Model Year 1978

AUS

service

Introduction into service

Daimler-Benz Aktiengesellschaft
Stuttgart-Untertürkheim
Zentralkundendienst

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With this introduction into service publication we would like to introduce to you the Australia version models for the model year 1978.

The following models are not new for you, but do have several modifications.

240 D	(123.123)
300 D	(123.130)
230	(123.023)
250	(123.026)
280 E	(123.033)
280 SE	(116.024)
450 SE	(116.032)
450 SEL	(116.033)
450 SL	(107.044)
450 SLC	(107.024)

New models:

280 CE	(123.053)
280 SEL	(116.025)

This introduction into service publication is intended to inform you concerning the details and of modifications necessary to carry out maintenance and repairs until supplements for the Workshop Repair Instructions are published.

Daimler-Benz Aktiengesellschaft
Zentralkundendienst

September 1978

Contents

Sales Designation	Model	Engine	Transmission Manual	Transmission Automatic	Power Steering
240 D	123.123	616.912	716.055 (G76/18C)	722.117 (W4B 025)	765.704 (LS 90)
300 D	123.130	617.912		722.118 (W4B 025)	
230	123.023	115.954	–	722.119 (W4B 025)	
250	123.026	123.920	–	722.113 (W4B 025)	
280 E	123.033	110.984	–	722.112 (W4B 025)	
280 CE	123.053	110.984	–	722.112 (W4B 025)	
280 SE	116.024	110.985	–	722.112 (W4B 025)	765.702 (LS 90)
280 SEL	116.025	110.985	–	722.112 (W4B 025)	
450 SE	116.032	117.986	–	722.004 (W3A 040)	
450 SEL	116.033	117.986	–	722.004 (W3A 040)	
450 SLC	107.024	117.985	–	722.004 (W3A 040)	765.701 (LS 90)
450 SL	107.044	117.985	–	722.004 (W3A 040)	

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

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

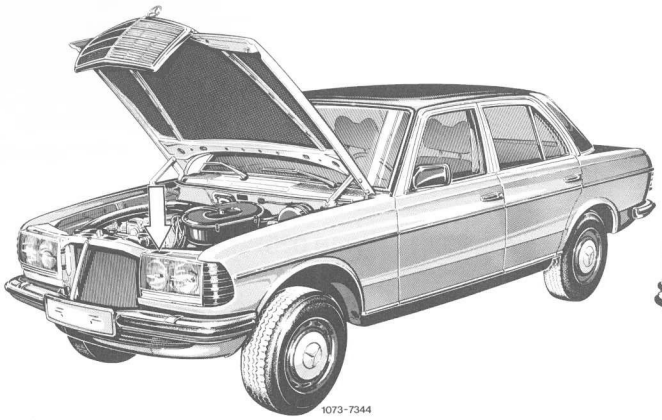


Fig. 1 Model 123

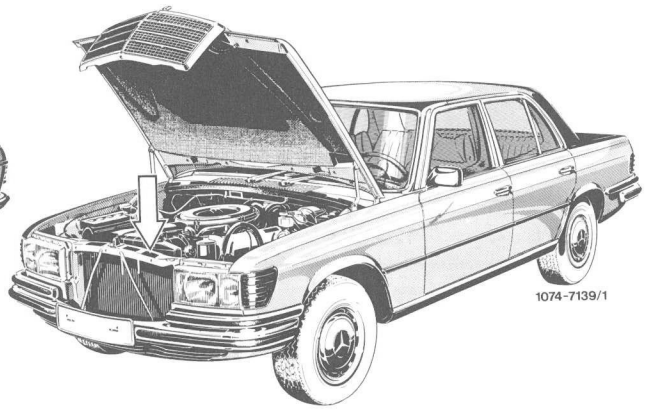


Fig. 2 Model 116

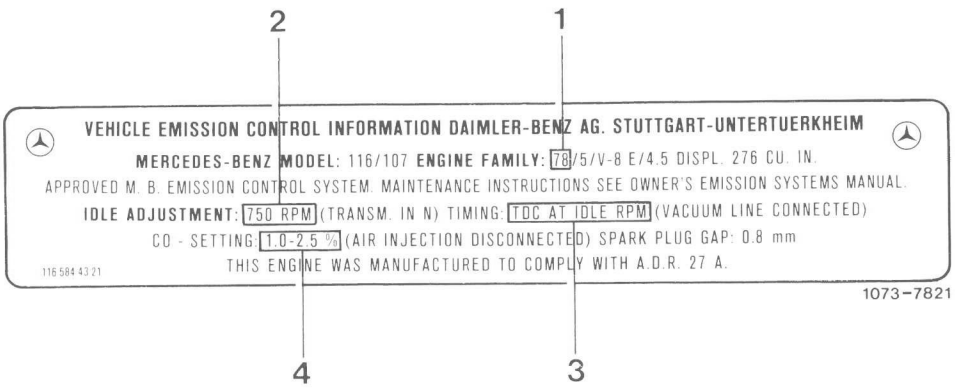


Fig. 3
1 Model year designation
2 Idle speed
3 Ignition timing at idle speed
4 CO level at idle speed

On vehicles with diesel engines an information plate is glued on the cylinder head cover. This plate bears the vehicle production data and its basic color is black with silver lettering.

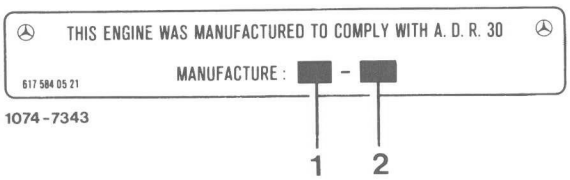


Fig. 4
1 Month of manufacture
2 Year of manufacture

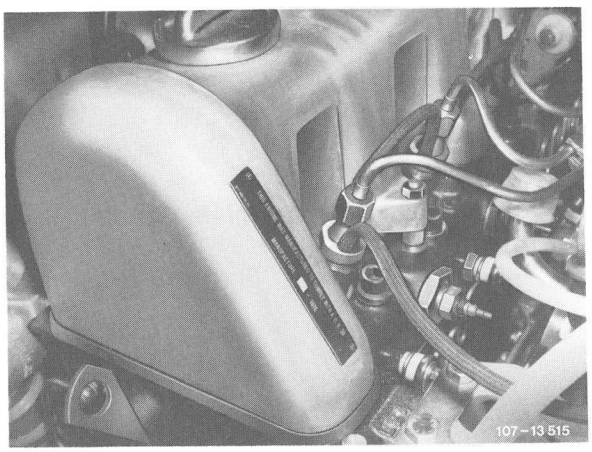


Fig. 5

Spark Plugs

Spark plugs with a heat range of 145 are installed. The electrode gap has been increased to 0.8 mm.

Exhaust Manifold

Exhaust manifolds have a spherical exterior to provide a better seal between the exhaust manifolds and front exhaust pipes.

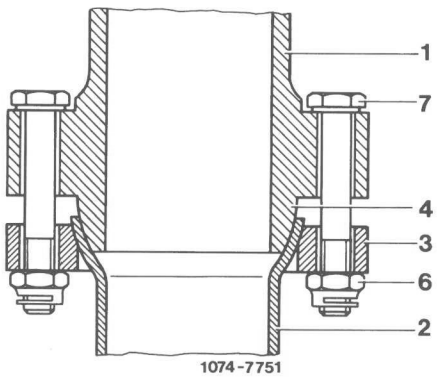


Fig. 6

Brakes

The differential pressure indicator is omitted on all models with a stepped tandem brake master cylinder as from model year 1978.

To fulfill legislative stipulations, the stepped tandem brake master cylinder is installed with a larger double-chamber brake fluid reservoir and two fluid level sensors.

Since each camber has its own fluid level sensor, a loss in brake fluid would be reported shortly after failure of a circuit.

Lamp Reminder Buzzer

If a source of light (high beams, low beams or parking lights) are not switched off, a buzzer will sound when the ignition key is removed and the left or right front door is opened.

The buzzer is operated by the front door contact switch for the inside light. If the lights are not turned off in spite of the reminder, the buzzer will stop when the front doors are shut.

Wiring Diagram

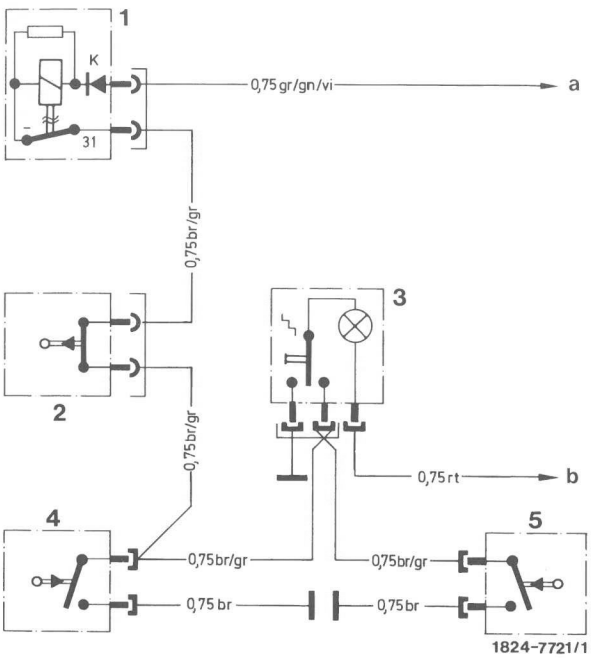


Fig. 7

a To light switch term. K 30
b Fuse box term. 30
1 Buzzer
2 Buzzer contact
3 Ceiling lamp with switch
4 Contact switch, left
5 Contact switch, right

The buzzer is mounted on the back of the instrument cluster's printed circuit (Fig. 8). Consequently when defective it can only be replaced together with the printed circuit.

The buzzer contact is located on the steering lock (Fig. 9). The door contact switches for inside lighting are not new. Only the wiring has been changed since introduction of the buzzer. The door contact switches now operate minus (previously plus).

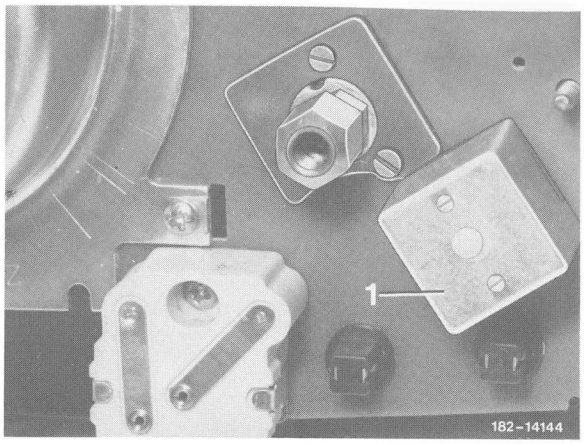


Fig. 8
1 Buzzer

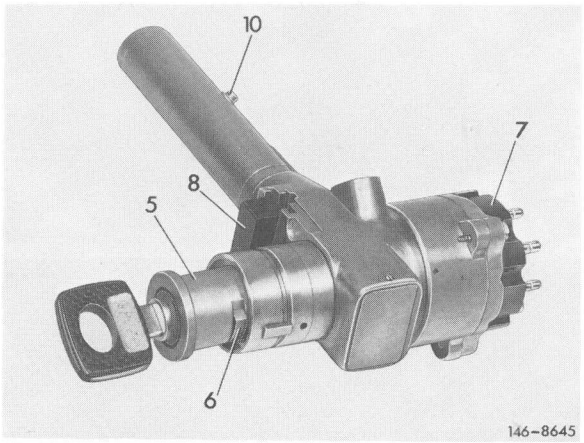


Fig. 9
8 Buzzer contact

Note: A lamp reminder buzzer similar to that of Series 123 is planned for future use in Series 107 and 116.

Second Horn

As for model 123.03 all models of series 123 will have a second horn with a higher sound.

Power steering 765.704 (LS 90) has a more indirect ratio.

In center position the ratio of this steering is 16.23 and the total ratio is 16.55. The steering stops of cars with power steering are no longer on the steering arms and frame cross members, but in the steering case.

For identification the steering is marked with "A" * (letter A and asterisk).

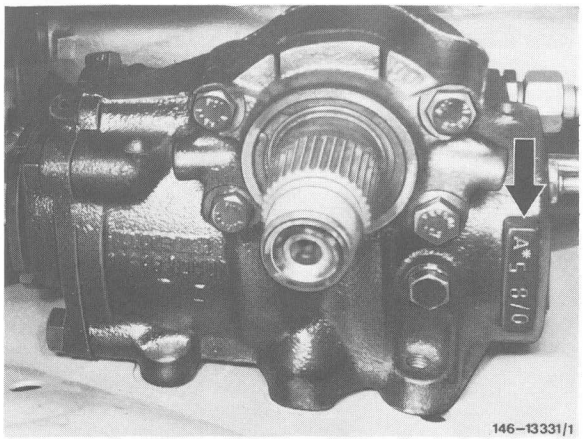


Fig. 10

Identification of steering

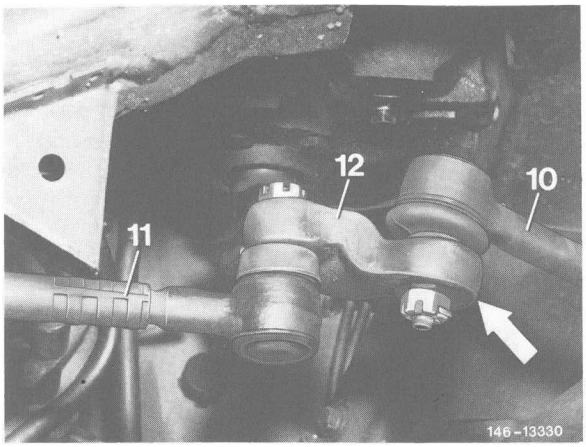


Fig. 11

Steering arm without stop

If repairs require the replacement of the steering, make sure that only a steering with an inside stop ("A" * mark) is installed. The steering has Part No. 123 460 5901.

Fig. 12

Fig. 13

General Information

The design of the new coupe 123.053 (280 CE) is based on the sedan series 123.

The coupe 123.053 has engine 110.984 already known from sedan 123.

This section will deal with all of the things which deviate from sedan 123. All testing and adjusting values not given in this section can be taken from other publications already published.

General Description

The new coupe of model series 123 has a total length of 4640 mm and is 85 mm shorter than the sedans 123. The width is the same with 1786 mm. And it is 43 mm lower, having a height of 1395 mm. The reduction in total length is the result of shortening the wheelbase by 85 mm.

In spite of elegant coupe styling, many parts are used from sedan manufacturing.

These are, for example, front end, front fenders, engine hood, radiator panel, bumpers, trunk lid, rear center panel, the entire heating and ventilation system, instrument panel and center console.

Completely new on the other hand is the entire roof assembly with windshield and rear window, the main floor plate, both doors, the rear fenders as well as all seats including head restraints.

Interior Equipment

Instrument panel and center console are lined with rootwood veneer; seat covers and carpets are of the same quality as those for model 123.033 (280 E).

Seats

Both front seats are standard with seat height adjustment. Backrests are locked in position by vacuum coming from engine. When door is opened backrest can be folded forward for access to rear seats; when door is closed lock can be released by button in pertinent seat backrest.

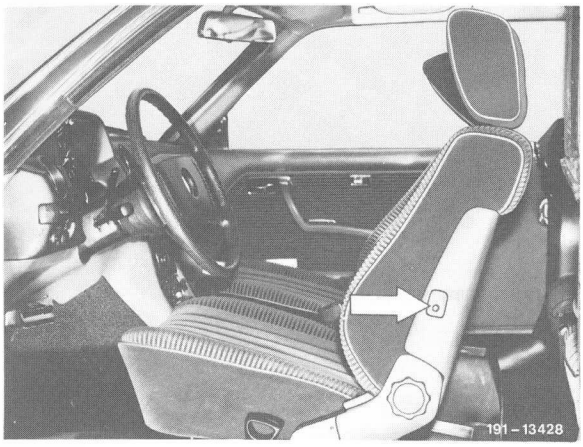


Fig. 14

Backrest unlocking button

The one-piece rear seat has an optical division in form of a center cushion.

Fig. 15

Rear seat center cushion

Removal of this center cushion provides an additional tray in the rear. The rear ash tray is installed in front of this tray.

In contradiction to the front seats with a steel spring core, the rear seat core consists of foam rubber. A fold-down arm rest is installed in the backrest as for all sedans.

Backrest and seat cushion surfaces are ergonomically designed.

Fig. 16

Tray with ash tray between rear seats

Seat Belts

Retractors for belts of driver's seats are installed in the box type pillars and, as optional extra equipment for rear seats, underneath the rear pillar trim.

Fig. 17
Front and rear seat belts

Door and Rear Side Windows

A new window regulator has been designed to guarantee proper function of the large side windows of coupe doors. This window regulator with additional support at bottom is improved considerably over that for the previous model (coupe 114).

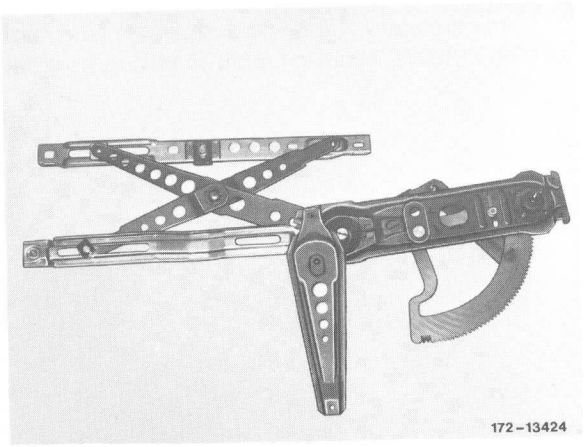


Fig. 18
Window regulator for driver's door

The rear side window regulator with through-type center guide linkage and similar lateral guide is the same as that of coupe 107.

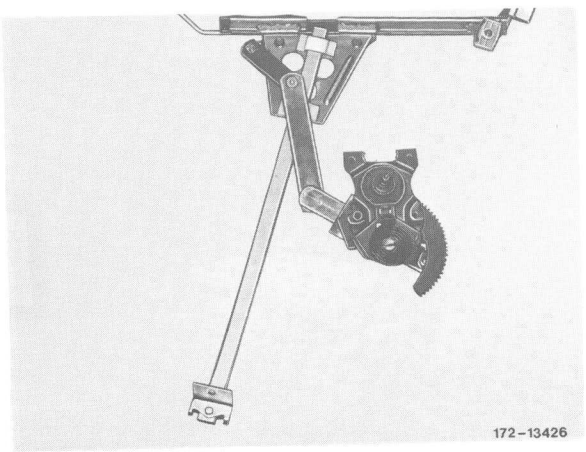


Fig. 19
Rear side window regulator

Door and rear side windows can be lowered completely (without a disturbing frame).

Fig. 20
Roof assembly with side windows open

Fuel Tank Flap

There is a recess in rear fender near upper rear corner of flap to facilitate opening and closing the fuel tank flap.

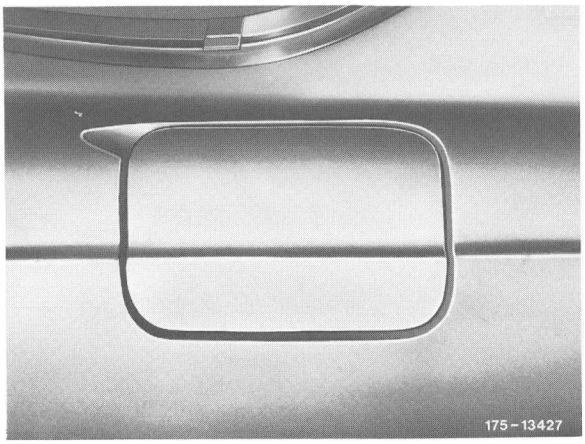


Fig. 21
Recess in rear fender

Twin elements, as known from moedel 116, are installed in central locking system of model 123.053.

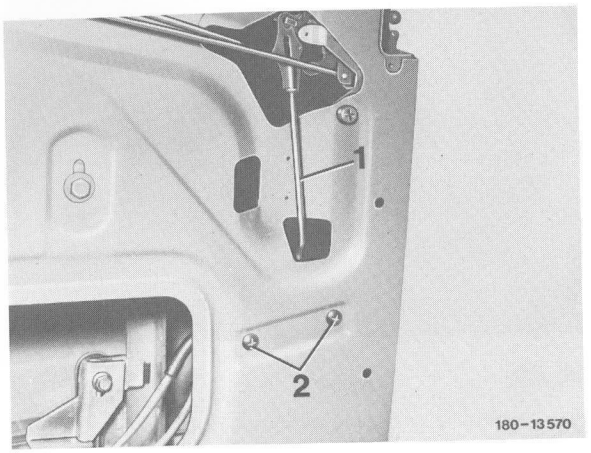


Fig. 22
1 Shift rod
2 Oval head screws

Distributor connectors are no longer located underneath instrument panel on left and right sides, but now in driver's floor plate underneath carpet of footwell on front right hand side.

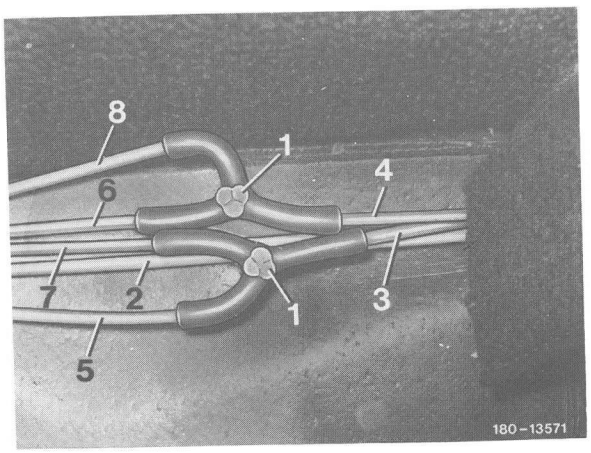


Fig. 23
1 Distributor
2 Suction line (vacuum supply tank)
3 Locking line, vacuum element of flap for tank filler neck and trunk lid
4 Unlocking line, vacuum element, trunk lid
5 Locking line, left, side
6 Unlocking line, left, side
7 Locking line, vacuum element, driver's door, right
8 Unlocking line, vacuum element, driver's door, right

Straightening set ENS 218 is for body repairs on coupe. Since wheelbase is shorter, fixtures 39, 44, 52 an 53 must be mounted on straightening bench further forward by 85 mm.

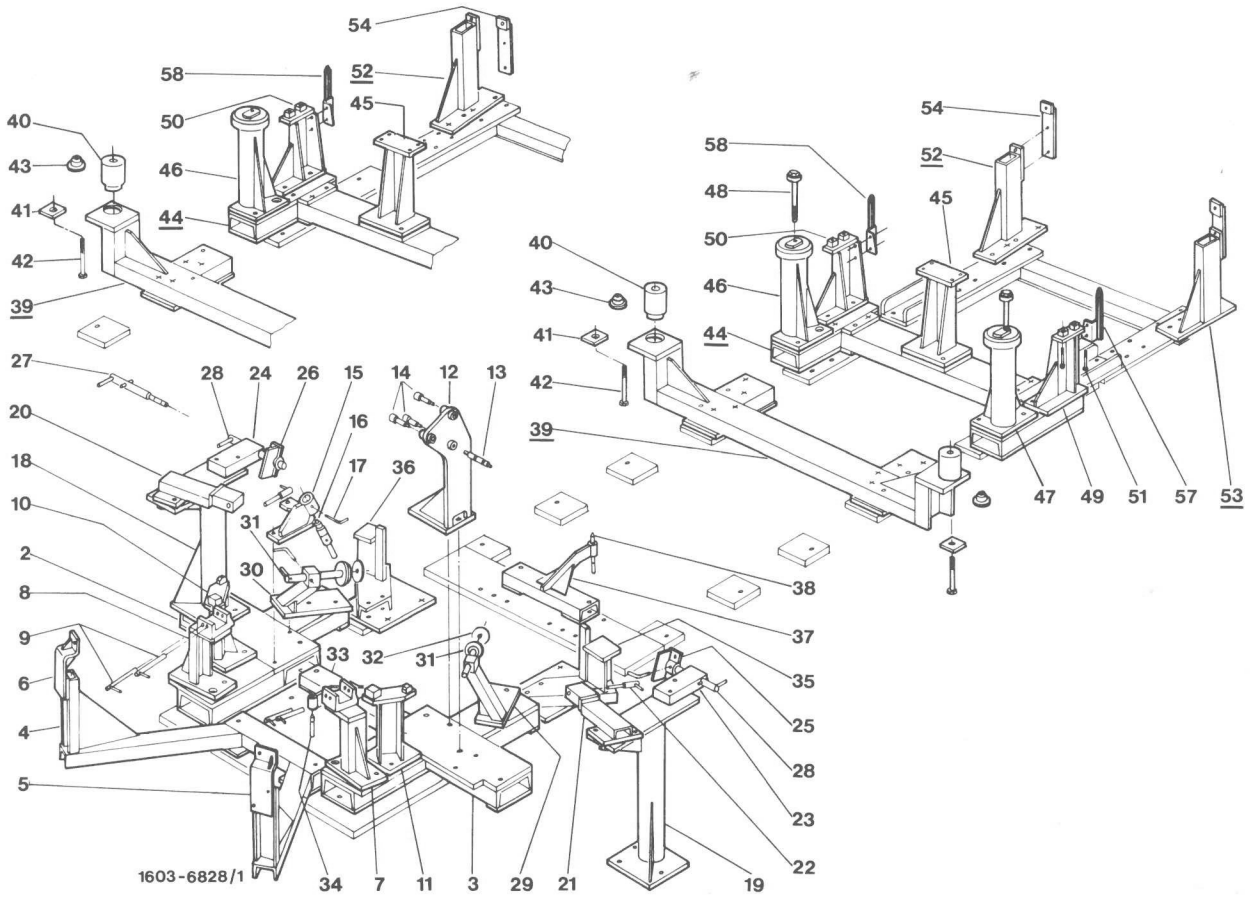


Fig. 24

Straightening set ENS 218

2, 3	Supports for fixture groups
4	Carrier for front cross member fixture 5 and 6
5, 6	Fixtures for front cross member
7, 8	Fixtures for bottom control arm bearing
9	Checking and locating plug for item 7 and 8
10, 11	Fixture for front side member
12	Fixture for steering gear attachment
13	Check plug for steering fixture
14	Fastening plug
15	Fixture for intermediate steering lever bearing
16	Checking and locating plug for item 15
17	Locking plug
18, 19	Carrier for fixtures 20, 21, 23, 24
20, 21	Fixture for upper control arm bearing
22	Checking and locating plug for upper control arm bearing
23, 24	Guide piece for torsion bar bearing
25, 26	Adaptor for torsion bar bearing
27	Check plug for torsion bar bearing
28	Locating plug for adaptor item 25 and 26
29, 30	Guide piece for brake support
31	Checking and locating plug for brake support
32	Mounting plate for brake support
33	Fixture for checking and locating plug in cross member
34	Check pin for item 33
35, 36	Fixtures for side member connecting shell
37	Fixture for check bore
38	Check pin for item 37
39	Fixture for rear axle supporting bearing
40	Spacer
41	Washer
42	Fastening screw
43	Centering sleeve
44	Cross member for fixtures 45, 46, 47, 49, 50
45	Fixture for cross member above rear axle
46, 47	Fixture for spring retainer rear
48	Fastening screw for item 46 and 47
49, 50	Fixture for torsion bar bearing of rear axle
51	Fastening screw for item 49 and 50
52, 53	Carrier for fixtures 54
54	Fixture for cross member rear
57, 58	Guides for side member rear

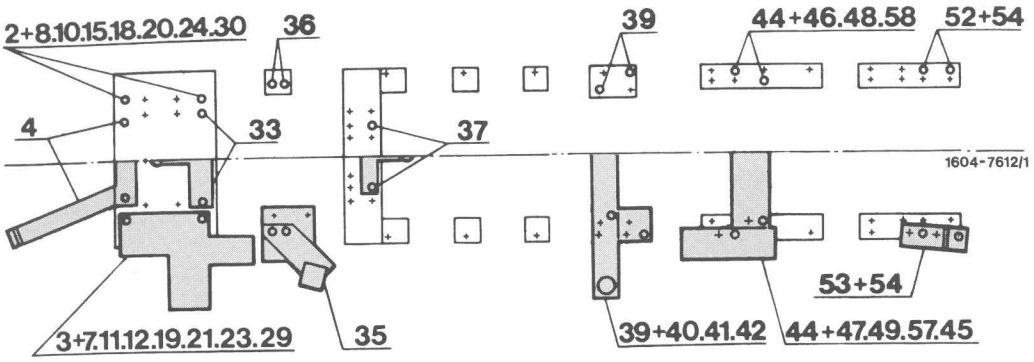


Fig. 25

Hole locating diagram of Celette straightening bench and straightening fixture installation plan.

The coupe 123.053 (280 CE) is equipped with the same rims and tires as the sedans with 2.8 liter engines.

Rims and tires

Model	Rim	Summer tire radial tire	Winter tire radial tire
123.053	6 J x 14 H2	195/70 HR 14 tubeless	195/70 SR 14 M + S tubeless

Rims

Designation	Make	MB part number	Remarks
Steel rims (standard version)			
6 J x 14 H2	Kronprinz Lemmerz Südrad	108 400 14 02	without inboard ventilation ring
Aluminium rims (special version)			
6 J x 14 H2	Mercedes-Benz	108 400 09 02	spare part delivery scope (wheel cover, special metal valve for tubeless tires and spherical collar bolts) 108 400 21 02

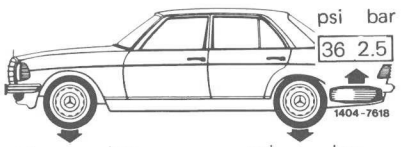
Approved makes of tires

Summer tires		Winter tires	
195/70 HR14 tubeless	Continental TS 792 Dunlop SP Sport D 1 Michelin XVS-P	195/70 SR 14 M + S tubeless	Continental CONTACT TS 730 Uniroyal Rallye M + S "PLUS"

Tire Pressure

Cold tires:

For driving up to 100 mph (160 km/h)



psi	bar	psi	bar
28	2.0	32	2.2

For driving above 100 mph (160 km/h)
+ 4 psi (+ 0.3 bar)

Warm tires:

after low-speed operation	+ 4 psi (+ 0.3 bar)
after high-speed operation	+ 8 psi (+ 0.5 bar)

Tire pressure label
Model 123.053

Part No.	Basic color	Letters
123 584 00 39	silver	red

Chassis Measurements

Level of ready-to-drive vehicle

Model	Suspension Version	Front Axle Control Arm Position mm	Rear Axle Trailing Arm Position mm
123.053	Standard suspension **without** level control	50 ± 10 / 14	46 ± 8 / 12
	Standard suspension **with** level control		32 ± 8 / 12

Loaded Rear Axle Vehicle Level for Cars with Level Control

Model	Vehicle Load [1])	Suspension Version	Rear Axle Trailing Arm Position [2])
123.053	ca. 150 kg in trunk or ca. 120 kg rear trailer load[3])	Standard suspension (normal vehicle level)	+ 12 ± 10 mm[4])[5])

[1]) Before loading, the vehicle must be in a ready to drive state.
[2]) Adjusting procedures:
Detach connecting rod at level regulator.
Operate lever of control regulator with engine running for so long, until specified trailing arm position is reached.
Lock control regulator's lever in position with a pin.
Adjust connecting rod to given length and attach, then remove pin.
[3]) Mount trailer load on bumper brackets.
[4]) For cars with level control the tolerances for the trailing arm position are only in reference to testing. Nominal values apply to adjusting. Tolerances are the result of the level regulator's dead travel; but they are without influence on control accuracy when car is operated.
[5]) For hauling trailers the trailing arm position can be adjusted to the lower tolerance limit when the ball joint height of the hitch is too high.

Additional mechanical chassis measurements

The 85 mm shorter wheel base of the coupe over the sedan is reflected in the effective dimension H 3.

H 3 = 1585 ± 4 mm

All other dimensions for front and rear axle are the same as on the 123 sedans (see microfiche Repair Instructions)

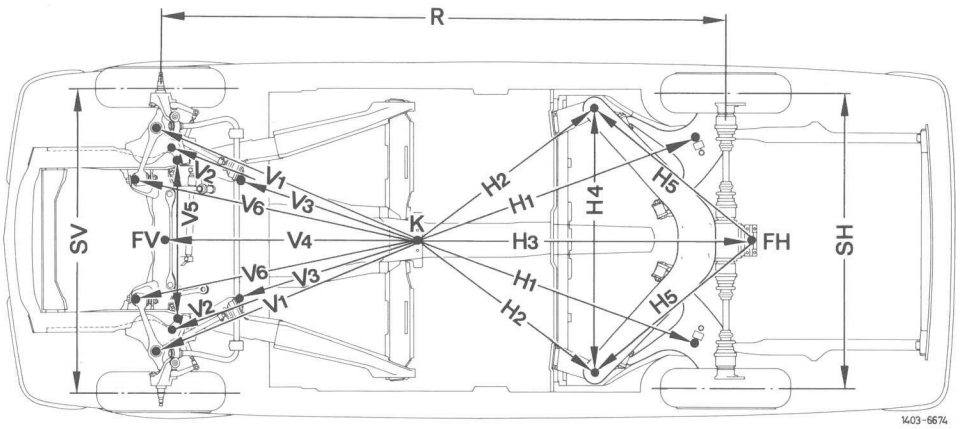


Fig. 26

R Wheel base
SV Track width of front axle
SH Track width of rear axle
K Check bore in frame floor
FV Locating bore in frame cross member for front axle
FH Locating bore in rubber mount of rear bearing of rear axle on frame floor

Wheel adjustment at front axle

Ball joint position

The end stop brackets on the frame cross member and the stop nose on the pitman arm and idler arm have been eliminated with the introduction of the power steering housing with an internal end stop. The checking of the maximum steering lock position is no longer required.

The dimension "a" for the ball joint position is now:

$a = 121 \begin{matrix} +\ 4.5 \\ -\ 2.5 \end{matrix}$ (118.5 to 125.5) mm

Note: The idler arm without stop nose 123 463 28 10 (code 2328) used for standard production of the coupe is installed without a washer to give the ball joint position.

Since introduction of the final idler arm 123 463 30 10 (code 2330) the 3.5 mm thick washer 115 463 00 52 is installed between the arm and bracket.

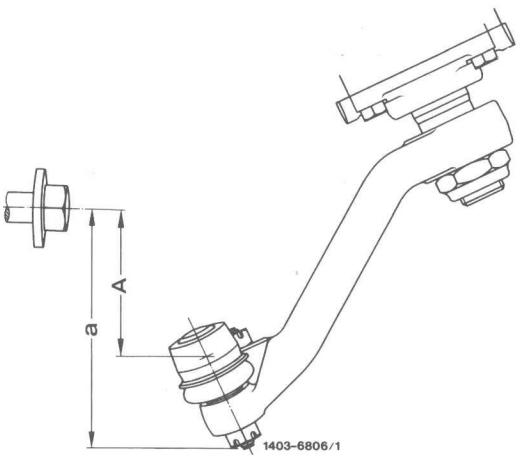


Fig. 27

Wheel adjustment at rear axle

The values for toe-in and rear wheel camber of the coupe since the beginning of series production are slightly different than those for the sedans (see tables). The mounting points for the trailing arms have been modified accordingly on the rear axle carrier.

Values for Wheel Adjustment Ready to Drive	Model 123.053	
Toe-in of rear wheels at semi-trailing arm position	0 to + 35 mm	0° 30′ ± 15′ or 3 ± 1.5 mm
	+ 35 to + 50 mm	0° 35′ ± 15′ or 3.5 ± 1.5 mm
	+ 50 to + 60 mm	0° 40′ ± 15′ or + 4 ± 1.5 mm
Camber of rear wheels	see table: "Comparsion: Semi-Trailing Arm Position of Rear Axle – Rear Wheel Camber"	

Comparison: **Semi-Trailing Arm Position of Rear Axle – Rear Wheel Camber**

Semi-trailing arm position mm	corresponds to rear wheel camber
+ 55	+ 0° 45′ ± 30′
+ 50	+ 0° 30′ ± 30′
+ 45	+ 0° 15′ ± 30′
+ 40	0° ± 30′
+ 35	−0° 15′ ± 30′
+ 30	−0° 30′ ± 30′
+ 25	−0° 45′ ± 30′
+ 20	−1° ± 30′
+ 15	−1° 15′ ± 30′
+ 10	−1° 30′ ± 30′
+ 5	−1° 45′ ± 30′
0	−2° ± 30′

On coupe 123.053 with two-piece drive shaft, the rear shaft has been adopted to the shorter wheel base.

Both shaft sections have a tubing diameter of 60 mm.

Start Ready Indicator for 4 Cylinder Diesel Engines

The 4 cylinder diesel engine is equipped with a start ready indicator to further facilitate operation of car.

Description of Operation

The preheating indicator lamp is now operated by a thermo bimetal switch in the coolant circuit. In this manner the preheating time is matched with the pertinent engine temperature. As soon as the preheating lamp goes out, the engine is ready for starting and can be started immediately.

Wiring Diagram

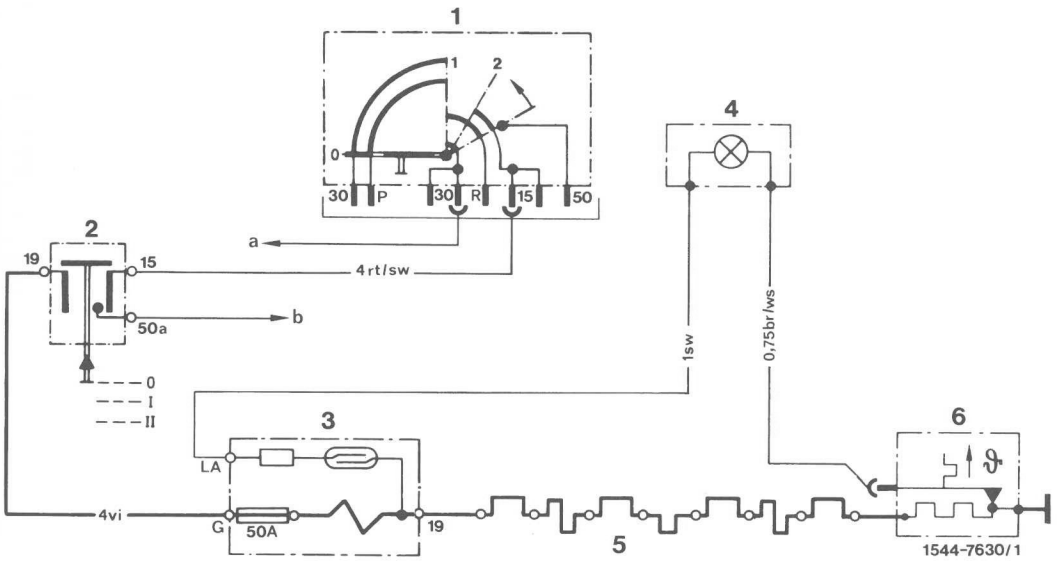


Fig. 28

1 Steering lock switch
2 Glow plug starter switch
3 Fuse box with reed contact
4 Preheating indicator resistors
5 Glow plugs with resistors
6 Thermo bimetal switch

Checking Thermo Bimetal Switch

Measure resistance between connection (see arrow in figure 29) and ground with an ohmmeter (measuring range 0 to ∞.

Ohmmeter must show the following values when thermo bimetal switch functions correctly:

Temperature		Resistance
Below	70° + 6 °C	0
	80 °C	∞

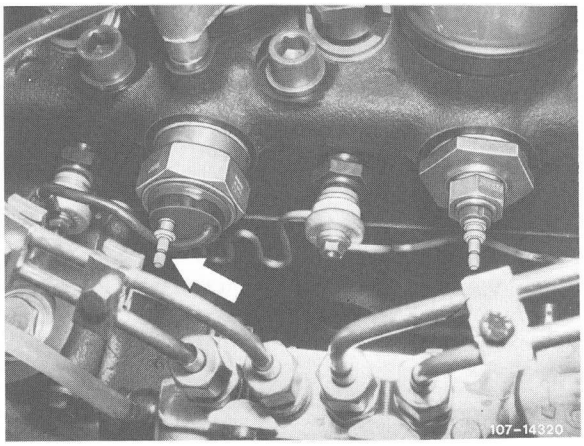


Fig. 29

Alternator

A 55 ampere alternator is installed with engines 616.912 and 617.912, instead of the former 35 ampere alternator.

In place of the former molded rubber part on the end of the fuel tank vent line, a new rubber part with diaphragm has been installed.

The diaphragm will increase the pressure in the tank by approximately 10 mbar. This increased pressure causes an earlier shut-off of the automatic nozzle at the filling station.

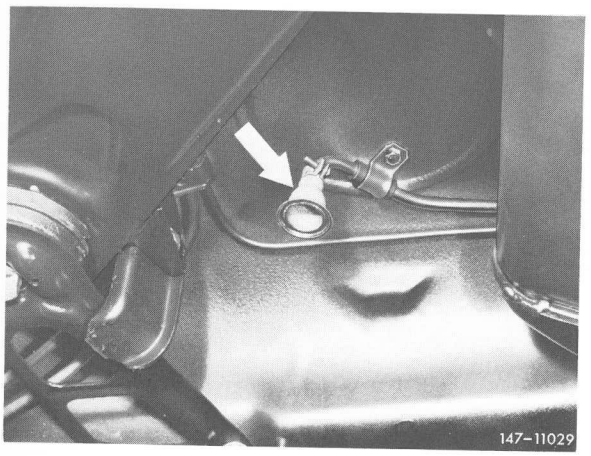


Fig. 30

Arrow, previous version

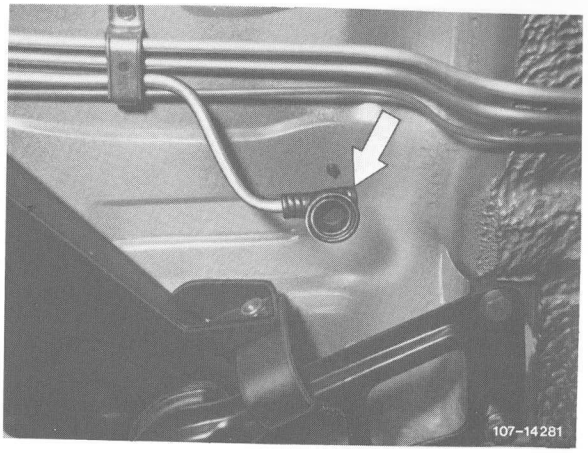


Fig. 31

Arrow, new version

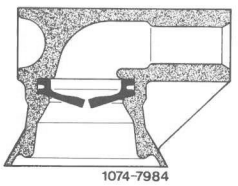


Fig. 32

The stromberg carburetor has been fitted with a pull down delay.

The pull down delay prevents an excessively lean mixture immediately after starting allowing the engine to run smoothly after a cold start.

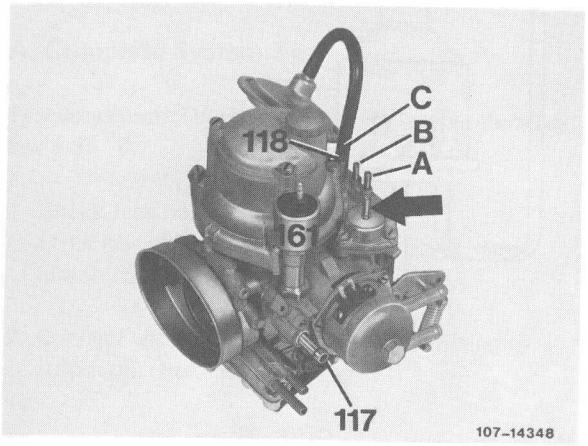


Fig. 33

A Intake air preheating (blue ring)
B Ignition change-over (red ring)
C Throttle lift
117 Connection for float chamber venting (to charcoal canister)
118 Connection for fuel evaporation system
161 Solenoid valve for float chamber venting

Components

The pull down delay consists of a thermo-time switch (165), a solenoid switch-over valve (164), the vacuum lines and the wiring harness.

Thermo-time switch

The thermo-time switch is located in the air filter support. The contacts open and close depending on the temperature in the engine compartment and control the switch-over valve accordingly.

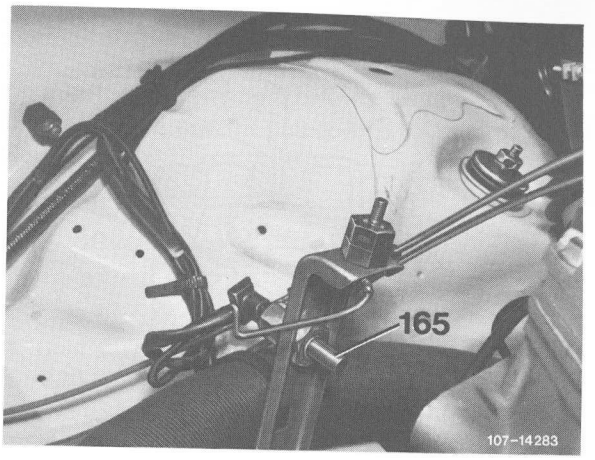


Fig. 34

Thermo-time switch

Switch-over valve

The switch-over valve (10) is fastened to the right wheel housing. The switch-over valve is controlled via the thermo-time switch (165) and connects or interrupts the vacuum to the pull down diaphragm.

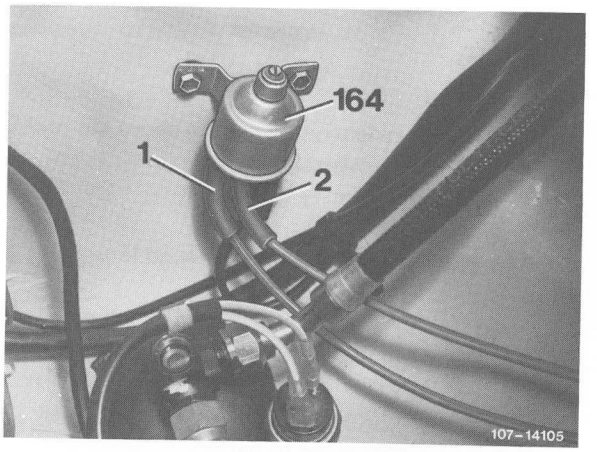


Fig. 35

Switch-over valve

Description of operation

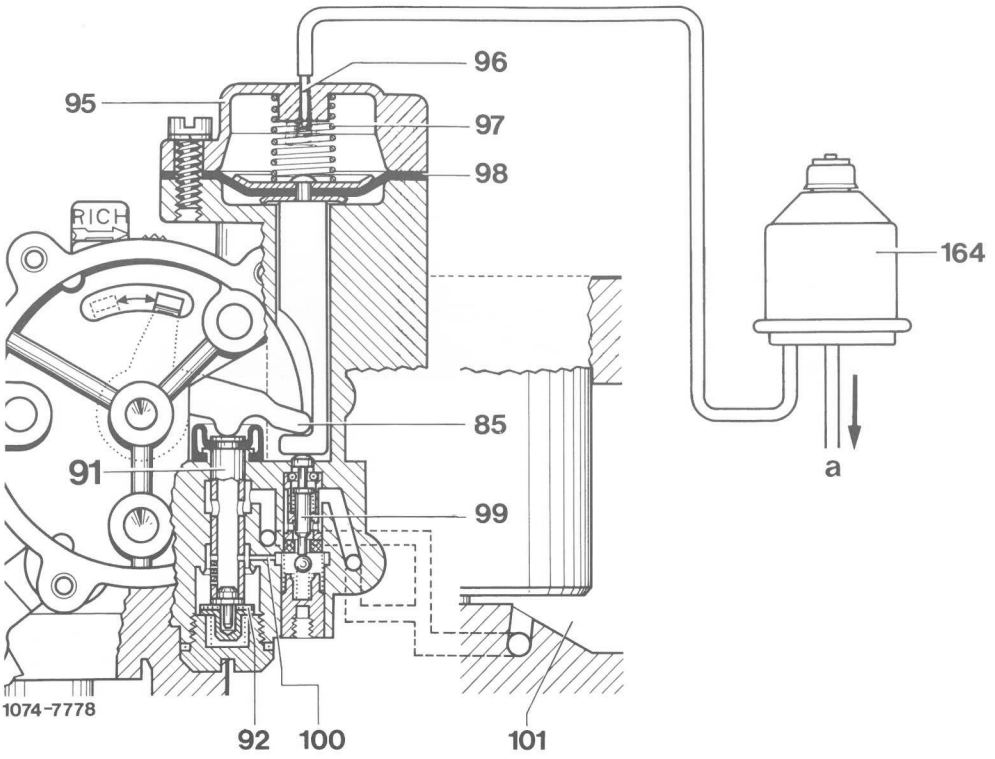


Fig. 36

For the pull down delay, the vacuum above the pull down diaphragm is controlled temperature dependent below approximately + 35 °C.

Above + 35 °C the pull down delay is no longer effective.

Below approx. + 35 °C

With the ignition turned on, the switch-over valve (164) is always connected to battery +. Below approx. + 35 °C the switch-over valve is connected to ground via the thermo-time switch (165).

The switch-over valve interrupts the vacuum connection from the intake manifold to the pull down diaphragm.

This will prevent the pull down diaphragm from moving when the engine is running, thereby keeping the start enrichment valve open and the **start mixture enriched.**

With increasing temperature of the heating coil and the bimetal spring in the thermo-time switch, the switch contacts will open after a predetermined time depending on the existing ambient temperature (delay time).

The ground connection to the switch-over valve is interrupted and the line for the intake manifold vacuum to the pull down diaphragm is opened. The diaphragm is pulled up, the start enrichment valve is closed and the choke is moved from start to warmup position. A leaning-out of the fuel mixture takes place.

Note: The delay time is limited. It starts at approx. + 35 °C and increases with decreasing temperatures until it reaches a max. of 27 seconds at – 20 °C.

Functional Test of Pull down Delay

The tests are devided into the Complete System Test and the Components Test. The test of the complete system will produce valid results only if the thermo-time switch temperature is **below + 35 °C,** since at higher temperatures the pull down delay is not functioning.

A. Complete System Test

Test condition: Thermo-time switch temperature **below + 35 °C.**

1. Check fuse no. 14 (item "a", fig. 38).
   (This fuse also protects the choke cover heater, idle shut-off valve and horn).

2. Connect vacuum gauge with T - or Y-fitting to automatic choke housing (Fig. 37).

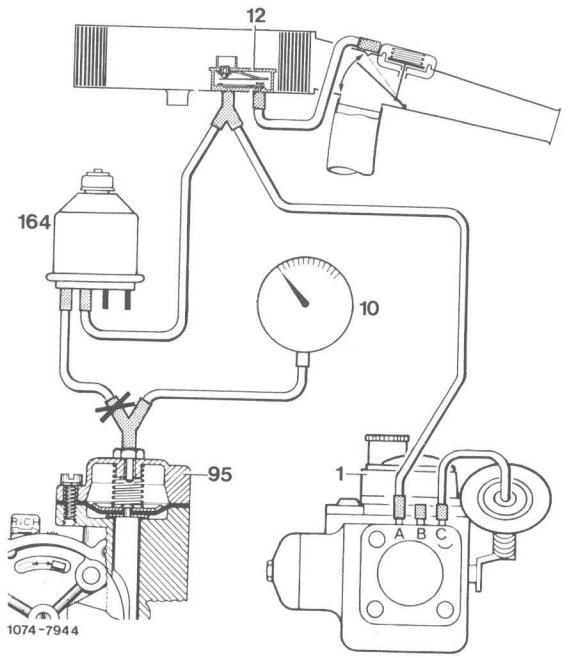


Fig. 37

1 Carburetor
10 Vacuum tester
12 Temperature switch (intake air preheating)
95 Choke housing
164 Switch-over valve

3. **Cool down** thermo-time switch to approximately **+ 20 °C.** This can be done by wrapping a rag, soaked in cold water, around the thermo-time switch for a minimum of 5 minutes.

4. Start engine and observe vacuum gauge. No vacuum should be indicated immediately after the engine starts. After approximately **4 to 8 seconds**, a vacuum of **0.3 to 0.5 bar** should be indicated (see Troubleshooting page 32).

Note: If the test is performed at thermo-time switch temperatures below approx. + 20 °C, the delay time is correspondingly increased (see table).

The component test need only be done if the complete system test shows errors.

Thermo-time switch temperature	Delay time
+ 40 °C	0 sec;
+ 20 °C	4 to 8 sec.
0 °C	10 to 18 sec.
– 5 °C	12 to 20 sec.
– 10 °C	14 to 22 sec.
– 15 °C	15 to 24 sec.
– 20 °C	17 to 27 sec.

Troubleshooting hints for complete system test

Test Result or Complaint	Possible Cause	Correction
1. No vacuum is indicated after the delay time (Engine runs too rich after cold start, carbon deposits on spark plugs, engine stalls).	– Vacuum lines incorrectly or not properly connected. Vacuum lines leaking	– Make sure that the vacuum lines are attached to the correct connection (see fig. 37, page 31).
	– Switch-over valve does not open	– Check switch-over valve (see Component Test, section B). Replace switch-over valve if necessary.
	– Termo-time switch defective, ground connection is not interrupted after delay time.	– Check thermo-time switch (see Component Test, section B). Replace thermo-time switch if necessary.
	– Pull down diaphragm or gasket defective	– Check pull down diaphragm for leaks (see Component Test, section B). Replace diaphragm or gasket if necessary.
Below approx. 35 °C 2. Vacuum is indicated immediately after the engine starts. No delay time. (Engine stalls one or more times after cold start).	– Thermo-time switch defective. Ground is not connected to switch-over valve.	– Check thermo-time switch (see Component Test, section B). Replace thermo-time switch if necessary.
	– Switch-over valve does not close	– Check switch-over valve (see Component Test, section B). Replace switch-over valve if necessary.
Below approx. 35 °C 3. After starting the engine, the time lapse for applying vacuum to the pull down is too long or short. (Complaints as under 1. or 2.).	– Thermo-time switch does not function properly. Switch-over valve is switched improperly.	– Check thermo-time switch (see Component Test, section A), Replace thermo-time switch if necessary.
	– Insufficient voltage at thermo-time switch.	Check voltage at terminal "G" on plug of thermo-time switch with engine running. **Nominal value:** at least 13 volts. If voltage is too low, check alternator regulating voltage.

B. Component Test

Thermo-time switch test

1. Turn off ignition

2. Remove thermo-time switch and cool it down to approximately + 20 °C.

3. Check voltage at terminal "G" on the plug of the thermo-time switch with the engine running. Nominal value: 13 Volts minimum. If necessary, check alternator regulating voltage.

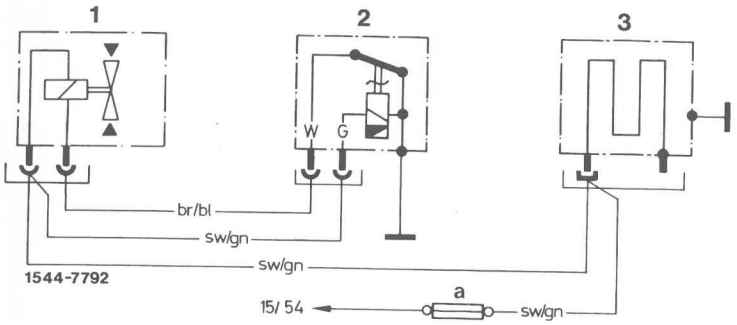


Fig. 38
1 Switch-over valve
2 Thermo-time switch
3 Choke cover heating element
a Fuse no. 14 (for pull down delay, choke cover heater, idle shut-off valve and horn).

4. Reconnect plug to thermo-time switch (make sure that the plug is inserted correctly, otherwise the fuse will burn out).

5. Disconnect plug of switch-over valve and connect test lamp to terminals of plug.

6. Connect thermo-time switch to ground (do not press thermo-time switch against hot engine for ground connection).

7. Start engine. The test lamp must go on for a specific time (delay time), e. g. at + 20 °C thermo-time switch temperature for **4 to 8 sec.** (see table) and then it should go out again.

8. Install thermo-time switch and connect plugs on switch-over valve and thermo-time switch.

Switch-over valve test

1. Turn on ignition. Disconnect plug on thermo-time switch. Connect terminal "W" on plug to ground. The switch-over valve should then click audibly. This can also be felt.

2. Disconnect vacuum line, which leads to the center connection of the switch-over valve, at the Y-fitting and vacuum line at choke housing and blow into it. The air must go through.

3. While blowing into vacuum line, connect terminal "W" of the thermo-time switch plug to ground. The valve should close and no air should go through the line.

Leakage test of pull down diaphragm

1. Connect vacuum gauge with T-or Y-fitting to automatic choke housing (fig. 37).

2. Run engine and read vacuum gauge. Pinch vacuum line at point marked (*) in fig. 37 with a terminal.

3. Turn off engine and observe reading on vacuum gauge. The vacuum reading must not drop.

   If the vacuum drops, check gasket of pull down cover and diaphragm for damage. Replace as required.

The fuel evaporation control system has been completely modified.

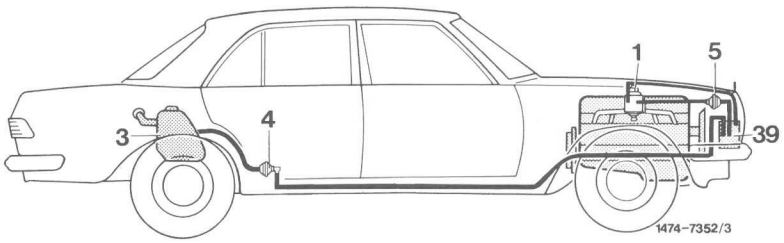


Fig. 39
1 Carburetor with vent valve
3 Fuel tank
4 Tank vent valve unit
5 Purge valve
39 Charcoal canister

The system consists of the following components:

Fuel tank

The fuel tank with the tube system and the catch pan corresponds in its construction to the already known unit.

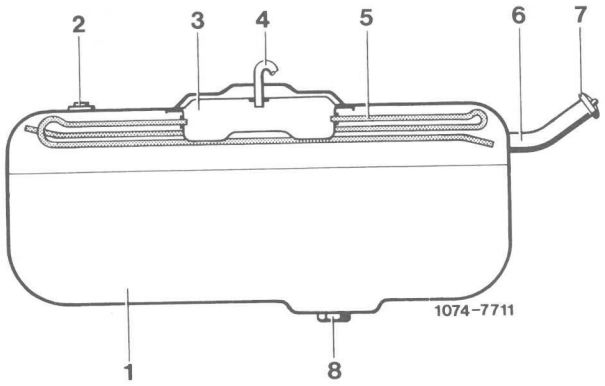


Fig. 40
1 Fuel tank
2 Fuel gauge sending unit
3 Expansion tank
4 Connection, vent valve unit
5 Tube system
6 Filler neck
7 Fuel tank cap
8 Connection, fuel feed line

Fuel tank vent valve unit

The vent valve unit is mounted underneath the vehicle in the area of the rear footwell and replaces the valve system as known from model year 1977.

The vent valve unit consists of a vacuum and pressure relief valve.

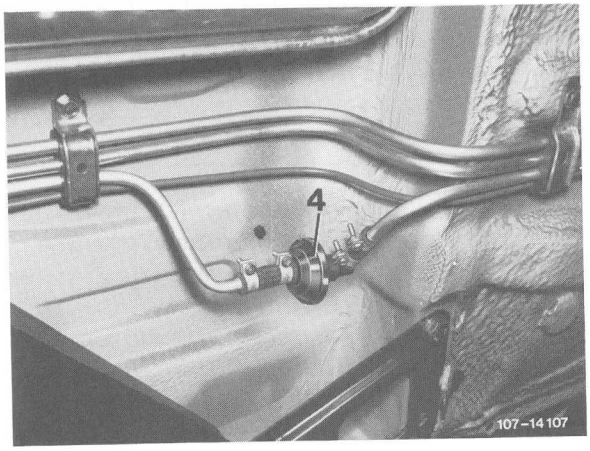


Fig. 41

Charcoal canister

The charcoal canister corresponds in its construction to the already known unit.

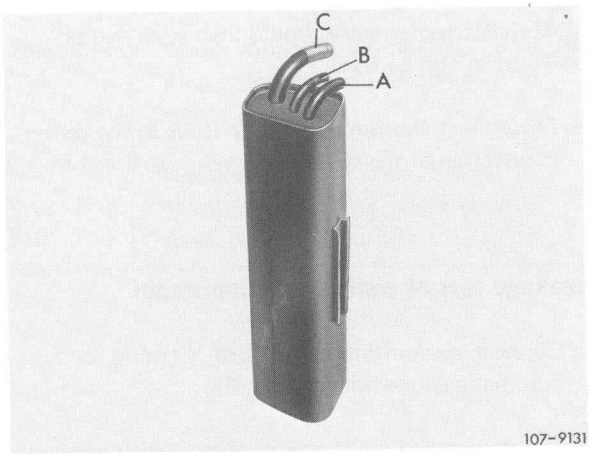


Fig. 42
A Connection, fuel vapors from tank
B Connection, purge line
C Connection, float chamber vent valve

Purge valve

The purge valve is located in the purge line between charcoal canister and carburetor.

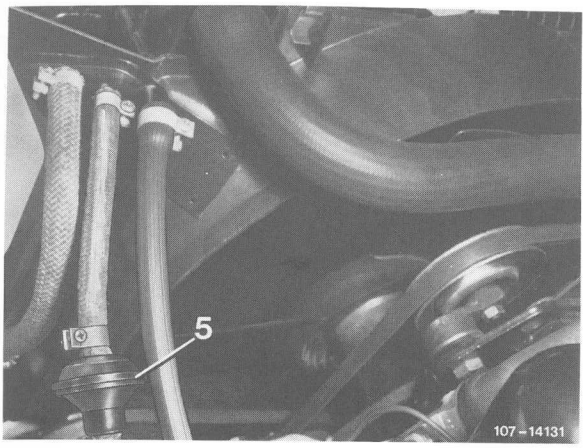


Fig. 43
5 Purge valve

Float chamber vent valve

The construction and operation of the float chamber vent valve is the same as already known from model year 1977.

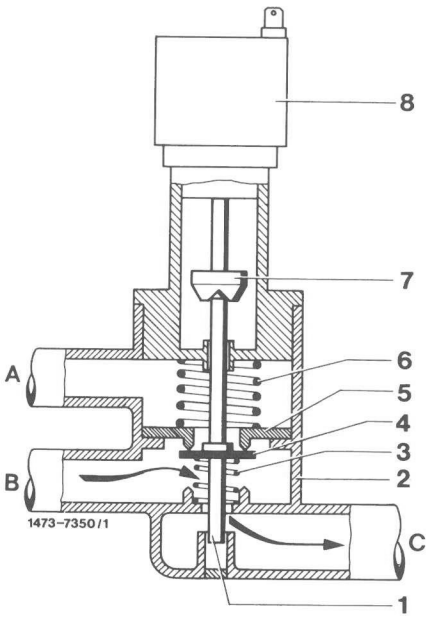


Fig. 44

Purge connection on carburetor

In order to draw the fuel vapors out of the charcoal canister, a connection is provided on the carburetor in front of the throttle valve.

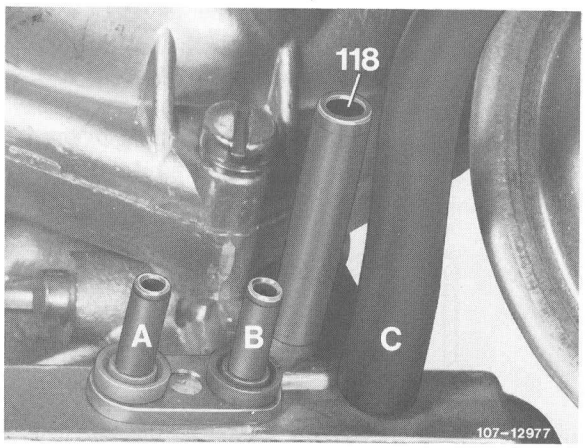


Fig. 45
118 Connection, purge line

Fuel tank cap

In order to prevent excessive pressure in the fuel tank, the fuel tank cap has been modified.

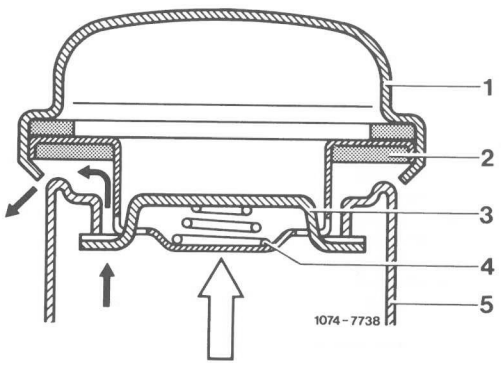


Fig. 46
1 Fuel tank cap
2 Gasket
3 Locking tab
4 Compression spring
5 Filler neck

Description of operation

Evaporation system

The pressure in the fuel tank is increased to 30 – 50 mbar by the vent valve unit (4). This ensures that less fuel vapors can escape from the fuel tank.

When the pressure in the fuel tank reaches 30 – 50 mbar, the pressure relief valve (4) in the vent valve unit opens allowing the fuel vapors to flow to the charcoal canister where they are stored if the engine is not running.

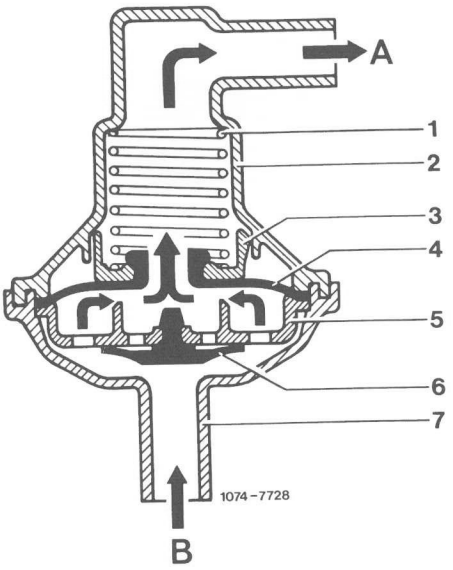


Fig. 47

Vent valve unit open to charcoal canister

1 Compression spring
2 Valve housing
3 Spring seat
4 Pressure relief valve
5 Valve disc
6 Vacuum relief valve
7 Connection fitting

A Connection, charcoal canister
B Connection, fuel tank

When the fuel cools down, the volume is reduced creating a vacuum in the fuel tank. If the vacuum increases to 1 – 16 mbar, the vacuum relief valve (6) opens allowing air or fuel vapors to flow from the charcoal canister back into the fuel tank thereby reducing the vacuum. If the vacuum in the fuel tank drops below 1 mbar, the vacuum relief valve (6) closes.

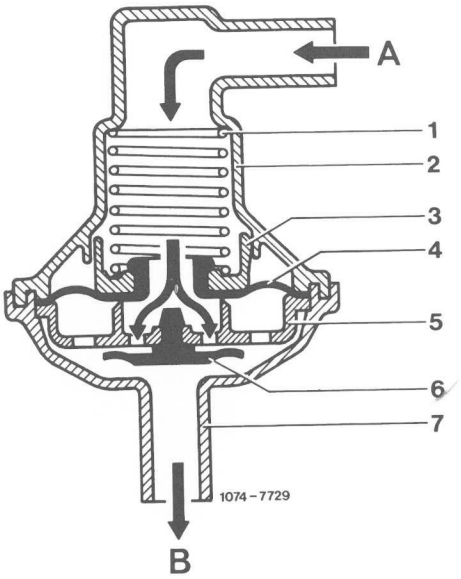


Fig. 48

Vent valve unit open to fuel tank

1 Compression spring
2 Valve housing
3 Spring seat
4 Pressure relief valve
5 Valve disc
6 Vacuum relief valve
7 Connection fitting

A Connection, charcoal canister
B Connection, fuel tank

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

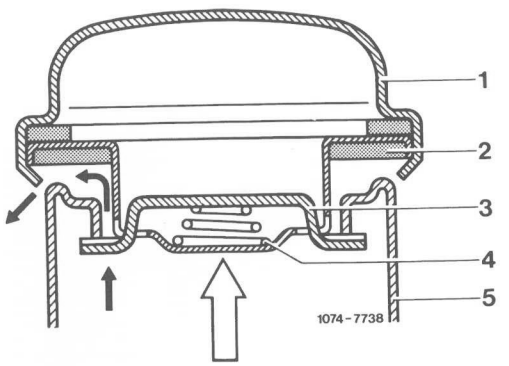


Fig. 49

1 Fuel tank cap
2 Gasket
3 Locking tab
4 Compression spring
5 Filler neck

The fuel vapors from the float chamber are routed to and stored in the charcoal canister when the engine is not running and the ignition is turned off.

Purge system

The charcoal canister is connected to the carburetor by a hose in which the purge valve (5) is installed.

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

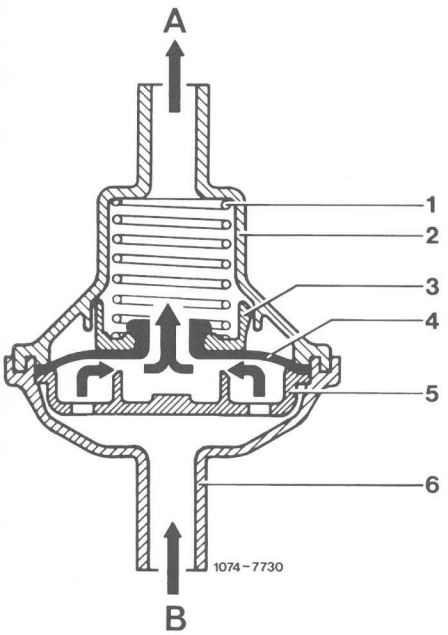


Fig. 50

Purge valve open

1 Compression spring
2 Valve housing
3 Spring seat
4 Pressure relief valve
5 Valve disc
6 Connection fitting

A Connection, carburetor
B Connection, charcoal canister

When opening the throttle valve, the two purge bores, which terminate in a common passage, are progressively exposed to the venturi vacuum. This will result in a metered purging in the lower partial load operating range of the engine without influencing the driving characteristics.

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

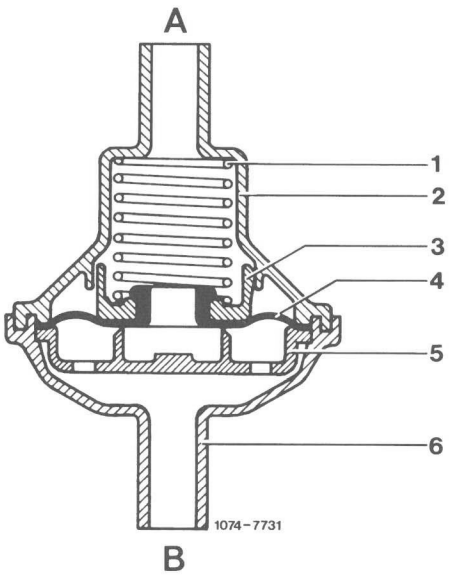


Fig. 51

Purge valve closed

Quick Test

This quick test covers the testing of the exhaust gas recirculation, of air injection, throttle valve lift and fuel evaporation control system.

Carry out the following tests at engine operating temperature and in the sequence listed:

Run engine at idle.

If the correct test result is not obtained, eliminate the fault before proceeding further. The further test procedure is described in the section "Component Tests" under the same test number for the easier diagnosis of the fault.

Exhaust Gas Recirculation (EGR)

Test No. 1

Pull off the brown vacuum line from the carburetor and the gray or blue vacuum line from the intake manifold. Then connect the brown vacuum line to the intake manifold.

Result

The engine should run erratically or stall.

Air Injection

Test No. 2

Connect CO tester. Disconnect the upper vacuum line (a) from anti-backfire valve (Fig. 56).

Result

The CO value must rise.

Test No. 3

Reconnect the vacuum line to the anti-backfire valve. Remove silencer (air filter for noise suppression) (45) from anti-backfire valve (41) (Fig. 56). Hold your hand in front of the air hose and accelerate briefly to full throttle.

Result

A flow of air must be felt at the air hose for approx. 3–5 seconds during deceleration.

Throttle Valve Lift

Test No. 4

Pull off vacuum hose from carburetor.

Reconnect vacuum hose.

Result

Idle speed must rise.

Idle speed must drop.

Fuel Evaporation Control System

Test No. 5

Remove cable connector from solenoid of float chamber vent valve (161). Hold solenoid in one hand and reconnect cable connector.

Result

The switch-over action of the solenoid can be felt.

Test No. 6

Remove from charcoal canister the center draw-off hose leading to the carburetor, hold shut with one finger or connect to a vacuum gauge.

Slowly increase engine speed above approx. 2000/min.

Result

a) There should be no vacuum at idle.

b) Vacuum must build up with increasing speed.

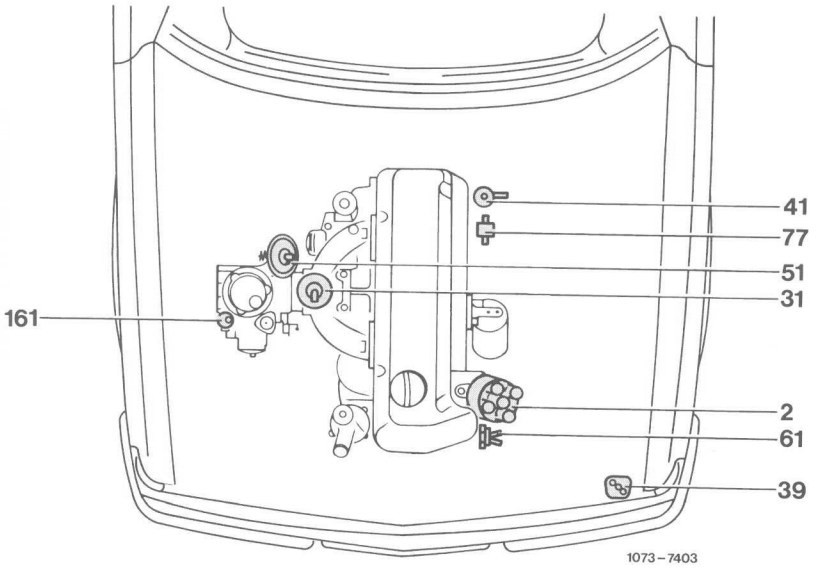


Fig. 52

2 Ignition distributor
31 EGR valve
39 Charcoal canister
41 Anti-backfire valve
51 Throttle vacuum control
61 Thermo valve 17 °C
77 Delay valve
161 Float chamber vent valve

Component Test

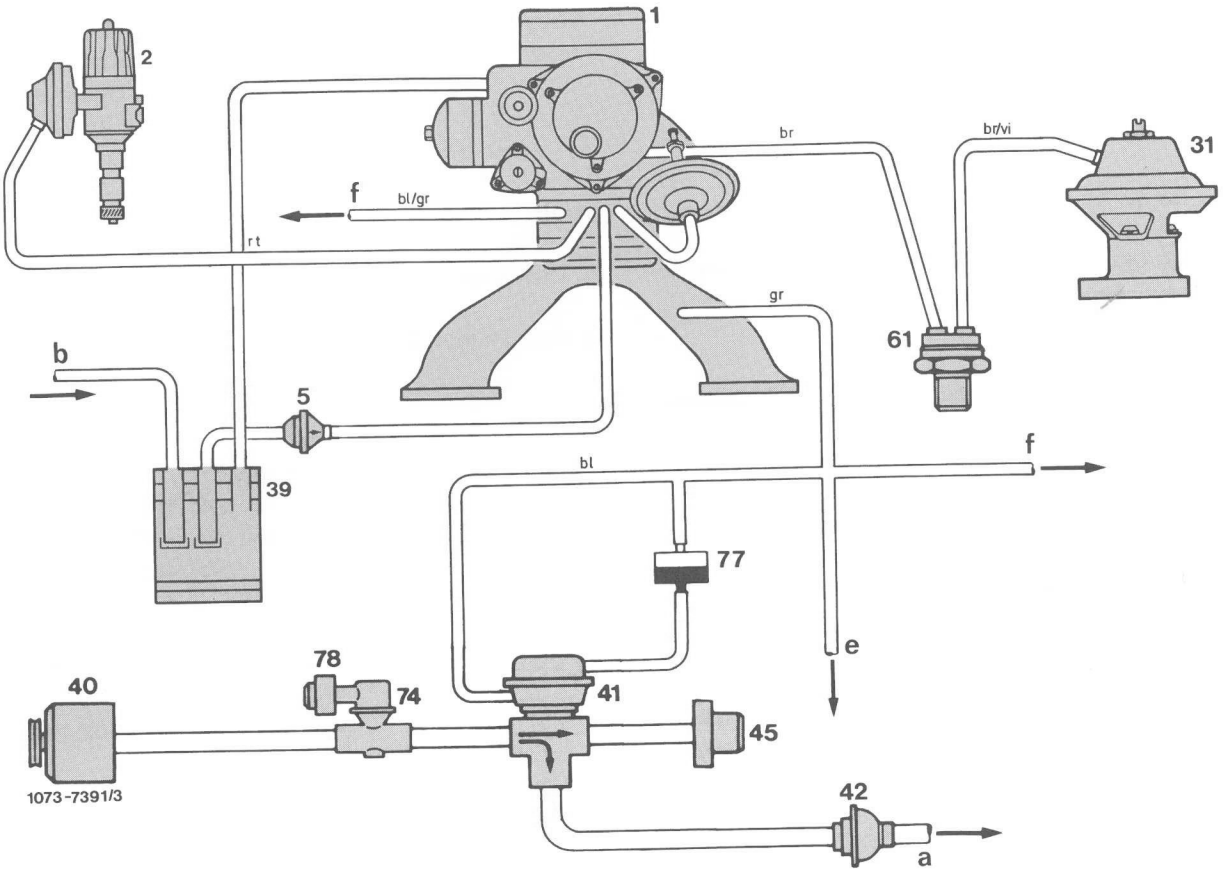


Fig. 53

1 Carburetor
2 Distributor
5 Purge valve
31 EGR valve
39 Charcoal canister
40 Air pump
41 Anti-backfire valve
42 Check valve
45 Silencer (air filter) for noise suppression
61 Thermo valve 17 °C
74 Pressure relief valve
77 Delay valve
78 Silencer (air filter) for noise suppression

a To cylinder head
b From fuel tank
e Air conditioner
f Master lock system
g To the air cleaner

bl = blue
br = brown
gr = gray
rt = red
vi = purple

Exhaust Gas Recirculation (EGR)

Test No. 1

If the engine speed does not change:

1.1 Check Vacuum Line

The brown vacuum line from the carburetor has to be attached to the angular connection of the thermo valve, and the brown/purple vacuum line to the EGR valve must be attached to the vertical connection of the thermo valve. Check vacuum line for leaks and blow air through vacuum connection on carburetor.

1.2 Check Thermo Valve (61)

The thermo valve can be identified by the blue plastic part and by the designation 50 AB 5 stamped into the metal part.

Remove brown/purple vacuum line. Idle engine and accelerate. Vacuum must be felt at the open connection. Be sure not to damage the connection pipes when removing and installing the thermo valve.

1.3 Check EGR Valve (31)

Remove EGR valve. Connect brown/purple vacuum line to the removed valve. Idle engine and slowly increase the engine speed while covering up the bores in the intake manifold. The valve cone (arrow) must lift off its seat. Should it fail to lift off, replace EGR valve.

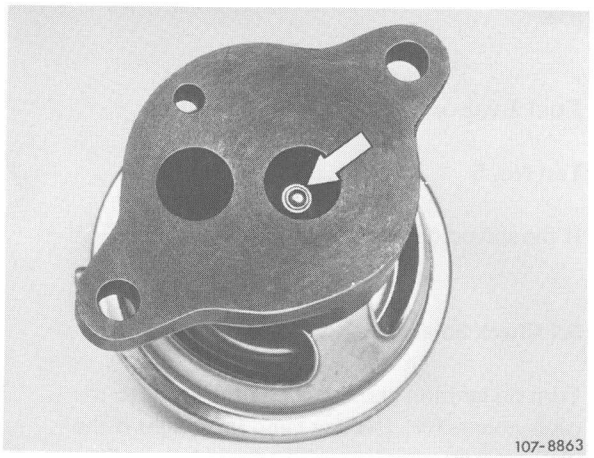


Fig. 54

1.4 Clean EGR Bores in Intake Manifold

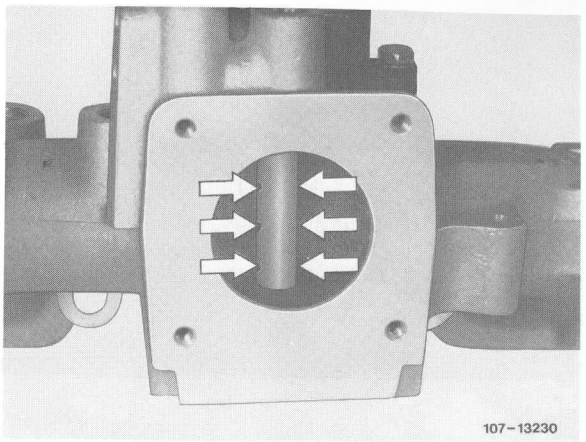


Fig. 55

Remove exhaust deposits from the cross bores in the distribution tube and clean it with compressed air.

Air Injection

Test No. 2

If the CO valve does not rise:

2.1 Check Vacuum Lines

The gray and/or blue vacuum line routed to the anti-backfire valve must be attached to the intake manifold.

The delay valve (77) is installed in the vacuum line between the line manifold and upper connection (a) at the anti-backfire valve. The vacuum line from the intake manifold must be connected to the white housing part.

2.2 Check Vacuum at Anti-backfire Valve

Remove lower vacuum line (b) from anti-backfire valve (41). Connect vacuum gauge or plug vacuum line with one finger. Vacuum should be available at idle speed. If there is no vacuum, check vacuum line for leaks and blow compressed air through the vacuum connection on intake manifold. If there is vacuum available, check anti-backfire valve.

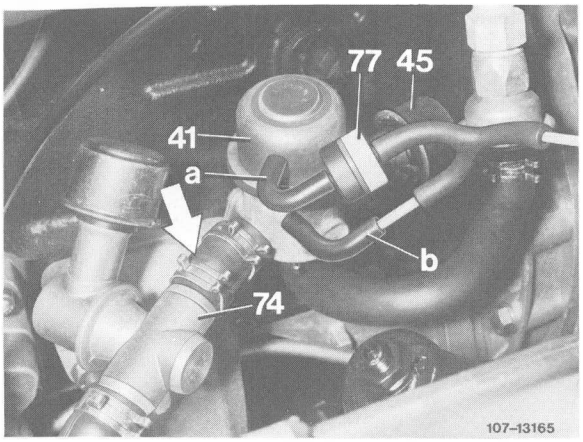


Fig. 56

2.3 Check Anti-backfire Valve (41)

a) Remove silencer (air filter for noise suppression) (45). Idle engine. Remove vacuum line (a) from anti-backfire valve. Air must be emitted from the air hose. Should no air be emitted, check air pump. To do this, remove air hose (arrow) from the air pump at the anti-backfire valve.

If air is emitted at the hose, renew anti-backfire valve.

Should there be no air, check air pump drive belt tension or renew air pump.

b) Reattach vacuum line (a) to the delay valve. No more air must be emitted at the air hose of the anti-backfire valve after approx. 3 – 5 seconds.

If air is emitted, check delay valve.

Test No. 3

If no air flow can be felt.

3.1 Check Delay Valve (77)

Remove silencer (45) from anti-backfire valve. Run engine and accelerate briefly to full throttle. A flow of air must be felt at the air hose of the anti-backfire valve for approx. 3 – 5 seconds when decelerating.

Should there be no air, renew delay valve.

Throttle Valve Lift

Test No. 4

If the idle speed does not rise:

4.1 Check Vacuum Hose

The vacuum hose must be connected to the vacuum connection (arrow).

Check vacuum hose for leaks and blow compressed air through vacuum connection.

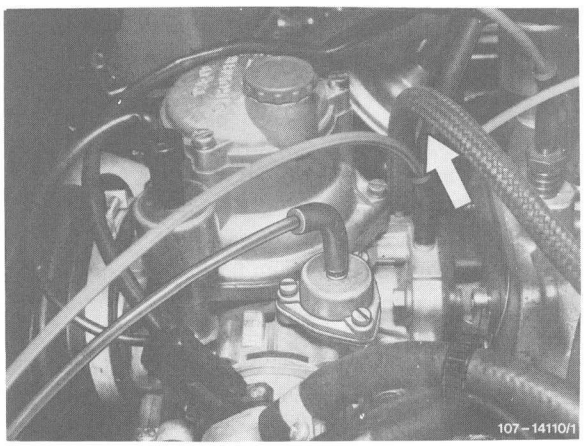


Fig. 57

4.2 Check Throttle Vacuum Control

Idle engine. Remove vacuum hose from carburetor. Idle speed must increase.
Replace throttle vacuum control if speed does not rise.

Fuel Evaporation Control System

Test No. 5

If the solenoid does not switch:

5.1 Check Solenoid

Turn on ignition and connect a test lamp to the cable connector. The test lamp must light if the ignition is switched on. If the lamp fails to light, check fuse.

If the test lamp comes on, renew solenoid.

Test No. 6

If no vacuum is indicated with increasing engine speed.

6.1 Check Draw-off Hose and Purge Valve

The draw-off hose must be connected to the carburetor flange (arrow).

Check hose for leaks and blow compressed air through the connection at the carburetor from the inside.

If there is still no vacuum, detach purge hose at purge valve and repeat test.

If there is vacuum, renew purge valve.

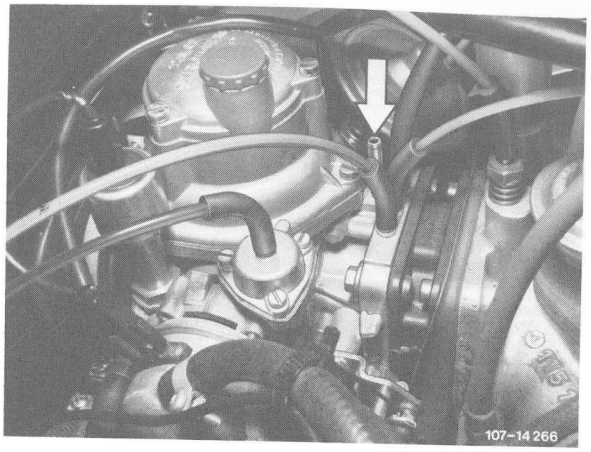


Fig. 58

A camshaft with code 03 is installed in place of the one with code 02.

Timing for Test Measurements with 2 mm Valve Lift

Camshaft Code[1])	Intake Valve Opens ATDC	Closes ABDC	Exhaust Valve Opens BBDC	Closes BTDC
03	15°	24°	23°	12°

[1]) Code is stamped on rear end of camshaft.

Carburezation System

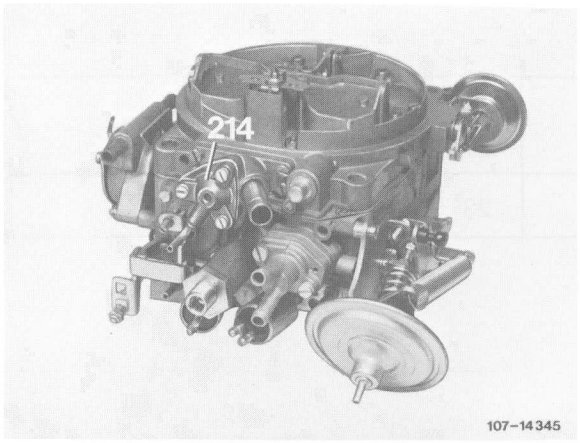


Fig. 59
267 Central idle mixture control screw
279 Lift limit stop screw

The following modifications have been incorporated in Solex carburetor 4 A 1.

- Low pressure fuel return valve
- Higher fuel level
- Additional choke housing mounting screw
- Carburetor mounted with lockwashers

Fuel Return Valve

The fuel pressure of the fuel regulator in the return valve has been dropped to 0.1 bar. The new fuel return valve is identified with index PE . . . 395 (see arrow).

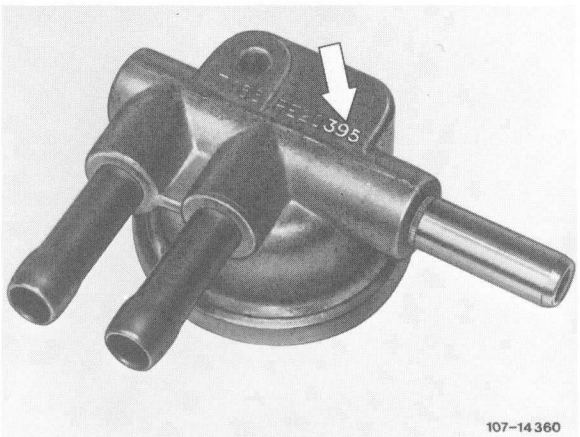


Fig. 60

Higher Fuel Level

The float level has been increased by 4 mm.

Reason: fuel pressure dropped to 0.1 bar.

Additional Choke Housing Mounting Screw

The choke housing is mounted with an additional screw (arrow). This means that the float chamber has another cast boss for the mounting screw. The stepped washer (44) is also machined accordingly.

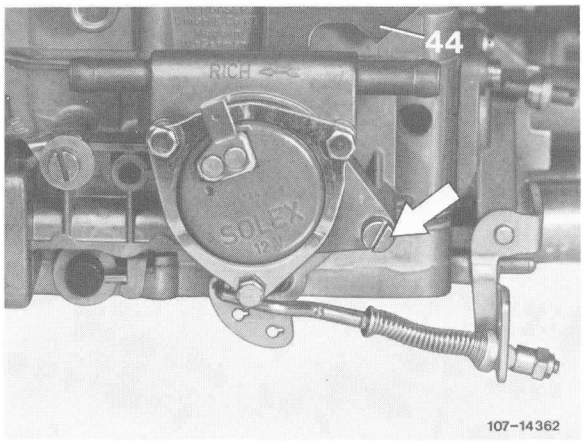


Fig. 61

Carburetor Mounted with Lockwashers

Lockwashers are used underneath the nuts, to prevent the latter from becoming loose. The tightening torque in general has been set for **8 Nm.**

The fuel evaporation control system has been completely modified.

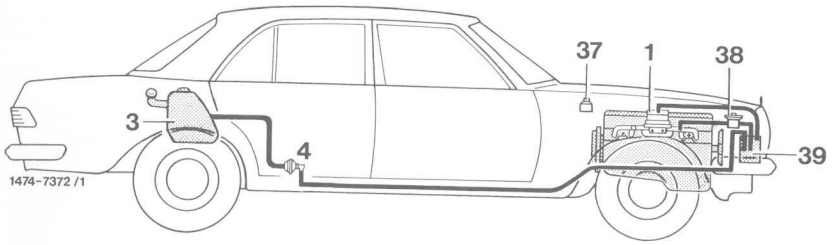


Fig. 62
1 Carburetor with vent valve
3 Fuel tank
4 Tank vent valve unit
38 Purge valve
39 Charcoal canister

The system consists of the following components:

Fuel tank

The fuel tank with the tube system and the catch pan corresponds in its construction to the already known unit.

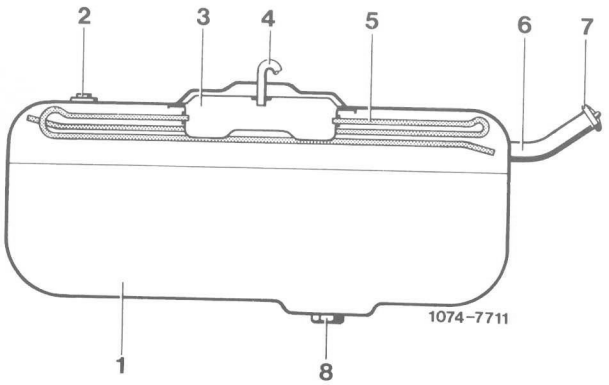


Fig. 63
1 Fuel tank
2 Fuel gauge sending unit
3 Expansion tank
4 Connection, vent valve unit
5 Tube system
6 Filler neck
7 Fuel tank cap
8 Connection, fuel feed line

Fuel tank vent valve unit

The vent valve (4) is mounted underneath the vehicle in the area of the rear footwell and replaces the valve system as known from model year 1977.

The vent valve unit consists of a vacuum and pressure relief valve.

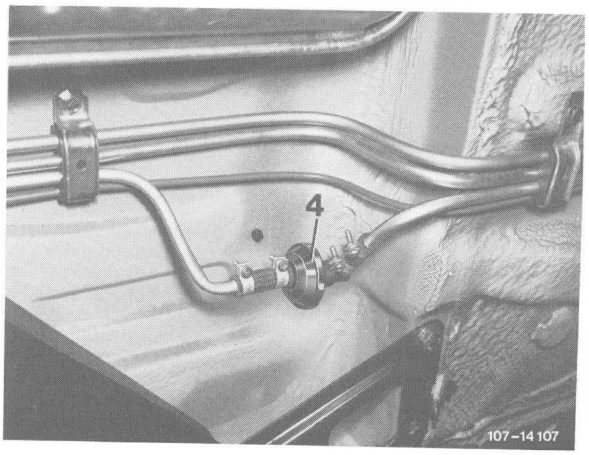


Fig. 64

Charcoal Canister

The charcoal canister corresponds in its construction to the already known unit.

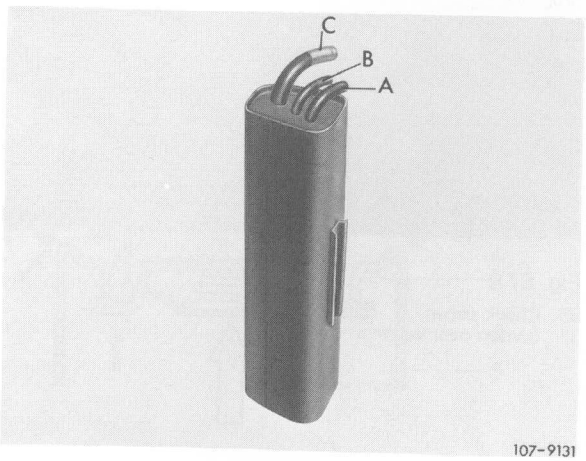


Fig. 65
A Connection, fuel vapors from tank
B Connection, purge line
C Connection, float chamber vent valve

Purge Valve

The purge valve (38) controls the quantity of fuel vapors drawn from the charcoal canister depending on the intake manifold vacuum.

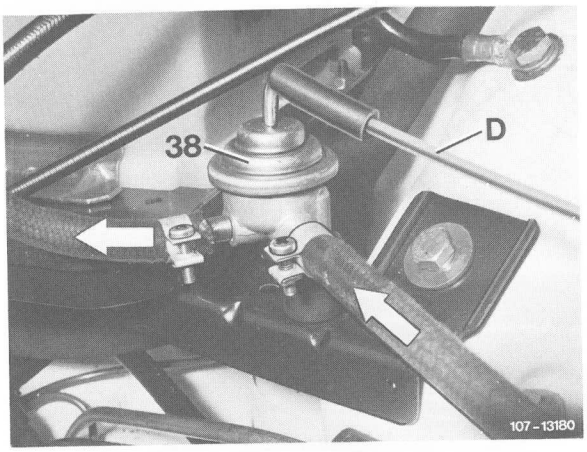


Fig. 66

Float Chamber Alternating Ventilation

The construction and operation of the float chamber alternating ventilation are the same as for model year 1977. Only the switch-over valve (37) has been modified.

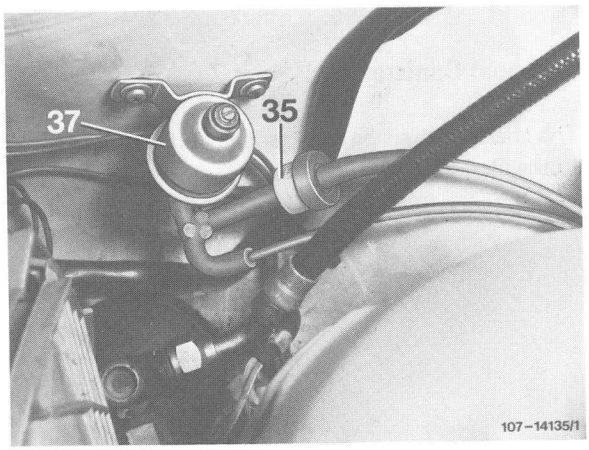


Fig. 67
35 Check valve
37 Switch-over valve

Purge Connection at Carburetor

In order to draw the fuel vapors out of the charcoal canister, a connection is provided on the carburetor in front of the throttle valve.

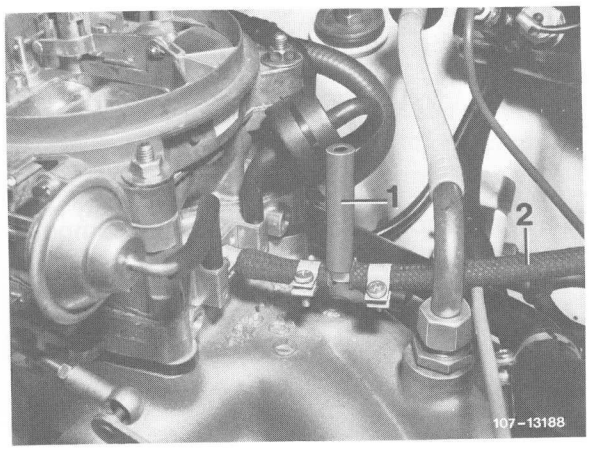


Fig. 68

Fuel Tank Cap

In order to prevent excessive pressure in the fuel tank, the fuel tank cap has been modified.

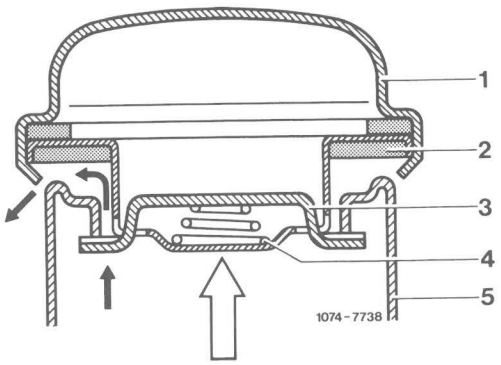


Fig. 69
1 Fuel tank cap
2 Gasket
3 Locking tab
4 Compression spring
5 Filler neck

Description of operation

Evaporation system

The pressure in the fuel tank is increased to 30–50 mbar by the vent valve unit (4). This ensures that less fuel vapors can escape from the fuel tank.

When the pressure in the fuel tank reaches 30–50 mbar, the pressure relief valve (4) in the vent valve unit opens allowing the fuel vapors to flow to the charcoal canister where they are stored if the engine is not running.

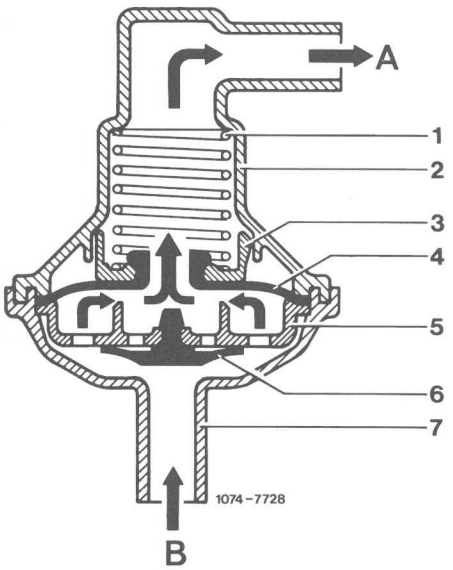


Fig. 70

Vent valve unit open to charcoal canister

1 Compression spring
2 Valve housing
3 Spring seat
4 Pressure relief valve
5 Valve disc
6 Vacuum relief valve
7 Connection fitting

A Connection, charcoal canister
B Connection, fuel tank

When the fuel cools down, the volume is reduced creating a vacuum in the fuel tank. If the vacuum increases to 1–16 mbar, the vacuum relief valve (6) opens allowing air or fuel vapors to flow from the charcoal canister back into the fuel tank thereby reducing the vacuum. If the vacuum in the fuel tank drops below 1 mbar, the vacuum relief valve (6) closes.

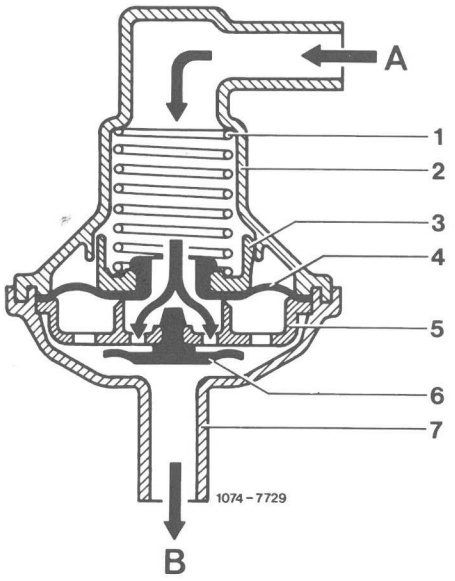


Fig. 71

Vent valve unit open to fuel tank

1 Compression spring
2 Valve housing
3 Spring seat
4 Pressure relief valve
5 Valve disc
6 Vacuum relief valve
7 Connection fitting

A Connection, charcoal canister
B Connection, fuel tank

The fuel vapors from the float chamber are routed to and stored in the charcoal canister when the engine is not running and the ignition is turned off.

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

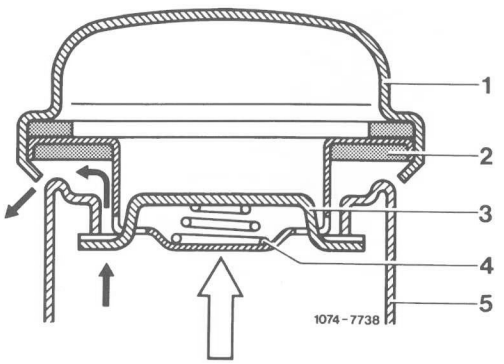


Fig. 72

1 Fuel tank cap
2 Gasket
3 Locking tab
4 Compression spring
5 Filler neck

Purge system

The charcoal canister is connected to the carburetor by a hose in which the purge valve is installed.

When the engine is running and the vacuum in the purge line exceeds a certain value on the diaphragm the purge valve (38) opens. The fuel vapors stored in the charcoal canister can be drawn into the carburetor depending on the carburetor throttle valve position.

When opening the throttle valve, the two purge bores, which terminate in a common passage, are progressively exposed to the venturi vacuum. This will result in a metered purging in the lower partial load operating range of the engine without influencing the driving characteristics.

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

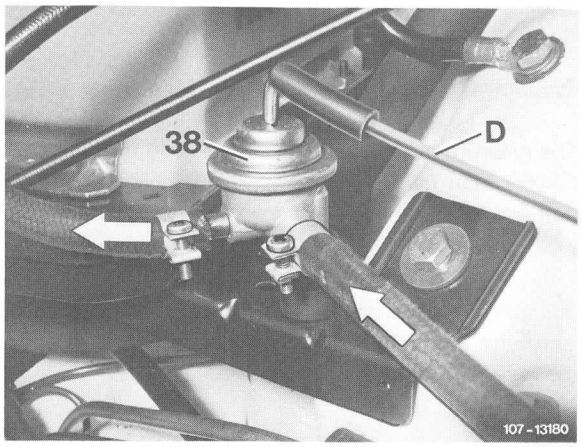


Fig. 73

The vehicle is equipped with a breakerless transistorized ignition system.

This breakerless ignition system is virtually maintenance-free and guarantees sufficient spark intensity even at the highest engine rpm and maintains the ignition timing more accurately.

The ignition coil and the pre-resistors are identical with the transistorized ignition system with breaker points. The electrical layout of the switching unit, however, has been changed.

Marking: Yellow paint dot on top of switching unit housing.

Ignition distributor

In place of the breaker points, the distributor contains an armature and magnetic pick-up coil assembly which functions according to the induction principle. Depending on engine operating conditions, the spark advance is controlled as previously by vacuum and centrifugal control units.

Operation of the armature and pick-up assembly

An armature out of magnetic soft steel, with protrusions or teeth corresponding in number to the number of cylinders on the engine, creates a change in the magnetic flux field of the permanent magnetic pick-up each time a tooth of the armature passes the pick-up magnet. This produces a tiny current impulse in the induction coil which is positioned in the magnetic flux field. This current impulse (0.3 V to 100 V) varies with the engine rpm and changes with a steep curve from positive to negative current. This abrupt alteration of polarity is used to form and amplify the impulse after it passes through the zero line and to interrupt the primary current in the switching unit.

Through interruption of the primary current, the ignition voltage will be induced in the secondary winding of the ignition coil. The dwell angle is controlled by the electronic circuitry in the switching unit and the dwell angle increases with increasing engine speed. Therefore, the spark intensity is maintained even at high engine speed.

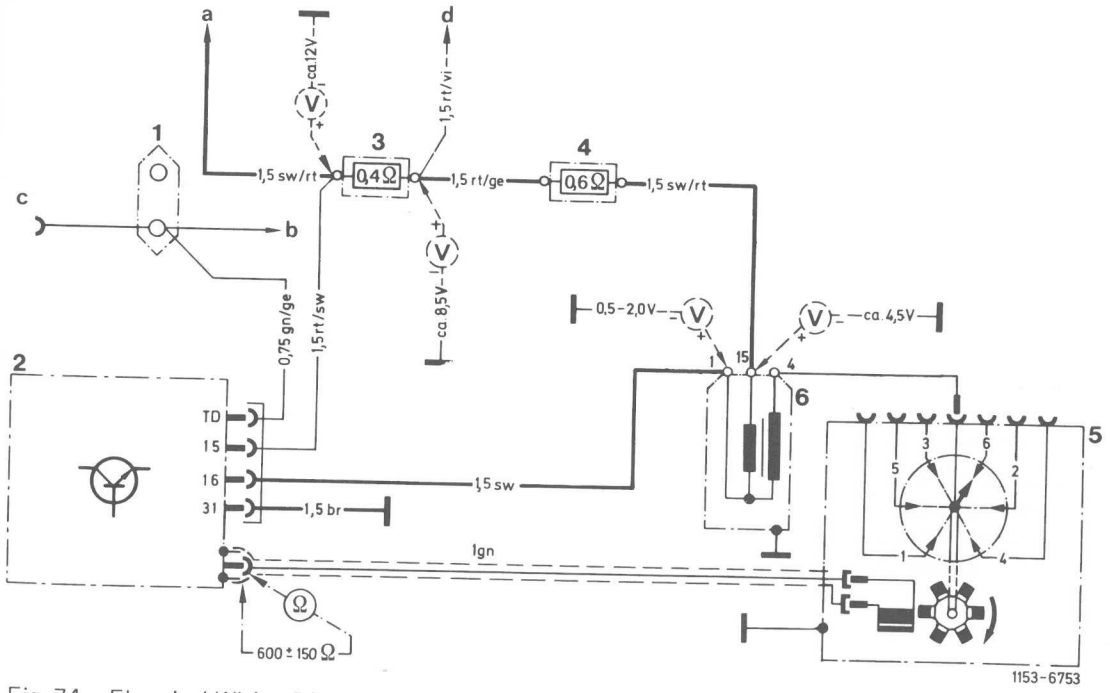


Fig. 74 Electrical Wiring Diagram

1 Two-pole terminal block
2 Switching unit
3 Pre-resistor 0.4 ohm
4 Pre-resistor 0.6 ohm
5 Ignition distributor with armature and pick-up coil
6 Ignition coil
a Ignition switch term. 15
b Instrument cluster, tachometer
c Diagnostic plug
d Terminal 16 starter

Checking breakerless transistorized ignition

Test instruments

Voltmeter, ohmmeter, dwell meter, tachometer

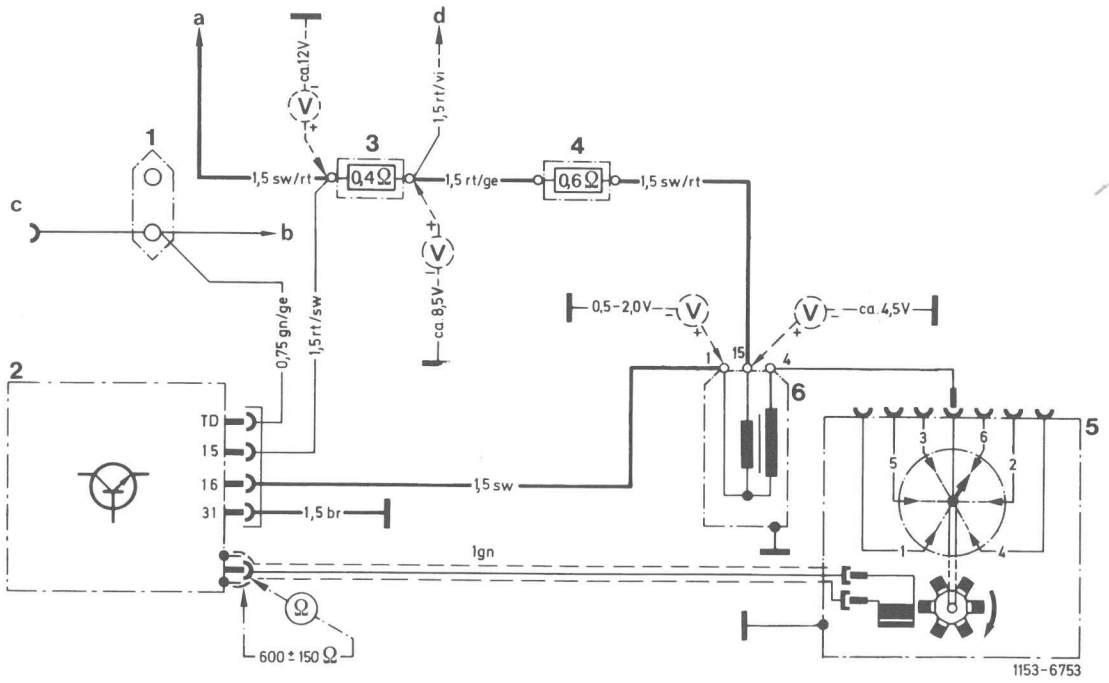


Fig. 75

Wiring diagram, breakerless transistorized ignition with measuring points for test values

1 Two-pole terminal block
2 Switching unit
3 Pre-resistor 0.4 ohm
4 Pre-resistor 0.6 ohm
5 Ignition distributor with armature and pick-up coil
6 Ignition coil
a Ignition switch term. 15
b Instrument cluster, tachometer
c Diagnostic plug
d Terminal 16, starter

Note: In the event of complaints about misfiring, check high-voltage end of ignition system first (spark plugs, ignition cables, spark plug connectors).

In case of starting problems perform the following tests on ignition system in addition to the fuel system tests.

Visual inspection

Check electrical screw-type terminals and plug terminals of ignition system for tight connections.

Voltage test

Caution: With the ignition turned on and the engine stopped, a primary current of approx. 8 amps. will flow through this ignition system continuously.

1. Input voltage on pre-resistance 0.4 ohm (3), cable color black/red (15/54):

Nominal value approx. 12 volts.

2. Voltage at ignition coil (6) at approx. 20 °C:

Terminal 15 = approx. 4.5 volts
Terminal 1 = 0.5 – 2.0 volts

a) If the value on terminal 1 is exceeded, the switching unit is defective and must be replaced.

b) If the value on terminal 1 is obtained, but no ignition spark is induced, check armature and pick-up coil in ignition distributor (5) and secondary winding of ignition coil.

Resistance values, ignition coil
Primary winding:
Terminal 15 to terminal 1 = 0.33 – 0.46 ohm

Secondary winding: terminal 1 to terminal 4
= 7–12 ohm

Test dwell angle

Note: Adjustment of the dwell angle is not possible. This test only serves as a control test for the switching unit (dwell angle timing).

Connect dwell meter (hook-up as on SI standard switching unit).

Nominal value at:

Engine speed	Dwell angle
1,500 ± 50 rpm	39° – 51°
5,000 ± 50 rpm[1])	49° – 54°

[1]) Carry out this test only if complaints concerning misfiring at high speeds are received.

If the above dwell angle values are not obtained, the armature and pick-up coil must be checked first. If the armature and pick-up coil function properly, the switching unit must be replaced.

Cheching ignition distributor armature and pick-up coil

Unplug wire between ignition distributor and switching unit and connect ohmmeter.

1. Test armature resistance between terminal 7 and 31 d (Fig. 76).

Nominal value = 600 ± 100 ohm

Note: With a cold engine, the ohm value should be in the lower half of the specified values, with a warm engine, it should be in the upper half.

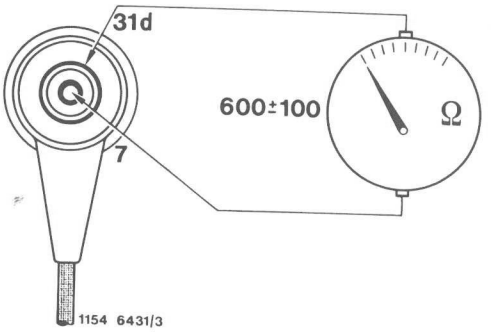


Fig. 76

Ohmmeter hook-up for armature resistance test

2. Test pick-up coil resistance including wire connection for ground.

Nominal value = Terminal 7 – ground = ∞ (infinity)

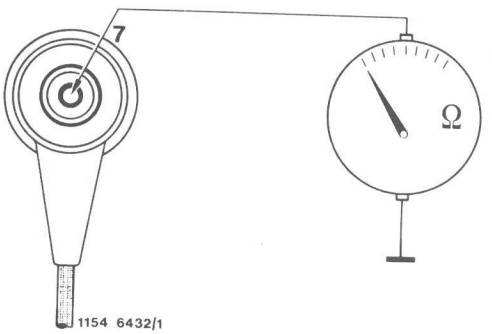


Fig. 77

Ohmmeter hook-up for testing ground connection

3. Checking armature and pick-up coil for mechanical damage

An gap should exist between the armature and pick-up coil.

Note: If the armature and/or pick-up coil is defective, replace the complete ignition distributor.

Quick Test

The operation of the EGR, air injection and the fuel evaporation control system can be checked with this quick test.

The following tests should be performed in the sequence given and with the engine at operating temperature:

Run engine at idle.

If the correct test result is not obtained, the defect must first be eliminated. To simplify the defect location, the subsequent test procedure is described under the same test number in the section entitled **"Component Test".**

Exhaust Gas Recirculation (EGR)

Test No. 1

Slowly increase idle speed and observe diaphragm disc of EGR valve.

Result

The diaphragm disc and the valve rod attached to it are moved up.

Air Injection

Test No. 2

Connect CO tester. Pull off rear or upper vacuum line (a) from anti-backfire valve (Fig. 82)

Result

The CO value should rise.

Test No. 3

Reconnect vacuum line to anti-backfire valve. Remove air filter for noise suppression (45) from anti-backfire valve (41) (Fig. 82). Hold one hand in front of air hose and fully accelerate briefly.

Result

When decelerating, an air flow must be noticeable at the air hose for approx. 3 to 5 seconds.

Fuel Evaporation Control System

Test No. 4

Install vacuum gauge in the green/purple vacuum line leading to the float chamber vent valve. Start engine and accelerate briefly.

Result

a) At idle, vacuum must be present.

b) During acceleration, the vacuum must remain constant.

Test No. 5

Pull off center purge hose of purge valve from charcoal canister and hold shut with a finger or connect a vacuum gauge.

Slowly increase engine speed to above approx. 2,200/min.

Result

a) At idle, a slight vacuum should be present.

b) With increasing speed the vacuum must rise.

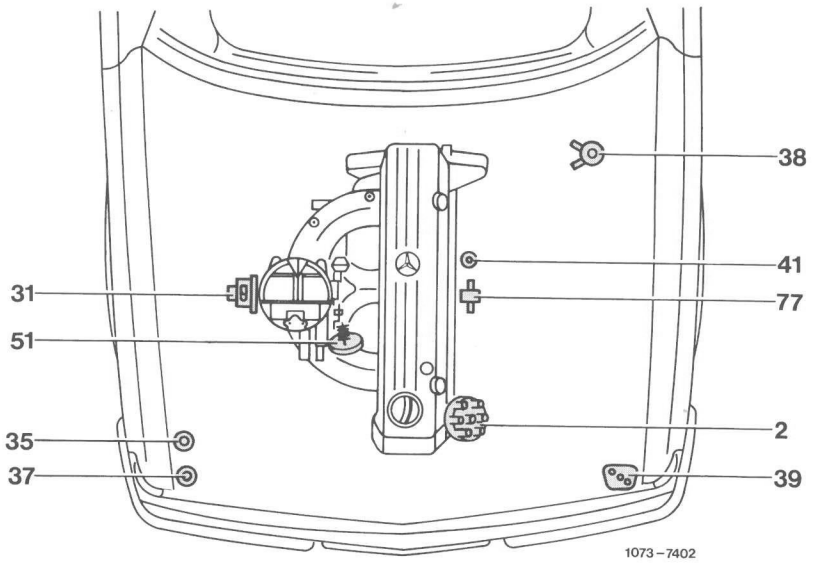


Fig. 78

2 Distributor
31 EGR valve
35 Check valve
37 Switch-over valve
38 Purge valve
39 Charcoal canister
41 Anti-backfire valve
51 Throttle vacuum control
77 Delay valve

Component Test

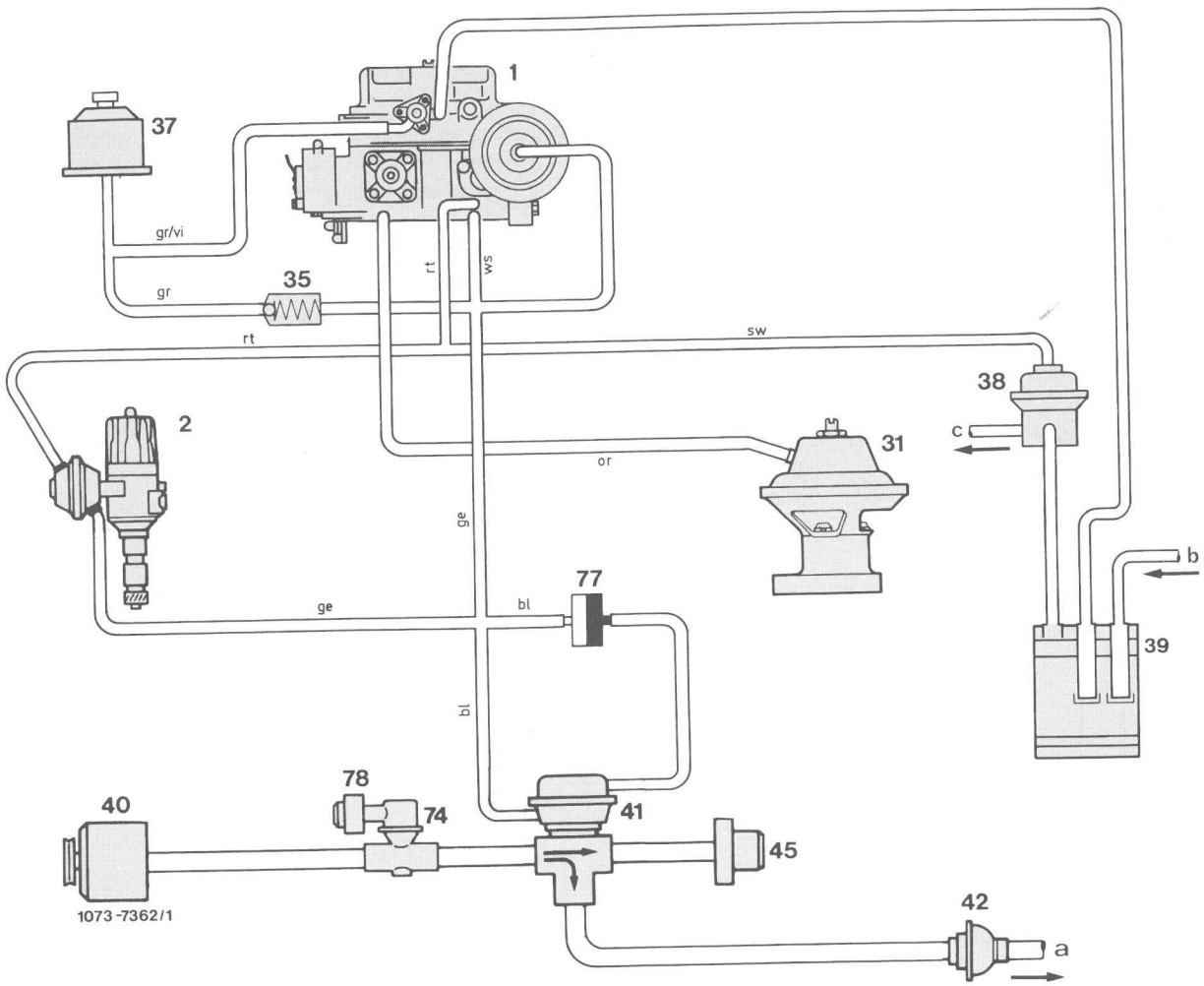


Fig. 79

1 Carburetor
2 Distributor
31 EGR valve
35 Check valve
37 Switch-over valve
38 Purge valve
39 Charcoal canister
40 Air pump
41 Anti-backfire valve
42 Check valve
45 Silencer (air filter for noise suppression)
74 Pressure relief valve
77 Delay valve
78 Silencer (air filter for noise suppression)

a to cylinder head
b from charcoal canister
c to carburetor

bl = blue
ge = yellow
gr = green
or = orange
rt = red
sw = black
vi = purple
ws = white

Test No. 1

If the diaphragm disc and the valve rod attached to it are not drawn in:

1.1 Check vacuum hose

The vacuum hose must be connected to the vacuum connection (arrow).

Check vacuum hose for leaks and blow out the vacuum connection at the carburetor.

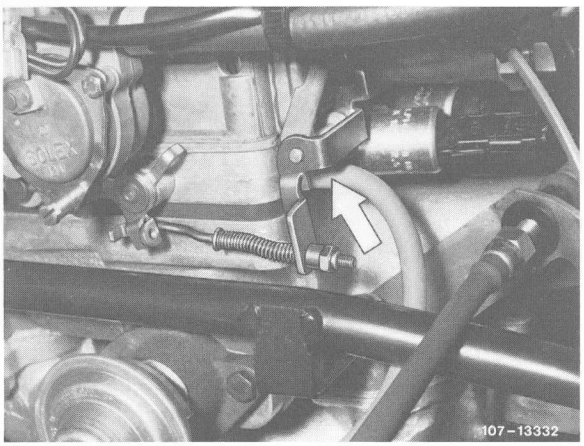


Fig. 80

1.2 Check EGR valve (31)

Remove EGR valve. Slip orange vacuum hose onto removed valve. Run engine and slowly increase idle speed.

To do so, cover or hold the bores in the intake manifold shut.

The valve cone must lift from its seat. If this is not the case, replace EGR valve.

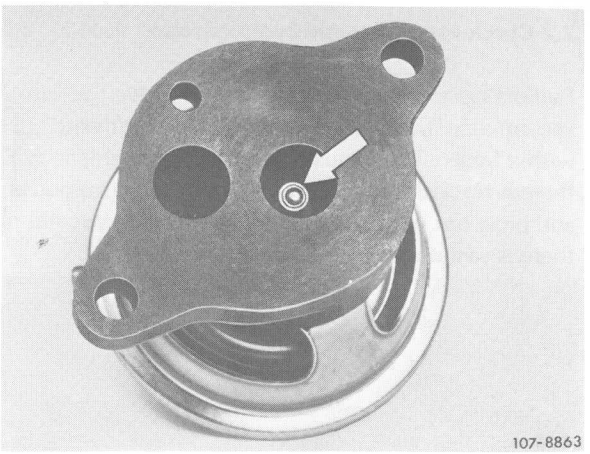


Fig. 81
EGR valve

Air Injection

Test No. 2

If the CO value does not increase:

2.1 Check vacuum lines

The blue vacuum line to the anti-backfire valve must be connected to the yellow vacuum line from the carburetor to the distributor (retard unit).

The delay valve (77) is inserted in the vacuum line between line manifold and the upper or rear anti-backfire valve connection. The vacuum line from the carburetor must be connected to the white portion of the housing.

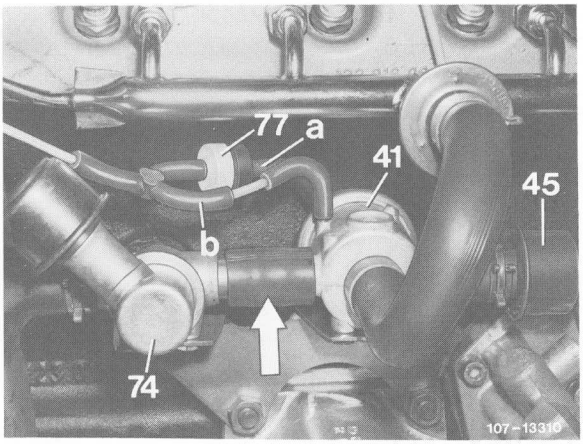


Fig. 82

2.2 Check vacuum at anti-backfire valve

Pull off bottom or front anti-backfire valve vacuum line. Connect vacuum gauge or hold shut with a finger. There must be vacuum at idle. If there is no vacuum, check vacuum line for leaks and blow out vacuum connection at carburetor. If there is vacuum, check anti-backfire valve.

2.3 Check anti-backfire valve (41)

a) Remove air filter for noise suppression (45). Run engine at idle. Pull off vacuum line (a) from anti-backfire valve (Fig. 82). Air must flow from air hose. If no air is emitted, check air pump. To do so, pull off air hose (arrow, Fig. 82) from the air pump on the anti-backfire valve.

If the hose emits air, replace anti-backfire valve.

If there is no air, check tension of air pump drive belt or replace air pump if necessary.

b) Replug vacuum line (a) into delay valve again. No air must flow from the air hose of the anti-backfire valve after 3 to 5 seconds.

If air is emitted, check delay valve.

Test No. 3

If no air flow noise is noticeable:

3.1 Check delay valve (77)

Remove air filter (45) on anti-backfire valve. Run engine and briefly accelerate at full throttle. When decelerating, an air flow must be noticeable at the air hose of the anti-backfire valve for approx. 3 to 5 seconds.

If not, replace delay valve.

Fuel Evaporation Control System

Test No. 4

a) If there is no vacuum:

4.1 Check vacuum lines

The green vacuum line (3) must be connected to the line manifold.

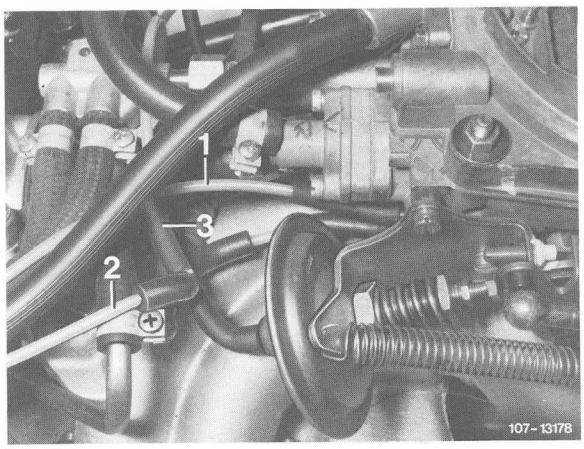


Fig. 83

Check green (3) and green/purple (4) vacuum line for leaks (Fig. 84). Blow out vacuum connection at carburetor.

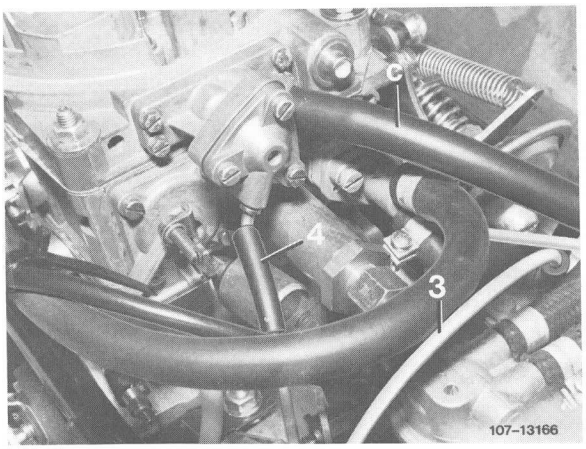


Fig. 84

3 Vacuum line (green) to switch-over valve
4 Vacuum line (green/purple) from switch-over valve
C Hose line to charcoal canister

4.2 Check check valve (35)

The green vacuum line from the carburetor must be plugged into the larger part of the housing (A).

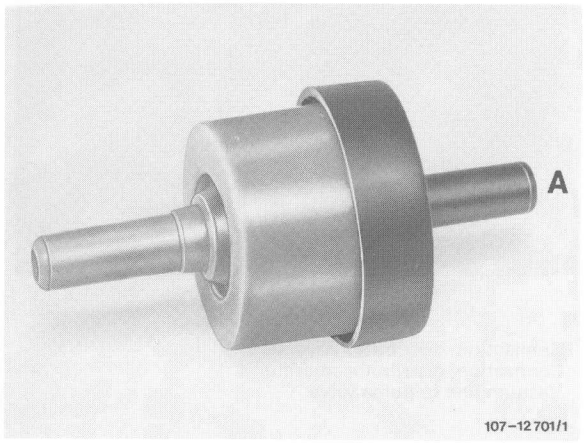


Fig. 85

4.3 Check switch-over valve (37)

Turn ignition on. Connect test lamp to cable plug. With ignition turned on, the test lamp must light up. If not, check fuse.

If the test lamp lights up, replace switch-over valve.

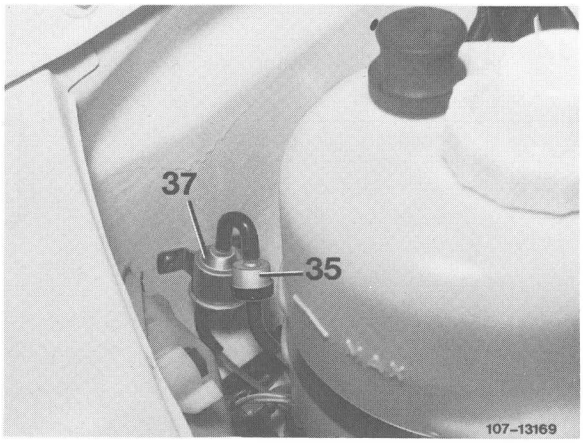


Fig. 86
35 Check valve
37 Switch-over valve

b) If the vacuum does not remain constant:

4.4 Replace check valve (35)

4.5 Check float chamber vent valve

Unscrew float chamber vent valve from carburetor. Plug green/purple vacuum line into breather valve. Run engine at idle and hold shut breather bore on carburetor. The valve rod with valve reed is drawn in (arrow). If not, replace diaphragm.

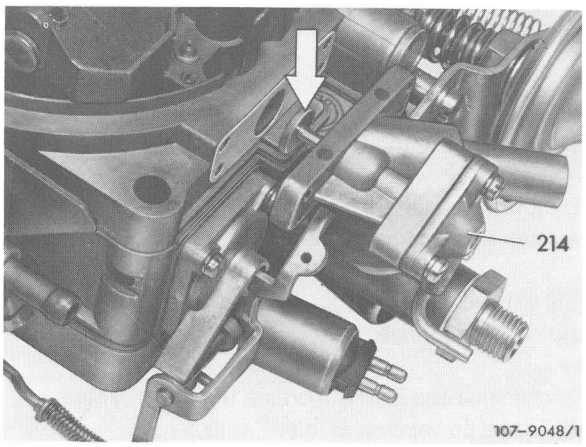


Fig. 87
214 Float chamber vent valve

Test No. 5

a) If there is no vacuum:

5.1 Check purge hose

The purge hose must be connected to the line manifold of the crankcase ventilation (arrow).

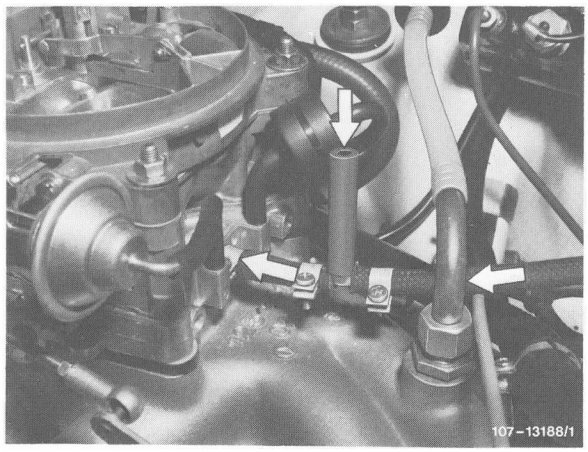


Fig. 88

Check the purge hose from charcoal canister to purge valve and from purge valve to line manifold on the carburetor for leaks. Blow through connection on carburetor.

Remove purge hose from charcoal canister on the purge valve and blow through purge valve with compressed air.

b) If the vacuum does not increase:

5.2 Check vacuum line on purge valve

The black vacuum line (D) must be connected to the vacuum line leading to the distributor advance unit.

Pull off vacuum line from purge valve and hold it shut with one finger.

Start engine and slowly increase the speed. There should be no vacuum at idle.
With increasing engine speed the vacuum must rise.

If this is the case, replace purge valve.

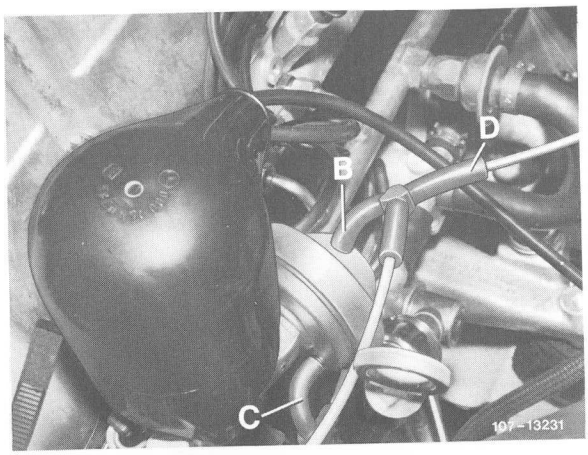


Fig. 89

B Connection, distributor advance unit
C Connection, distributor retard unit
D Vacuum line to purge valve

Model 116.024 (280 SE)

As of Model year 1978, the position of the actuator and the routing of the cable have been changed.

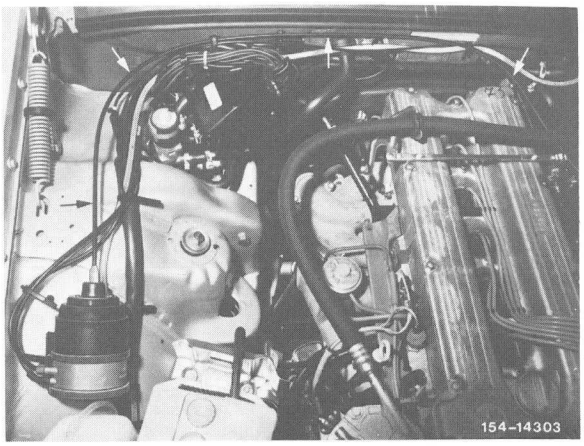


Fig. 90

Fuel Injection System (CIS)

The fuel return line from the suction damper is now attached to the hose for crankcase ventilation.

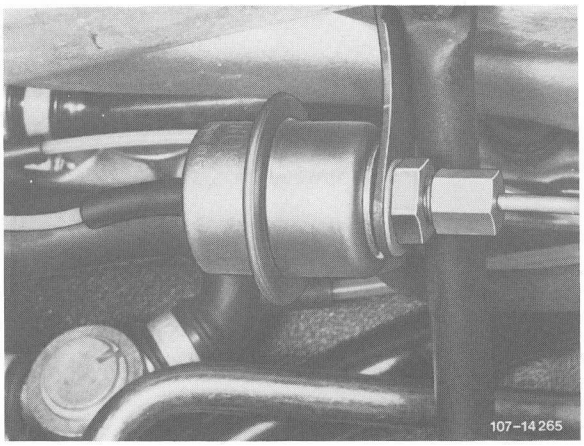


Fig. 91

Suction damper

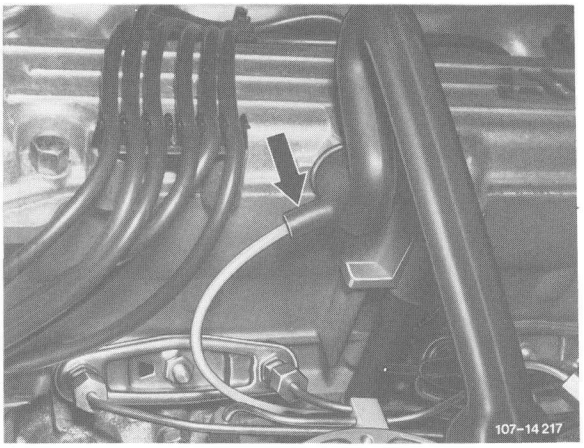


Fig. 92

Hose for crankshaft ventilation

Arrow = Fuel return line from suction damper

Ignition System

Vacuum for ignition retard is no longer picked up at the throttle valve housing but rather at the molded hose between the auxiliary air valve/idle speed air valve.

By this arrangement, ignition retard does not become effective at low temperatures as long as the auxiliary air valve remains open.

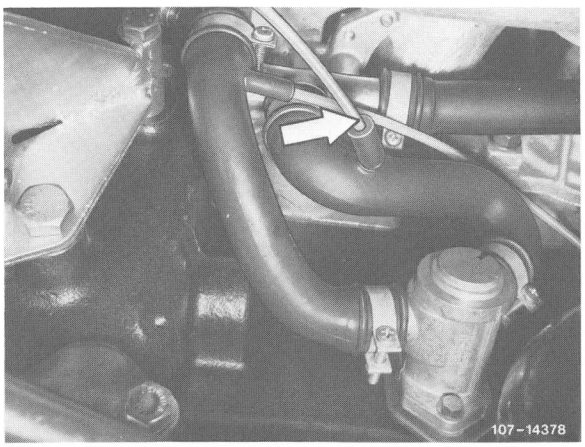


Fig. 93

Arrow = Vacuum line for ignition retard

The fuel evaporation control system has been completely revised.

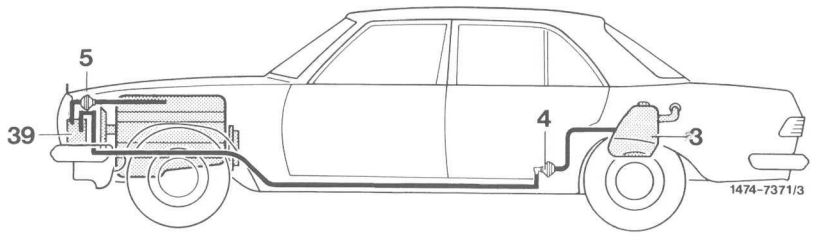


Fig. 94
3 Fuel tank
4 Vent valve
5 Purge valve
39 Charcoal canister

The system consists of the following components:

Fuel tank

The fuel tank with the tube system and catch pan is identical to the already known version.

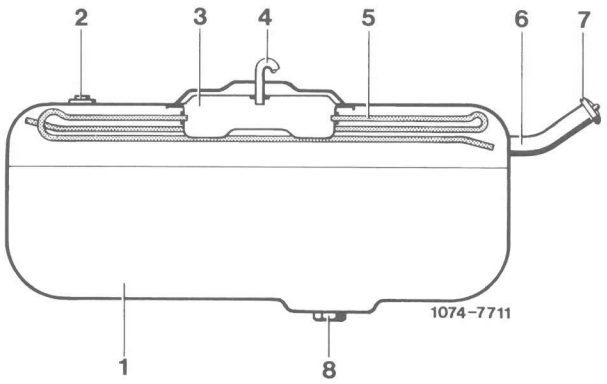


Fig. 95
1 Fuel tank
2 Fuel gauge sending unit
3 Expansion tank
4 Connection, vent valve unit
5 Tube system
6 Filler neck
7 Fuel tank cap
8 Connection, fuel feed line

Vent valve unit

The fuel tank vent valve unit (4) is mounted underneath the vehicle in the area of the rear footwell and replaces the valve system as known from Model Year 1977.

The vent valve unit consists of a vacuum and pressure relief valve.

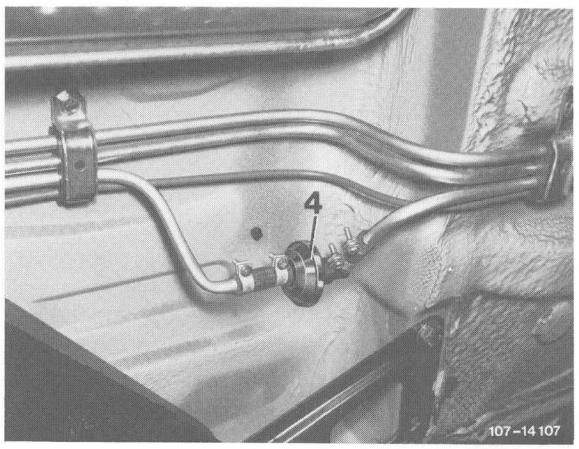


Fig. 96
4 Vent valve unit

Charcoal canister

The charcoal canister corresponds to the already known version. Only the mounting bracket (arrows) has been modified.

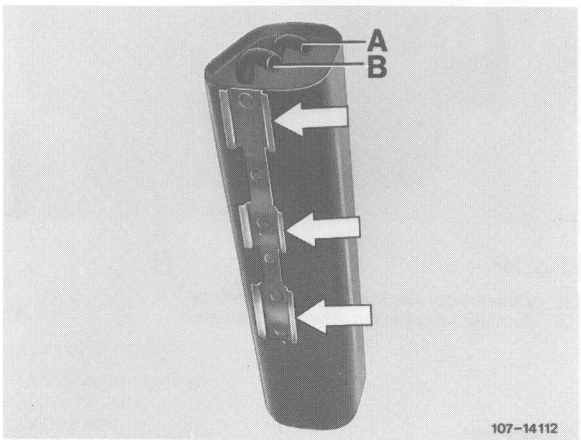


Fig. 97
A Connection, purge line
B Connection, fuel vapors from tank

Purge valve

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

Fig. 98

Throttle valve housing

In comparison to Model Year 1977, the throttle valve housing has been slightly modified. To prevent a mix-up of the vacuum lines, the outside diameter of the vacuum line to the charcoal canister has been increased from 4 to 5 mm. To purge the fuel vapors from the charcoal canister, two purge bores are provided above the throttle valve.

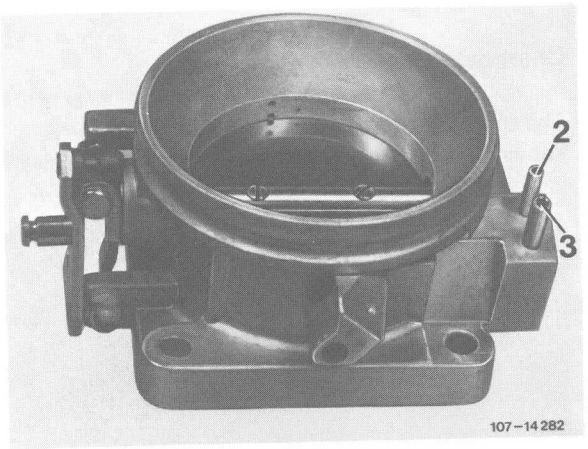


Fig. 99
2 Vacuum connection, ignition advance
3 Vacuum connection, charcoal canister

Fuel tank cap

To avoid excessive pressure in the fuel tank, the fuel cap has been modified.

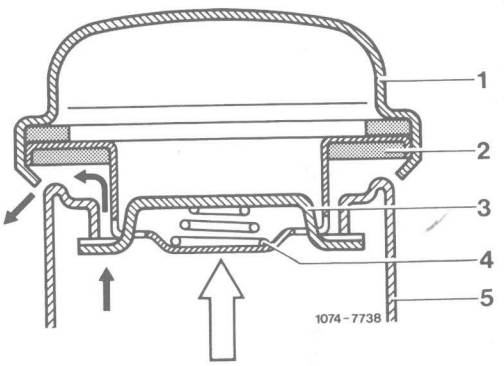


Fig. 100
1 Fuel tank cap
2 Gasket
3 Locking tab
4 Compression spring
5 Filler neck

Description of operation:

Evaporation system

By means of the vent valve unit (4), the pressure in the fuel tank is increased to 30 – 50 mbar. This ensures that less fuel vapors can escape from the tank.

If a pressure of 30 – 50 mbar is reached in the fuel tank, the pressure relief valve in the vent valve unit (4) opens and permits the fuel vapors to travel to the charcoal canister, where they are stored if the engine is not running.

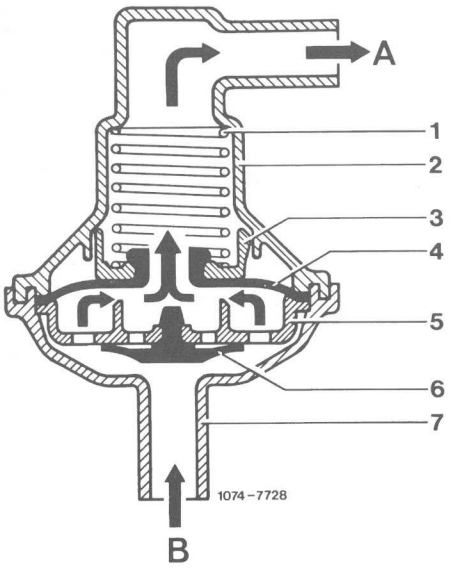


Fig. 101

Vent valve unit, open to charcoal canister

1 Compression spring
2 Valve housing
3 Spring seat
4 Pressure relief valve
5 Valve disc
6 Vacuum relief valve
7 Connecting fitting
A Connection, charcoal canister
B Connection, fuel tank

When the fuel cools down, the volume is reduced, creating a vacuum in the fuel tank. If the vacuum increases to 1 – 16 mbar, the vacuum relief valve (6) opens allowing air or fuel vapors to flow from the charcoal canister back into the fuel tank thereby reducing the vacuum. If the vacuum in the fuel tank drops below 1 mbar, the vacuum relief valve (6) closes.

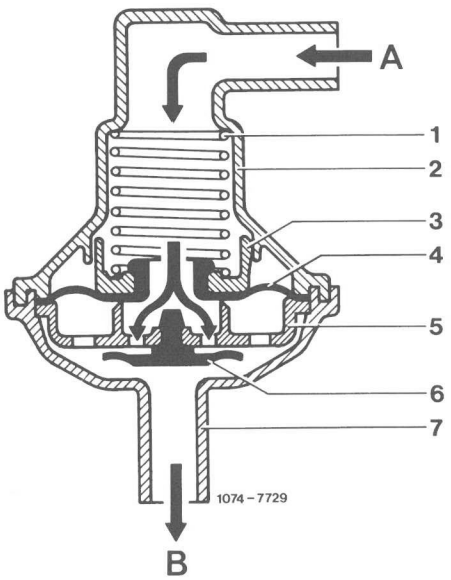


Fig. 102

Vent valve unit, open to fuel tank

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

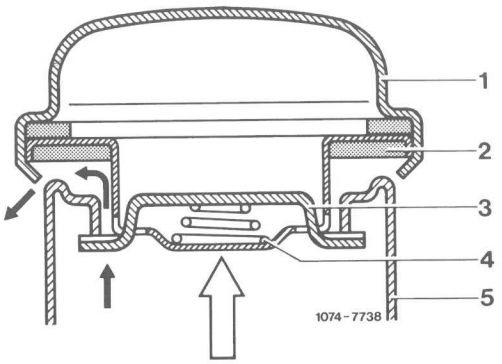


Fig. 103

1 Fuel tank cap
2 Gasket
3 Locking tab
4 Compression spring
5 Filler neck

Purge system

The charcoal canister is connected with the throttle valve housing by a hose in which the purge valve is installed.

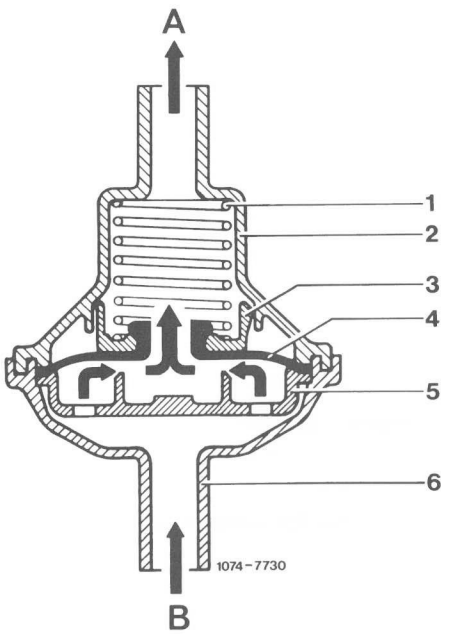


Fig. 104

Purge valve open

1 Compression spring
2 Valve housing
3 Spring seat
4 Pressure relief valve
5 Valve disc
6 Connection fitting
A Connection, throttle valve housing
B Connection, charcoal canister

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

As the throttle valve is opened, the two purge bores in the throttle valve housing, which terminate in a common passage, are progressively exposed to the venturi vacuum. This will result in a metered purging in the lower partial load operating range of the engine without influencing the driving characteristics.

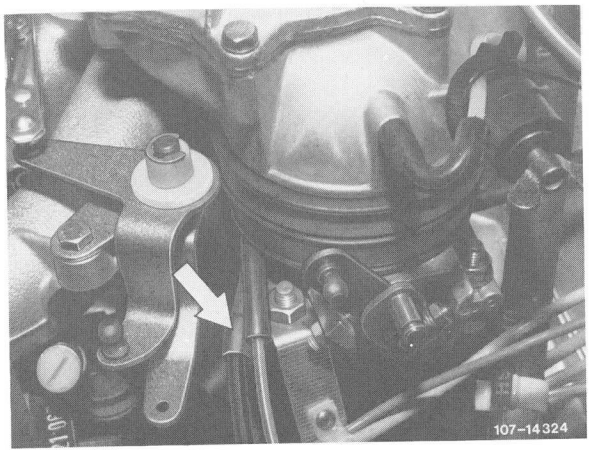


Fig. 105
Arrow = Purge connection, throttle valve

At idle and during coasting (throttle valve closed), both purge bores are located on the atmosphere side of the throttle valve. The purge valve is closed and, therefore, no purging of fuel vapors from the charcoal canister takes place.

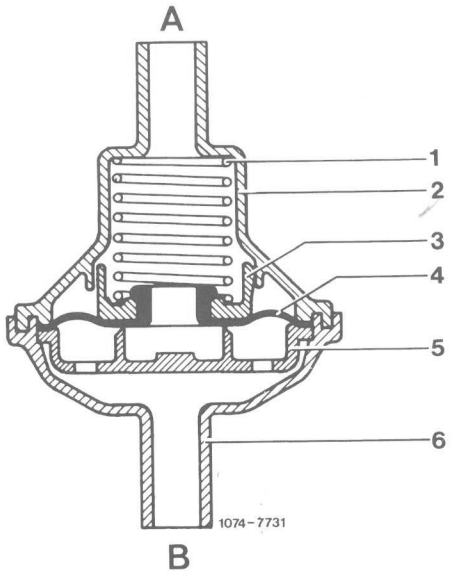


Fig. 106
Purge valve, closed

Quick Test

The operation of the EGR, air injection and the fuel evaporation control system can be checked with this quick test.

The following tests should be performed in the sequence given and with the engine at operating temperature:

Run engine at idle.

If the correct test result is not obtained, the defect must first be eliminated. To simplify the defect location, the subsequent test procedure is described under the same test number in the section entitled "Component Test".

Exhaust Gas Recirculation (EGR)

Test No. 1

Pull off brown vacuum line from EGR valve and slowly increase idle speed.

Result

Starting at approx. 1,200/min the engine should run erratically or stall.

Air Injection

Test No. 2

Connect CO tester. Pull off vacuum line (a) from delay valve (Fig. 112).

Result

The CO value should rise.

Test No. 3

Slip vacuum line onto delay valve again and briefly accelerate fully.

Result

When decelerating, an air flow noise must be noticeable on the RH side of the engine (driving direction) for approx. 3 to 5 seconds.

Fuel Evaporation Control System

Test No. 4

Pull off left purge hose leading to throttle valve housing from charcoal canister and hold shut with a finger or connect vacuum gauge.
Slowly increase engine speed to above approx. 2,000/min.

Result

a) At idle, no vacuum must be present.

b) At rising engine speed, vacuum must increase.

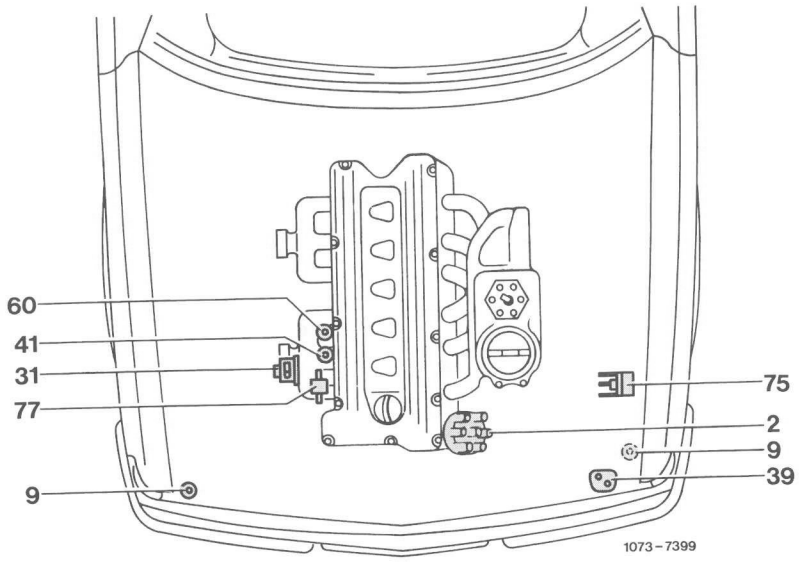


Fig. 107

2 Distributor
9 Switch-over valve, ignition
31 EGR valve
39 Charcoal canister
41 Anti-backfire valve
60 Thermo valve, 40 °C
75 Transducer
77 Delay valve

Component Test

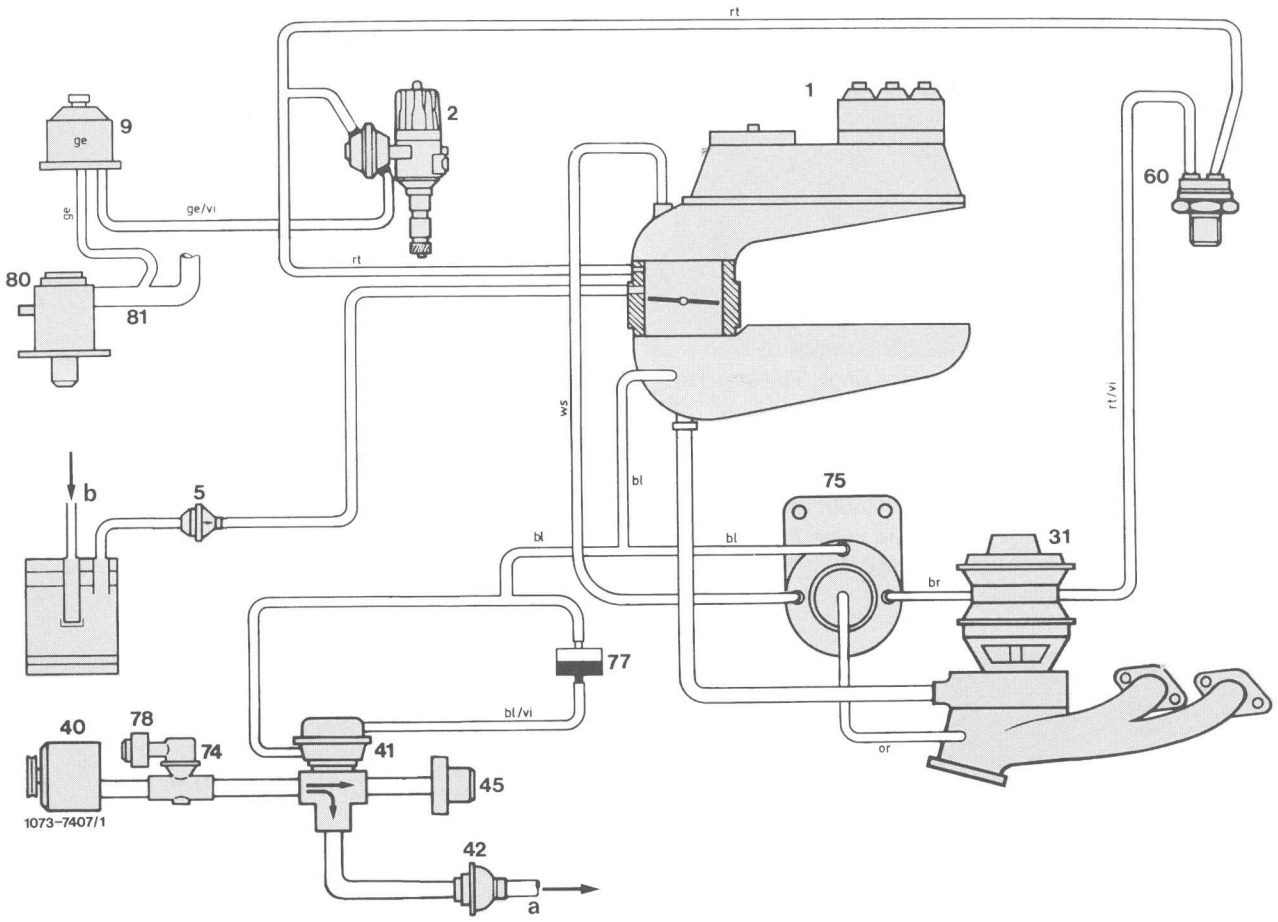


Fig. 108

1 Throttle valve housing and intake manifold
2 Distributor
5 Purge valve
9 Switch-over valve (on vehicles with air conditioner)
31 EGR valve
39 Charcoal canister
40 Air pump
41 Anti-backfire valve
42 Check valve
45 Silencer (air filter for noise suppression)
60 Thermo valve, 40 °C
74 Pressure relief valve
75 Transducer
77 Delay valve
78 Silencer (air filter for noise suppression)
80 Auxiliary air valve
81 Hose
a to cylinder head
b from fuel tank

bl = blue
br = brown
ge = yellow
or = orange
rt = red
vi = purple
ws = white

Exhaust Gas Recirculation (EGR)

Test No. 1

If the engine does not run erratically or stall:

1.1 Check vacuum lines

Check that proper vacuum lines are connected to transducer and intake manifold.

While doing so, note that the connections of the transducer are marked with color rings. The attached vacuum lines must have the same color code.

The red vacuum line must be attached to the angular connection and the red/purple vacuum line to the vertical connection of the thermo valve, 40 °C. Check all mentioned vacuum lines for leaks and blow out the vacuum connections.

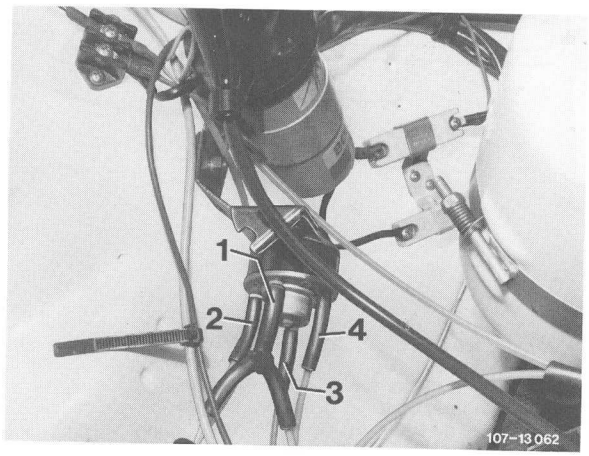


Fig. 109
1 Connection, intake manifold vacuum (blue)
2 Connection, vent line (white)
3 Connection, exhaust back pressure line (orange)
4 Connection, vacuum control line to EGR valve (brown)

1.2 Check thermo valve (60)

The thermo valve can be recognized by the black plastic part and by the stamped-in temperature value 40 °C in the metallic part.

Pull off red/purple vacuum line, run engine and accelerate.

Vacuum must be present at the open connection. When removing and installing the thermo valve, make sure that the connecting tubes are not damaged.

1.3 Check tansducer (75)

Run engine at idle. Pull off brown vacuum line from EGR valve. Connect vacuum gauge or hold shut with a finger. Vacuum must be present at idle speed.

Replace transducer if no vacuum is present.

1.4 Check EGR valve (31)

Run engine at idle. Pull off both vacuum lines from EGR valve. Attach the brown vacuum line to the connection for the red/purple vacuum line. The engine should run erratically or stall.

Replace EGR valve if the engine does not run erratically or stall.

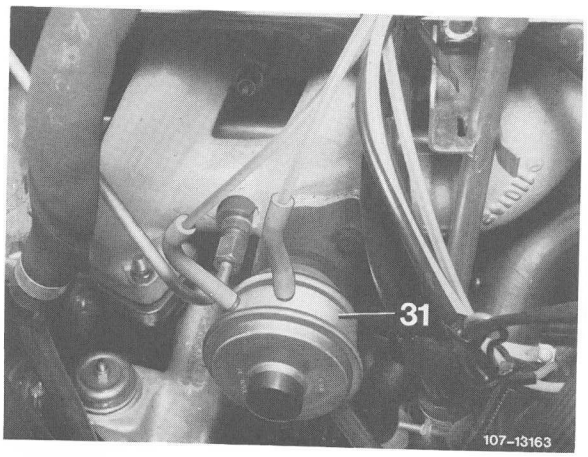


Fig. 110
31 EGR valve

Air Injection

Test No. 2

If the CO value does not increase:

2.1 Check vacuum lines

The blue vacuum line to the anti-backfire valve must be connected to the intake manifold (arrow).

The delay valve (77) is located in the vacuum line between line manifold and the lower connection (a) on the anti-backfire valve. The vacuum line from the intake manifold must be connected to the white part of the housing.

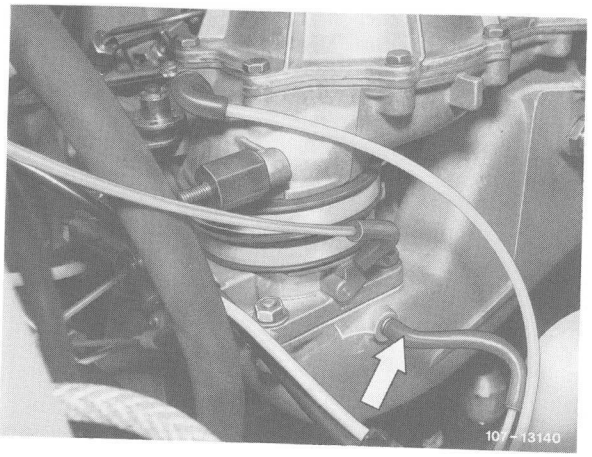


Fig. 111

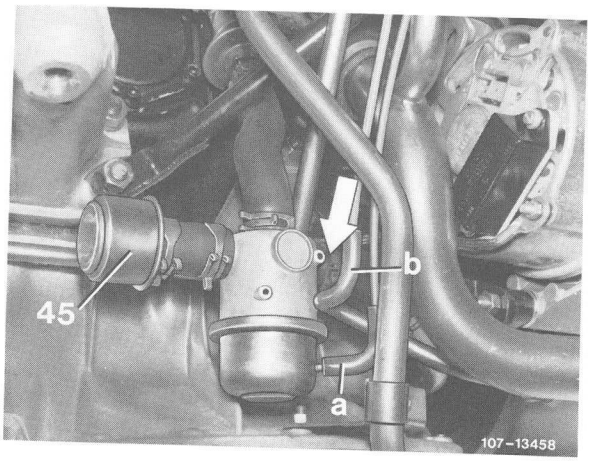


Fig. 112

2.2 Check vacuum at anti-backfire valve

Pull off upper vacuum line (b) from the anti-backfire valve (41). Connect vacuum gauge or hold shut with a finger. Vacuum should be present at idle speed. If there is no vacuum present, check vacuum line for leaks and blow out vacuum connection at intake manifold.

Check anti-backfire valve if vacuum is present.

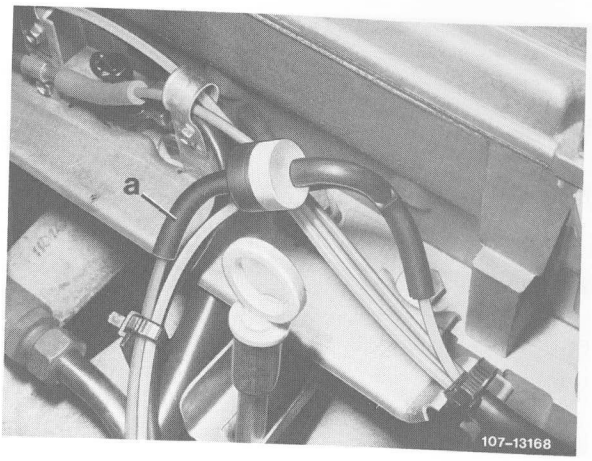


Fig. 113

2.3 Check anti-backfire valve (41)

a) Remove air filter for noise suppression (45). Run engine at idle. Pull off vacuum line (a) from delay valve (77) (Fig. 113). Air must flow from air hose of anti-backfire valve. If no air is emitted, check air pump. To do so, pull air hose (arrow, Fig. 112) from air pump on the anti-backfire valve.

If the hose emits air, replace anti-backfire valve.

If there is no air, check tension of air pump drive belt or replace air pump if necessary.

b) Replug vacuum line (a) into delay valve again. No air must flow from the air hose of the anti-backfire valve after 3 to 5 seconds.

If air is emitted, check delay valve.

Test No. 3

If no air flow noise is noticeable:

3.1 Check delay valve (77)

Remove air filter (45) from anti-backfire valve.

Run engine and briefly accelerate. When decelerating, an air flow must be noticeable at the air hose of the anti-backfire valve for approx. 3 to 5 seconds.

If not, replace delay valve.

Fuel Evaporation Control System

Test No. 4

If there is no vacuum at increasing engine speed:

4.1 Check vacuum hose

The vacuum hose must be attached to the throttle valve housing (arrow). Check hose for leaks and blow out the connection on the throttle valve housing.

If there is still no vacuum, detach purge hose at purge valve and repeat test. If there is vacuum, renew purge valve.

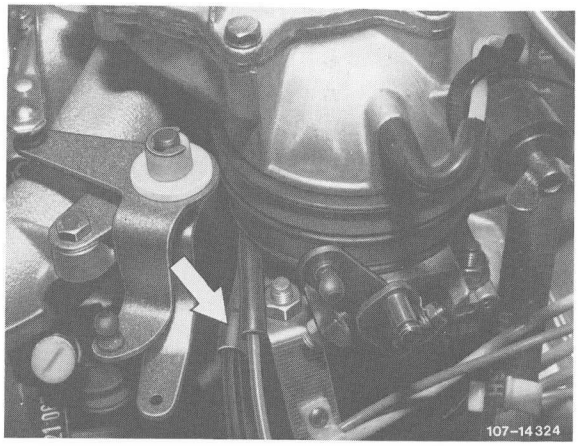


Fig. 114

Series 107 vehicles

The rechargable glove compartment lamp unit has been replaced by a glove compartment light similar to the one used in series 116 vehicles.

Both sun visors are provided, as on series 123 vehicles, with a detent in the end positions.

A wood veneer covering is supplied as standard for the center console.

Series 116 vehicles

Both loudspeakers in the dashboard have been relocated on top of the dash as on series 123 vehicles.

Fig. 115
Dashboard-mounted loudspeakers

Also on engines 117, cylinder head gaskets are used which do not require retightening.

These gaskets are made from a material with minimum compression set. The holes for the water passages are without metal reinforcements.

These cylinder head gaskets are not to be retightened at the first service or after approx. 500 – 1000 km (300 – 600 miles) after replacement during repairs.

When installing a new cylinder head gasket, the cylinder head screws must be retightened as before with the engine at operating temperature (80 °C engine coolant temperature).

Thereby proceed as follows: Loosen each individual screw slightly and retighten to the specified torque by following the sequence of the tightening diagram.

Fuel Injection System (CIS)

The fuel return line from the suction damper is now attached to the hose for crankcase ventilation.

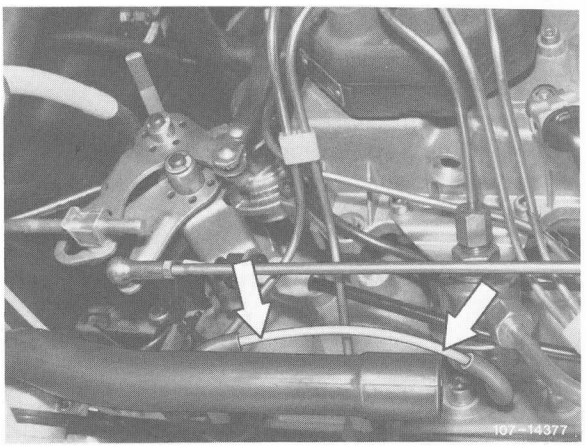


Fig. 116

Suction damper
Hose for crankshaft ventilation
Arrow = Fuel return line from suction damper

Ignition System

Vacuum Ignition Advance

In addition to the already known control of the vacuum ignition advance, a delay valve (77) is installed in the vacuum line leading to the vacuum box, to prevent a sudden increase in vacuum. This improves the emission values.

Note: The delay valve for ignition advance has a red ring going all around the middle.

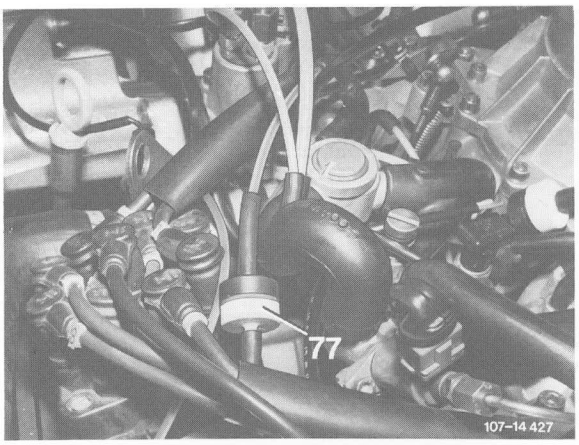


Fig. 117

Vacuum Ignition Retard

Vacuum for ignition retard is no longer picked up at the throttle valve housing but rather at the molded hose between the auxiliary air valve/idle speed air valve.

By this arrangement, ignition retard does not become effective at low temperatures as long as the auxiliary air valve remains open.

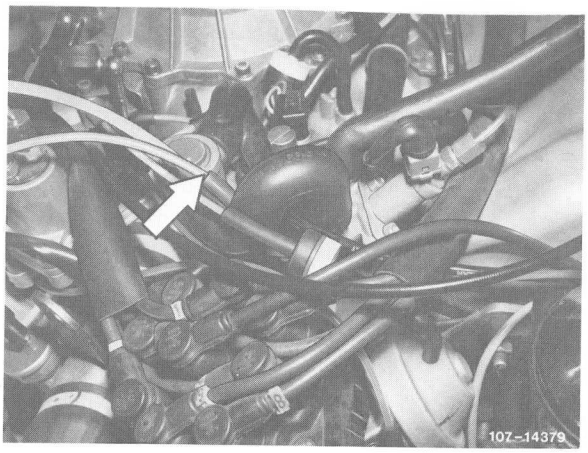


Fig. 118
Arrow = Vacuum line for ignition retard

The emission control system remains the same except for the coasting bypass valve and air injection control described below.

Coasting Bypass Valve

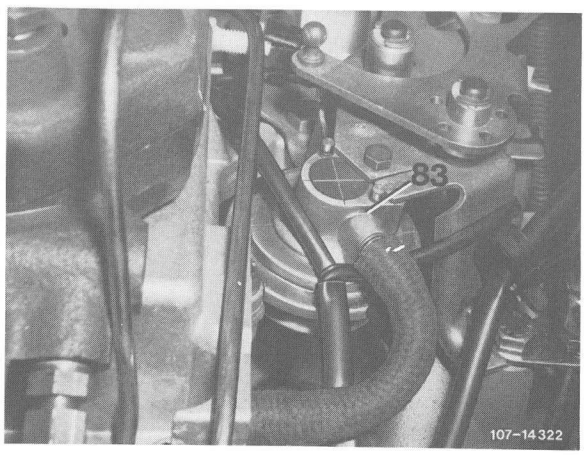


Fig. 119

A coasting bypass valve (83) has been installed to lift the speed after starting and to improve combustion while coasting. It is located behind the mixture control unit and mounted on the gate lever holder for the accelerator linkage.

The coasting bypass valve is operated by vacuum from the intake and connects the air guide housing with the intake manifold.

Description of Operation

Speed Boost After Starting

The pressure is uniform in upper and lower diaphragm chambers with engine turned off. After starting the engine there is high vacuum in lower diaphragm chamber (5) for a short time, which overcomes the force of spring (6). Valve (8) is pressed downward, and the opening for bypass air is open from the air guide housing to the intake manifold.

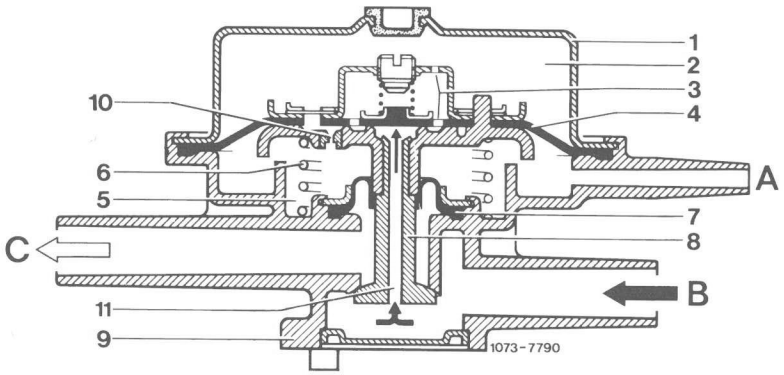


Fig. 120

1 Housing upper section
2 Upper diaphragm chamber
3 Vent bores
4 Diaphragm spring
5 Lower diaphragm chamber
6 Spring
7 Sealing diaphragm
8 Valve
9 Housing lower section
10 Throttle bore
11 Vent bore
A Intake manifold vacuum connection
B Air guide housing connection
C Intake manifold lower section connection

As soon as the vacuum has been equalized in both diaphragm chambers by way of throttle bore (10), spring (6) presses valve (8) up to close it.

The idle speed is increased briefly by supplying bypass air, which stabilizes idle operation.

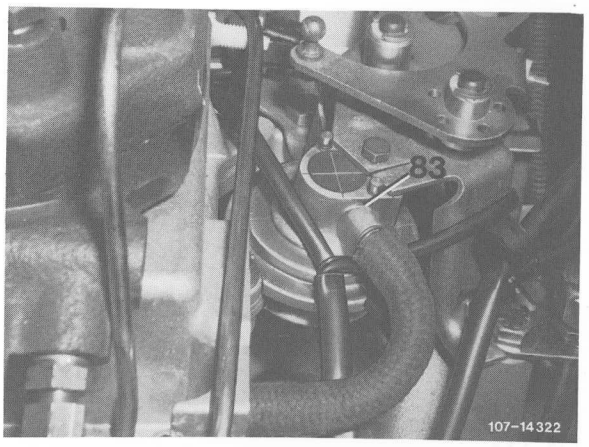


Fig. 121

Air Feed for Coasting

A spring closes valve (8) because of the equalized pressure in upper and lower diaphragm chambers while driving constantly.

While coasting vacuum in the lower diaphragm chamber (5) will rise faster than it can be equalized with the upper diaphragm chamber by way of throttle bore (10). The pressure of the high vacuum overcomes the force of spring (6) and valve (8) is pressed down again. Bypass air can now flow from the air guide housing into the intake manifold.

Improved combustion and less hydrocarbon emissions are the results from feeding air while coasting and bypassing the throttle housing.

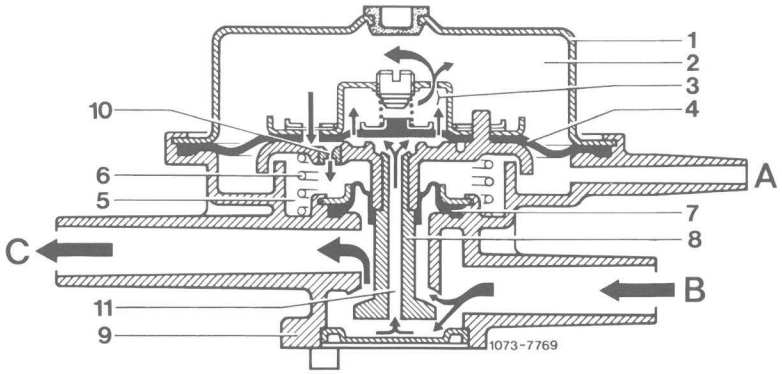


Fig. 122

1 Housing upper section
2 Upper diaphragm chamber
3 Vent bores
4 Diaphragm spring
5 Lower diaphragm chamber
6 Spring
7 Sealing diaphragm
8 Valve
9 Housing lower section
10 Throttle bore
11 Vent bore
A Intake manifold vacuum connection
B Air guide housing connection
C Intake manifold lower section connection

Air Injection

The system consists of the following components:

Air pump (Saginaw pump)

The air supply pump is an impeller pump with a maintenance-free centrifugal filter which cleans the intake air.

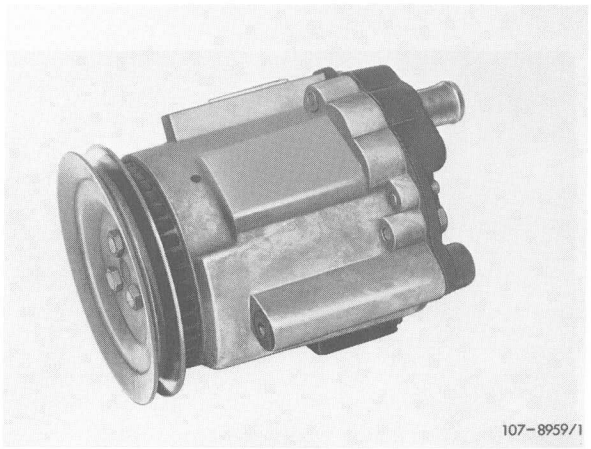


Fig. 123

Anti-backfire valve

The anti-backfire valve controls the air injection/ blow-off at given driving conditions.

An air filter for noise suppression is attached to the end of the blow-off line.

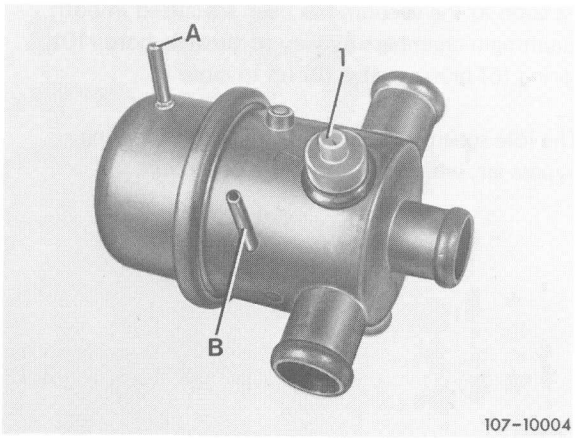


Fig. 124

A Connection to delay valve
B Connection to intake manifold
1 Safety valve

Delay valve

With the aid of the delay valve, the air injection is delayed for a given period of time and is switched over to air blow-off upon transition to deceleration.

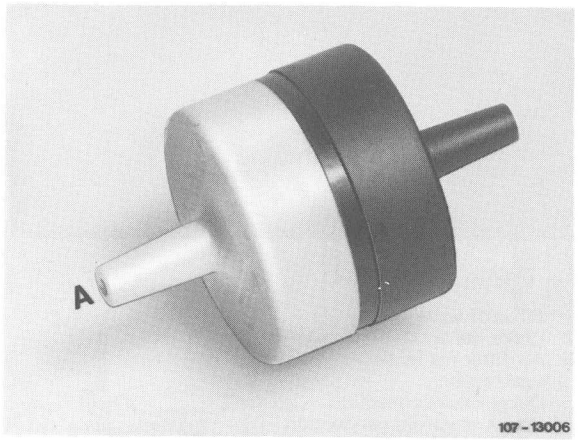


Fig. 125

A White portion of housing – vacuum connection (intake side)

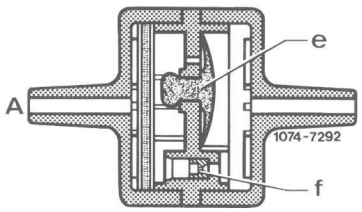


Fig. 126

A Vacuum connection (intake side)
e Valve reed
f Calibrated bore

Check valve

The check valve prevents hot exhaust gases from flowing into the system.

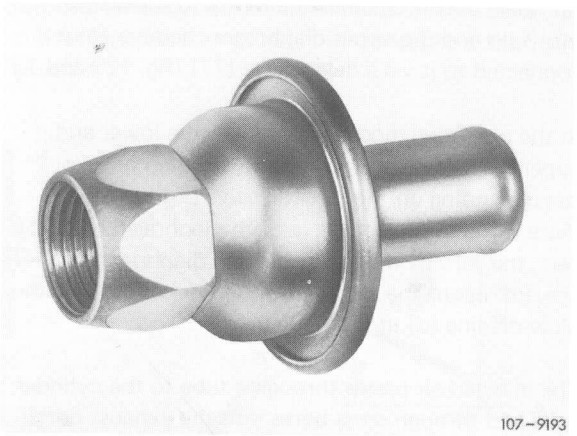


Fig. 127

Description of operation

In order to reduce the CO and the unburnt HC contents in the exhaust gases, air is injected into the exhaust ducts of the cylinder head **in all modes of operation except for transition to deceleration.**

The oxygen contained in the injected air merges with the hot exhaust gases in the exhaust manifold and initiates a reaction.

The air pump, driven by the crankshaft via a V-belt, continuously supplies air while the engine is running.

An air filter (45) is located on the blow-off line for the purpose of noise suppression.

The injected air reaches the anti-backfire valve (41) via the air pump.

Two switching functions are integrated in the anti-backfire valve.

1. Air injection

(except on transition to deceleration)

The lower diaphragm chamber (b) of the anti-backfire valve (41) is connected directly to the intake manifold and the upper diaphragm chamber (a) is connected to it via a delay valve (77) (fig. 129 and 130).

In the operating modes mentioned, the lower and upper diaphragm chambers are evacuated more or less depending on the throttle valve position. Since there is the same vacuum in both diaphragm chambers, the spring pulls the two-sided diaphragm disc upward, opens the air injection line (c) and closes the blow-off line (d) at the same time.

The injected air passes through a tube to the cylinder head and through cross bores into the exhaust ports.

To prevent hot exhaust gases from entering into the air injection line, a check valve (42) has been installed in the line between the anti-backfire valve and cylinder head.

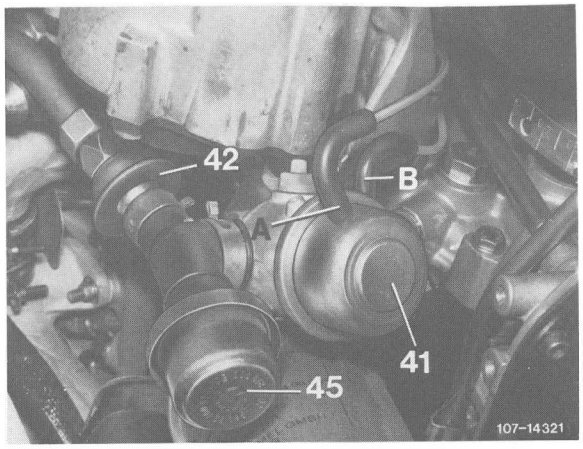


Fig. 128
41 Blowoff valve
42 Check valve
45 Air filter for noise suppression
A Delay valve connection
B Intake manifold connection

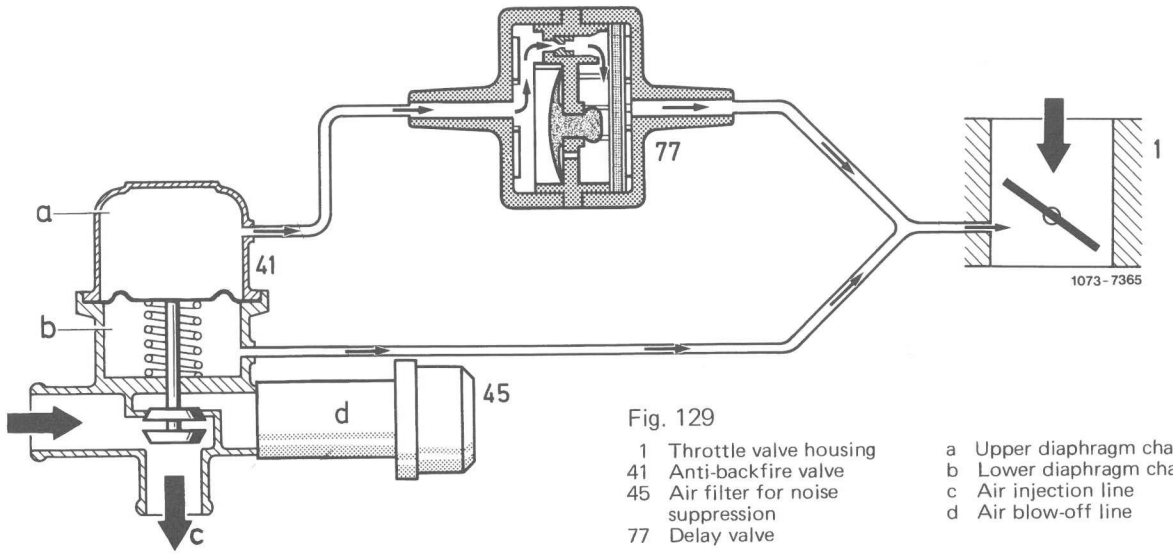


Fig. 129
1 Throttle valve housing
41 Anti-backfire valve
45 Air filter for noise suppression
77 Delay valve
a Upper diaphragm chamber
b Lower diaphragm chamber
c Air injection line
d Air blow-off line

2. Air discharge for transition to deceleration

During the time the throttle valve in housing is closed, vacuum in the lower diaphragm chamber (b) increases very quickly. In the upper diaphragm chamber (a), on the other hand, the vacuum cannot increase so quickly because of the calibrated bore in the delay valve (77). The difference in vacuum effects that the valve head is pulled down against the spring force and the air discharge line is opened.

The delivered air is blown off through the air filter (45). This procedure continues for so long, until the vacuum in both diaphragm chambers is the same. The compensating time depends on the size of the calibrated bore in the delay valve and the volume of the upper diaphragm chamber (a).

This measure will prevent backfiring in the exhaust while in transition to deceleration.

So that the vacuum can be reduced in the upper diaphragm chamber (a) just as quickly as in the lower diaphragm chamber (b) when accelerating, in addition to the calibrated bore (f) the upper diaphragm chamber is vented via a valve plate (e) in the delay valve.

This is necessary, so that when in transition to deceleration the anti-backfire valve can switch to air discharge immediately.

The desired switching would not be possible without this venting, because in this case there would still be high vacuum pressure in the upper diaphragm chamber.

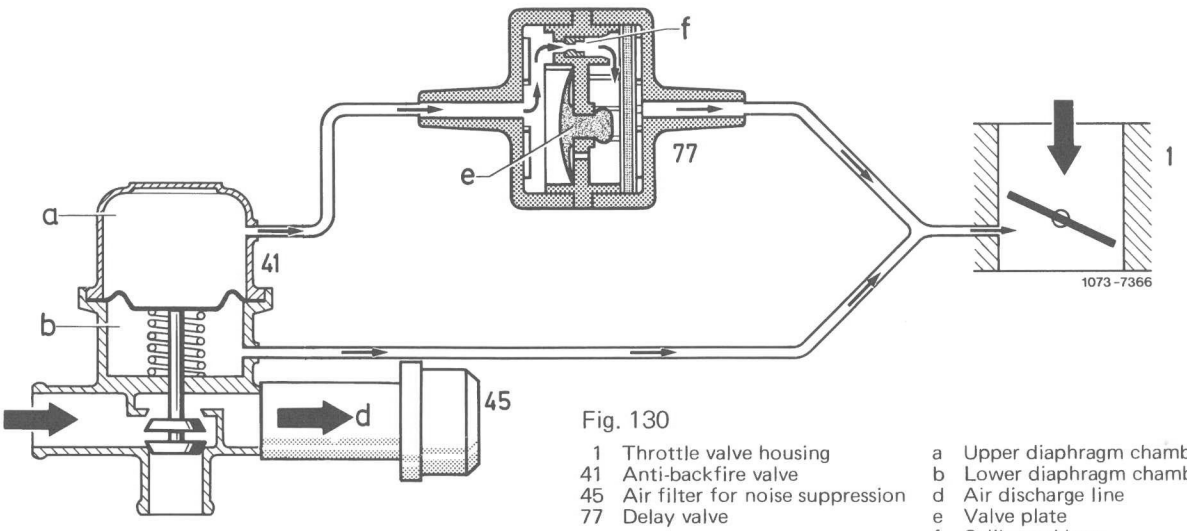


Fig. 130

1 Throttle valve housing
41 Anti-backfire valve
45 Air filter for noise suppression
77 Delay valve

a Upper diaphragm chamber
b Lower diaphragm chamber
d Air discharge line
e Valve plate
f Calibrated bore

The fuel evaporation control system has been completely revised.

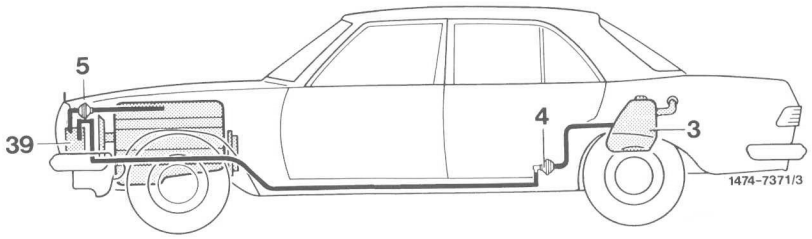


Fig. 131
3 Fuel tank
4 Vent valve
5 Purge valve
39 Charcoal canister

The system consists of the following components:

Fuel tank

The fuel tank with the tube system and expansion tank is identical to the already known version.

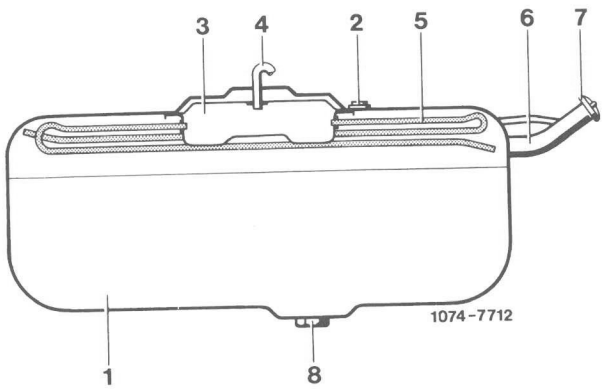


Fig. 132
1 Fuel tank
2 Fuel gauge sending unit
3 Expansion tank
4 Connection, vent valve unit
5 Tube system
6 Filler neck
7 Fuel tank cap
8 Connection, fuel feed line

Note: In Model 107.044 the expansion tank is outside the fuel tank.

Vent valve unit

The fuel tank vent valve unit (4) is mounted underneath the vehicle in the area of the rear footwell and replaces the valve system as known from Model Year 1977.

The vent valve unit consists of a vacuum and pressure relief valve.

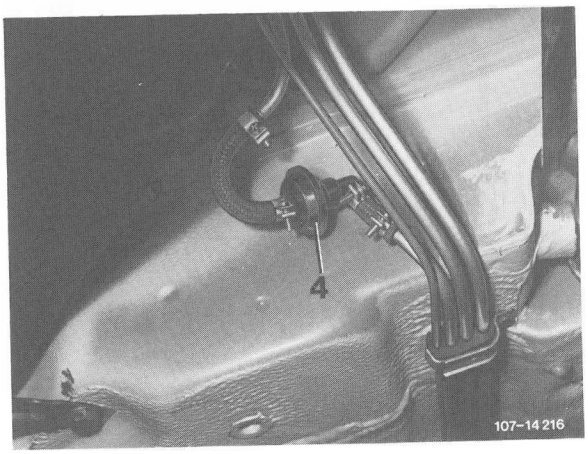


Fig. 133
4 Vent valve unit

Charcoal canister

The charcoal canister corresponds to the already known version. Only the mounting bracket (arrows) has been modified.

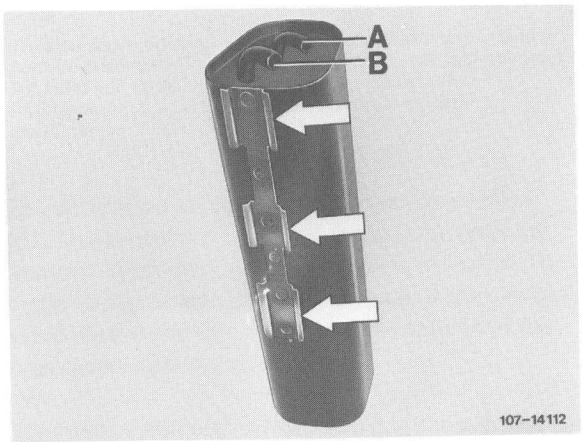


Fig. 134
A Connection, purge line
B Connection, fuel vapors from tank

Purge valve

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

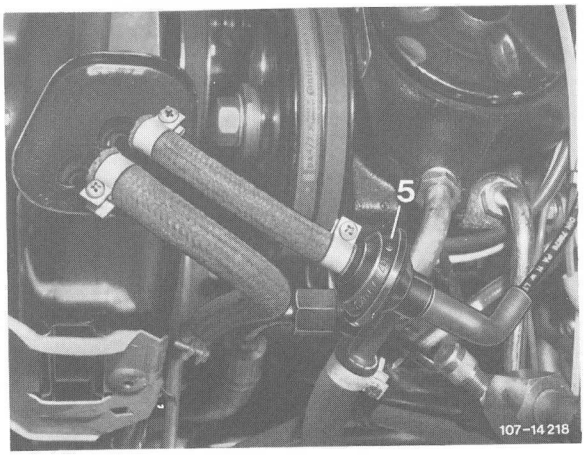


Fig. 135

Throttle valve housing

In comparison to Model Year 1977, the throttle valve housing has been slightly modified. To prevent a mix-up of the vacuum lines, the outside diameter of the vacuum line to the charcoal canister has been increased from 4 to 5 mm. To purge the fuel vapors from the charcoal canister, two purge bores are provided above the throttle valve.

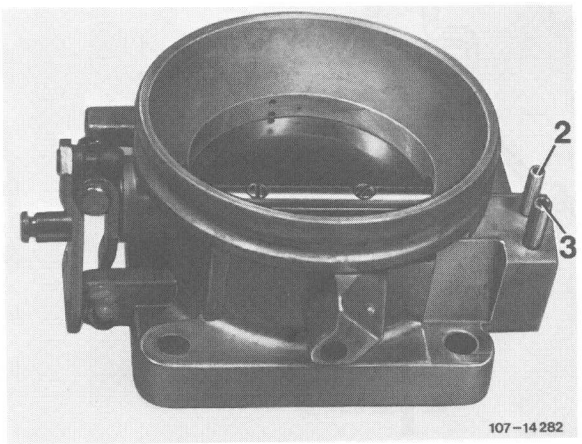


Fig. 136

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

Fuel tank cap

To avoid excessive pressure in the fuel tank, the fuel tank cap has been modified.

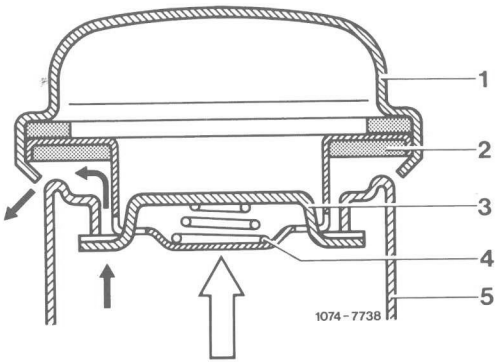


Fig. 137

1 Fuel tank cap
2 Gasket
3 Locking tab
4 Compression spring
5 Filler neck

Description of operation:

Evaporation system

By means of the vent valve unit (4), the pressure in the fuel tank is increased to 30 – 50 mbar.
This ensures that less fuel vapors can escape from the tank.

If a pressure of 30 – 50 mbar is reached in the fuel tank, the pressure relief valve in the vent valve unit (4) opens and permits the fuel vapors to travel to the charcoal canister, where they are stored if the engine is not running.

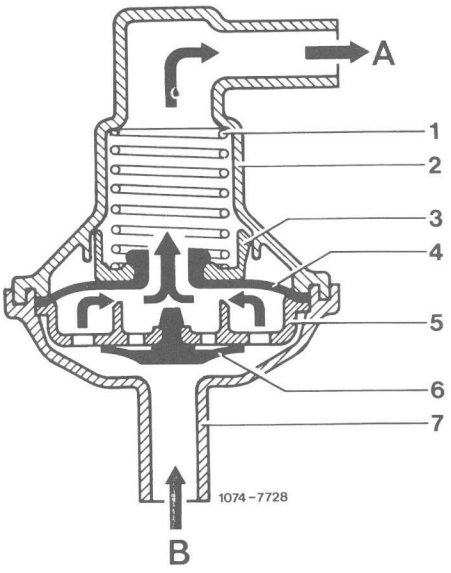


Fig. 138

Vent valve unit, open to charcoal canister

1 Compressing spring
2 Valve housing
3 Spring seat
4 Pressure relief valve
5 Valve disc
6 Vacuum relief valve
7 Connecting fitting
A Connection, charcoal canister
B Connection, fuel tank

When the fuel cools down, the volume is reduced, creating a vacuum in the fuel tank. If the vacuum increases to 1 – 16 mbar, the vacuum relief valve (6) opens allowing air or fuel vapors to flow from the charcoal canister back into the fuel tank thereby reducing the vacuum. If the vacuum in the fuel tank drops below 1 mbar, the vacuum relief valve (6) closes.

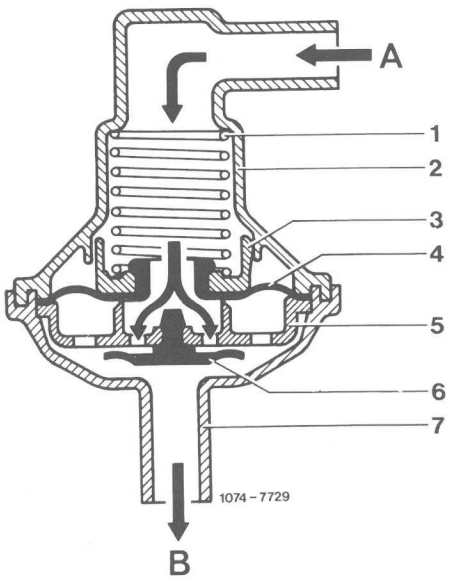


Fig. 139

Vent valve unit, open to fuel tank

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

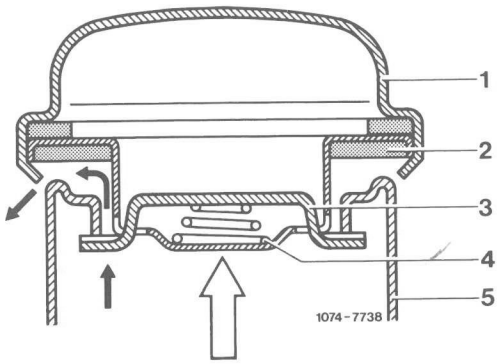


Fig. 140

1 Fuel tank cap
2 Gasket
3 Locking tab
4 Compression spring
5 Filler neck

Purge system

The charcoal canister is connected with the throttle valve housing by a hose in which the purge valve is installed.

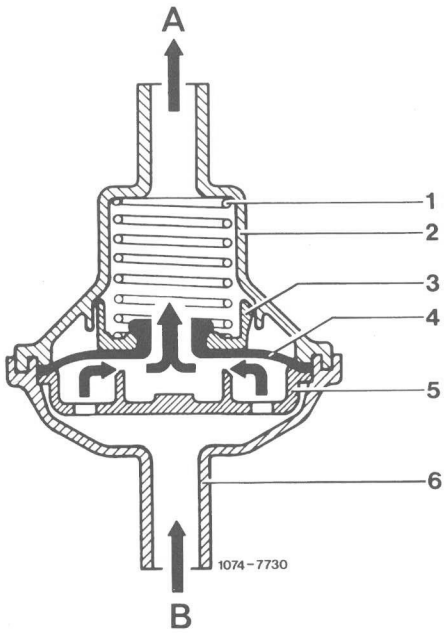


Fig. 141

Purge valve open

1 Compression spring
2 Valve housing
3 Spring seat
4 Pressure relief valve
5 Valve disc
6 Connection fitting
A Connection, throttle valve housing
B Connection, charcoal canister

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

As the throttle valve is opened, the two purge bores in the throttle valve housing, which terminate in a common passage, are progressively exposed to the venturi vacuum. This will result in a metered purging in the lower partial load operating range of the engine without influencing the driving characteristics.

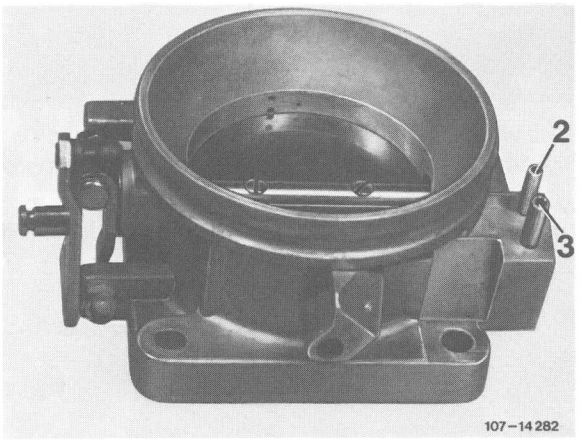


Fig. 142
Throttle valve

At idle and during coasting (throttle valve closed), both purge bores are located on the atmosphere side of the throttle valve. The purge valve is closed and, therefore, no purging of fuel vapors from the charcoal canister takes place.

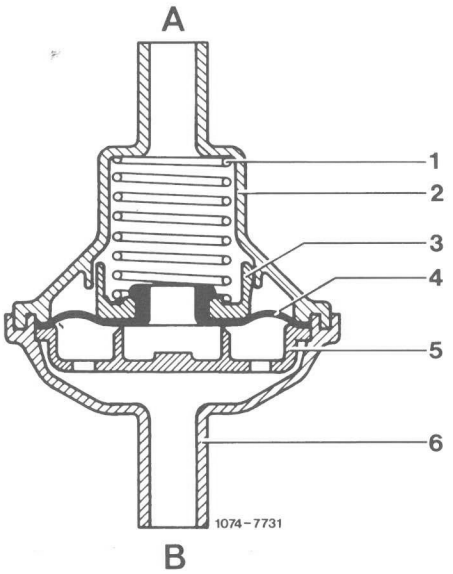


Fig. 143
Purge valve, closed

Adjusting Idle

For idle adjustments nothing has been changed, except for switching off of the air injection.

The air injection is switched off by detaching the vacuum hose (arrow) at delay valve (77).

To check or adjust the idle speed CO level and idle speed, the vacuum hose connection (arrow) must be plugged.

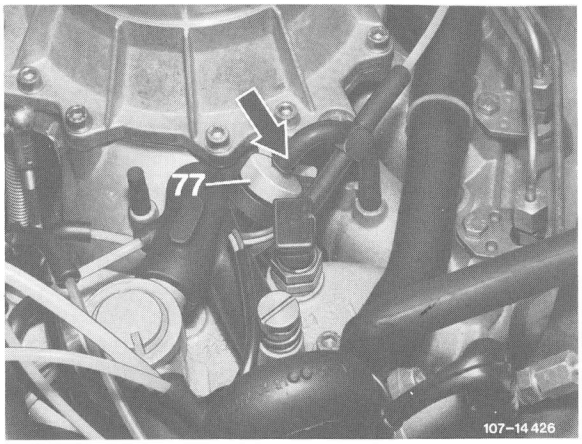


Fig. 144

77 Delay valve
Arrow = connection to antibackfire valve

Quick Test

Test Line

A vacuum line according to the figure must be made up to check the EGR valve.

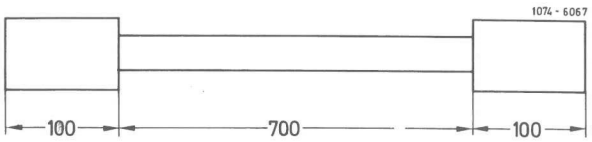


Fig. 145
700 = 700 mm vacuum line 4 x 1 mm
100 = 100 mm hose 8 x 2 mm

This quick test is used to check the operation of the exhaust gas recirculation, the speed boost after starting, the air feed while coasting and the fuel evaporation control system. The following tests must be carried out in the given sequence with the engine at operating temperature.

Run engine at idle speed

If the results of a test are not reached, first eliminate the defect. To facilitate finding a defect, test procedures are described under the same position numbers in the section "Component Test".

Exhaust Gas Recirculation

Test 1

Detach brown/violet vacuum line at EGR valve. Connect brown/violet line to vacuum gage. Run engine at idle speed. Then raise engine speed to approx. 2500 rpm.

Results

At idle speed there should not be any vacuum at vacuum gauge. At higher speeds there should be vacuum.

Test 2

Detach yellow/violet vacuum at distributor. Detach brown/violet vacuum line at EGR valve (31). Connect the test line between the yellow/violet vacuum line and EGR valve.

Results

Engine should run erratically and stall.

Air Injection

Test 3

Connect CO tester. Detach vacuum line at black section of delay valve (77).

Results

CO level must rise.

Test 4

Re-attach vacuum line to delay valve (77) and run engine at full throttle briefly.

Results

When releasing the accelerator an air flow sound must be heard on right side of engine (as seen in driving direction) for approx. 3 to 5 seconds.

Speed Boost After Starting

Air Supply While Coasting

Test 5

Detach vacuum hose at connection (A) of coasting bypass valve, and re-attach after waiting briefly.

Results

Engine idle speed should rise briefly after re-attaching the vacuum hose.

Fuel Evaporation Control System

Test 6

Detach black plastic purge line leading to throttle housing at charcoal canister and plug it with a finger or connect a vacuum gage.

Results

There should not be any vacuum at idle speed.

Increase engine speed slowly past approx. 2000 rpm.

Vacuum must rise with increasing engine speed.

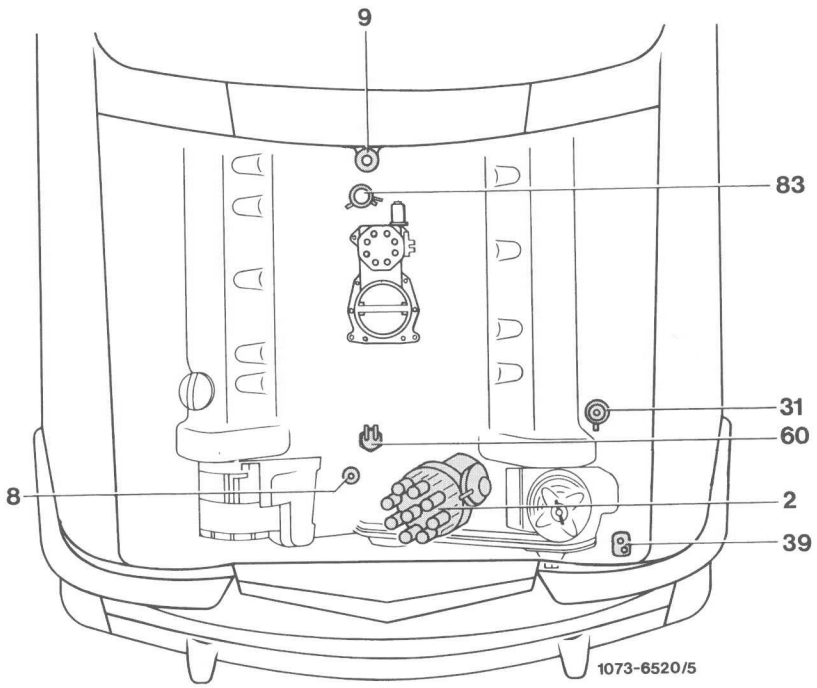


Fig. 146
2 Distributor
31 EGR valve
39 Charcoal canister
60 Thermo valve 40 °C (black)
83 Coasting bypass valve

Component Test

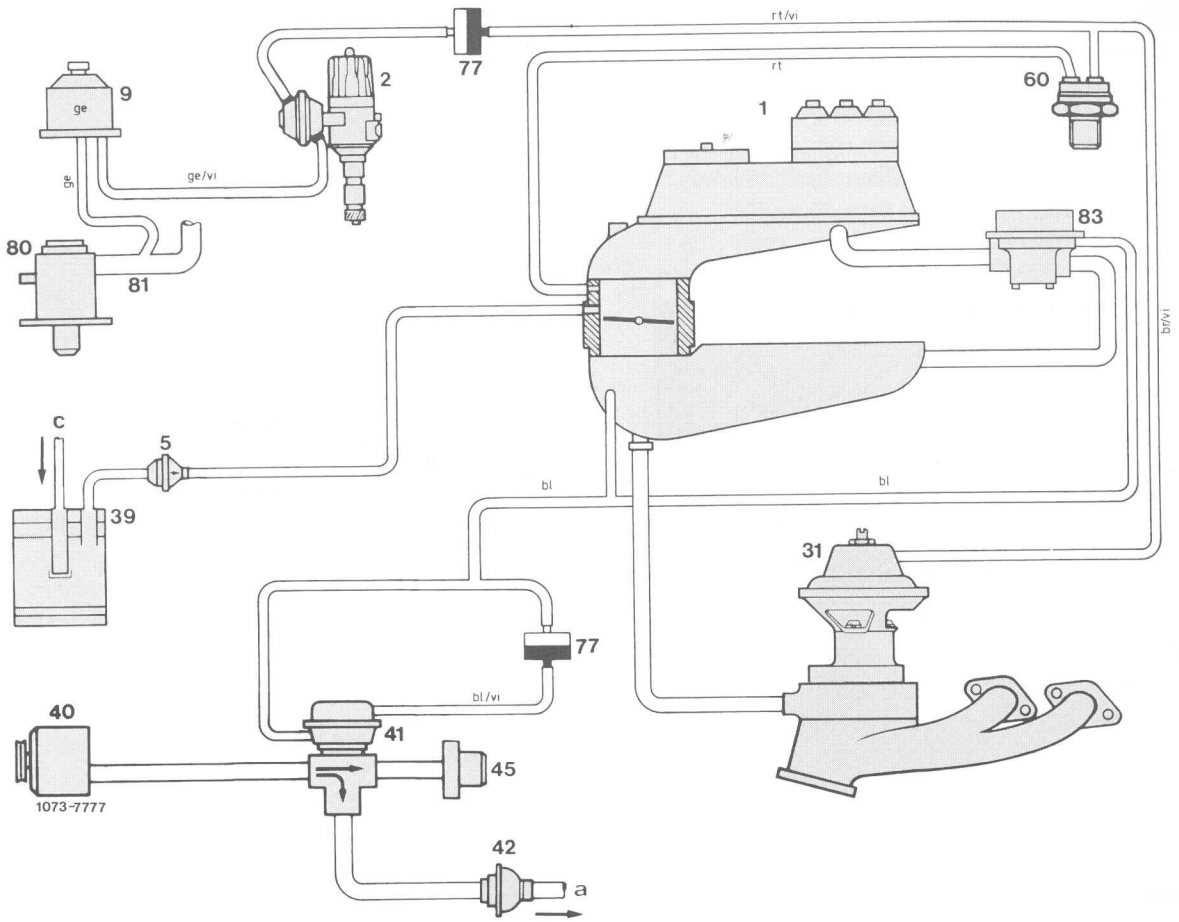


Fig. 147

1 Mixture control unit
2 Distributor
9 Switch-over valve, ignition
31 EGR valve
35 Check valve, vacuum
39 Charcoal canister
40 Air pump
41 Blow-off valve
42 Check valve
45 Air filter for noise suppression
60 Thermo valve 40 °C
61 Thermo valve 17 °C
75 Pressure transducer
77 Delay valve
80 Auxiliary air valve
81 Hose
83 Coasting bypass valve
a Air injection, cylinder head
b Connection, tank vent

Exhaust Gas Recirculation

Test 1

1.1 Checking Vacuum Lines

Red vacuum line must be connected to inclined and rubber hose to straight connection of black thermo valve 40 °C (60). Check all pertinent vacuum lines for leaks and blow through the vacuum source connections.

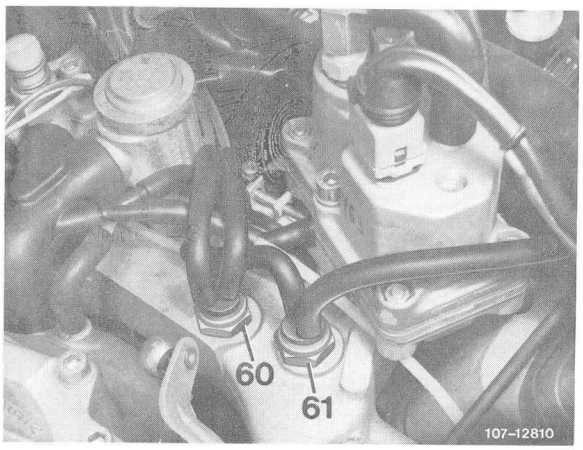


Fig. 148
60 Thermo valve 40 °C

1.2 Checking Thermo Valve 40 °C (60)

The thermo valve is identified by the black plastic section and "50 AA 4" stamped in the metal section.

Detach red/violet vacuum line, run engine and accelerate.

Vacuum must be felt at open connection.

Fig. 149

Test 2

Engine does not run erratically or stall.

Renew EGR valve.

Fig. 150
EGR Valve

Air Injection

Test 3

CO level does not rise.

3.1 Checking Vacuum Lines

Blue vacuum line leads from intake manifold to connection (B) of anti-backfire valve (41).

Blue/violet vacuum line with interposed delay valve (77) leads from connection (A) of anti-backfire valve (41) into an adaptor of blue vacuum line.

The delay valve must be installed that white connection (A) faces the intake manifold.

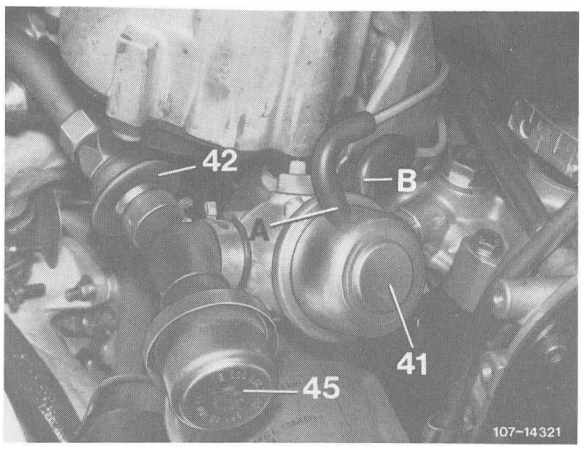


Fig. 151

3.2 Checking Vacuum at Anti-backfire Valve

Detach blue vacuum line at anti-backfire valve (41). Connect a vacuum gage or plug vacuum line with a finger. There should be vacuum at idle speed. If not, check vacuum line for leaks and blow through vacuum source connection on intake manifold.

If there is vacuum, check anti-backfire valve.

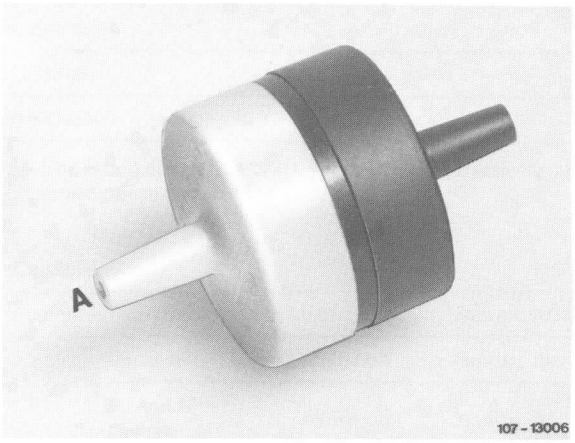


Fig. 152

Delay valve (77)

A White housing section vacuum connection (intake)

3.3 Checking Anti-backfire Valve (41)

a) Detach air filter for noise suppression (45). Run engine at idle speed. Detach blue/violet vacuum line at delay valve (77) (Fig. 144). Air must leave air hose of anti-backfire valve. If not, check air pump. This requires detachment of hose at air pump.

If air leaves hose, renew anti-backfire valve.

If not, check tightness of air pump belt or renew air pump.

b) Re-attach blue/violet vacuum line at delay valve. Air must not leave air hose on anti-backfire valve for approx. 3 to 5 seconds.

If air escapes, check delay valve.

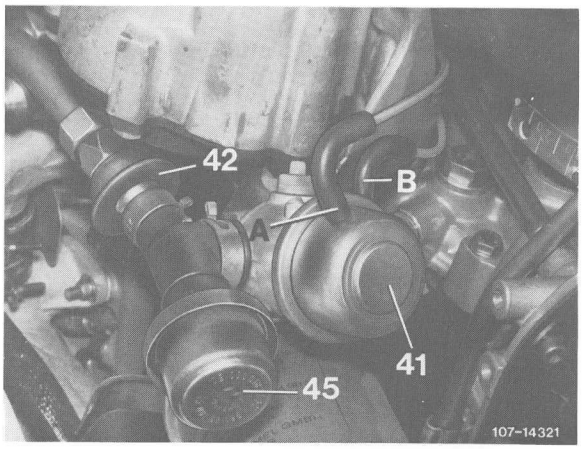


Fig. 153

Test 4

No air flow sound heard.

4.1 Checking Delay Valve (77)

Detach air filter (45) at anti-backfire valve.

Run engine and accelerate briefly. When releasing accelerator an air flow must be felt at air hose of anti-backfire valve for approx. 3 to 5 seconds.

If not, renew delay valve.

Speed Boost After Starting

Air Supply While Coasting

Test 5

No Speed Boost.

5.1 Checking Vacuum

Blue vacuum line leads from intake manifold to connection (A) of coasting bypass valve (83) via an adaptor.

Detach blue vacuum line at connection (A) of coasting bypass valve (83), plug vacuum line with a finger or connect a vacuum gage. Vacuum must be higher at idle speed and drop slowly as engine speed increases.

If there is vacuum, renew coasting bypass valve (83).

Fuel Evaporation Control System

Test 6

No vacuum when engine speed increases.

6.1 Checking Purge Hose and Purge Valve

Purge hose must be connected at throttle housing (3). Check hose for leaks and blow through connection on throttle housing.

If there is still no vacuum, detach purge hose at purge valve and repeat test.

If there is now vacuum, renew purge valve.

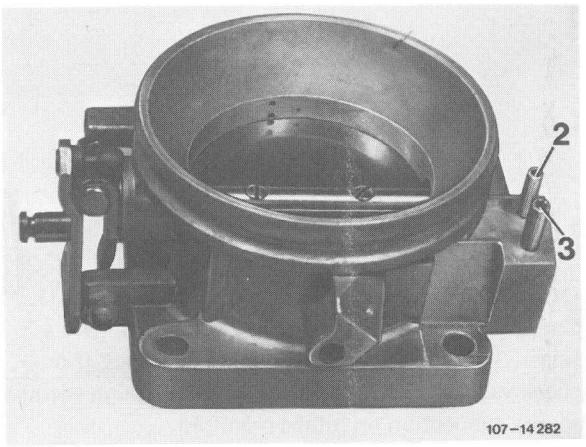


Fig. 154

Model	116.025	123.053
Engine	110.985	110.984

Engine

Operation		four-stroke gasoline engine, mechanical fuel injection with air flow sensor
Number of cylinders		6
Cylinder arrangement		vertical, in-line
Bore/stroke	mm	86/78.8
Total effective displacement	cm^3	2746
Compression ratio	ϵ	8 : 1
Firing order		1-5-3-6-2-4
Max. speed	1/min	6500
Engine output DIN[1])	kW (HP) at 1/min	112 (152)/5750
Max. torque DIN	Nm at 1/min	206/4600
No. of crankshaft bearings		seven
Valve arrangement		overhead
Camshaft arrangement		2 OHc
Oil cooling system		–
Cooling system		coolant circulated by pump, thermostat with bypass line, finned tube radiator, visco-fan coupling
Lubrication		force-feed oil lubrication by means of gear pump
Oil filter		full flow filter
Air cleaner		dry-type air cleaner with paper cartridge

[1]) The stated output in kW (HP) is the power effectively available at the clutch since all other power requirements have already been deducted.

Capacities

Fuel tank/reserve		fuel	approx. ltr.	96/13	80/11.5
Engine	initial fill	engine oil	approx. ltr.	7.0	
	oil and filter change	engine oil	approx. ltr.	6.5	
	oil pan up to dipstick marks	engine oil, max./min.	ltr.	6/4.5	
	oil filter	engine oil	ltr.	0.6	
Cooling system with heater		coolant	approx. ltr.	11	10
Water pump				free of maintenance	
Brake system and clutch actuation		brake fluid	approx. ltr.	0.5	
Automatic transmission		ATF	approx. ltr.	6.6/5.3	
Rear axle, hypoid gear lube		SAE 90	approx. ltr.	1	
Power steering		ATF or gear lube	approx. ltr.	1.4	

Model			116.025	123.053
Engine			110.985	110.984

Dimensions

Vehicle length		mm	5060	4640
Vehicle width		mm	1870	1786
Vehicle height, curb condition		mm	1430	1395
Wheelbase		mm	2965	2710
Track	front	mm	1521	1488
	rear	mm	1505	1446
Wheel turning angle	inner wheel	approx. degrees	43	43
	outer wheel	approx. degrees	34	33
Min. turning circle dia.		m	11.78	11.0

Weights

Vehicle curb weight acc. to DIN 70 020 incl. full fuel tank, spare wheel and tools		kg	1735	1560
Gross vehicle weight		kg	2190	2015
Permissible axle load	front/rear	kg	1060/1130	985/1030

Electrical system

Battery	voltage capacity	12 V 55 Ah
Starter	Bosch	GF 12 V 1.5 kW
Alternator	Bosch	K 1–14 V 55 A 20 max. output 770 W

Model	116.025	123.053
Engine	110.985	110.984

Driving Performance with Automatic Transmission

At rear axle ratio of		i =	3.69	3.54
Max. speed in individual gears	1st	km/h	42	42
	2nd	km/h	88	88
	3rd	km/h	145	145
	4th approx.	km/h	185	185
Climbing ability	1st slip limit	%	43	42
	2nd	%	43	42
	3rd	%	24	27
	4th	%	10	11
Acceleration shifting through gears 0—100 km/h Load: 2 persons		sec. ± 7 %[1])	13.5	12.5
Engine speed at 100 km/h in 4th		1/min	3215	3155

Consumption Data and Operating Conditions

Fuel consumption during average highway driving		l/100 km/h	11,5 – 18.5
Fuel consumption acc. to DIN 70 030[2])		l/100 km/h	14.0
Engine oil consumption		l/100 km/h	max. 0.25
Coolant	Operating temperature approx.	°C	85 – 100
	Max. temperature approx.	°C	126
Fuel			Super (Premium)
Octane rating	Min. RON		91
	Min. MON		81

[1]) The range of "± 7%" is not only comprising the dispersions as a result of permissible engine output tolerances, but also any possible, permissible deviations initiating at the tires.
[2]) Determined at 3/4 of max. speed, max. 110 km/h adding 10%.

Dwell angle

Conventional coil ignition

Engine	Test and **installation value** at idle[1])	Deviation between idle and 3.000/min
115.954	46–**53**°	max. ± 3°

[1]) Do not change dwell angele on used contacts. Replace contacts when lowest test value has been reached. When installing new contacts adjust dwell angle according to value printed in boldface ± 1°.

Ignition timing

Engine	Bosch distributor designation	Ignition **timing value** with vacuum at idle	**Test values** of ignition adjustment without vacuum at			Vacuum adjustment toward		**Installation value** of distributot
			1500/min	3000/min or 3500/min	4500/min	„retard" at idle	„advance" at 4500/min	
110.984/985	0 237 302 005	**TDC**	16–26°	27–34° 3000/min	–	8–12°	8–12°	10° BTDC
115.954	0 231 170 238	**10° BTDC**	15–20°	27–32° 3000/min	42–48°	–	6–10°	10° BTDC
117.985/986	0 237 405 002	**TDC**	9–16°	27–33° **3500/min**	–	6–10°	8–12°	7° BTDC
123.920	0 237 007 001	**TDC**	11–19°	27–35° 3000/min	26–34°	4– 8°	13–17°	6° BTDC

Spark plugs

Make		All engines
BERU	Designation Part no. Electrode gap	145/14/3 A 002 159 16 03 0.8 mm
BOSCH	Designation Part no. Electrode gap	W 145 T 30 002 159 17 03 0.8 mm
CHAMPION	Designation Part no. Elektrode gap	N 10 Y 002 159 15 03 0.8 mm

Idle speed adjustment

Engine	Idle speed	Idle emission value **without air injection**
115.954	850/min	0.4–2.0 % CO
123.920		0.2–0.8 % CO
110.984/985	800/min	0.5–1.5 % CO
117.985/986	750/min	1.0–2.5 % CO

Carburetor Parts and Adjustment

Engine 115.954

Carburetor designation		Stromberg 175 CDT U
Metering needle		MB
Metering jet		100
Float needle valve		2.25
Sealing ring for float needle valve		1.5 mm
Cold start speed[1])		1800/min
Cold start emission value[1]) [2])		5 – 6 % CO
Automatic choke cover	Preload	on mark
	Code no.	173
Oil dashpot air piston		engine oil/ATF
Throttle vacuum control adjustment[3])	Engine speed with vacuum hose removed	1200 – 1400/min
	Gap between throttle valve lever and adjusting screw	approx. 0.5 mm

[1]) To be checked **at 2nd step** and **at operating temperature.**
[2]) Check **without** air injection.
[3]) The engine must still run smoothly after all accesories have been switched on.

Carburetor Parts and Adjustment

Engine 123.920

Carburetor designation		Solex dual compound carburetor 4 A 1	
Carburetor barrel		1st barrel	2nd barrel
Metering needle		–	B 4
Main metering jet		x 97.5	
Idle fuel jet		45[1])	–
Idle air jet		120	–
Start of injection		immediately	
Gap between piston travel limit adjusting screw and accelerator pump cover		3 mm	
Float level		+ 4 mm	
Choke gap		3.5 mm[2])	
Automatic choke cover	Preload	on mark	
	Code no.	144	
Throttle vacuum control adjustment[3])	With vacuum hose removed	2000/min[4])	
	Driving position engaged	600 – 700/min	

[1]) Detachable
[2]) Preadjusted by manufacturer according to mixture ratio. Inspection and adjustment **only necessary in case of complaint.**
[3]) The engine must still run smoothly after all accessories have been switched on.
[4]) Check at operating temperature.