For conplaints such as: On/off ratio cannot be regulated, poor warm-up characteristics of engine, hunting at idle, engine not accepting gas or splashing during acceleration, proceed as follows:

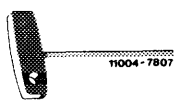
Check lambda control.

Check air injection.

Check fuel evaporation control system.

Assumption: CIS injection system and ignition system in order.

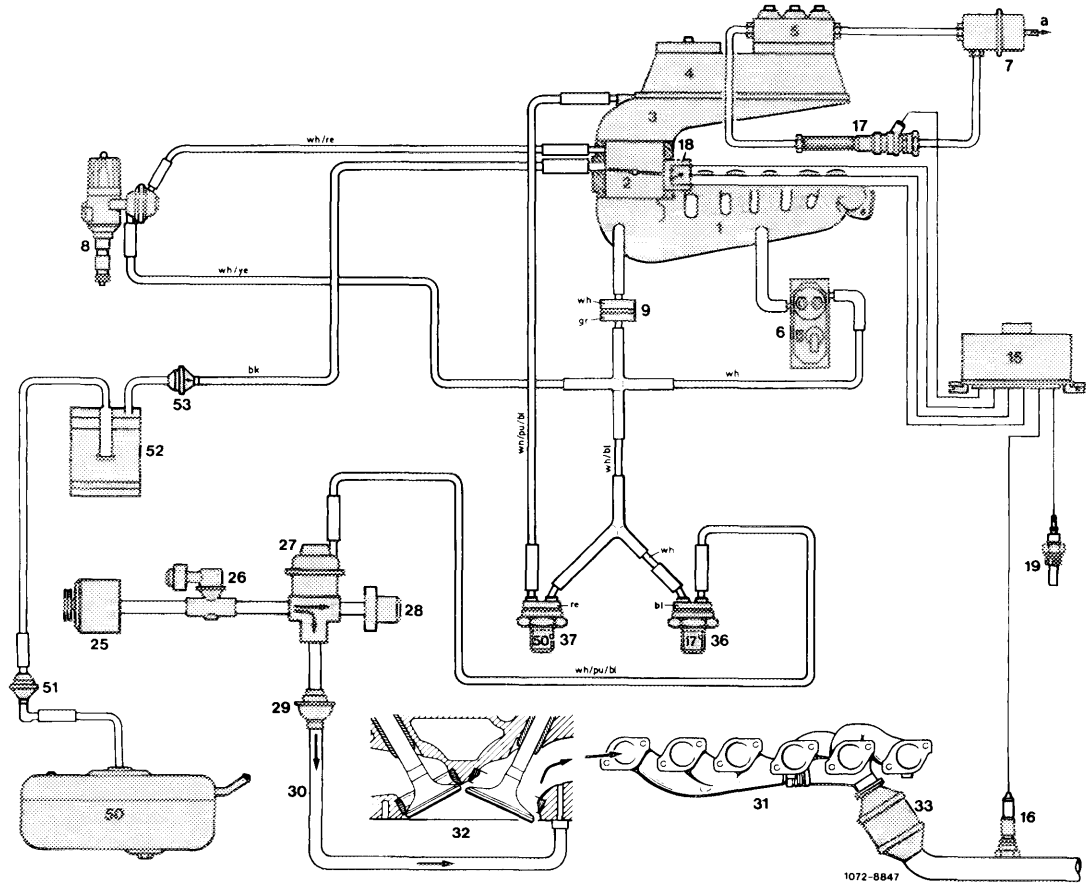
Special tools

Oil telethermometer		116 589 27 21 00
Allen wrench for hex socket screw 3 mm		000 589 14 11 00
Adapter for checking electric lines and components		110 589 14 21 00

Conventional tools

Revolution counter, multimeter (volt-ohmmeter)	
Lambda control tester	KDJE–P 600

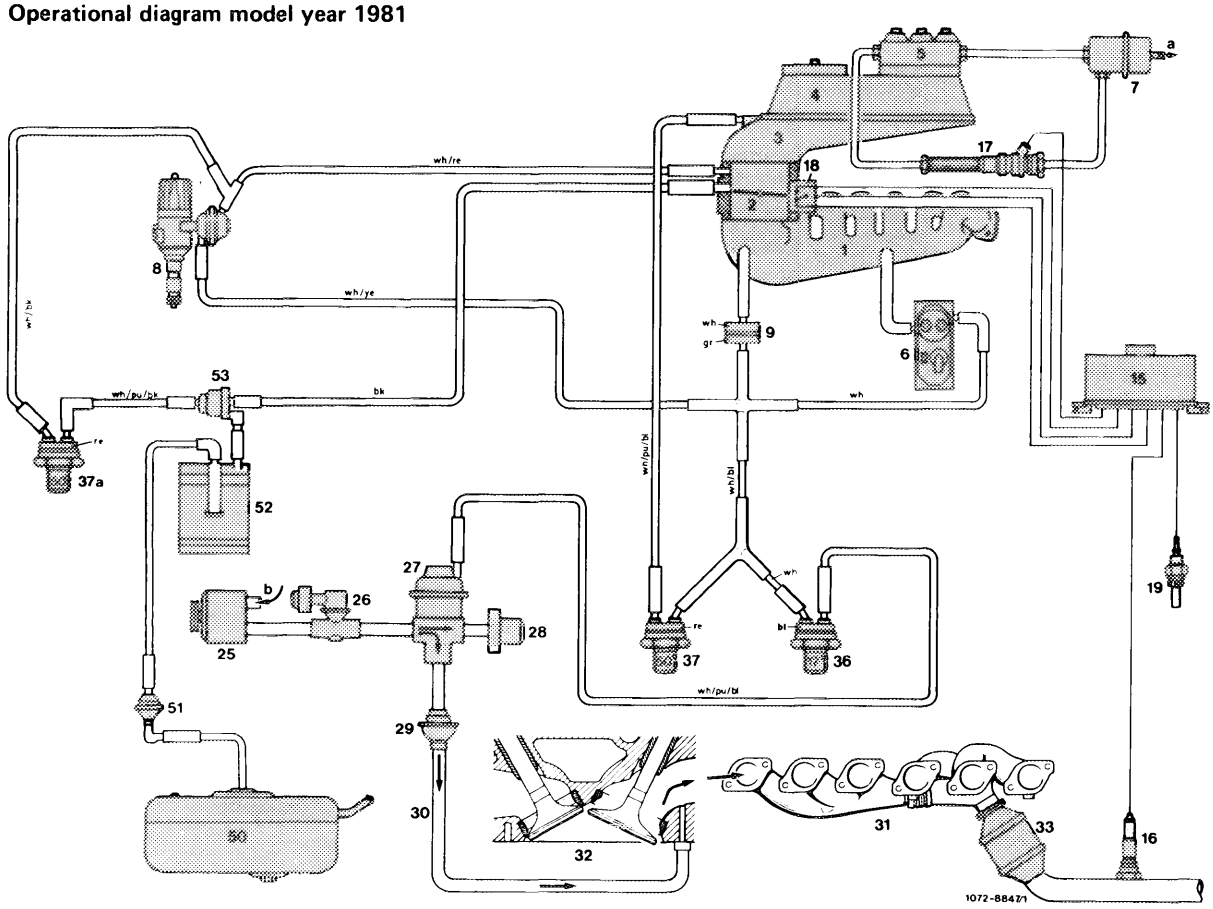
Operational diagram model year 1980



1 Intake manifold
2 Throttle valve housing
3 Air guide housing
4 Air flow sensor
5 Volume distributor
6 Warm-up compensator
7 Damper
8 Ignition distributor
9 Orifice
15 Control unit
16 Oxygen sensor
17 Frequency valve
18 Throttle valve switch
19 Temperature switch oil 16 °C/61 °F
25 Air pump
26 Pressure relief valve
27 Diverter valve
28 Damper filter (silencer)
29 Check valve
30 Injection line
31 Exhaust manifold
32 Cylinder head
33 Primary catalyst
36 Thermovalve 17 °C/62 °F
37 Thermovalve 50 °C/122 °F
50 Fuel tank
51 Vent valve unit
52 Charcoal canister
53 Purge valve
a Leak-off connection

Color code
bk = black
bl = blue
gr = green
ye = yellow
re = red
wh = white
pu = purple

Operational diagram model year 1981



1	Intake manifold	18	Throttle valve switch	36	Thermovalve 17 °C/62 °F	Color code	
2	Throttle valve housing	19	Temperature switch oil 16 °C/61 °F	37	Thermovalve 50 °C/122 °F	bk	= black
3	Air guide housing	25	Air pump	37a	Thermovalve 50 °C/122 °F	bl	= blue
4	Air flow sensor	26	Pressure relief valve	50	Fuel tank	gr	= green
5	Fuel distributor	27	Diverter valve	51	Vent valve unit	ye	= yellow
6	Warm-up compensator	28	Damper filter (silencer)	52	Charcoal canister	re	= red
7	Damper	29	Check valve	53	Purge valve	wh	= white
8	Ignition distributor	30	Injection line	a	Leak-off connection	pu	= purple
9	Orifice	31	Exhaust manifold	b	From air cleaner		
15	Control unit	32	Cylinder head				
16	Oxygen sensor	33	Primary catalyst				
17	Frequency valve						

A. Quick test with lambda control tester KDJE–P 600

The lambda control tester can be used for adjusting on/off ratio at idle, but also for a quick diagnosis of lambda control.

Connect lambda control tester to diagnosis socket and revolution counter. Connect oil telethermometer.

Note: If the specified nominal value is not attained, refer to quick test with adapter.

Scope of test	Actuation	Readout/nominal value
a) Engine oil temperature < 13 °C/55 °F	Engine at idle	Constant between 56–64 %
b) Simulation	Pull plug from temperature switch 16 °C/61 °F and connect to ground	Readout as above

Warm-up control

a) Engine oil temperature > 20 °C/68 °F, oxygen sensor not yet ready for operation (< approx. 300 °C/572 °F)	Engine at idle	Constant between 46–54 %
b) Simulation	Separate plug of oxygen sensor	Readout as above

Control at operating temperature

Engine oil temperature approx. 80 °C, oxygen sensor ready for operation (> approx. 300 °C)	Engine at idle	50 % ± 10 % slowly swinging needle
Idle contact closed	Throttle valve at idle stop	Deflection of needle approx. 8–12 % around nominal value
Idle contact open	Slightly open throttle valve	Deflection of needle approx. 13–23 % around nominal value
Full throttle contact closed	Apply full throttle for a short moment	Constant between 56–64 %
Lean stop control unit	Separate plug of oxygen sensor, connect plug of control unit to 2 volt output of tester **for a short moment**	Constant < approx. 20 % < approx. 20 %
Rich stop control unit	Separate plug of oxygen sensor, connect plug for control unit to ground **for a short moment**	Constant > approx. 87 %
Air injection	Pull blue/purple vacuum line from air guide housing and close **for a short moment**	Constant approx. 87 %

B. Quick test with adapter

Connect adapter to plug, control unit and multimeter to adapter.

Test set-up	Circuit or component tested	Setting of controls	Specified value . . . If deviating, see individual component test program sections
Adapter to position 1 with voltmeter	Supply voltage	Ignition turned on	U = 12 ± 2 V light on If deviating, see section I.
Adapter to position 2 with ohmmeter	Throttle valve switch	Ignition off Idle position . . . Full throttle position . . .	R = ∞ Ω R = 0 Ω If deviating, see sections IV and V.
	Switch 16 °C/ 61 °F	Ignition off	< 13 °C R = 0 Ω > 19 °C R = ∞ Ω If deviating, see sections II and III.
Adapter to position 3 with ohmmeter	Throttle valve switch	Ignition off Idle position . . . Advance slightly throttle linkage . . .	R = 0 Ω R = ∞ Ω If deviating, see sections IV and V.
Adapter to position 4 with voltmeter	Frequency valve	Ignition on Crank engine	U = 12 ± 2 V If deviating, see sections VI and IX.
Adapter to position 5 with ohmmeter	Oxygen sensor probe cable and connection to electronic control unit	Ignition off Pull off oxygen sensor connection and bridge plug going to electronic control unit	R = ∞ Ω R = 0 Ω If deviating, see sections VII and VIII.
Disconnect adapter and re-insert plug into control unit. Connect lambda control tester		Run engine until operating temperature is attained	On/off ratio = 50 % ± 10 % If deviating, see section X.
Pull blue/purple vacuum line from air guide housing and close		Start engine for a short moment	On/off ratio = > 80 % If deviating, see section XI.
Pull draw-off line (purge line) to throttle valve housing from charcoal canister		Start engine Idle approx. 2000/min	 No vacuum Vacuum available If deviating, see section XII.

C. Component test program

Test section A

Test conditions: Connect adapter to plug, control unit and multimeter to adapter.

Connect oil telethermometer.

I. Testing voltage supply of control unit

Rotary switch on adapter to position 1, multimeter to measuring range 0–30 volts, ignition switched on, read indicator.

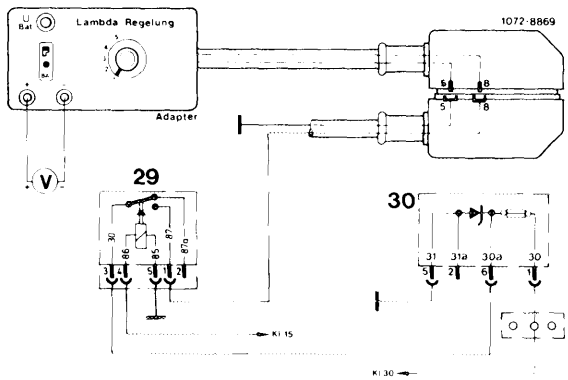
Indicator lamp of adapter:

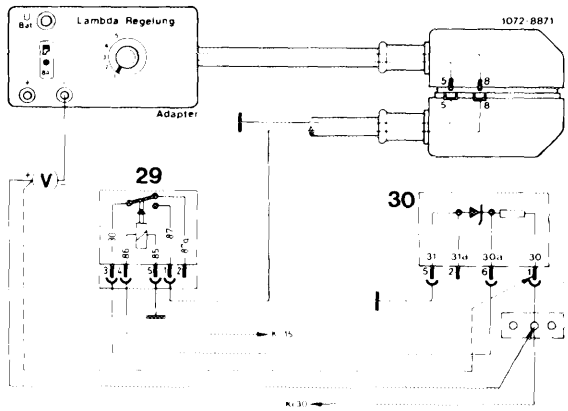
Lighting up	Not lighting up
Readout	
approx. 12 volts	0 volt

Pull plus (positive) cable of voltmeter from adapter. Measure voltage: on connector of engine harness (terminal 30), on plug of overload protection (30) jack 1.

Readout	
approx. 12 volts	0 volt

Check line for break and correct, if required. Readout approx. 12 volts.



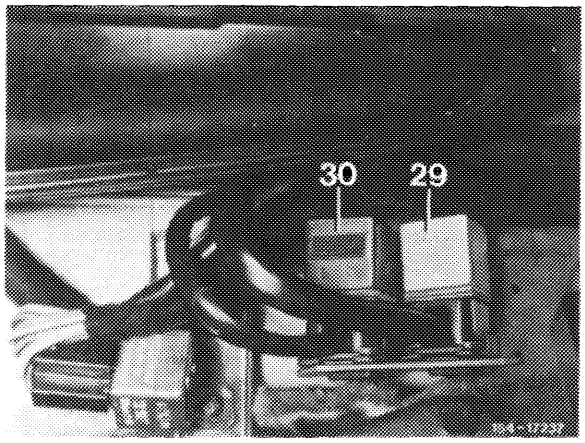


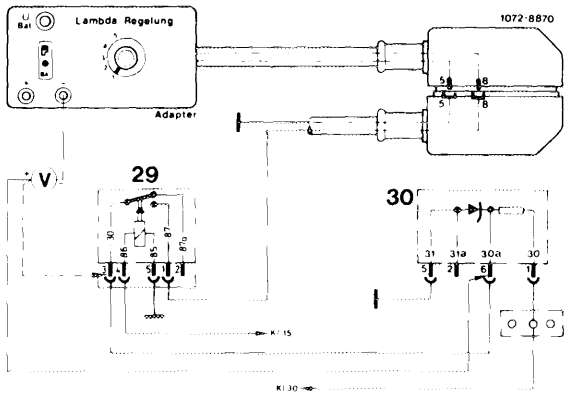
Attach overload protection (30) to plug in such a manner that the voltage on terminal 6 can be measured with plus (positive) cable of voltmeter.

Readout

approx. 12 volts | 0 volt

Renew overload protection (30).
Readout approx. 12 volts

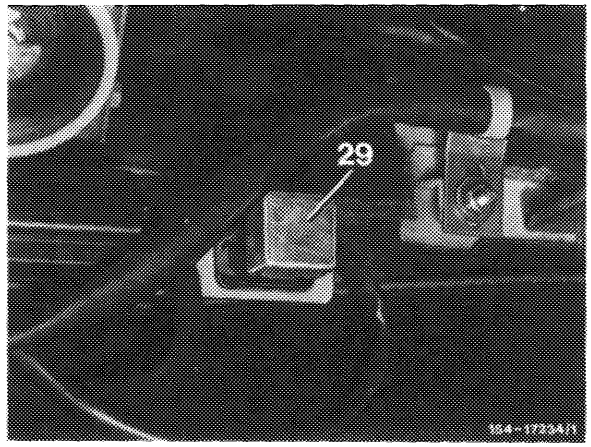




Attach relay for voltage supply (29) to plug in such a manner that voltage on jack 3 can be measured with plus (positive) cable of voltmeter.

Readout

approx. 12 volts | 0 volt



Check line to overload protection for break and correct, if required.
Readout approx. 12 volts.

Check voltage on jack 4 with ignition switched on.

Readout

approx. 12 volts | 0 volt

Check line to terminal 15 for break and correct, if required.
Readout approx. 12 volts.

Connect voltmeter to jack 3 and 5.

Readout

approx. 12 volts | 0 volt

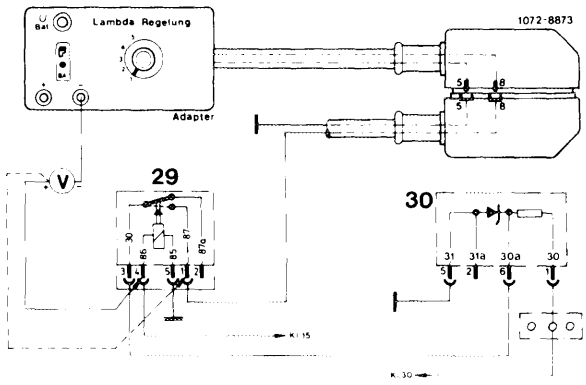
Check ground connection line (jack 5) for break and correct, if required.
Readout approx. 12 volts.

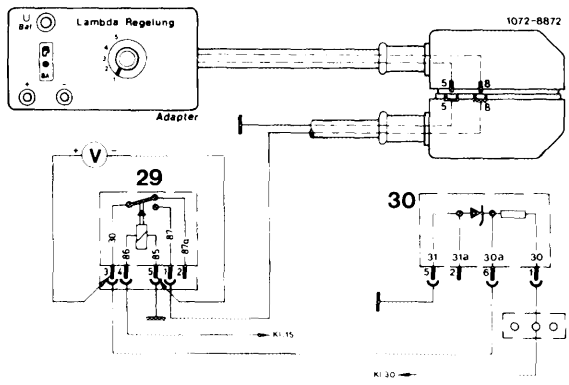
Attach relay for voltage supply (29) to plug in such a manner that voltage on jack 1 can be measured.

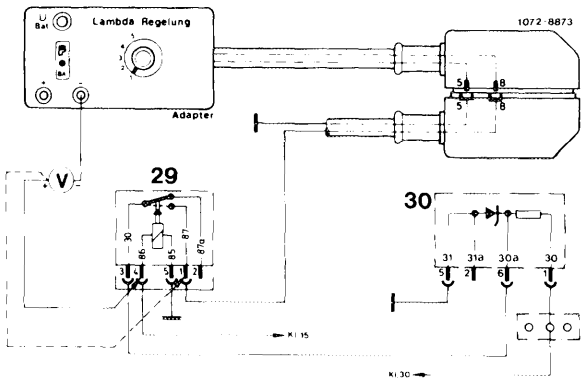
Readout

approx. 12 volts | 0 volt

Renew relay.
Readout approx. 12 volts.



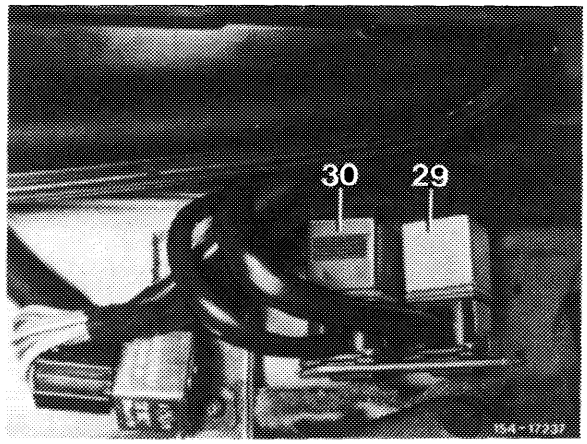




Connect voltmeter to adapter and check voltage.

Readout	
approx. 12 volts	0 volt

Check line from plug of relay voltage supply (29) to plug of control unit for break and correct, if required. Readout 12 volts.

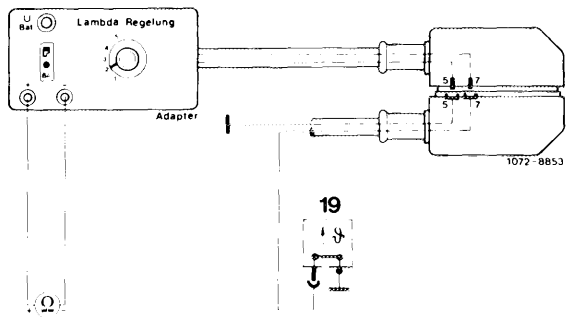


End of test

II. Testing temperature switch oil 16 °C/61 °F (engine oil temperature < 13 °C/55 °F)

Rotary switch on adapter in position 2, multimeter on measuring range 0 – ∞ ohm, ignition switched off, disconnect plug of throttle valve switch, read indicator.

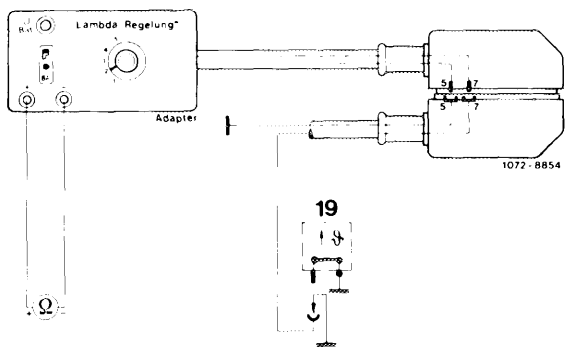
Readout	
0 ohm	∞ ohm

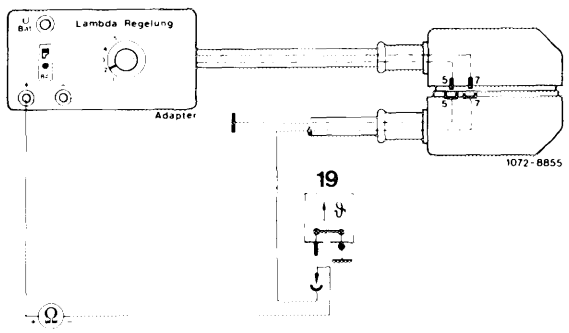


Pull plug of temperature switch and connect to ground.

If readout is 0 ohm, renew temperature switch.

If readout is ∞ ohm, check line of control unit plug (terminal 7) to temperature switch for break.





End of test

III. Testing temperature switch oil 16 °C/61 °F (engine oil temperature > 20 °C/68 °F)

Rotary switch on adapter in position 2, multimeter on measuring range 0—∞ ohm, ignition switched off.

Disconnect plug of throttle valve switch (arrow). Read indicator.

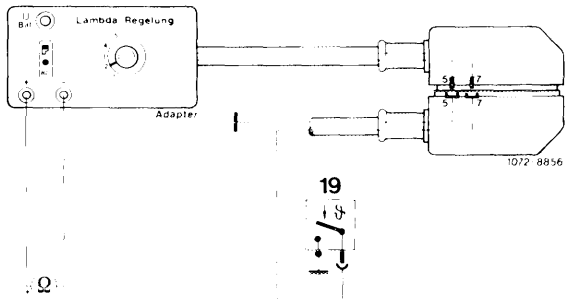
Readout	
∞ ohm	0 ohm

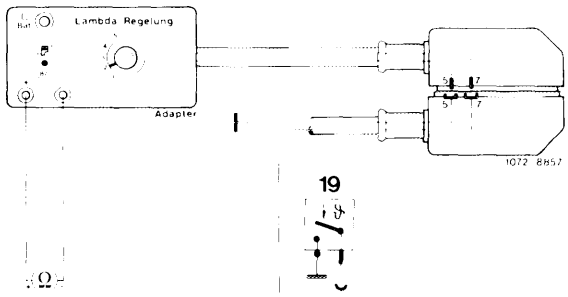
Pull plug on temperature switch.

If readout is ∞ ohm, renew temperature switch.

If readout is 0 ohm, check line from plug of control unit (terminal 7) to temperature switch for ground connection.

End of test





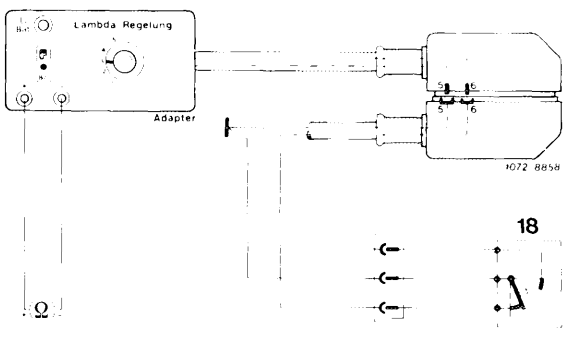
IV. Testing throttle valve switch (idle speed stop, engine oil temperature > 20 °C/68 °F)

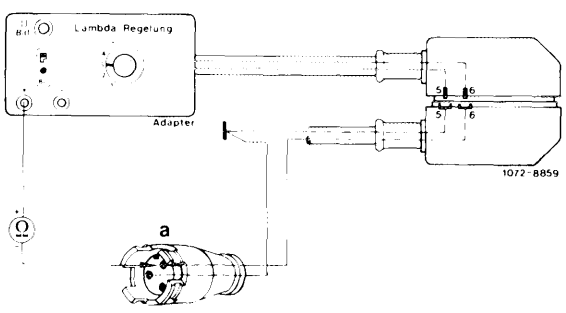
Rotary switch on adapter in position 3, multimeter on measuring range 0—∞ ohm, ignition switched off.

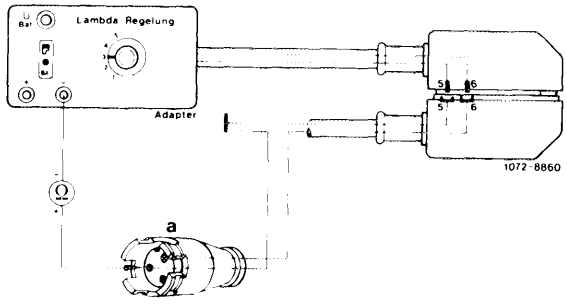
Regulating linkage at idle speed stop. Read indicator.

Readout	
Idle speed stop 0 ohm	∞ ohm
Lightly operate regulating linkage ∞ ohm	0 ohm

Disconnect plug of throttle valve switch.
Check lines from plug (a) to plug of control unit (terminal 6 or 15) for break according to wiring diagram.
If lines are in order, renew throttle valve switch.







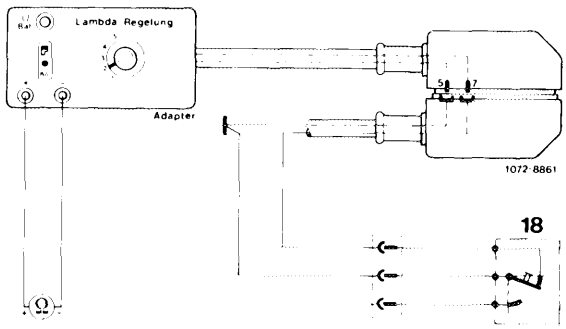
End of test

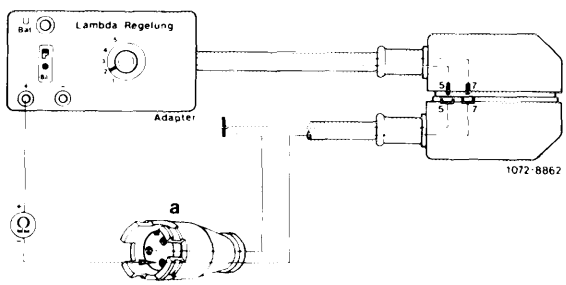
V. Testing throttle valve switch (full throttle stop, engine oil temperature > 20 °C/68 °F)

Rotary switch on adapter in position 2, multimeter on measuring range 0—∞ ohm, ignition switched off.

Plug on temperature switch oil pulled off. Regulating linkage at full throttle stop. Read indicator.

	Readout
Full throttle stop 0 ohm	∞ ohm
Slightly release regulating linkage ∞ ohm	0 ohm





Disconnect plug of throttle valve switch. Check line from plug (a) to plug of control unit (terminal 7) for break. If line is in order, renew throttle valve switch.

End of test

VI. Testing frequency valve

Rotary switch of adapter in position 4, multimeter on measuring range 0–30 volts, ignition switched on, operate starter. Read indicator.

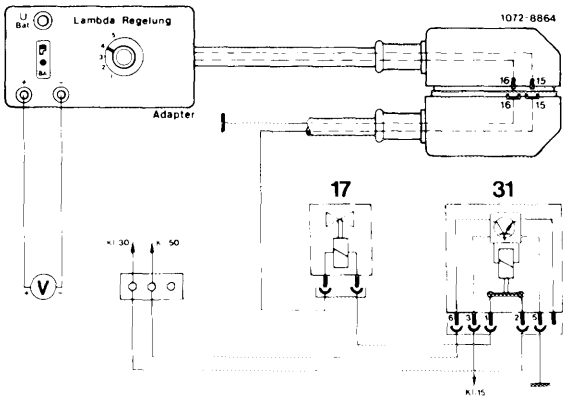
Readout	
approx. 12 volts	0 volt

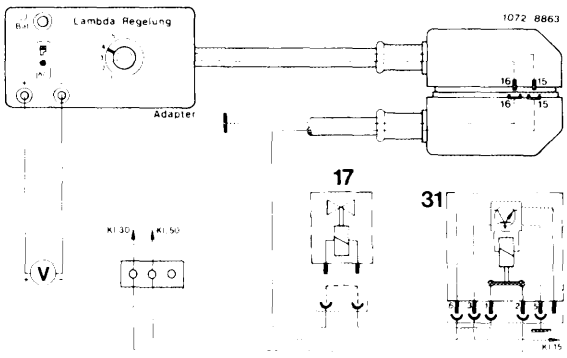
Pull plug from frequency valve and bridge. Operate starter. Readout 12 volts: replace frequency valve.

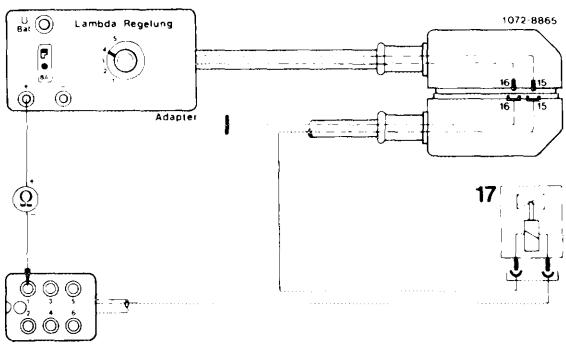
Readout 0 volt: switch off ignition, multimeter to measuring range 0–∞ ohm.

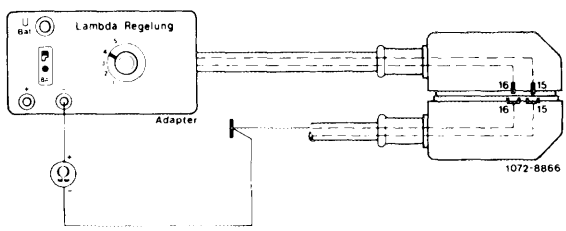
Test line from plug (control unit, terminal 15) to plug of electronic fuel pump relay (terminal 1), as well as line from plug of control unit (terminal 16) to ground connection point in legroom at the right under instrument panel for break.

End of test









VII. Testing supply line to oxygen sensor

Rotary switch on adapter in position 5, multimeter on measuring range 0—∞ ohm, ignition switched off, plug oxygen sensor disconnected. Read indicator.

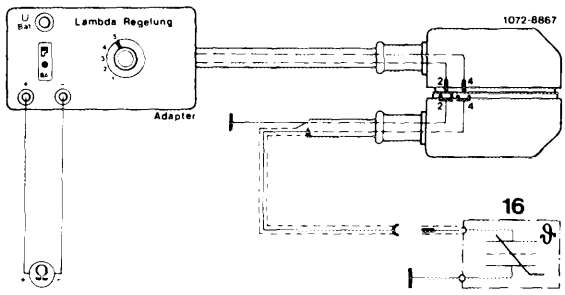
Readout	
∞ ohm	0 ohm

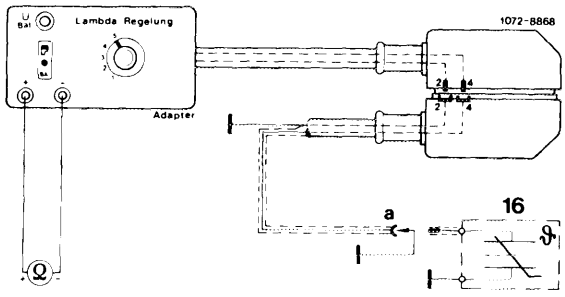
Line from plug of oxygen sensor to plug of control unit shorted.

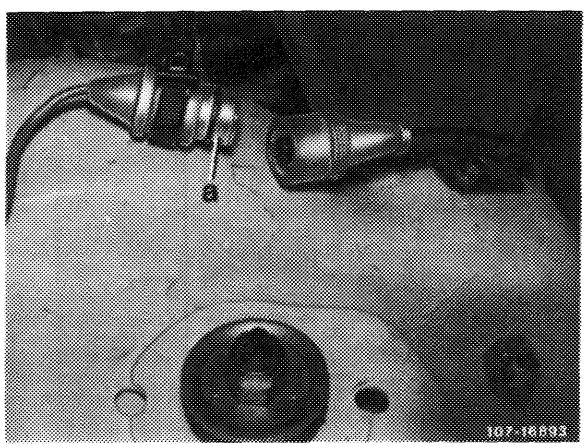
Connect plug member (a) to ground.

Readout 0 ohm, line in order.

Readout ∞ ohm, line interrupted.







End of test

Test section B

Test conditions: Remove adapter, connect plug to control unit. Connect tester on/off ratio to diagnosis socket.

Start engine (plug of oxygen sensor connected).

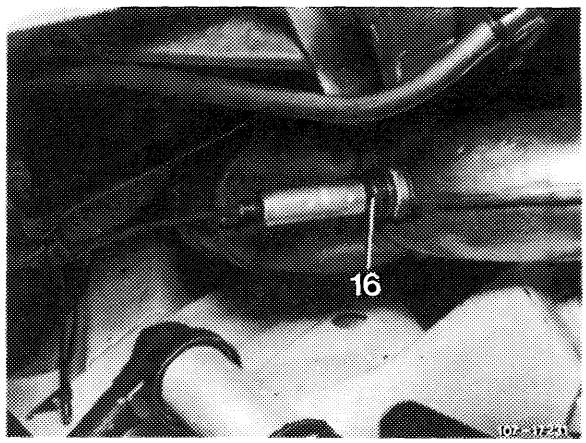
VIII. Testing oxygen sensor

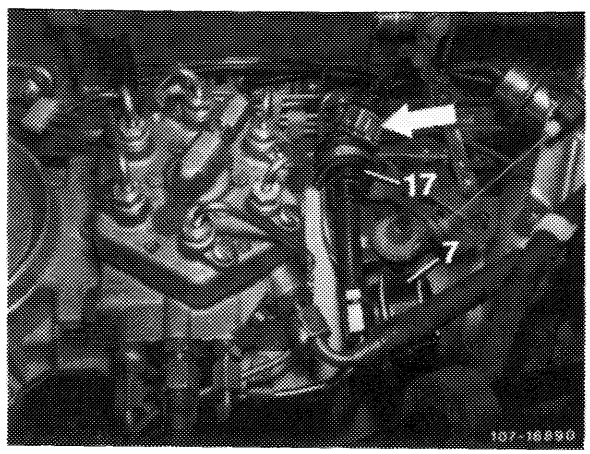
Temperature of oxygen sensor below + 300 °C/ 572 °F. Read indicator on/off ratio.

Readout	
constant 50 %	constant 92 %

Oxygen sensor shorted, renew oxygen sensor.

End of test





IX. Testing frequency valve (17)

Engine oil temperature > 20 °C/68 °F. Engine at idle.

Place one hand on frequency valve.

Frequency valve noticeably operating.	Frequency valve not operating.

Renew frequency valve.

End of test

X. Testing lambda control

Engine oil temperature approx. 80 °C/176 °F.
Engine at idle (750 ± 50/min).

Read indicator on/off ratio.

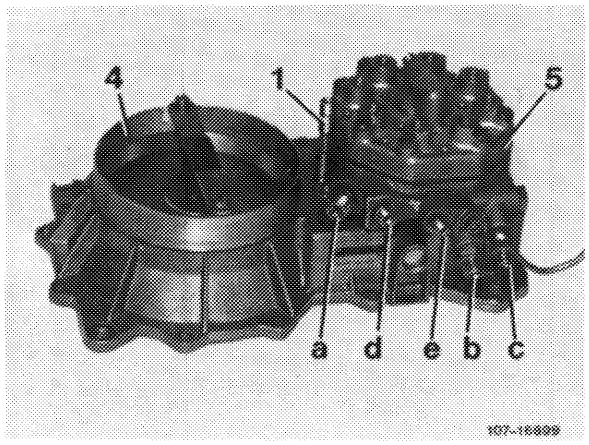
Readout	
between 40–60 %	< 40 % or > 60 % Constant 50 %

Adjust on/off ratio on mixture regulating screw (1) in such a manner that readout is around 50 ± 5 %.

If on/off ratio cannot be regulated, check thermovalve 50 °C/122 °F (37) for passage.
If passage is clear, renew control unit.

Readout constant 50 %, oxygen sensor defective, renew.

End of test

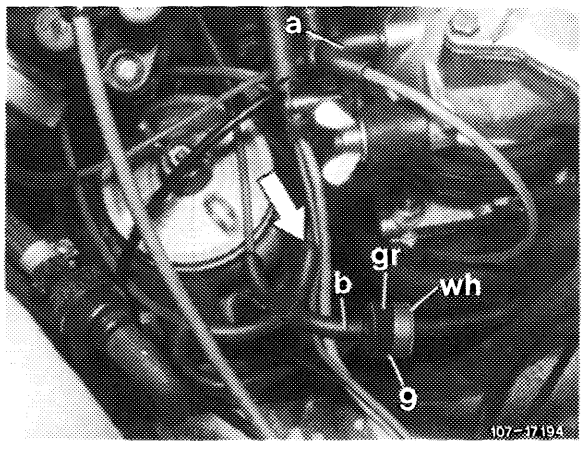


XI. Testing air injection

Engine oil temperature approx. 80 °C/176 °F, engine at idle (750 ± 50/min), pull blue/purple vacuum line (a) from air guide housing. Close vacuum line with finger for a short moment.

Read indicator on/off ratio.

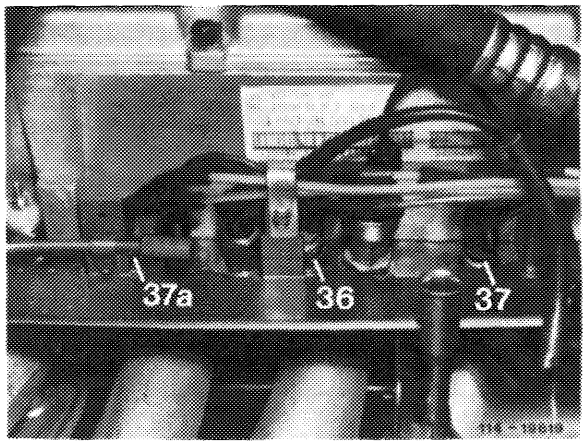
Readout	
Constant > approx. 87 %	Remains constant



Testing vacuum lines

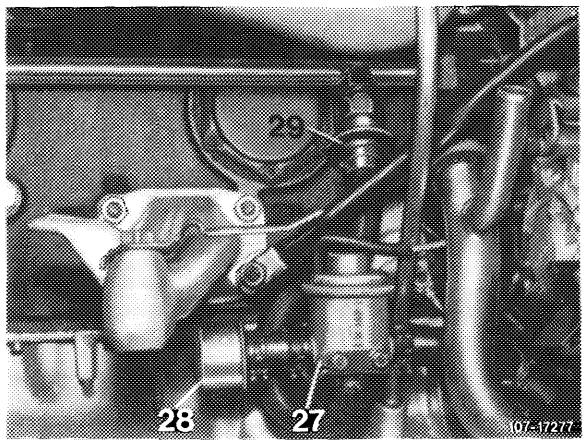
The blue/purple vacuum line from air guide housing leads to straight connection of thermovalve (37), the blue/purple vacuum line from diverter valve (27) leads to straight connection of thermovalve (36).

Thermovalves (36 and 37) are connected to the diagonal connections by means of a 3-point distributor. From there, a blue vacuum line leads to 4-point distributor, which is connected to the intake manifold by means of orifice (9) and a rubber hose.



Testing vacuum

Pull 3-point distributor from diagonal connections of thermovalves (36 and 37) and check for presence of vacuum at distributor. If there is no vacuum: blow out connection on intake manifold with compressed air.

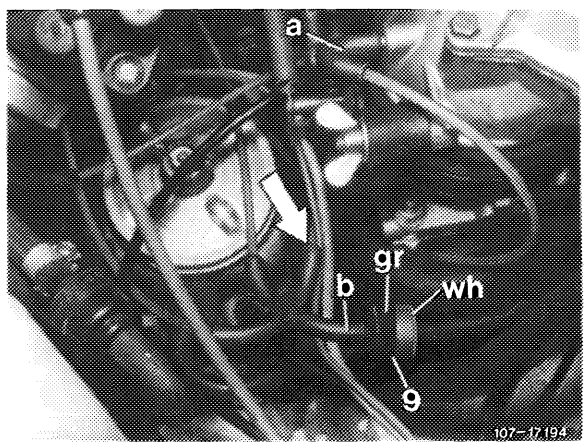


Check 3-point distributor, blue vacuum line, 4-point distributor, orifice (9) and rubber hose for passage.

If vacuum is present: check thermovalves (36 and 37) for passage and renew, if required.

If passage is available on both thermovalves, renew diverter valve (27).

If readout of on/off ratio is still constant upon completion of these tests, check V-belt tension and delivery capacity of air pump.

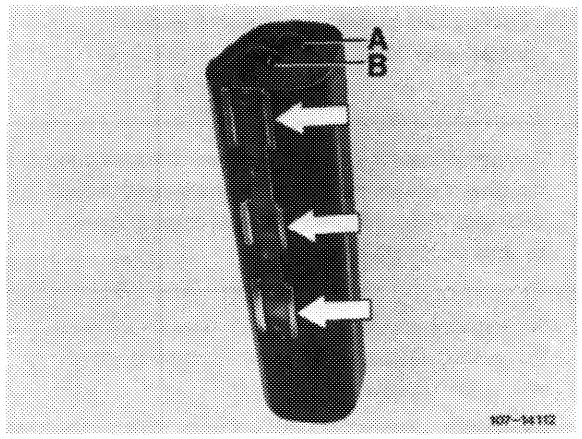


End of test

XII. Testing fuel evaporation control system model year 1980

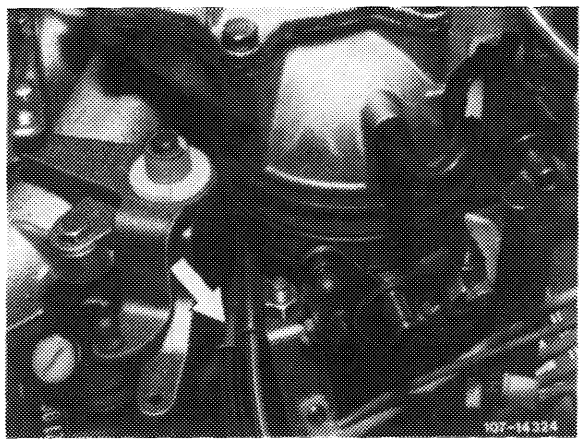
Pull draw-off hose (A) toward throttle valve housing from charcoal canister and keep closed with one finger. Slowly increase engine speed above approx. 2000/min.

No vacuum at idle. Increasing vacuum with increasing speed.	No vacuum increase with increasing speed.



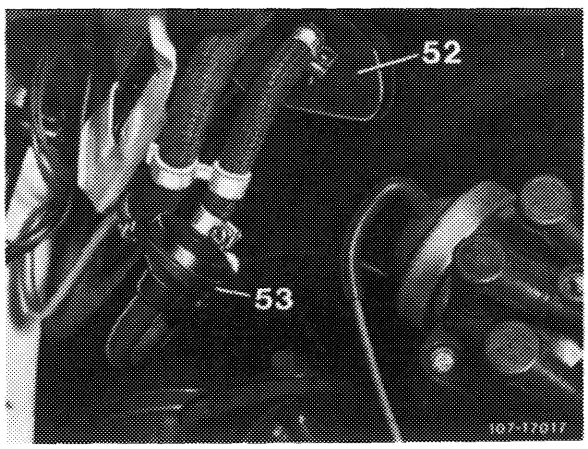
Checking draw-off connection and purge valve

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



If there is still no vacuum, pull off draw-off hose in front of purge valve (53) and repeat checkup.

If vacuum is present, renew purge valve.

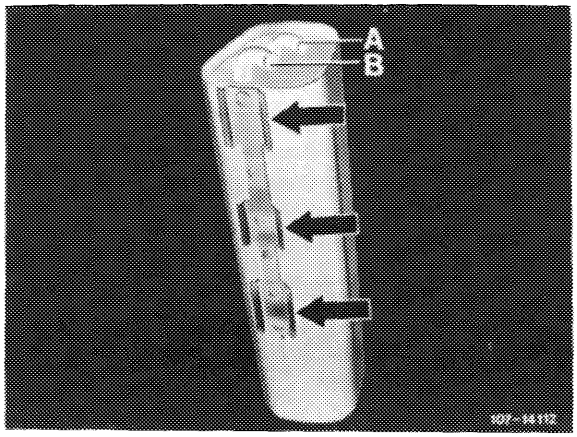


End of test

XII. Testing fuel evaporation control system model year 1981

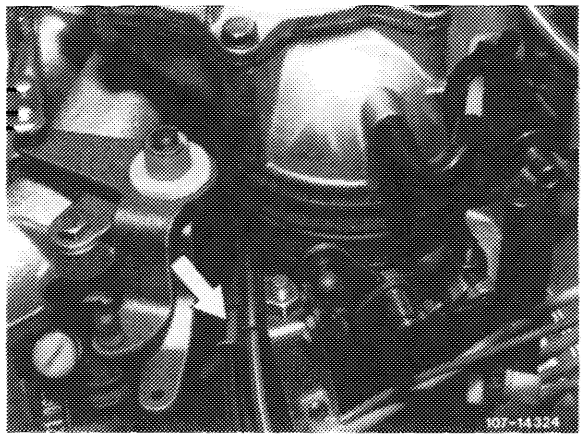
Pull off draw-off hose (A) toward throttle valve housing from charcoal canister and keep closed with one finger. Slowly increase engine speed to approx. 2000/min.

No vacuum at idle. Increasing vacuum at increasing speed.	No vacuum increase at increasing speed.



Checking draw-off connection

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

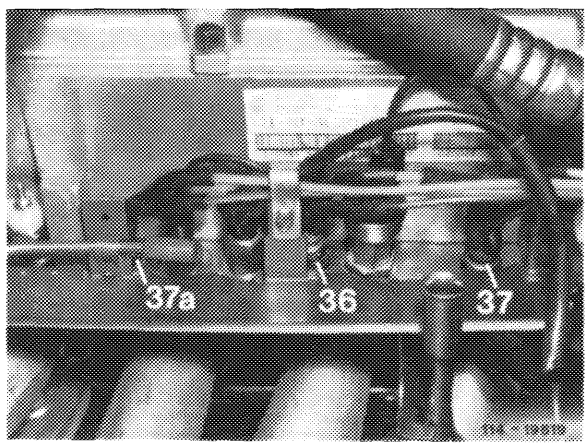


If there is still no vacuum:

Checking thermovalve (37a) and purge valve (53)

Pull off white/purple/black vacuum line on purge valve and check for presence of vacuum.

If vacuum is present, renew purge valve, if not, renew thermovalve.



End of test