

## 14-100 Troubleshooting

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For complaints such as: Very poor engine performance, black or blue smoke, tendency for knocking at full load, poor starting characteristics with smoke, rough idle.

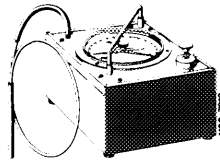
Test conditions: Throttle linkage correctly adjusted, connect revolution counter, engine at operating temperature, run engine at idle ( $750 \pm 50$  rpm) (without increasing speed), steering in straight-ahead position, air conditioning switched off, selector lever for automatic transmission in position "P".

Test: Exhaust gas recycling.

### Special tools

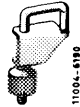
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Tester 0-1000 mbar for vacuum



116 589 25 21 00

Clip



000 589 40 37 00

### Conventional tools

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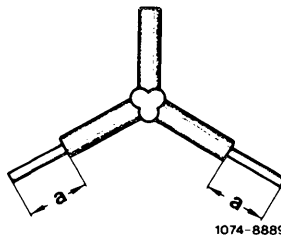
Rev counter

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### Shop-made measuring connection

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Distributor



117 078 01 45

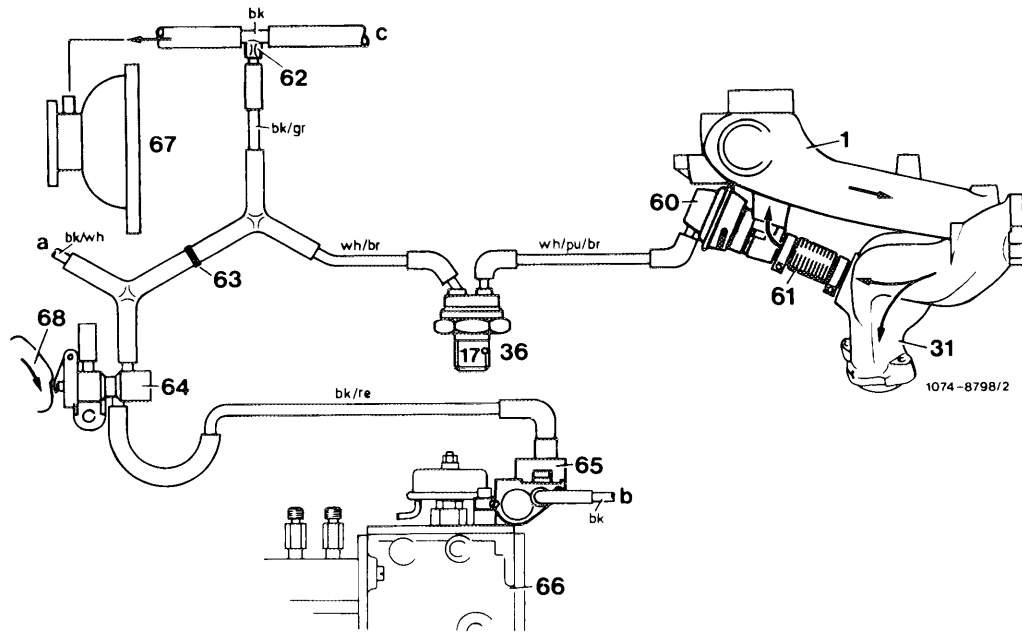
a Vacuum pipe 4 x 1 x 40 mm

Test line 4 x 1 x 400 mm (for model year 1981 only)

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A. (USA) model year 1980

Functional diagram of vacuum pipe routing



- 1 Intake pipe
- 31 Exhaust manifold
- 36 Thermo-valve 17 °C
- 60 EGR valve
- 61 Bellows
- 62 Orifice
- 63 Orifice
- 64 Switch-over valve

- 65 Vacuum modulating valve
- 66 Injection pump
- 67 Vacuum pump
- 68 Bell crank with cam
- a Automatic transmission
- b Air admission to passenger compartment
- c Brake booster

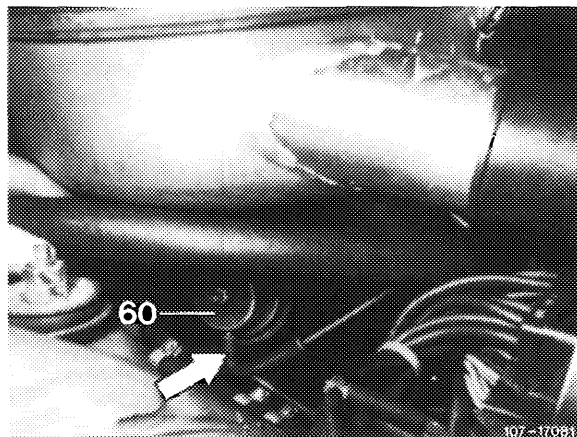
- Color coding:
- bk = black
  - br = brown
  - gr = green
  - pu = purple
  - re = red
  - wh = white

### Checking exhaust gas recycling

Detach vacuum pipe (arrow) at EGR valve (60) and then put back.

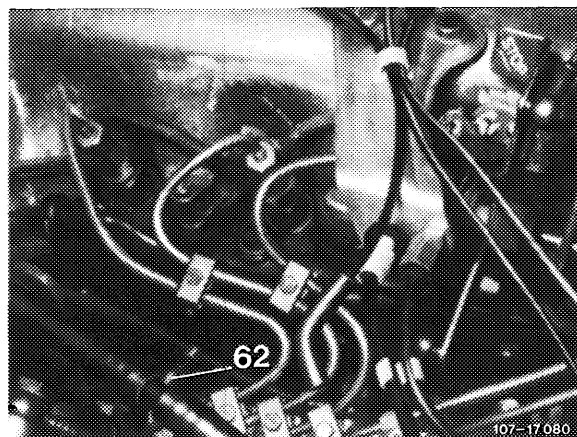
EGR valve must close **audibly**

EGR valve fails to close

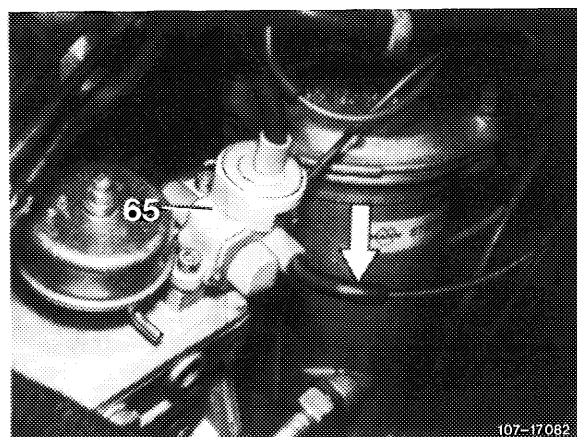


### Checking vacuum pipes

All vacuum pipes serving to control exhaust gas recycling and automatic transmission are to be checked for leakage and correct positioning with reference to the **functional diagram of vacuum pipe routing**. If necessary, blow out orifice (62) at vacuum tapping point.

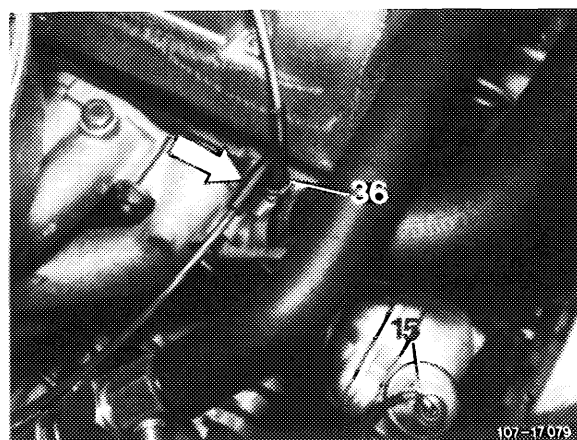


Black admission pipe (arrow) from passenger compartment to vacuum modulating valve (65) is to be checked for continuity.



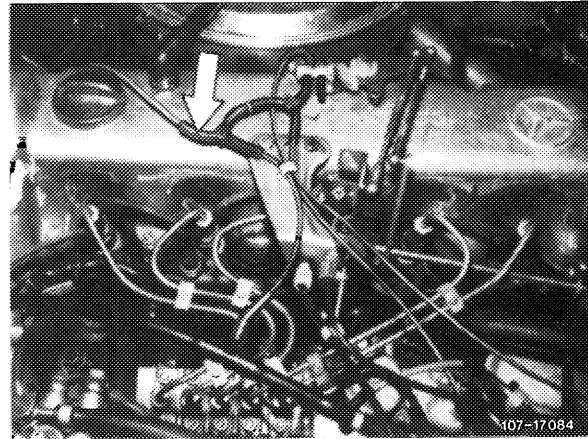
### Checking thermo-valve 17 °C (36, code color blue)

Detach vacuum pipe (white/purple/brown) at thermo-valve (arrow).



Disconnect white/brown vacuum pipe from distributor (arrow) and check for continuity. Failing this, renew thermo-valve.

When the thermo-valve is allowed to cool down it should not be open at temperatures below 7 °C.



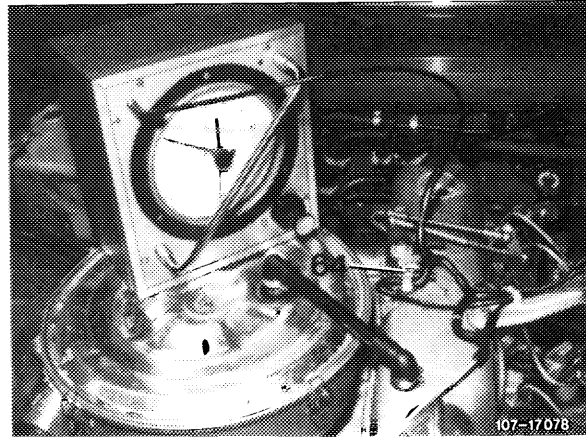
#### Checking switch-over valve (64)

Insert vacuum pressure gauge between switch-over valve and distributor. Vacuum reading about 700–800 mbar.

#### Checking for leakage

Disconnect distributor. Vacuum reading must be stable for about 2 minutes.

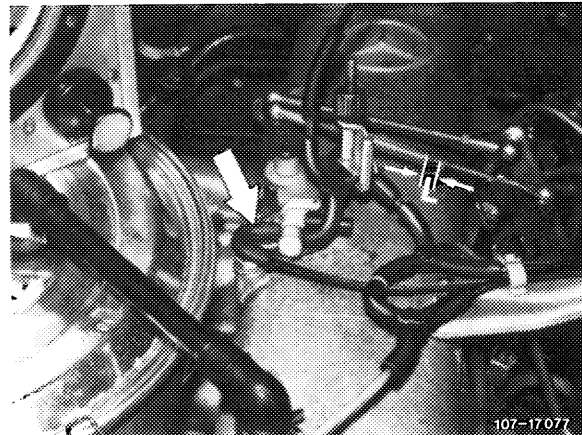
Renew switch-over valve if vacuum begins to drop.



Vacuum is stable:

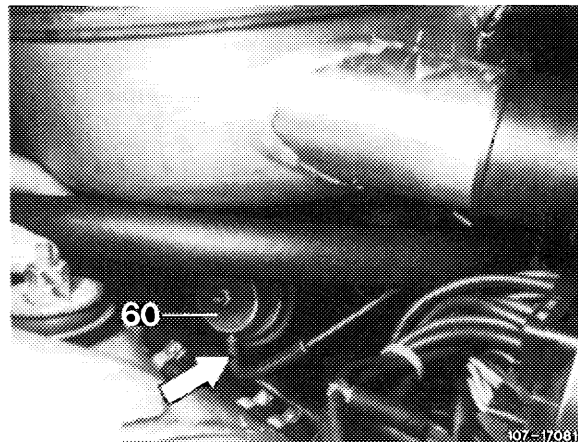
#### Checking switch-over

For this purpose detach clip and disconnect vacuum pipe (arrow, black/red) from switch-over valve. Adjust control linkage until free movement "L" is bridged at free movement rod. Vacuum must drop appreciably.



#### Checking EGR valve (60)

Renew EGR valve if it still fails to open and close.



### Checking vacuum control

Connect vacuum tester to vacuum pipe (arrow, white/purple/brown) between thermo-valve (36) and EGR valve. Move control linkage and elevate idling speed to  $1000 \pm 10$  rpm (do not pull stop lever).

Vacuum must drop to 340–390 mbar.

Vacuum fails to drop.



### Checking orifice (63)

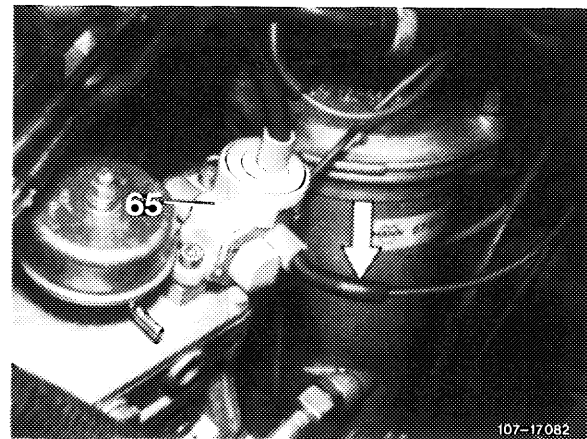
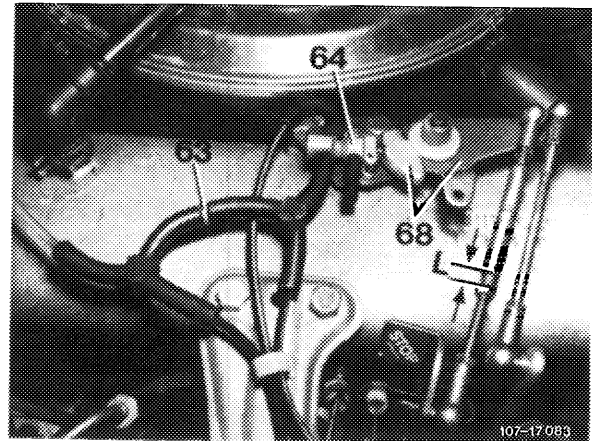
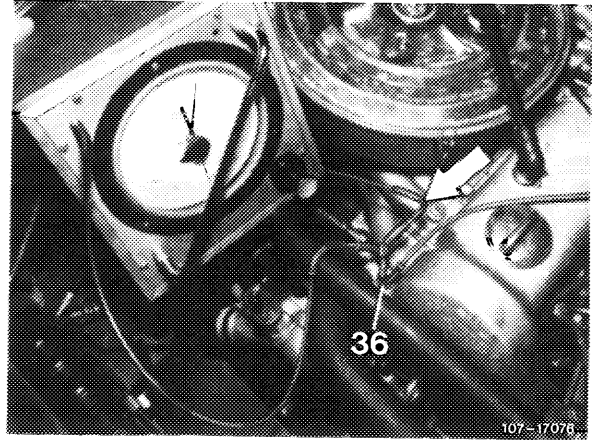
Check orifice for continuity, blowing out if necessary.

### Exchanging orifice (63)

If vacuum still fails to reach 340–390 mbar or drops below this figure, it will be necessary to fit the next larger orifice for an excessive vacuum, and the next smaller one for inadequate vacuum.

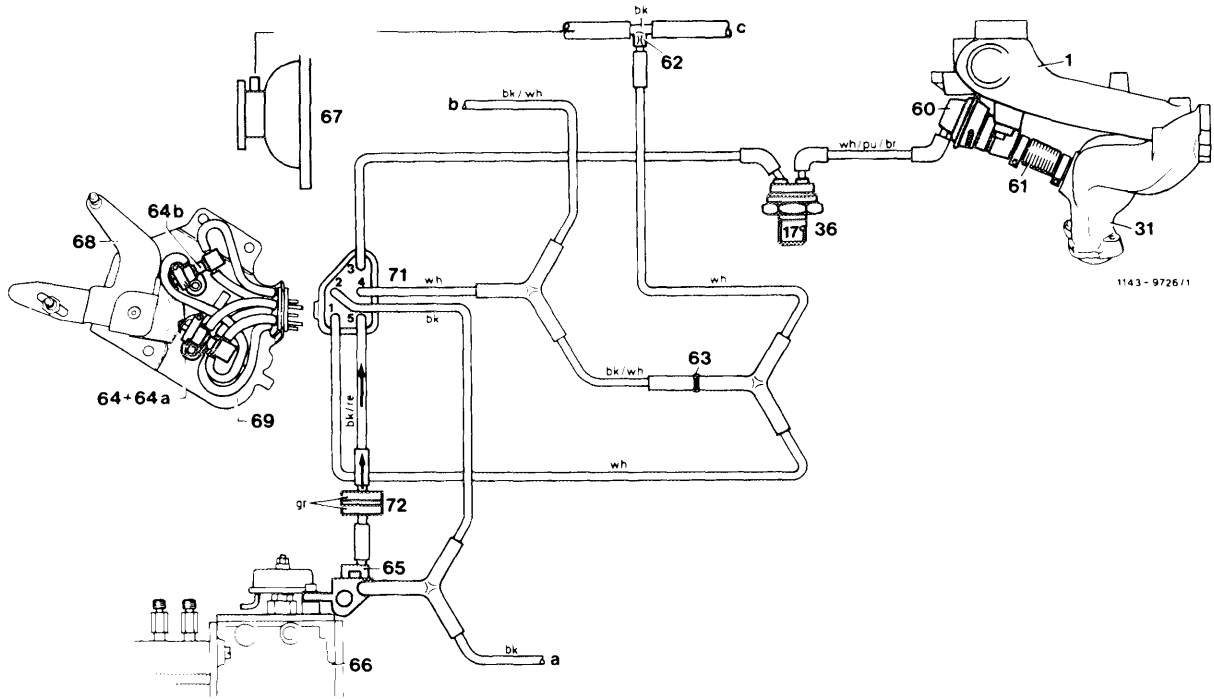
**Vacuum modulating valve (65)** will have to be renewed if installation of a new orifice **fails** to produce the correct reading.

End of check



B. (USA) model year 1981

Operational diagram, vacuum line layout



- 1 Intake manifold
- 31 Exhaust manifold
- 36 Thermo-valve 17 °C/63 °F
- 60 EGR valve
- 61 Corrugated tube
- 62 Orifice
- 63 Orifice
- 64 Switchover valve, automatic transmission
- 64a Switchover valve, idle shutoff — EGR
- 64b Switchover valve, full throttle shutoff — EGR

- 65 Vacuum control valve
- 66 Injection pump
- 67 Vacuum pump
- 68 Reverse-transfer lever with cam
- 69 Valve plate
- 71 Central plug
- 72 Damper, vacuum
- a Vent to passenger compartment
- b Automatic transmission
- c Brake unit

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

Checkup

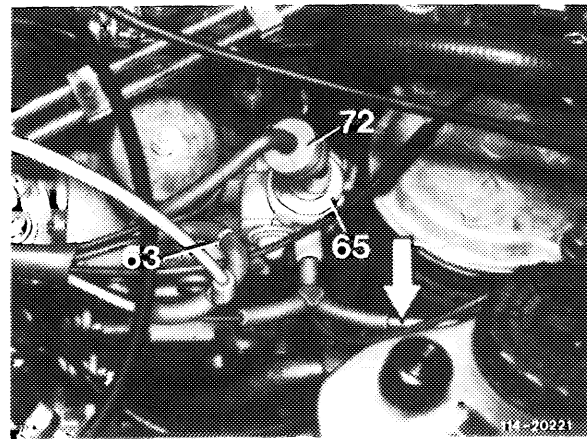
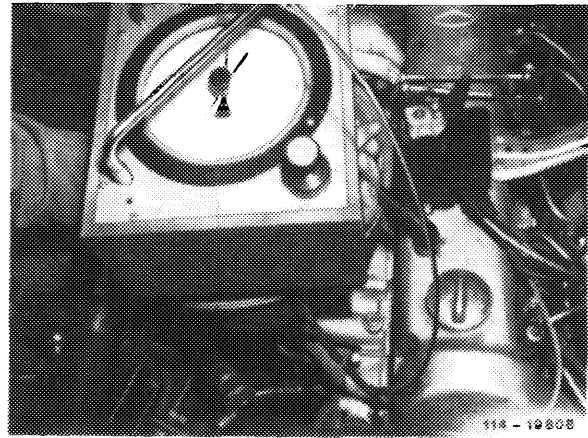
**Note:** At begin of test, yellow orifice (63) should be installed.

### Testing EGR

Connect vacuum tester between EGR valve (60) and straight connection of thermo-valve (36). At idle, the throttle linkage at idle stop, no vacuum should be indicated. Adjust regulating linkage until free travel on free travel rod is bridged (do not pull on stop lever). Vacuum should now amount to 350–500 mbar.

Idle, no vacuum present.  
Vacuum of 350–500 mbar is attained.

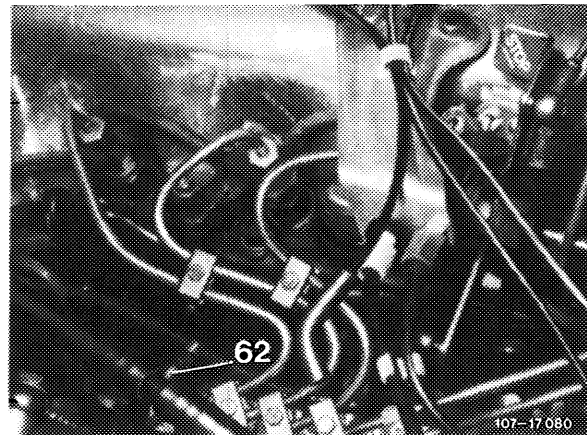
Vacuum present.  
Vacuum not attained or exceeded.



#### 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.

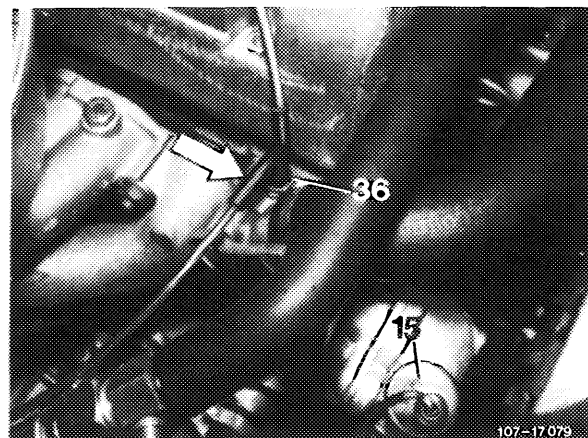


#### Check thermo-valve 17 °C/63 °F (36, color code blue)

Pull off white/brown vacuum line on diagonal connection of thermo-valve.

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

If there is no passage, remove thermo-valve.





### Check switchover valve (64a)

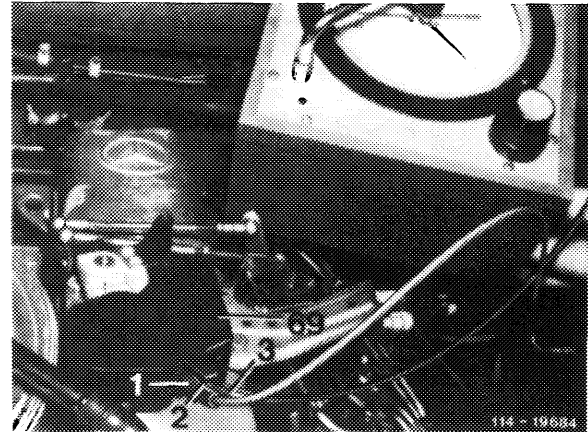
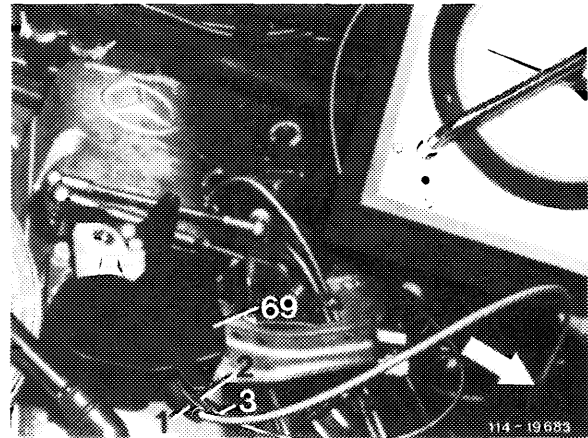
Pull central plug (71) from valve plate (69). Connect test line between tapping point (black orifice, arrow) on vacuum line for brake unit and valve plate connection (1). Close connection (2). Connect vacuum tester to connection (3).

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

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

Vacuum should remain constant for approx. 2 minutes. Pull closing cap from connection (2).

Vacuum should drop to "0". If test values are not attained: Replace switchover valve (64a).

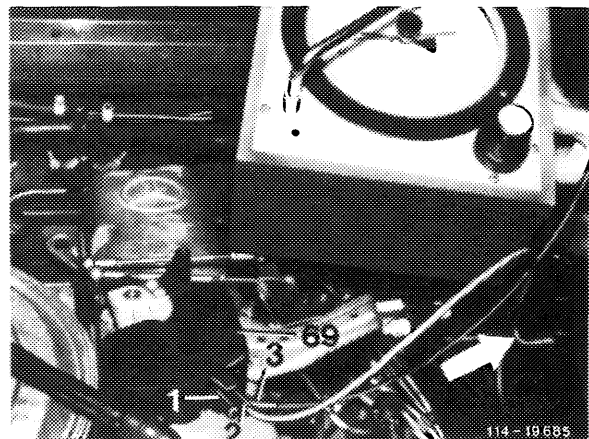


### Check switchover valve (64b)

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 (2). Close connection (1). Connect vacuum tester to connection (3).

Vacuum readout:  
Idle speed (throttle linkage against 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.



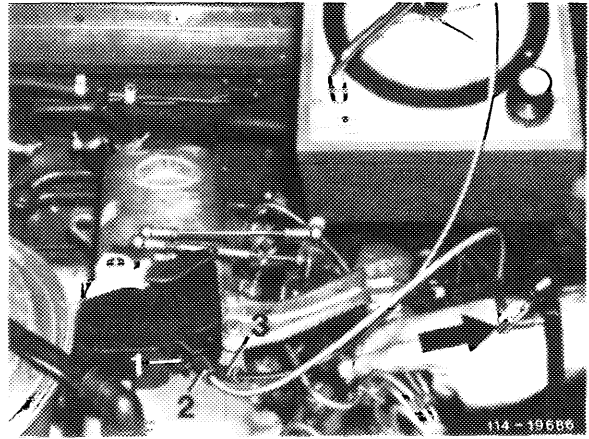


Vacuum readout at switchover:  
Remove closing cap from connection (1).  
Throttle linkage at full stop, vacuum  
remains constant.

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).

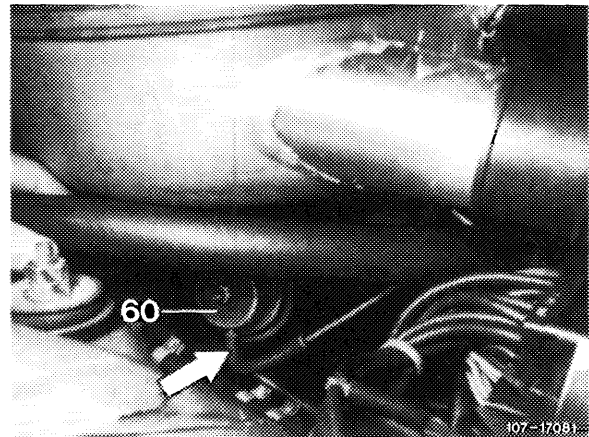


### Checking EGR valve (60)

Start engine. Operate switchover valve (64a) by  
bridging idle path "L" on idle path rod. Pull off  
vacuum line on EGR valve (arrow) and plug-on  
again.

EGR valve should  
**audibly** close.

EGR valve not  
closing.



Replace EGR valve (60).

### Checking vacuum control

Connect vacuum tester between EGR valve (60) and straight connection of thermo-valve (36). Increase idle speed to  $1000 \pm 10$ /min (do not pull on stop lever).

Vacuum readout  
390–460 mbar.

Vacuum is exceeded  
or not attained.



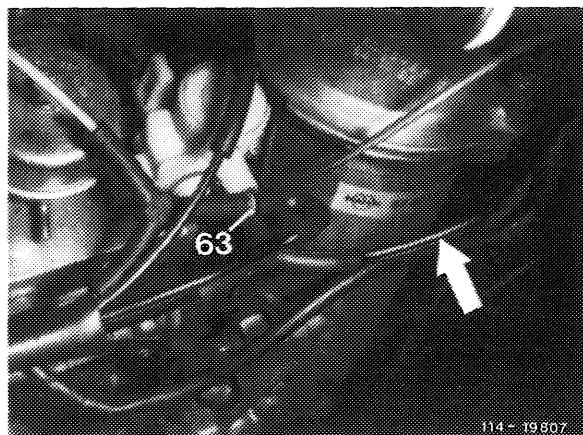
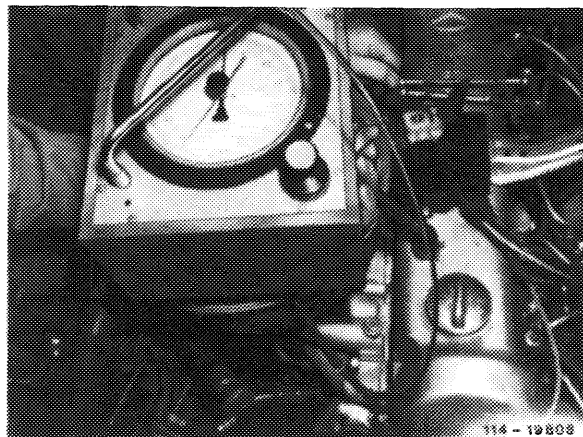
### Check orifice (63)

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 size orifice if the vacuum is too low.

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



End of test