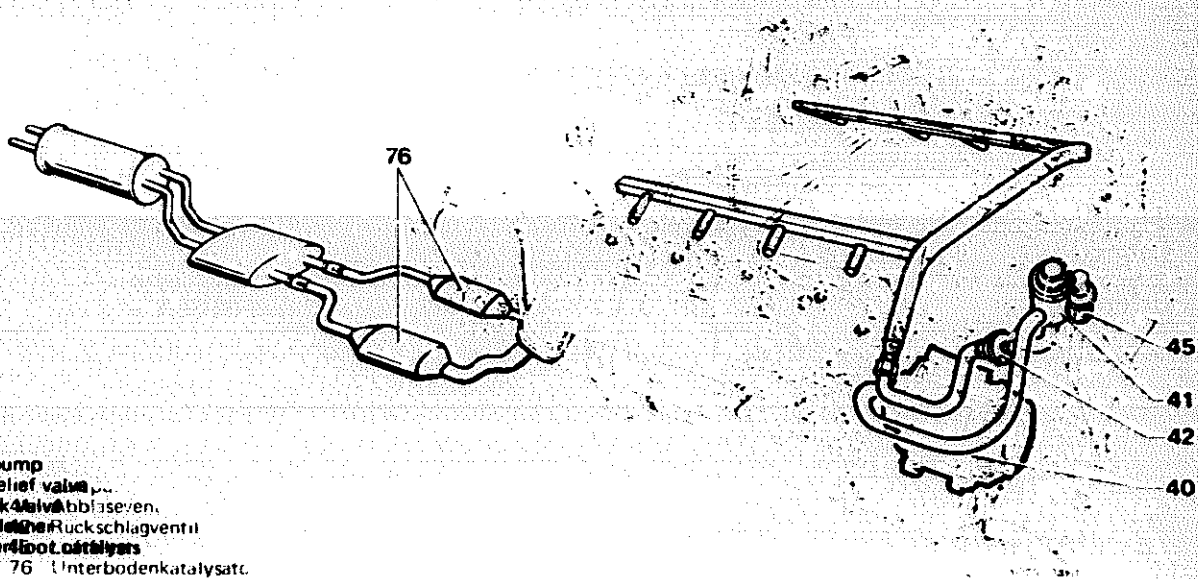
C. Air injection

To reduce the incompletely burnt components in the exhaust gases, air is injected into hot zone behind exhaust valves.

Afterburning is controlled by way of the engine temperature and vacuum conditions in intake manifold.

To avoid backfiring in exhaust, as well as overheating of catalyst, the air injection is shut off in given driving ranges.

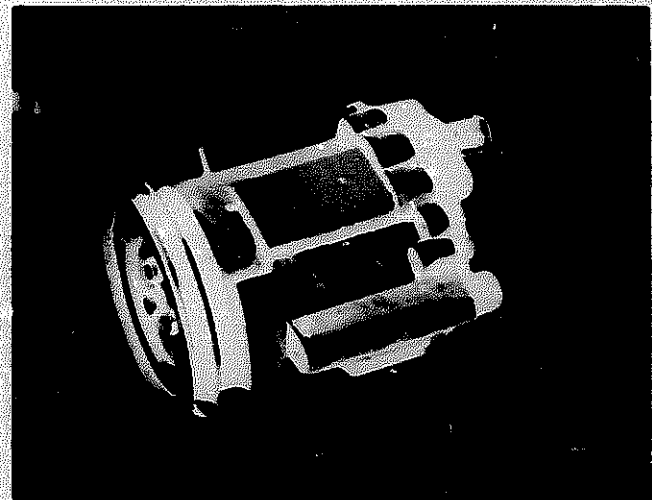
Function diagram



Components of air injection:

Air pump

The air pump is a vane-type pump with maintenance-free rotation filter which cleans the drawn-in air.



Air relief valve

The air relief valve serves the purpose of discharging the delivered air below 17 °C coolant temperature by way of a separate air cleaner for silencing.

The air relief valve is provided with a safety valve (1), which discharges the delivered air at a given overpressure to protect the pump vanes against overloads.

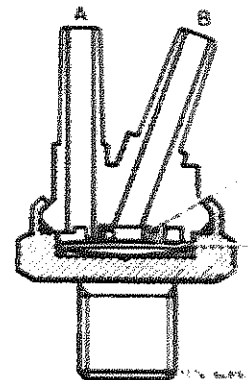
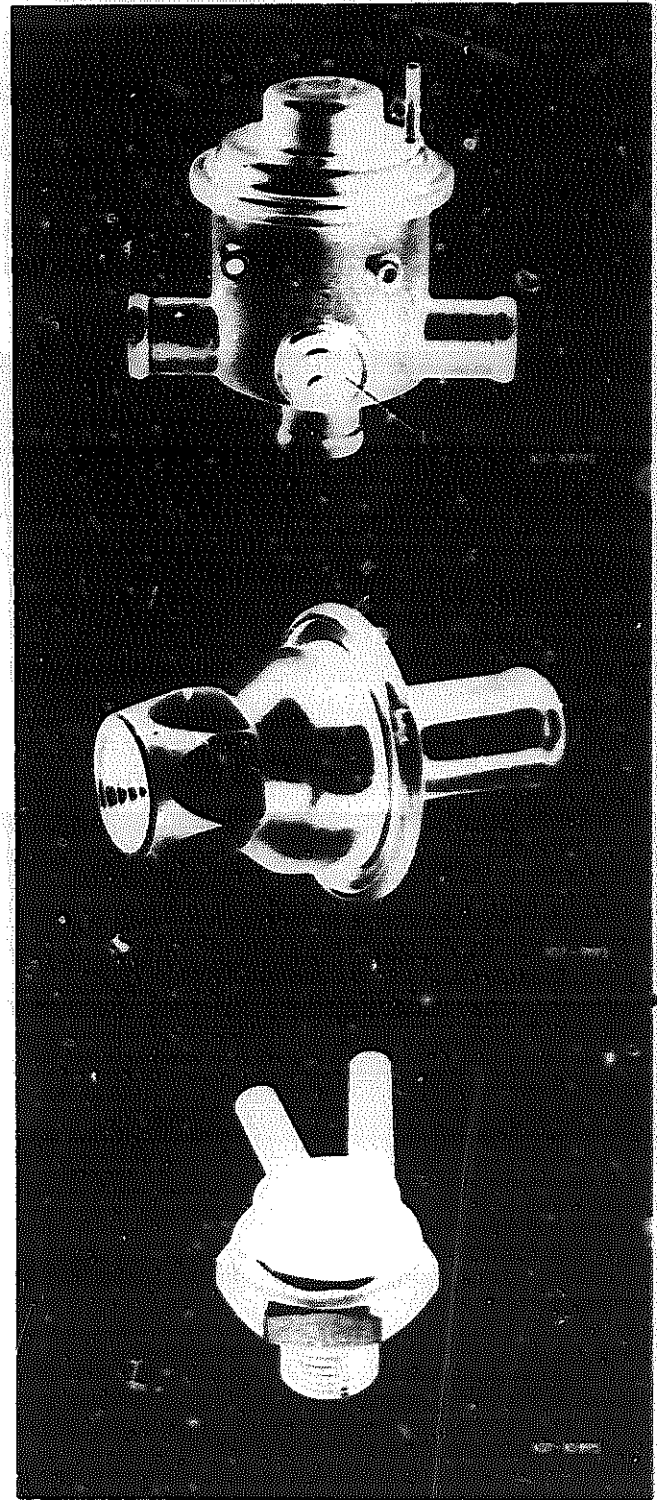
Check valve

The check valve prevents hot exhaust gases from flowing into air line.

Therموvalve 17 °C (color code blue)

The therموvalve is screwed into coolant-controlled portion of intake manifold and opens at approx. 17 °C coolant temperature. Below 17 °C coolant temperature the bimetallic plate rests against O-ring and closes connection "B".

Above 17 °C coolant temperature the bimetallic spring snaps downwards under influence of heat. Both connections are connected to each other.



- 1 Bimetallic plate
- 2 O-ring
- A To EGR valve
- B To throttle valve housing

Catalysts

The catalysts are designed as underfloor catalysts.

One catalyst is installed for each cylinder bank.



Operation

Starting at a coolant temperature of approx. 17 °C in intake manifold, air is blown into exhaust ports of cylinder heads at idle, during deceleration and partial load operation.

60 Thermovalve 40 °C
61 Thermovalve 17 °C

The air pump driven by crankshaft via a V-belt is continuously delivering air when the engine is running.

The air flows to air relief valve (41). Starting at approx. 17 °C coolant temperature, when the diaphragm of the air relief valve is under influence of vacuum, the air is injected into cylinder heads via check valve (42). Below 17 °C coolant temperature, when no vacuum flows to diaphragm of air relief valve, the delivered air is discharged into the atmosphere by means of air cleaner for silencing (45).

The exhaust gases and the injected air are routed through exhaust pipes into catalysts.

The oxygen in injected air encounters the hot exhaust gases for reaction in catalyst.



41 Air relief valve
42 Check valve
45 Air cleaner for silencing

D. Air injection tourist vehicles

Tourist vehicles are supplied ex factory without catalysts.

For this reason, only the air injection is different from vehicles delivered to the USA.

To reduce the incompletely burnt components in exhaust gas, air is injected into hot zone behind exhaust valves.

The oxygen in the injected air encounters the hot exhaust gases in exhaust manifold and initiates a reaction.

Afterburning is controlled via engine temperature and vacuum conditions in intake manifold.

To prevent backfiring, the air injection is shut off in given driving ranges.

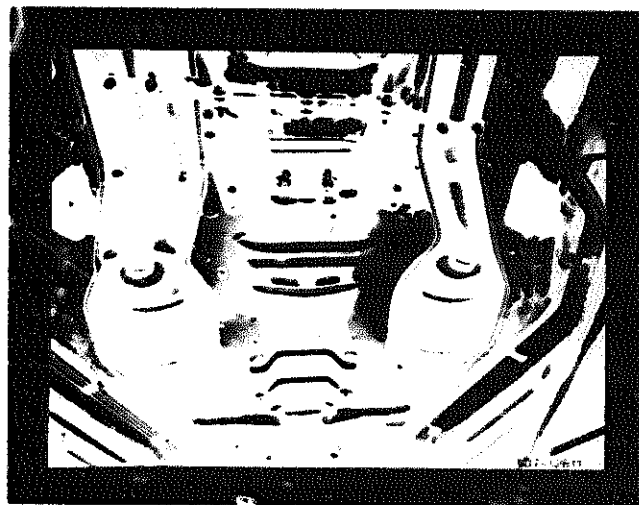
Components and operation of air injection

Except for catalysts, components and operation are similar to USA version (as described in section C).

E. Catalysts

The catalysts are installed in exhaust system in front of mufflers (silencers). Because of the higher temperatures, the front exhaust pipes and the catalysts are covered with heat shields.

Two catalysts are installed.



The catalyst comprises an oval monolith (3), a honeycomb-shaped body of ceramic material elastically supported in a wire netting (2). The noble metal evaporated on the monolith, the actual catalyst, accelerates the oxidation of CO and hydrocarbons while adding fresh air at the proper temperature.

To keep catalyst in functioning condition, operate engine with unleaded fuel only.

- 1 Distributor panel
- 2 Wire netting
- 3 Monolith

Overheating of catalysts should be prevented

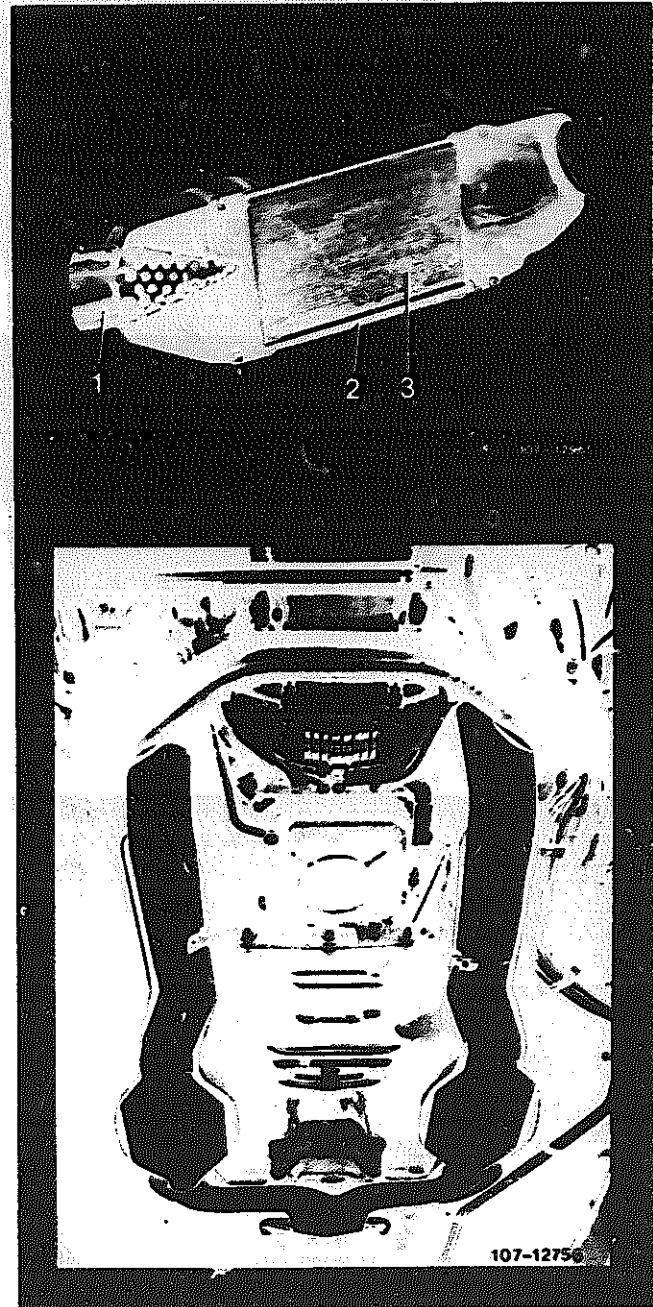
Extended overheating of catalyst will result in catalyst damage, that is, the monoliths in catalyst may melt.

Overheating of catalyst may occur ...:

- a) The specified engine service is not maintained.

Perfect spark plugs are important for life of catalyst.

- b) Irregular operation of engine results in excessive enrichment of fuel-air mixture.
- c) Exhaust gas emission control system is arbitrarily changed.



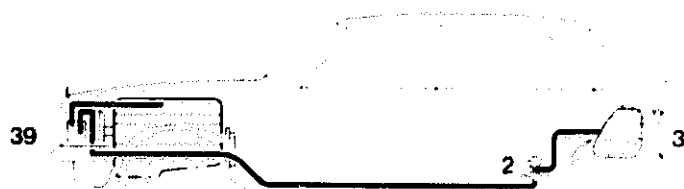
Catalysts with heat shields

F. Fuel evaporation control system model year 1977

A fuel evaporation control system is installed to improve emissions which are not directly connected with engine combustion.

Function diagram

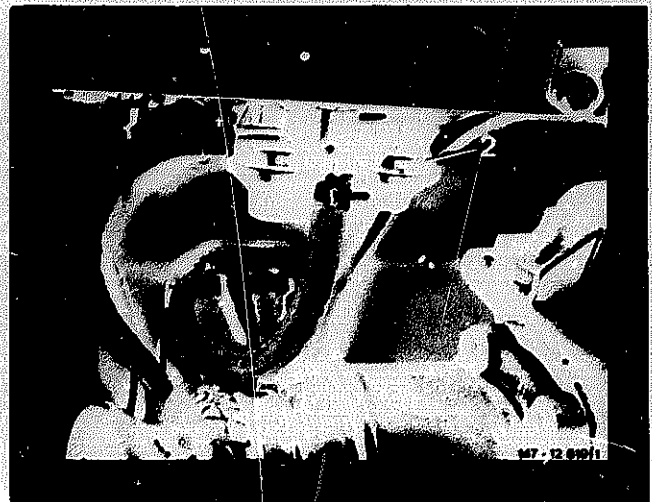
- 2 Valve system
- 3 Fuel tank
- 39 Charcoal canister



Components of fuel evaporation control system:

Valve system

The valve system is mounted underneath vehicle at level of rear legroom.



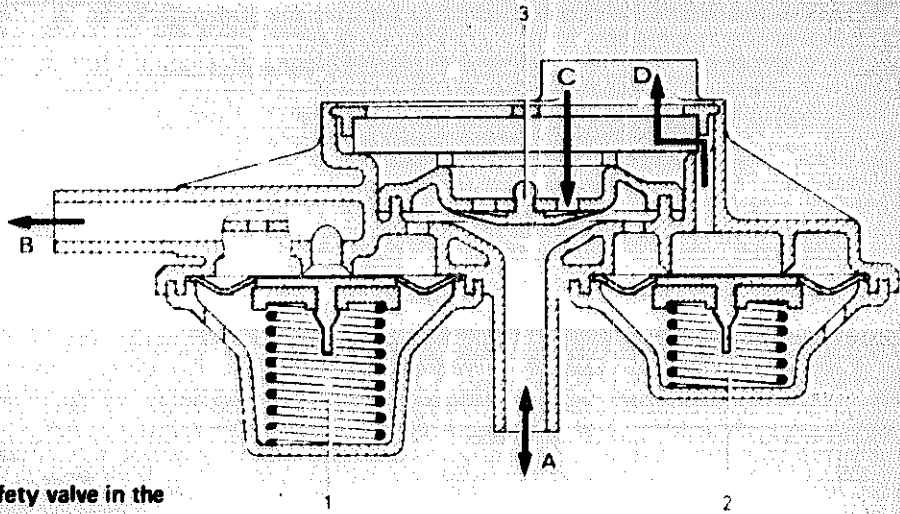
The valve system comprises three valves:

1. Negative vent valve
2. Pressure relief valve
3. Positive vent valve

The negative vent valve opens at a slight overpressure. The evaporation vapors are flowing via negative vent valve into a line toward charcoal canister.

Sectional view valve system

- 1 Negative vent valve
- 2 Pressure relief valve
- 3 Positive vent valve
- A Input to valve system/output or positive venting of fuel expansion tank
- B To charcoal canister
- C Fresh air input
- D Output pressure relief valve



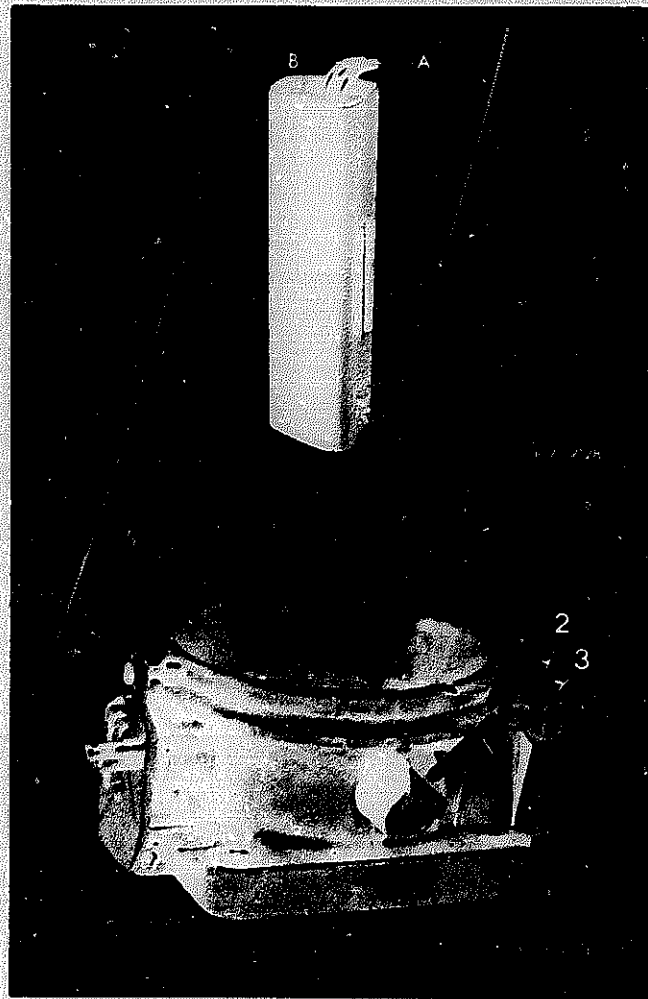
The pressure relief valve opens as a safety valve in the event of an overpressure in fuel evaporation control system. The fuel vapors are discharged directly into the open air (atmosphere).

The positive vent valve opens whenever cooling down of fuel tank or reduced contents result in a vacuum.

Charcoal canister

The fuel evaporation vapors from fuel tank are stored in charcoal canister and are drawn off again when driving.

- A Connection tank vent
- B Draw-off connection



Throttle valve housing

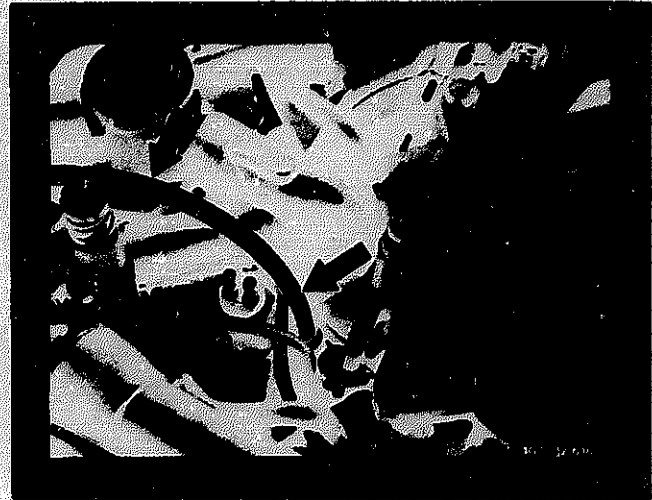
The throttle valve housing is provided with a connection to draw evaporation vapors from charcoal canister.

- 1 Vacuum connection ignition retard
- 2 Vacuum connection ignition advance
- 3 Vacuum connection charcoal canister

Operation

The fuel evaporation vapors from fuel tank are routed to charcoal canister via valve system (2). In the charcoal canister the fuel evaporation vapors are stored when the engine is stopped, and are drawn off into throttle valve housing starting at a given throttle valve position when the engine is running.

Arrow = draw-off line to throttle valve housing

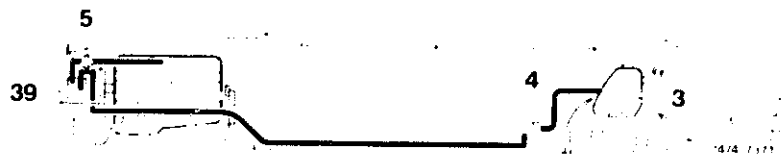


G. Fuel evaporation control system model year 1978/79

A fuel evaporation control system has been installed to improve emissions which are not directly connected with engine combustion.

Function diagram

- 3 Fuel tank
- 4 Vent valve unit
- 5 Purge valve
- 39 Charcoal canister

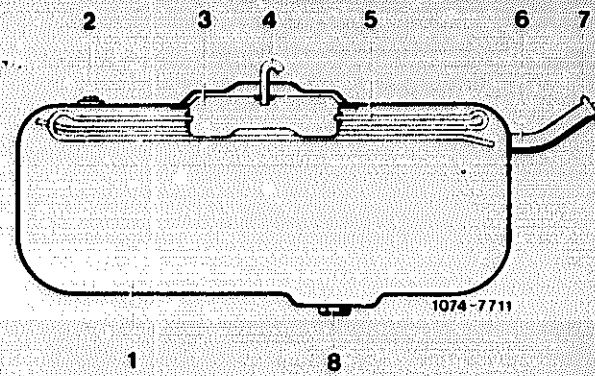


Components of fuel evaporation control system:

Fuel tank

A collecting tray connected to pipe system is installed in fuel tank, connection (4) to vent valve unit enters into tray.

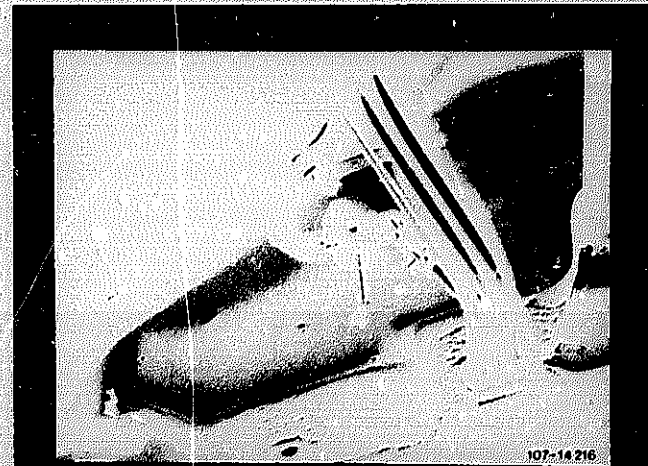
- | | |
|------------------------------|-----------------------------|
| 1 Fuel tank | 5 Pipe system |
| 2 Immersion tube transmitter | 6 Filler neck |
| 3 Expansion tank | 7 Cap |
| 4 Connection vent valve unit | 8 Connection fuel feed line |



Vent valve unit

The vent valve unit (4) is mounted underneath vehicle at level of rear legroom and takes the place of the valve system known from model year 1977.

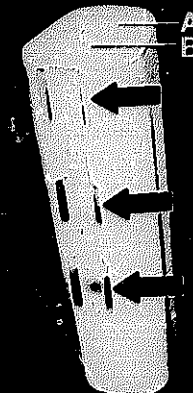
The valve unit comprises a negative vent valve and a positive vent valve.



Charcoal canister

The fuel evaporation vapors from fuel tank are stored in charcoal canister and are drawn off again while driving.

- A Draw-off connection
B Tank vent connection



Purge valve

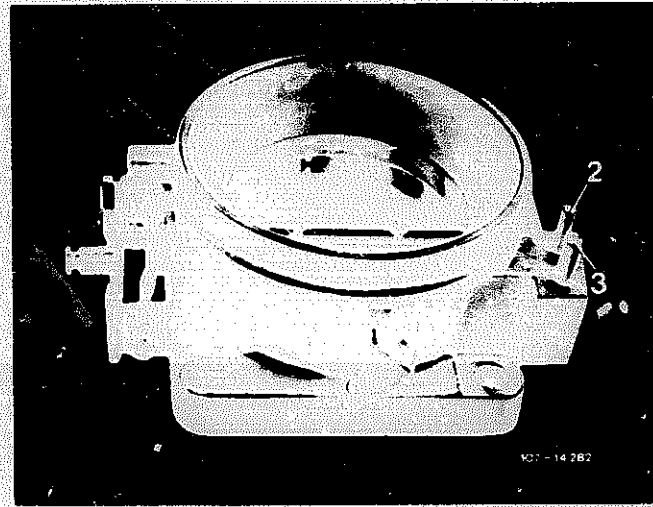
Purge valve (5) is located in purge line from charcoal canister to throttle valve housing.



Throttle valve housing

The throttle valve housing has been slightly changed compared with model year 1977. To avoid mixing up the vacuum connections, the OD of the vacuum connection to charcoal canister has been increased from 4 to 5 mm. Two purge bores were added above throttle valve for drawing off evaporation vapors from charcoal canister.

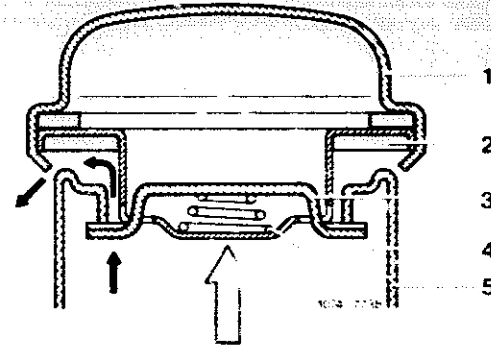
- 2 Vacuum connection ignition advance
- 3 Vacuum connection charcoal canister



Fuel tank cap

To avoid increased overpressure in fuel tank, the fuel tank cap has been modified.

- 1 Cap
- 2 Gasket
- 3 Clamp
- 4 Compression spring
- 5 Filler neck



Operation

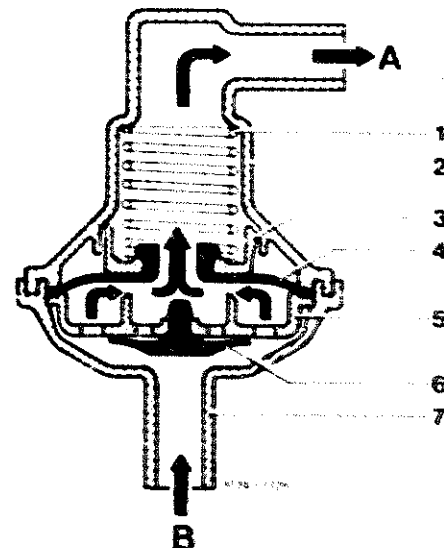
Evaporation system

The vent valve unit increases the pressure in fuel tank to 30–50 mbar, so that less fuel evaporation vapors can escape from fuel tank.

If the pressure in fuel tank arrives at 30–50 mbar, the negative vent valve (4) opens and permits the fuel evaporation vapors to flow toward charcoal canister where they are stored when the engine is stopped.

Vent valve unit open to charcoal canister

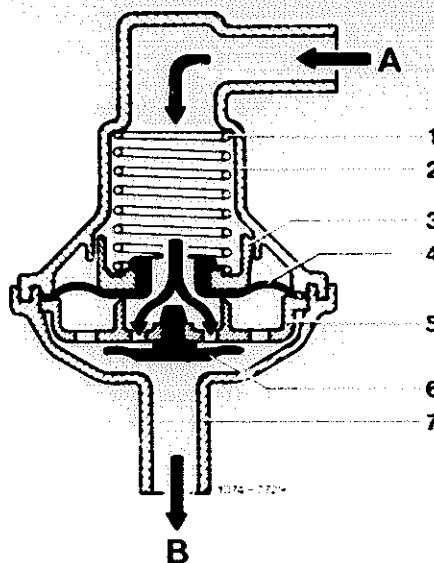
- 1 Compression spring
- 2 Valve housing
- 3 Spring seat
- 4 Negative vent valve
- 5 Valve disc
- 6 Positive vent valve
- 7 Connection
- A Connection charcoal canister
- B Connection fuel tank



When the fuel cools down, the decreasing volume is compensated by the intake of air or fuel evaporation vapors via negative vent valve (6) starting at a vacuum of 1–16 mbar. If the vacuum in fuel tank drops below 1 mbar, the negative vent valve (6) will close.

Vent valve unit open to fuel tank

If the pressure in fuel tank increases above 0.1–0.3 bar due to a malfunction in the fuel evaporation system, the fuel evaporation vapors can escape from fuel tank via fuel tank cap.



Purge system

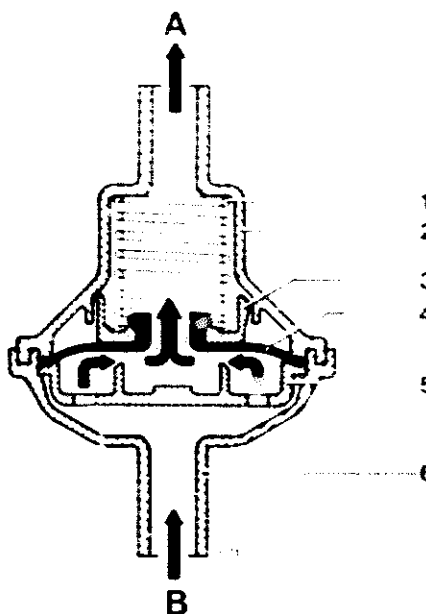
The charcoal canister is connected to the throttle valve housing by means of a line in which the purge valve is enclosed.

When the engine is running and the vacuum in the purge line exceeds 30–50 mbar, the purge valve opens. The fuel vapors stored in charcoal canister can be drawn off depending on throttle valve position.

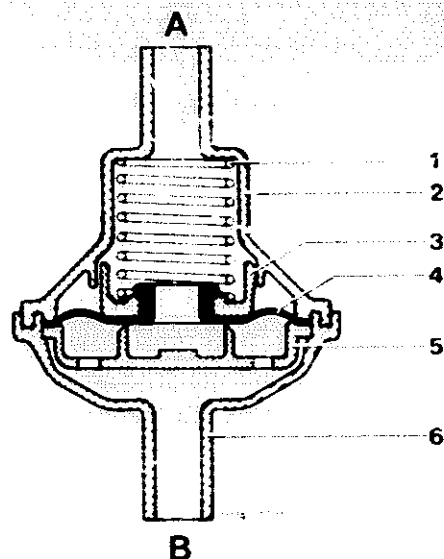
Purge valve (open)

- | | |
|-----------------------|-------------------------------------|
| 1 Compression spring | 5 Valve disc |
| 2 Valve housing | 6 Connection |
| 3 Spring seat | A Connection throttle valve housing |
| 4 Negative vent valve | B Connection charcoal canister |

When the throttle valve opens, the two purge bores in throttle valve housing, which are entering a common duct, are both passed over one after the other. As a result, purging in lower partial load range begins in dosages which are not influencing the driving characteristics.



At idle and during deceleration (throttle valve closed) the two purge bores are at atmospheric side of throttle valve. There is no purging of charcoal canister.



Purge valve (closed)

H. Vehicles for Federal version – high altitudes (model year 1977 only)

As a result of emission control regulations for high altitudes, model 116.036 with Federal emission control system for Federal version – high altitudes is provided with a modified CIS warm-up compensator and a different valve system for fuel evaporation control system.

If a vehicle of model 116.036 is sold in Federal version – high altitudes, these components must be installed and the idle speed emission value in high altitude area must be newly set.

Warm-up compensator for Federal version – high altitudes:

MB part no. 000 070 13 62

Bosch no. 0 438 140 043

Valve system for Federal version – high altitudes:

MB part no. 107 470 06 93

Identification: yellow dot.

14-100 Test program

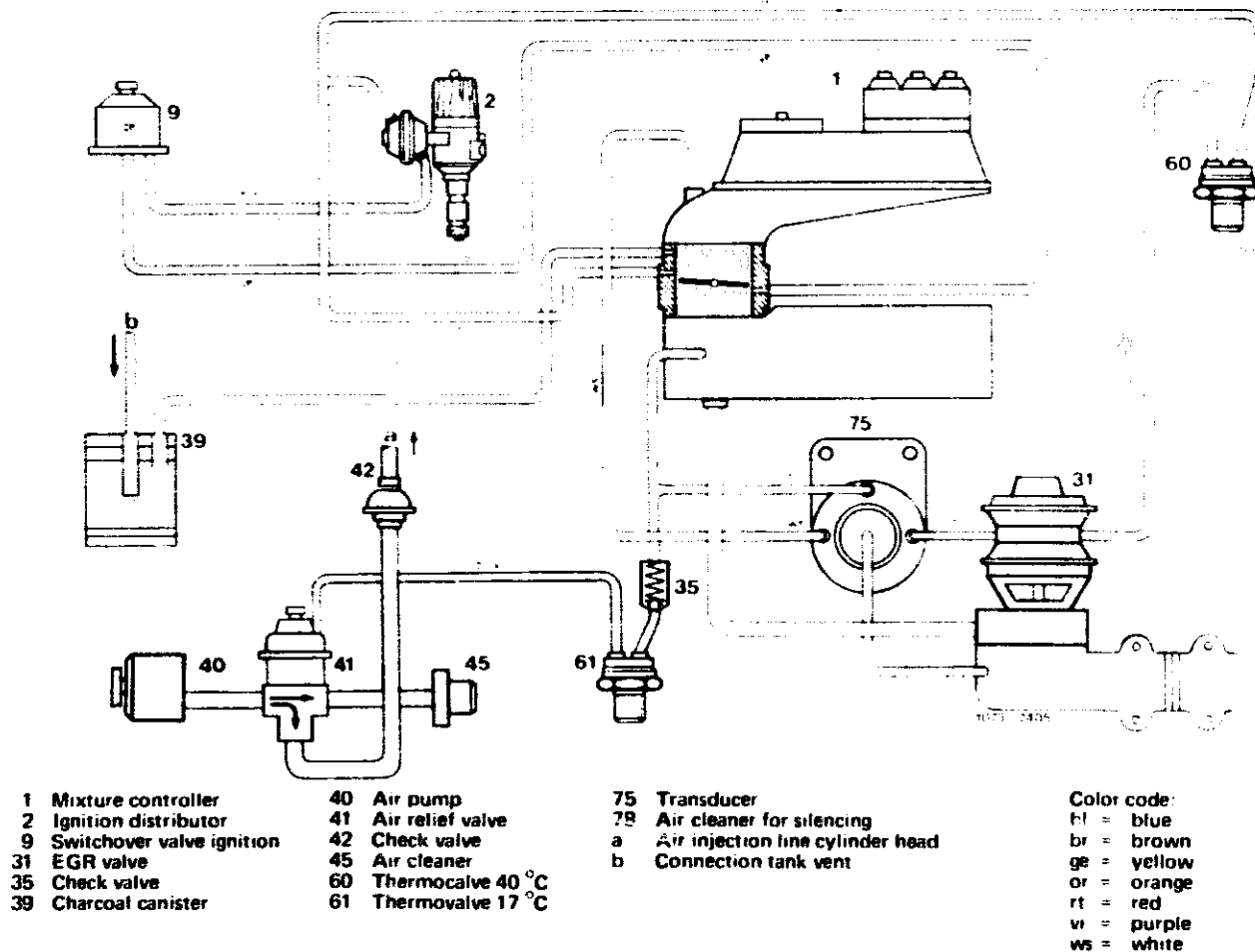
Federal and California version model year 1977/78/79

For complaints such as: Poor warming-up characteristics of engine, poor idle speed, engine not accelerating or splashing during acceleration, check emission control system for function.

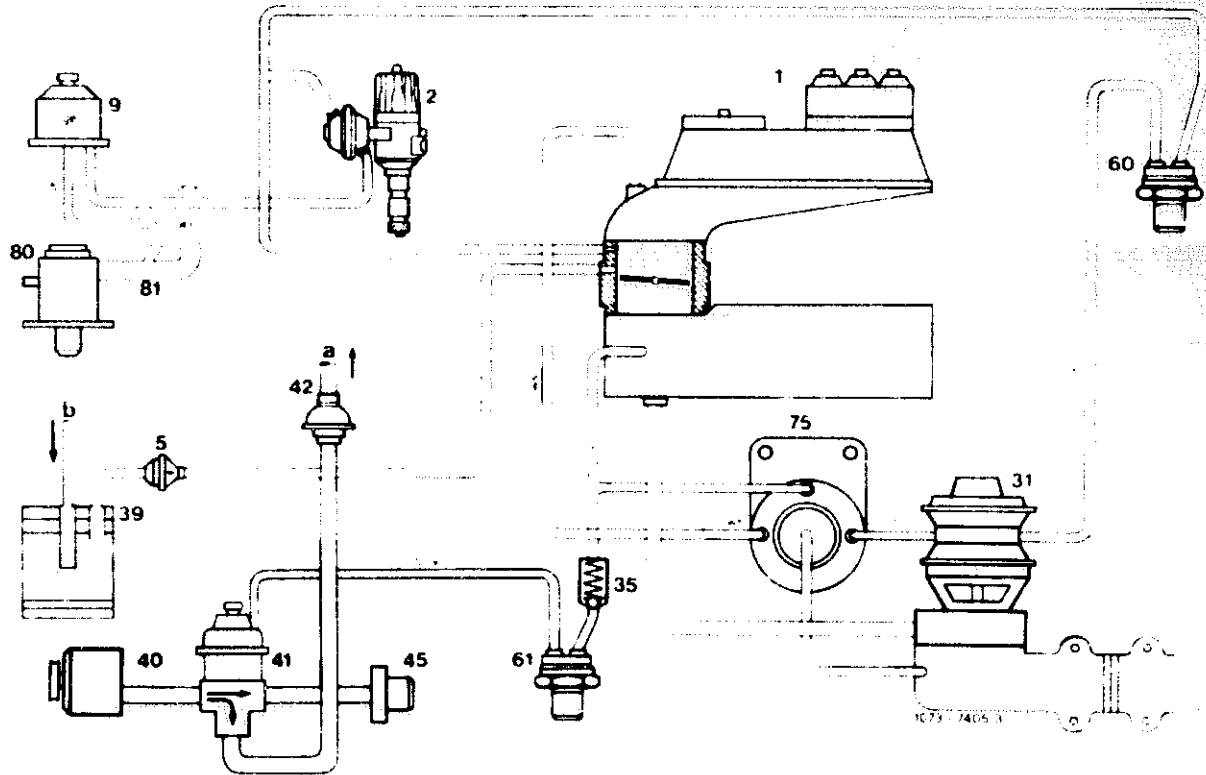
Test conditions: Engine at operating temperature, run engine at idle speed.

Test the following: EGR, air injection and fuel evaporation control system.

Function diagram model year 1977



Function diagram model year 1978/79



- 1 Mixture controller
- 2 Ignition distributor
- 5 Purge valve
- 9 Switchover valve ignition
- 31 EGR valve
- 35 Check valve

- 39 Charcoal canister
- 40 Air pump
- 41 Air switchover valve
- 42 Check valve
- 60 Thermovalve 40 °C
- 61 Thermovalve 17 °C
- 75 Transducer

- 78 Air cleaner for silencing
- 80 Auxiliary air valve
- 81 Contour hose
- a Air injection line cylinder head
- b Connection tank vent

- Color code:
- bl = blue
 - br = brown
 - ge = yellow
 - or = orange
 - rt = red
 - vi = purple
 - ws = white

Checking EGR

Pull brown vacuum line from EGR valve (31) and slowly increase idle speed.

Engine runs irregularly starting at approx. 800/min or stops.

Engine runs without change.



Check vacuum lines

Check layout of vacuum lines on transducer and intake manifold. Note that connections on transducer are identified with color rings. The attached vacuum lines should have the same color.

- 1 Connection intake manifold vacuum (blue)
- 2 Connection positive vent line (white)
- 3 Connection exhaust gas backpressure line (orange)
- 4 Connection vacuum control line to EGR valve (brown)

On black thermovalve 40 °C (60) the red vacuum line should be plugged to diagonal connection and the red/purple vacuum line to straight connection. Check all pertinent vacuum lines for leaks and blow out vacuum connections.

Check thermovalve 40 °C (60)

The thermovalve is identified by a black plastic section and the designation "50 AA 4" punched into metal section.

Pull off red/purple vacuum line on straight connection, let engine run and accelerate.

Vacuum should be present at free connection.

If there is no vacuum, replace thermovalve (60).

Check transducer (75)

Run engine at idle. Pull off brown vacuum line on EGR valve. Connect vacuum gauge or keep vacuum line closed with finger. Vacuum should be present at idle speed.

If there is no vacuum, renew transducer.

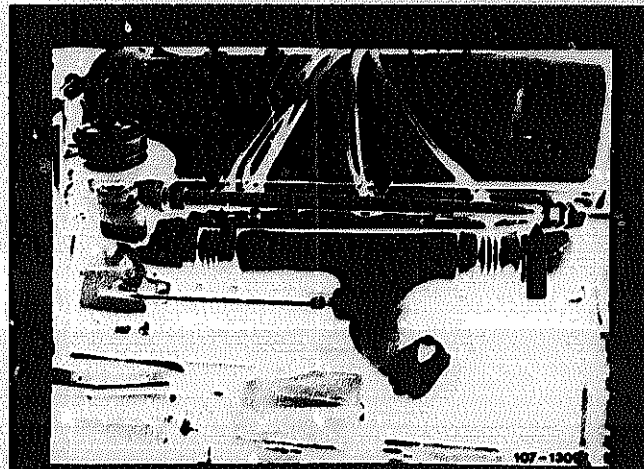


Check EGR valve (31)

Run engine at idle. Pull off both hoses on EGR valve.

Plug brown vacuum line to connection for red/purple vacuum line. Engine should run irregularly or come to a stop.

If operation of engine is not changing, replace EGR valve.

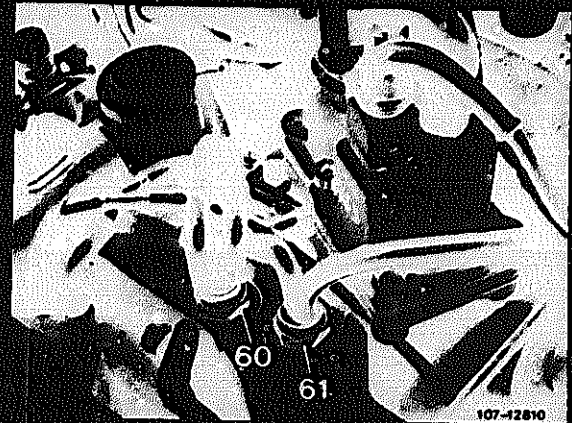


Checking air injection

Connect CO measuring instrument to exhaust gas backpressure line and read emission value. Pull off blue/purple vacuum line on straight connection of thermostatic valve (61) and close connection.

Emission value increasing.

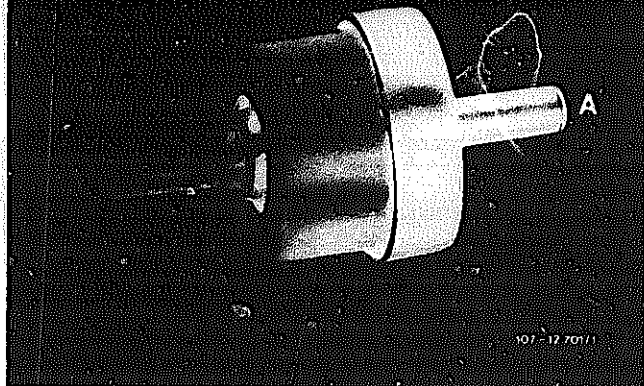
Emission value not increasing.



Check vacuum lines

The blue vacuum line with check valve (35) plugged in-between leads from intake manifold to diagonal connection of thermostatic valve (61). The purple/blue vacuum line leads from straight connection of thermostatic valve (61) to air relief valve (41).

Connection (A) of check valve (35) should face intake manifold.



Check vacuum

Pull vacuum line from diagonal connection of thermostatic valve (61). Connect vacuum gauge or keep closed with finger. Vacuum should be present at idle speed. If there is no vacuum, check vacuum lines for leaks and blow through vacuum tapping hole on intake manifold.

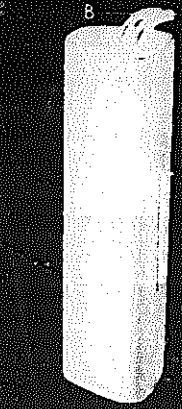
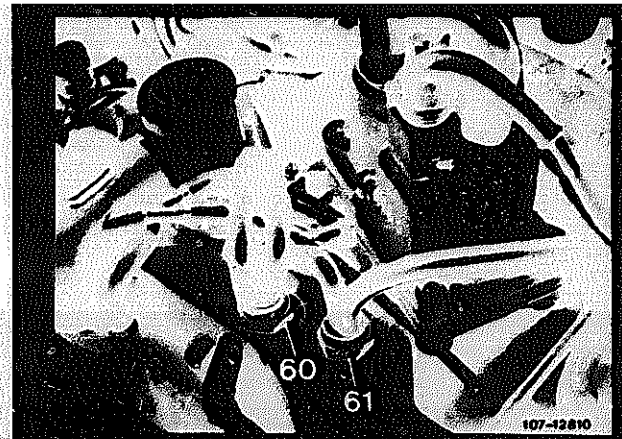
If there is a vacuum, check thermostatic valve (61) or replace.

The thermostatic valve is identified by its blue plastic section and by the designation "50 AB 5" punched into metal section.

Note: Starting model year 1978 with color code green, designation "50 AC 13".

Pull off blue/purple vacuum line. Run engine and accelerate. Vacuum should be noticeable at free connection.

If thermostatic valve is in order, renew air relief valve (41).



Checking fuel evaporation control system

Pull draw-off line (B) to throttle valve housing from charcoal canister and keep closed with finger or connect vacuum gauge.

Slowly increase engine speed to approx. 2000/min.

No vacuum at idle. Vacuum increasing with increasing speed.	No vacuum increase with increasing speed.
---	--

Model year 1977

Check draw-off hose

The draw-off hose (arrows) should be plugged to throttle valve housing. Check hose for leaks and blow through connection on throttle valve housing.

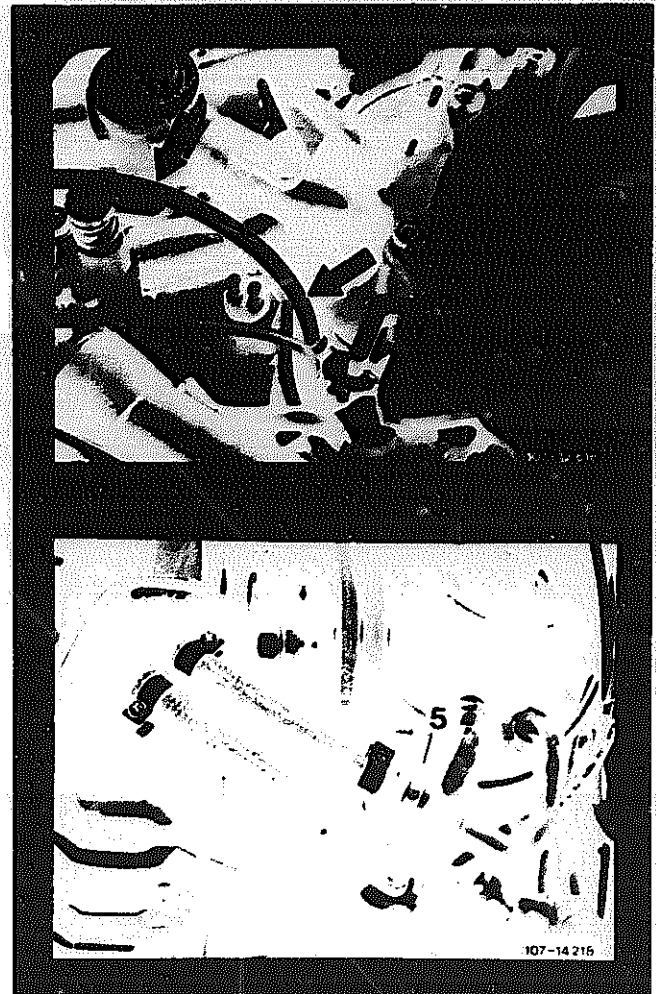
Model year 1978/79

Check draw-off hose and purge valve

The draw-off hose (arrows) should be plugged to throttle valve housing. Check hose for leaks and blow through connection on throttle valve housing.

If there is still no vacuum, pull off draw-off hose in front of purge valve (5) and repeat test.

If vacuum is present, replace purge valve.



End of test

14-200 Removal and installation of catalyst

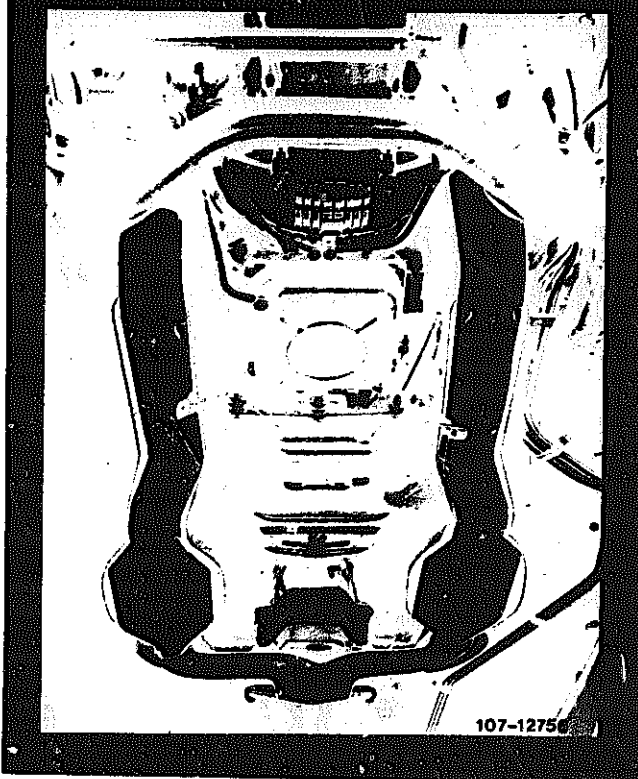
Model year 1977/78/79

Removal

1 Loosen screws of flange connections on exhaust manifold and unscrew.



2 Remove heat shields.

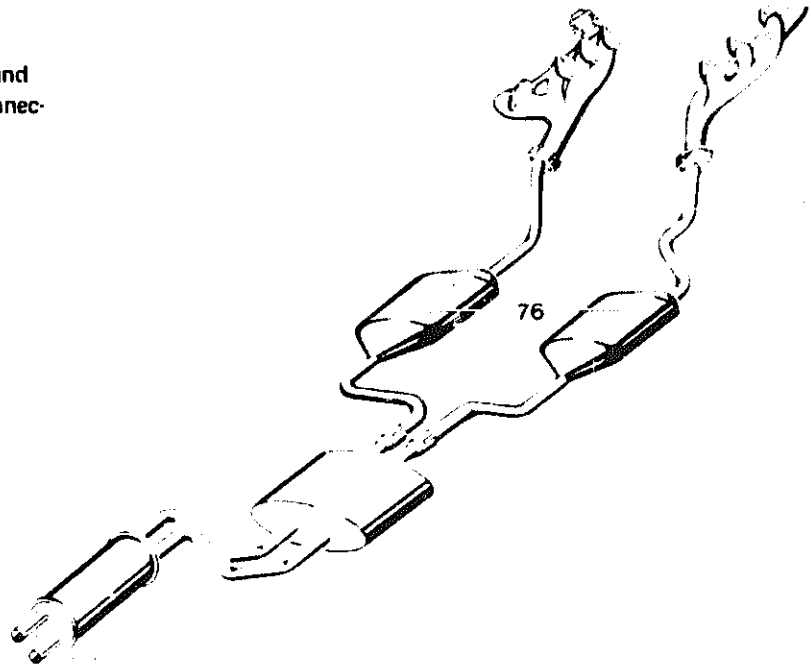


3 Remove lateral support on transmission, disconnect all rubber rings of exhaust mounting bracket and completely remove exhaust system.



4 Loosen exhaust pipe on plug connections in front of mufflers.

5 Heat plug connections with welding torch and pull catalyst with exhaust pipe out of plug connections by a slight turning motion.



Installation

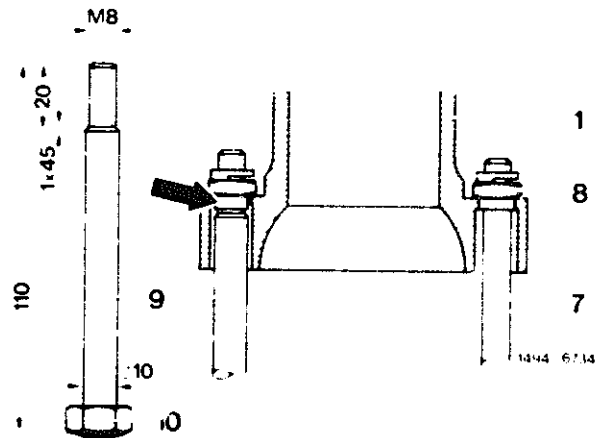
6 Insert catalyst with exhaust pipe into plug connections, slightly tighten plug connections.

7 Insert rivet nuts with **self-made threaded bolt** into exhaust manifold and screw-in until rivet nut is slightly widened at flange (arrow).

Attention!

Slot nut should not be seated tightly in exhaust manifold, since slot nut will be released again from clamp fit by the high releasing torque when un-screwing threaded bolt.

- 1 Exhaust manifold
- 7 Hex. head bolt
- 8 Rivet nut
- 9 Threaded bolt
- 10 Nut M 10 with threaded bolt welded

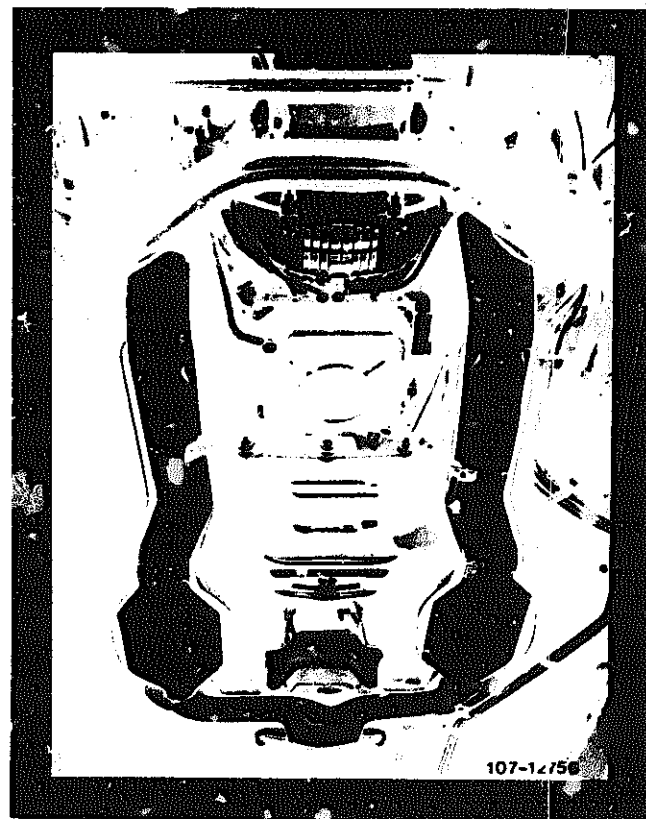


8 Install exhaust system and align. Tighten bolts of flange connections on exhaust manifold. Pay attention to good seat of ball connection. Tighten plug connections. Tightening torque of selflocking hex. head screws (7) is 20 Nm.

9 Attach lateral supports on transmission.

10 Check exhaust system for leaks.

11 Install heat shields.



14-250 Removal and installation of air pump

Federal and California version model year 1977/78/79

Adjusting values

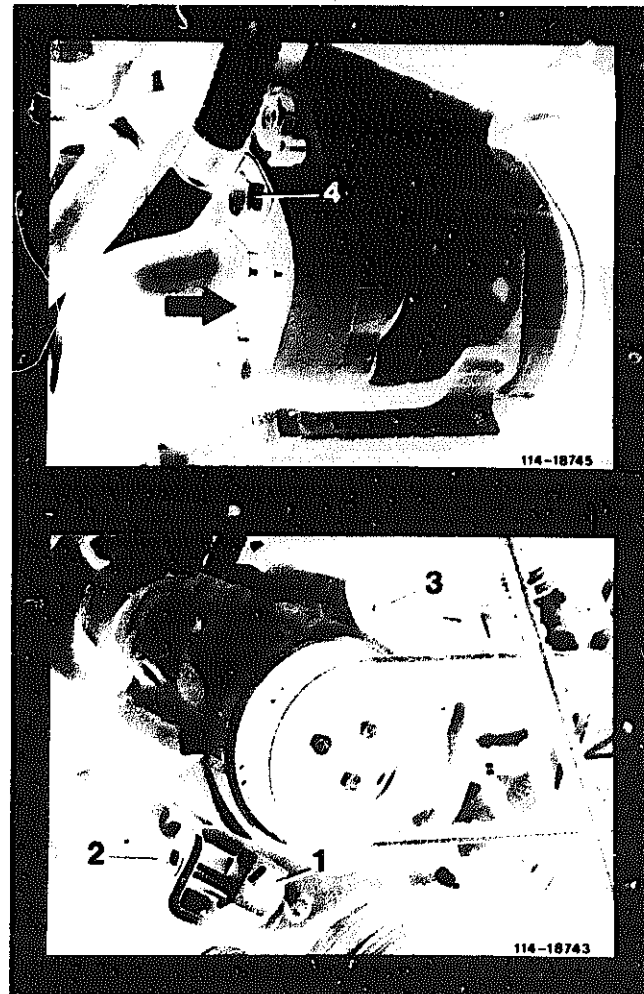
V-belt (depth of profile in mm)	New V-belt (KG scale on measuring instrument)	Used V-belt (KG scale on measuring instrument)
9.5	30	20-25

Conventional tool

Measuring instrument (Krikit)	Federal Republic of Germany	e.g. made by Gates GmbH Gravener Straße 191-193, D-4018 Langenfeld 2
	remaining countries	e.g. made by Gates Rubber Company, 999 S. Broadway, USA-80217 Denver/Colorado

Removal

- 1 Disconnect battery.
- 2 Remove alternator.
- 3 Compress hose clipped on contour hose (arrow) with combination plier, and pull off contour hose.
- 4 Unscrew fastening screw (4) for clamp holding cable harness of alternator, put cable harness together with clamp aside.
- 5 Loosen clamping screw (1), slightly unscrew tensioning screw (2) until V-belt is loose.
- 6 Unscrew clamping screw (1) and remove V-belt.
- 7 Loosen fastening screw (3) and unscrew, remove air pump.



Installation

8 For installation proceed vice versa.

9 Check tension of V-belts, for handling instruments refer to operating instructions.

The adjusting values named above refer to KG-scale of measuring instrument (arrow).

Note: Starting model year 1980, the threads of the air pump have been changed from inch threads to metric threads.

On vehicles with air pump in metric version, only an air pump with the same threads may be installed as a spare part.

After using up stocks of air pumps with inch threads, only air pumps with metric threads will be available.

From this date, if air pumps with metric threads will be installed as a replacement for an air pump with inch threads, the required screws, nuts, holders or flange bushings will be included in shipment.

In such a case, it is absolutely necessary to include the chassis number in order.

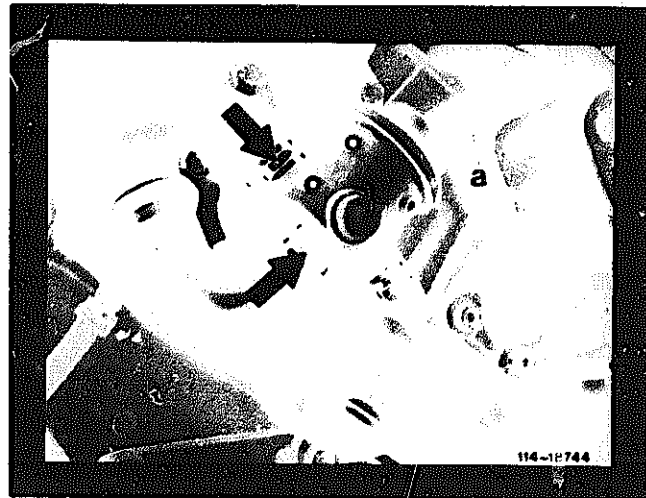


14-300 Removal and installation of air relief valve

Model year 1977/78/79

Removal

- 1 Disconnect battery.
- 2 Remove alternator.
- 3 Compress hose clamps (arrows) with pliers and pull off contour hoses.
- 4 Pull off vacuum line (a).
- 5 Unscrew fastening screws on air relief valve from the rear and remove air relief valve.



Installation

- 6 Transfer contour hose with cleaner for silencing from removed air relief valve to air relief valve about to be installed.
- 7 For further installation proceed vice versa.

14 Emission control system

	Job no.	Coordinates
Functional characteristics	14-001	D 1 - E 1
Operation	050	E 1 - E 3
A. General		E 1 - F 1
B. Ignition timing		E 1 - F 1
C. EGR (exhaust gas recirculation)		G 1 - B 2
D. Air injection		B 2 - J 2
E. Auxiliary air following start and during deceleration		K 2 - J 2
F. Fuel evaporation control system		N 2 - E 3
Test program	100	E 3 - P 3
Removal and installation of air pump	250	A 4 - C 4
Removal and installation of decel diverter valve	300	D 4 - E 4

14 Emission control system

	Job no.	Coordinates
Functional characteristics	14-001	B 5 - F 5
Operation	050	G 5 - E 7
A. General		G 5 - H 5
B. EGR (exhaust gas recirculation)		G 5 - B 6
C. Air injection		B 6 - F 6
D. Air injection tourist vehicles		G 6 - H 6
E. Catalysts		G 6 - J 6
F. Fuel evaporation control system model year 1977		K 6 - M 6
G. Fuel evaporation control system model year 1978/79		N 6 - C 7
H. Vehicles for Federal version high altitudes (model year 1977 only)		D 7 - E 7
Test program	100	E 7 - O 7
Removal and installation of catalyst	200	O 7 - C 8
Removal and installation of air pump	250	D 8 - F 8
Removal and installation of air relief valve	300	G 8 - H 8

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