

5. Removal, Installation, and Adjustment of Individual System Components

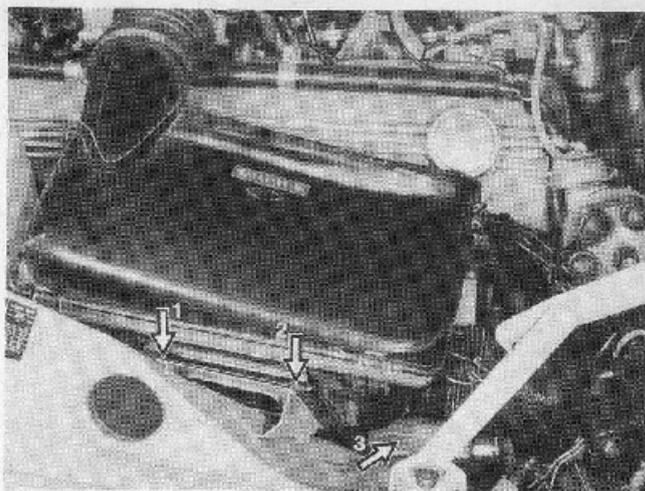
Remove connectors from the individual components in the system only by gripping the sides of the plugs themselves — do not pull on the cables! When a plug is replaced, the rubber cap should be drawn properly over the plug housing.

Air filter

The air filter must be removed only if the cable disconnect plug (arrow 3 in Fig. 11) must be exposed.

Removal:

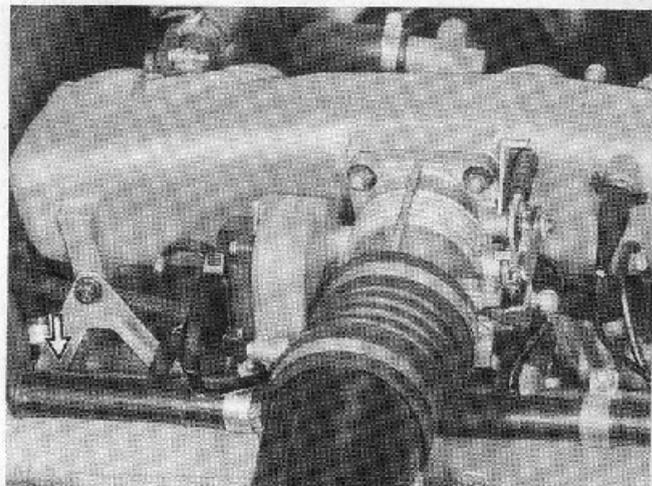
Release the hose clamps and pull off the air hoses. Remove the air filter upward from the guide rails (arrows 1 and 2).



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Ground terminal

The arrow in Fig. 12 points to the ground terminal of the engine wiring harness. The ground connection can also be made at the cylinder-head cover, however.



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5.1 Pressure Sensor

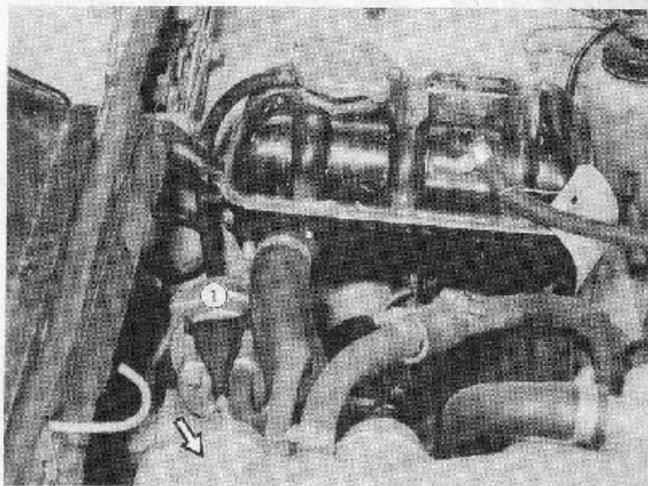
The pressure sensor ① is located on a support plate under the coolant container (Fig. 13).

Removal:

Detach the four-pin plug and the pressure hose, unscrew the support plate.

Installation instructions:

When a new pressure sensor is installed, the protective sleeve on the connector fitting should be removed only immediately before the pressure hose is attached to the fitting! Danger of becoming dirty! Be sure that the four-pin plug is attached correctly!



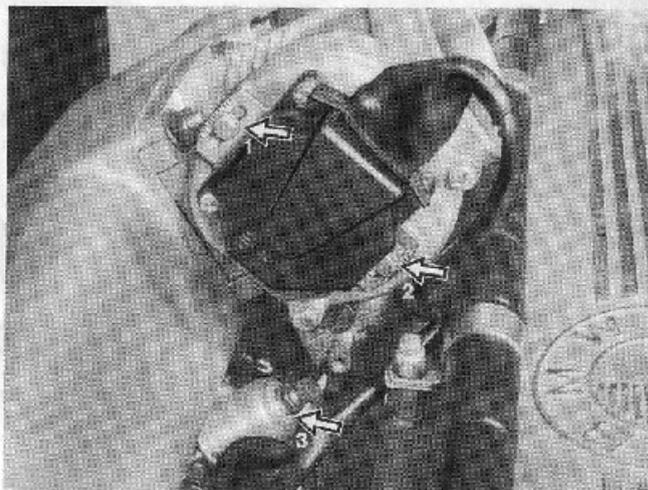
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5.2 Throttle-Valve Switch

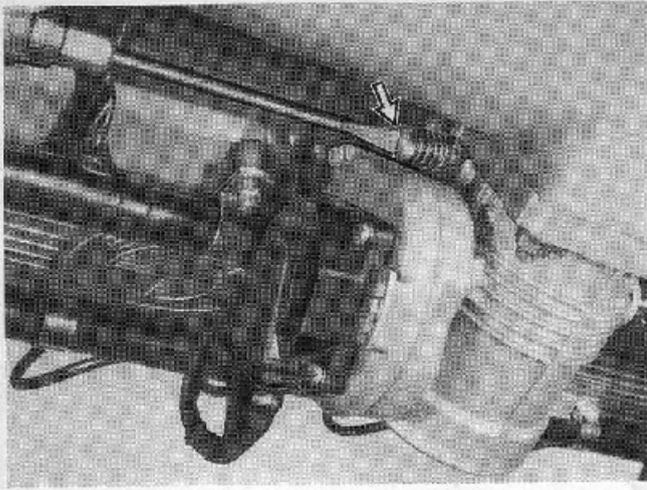
The throttle-valve switch is bolted onto the angular gear on the side of the throttle-valve assembly (Fig. 14).

Removal:

Detach the four-pin plug, release the two fastening screws (arrows 1 and 2), and remove the switch.



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Adjust the throttle-valve switch:

The throttle-valve switch should switch over at the instant when the throttle valve has opened 1° from its rest position. In order to facilitate the adjustment work, degree marks (1 graduation = 2°) have been stamped into the base plate for the throttle-valve switch.

Corresponding countermarks should be made on the angular gear housing.

The adjustment is made as follows:

Connect Tester EFAW 228 (A) as described in Section 3. Set switch "A" to the "Measure" position and set switch "B" to the "Throttle-valve switch III" position. Slide the throttle valve into place and tighten the two fastening screws slightly.

The throttle valve must be closed! See Section 5.2.1 for adjustment instructions.

Attach the four-pin plug and switch on the ignition. Turn the switch until the needle on the meter goes from the " ∞ " position to the "0" position. Starting from this position, adjust the switch by $\frac{1}{2}$ a graduation (= 1°) in a counterclockwise direction, and then tighten the fastening screws. Finally, check the adjustment by operating the throttle valve.

Throttle-valve switch with stop:

Release the fastening screws far enough so that the throttle-valve switch can be turned.

Carefully turn the throttle-valve switch in a counterclockwise direction until an internal stop can be felt. Tighten the fastening screws.

5.2.1 Adjust the Throttle Valve

The adjustment screw (arrow in Fig. 15) is adjusted at the plant so that there is a hair's breadth gap between the throttle valve and the hole. This prevents the throttle valve from striking against the housing or becoming stuck. The adjustment screw is secured with lacquer and it must not be moved.

If a new adjustment is required, proceed as follows: Turn the adjustment screw inward until the idle stop is just touched. Move the control lever several times and let the spring snap it back each time. Turn the adjustment screw one turn farther and lock it with the hexagon nut. Check the hair gap between the throttle valve and the hole.

5.3 Pressure Regulator

The pressure regulator (arrow in Fig. 16) is bolted in place between the two center vibration pipes under the throttle-valve assembly.

Removal:

Remove the two center vibration pipes. As this is done, the auxiliary-air device together with the holder will also be unscrewed. Collect the coolant or drain it off first.

Pinch off the fuel return line (arrow 3 in Fig. 16) and the pressure line (see Fig. 25) with hose clamps.

After the 3 hose fastening clamps have been released, the hoses should be detached. Collect any fuel that escapes.

Release the fastening nut with a socket wrench and remove the pressure regulator toward the back.

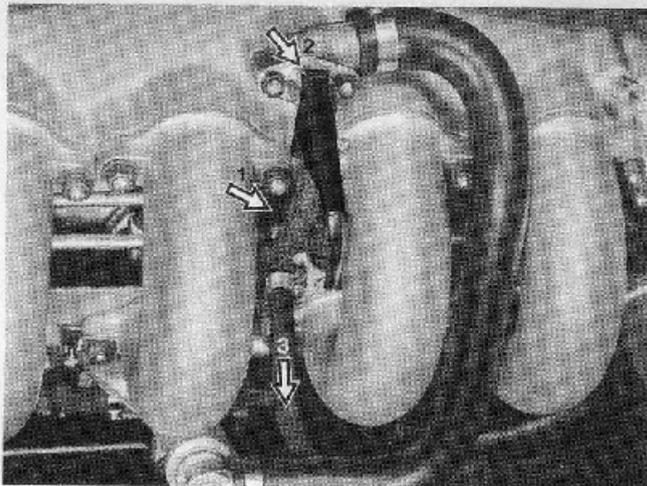
The adjustment of the pressure regulator (and therefore the adjustment of the fuel pressure) has a great effect on fuel consumption and on the composition of the exhaust gases. For this reason, the adjustment of the pressure regulator may be changed only when a pressure deviating from the specified pressure (2.0 to 2.2 kgf/cm²) is measured with the pressure gauge.

Install the pressure gauge in the fuel line leading to the ring main (Fig. 18).

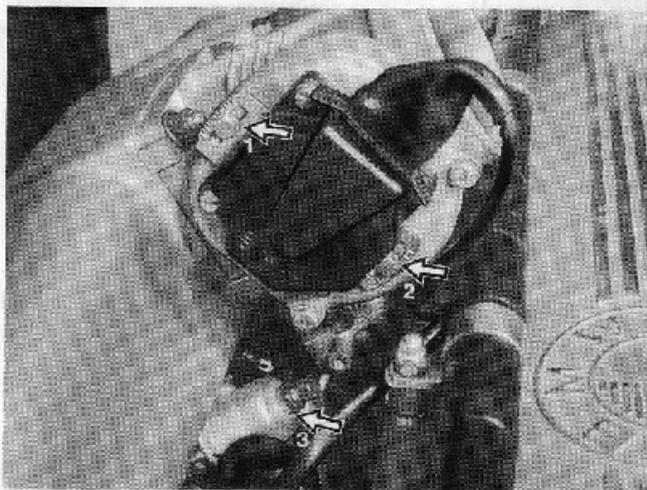
Start the engine and let it run at the idle speed, or control the fuel pump from Tester EFAW 228 (A). Release the lock nut at the pressure regulator and adjust the pressure to 2.0 ± 0.05 kgf/cm² using the hexagon screw (arrow in Fig. 17).

Then tighten the lock nut securely.

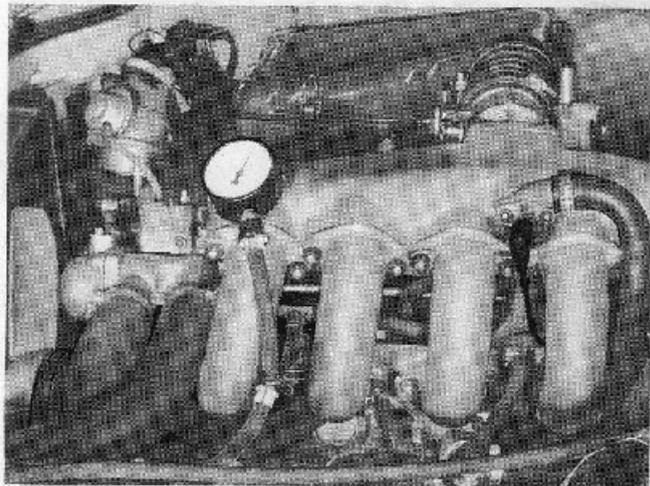
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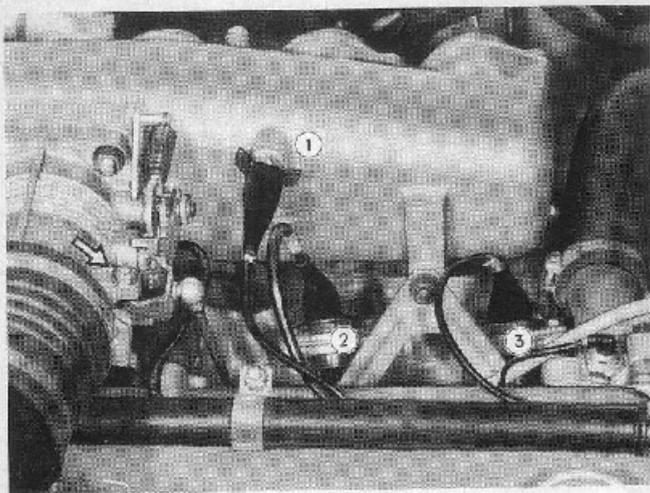


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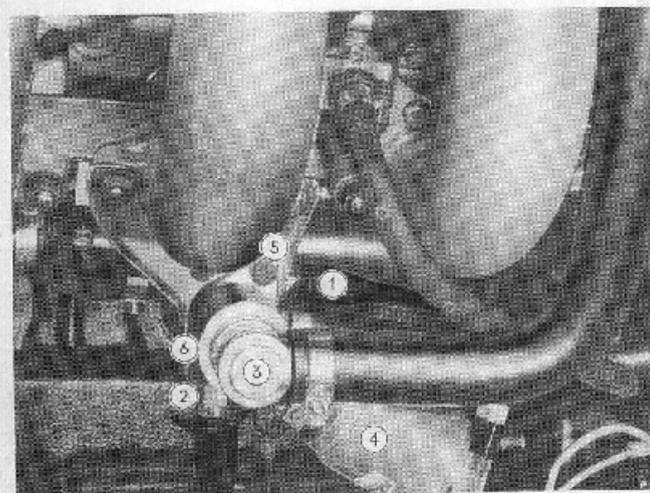


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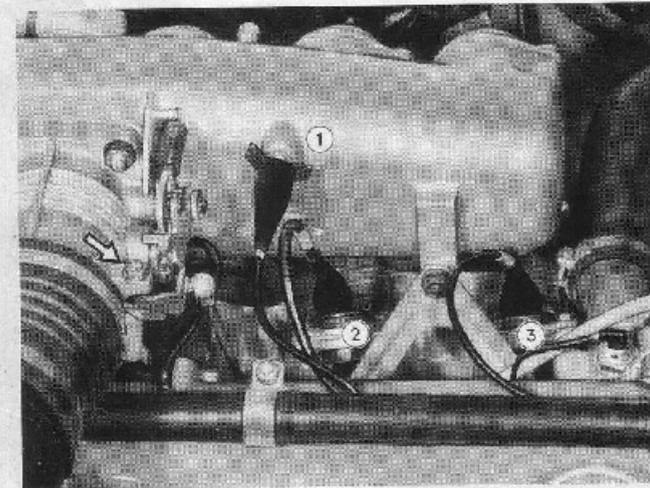




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5.4 Temperature Sensor I (Intake Air)

Temperature sensor I (1) is bolted in place in the common intake manifold beside the throttle-valve assembly (Fig. 19). The two-pin plug should be detached before removing this sensor.

5.5 Temperature Sensor II (Coolant)

Temperature sensor II (1) is bolted in place in the coolant channel leading to the auxiliary-air device (3) (Fig. 20). Before removing temperature sensor II, release the pressure in the cooling system by opening the radiator cap or drain part of the coolant out and collect it.

Before the temperature sensor (width across flats 13) is unscrewed, detach the two-pin plug.

When the temperature sensor is installed, the seal ring must be replaced in every case.

Refill the coolant system if coolant was drained out.

5.6 Thermo-Time Switch

The thermo-time switch (2) is bolted in place in the coolant channel for the auxiliary-air device (Fig. 20). The same instructions apply for replacement of the thermo-time switch as described in Section 5.5.

5.7 Auxiliary-Air Device

The auxiliary-air device (3) is fastened to a holder piece at the vibration pipe under the pressure regulator (Fig. 20).

Removal:

Release the pressure in the coolant system or drain the coolant out as described in Section 5.5.

After the hose clamps have been released, detach the air hose and the air filter (4).

Unscrew the fastening screws (Items 5 and 6 in Fig. 20), and remove the auxiliary-air device. A new seal must be installed when replacing the auxiliary-air device.

5.8 Injection Valves

The injection valves (for example 2 and 3) are arranged so that they inject fuel into the intake passage immediately in front of the engine intake valve. They are fastened individually with a holding plate and are positioned behind the vibration pipes (Fig. 21).

Test the injection valves for proper operation (injection) and leaks according to VDT-W-280/1010 B. In order to remove the injection valves, unbolt the common intake manifold together with the vibration pipes. As this is done, the auxiliary-air device together with the holder will also be removed; collect the coolant or drain it out first.

Release the holding plates and remove the valves carefully so that the nozzle needles are not damaged.

Make an operational test.

Additional removal steps:

Pinch off the line leading from the fine fuel filter to the ring main (see Fig. 25).

Detach the plug at the valve to be replaced, release the clamp holding the hose in place, and withdraw the valve.

Installation instructions:

Turn the valve on the ring main connector so that the electrical connection points upward (Fig. 22). The sequence of parts is shown by Fig. 23. Be absolutely sure to replace the small rubber seal ring (Item 14 in the Service-Parts List).

Remove the protective cap over the nozzle needle only just before installing the needle in the hole in the cylinder head.

Do not damage the nozzle needle!

Draw the rubber cap over the plug housing.

5.9 Start Valve

The start valve (arrow 2) is flanged to the intake manifold opposite the throttle-valve assembly.

Removal:

Detach the two-pin plug. Release the fastening nuts and pinch off the fuel line with a hose clamp. Release the clamp holding the fuel line in place and carefully disconnect this line.

When installing the start valve, use a new seal (Fig. 24).

5.10 Fuel Filter

The fuel filter (arrow) is fastened in place in the engine compartment with a clamping band. It is installed in the fuel line on the pressure side of the pump (Fig. 25). This filter should be replaced after every 60,000 km of driving.

Removal:

Pinch off the fuel hoses in front of and behind the filter using hose clamps.

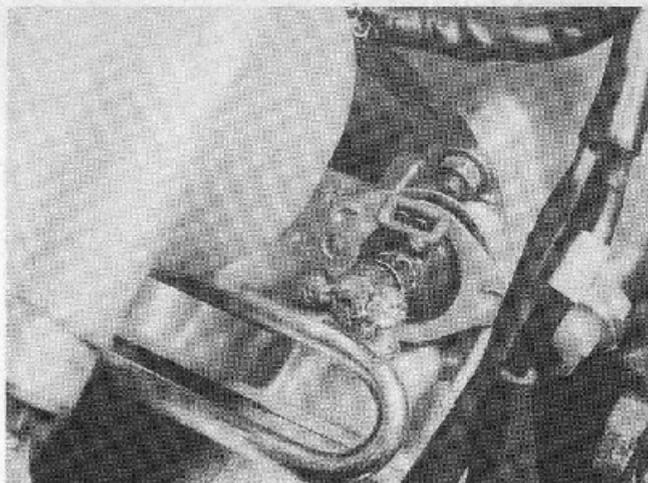
Release the clamping band and remove the filter.

Release the clamps holding the hoses to the connector fittings and detach the hoses.

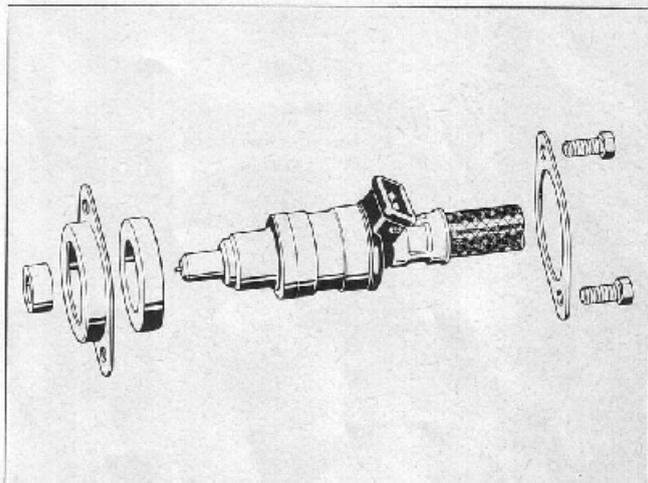
Collect any fuel that escapes.

When installing the filter, be sure that the direction of flow through it is correct: hose leading from the fuel pump to the hose fitting marked "Ein" ("In"), and hose leading to the ring main attached to the hose fitting marked "Aus" ("Out") (Fig. 25).

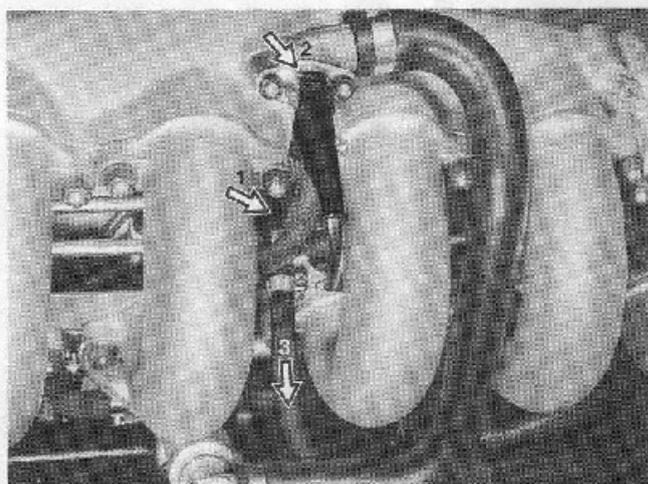
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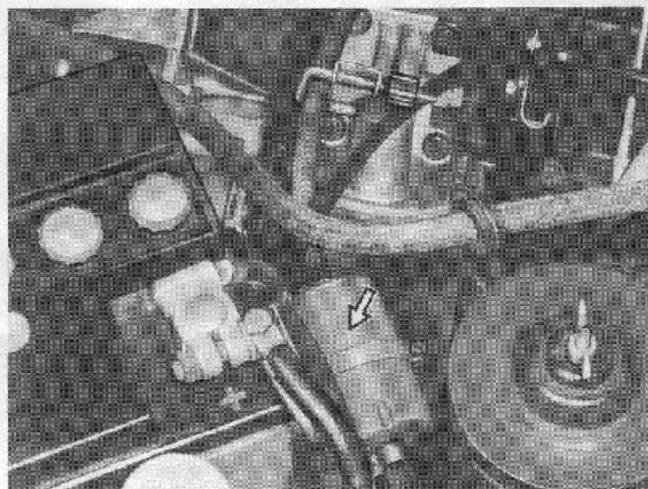
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5.11 Fuel Pump

The fuel pump is located in front of the left rear axle. The expansion vessel is welded to the pump support piece.

Removal:

Pinch off the fuel line in front of the pump (suction side) and behind the expansion vessel (pressure side) using hose clamps (Fig. 26). Close the connector fitting on the pump so that the pump does not dry out. Detach the electrical connection and the hoses. It is best to unscrew the entire holder assembly (including the expansion vessel) at the 3 rubber-bonded metal buffers (arrows 1, 2, and 3 in Figs. 26 and 27).

Unscrew the fastening clamp (arrow 4 in Fig. 26) and remove the pump.

Collect any fuel that escapes.

Attach the electrical pump connection correctly, with the notch forward (arrow 5 in Fig. 26).

With new pumps the rubber caps on the connector fittings should be removed only just before the fuel lines are attached.

5.12 Ignition Distributor – Trigger Contacts

In order to replace the holder with the trigger contacts, it is not absolutely necessary to remove the ignition distributor.

The two trigger contacts are mounted on the holder in the lower part of the ignition distributor. These contacts require no maintenance.

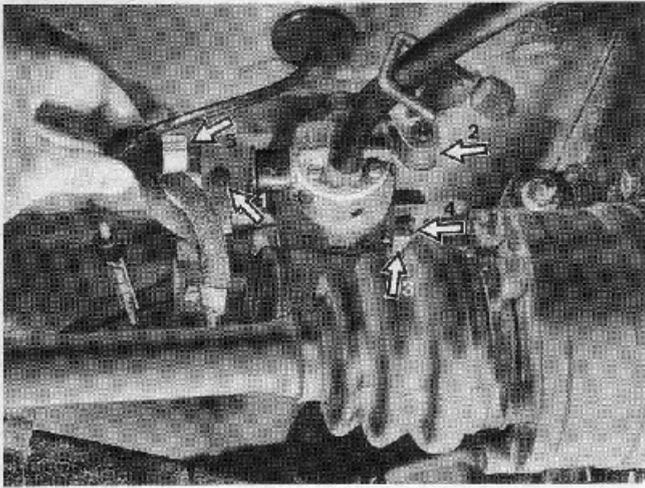
Removal:

Release the hexagon screws (arrows in Fig. 28) and remove the holder.

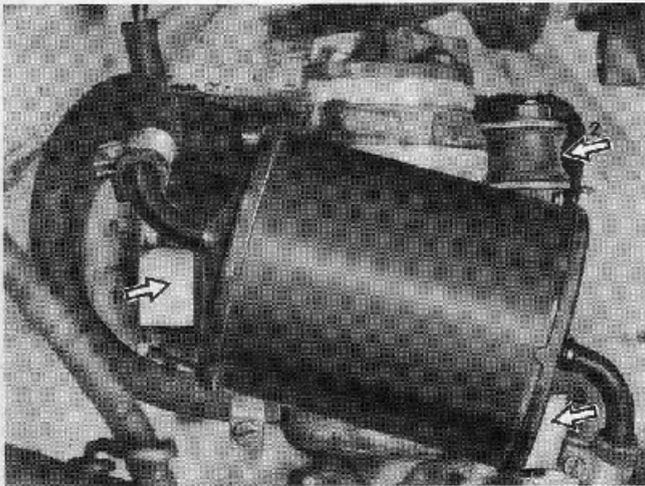
Before installing a new holder, the deflection pieces (arrows 1 and 2 in Fig. 29) on the breaker lever should be lubricated very lightly with Ft 1 v 4.

The lubricating felt (arrow 3) has already been lubricated at the manufacturing plant.

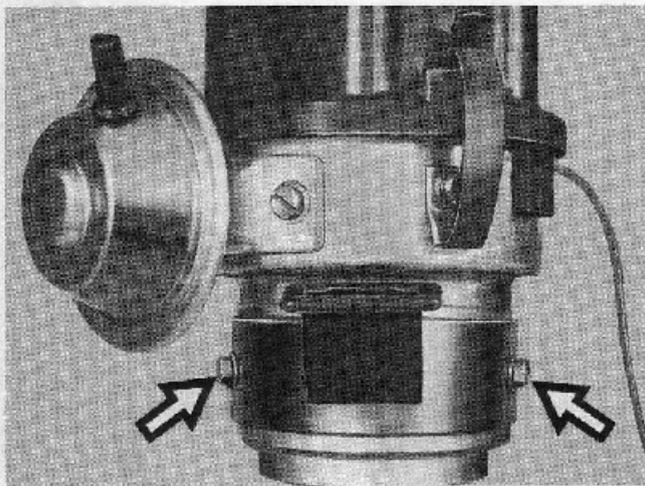
The contacts cannot be adjusted.



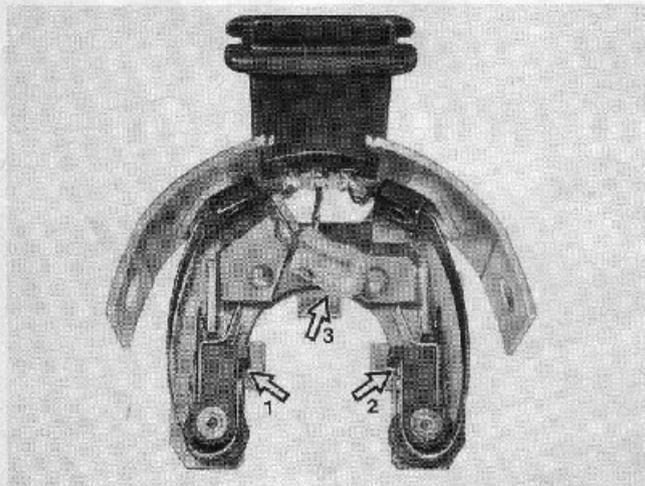
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5.13 Adjust Ignition Timing and Idle Characteristics

Dwell angle $= 42^\circ \pm 3^\circ$
Initial ignition-timing adjustment:
assembly setting with test lamp $= \text{TDC}$
(notch in flywheel and in vibration damper).

Caution: the assembly setting is only a coarse preliminary adjustment!

Adjustment of ignition timing:
at $n = 2500 \text{ rev/min}$ (for 3.0 Si Oct. 75:
 $n = 1700 \text{ rev/min}$) without vacuum
 $= 22^\circ$ before TDC (ball in the flywheel).

Idle adjustment

In the idle adjustment, the amounts of fuel and air are matched to each other, taking the idle speed and the level of CO in the exhaust gases into account.

Testing equipment required:

1 tachometer
1 CO analyzer

A prerequisite for the idle adjustment is that the engine is at normal operating temperature (coolant temperature about 80°C).

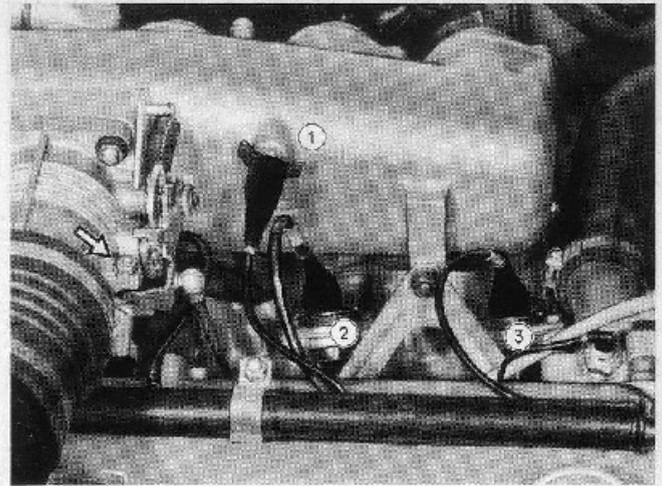
Adjustment specifications:

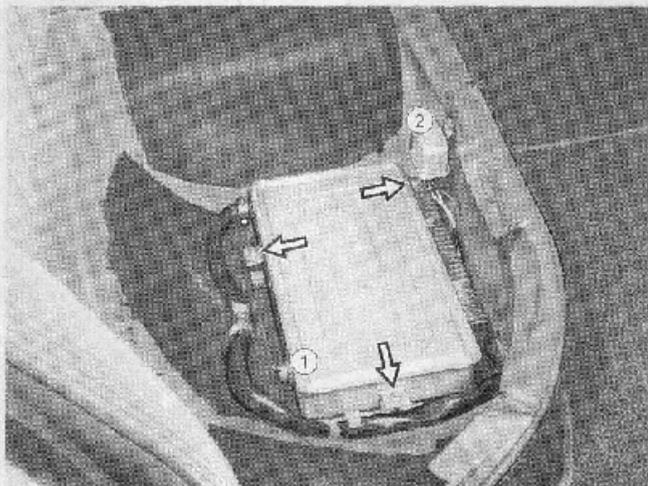
Idle speed: $850 \dots 1000 \text{ rev/min}$
CO level during idling: $1.0 \dots 2.0 \%$
The same values apply for vehicles with automatic transmission (gear shift lever in position N or P).

The idle speed must be set **only** with the idle-speed adjusting screw. This adjusting screw is located under the throttle-valve switch (Fig. 30).

When the idle-speed adjusting screw is turned in a clockwise direction, the quantity of air provided for idling is reduced, and the engine speed decreases. Conversely, the quantity of air provided for idling, and thus the engine speed, increase if this adjusting screw is turned in a counterclockwise direction.

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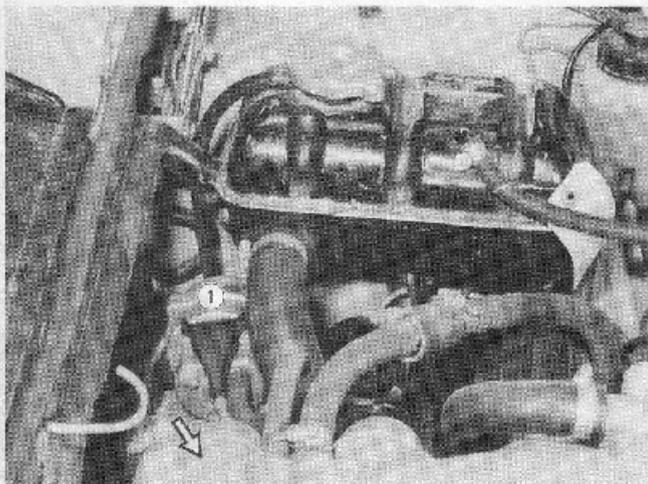
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The potentiometer on the control unit (① in Fig. 31) serves only to match the quantity of fuel to the volume of air in the idle range so that a favorable exhaust-gas composition (CO) is developed.

If, for example, an air-fuel mixture is too "rich" (recognizable by the high CO level), the amount of fuel can be reduced by turning the rotary knob on the potentiometer in a counterclockwise direction, thus decreasing the concentration of CO.

Any changes in the speed resulting from such an adjustment should be corrected at the idle-speed adjusting screw.

If it is not possible to change the concentration of CO in the exhaust gases by turning the rotary knob at the potentiometer, the adjustments of the throttle valve and the throttle valve switch must be checked and set correctly if necessary as described in Section 5.2.



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5.14 Pump Relay, Main and Post-Start Relay

The pump relay is located under the right rear seat near the electronic control unit (② in Fig. 31).

The main and post-start relay (arrow in Fig. 32) is located in the engine compartment on the pressure sensor holder. The electric cables are connected.

6. Service-Parts List

for the electronically controlled fuel injection system

Service parts which do not have a Bosch Part No. are only available through the BMW After-Sales Service Organization.

Designation	Item	Bosch Part No.	BMW Service Part No.	No. per vehicle
Electronic control unit, complete	1	0 280 001 007	13 61 1 353 347	1
		0 280 001 013 USA		1
Closing cover for the control unit	2	2 285 506 000	—	1
Wiring harness for engine	3	0 280 190 001	13 65 1 355 046	1
Wiring harness for passenger compartment		0 280 190 002	61 12 1 355 047	1
Wiring harness, one-piece, for engine and passenger compartment		0 280 190 011 ¹⁾		1
		0 280 190 013 ⁴⁾		1
Wiring harness for pump (Coupé)		0 280 191 002	61 12 1 354 280	1
Wiring harness for pump (Limousine)		0 280 191 006	61 12 1 354 245	1
		1 282 386 002	61 13 1 353 435	1
Plug housing, single, 25-pin		1 284 485 019	61 13 1 353 436	1
Plug housing, single, 2-pin for injection valves, temperature sensor, start valve, and thermo-time switch		1 284 485 002	61 13 1 352 607	10
Rubber cap for 2-pin plug		1 280 703 012	61 13 1 352 793	10
Plug housing, single, 3-pin at ignition distributor		1 284 485 010	13 65 1 353 482	1
Rubber cap for 3-pin plug		1 280 703 015	13 65 1 353 479	1
Plug housing, single, 4-pin, for pressure sensor and throttle-valve switch		1 284 485 004	13 65 1 353 481	2
Rubber cap for 4-pin plug		1 280 703 014	13 65 1 353 478	2
Blade receptacles, 2.8 mm (use AMP pliers No. 574 860)		1 284 478 007	61 13 1 351 192	31
Plug housing, 5-pin, for post-start relay		1 284 485 022	13 65 1 355 044	1
Plug housing, 5-pin, for main relay		1 284 485 025	61 13 1 354 373	1
Plug housing, 3-pin, for pump relay		1 284 485 023	61 13 1 354 374	1
Plug housing, 2-pin for pump relay		1 284 485 012	61 13 1 353 828	1
Ignition distributor, complete Holder with trigger contacts	4	0 231 306 001	12 11 1 353 330	1
		1 230 090 011	—	1
Pressure sensor	5	0 280 100 030 0 280 100 047 USA	13 63 1 351 827	1
Support plate for pressure sensor		—	13 63 1 353 332	1
Connecting hose between pressure sensor and intake manifold, about 270 mm long	6	—	13 63 1 354 247	1
Throttle-valve switch	7	0 280 120 014	13 63 1 352 716	1
		0 280 120 035 ²⁾		
		0 280 120 034 USA		
Temperature sensor I (intake air)	8	0 280 130 006	13 62 1 353 331	1

Designation	Item	Bosch Part No.	BMW Service Part No.	No. per vehicle
Temperature sensor II (coolant)	9	0 280 130 014	13 62 1 353 329	1
Seal ring for sensor II (A 10 x 13.5 DIN 7603-A)		—	—	1
Auxiliary-air device	10	0 280 140 018	11 61 1 255 284	1
Gasket for above		—	11 61 1 254 152	1
Filter for above		(Purolator)	11 61 1 256 507	1
Injection valve	11	0 280 150 003 0 280 150 015 0 280 150 043 ²⁾	13 64 1 352 719	6
Rubber ring for above	12	1 280 206 702	13 64 1 352 717	6
Cup flange for above	13	—	13 64 1 256 445	6
Rubber seal ring for above	14	1 280 206 703	13 64 1 352 718	6
Holding plate for above	15	—	13 64 1 256 446	6
Fuel pump	16	0 580 364 002	16 12 1 107 414	1
Holder for fuel pump with expansion vessel welded to it		—	16 12 1 106 665	1
Rubber-bonded metal buffer for fuel pump holder		—	16 12 1 105 942	3
Plug housing	} for 2-pin electric pump connection	1 284 485 009	61 13 1 353 466	1
Rubber cap		1 280 703 005	61 13 1 353 464	1
Blade receptacle		1 901 355 891	61 13 1 352 810	2
Fuel hose for ring main	17a	—	34 32 1 108 074	2
Fuel hose for start valve	17b	—	13 53 1 251 056	1
Fuel pipe for cylinders 1 ... 3	18	—	13 53 1 256 428	1
Fuel pipe for cylinders 4 ... 6	19	—	13 53 1 256 429	1
Fuel filter	20	—	13 32 1 256 492	1
Pressure regulator	21	0 280 160 004	13 51 1 254 626	1
Holder for pressure regulator		—	13 53 1 256 430	1
Start valve	22	0 280 170 024	13 64 1 353 685	1
Gasket for start valve		—	11 61 1 254 062	1
Thermo-time switch with seal	23	(VDO)	13 62 1 355 006	1
Post-start relay	} 24	0 332 003 028	61 31 1 354 858	1
Main relay		0 332 003 014	61 31 1 352 156	1
Pump relay		0 332 003 021	61 31 1 353 361	1
Vacuum limiter		0 280 100 104 USA		

1) No replacement for two-piece design

2) Replacement for previous type

3) No replacement for previous type

4) As from 1974 model

