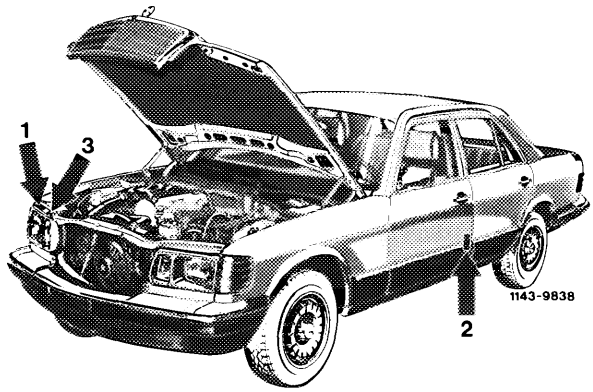
California vehicles are identified with three, and Federal version vehicles with two emission control labels.



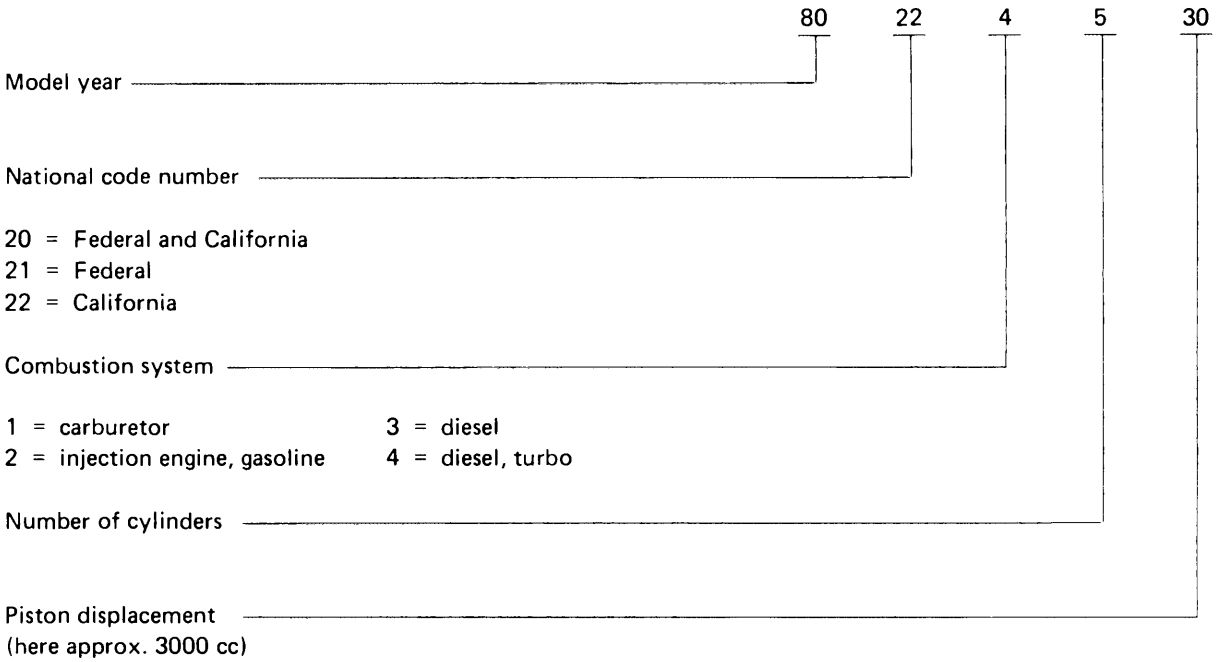
Emission control identification label on radiator cross member (1)

This label contains the engine identification data as well as the most important engine adjustment data.

The key for engine identification data is an 8-digit code number for model year 1980 and a 10-digit code number for model year 1981.

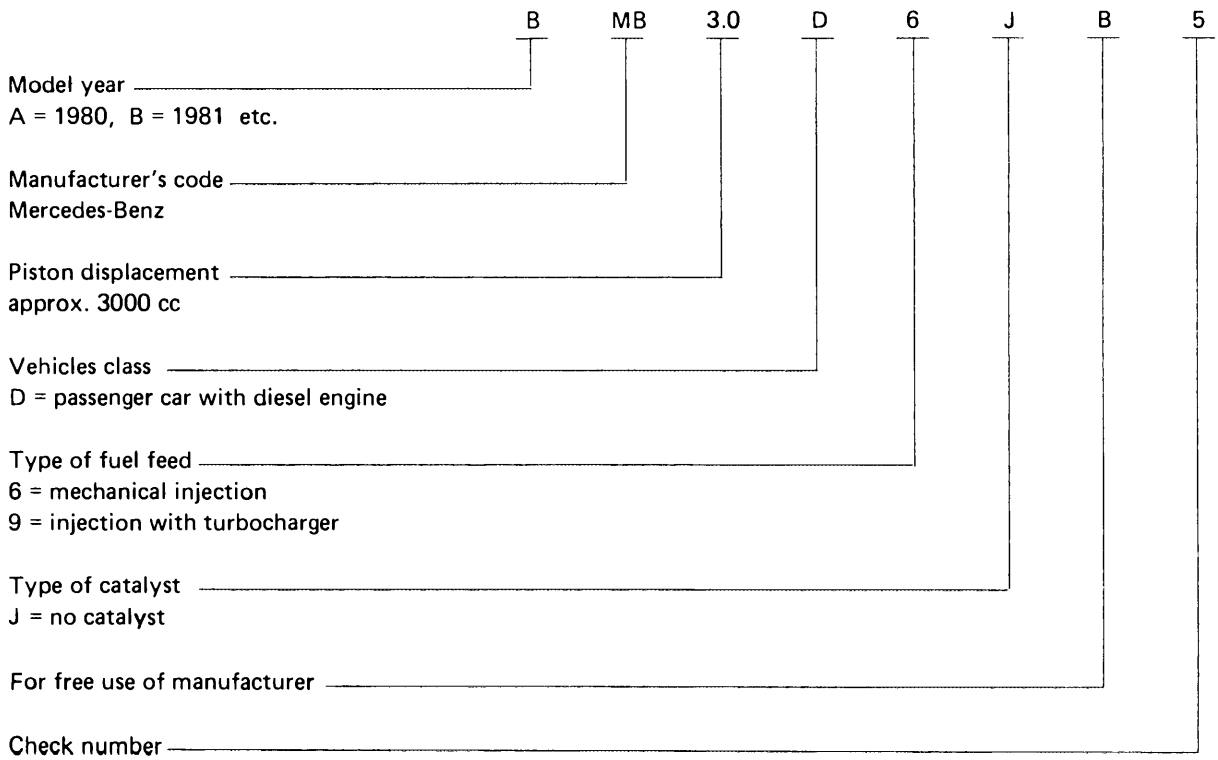
Example model year 1980:

Engine Family 80.22.45.30



Example model year 1981:

Engine Family B MB 3.0 D 9 J B 3



Basic color/lettering

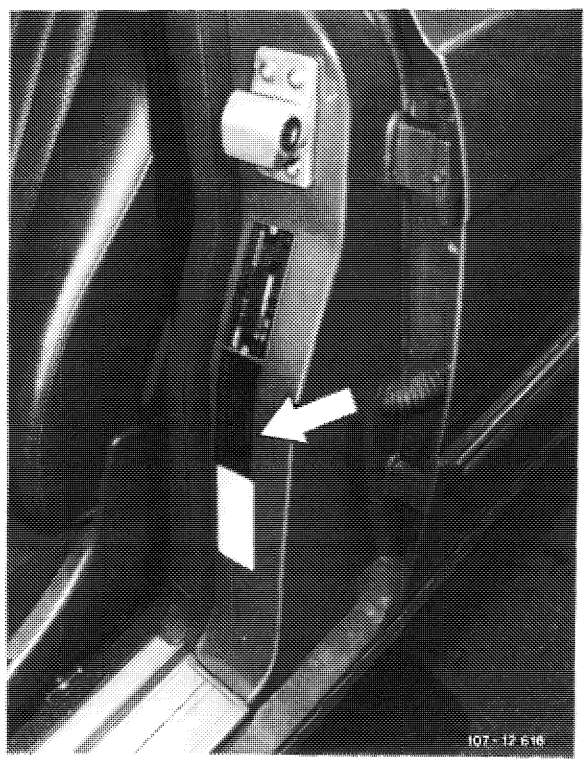
Model year	Federal version	California version
1980	black/white	yellow/black
1981[1])	black/white	

[1]) For model year 1981 there is only one version for Federal and California.

Identification label on door pillar of driver's door (2)

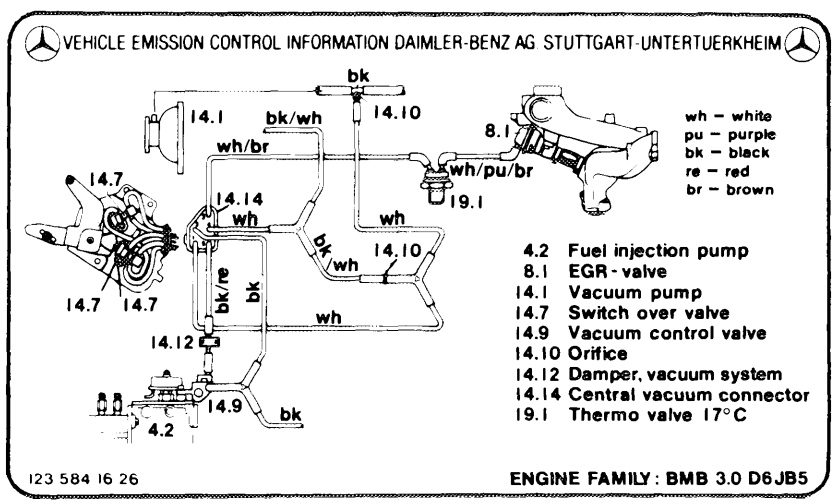
This label shows whether the vehicle is equipped with or without catalysts.

Vehicles with diesel engines are not provided with a catalyst (NON CATALYST).



Identification label (3, California only)

This label shows a diagram of the vacuum line routing in the engine compartment for all emission-related components.



1143-9841

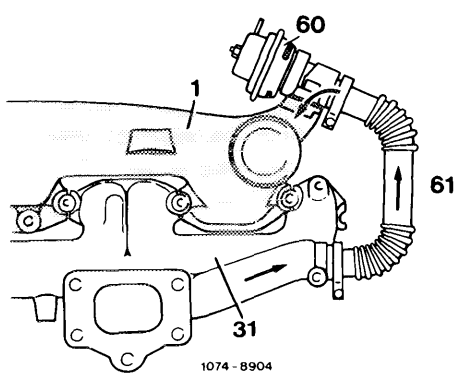
A. General information

In (USA) version starting model year 1980 for California and starting model year 1981 for Federal and California, engine 617.95 is provided with exhaust gas recirculation (EGR).

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

The returned exhaust gas is vacuum-controlled by means of the accelerator pedal (depending on load) or is turned off at given driving conditions.

EGR has no influence on driving characteristics.



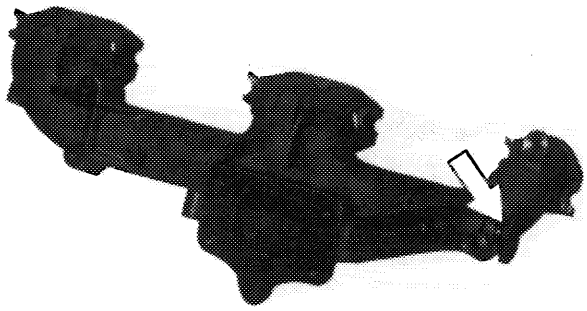
Operational diagram EGR

1 Intake manifold
31 Exhaust manifold
60 EGR valve
61 Corrugated tubing

B. EGR components

Exhaust manifold

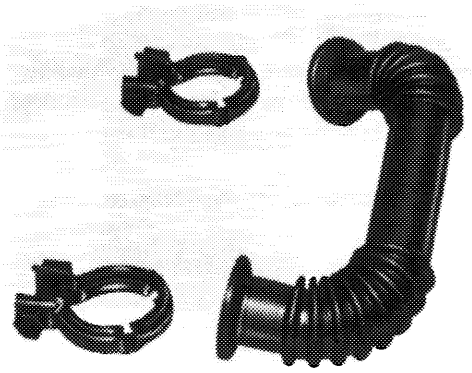
The exhaust manifold is provided with a connection (arrow) for tapping the exhaust gases about to be recirculated.



147-17010

Corrugated tubing

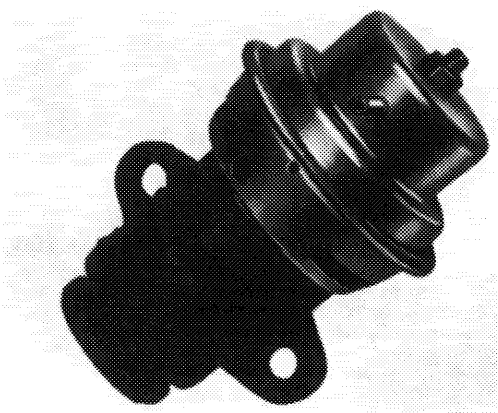
A corrugated tube is installed between exhaust manifold and EGR valve, through which the exhaust gases are routed from exhaust manifold to EGR valve.



107-17022

EGR valve

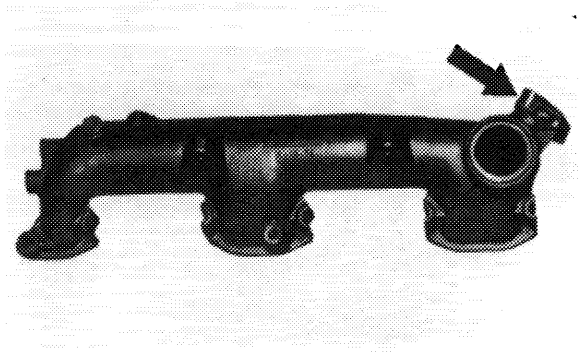
The EGR valve is flanged to intake manifold and controls the quantity of the returned exhaust gases depending on operating conditions.



107-17019

Intake manifold

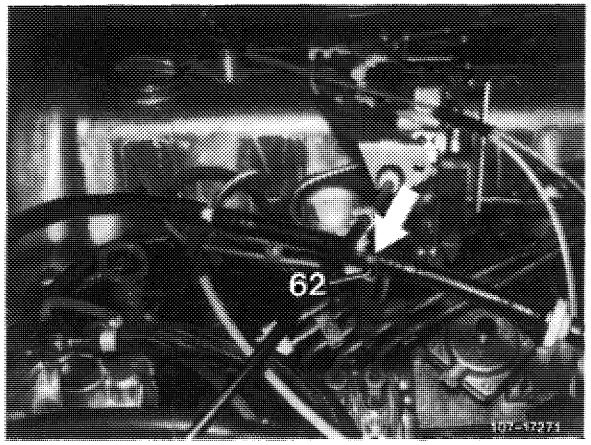
The intake manifold is provided with a two-hole flange (arrow) for attaching EGR valve. The recirculated exhaust gases are distributed to the individual cylinders.



107-17021

Vacuum tapping point with orifice (62, color code black)

The vacuum for controlling EGR is taken from vacuum line between vacuum pump and brake booster (arrow). The tapping point has a black orifice (62) with an ID of 0.6 mm (not exchangeable).



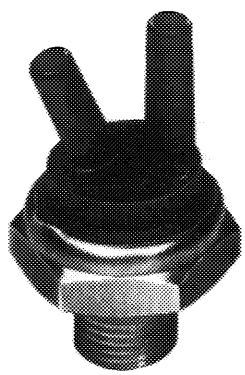
Thermovalve 40 °C (color code blue)

The thermovalve is screwed into thermostat housing. The designation "50 AB 5" is punched into metal part.

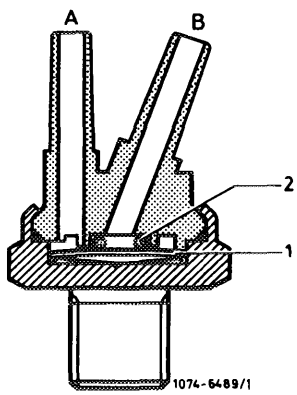
Below 40 °C/104 °F coolant temperature the bimetallic plate rests against O-ring and closes connection "B".

Starting at approx. 40 °C/104 °F coolant temperature the bimetallic plate will snap in downward direction under influence of heat. Both connections are connected to each other.

The vacuum line (white/brown) to distributor should be plugged to connection "B", since this alone will guarantee perfect sealing between bimetallic plate and O-ring.



107-10895

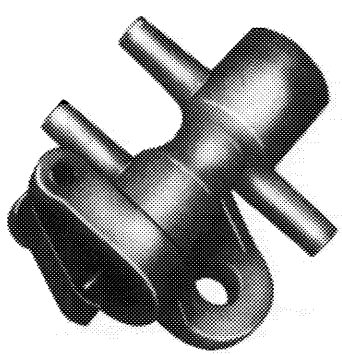


1 Bimetallic plate
2 O-ring
A To switchover valve (64a)
B To distributor (vacuum)

Switchover valve (64a, model year 1980)

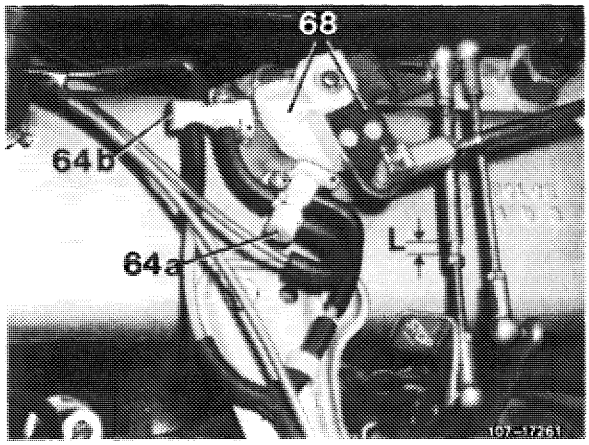
The switchover valve is switched via guide lever (68) and cam.

The valve serves the purpose of venting the vacuum line to EGR valve for the purpose of switching off EGR at idle (throttle) linkage against idle speed stop).



107-17056

If the throttle linkage is actuated to the extent that the idle path (L) at idle path rod is bridged, the switch-over valve has switched over and the largest possible EGR will proceed.

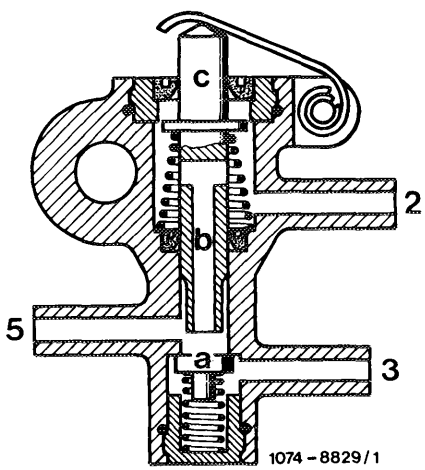


Switchover valve (64b)

The switchover valve is switched over by the second cam on guide lever (68) shortly before attaining full throttle position. As a result, the vacuum line (white/purple/brown) to EGR valve will be vented and there will be no EGR.

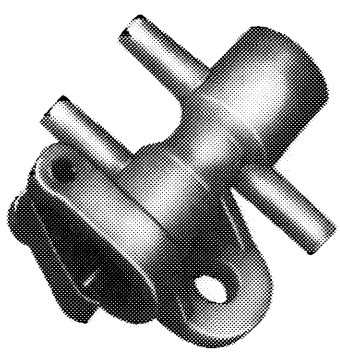
Attention!
The link and the cam running surface should be clean and **not lubricated.** They should be covered during engine preservation.

Note: At idle position (without idle path bridge "L") both switchover valves may have passage from 2 to 5 only. With switchover valves switched through, passage should be available from 3 to 5.

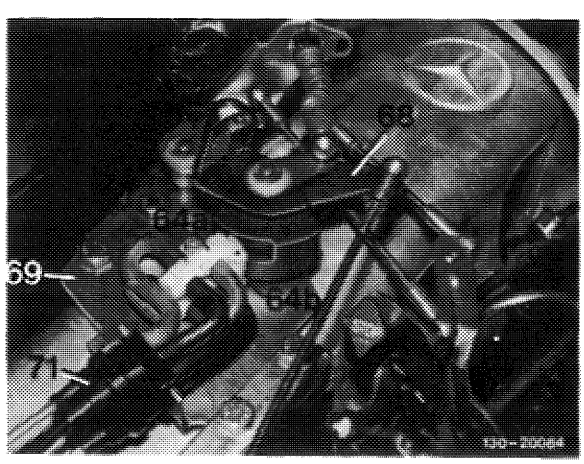


Switchover valves (model year 1981)

To control EGR, the switchover valves known from model year 1980 are used again, but their arrangement has been modified. Both switchover valves are now located on valve plate one above the other. Connection is made by a central plug (71). A cover plate is attached to prevent dirt collecting on plastic running surface.



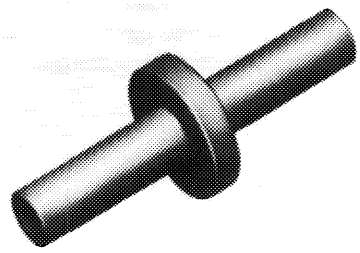
107-17056



64a Switchover valve idle shutoff – EGR
64b Switchover valve full throttle shutoff – EGR
68 Guide lever
71 Central plug

Orifice (63)

Orifices of different diameter may be installed between the two distributors on vacuum control valve (65).

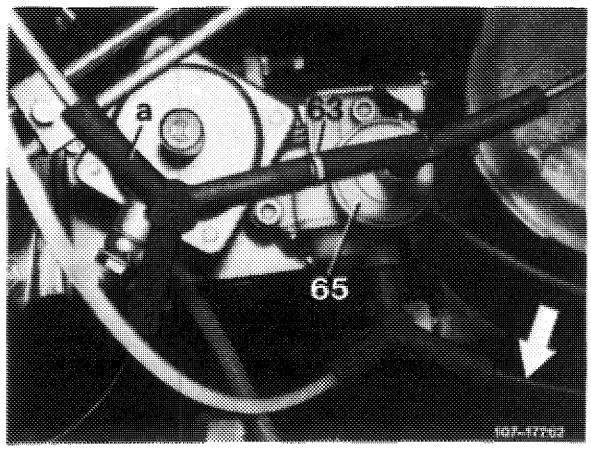


107-17058

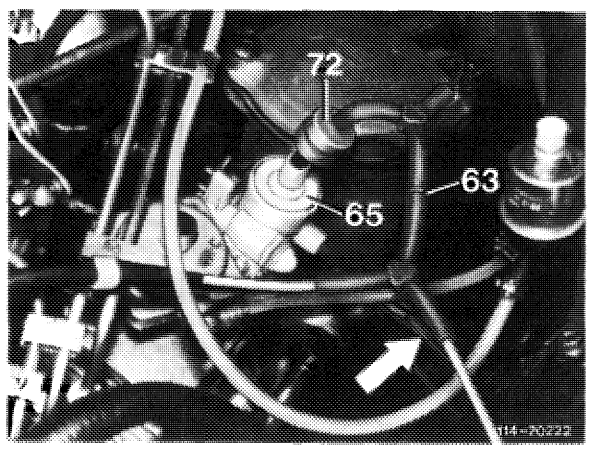
Color code and diameter of orifices

green	= 0.7 mm
white	= 0.8 mm
blue	= 1.0 mm
red	= 1.1 mm
yellow	= 2.0 mm (unthrottled)

The ID of the orifice depends on the tolerances of the adjusting angle on regulating lever (1) of injection pump and vacuum control valve (65).



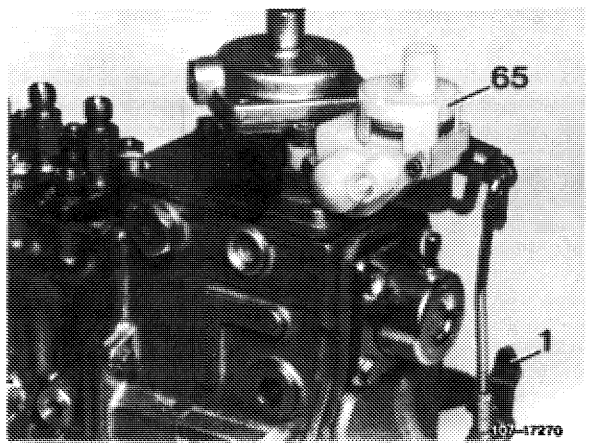
Model year 1980



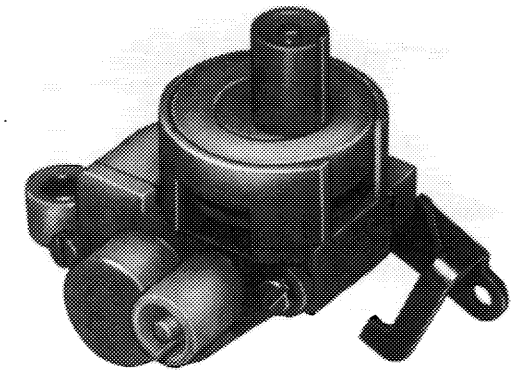
Model year 1981

Vacuum control valve (65)

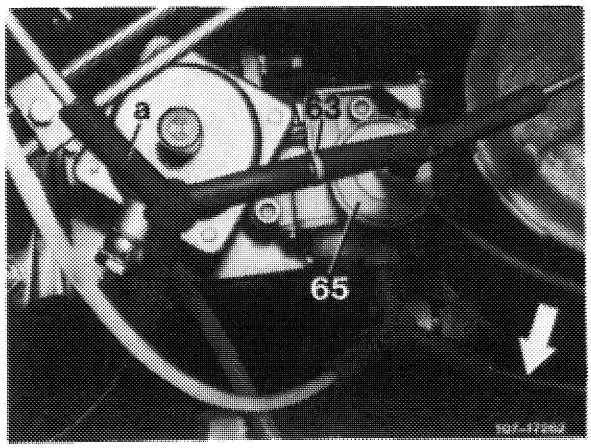
The vacuum control valve serves to control venting of EGR valve. At idle, the vacuum line to automatic transmission, to thermovalve 40 °C/104 °F and switch-over valve (64a) is constantly vented by way of a small annular gap in vacuum control valve. The vacuum amounts to approx. 350–500 mbar.



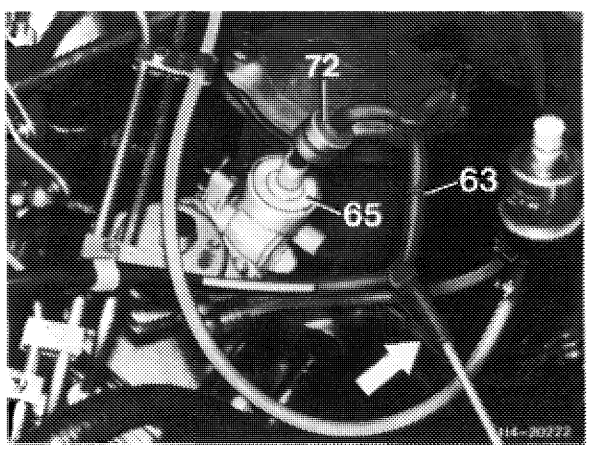
After bridging the idle path, the vent cross section in vacuum control valve is constantly increased under the increasing load and the vacuum is therefore continuously reduced. Venting proceeds via black plastic line (arrow) leading into passenger compartment.



107-17057



Model year 1980



Model year 1981

Damper (vacuum, 72) model year 1981 only

To reduce the high vacuum peaks, a damper is installed into vacuum line from vacuum control valve to central plug (valve plate).

C. Total operation (USA) model year 1980

EGR begins:

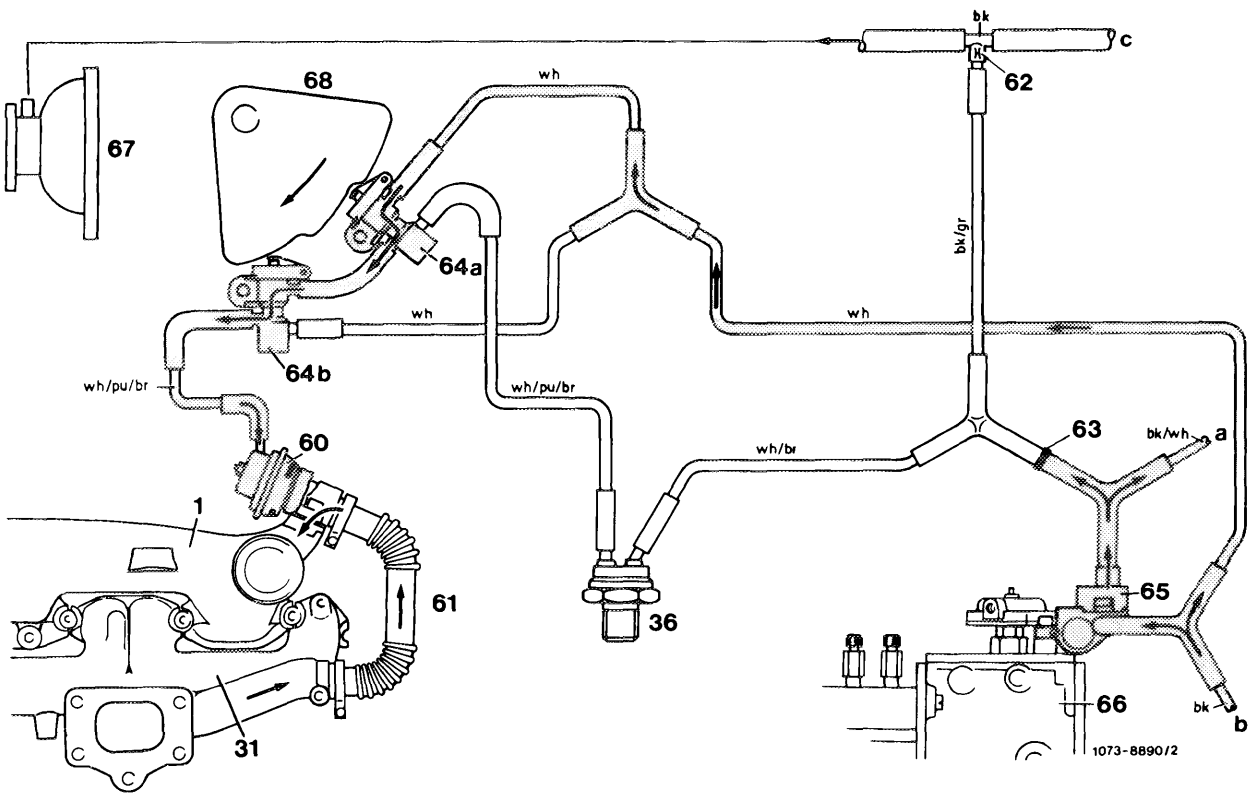
- Above approx. 40 °C/104 °F coolant temperature: After the free travel of the free travel rod has been eliminated.

In partial load range up to final EGR shutoff shortly before full throttle stop.

Below approx. 40 °C/104 °F coolant temperature the thermovalve (36) is closed. The vacuum cannot move to EGR valve. There will be **no EGR.**

Starting at a coolant temperature of approx. 40 °C/ 104 °F the thermovalve (36) opens. The vacuum, at idle 350–500 mbar, moves to the switchover valve (64a).

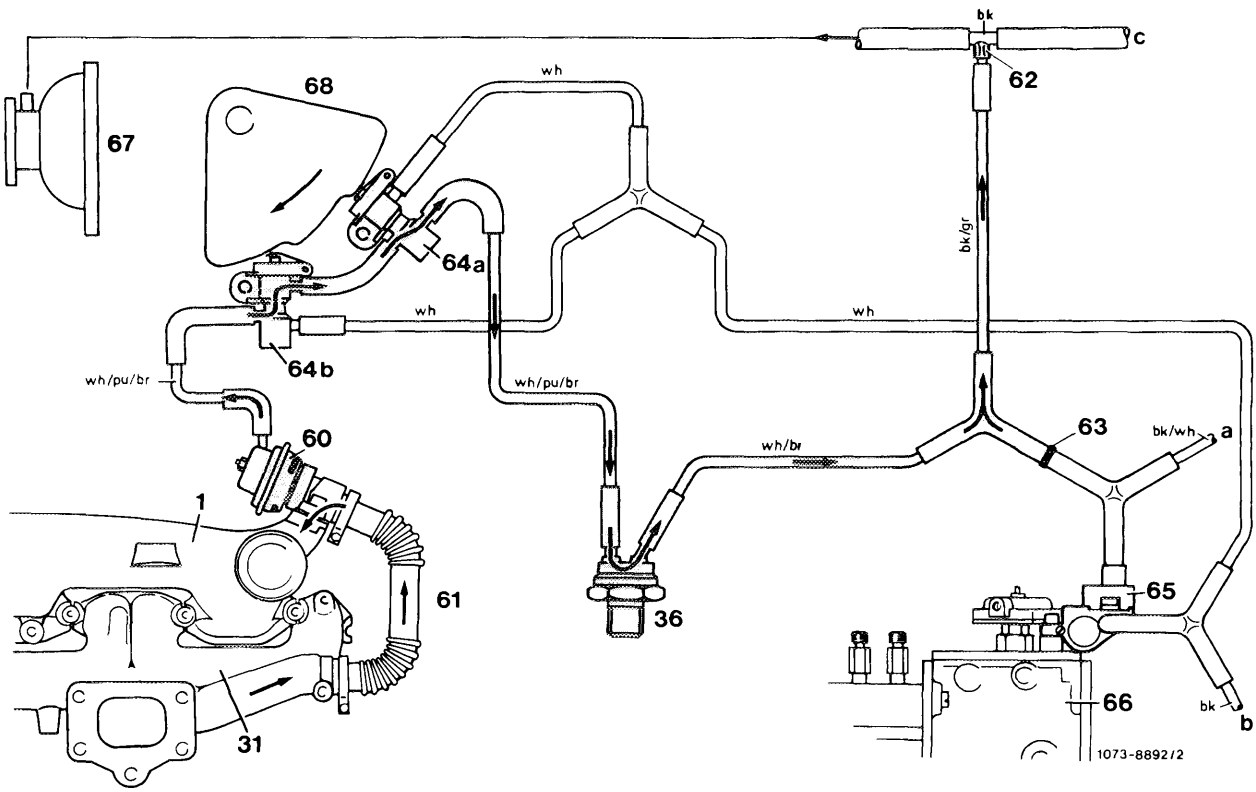
If the control linkage is at the idle speed stop, the EGR valve (60) is vented externally. There will be **no EGR.**



Vaccum routing at idle, throttle linkage at idle speed stop

1	Intake manifold	65	Vacuum control valve	bk	= black
31	Exhaust manifold	66	Injection pump	br	= brown
36	Thermovalve 40 °C/104 °F	67	Vacuum pump	gr	= green
60	Exhaust gas recirculation valve (EGR)	68	Guide lever with cam	pu	= purple
61	Corrugated tubing			re	= red
62	Orifice	a	Automatic transmission	wh	= white
63	Orifice	b	Vent to passenger compartment		
64a	Switchover valve, idle speed shutoff – EGR	c	Brake unit		
64b	Switchover valve, full throttle shutoff – EGR				

If the throttle linkage is opened so that the free travel in the free travel rod is eliminated, the switchover valve (64a) is operated by the cam of the guide lever (68). The vacuum now moves via the two switchover valves (64a and 64b) to the EGR valve and opens the valve completely. This results in **max. possible EGR.**



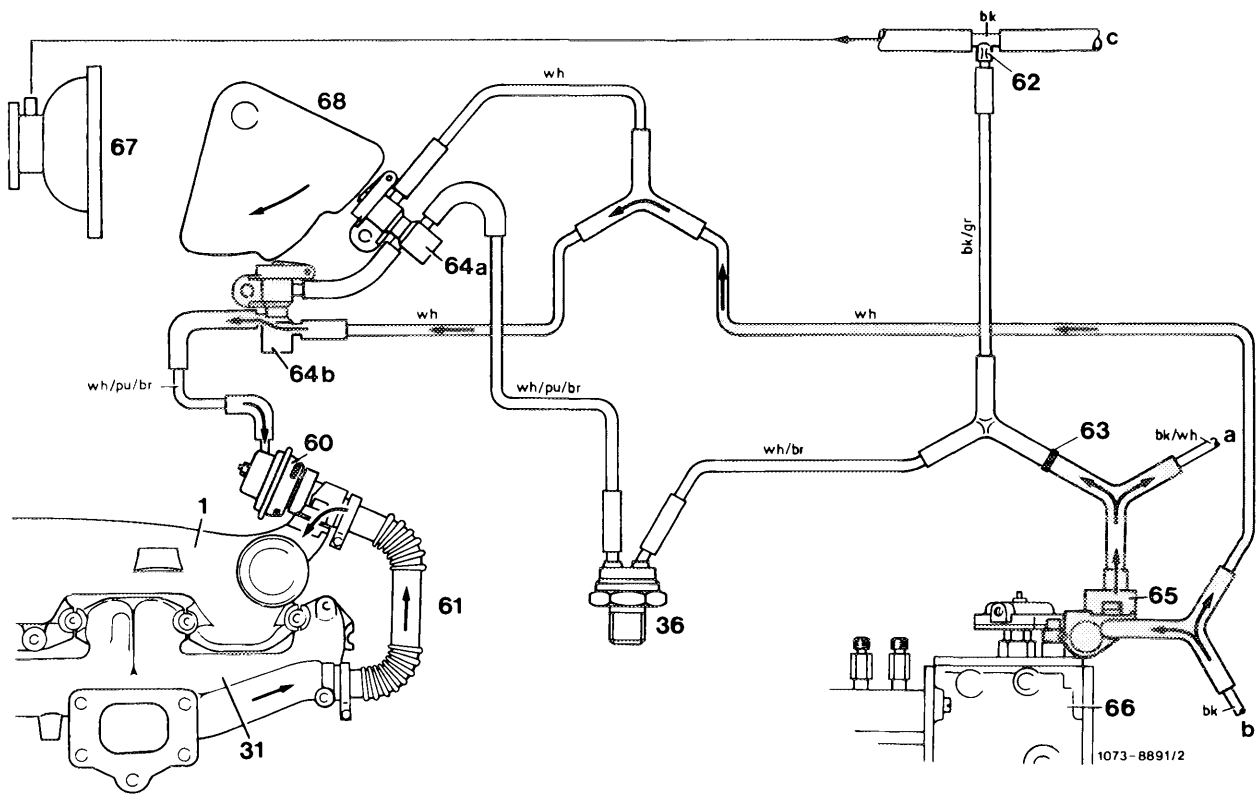
Vacuum routing after eliminating free travel

1 Intake manifold
31 Exhaust manifold
36 Thermovalve 40 °C/104 °F
60 Exhaust gas recirculation valve (EGR)
61 Corrugated tubing
62 Orifice
63 Orifice
64a Switchover valve, idle speed shutoff – EGR
64b Switchover valve, full throttle shutoff – EGR
65 Vacuum control valve
66 Injection pump
67 Vacuum pump
68 Guide lever with cam

a Automatic transmission
b Vent to passenger compartment
c Brake unit

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

At increasing load the vacuum is gradually decreased via vacuum control valve (65). This also reduces the amount of recirculated exhaust gas. Shortly before reaching full throttle position, the switchover valve (64b) is vented to atmosphere via cam of guide lever (68). The vacuum is completely removed, there is **no EGR.**



Venting process in full throttle position

1 Intake manifold
31 Exhaust manifold
36 Thermovalve 40 °C/104 °F
60 Exhaust gas recirculation valve (EGR)
61 Corrugated tubing
62 Orifice
63 Orifice
64a Switchover valve, idle speed shutoff – EGR
64b Switchover valve, full throttle shutoff – EGR
65 Vacuum control valve
66 Injection pump
67 Vacuum pump
68 Guide lever with cam

a Automatic transmission
b Vent to passenger compartment
c Brake unit

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

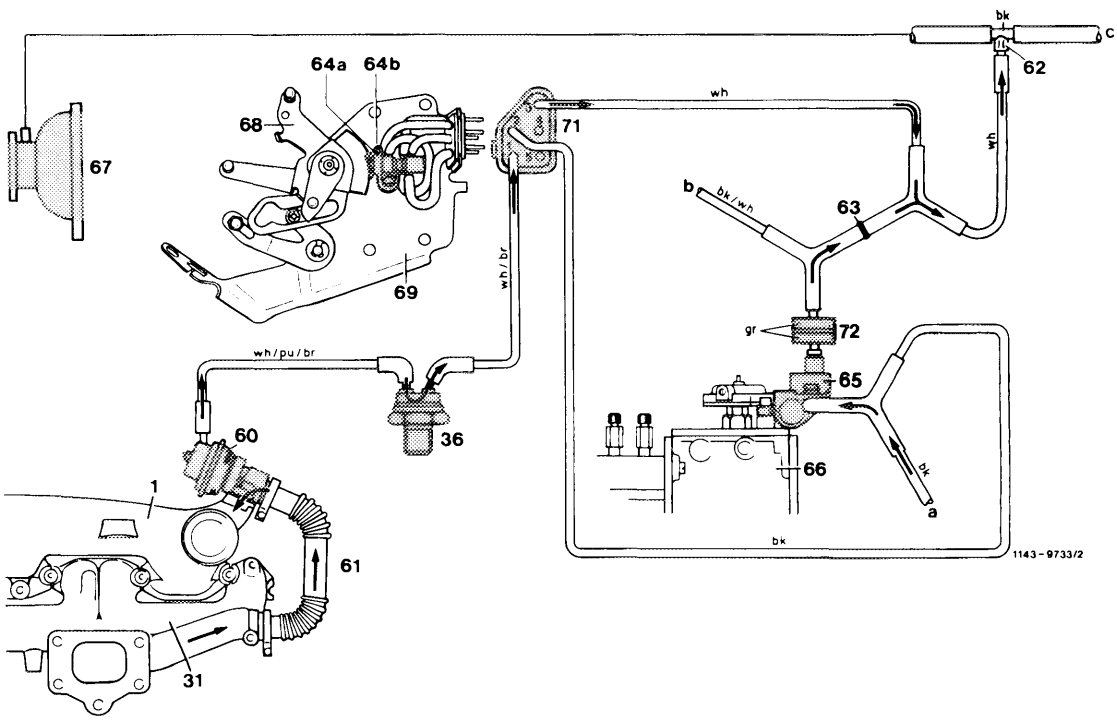
Total operation (USA) starting model year 1981

EGR begins above approx. 40 °C/104 °F coolant temperature after free travel of free travel rod is eliminated, EGR takes place in total partial load range.

Starting at a coolant temperature of approx. 40 °C/ 104 °F the thermovalve (36) opens. The vacuum, at idle 350–500 mbar, moves to switchover valve (64a).

If the control linkage is at idle speed stop, the EGR valve (60) is vented externally. There is **no EGR.**

If the throttle linkage is opened so that the free travel in the free travel rod is eliminated, the switchover valve (64a) is switched over by the cam of guide lever (68). The vacuum now moves via the two switchover valves (64a and 64b) to EGR valve and opens the valve completely. This results in **max. possible EGR.**

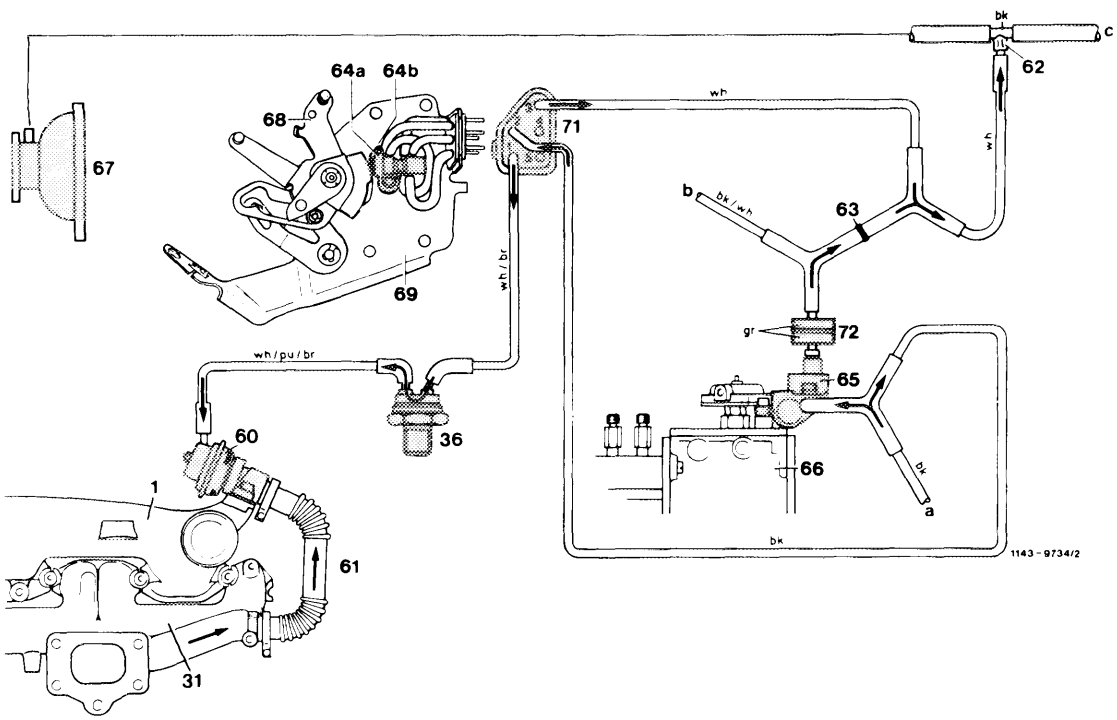


Vacuum routing after eliminating free travel

1	Intake manifold	66	Injection pump
31	Exhaust manifold	67	Vacuum pump
36	Thermovalve 40 °C/104 °F	68	Guide lever with cam
60	Exhaust gas recirculation valve (EGR)	69	Valve plate
61	Corrugated tubing	71	Central plug
62	Orifice	72	Damper, vacuum
63	Orifice	a	Vent to passenger compartment
64a	Switchover valve, idle speed shutoff – EGR	b	Automatic transmission
64b	Switchover valve, full throttle shutoff – EGR	c	Brake unit
65	Vacuum control valve		

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

At increasing load, the vacuum is gradually decreased via vacuum control valve (65). This also reduces the amount of recirculated exhaust gas. Shortly before reaching full load position, the switchover valve (64b) is vented to atmosphere via the cam of guide lever (68). The vacuum is completely removed, there will be no EGR.



Venting process when actuating full throttle shutoff

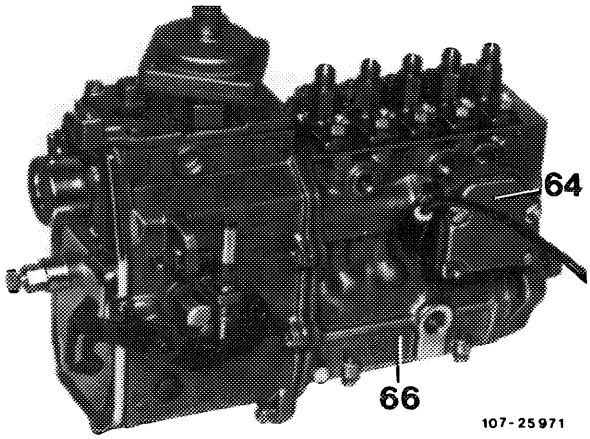
1 Intake manifold
31 Exhaust manifold
36 Thermovalve 40 °C/104 °F
60 Exhaust gas recirculation valve (EGR)
61 Corrugated tubing
62 Orifice
63 Orifice
64a Switchover valve, idle speed shutoff – EGR
64b Switchover valve, full throttle shutoff – EGR
65 Vacuum control valve
66 Injection pump
67 Vacuum pump
68 Guide lever with cam
69 Valve plate
71 Central plug
72 Damper, vacuum
a Vent to passenger compartment
b Automatic transmission
c Brake unit

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

E. Components with operation (USA) model year 1984 California

Injection pump

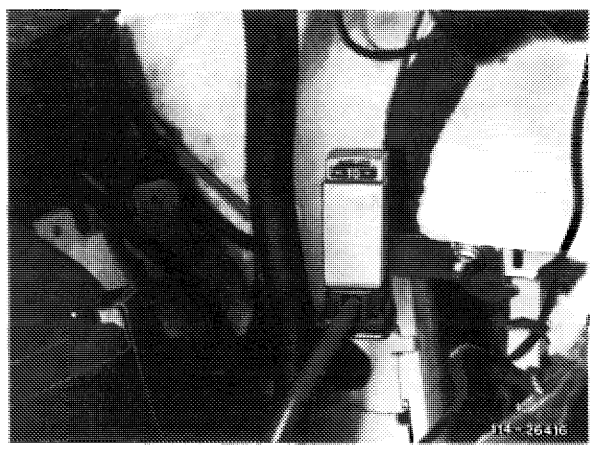
The emission control system requires a control rod travel indicator. The indicator is attached to pump housing inside in range of control rod.



64 Control rod travel indicator
66 Injection pump

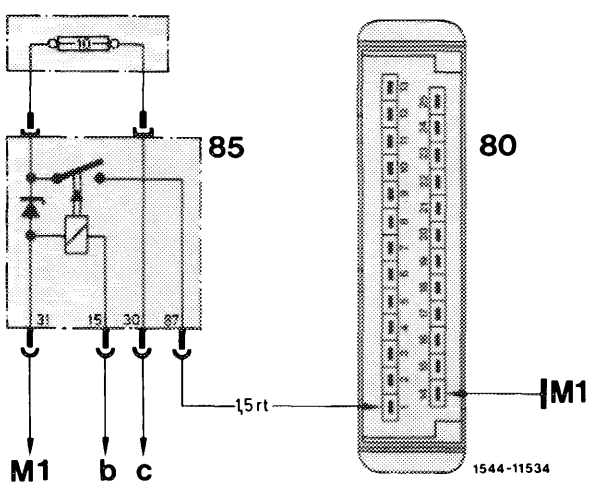
Overvoltage protection

Located in fusebox on model 126 and behind glove box on model 123. Serves to protect the electronic control unit. Fuse 10 A is installed at top of overvoltage protection.



Layout model 123

When the ignition is switched on, terminal 15 is energized. The relay attracts and the control unit is provided with battery voltage.

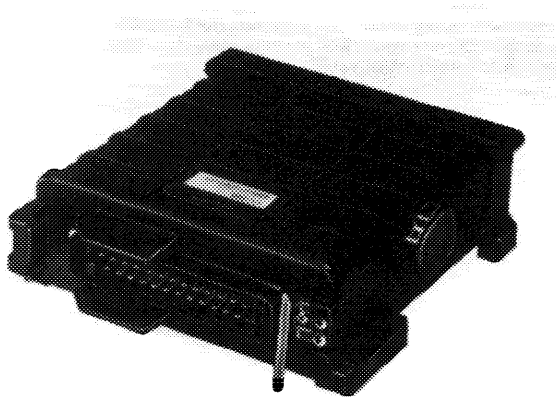


80 Control unit
85 Overvoltage protection
M1 Main ground behind instrument cluster
b Fuse capsule terminal 15
c Supporting lug terminal 30

Electronic control unit

Attached in legroom at the right behind side panelling.

Control unit is connected to battery voltage after ignition has been switched on.



The following signals are put in:

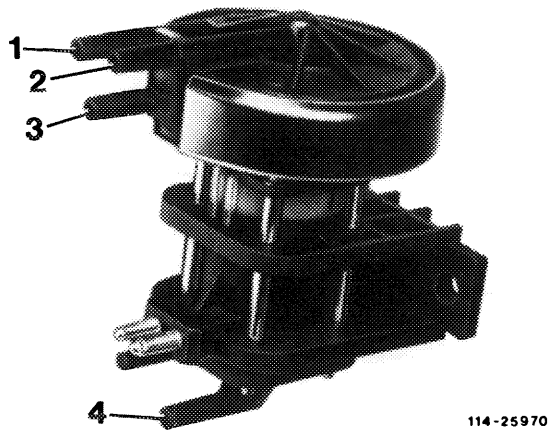
- Coolant temperature
- Engine rpm
- Control rod travel
- Barometric pressure

The inside of the control unit is provided with bellows (for altitude corrections).

The input signals are processed and the pressure converter (84) or the switchover valve (81) are pertinently activated.

Pressure converter

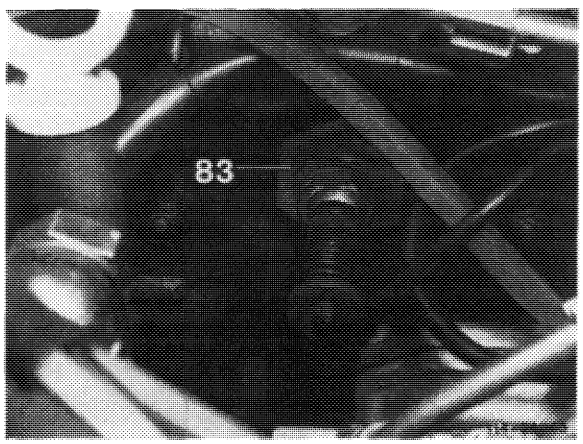
The vacuum generated by the vacuum pump of the engine is converted into a load-dependent vacuum signal by the pressure converter. The signal serves for controlling the EGR-valve.



1 EGR-valve connection
2 Vacuum pump connection
3 Positive vent line
4 Positive vent line

Temperature sensor coolant (NTC)

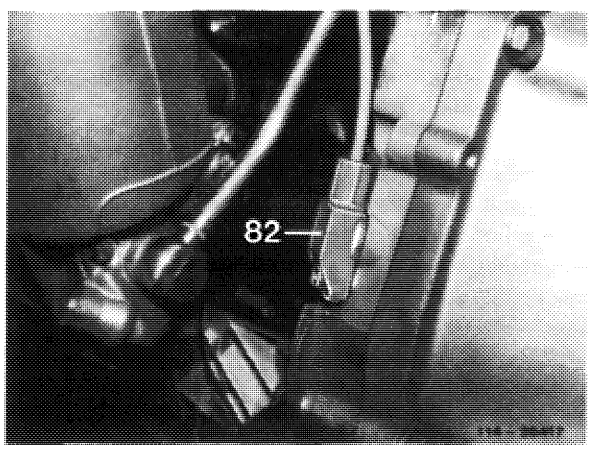
The coolant temperature is obtained by a temperature sensor (83), which is installed on lefthand side of cylinder head. The resistance of the temperature sensor changes in dependence of the coolant temperature.



Rpm sensor

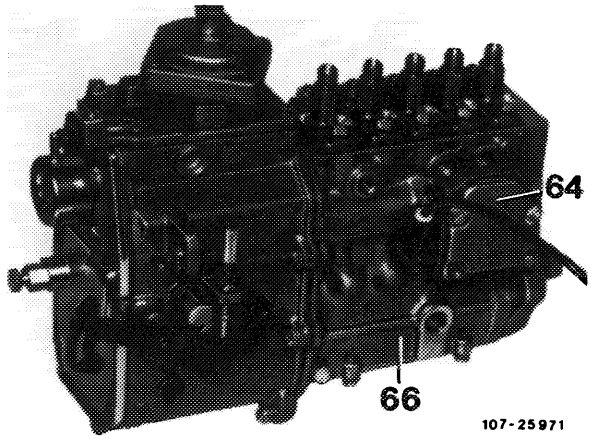
An inductance indicator which is screwed in on intermediate flange to automatic transmission (arrow).

The indicator comprises a magnetic core and a coil. It will pick up the engine speed for transmission to control unit in the shape of an AC voltage.



Control rod travel indicator

The control rod travel indicator is attached to pump housing at the right at level of control rod.

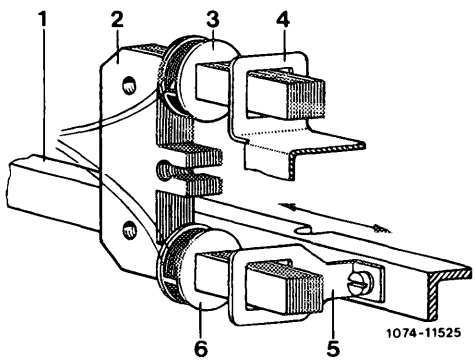


64 Control rod travel indicator
66 Injection pump

Layout

The control rod travel indicator comprises an iron core, two coils (measuring and fixed value coil) and two short circuit rings. It is connected to the electronic control unit by means of a 3-pole plug.

Coils (3) and (6) are attached to an iron core (2) fixed in housing. The short circuit ring (5) is connected to control rod (1) and slides this control rod free of contact on lower leg of iron core. The fixed value coil (3) and the short circuit ring (4) are attached to upper leg.



1 Control rod
2 Iron core
3 Fixed value coil
4 Bypass ring (fixed)
5 Short circuit ring (movable)
6 Measuring coil

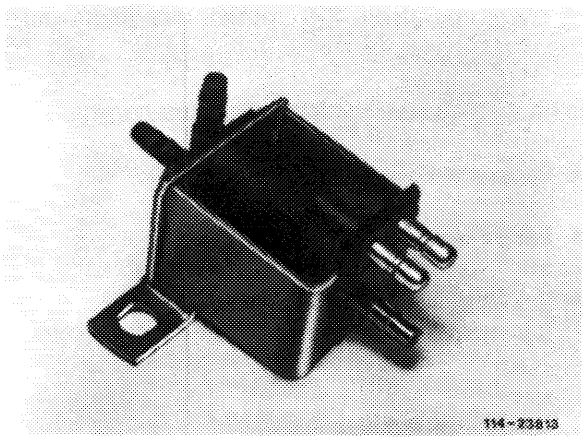
Operation

Together with short circuit ring (4) the fixed value coil (3) provides a constant inductance.

The distance between short circuit ring (5) and measuring coil (6) is changed depending on change of location of control rod (1). The resulting variable inductance is compared with the constant. From these data, the electronic control unit determines the control travel.

Switchover valve (electric)

This valve is activated depending on load condition of engine by way of control unit and provides the vacuum for the circulating air safety valve.



Layout model 123

Circulating air safety valve

Integrated on compressor housing of exhaust gas turbocharger. The EGR quantity is increased in partial load range by partial reduction of boost pressure.

When the circulating air safety valve is activated with a vacuum, the valve will open and will let a part of the boost air in front of compressor flow back in a bypass system.

F. Total operation (USA) model year 1984 California

EGR proceeds after the following points have been met:

- Coolant temperature > 40 °C and < 90 °C.
- Engine speed > 500/min.
- Load signal of injection pump:
  Idle speed auxiliary units switched off. Selector lever in position "P" or "N".

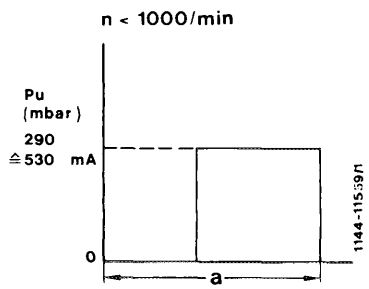
  Partial load auxiliary units switched on and selector lever in driving position.

The resistance of the coolant temperature sensor changes in dependence of the coolant temperature and thereby provides the input signal for the EGR electronic control system.

Engine speed > 500/min < 1000/min

In this rpm range (without load) the pressure converter (84) is activated with approx. 530 mA. The result is a vacuum at EGR-valve of approx. 290 mbar. The valve opens completely; max. possible EGR will result.

By engaging a driving position and switching on auxiliary units, a given load signal will be exceeded. The pressure converter will be deenergized and the vacuum toward EGR valve will be exhausted. There will be no more EGR.



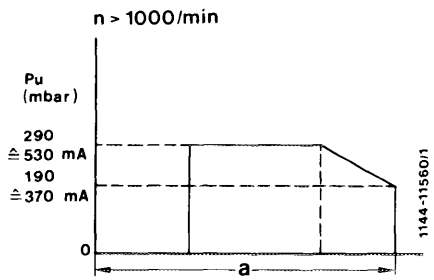
a Load signal injection pump

Engine speed > 1000/min

At engine speeds > 1000/min the pressure converter is also activated with approx. 530 mA in partial load range. Max. possible EGR will result.

With increasing load the current is reduced to 370 mA and the pressure converter will be deenergized as from a given load signal. In parallel with the reducing current the vacuum on EGR-valve will be exhausted and the EGR quantity will be reduced.

At 370 mA the vacuum on EGR-valve amounts to 190 mbar. This is the closing point of the EGR-valve; there will be no more EGR.



a Load signal injection pump

In addition, the circulating air safety valve will be completely opened at an engine speed > 1000/min and the respective load signal of the circulating air safety valve.

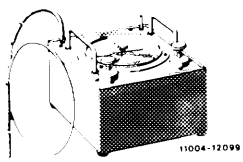
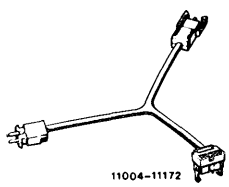
With increasing altitude a bellows integrated in control unit serves to reduce the EGR quantity in accordance with the prevailing air pressure.

For complaints such as: Very poor engine performance, black or blue smoke.

Test conditions: Throttle linkage correctly adjusted, connect tachometer, engine at operating temperature, run engine at idle (750 ± 100/min), steering in straightahead position, air conditioning turned off, selector lever of automatic transmission in position "P".

Tested: Exhaust gas recirculation (EGR).

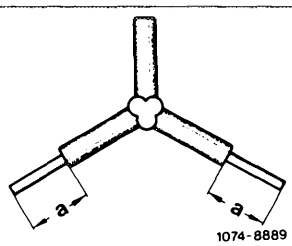
Special tools

Tester 0–100 mbar for vacuum and gauge pressure	 11004-12099	201 589 13 21 00
Clamp	 11004-6190	000 589 40 37 00
Test cable	 11004-11172	102 589 04 63 00
Adjusting roller		916 589 00 21 00

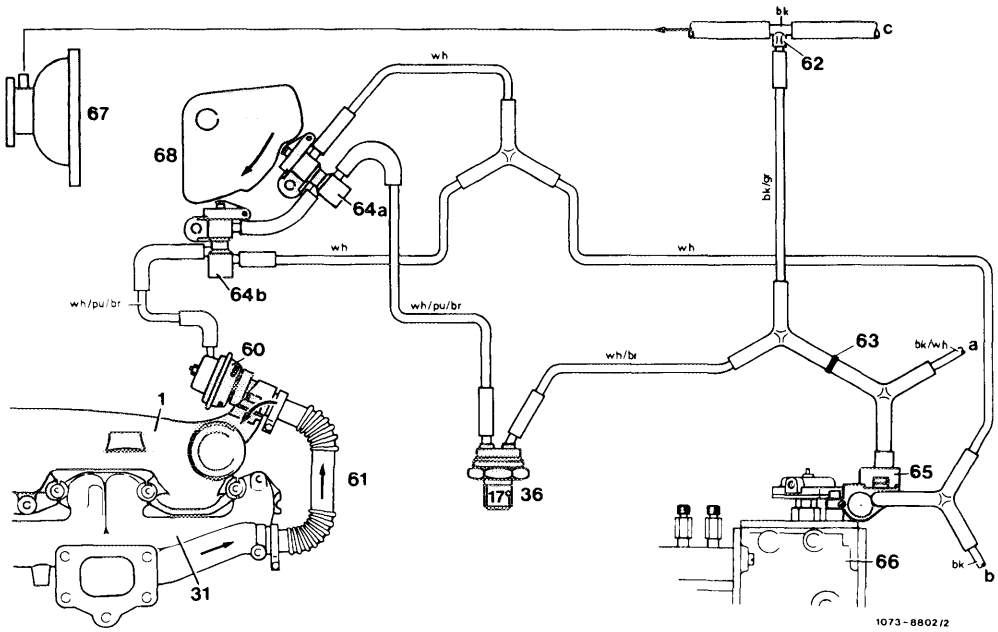
Conventional tools

Digital tester	e.g. Bosch, MOT 001.03 e.g. Sun, DIT 9000 e.g. Sun, 1019
Multimeter	e.g. Sun, DMM–5

Self-made test connection

Distributor a Vacuum line 4 x 1 x 400 mm	 1074-8889	117 078 01 45
Test line 4 x 1 x 400 mm		

A. (USA) model year 1980



Operational diagram vacuum line layout

1 Intake manifold
31 Exhaust manifold
36 Thermovalve 17 °C/63 °F
60 Exhaust gas recirculation valve (EGR)
61 Corrugated tubing
62 Orifice
63 Orifice
64a Switchover valve, idle speed shutoff – EGR
64b Switchover valve, full load shutoff – EGR
65 Vacuum control valve
66 Injection pump
67 Vacuum pump
68 Guide lever with cam

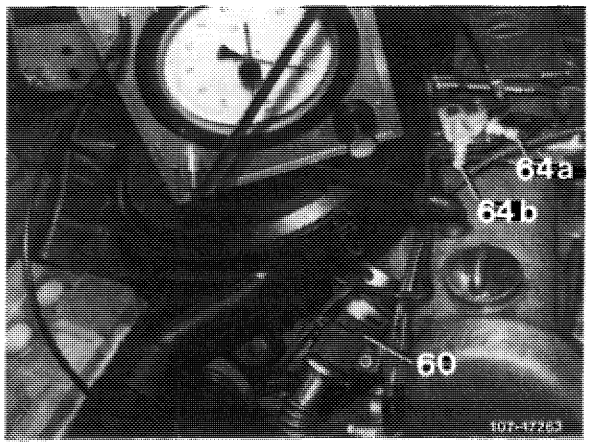
a Automatic transmission
b Vent to passenger compartment
c Brake unit

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

Testing EGR

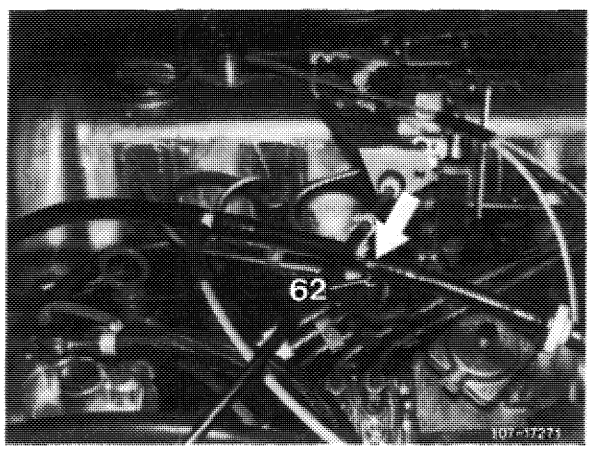
Connect vacuum tester between EGR valve (60) and switchover valve (64b) to vacuum line (white/purple/brown). At idle, with throttle linkage at idle stop, no vacuum should be indicated. Advance control linkage until free travel of free travel rod is eliminated (do not pull on stop lever). Vacuum should now amount to 350–500 mbar.

Vacuum nominal value of 350–500 mbar is attained.	Vacuum nominal value is not attained or exceeded.

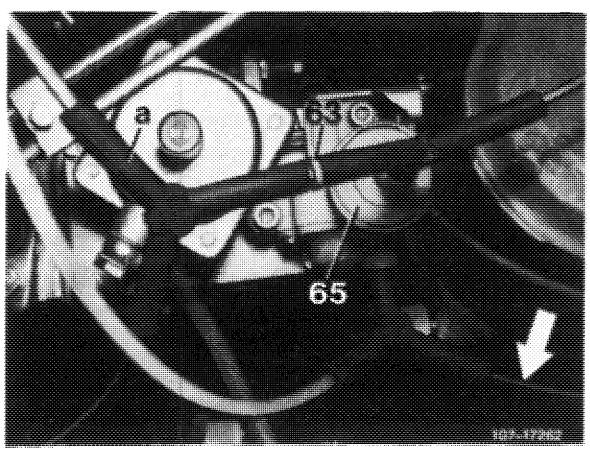


Check vacuum lines

Check all vacuum lines for control of EGR system and of automatic transmission according to **operational diagram vacuum line layout** for correct connection and leaks. Blow through orifice (62) at vacuum tapping point.



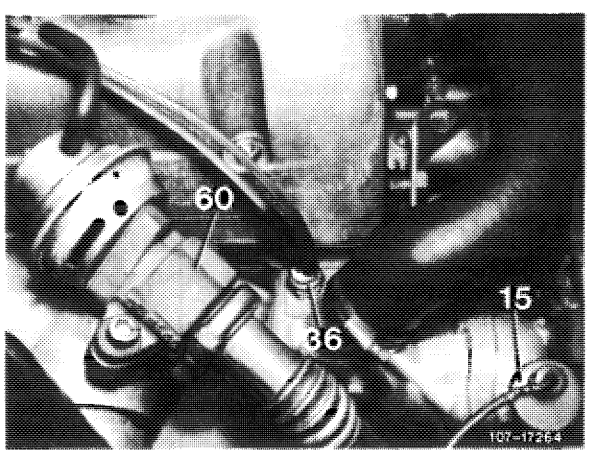
Check black vent line (arrow) from vacuum control valve to passenger compartment for free passage.



Check thermovalve 40 °C/104 °F (36, color code blue)

Pull off vacuum line (white/purple/brown) on diagonal connection of thermovalve.

Check vacuum line (white/brown) on distributor (a) and check for passage. If there is no passage, replace thermovalve.

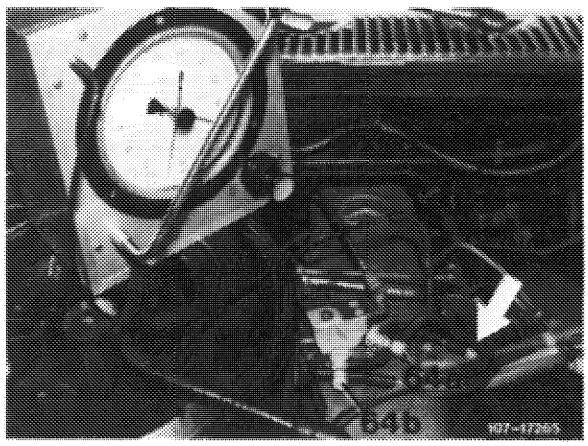


When thermovalve is **cooling down,** thermovalve should have no passage at temperatures below 7 °C/45 °F.

Check switchover valve (64a)

Pull connection (arrow) of vacuum line (white/purple/brown) from switchover valve.

Connect vacuum tester to free connection of switchover valve and connect with pulled off vacuum line. Vacuum readout approx. 350–500 mbar (regulating linkage at idle speed stop).



Leak test

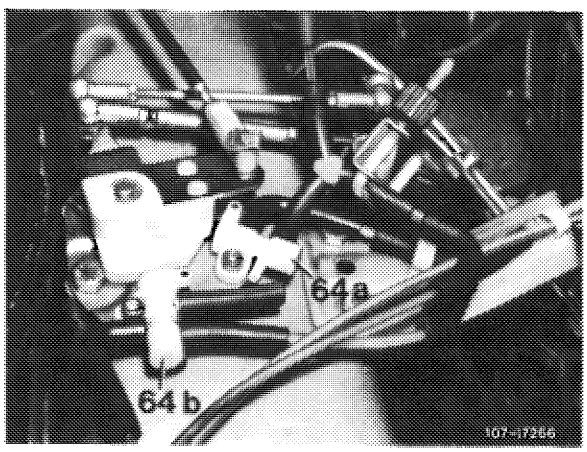
Disconnect distributor of white/purple/brown vacuum line.
Vacuum should remain constant for approx. 2 minutes.

If vacuum drops, replace switchover valve.

If vacuum remains constant, check **switchover:**

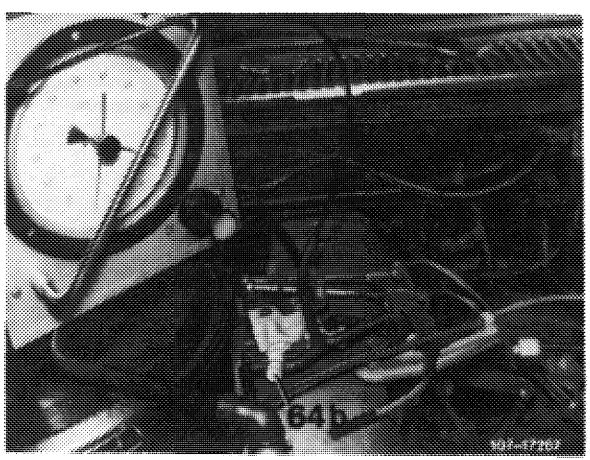
For this purpose, remove clamp, pull off connecting hose between the two switchover valves and bridge free travel on free travel rod.

Vacuum should distinctly drop. If vacuum is not dropping, replace switchover valve.



Checking switchover valve (64b)

Pull off vacuum line (white) on switchover valve (64b). Pull off vacuum line (white/purple/brown) on switchover valve (64a). Connect vacuum tester to free connection of switchover valve (64b) and connect with pulled off vacuum line (white/purple/brown). Vacuum readout 350–500 mbar.



Leak test

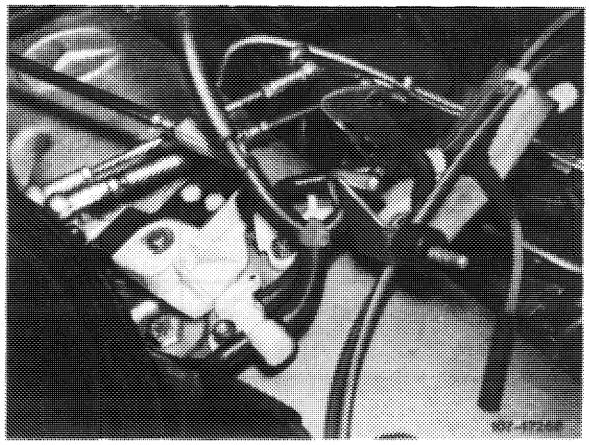
For this purpose, disconnect distributor of vacuum line (white/purple/brown). Vacuum should remain constant for approx. 2 minutes.

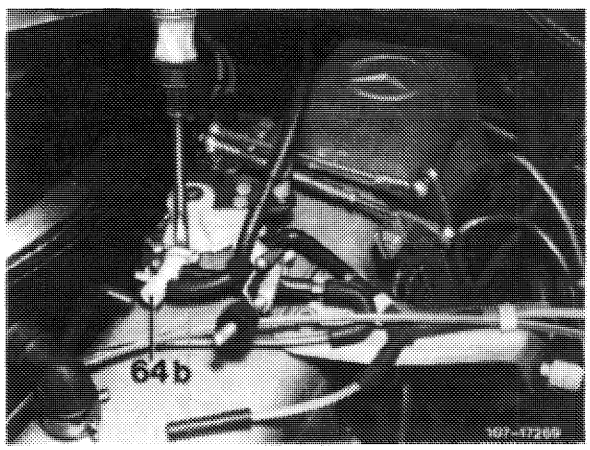
If vacuum drops, replace switchover valve.

If vacuum remains constant, **check switchover:**

For this purpose, remove clamp and pull off vacuum line (white/purple/brown) on switchover valve (64b). Switch over switchover valve with screwdriver. Vacuum should drop to "0".

If vacuum is not dropping to "0", replace switchover valve.

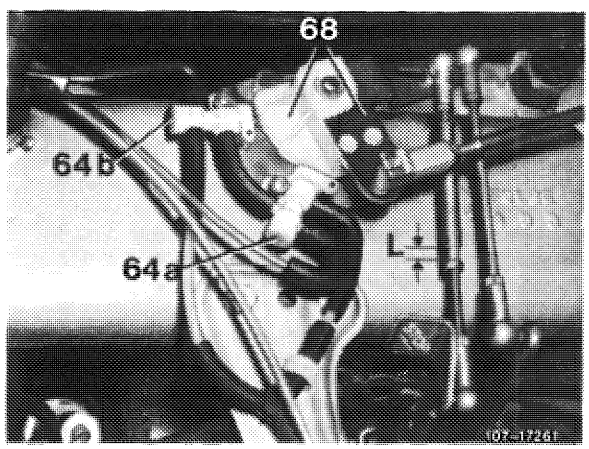




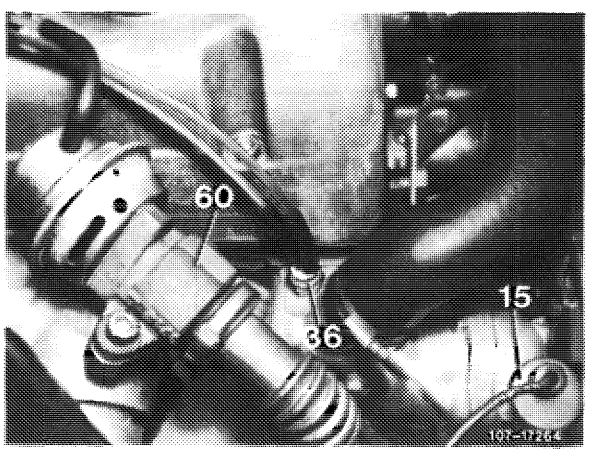
Checking EGR valve (60)

Switch over switchover valve (64a) by bridging free travel "L" on free travel rod. Pull off vacuum line on EGR valve and plug on again.

EGR valve should **audibly** close.	EGR valve not closing.



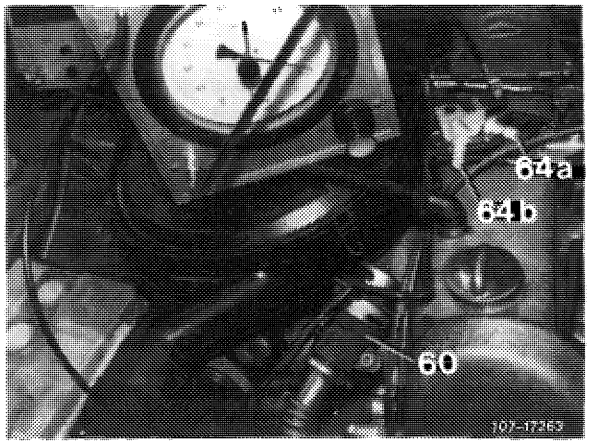
Replace EGR valve (60).



Checking vacuum control

Connect vacuum tester to vacuum line between EGR valve (60) and switchover valve (64b). Increase idle speed to 1000 ± 10/min by operating regulating linkage (do not pull on stop lever)

Vacuum amounts to 320–350 mbar.	Vacuum is below or above specified value.



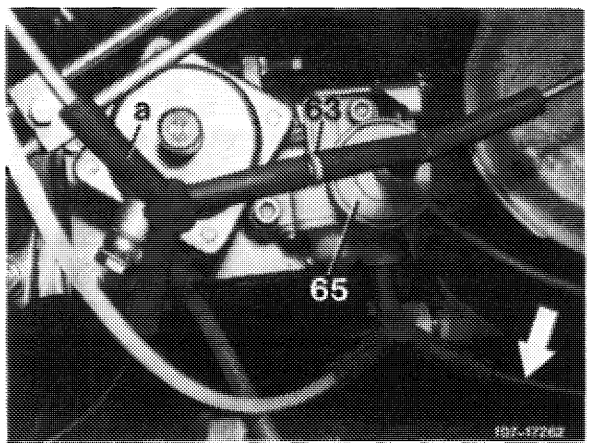
Check orifice (63)

Check if orifice is open and blow through, if required.

Change orifice (63)

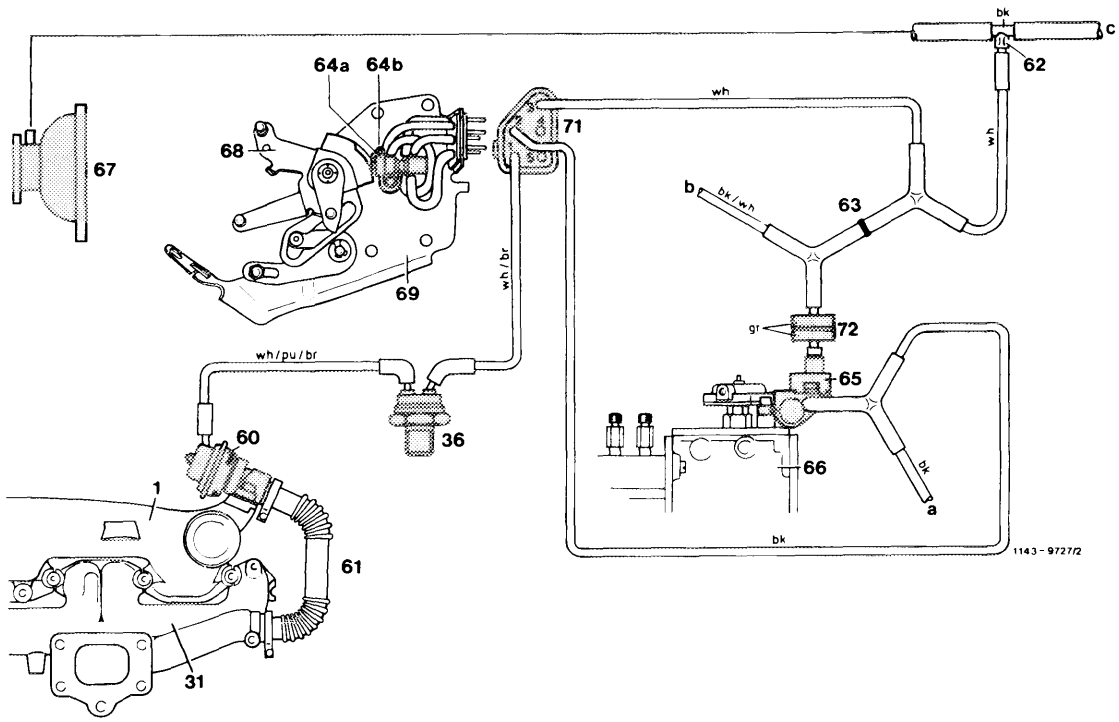
If the vacuum is not attained or is exceeded, install the next larger size orifice, if the vacuum is too high and the next smaller orifice if the vacuum is too low.

If the correct vacuum is **not** attained by the installation of another orifice, replace **vacuum control valve (65).**



End of test

B. (USA) starting model year 1981



Operational diagram, vacuum line layout

1 Intake manifold
31 Exhaust manifold
36 Thermovalve 40 °C/104 °F
60 Exhaust gas recirculation valve (EGR)
61 Corrugated tubing
62 Orifice
63 Orifice
64a Switchover valve, idle speed shutoff – EGR
64b Switchover valve, full throttle shutoff – EGR
65 Vacuum control valve
66 Injection pump
67 Vacuum pump
68 Guide lever with cam
69 Valve plate
71 Central plug
72 Vacuum damper
a Vent to passenger compartment
b Automatic transmission
c Brake unit

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

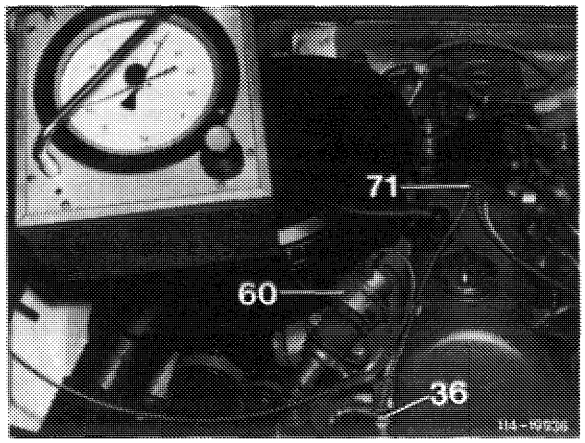
Checkup

Note: At begin of test, yellow orifice (63) should be installed.

Testing EGR

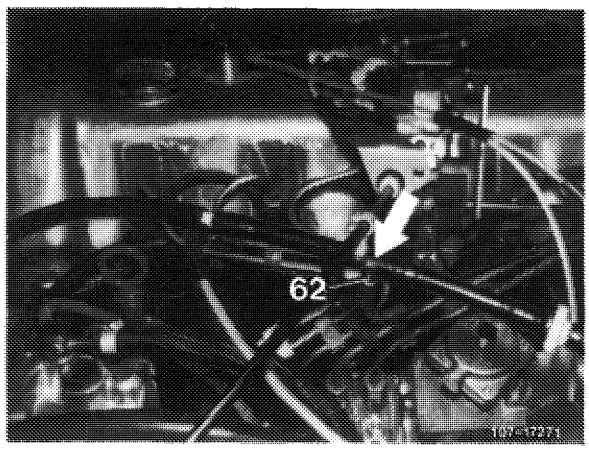
Connect vacuum tester between EGR valve (60) and straight connection of thermovalve (36). At idle, with throttle linkage at idle stop, no vacuum should be indicated. Advance control linkage until free travel of free travel rod is eliminated (do not pull on stop lever). The vacuum should now amount to 350–500 mbar.

Idle, no vacuum present. Vacuum of 350–500 mbar is attained.	Vacuum present. Vacuum not attained or exceeded.

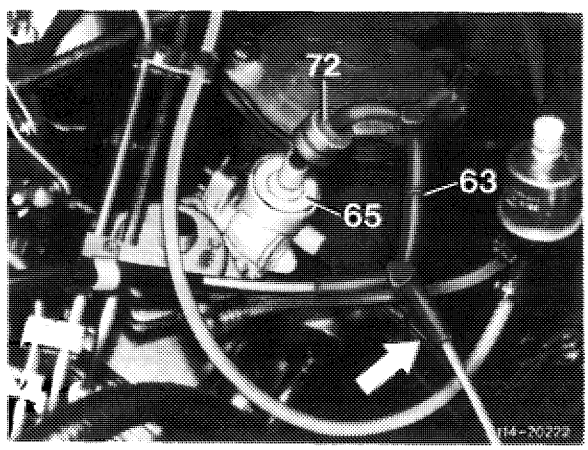


Check vacuum lines

Check all vacuum lines for control of EGR and automatic transmission according to **operating diagram vacuum line layout** for correct connection and leaks. Blow through orifice (62) in vacuum tapping point, if required.



Check black vent line (arrow) from vacuum control valve to passenger compartment for free passage.

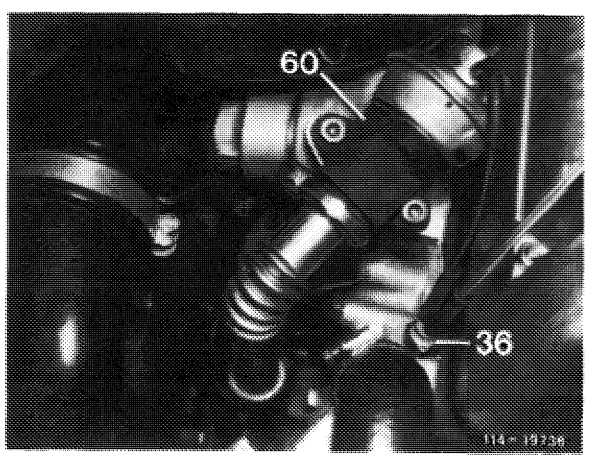


Check thermovalve 40 °C/104 °F (36, color code blue)

Pull off white/brown vacuum line on diagonal connection of thermovalve.

Pull off white/purple/brown vacuum line on EGR valve and blow through.

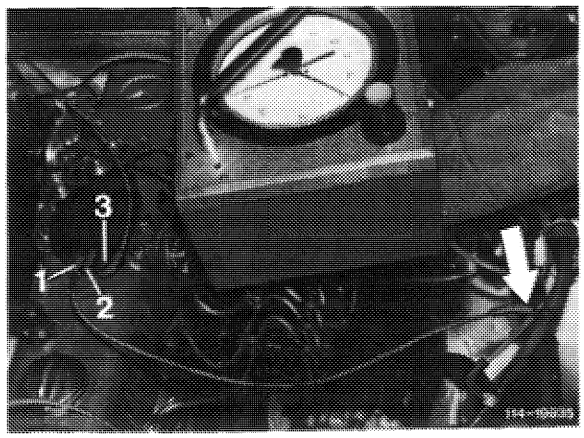
If there is no passage, remove thermovalve.



Check switchover valve (64a)

Pull central plug (71) from valve plate (69). Connect test line between tapping point (black orifice, arrow) on vacuum line for brake unit and valve plate connection (1). Connect vacuum tester to connection (3). Close connection (2).

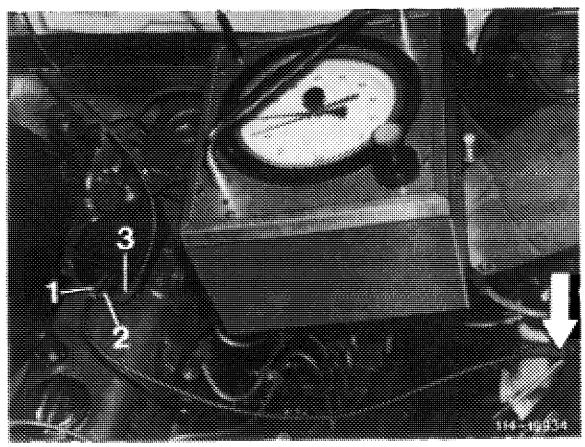
Vacuum readout at switchover:
Idle speed (throttle linkage at idle speed stop) "0" mbar.
Bridge idle speed (do not pull on stop lever) approx. 700–800 mbar.



Leak test:
Let throttle linkage return to idle speed stop, stop engine.

Vacuum should remain constant for approx. 2 minutes.
Pull closing cap from connection (2).
Bridge idle speed.
Vacuum should drop to "0".

If test values are not attained:
Replace switchover valve (64a).

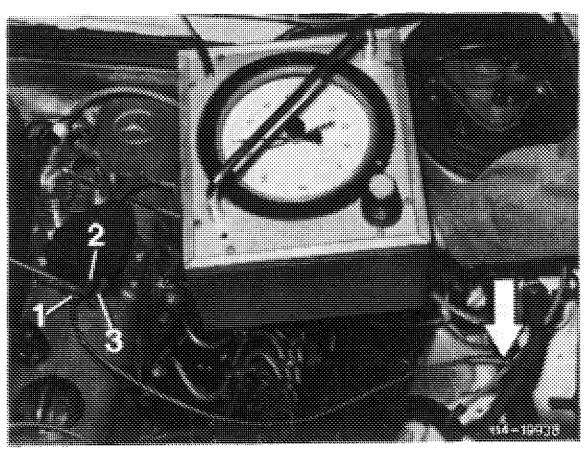


Check switchover valve (64b)

Pull central plug (71) from valve plate (69). Connect test line between tapping point (black orifice, arrow) on vacuum line brake unit and valve plate connection (1). Connect vacuum tester to connection (2).

Close connection (3), start engine.

Vacuum readout:
Idle speed (regulating linkage on idle speed stop) approx. 700–800 mbar.

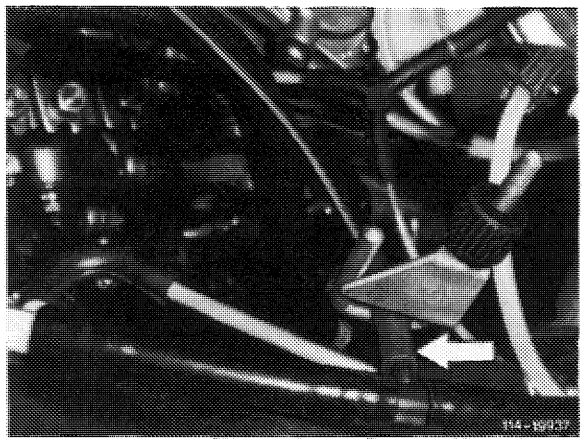


Leak test:
Disconnect tapping point for test line (arrow). Stop engine, vacuum should remain constant for approx. 2 minutes.

Vacuum readout at switchover:
Throttle linkage at full throttle stop, vacuum should remain constant.
Let throttle linkage return to idle speed stop and pull off test line.

Vacuum should drop to "0".

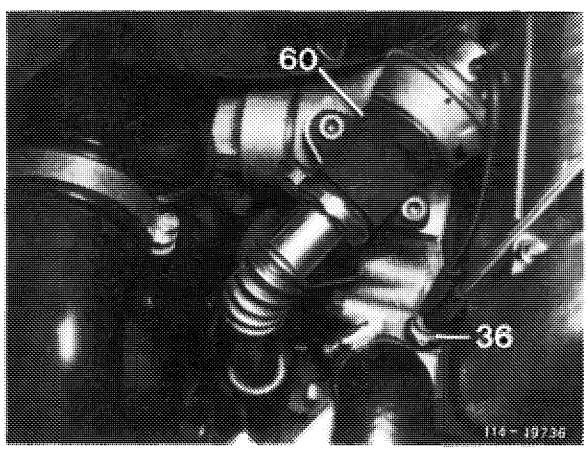
If test values are not attained, renew switchover valve (64b).



Checking EGR valve (60)

Start engine. Operate switchover valve (64a) by eliminating free travel "L" on free travel rod. Pull off vacuum line on EGR valve and plug-on again.

EGR valve should **audibly** close.	EGR valve not closing.



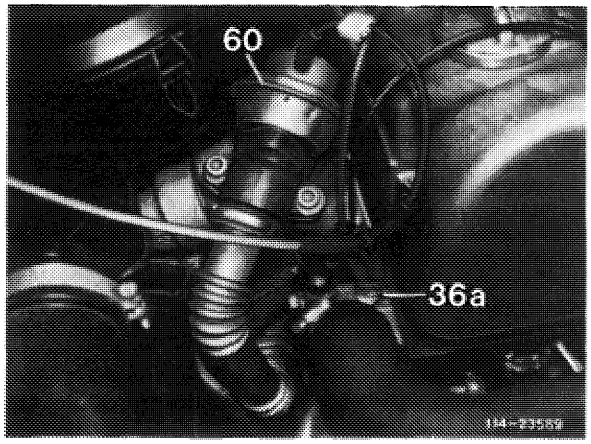
Replace EGR valve (60).

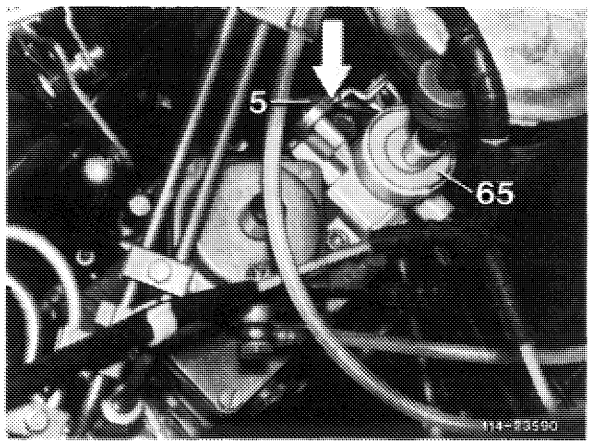
Note: Check adjustment of vacuum control valve prior to test.

Testing vacuum control

Connect vacuum tester between EGR-valve (60) and straight connection of thermovalve (36a). Disconnect connecting rod (5) on ball head. Start engine, increase rpm to approx. 900/min. Place adjusting roller on vacuum control valve (65) and set lever against stop (arrow).
Note: Engage connecting rod after test.

Vacuum readout 150–190 mbar	Vacuum is above or below requirements.

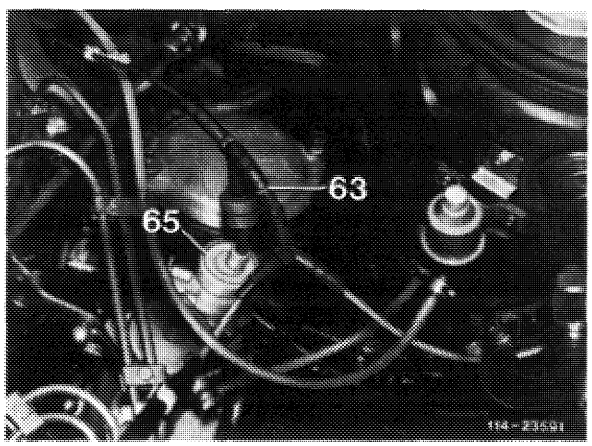




Test orifice (63)

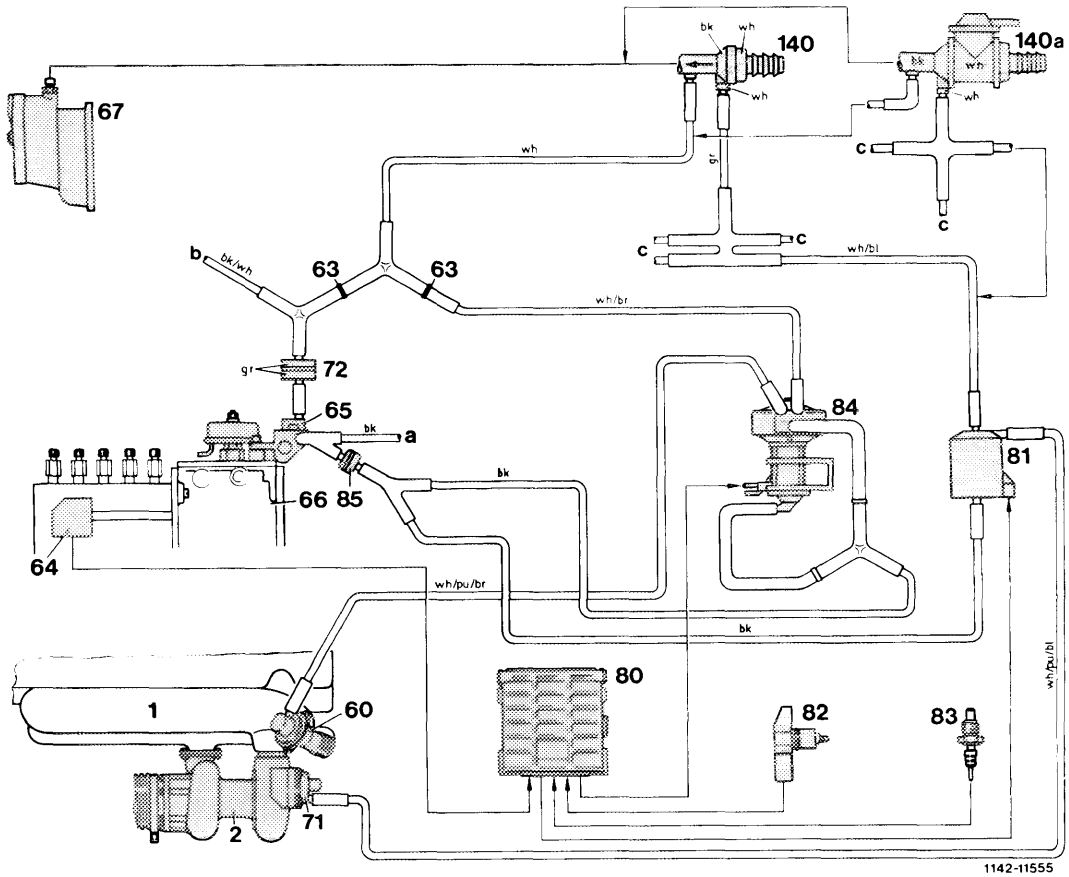
Test orifice for free passage and blow out, if required.

If the vacuum is not within tolerance, install the next larger orifice if the vacuum is too high, and the next smaller orifice if the vacuum is too low. If the specified vacuum is not attained by installing another orifice, replace vacuum control valve (65).



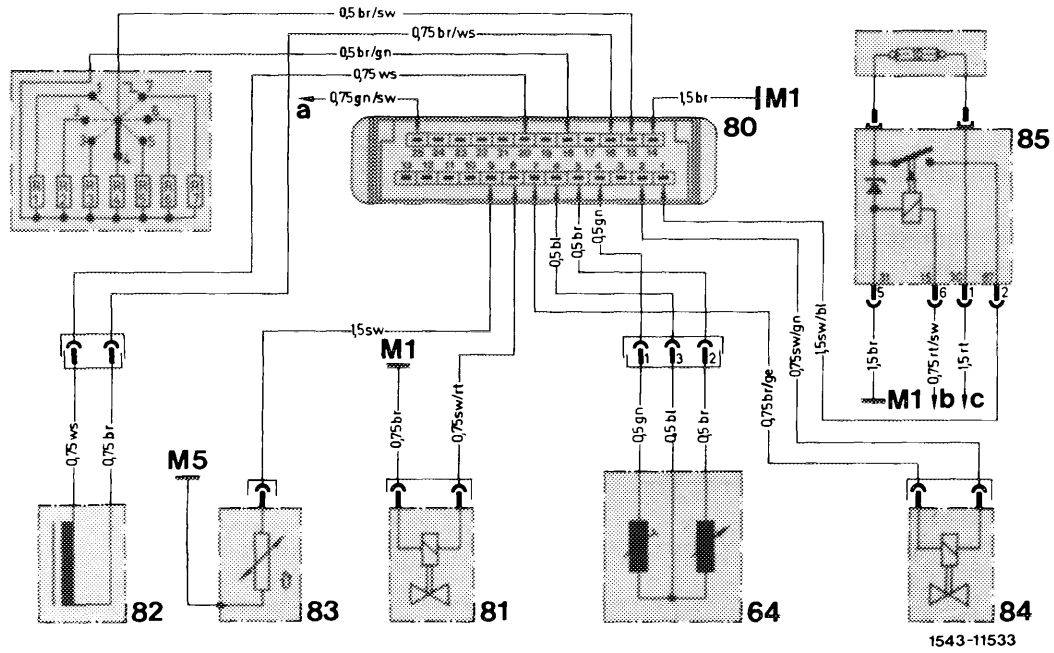
End of test

C. (USA) model year 1984 California



Function diagram vacuum line installation

1	Intake manifold	81	Switchover valve	bk	= black
2	Exhaust gas turbocharger	82	Rpm sensor	bl	= blue
50	EGR-valve	83	Temperature sensor coolant (NTC)	br	= brown
63	Orifice 0.5 mm	84	Pressure converter	gr	= green
64	Control rod travel indicator	85	Vent filter	pu	= purple
65	Vacuum control valve	140	Check valve, model 123	re	= red
66	Injection pump	140a	Check valve, model 126	wh	= white
67	Vacuum pump	a	Vent line to passenger compartment		
71	Circulating air safety valve	b	To automatic transmission		
72	Vacuum damper	c	Remaining consumers		
80	Control unit				



Electric wiring diagram

64 Control rod travel indicator
80 Control unit
81 Switchover valve
82 Rpm sensor
83 Temperature sensor
84 Pressure converter
85 Overvoltage protection
86 Compensating plug

M1 Main ground behind instrument cluster
M5 Ground, engine
a To revolution counter
b To fuse capsule, terminal 15
c To supporting lug, terminal 30

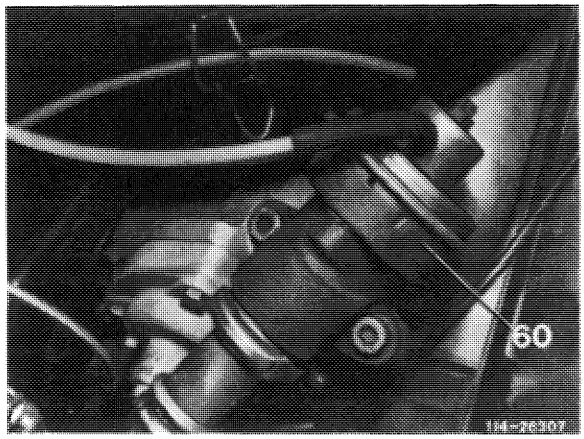
bl = blue
br = brown
ge = yellow
gn = green
rt = red
sw = black

Short test

Test EGR-valve (60) with engine stopped

Activate EGR-valve with approx. 300 mbar vacuum. Pull off vacuum line.

EGR-valve closes audibly	not closing

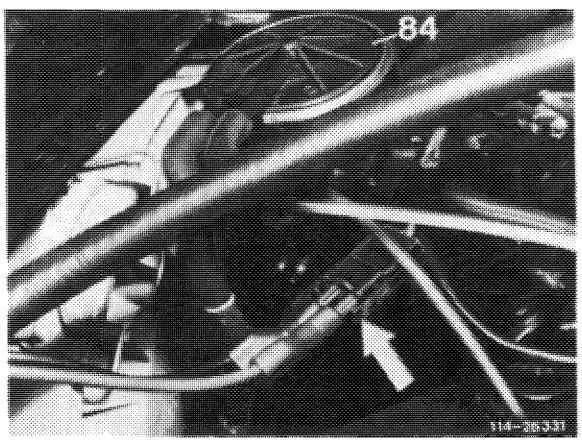


Renew EGR-valve.

Testing voltage at pressure converter (84)

Engine stopped, ignition switched on. Pull plug from pressure converter and connect with multimeter (arrow), push button "V=" and read nominal value 12 V.

Readout in order	not in order



Test overvoltage protection and electric activation according to wiring diagram.

Testing vacuum control

Connect vacuum tester with Y-distributor to EGR-valve (60).

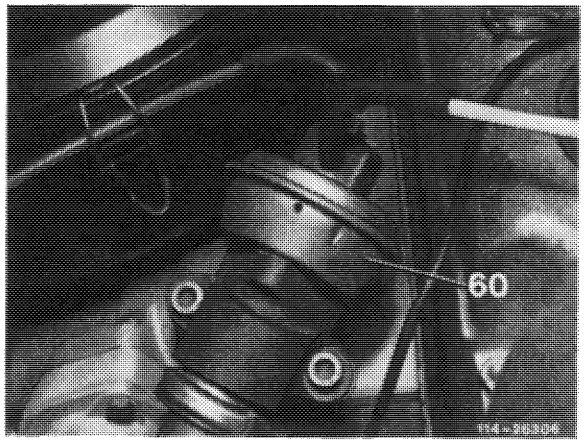
Read vacuum values at the following engine speeds:

1/min	mbar
700–2600 from approx. 2400	280–360 slowly dropping
3000	approx. 60

Vacuum values in order	not in order

Perform testing individual components.

End of test



Testing individual components

Testing temperature sensor for coolant (83)

Engine stopped.
Pull plug from temperature sensor for coolant.
Test resistance against ground.

For nominal value refer to diagram.
Test resistance at three temperature measuring points.

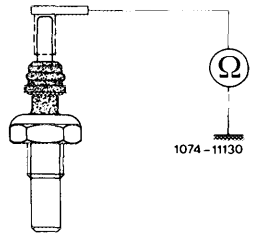
Example:
+ 20 °C = 2.2–2.8 kΩ
+ 80 °C = 290–364 Ω
+100 °C = 140–222 Ω

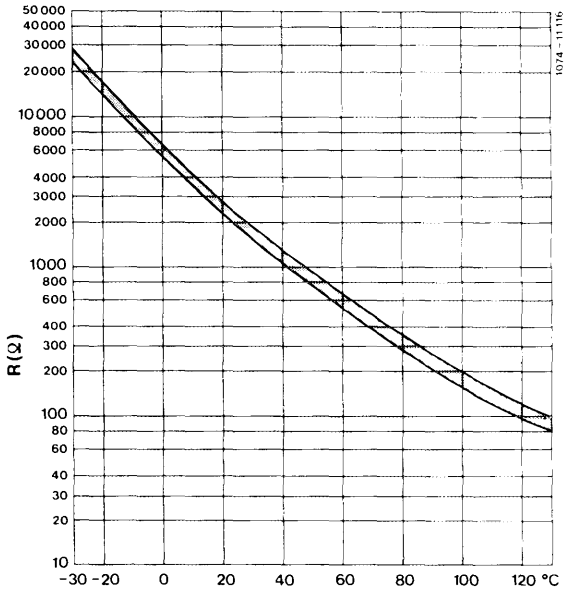
Test

values in order	not in order

Renew temperature sensor

End of test



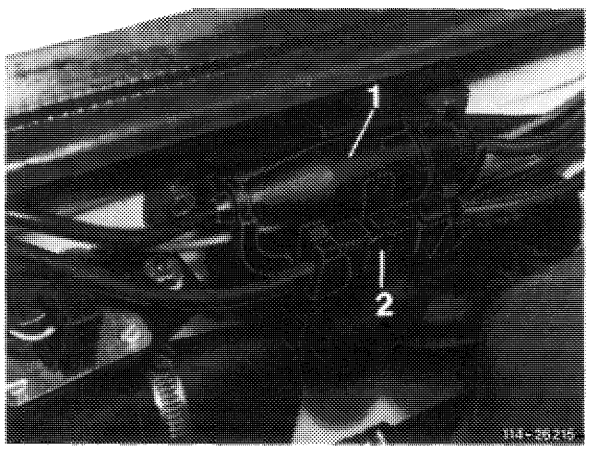


Testing rpm sensor (82)

Engine stopped.
Separate clutch (2) and test resistance with multimeter.
Readout: 1.9 ± 0.2 kΩ

in order	not in order

Renew rpm sensor.



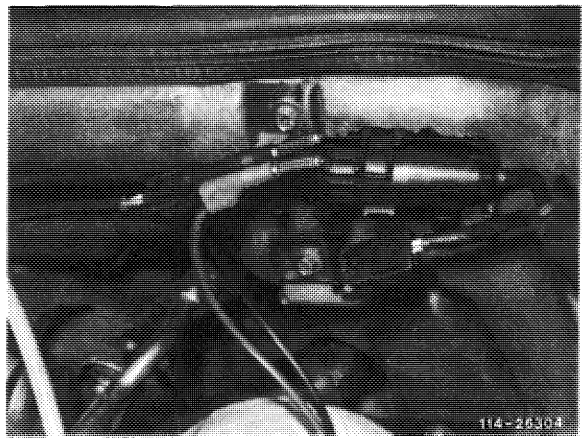
Connection as above.
Push "V" button.
Read test value at the following engine speed:

1/min	V ~
700–800	> 4[1])

Test values in order	not in order

Renew rpm sensor.

End of test



1) Voltage increasing with increasing engine speed.

Testing control rod travel indicator

Engine stopped, separate clutch (1). With multimeter in position Ω (measuring range up to approx. 100 Ω) and test resistance according to drawing.

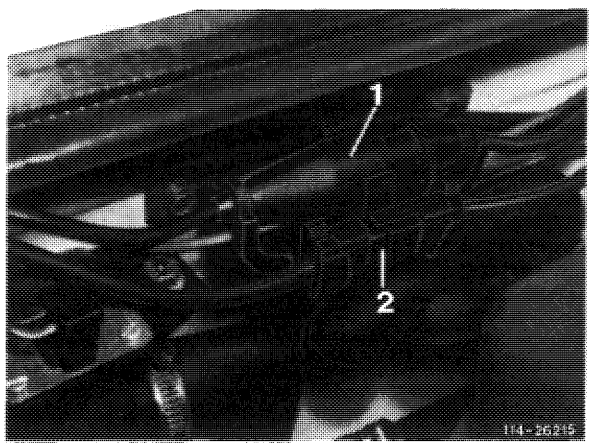
Readout: 1–2 = approx. 25 ± 2
2–3 = approx. 25 ± 2
1–3 = approx. 50 ± 6

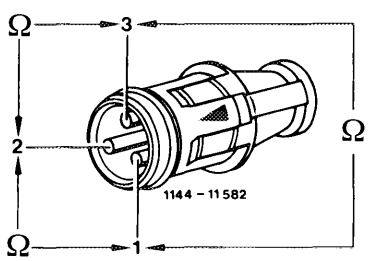
Readout in order	not in order

Exchange injection pump with control and travel indicator.

Attention!
The control rod travel is set by manufacturer on test bench. Do not remove or change its function.

End of test

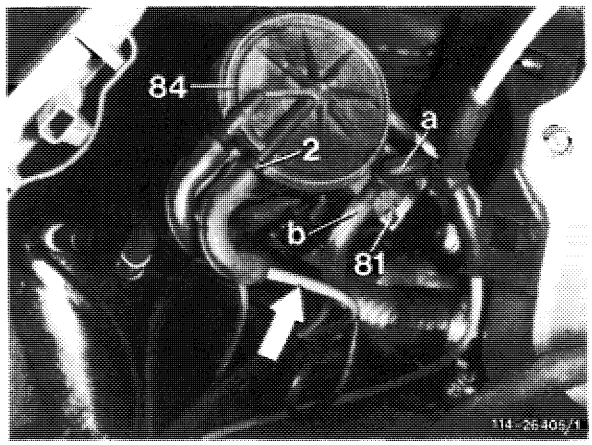




Testing pressure converter (84)

Connect vacuum tester to vacuum line of connection (2). Run engine at idle speed. Read vacuum value. Nominal value approx. 450 mbar.

Vacuum in order	not in order

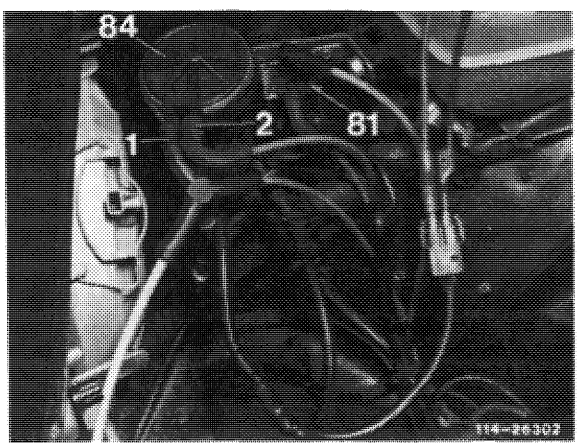


Test vacuum lines according to function diagram. Test vacuum pump (43–660).

Connect vacuum tester with Y-distributor to connection (1). Connect multimeter with test cable to pressure converter. Push button „mA"

Read test values at the following engine speeds:

1/min	mbar	mA
700–2600	280–360	≙ 530
from approx. 2400	dropping slowly	≙ 370
approx. 3000	approx. 60	0



Test values in order	not in order

Current values in order, renew pressure converter.

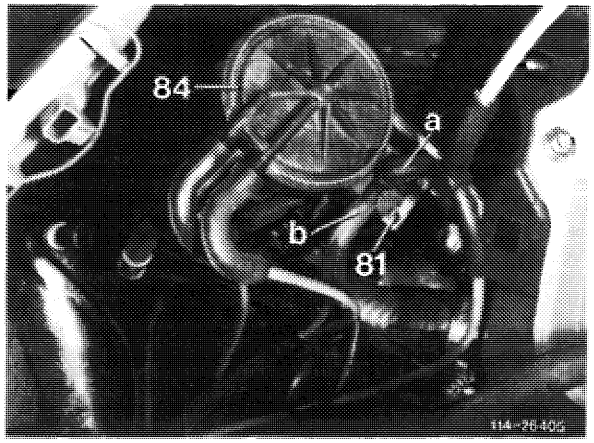
Current values not in order, perform activation test according to electric wiring diagram. Renew control unit, if required.

End of test

Testing switchover valve (81)

Connect vacuum tester with Y-distributor to connection (a). Run engine at idle speed. Read vacuum value. Nominal value > approx. 600 mbar.

Vacuum in order	not in order

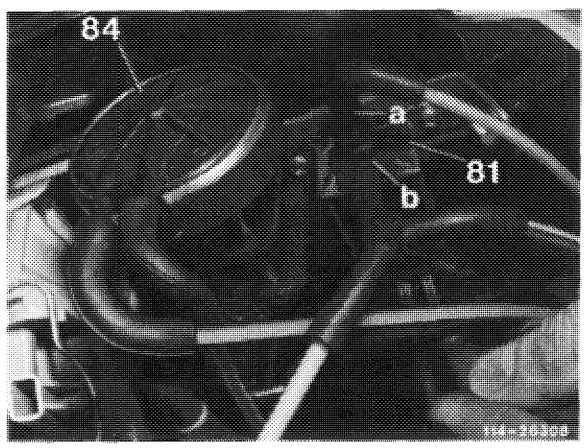


Test vacuum lines according to vacuum diagram. Test vacuum pump (43–660).

Connect vacuum tester with Y-distributor to connection (b). Connect multimeter with switchover valve. Push button "V=". Read test values at the following engine speeds:

1/min	mbar	Volt
700–800	0	0
1000–2500	approx. 600	approx. 12
> 3000	0	0

Test values in order	not in order



Voltage data in order, renew switchover valve.

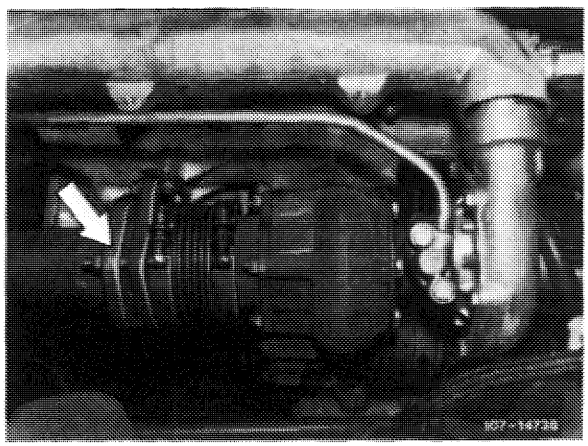
Voltage data not in order, perform activation test according to electric wiring diagram. Renew control unit, if required.

End of test

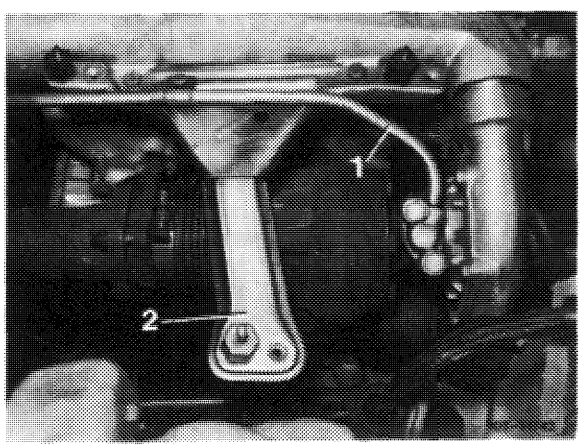
Removal

1 Remove air cleaner (09–400).

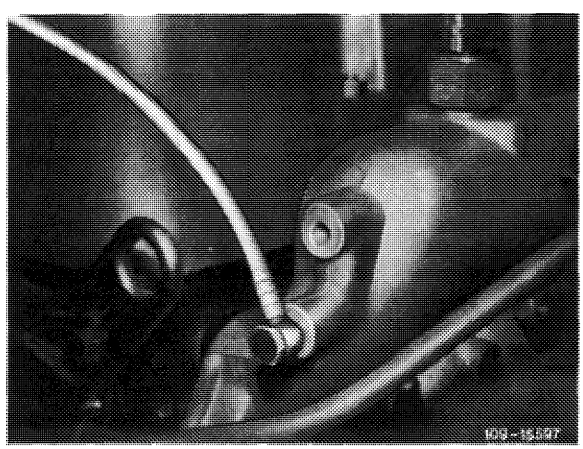
2 Unscrew fastening nuts (arrow) on exhaust flange.



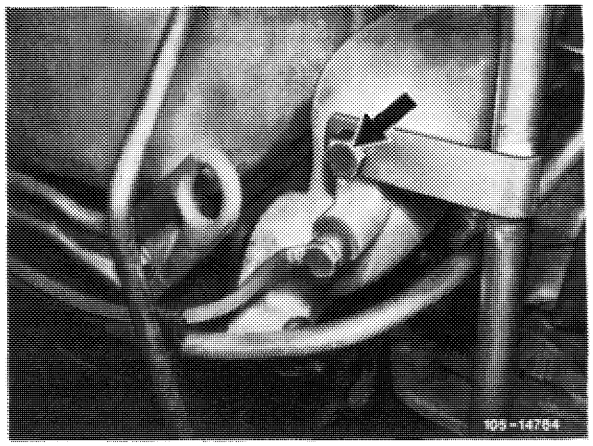
3 Unscrew engine oil feed line (1) on turbocharger and fastening clamp.



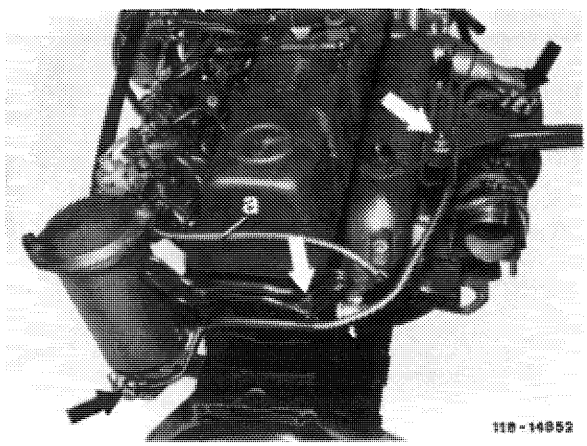
4 Unscrew pressure line to switchover valve on intake manifold.



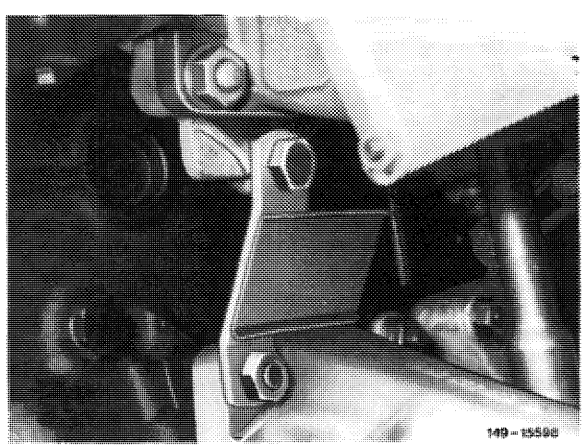
5 Unscrew fastening bracket (arrow) for oil pipe of automatic transmission.



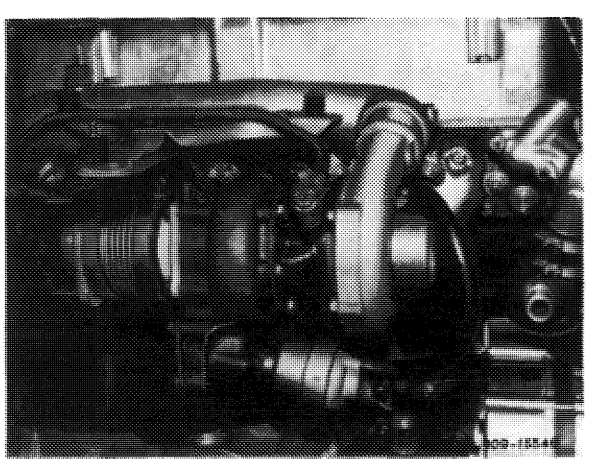
6 Loosen engine oil line (arrow) on oil filter and fastening clamp for engine oil line on cylinder head. On model 126, remove center part of partition for better access.



7 Unscrew supporting bracket for exhaust manifold on engine carrier.



8 Unscrew fastening nuts for intake manifold and exhaust manifold, remove intake manifold and exhaust manifold together with exhaust gas turbocharger.



9 Clean intake manifold and exhaust manifold. Check flange surfaces with straightedge and refinish on surface plate, if required.

10 When replacing intake manifold or exhaust manifold, unscrew all unscrewable parts and mount on new parts.

Installation

11 For installation proceed vice versa using new gasket and new exhaust nuts.

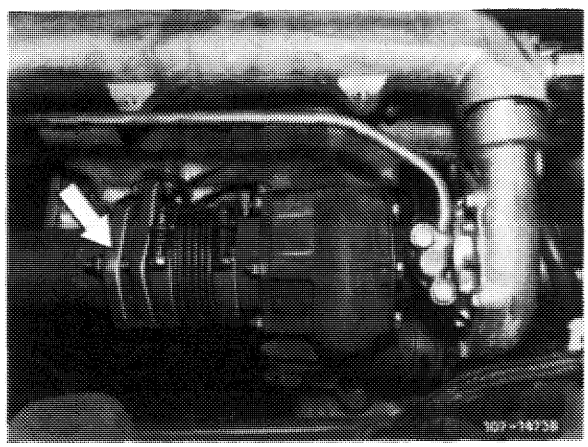
12 Adjust throttle linkage (30–300).

13 Adjust idle speed (07.1–100).

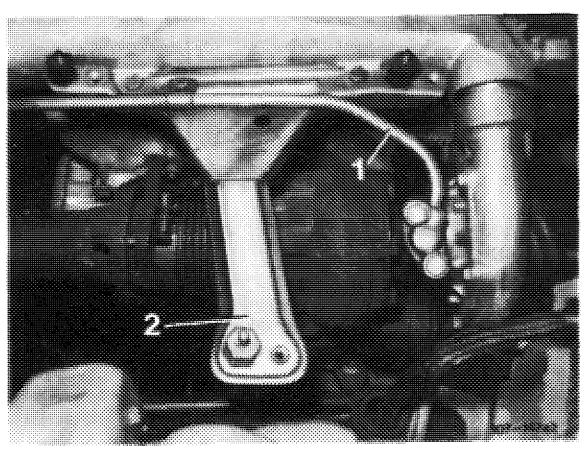
Removal

1 Remove air cleaner (09—400).

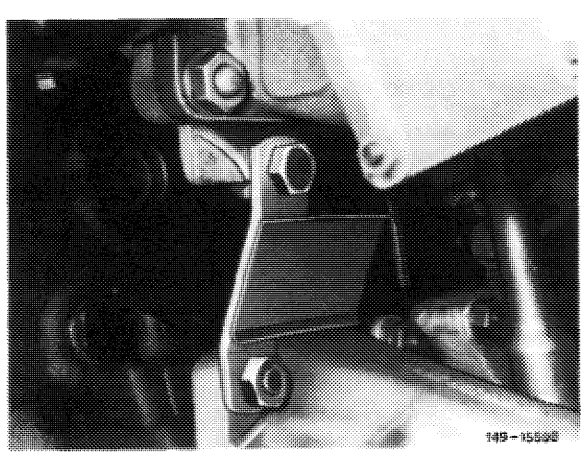
2 Unscrew fastening nuts (arrow) on exhaust manifold.



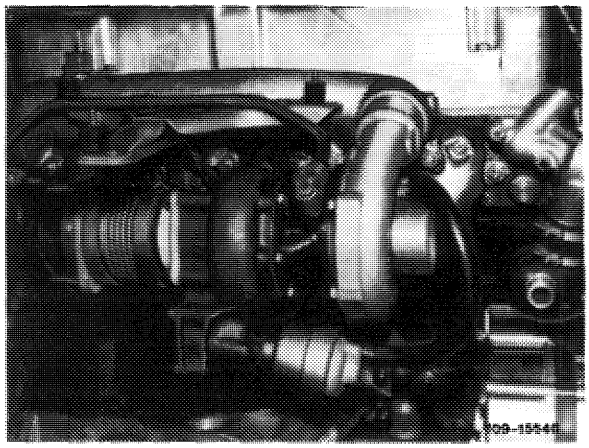
3 Unscrew engine oil feed line (1) on exhaust gas turbocharger and fastening clamp.



4 Unscrew supporting bracket for exhaust manifold on engine carrier.



5 Unscrew fastening nuts for intake manifold and exhaust manifold, remove intake manifold and exhaust manifold together with exhaust gas turbocharger.



6 Clean exhaust manifold and intake manifold, check flange surfaces with straightedge. Refinish on surface plate, if required.

7 When renewing exhaust manifold or intake manifold, unscrew all unscrewable parts and mount on new parts.

Convert exhaust gas turbocharger (09–430).

Installation

8 For installation proceed vice versa, using new gaskets and new exhaust nuts.