I. General

As part of the new emission legislation, the following changes were made to vehicles from model years 1970/71 for the USA and Canada from August 1, 1969:

- In the case of injection engines, **fuel is switched off** in overrun mode.
- In order to bring the hydrocarbon emissions to the lowest possible values, the **ignition point** in the lower speed range is **adjusted towards retarded**.
- To prevent the escape of fuel evaporation gases into the atmosphere, a "**crankcase storage system for fuel evaporation gases**" is installed in all types. The evaporation gases reach the engine crankcase from the fuel tank and are sucked out by the engine via the crankcase ventilation.

The following design changes were also made:

- The **shape of the combustion chamber** in the cylinder head has been changed in all 4 and 6 cylinder engines.
- The **spark plugs are set deeper** and **6 water holes have been added** to the 6 cylinder engines for better cooling.Please note that the crankcase is also equipped with these 6 water holes (adapted cylinder head gasket).
- In addition, all 4- and 6-cylinder engines have a **connection for the crankcase storage system (fuel evaporation system)** on the chain case of the crankcase.
- The **pistons of all engines are slightly lower** than before and are equipped with 4 piston rings.
- The **camshaft 1140510101** is installed in all 6-cylinder engines.

II. Electric and electrocmagnetic components

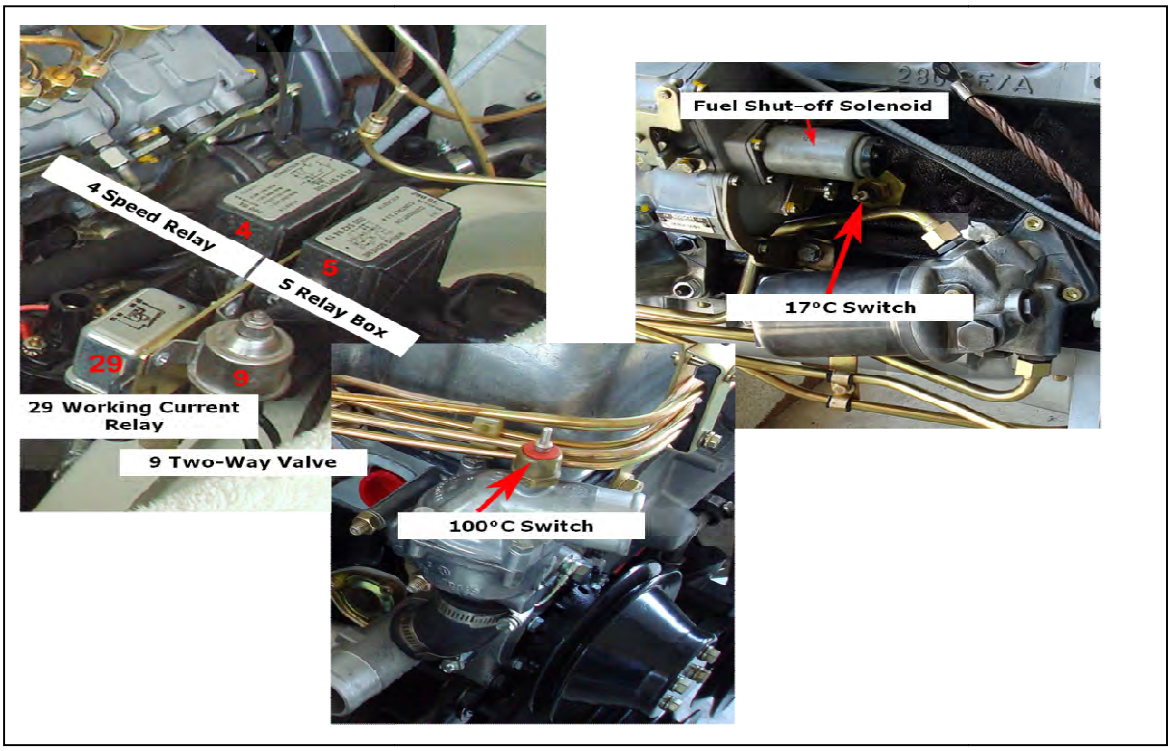


Fig. 1: ECS components of 280SL
Quelle: https://www.sl113.org/wiki/Electrical/EmissionControlSystem

III. 280SL with manual transmission

A.) Ignition switching (same with 280Sl with automatic gearbox)

Depending on the engine speed and the cooling water temperature, the ignition point is adjusted towards retarded. A two-way valve (9) is installed in the vacuum line between the vacuum unit on the ignition distributor and the intake manifold (Fig. 2). The two-way valve (9) is controlled by the speed relay (4) and via the relay (5) by the 17 ° C temperature switch in the cylinder head (7) and the 100 ° C temperature switch (8) in the thermostat housing.

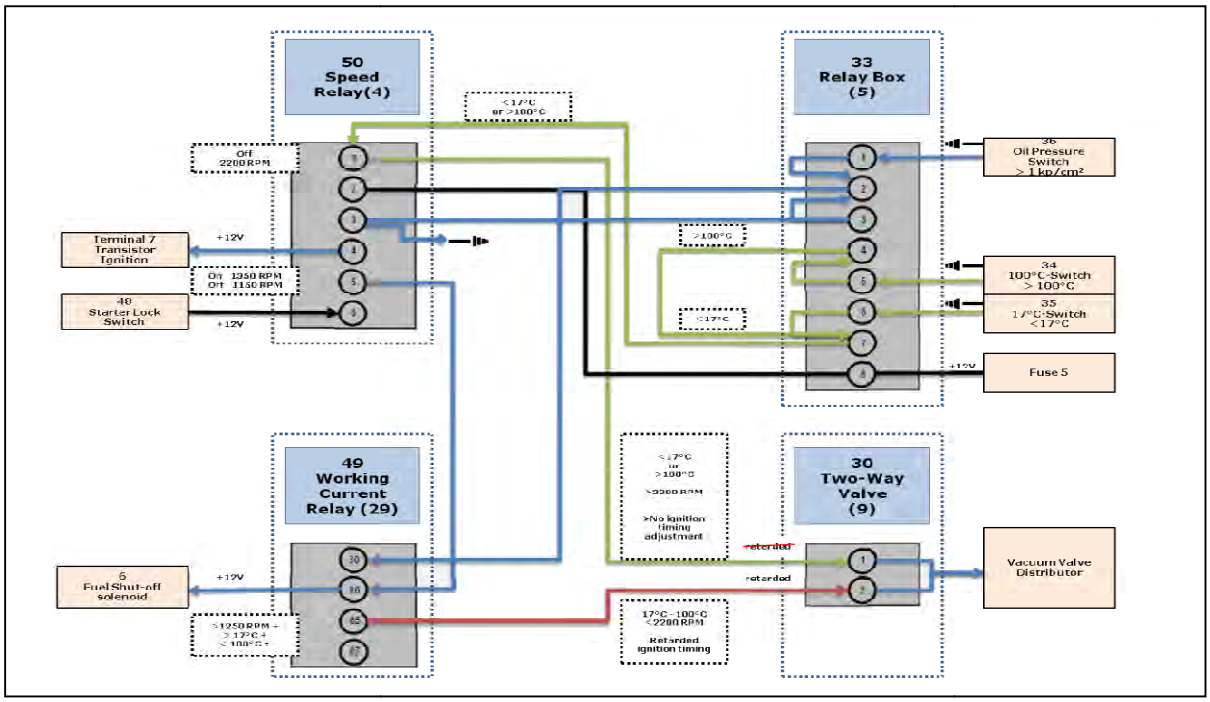
The ignition timing is adjusted towards retarded:

- At cooling water temperatures between + 17 ° C and 100 ° C, the two temperature switches (7) and (8) are open.
- If the engine speed falls below 2200 rpm in this temperature range, the speed relay (4) switches off the two-way valve (9) and the vacuum acts on the vacuum unit on the ignition distributor.

The retarded adjustment is canceled:

- If the engine speed rises in the temperature range between + 17 ° C and 100 ° C above 2400 rpm, the speed relay (4) closes and switches on the two-way valve (9). Atmospheric pressure is applied to the vacuum unit on the ignition distributor.
- The temperature switch (7) is closed at cooling water temperatures below + 17 ° C, and the temperature switch (8) is closed at cooling water temperatures above 100 ° C. The two-way valve (9) is switched on and atmospheric pressure is applied to the vacuum unit on the ignition distributor.

B.) Operation chart



Source: https://www.sl113.org/wiki/Electrical/EmissionControlSystem

C.) Fuel cut-off in coasting mode

The stop magnet (6) on the injection pump only pulls the control rod to zero delivery if the following operating conditions are reached at the same time.

- Cooling water temperature over + 17 ° C. Temperature switch (7) in the cylinder head.
- Acceleration pedal in neutral. Idle throttle switch (15) on throttle housing.
- The clutch is not activated. Clutch switch (32) on clutch pedal.
- Engaged 3rd or 4th gear. Gear switch (17/18/19/20) on the shift linkage.

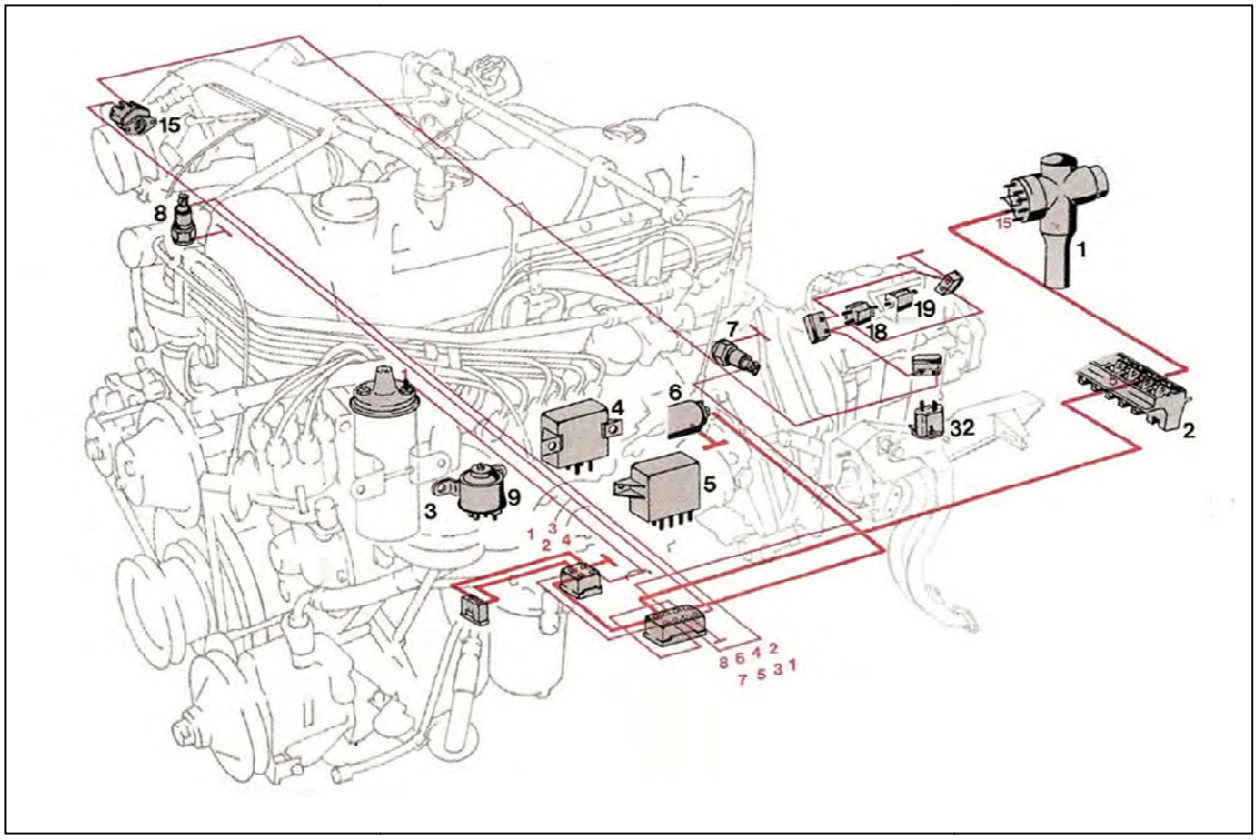


Fig. 2: 280SL with manual transmission

1 Ignition Starter Switch
2 Fuse Box
3 Ignition Coil
4 Speed Relay
5 Relay Box
6 Fuel Shut-off Solenoid
7 17°C Switch
8 100°C Switch
9 Two-Way Valve
15 Idle Throttle Switch
18 Gear Shifter (3. Gear)
19 Gear Shifter (4. Gear)
32 Clutch Switch

IV. 280SL with automatic transmission

A.) Ignition switchover (identical to 280SL with mechanical transmission)

See III.A

B.) Flow chart (identical to 280SL with mechanical gear)

See III.B

C.) Fuel cut-off in coasting mode

The stop magnet (6) on the injection pump only pulls the control rod to zero delivery if the following operating conditions are reached at the same time.

- Cooling water temperature over + 17 ° C. Temperature switch (7) in the cylinder head.
- Drive in 3rd or 4th gear. Oil pressure switch on gear connection B1. Selector lever position, starter lock and reversing light switch (14), in position 3 or 4.
- Engine speed over 1250 rpm. Speed relay (4) on the left wheel arch.
- Acceleration pedal in neutral. Idle throttle switch (15) on throttle housing.

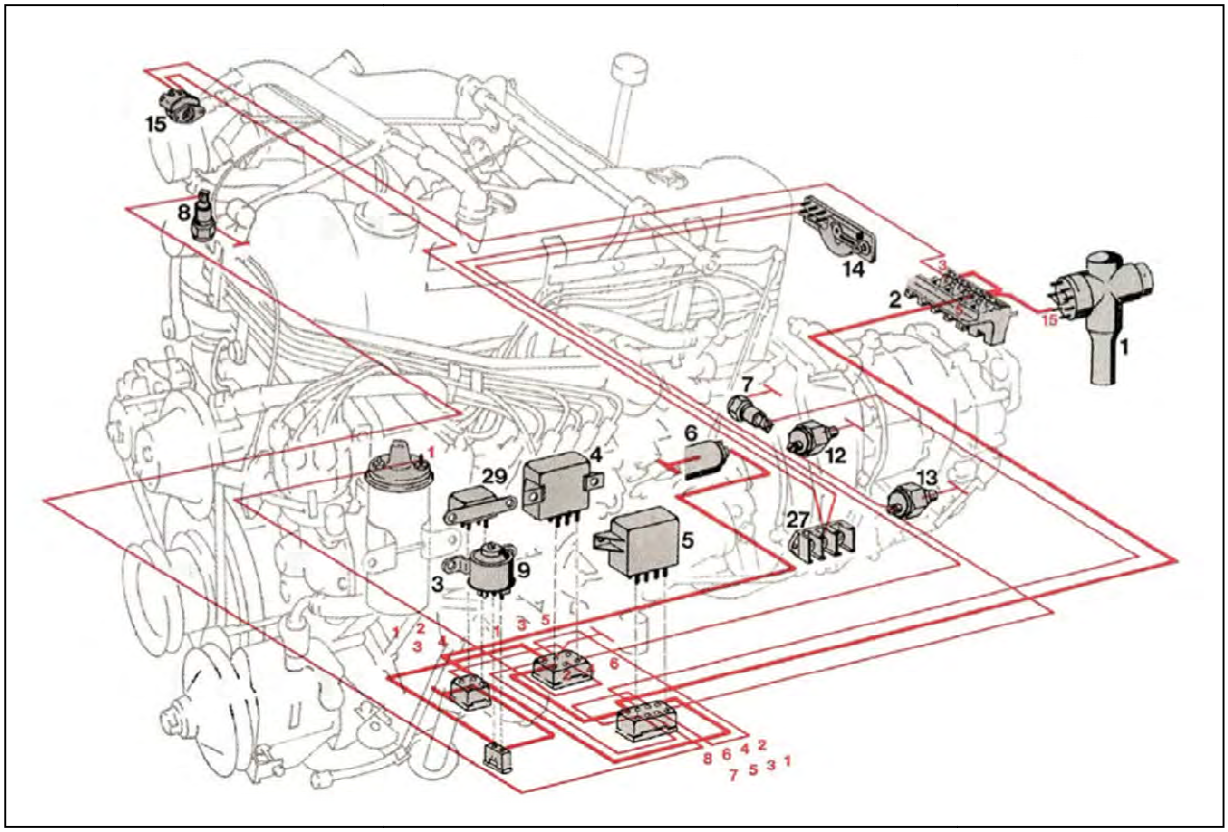
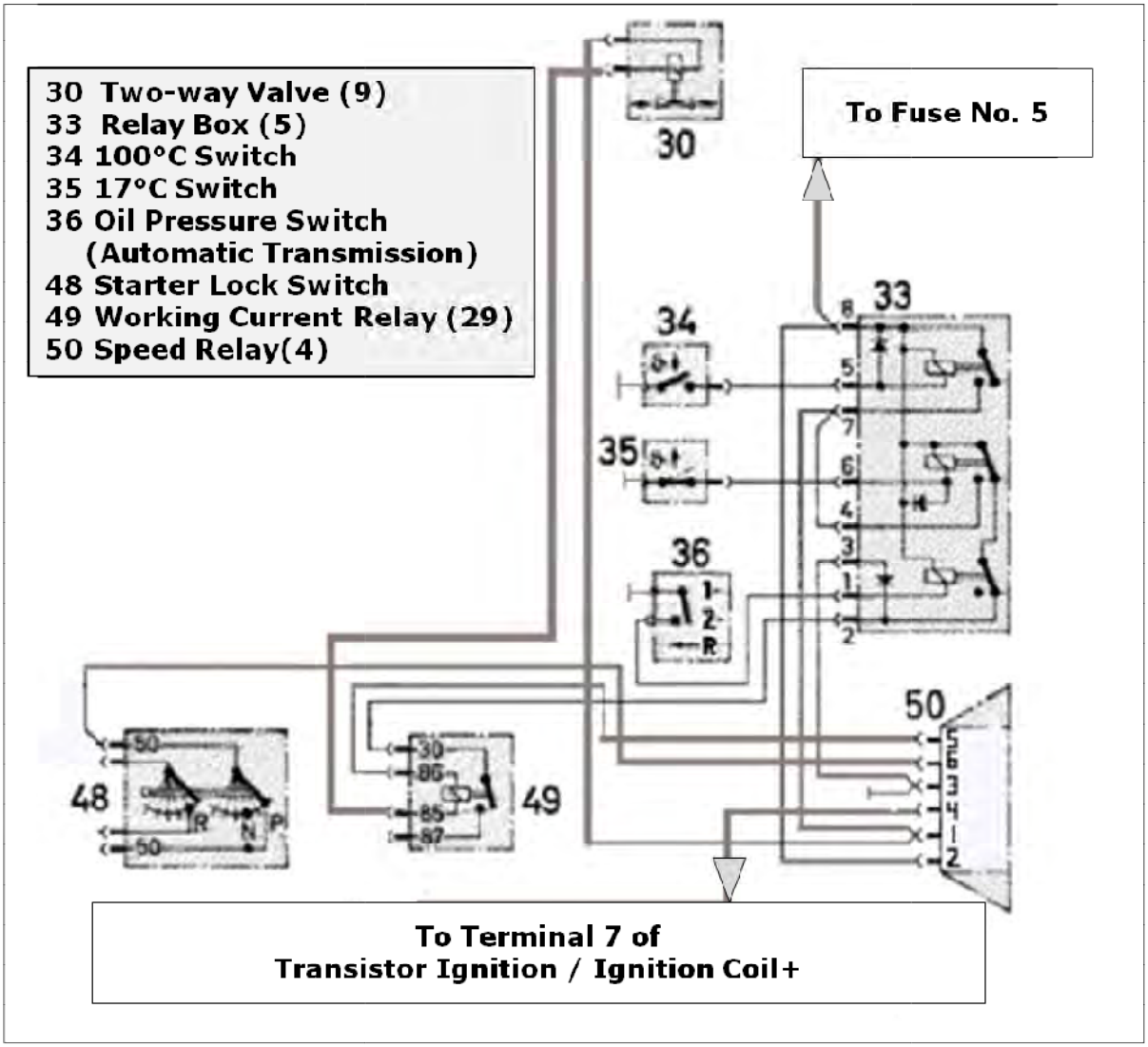


Fig. 3: 280SL with automatic tranmission

1 Ignition Starter Switch	5 Relay Box	9 Two-Way Valve	15 Idle Throttle Switch
2 Fuse Box	6 Fuel Shut-off Solenoid	12 Oil Pressure Switch	27 3-way Cable Connector
3 Ignition Coil	7 17°C Switch	13 Oil Pressure Switch	29 Working Current Relay
4 Speed Relay	8 100°C Switch	14 Starter Lock Switch	

V. Elektrischer Schaltplan



VI. Other supplementary and modified components for exhaust gas cleaning

A.) Fuel evaporation system

When the vehicle is operated, fuel evaporation gases are generated which, according to law, may not be vented into the atmosphere. In order to be able to comply with these regulations, a fuel evaporation system was built in that is structured as follows:

Two lines (inlet and return) go from the fuel tank to an expansion tank (capacity approx. 4.5 l). It is located on the right side in the trunk. At the top of the expansion tank there is a ventilation line that leads to a combined valve system, which consists of a ventilation, aeration and pressure relief valve.

The fuel evaporation gases flow to the engine via a line that is laid parallel to the fuel line. The line ends at the chain case in the cylinder crankcase. From here, the fuel evaporation gases are extracted via the crankcase ventilation and thus reach the combustion chambers.

Fig. 4 shows the structure of the fuel evaporation system.

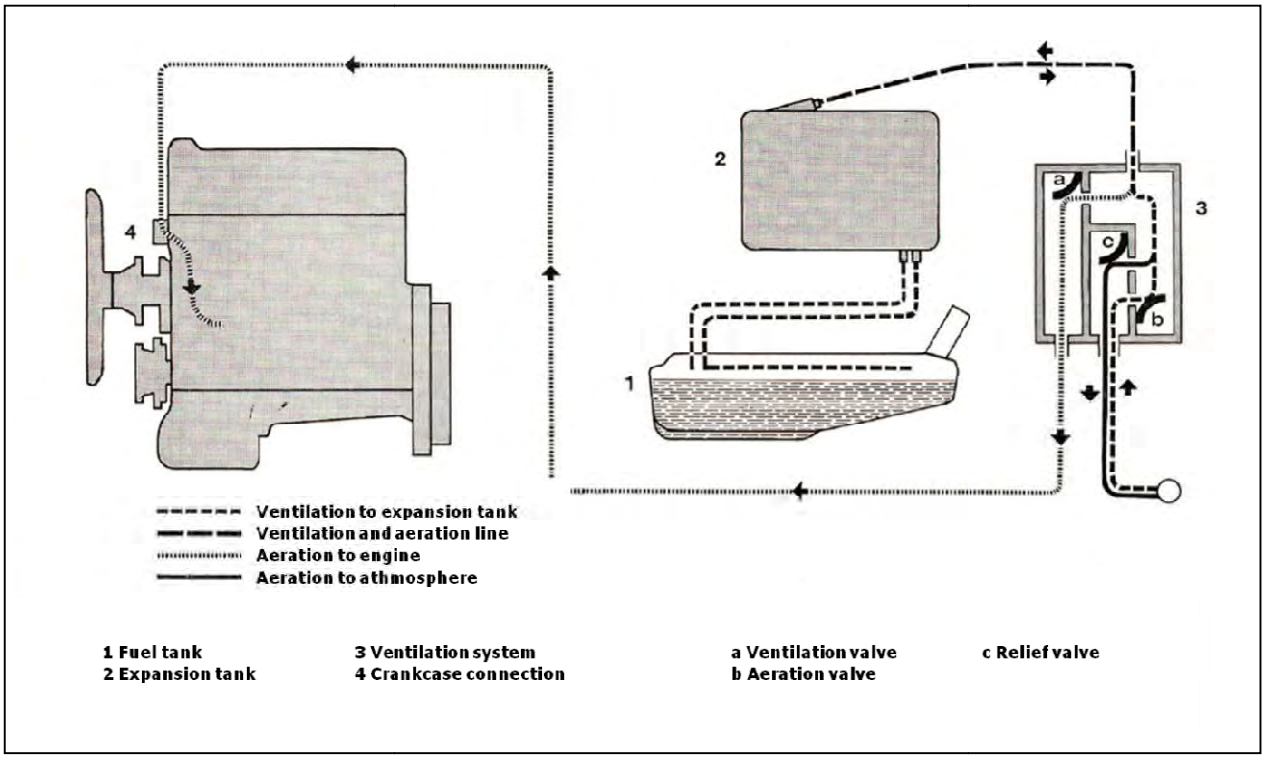


Fig. 4: Fuel Evaporation System

Fig. 5 shows the installation location and the appearance of the expansion tank and the valve system.

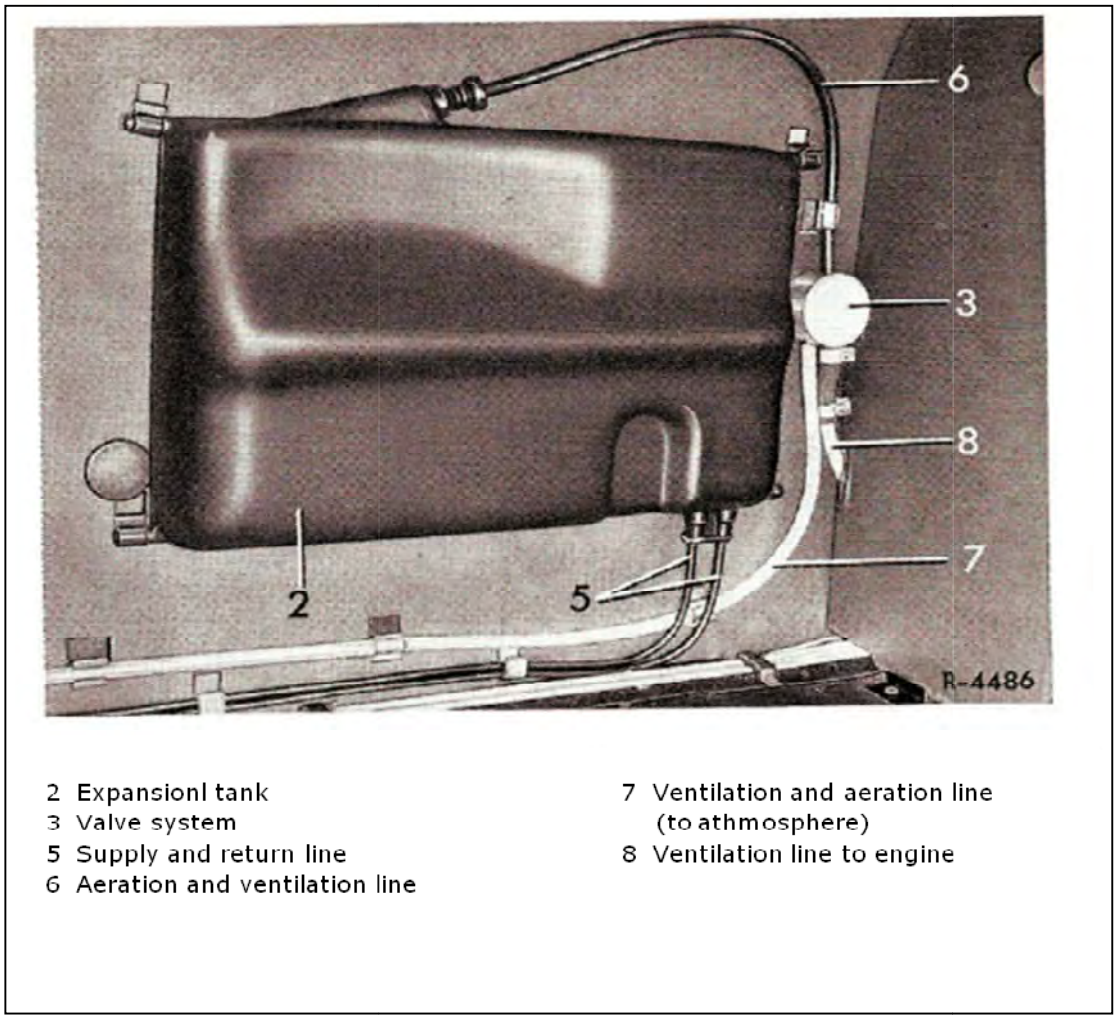


Fig. 5: Expansion tank and valve system of the fuel evaporation system

A.) Transistor Ignition

The transistor ignition installed from model year 1970 works for control with a mechanical breaker contact. The transistorized coil ignition uses a transistor to switch the primary current which, unlike the mechanical interrupter, is not subject to wear. The transistor can be controlled using the normal breaker contact, inductive or optical sensors. With this arrangement, the breaker only has to switch a purely ohmic load under battery voltage, which leads to a low electrical load on the breaker contact and no contact wear. Even at the lowest speeds, a clean interruption of the primary current is guaranteed, which results in better starting behavior. A higher primary current can also be switched with the transistor and the ignition coil can be designed accordingly. This results in a larger ignition voltage reserve at high speeds.
The system consists of a so-called switching device, an ignition coil and two series resistors (0.4 and 0.6 Ohm).

Fig. 6 shows the structure of the transistor ignition.

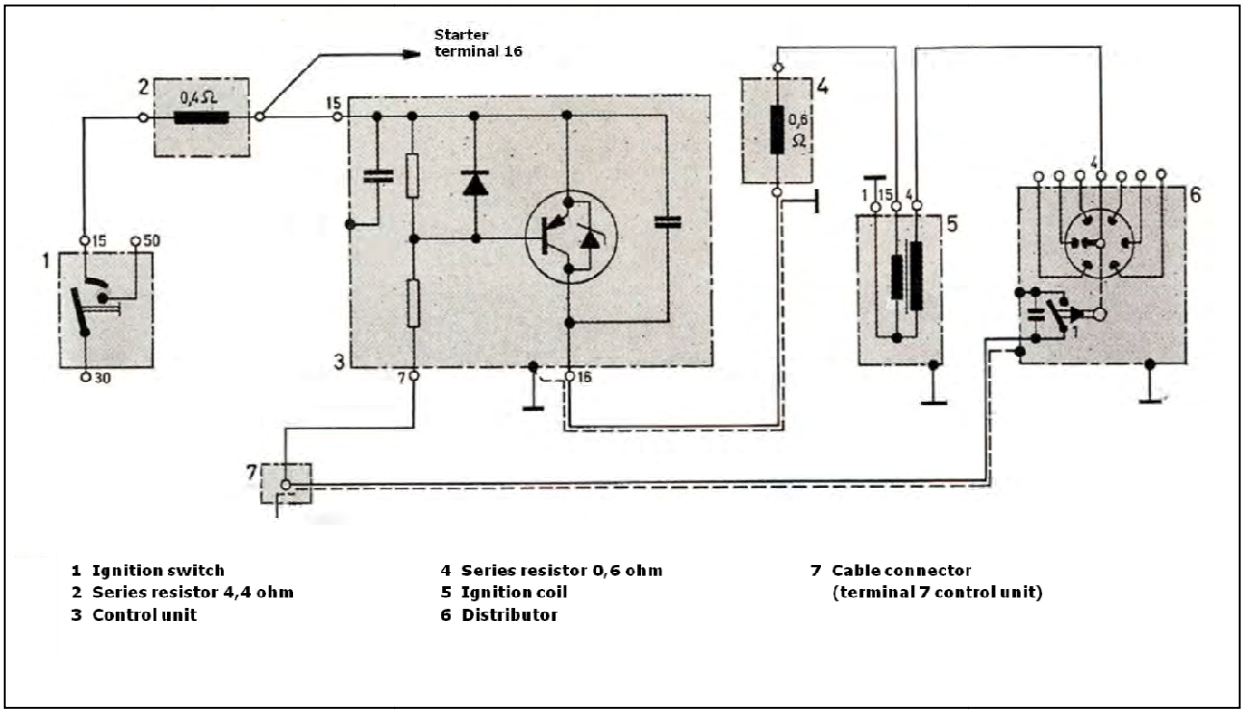
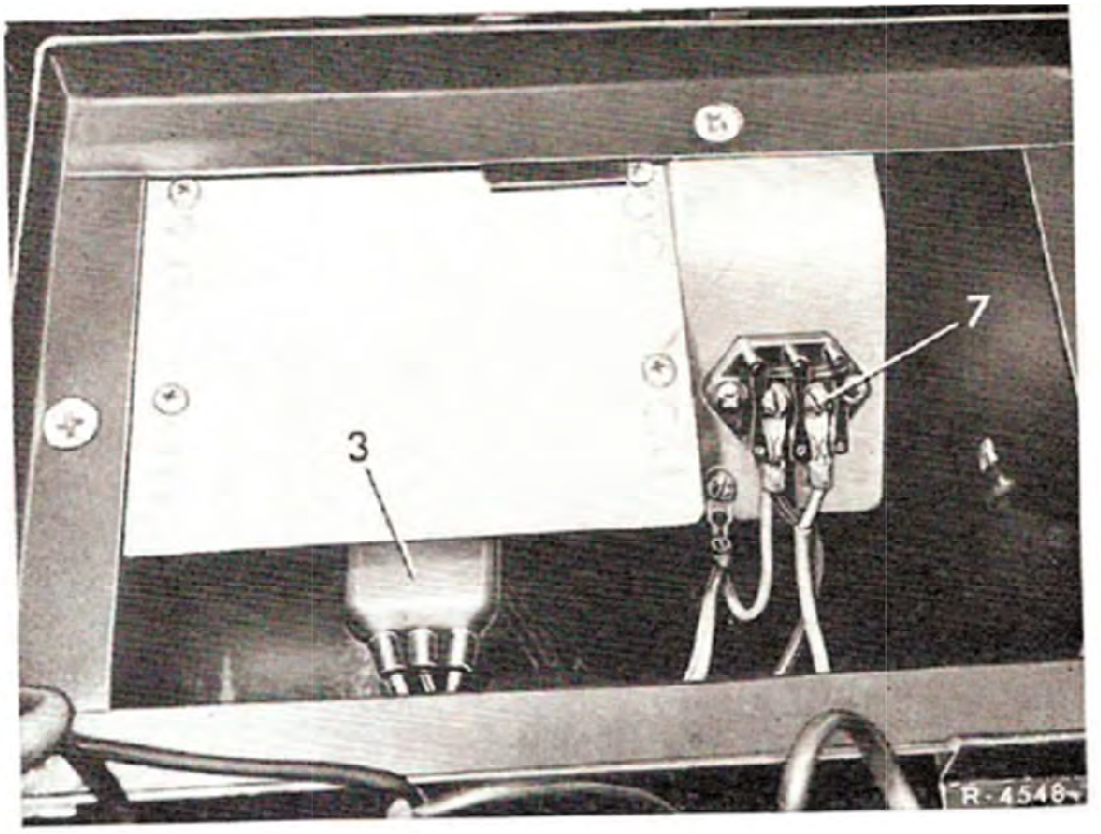


Fig. 6: Structure of the transistor ignition

Fig. 7 shows the installation location of the switching device/control unit of the transistor ignition and the terminal strip (cable connector).



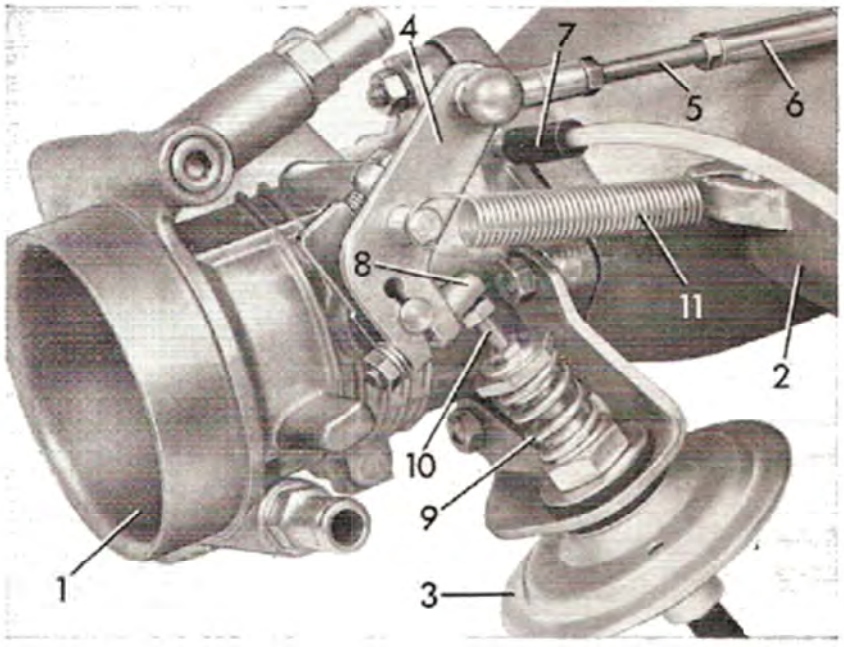
3 Switching device/control unit
7 Cable connector with terminal 7 of switching device/control unit

Fig. 7: Installation location of the switching device/control unit of the transistor ignition and the terminal strip (cable connector) in 280SL

B.) Throttle valve lift (280SL with automatic gearbox)

The throttle valve lift is vacuum-controlled. The vacuum unit (3) on throttle housing causes the throttle valve to be raised when the driving position is engaged. The control lever of the injection pump is not activated. As the engine speed drops when a gear is engaged, the intake manifold vacuum is reduced. The compression spring (9) of the vacuum regulator presses the adjusting screw (10) against the clamping bolt (8) and opens the throttle valve by 1-1.5 mm.

Fig. 8 shows the modified throttle valve.



1 Throttle valve
2 Air intake
3 Vaccuum box
4 Throttle valve lever
5 Slide rod
6 Sliding sleeve
7 Vaccuum removal
8 Clamping bolt
9 Pressure spring
10 Adjusting screw
11 Retaining spring

Fig. 8: Throttle valve with throttle valve lift

C.) Fuel injection pump

The injection pump has the end designation R22y. In order to achieve the prescribed exhaust gas values, the pump map has been changed. For this purpose, the injection pump received a new space cam.

The warm-up enrichment has been changed for this injection pump as follows:

It is switched off at approx. + 55 ° C cooling water temperature compared to the previous warm-up enrichment, which switched off at approx. + 65 ° C.

The injection pump no longer has a starting magnet. For this purpose, a new start valve is installed on the intake manifold with more spray volume. As before, the start valve is controlled by the + 35 ° C thermal timer switch (4) in the cylinder head.

Fig. 9 shows the built-in components.

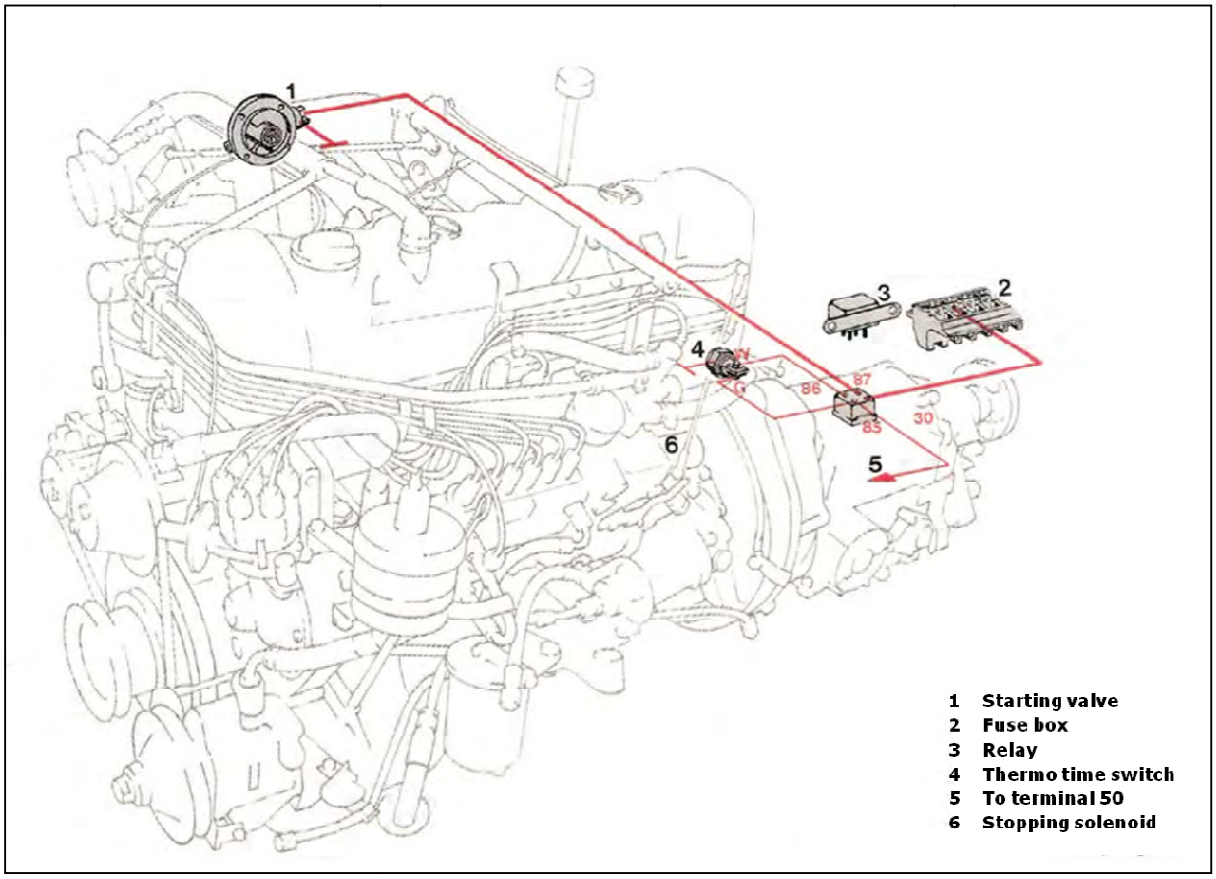


Fig. 9: Fuel injection pump R22y with components