

VOLVO

Service Manual

Design

Function

Section 2

Engine B28F

700-Series
1983-



Section 2A Engine – B28F

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Design and function

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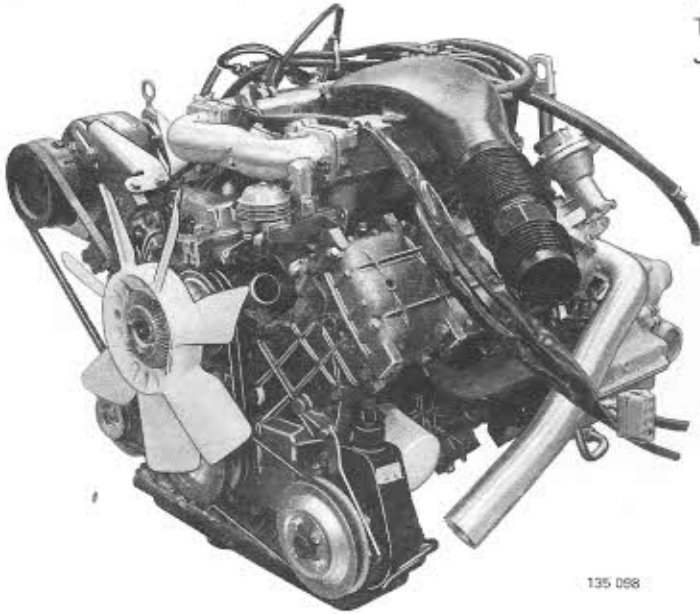
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Design and function

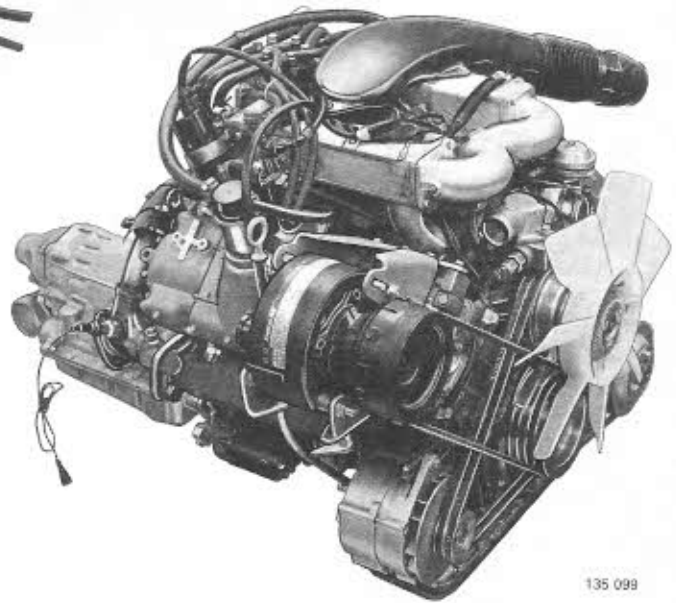
Group 20 General

B28F is a V-6 engine equipped with a mechanical fuel injection system.

This engine version is used for USA, Canada and Japanese markets.



Engine B28F viewed from left

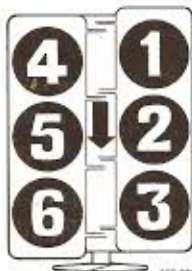
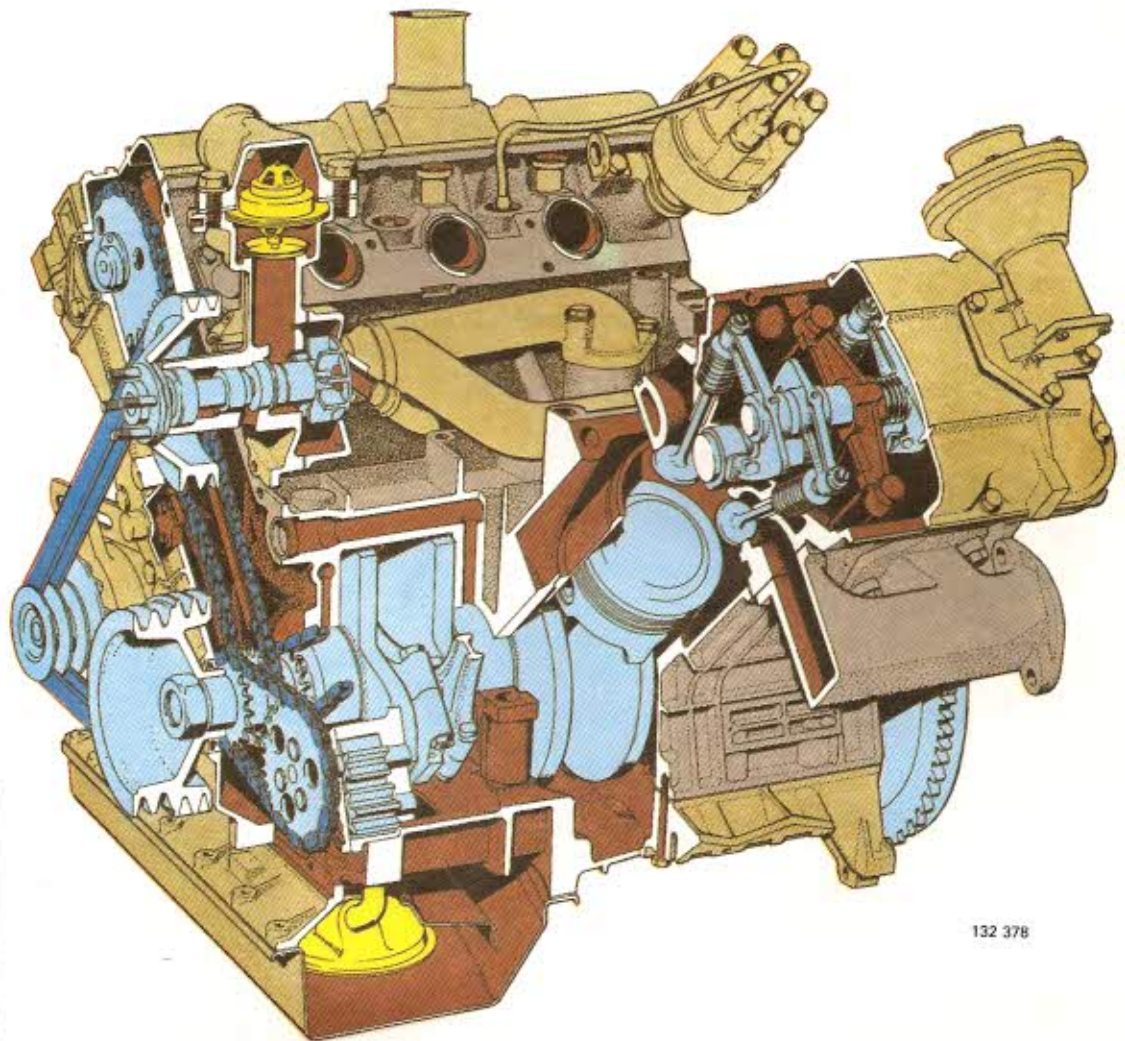


Engine B28F viewed from right

Characteristics:

- V-6 engine, 90° between cylinder banks
- cylinder block and cylinder heads made of aluminium alloy
- removable, cast iron cylinder liners
- aluminium alloy pistons, forged steel connecting rods
- cylinder heads of cross-flow construction, i.e. intake and exhaust ports are located on opposite sides of combustion chamber
- overhead camshafts operating through rocker arms
- chain drive for camshafts and oil pump with hydraulic tensioners
- oil pump located in cylinder block
- liquid cooled

NOTE: For additional "Design and Function" information, consult appropriate New Car Features manuals.



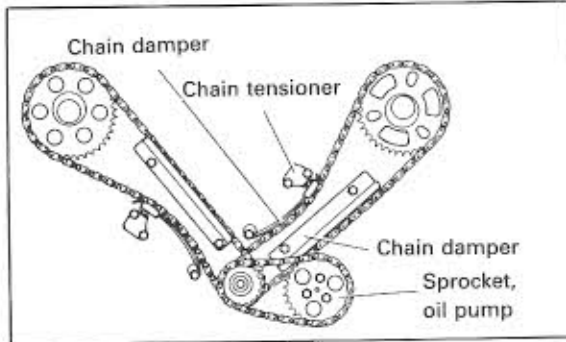
Cylinder location

132 378

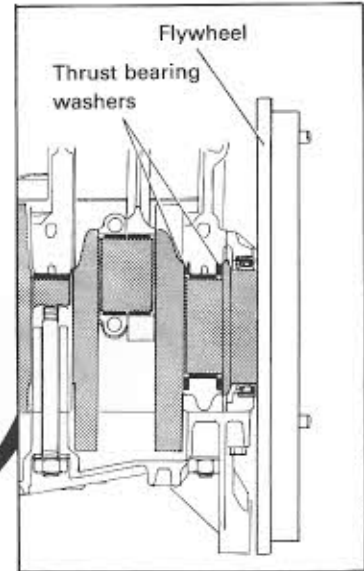
General data:

Engine identification number	498675
Fuel octane requirements (unleaded fuel only) according to research method (RON)	91
according to formula (R+M/2)	87
Fuel system	Fuel injection (CI system) Constant idle speed system (CIS-system)
Exhaust emission control	Lambda-sond system, catalytic converter
Output, DIN	100 kW at 92 r/s (136 hp at 5500 r/min)
SAE J 245	97 kW at 92 r/s (130 hp at 5500 r/min)
Max torque, DIN	215 Nm at 46 r/s (21.9 kpm at 2750 r/min)
SAE J 245	208 Nm at 46 r/s (153 ft. lbs. at 2750 r/min)
Compression ratio	8.8:1
No. of cylinders	6
Bore	91 mm (3.582 in)
Stroke	73 mm (2.874 in)
Displacement	2.849 dm ³ (liter)
Firing order	1-6-3-5-2-4
Weight	approx 150 kg (330 lbs)

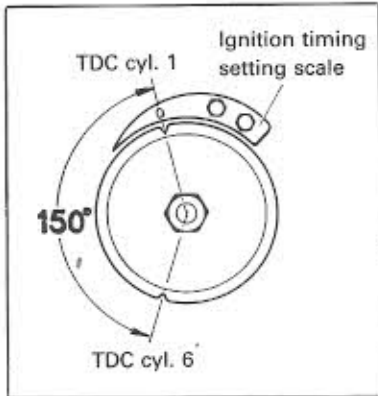
Group 21 Engine assembly



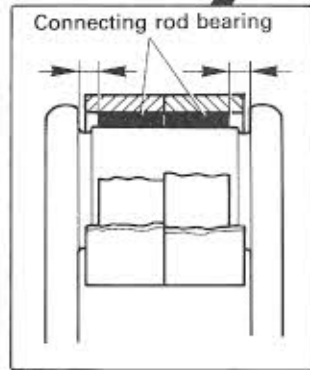
Timing chains



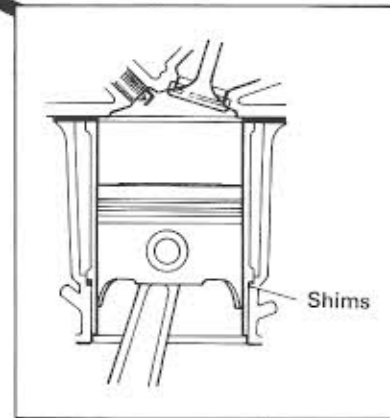
Crankshaft



Pulley marking

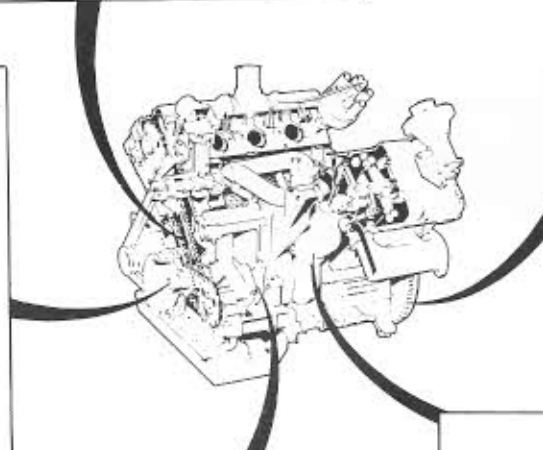


Connecting rod and bearing



Cylinder liner

132 379



Cylinder block

Cylinder banks are slightly displaced in relation to each other because connecting rods of two opposing cylinders are mounted on same crankshaft journal.

Cylinder liners

Liners are held in position by a flange in cylinder block. Cylinder heads press liners against their seats in block. Correct fit is obtained with shims (4 different thicknesses), which also prevent coolant leakage.

Liners and pistons are matched (3 classes) and must be replaced as an assembly.

Crank mechanism

Crankshaft is mounted on four main bearings. Main bearing studs pass through oil sump.

Crankshaft is located axially by thrust washers at rear main bearing (flywheel end).

Crankshaft seals are of rubber lip type. The front seal is located in timing gear case and rear seal sits in a holder bolted to cylinder block.

There are two connecting rods on each crankshaft journal, and it is very important that connecting rods are installed correctly (see fig.).

Pistons, piston pins, piston rings

Piston pins are firmly pressed into connecting rods and rotate in the pistons.

Three piston rings are used, two compression rings and one oil scraper ring, which comprises a spring loaded ring holder and two small scraper rings.

Cylinder head

Cylinder head bolts are also used to secure rocker arm shaft assembly.

Valve mechanism

Camshafts are of the overhead type, and operate valves through rocker arms.

Valve guides are replaceable. They are pressed into cylinder head and are equipped with rubber seals.

Valve seats are also replaceable, and are shrunk-fit into cylinder heads.

Valves operate at an opposing angle and have tapered stems.

Camshafts are mounted on four bearings, and are inserted in cylinder head from rear. They are held in position by a thrust washer at front end.

On rear end of right hand camshaft there is a gear to drive the distributor.

Left hand camshaft is equipped with an eccentric which drives vacuum pump in brake servo system.

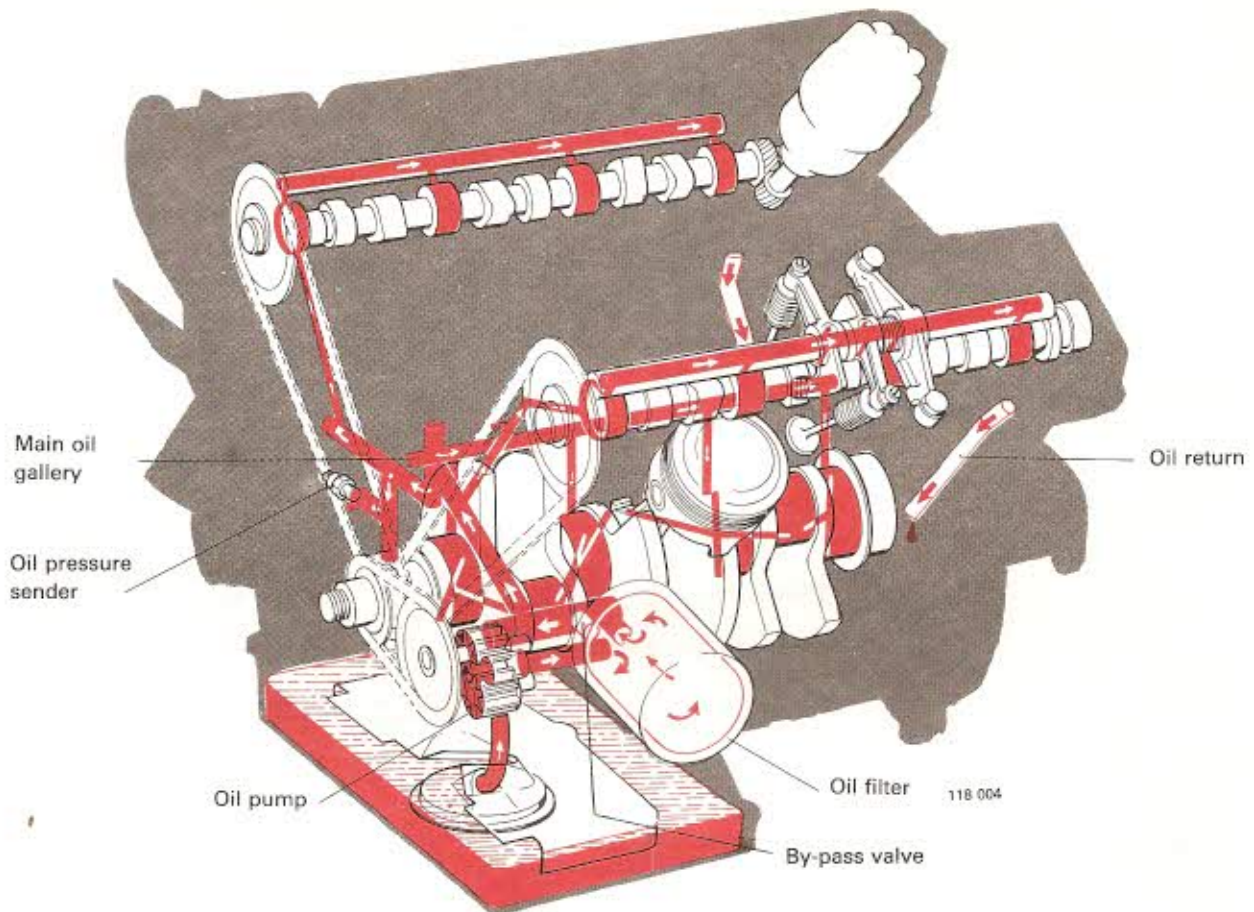
Timing gears

Camshafts are driven by chains, one for each camshaft. The oil pump is also chain driven.

Camshafts and sprockets are marked to facilitate correct installation.

Tension of camshaft chains is adjusted automatically by hydraulic tensioners. Chain tensioners operate under engine oil pressure. Chain dampers, two for each chain, are used to prevent chain vibration.

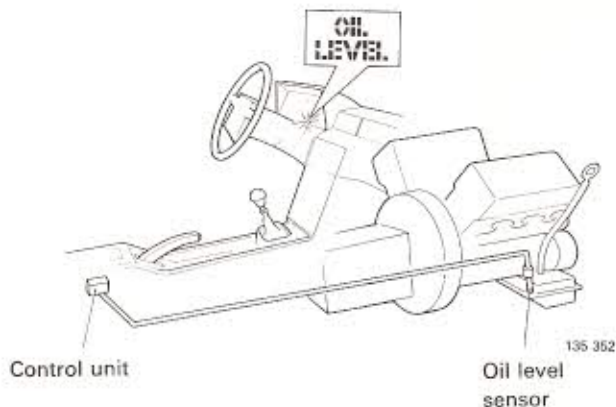
Group 22 Lubricating system



Lubricating system is of full-flow type i.e. all oil passes through an oil filter before being pumped to the various parts of system. The oil filter comprises a by-pass valve and a bleeder valve. Cylinder block is also equipped with a by-pass valve. This valve will open prior to oil filter by-pass valve.

All plain bearings in engine are pressure lubricated, while pistons and pins are lubricated by oil spray. Timing gear chains are lubricated by excess oil from camshaft front bearing and also from chain tensioners.

A gear type oil pump is used. A control valve in pump regulates oil pressure, returning excess oil to pan.



Oil level sensor

(see also section 3, group 38)

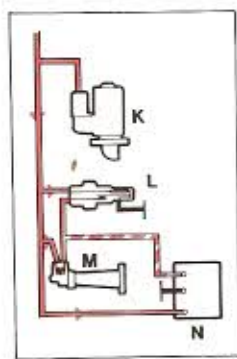
Oil level indicator light in instrument panel comes on when ignition switch is turned to position II. If oil level is correct light goes off after approx. 2 seconds. If oil level is low light remains on.

Level sensor system is disconnected when engine starts and light goes off.

Group 23 Fuel system

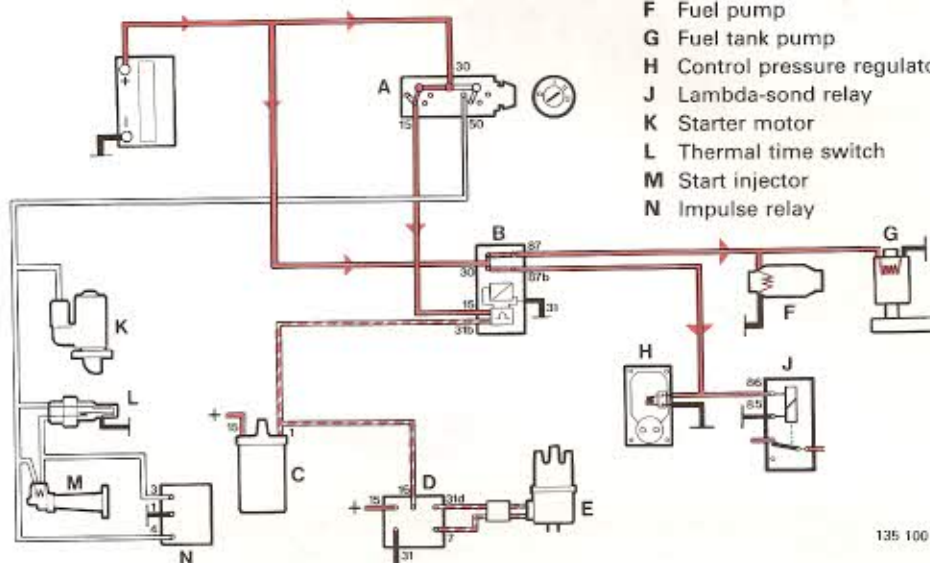
CI-system

CI-system circuit diagram



Current flow during cold start

132 286



System schematic, without connectors and fuses
Schematic shows current flow with engine running

135 100

Components

- A Ignition switch
- B Fuel pump relay
- C Ignition coil
- D Control unit (ignition system)
- E Distributor
- F Fuel pump
- G Fuel tank pump
- H Control pressure regulator
- J Lambda-sond relay
- K Starter motor
- L Thermal time switch
- M Start injector
- N Impulse relay

Fuel pump relay (B)

An electronic relay which switches on/off various system components.

Consists basically of an on/off relay and an impulse detector. Detector receives impulses from ignition control unit. When starting and running engine the detector allows current from terminal 15 to pass thus switching on relay.

When engine stalls or is shut off ignition pulses stop. Detector then blocks current and pumps shut off.

Control pressure regulator (H)

Consists of a diaphragm valve regulated by a bimetallic spring.

The spring is heated by both engine heat and current which flows through the regulator.

During cold start and warm-up regulator allows increased fuel flow (low control pressure = rich fuel/air mixture). When engine warms-up regulator decreases fuel flow (higher control pressure = lean fuel/air mixture).

Start injector (M)

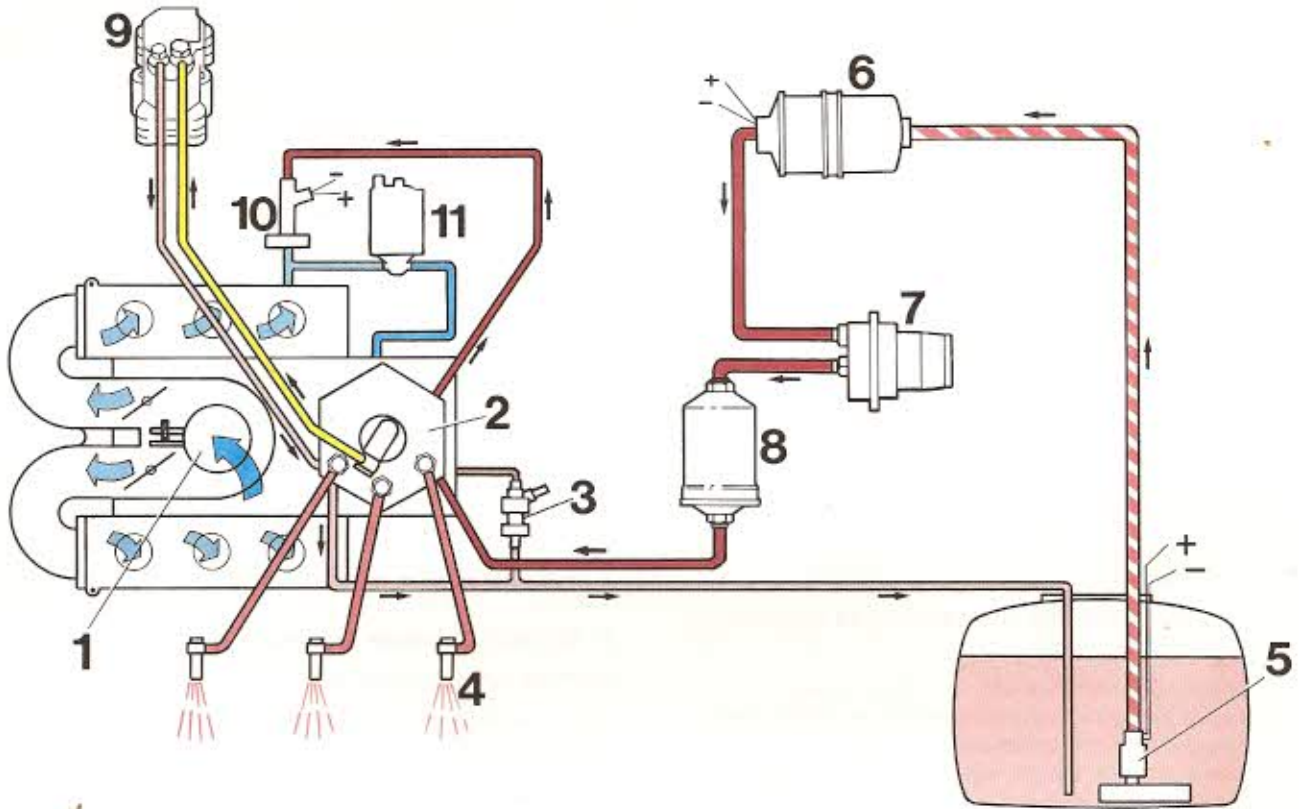
Injects fuel only during starter motor operation.

Controlled by thermal time switch (L) and impulse relay (N). Thermal time switch senses coolant temperature.

During cold start (coolant temperature under +35°C = 95°F) thermal time sensor breaks the circuit. The start injector opens and additional fuel is injected. Injection time depends on coolant temperature up to a maximum of 7.5 seconds.

During warm starts start injector is controlled by the impulse relay. The relay switches on after the first 1.5 seconds of starter operation and injects fuel for 0.1 second. It then alternately pauses 0.3 second and injects 0.1 second. The engine thus always receives additional fuel when starting.

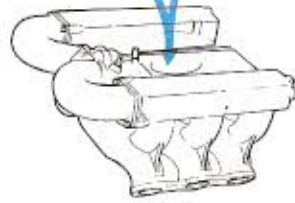
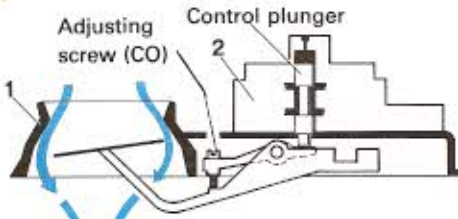
CI-system function



135 101

Components

- 1 Air-fuel control unit
- 2 Fuel distributor
- 3 Frequency valve (Lambda-sond system)
- 4 Injector
- 5 Tank pump
- 6 Fuel pump
- 7 Pressure accumulator
- 8 Fuel filter
- 9 Control pressure regulator
- 10 Start injector
- 11 Air control valve (CIS-system)



132 384

Air-fuel control unit and intake manifold

Pressure color code

- Air at atmospheric pressure
- Air at partial vacuum
- Fuel at line pressure of approx 510 kPa (72 psi)
- Fuel at pressure of approx 20 kPa (2.8 psi)
- Fuel at injection pressure of approx 390 kPa (55 psi)
- Fuel at tank (approx atmospheric) pressure
- Fuel at control pressure of approx 360 kPa (51 psi)

132 385

CI-system is a mechanically operated fuel injection system with one injector per cylinder. CI is short for "Continuous injection". The name is derived from the fact that injectors continuously spray fuel i.e. are open all the time engine is operating. Amount of fuel injected is therefore not controlled by variations of injection time but instead by regulating supply of fuel to injectors.

In principle system operates by continuously measuring amount of air flowing into engine, and adjusting accordingly amount of fuel to be supplied. The air-flow sensor (1) measures amount of incoming air, and fuel is regulated by fuel distributor (2).

1. Air-flow sensor

Continuously measures amount of incoming air and supplies this information to fuel distributor.

2. Fuel distributor

Controls and distributes fuel to injectors according to volume of incoming air.

Fuel distributor consists of:

- A. Control pressure regulator which regulates system pressure and rest pressure.
- B. Control plunger which regulates and distributes fuel to injectors.
- C. Pressure regulator valves (one for each injector), which ensure that fuel is evenly distributed to all injectors.

3. Frequency valve

A part of Lambda-sond system. Controls fuel pressure in fuel distributor's pressure regulator valves thereby finely adjusting amount of fuel injected.

4. Injectors

Atomize and inject the fuel.

5. Tank pump

Supplies fuel to main pump. Retains (rest) pressure in system to prevent vapor lock.

6. Fuel pump

Main fuel supply to system and incorporates a check valve to prevent return of fuel to tank thereby maintaining rest pressure.

7. Fuel accumulator

Dampens fuel pump pulsations and maintains rest pressure when engine is shut off.

8. Fuel filter

9. Control pressure regulator

Controls system pressure.

Lowers system pressure during starting and warm-up thereby creating a richer fuel-air mixture.

10. Start injector

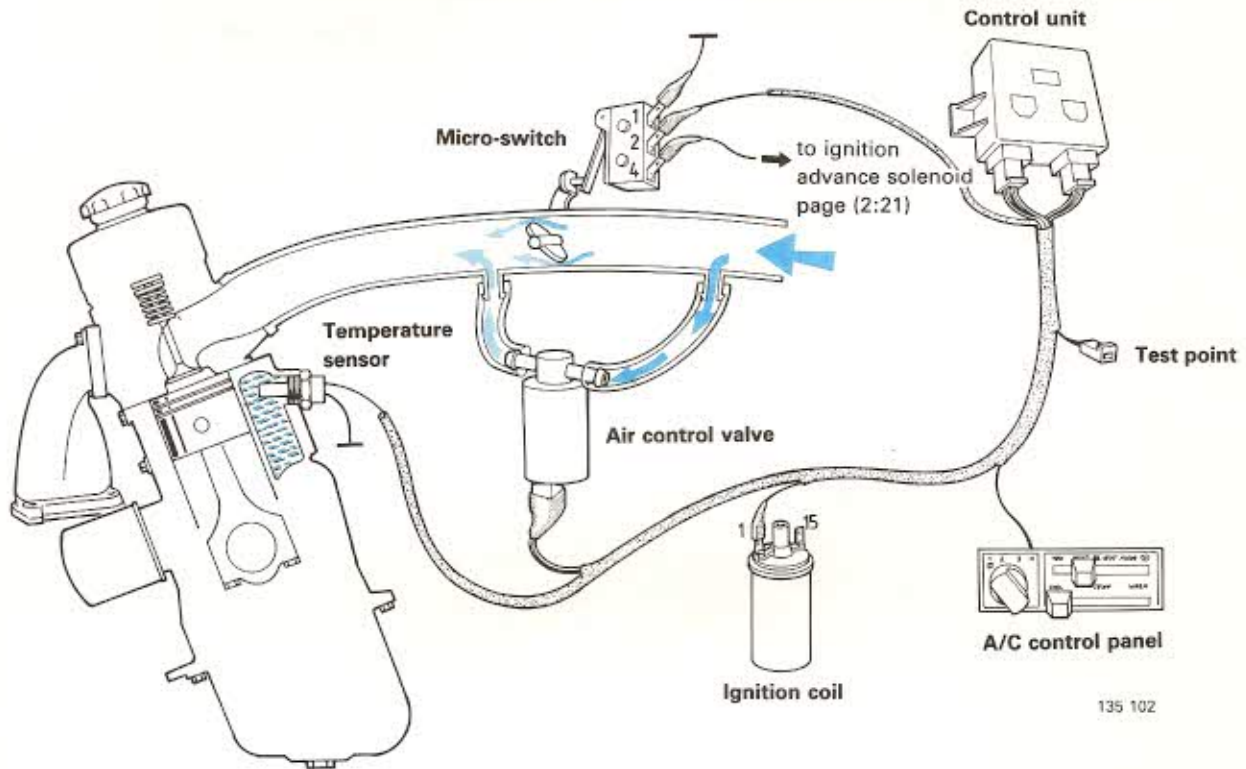
Supplies extra fuel during starting. Controlled by a thermal time switch and a impulse relay.

11. Air control valve

A part of the constant idle speed system (CIS-system).

The Lambda-sond system enriches the fuel-air mixture during certain driving conditions, see page 16.

Constant idle speed system (CIS-system)



System function

Control unit receives information from 4 sources:

- ignition coil gives information on engine speed.
- temperature sensor gives information on engine coolant temperature
- A/C control panel indicates A/C system on/off
- micro-switch indicates throttle in idle position

Control unit then processes this information and regulates air control valve so that correct idle speed is maintained.

Air control valve consists basically of an electric motor and controls idle speed by increasing/decreasing amount of air flow past throttle valves.

Fast idle

Temperature sensor indicates cold engine and a higher idle speed is ordered by control unit. At -20°C (-4°F) idle speed is about $1.5 \times$ higher than with hot engine. Idle speed decreases as engine temperature rises. Normal idle speed is reached at a temperature of approx 15°C (59°F).

Idle

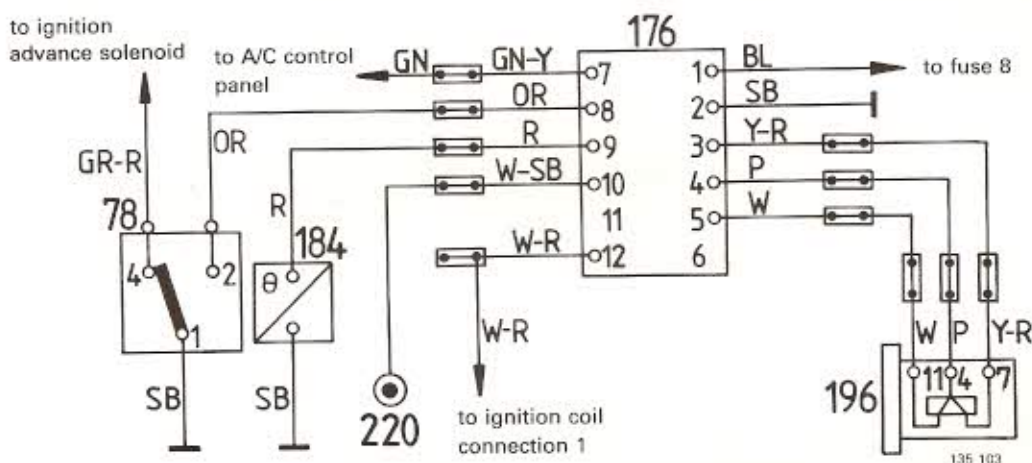
When engine is hot idle speed is approx 12.5 r/s (750 r/min).

Increased idle speed

When A/C system is switched on idle speed increases to approx 15 r/s (900 r/min). This is partly to compensate for increased engine loading and partly to provide increased cooling capacity.

Basic idle

When test point is grounded air control valve is fixed in its min-position. This position is used when basic-setting the throttle valves.



Wiring diagram CIS-system

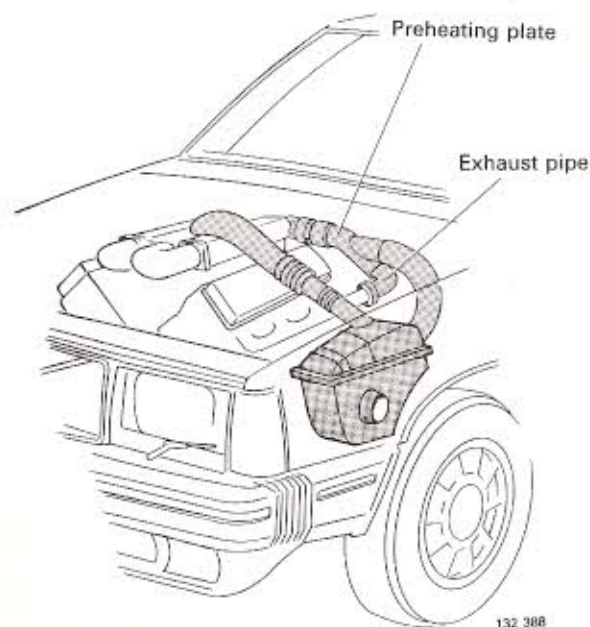
Component code

- 78 = micro-switch
- 176 = control unit
- 184 = temperature sensor
- 196 = air control valve
- 220 = test point

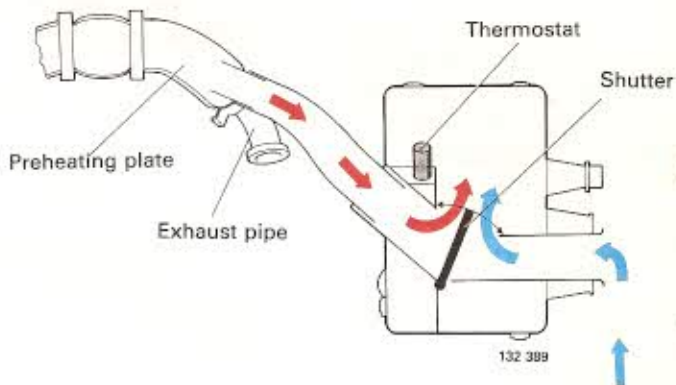
Color code

- | | |
|-------------|------------|
| GR = gray | Y = yellow |
| R = red | W = white |
| OR = orange | BL = blue |
| SB = black | P = pink |

Air cleaner, preheating



Air cleaner takes in air from space between fender and wheel housing.

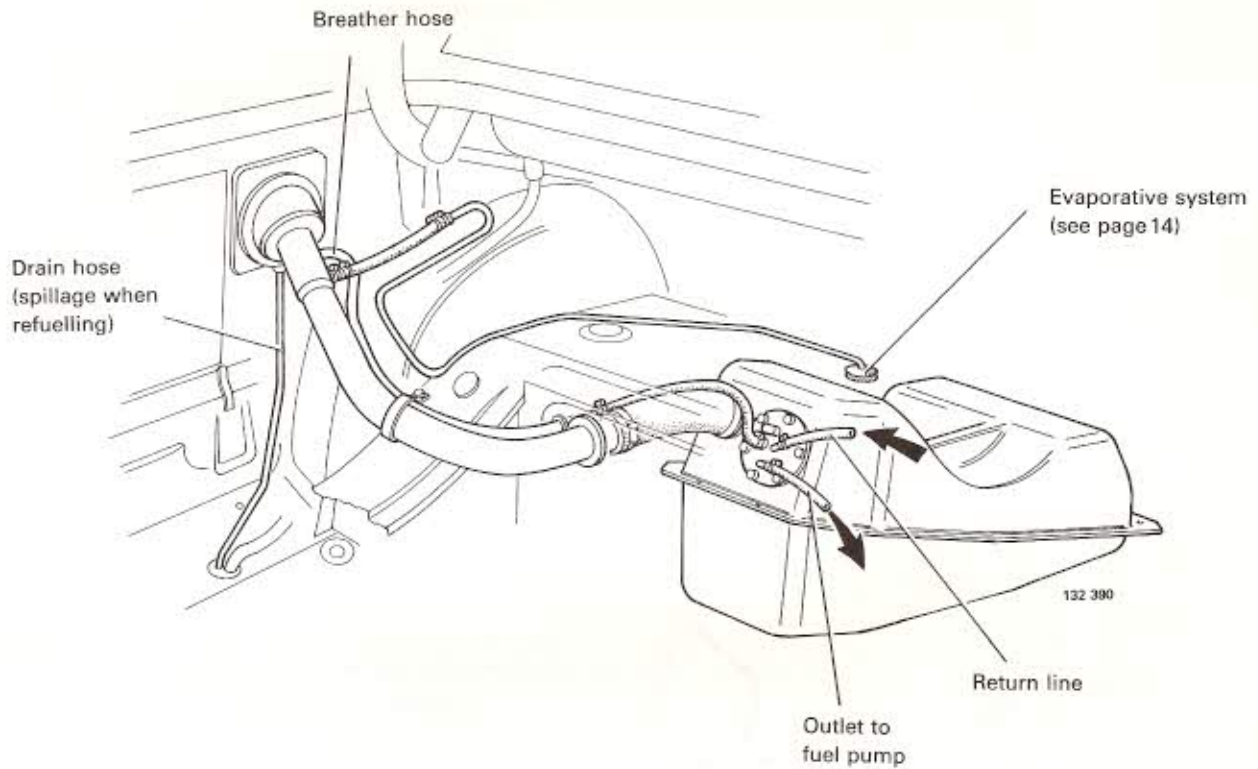


Intake air preheating provides engine with nearly constant temperature intake air regardless of ambient conditions. This provides for smooth engine running and prevents ice build-up.

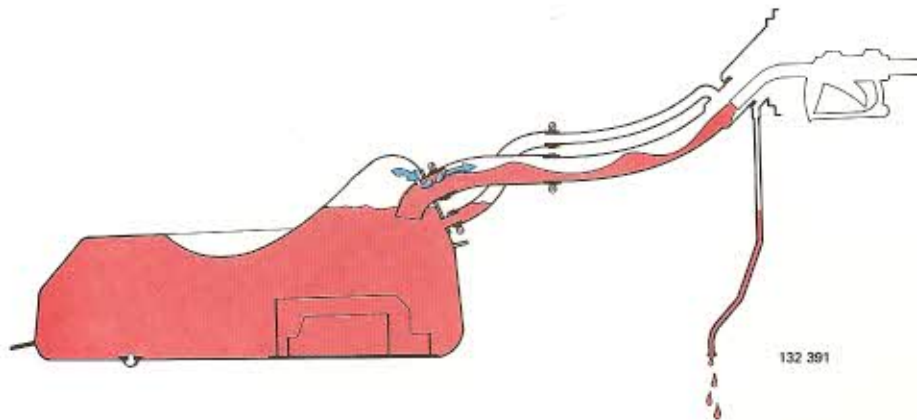
Preheating consists basically of a thermostatically controlled shutter.

Thermostat senses intake air temperature and then controls shutter to blend exhaust pipe heated air and ambient air in the correct proportions so as to maintain nearly constant intake air temperature.

Fuel tank



Fuel tank is mounted under the floor in front of rear axle. Volume when filling is approx 60 liters¹ = 17.4 gallons.

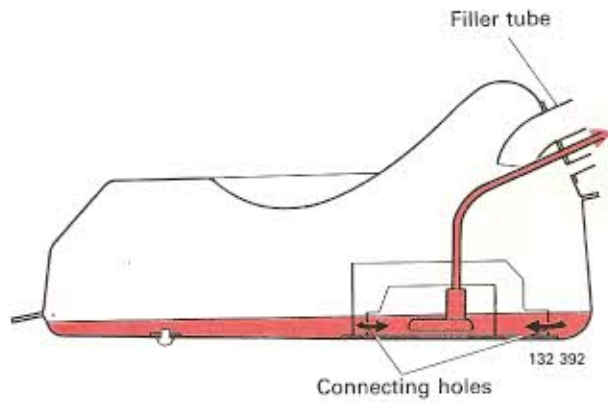


Expansion volume

An expansion volume is left when tank is filled with fuel. When refuelling, air is forced out of tank through the breather hose. However, when fuel level reaches the connection of this hose to the tank this passage is cut-off and air can only leave the tank by a very small hole (0.8 mm = 0.032 in) in top of filler pipe. Because fuel is supplied quicker than air can leave the system, fuel rises

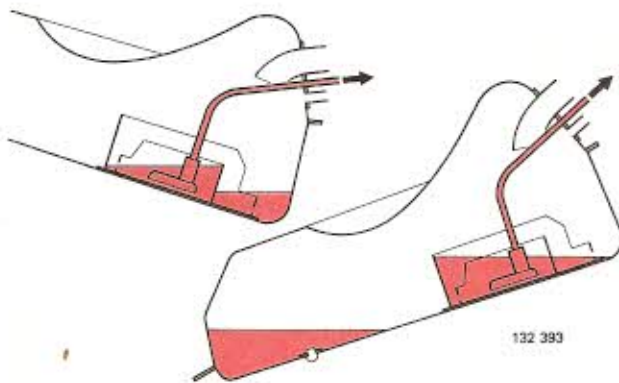
up filler pipe and fuel supply is automatically shut-off (by the fuel supply gun).

Fuel expands when warm and consequently air is displaced and forced out of the fuel tank. The size of the hole (0.8 mm = 0.032 in) is sufficiently large to allow for this slow expansion.



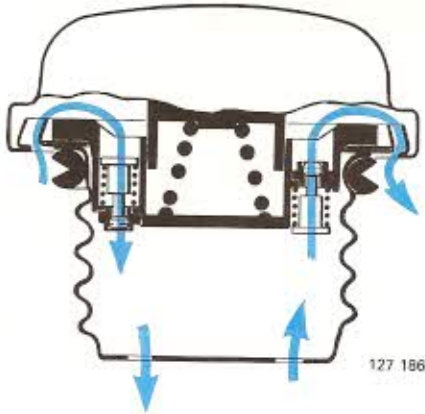
Fuel reservoir

Fuel reservoir is incorporated in fuel tank and consists in principle of an outer and inner cylinder. The inlet hose for fuel pump takes fuel from inner cylinder.



The level of fuel in reservoir is always adequate to prevent air from being drawn into system when driving up or down hills, around corners or when hill starting. Engine disturbances are thus avoided.

The end of the filler tube is directly above reservoir. This means that if car runs out of fuel, only a small amount of fuel needs to be added to restart the engine, even if car is parked on a hill.



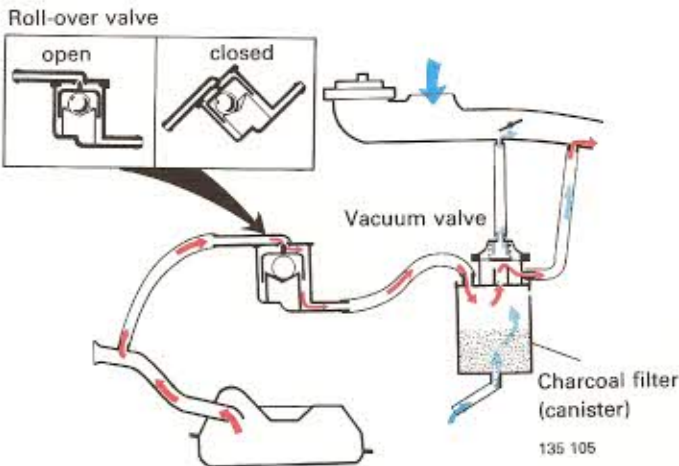
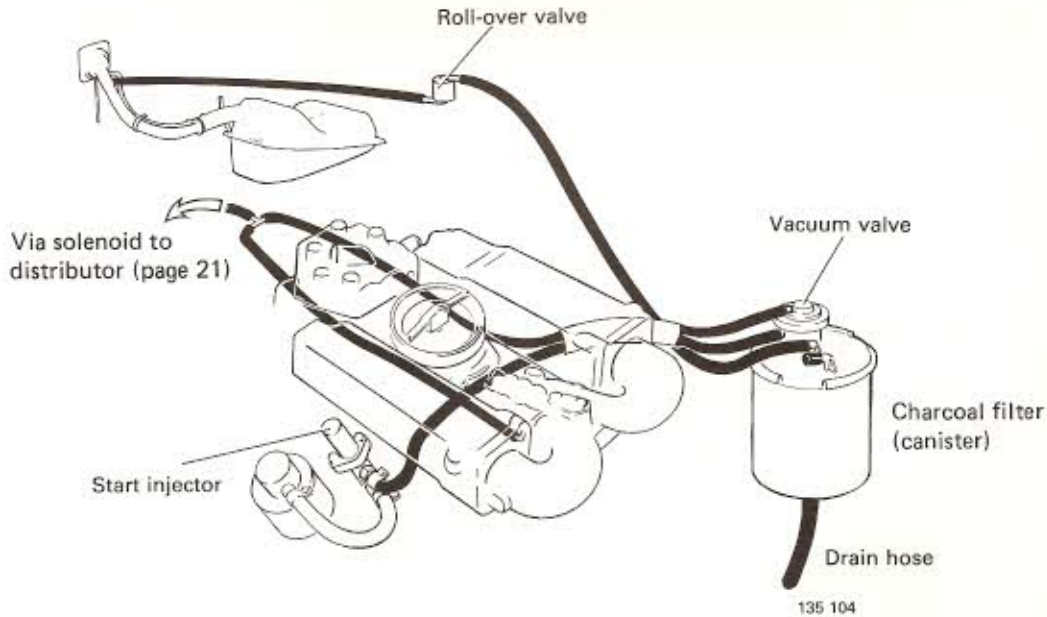
Tank cap

Two safety valves are incorporated in tank cap. Valves open when pressure in tank is too low or too high. In this way damage to fuel tank is prevented if for example breather hose becomes plugged.

Evaporative system

Evaporative system dampens pressure fluctuations in fuel tank resulting from changes in fuel volume and temperature.

System is connected to a charcoal filter (canister). A vacuum valve controls connection of canister to fuel tank and engine intake manifold.



Vacuum valve is controlled by vacuum upstream of throttle valves.

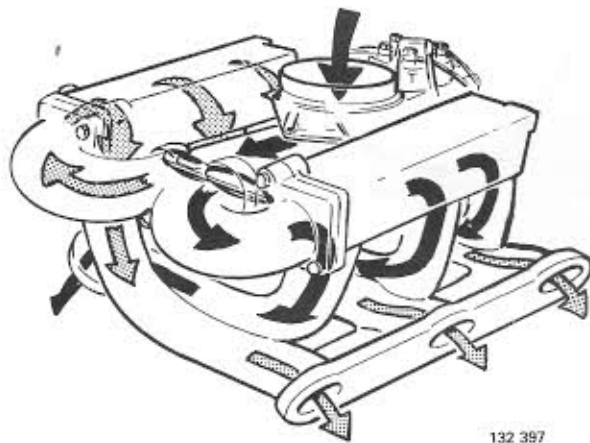
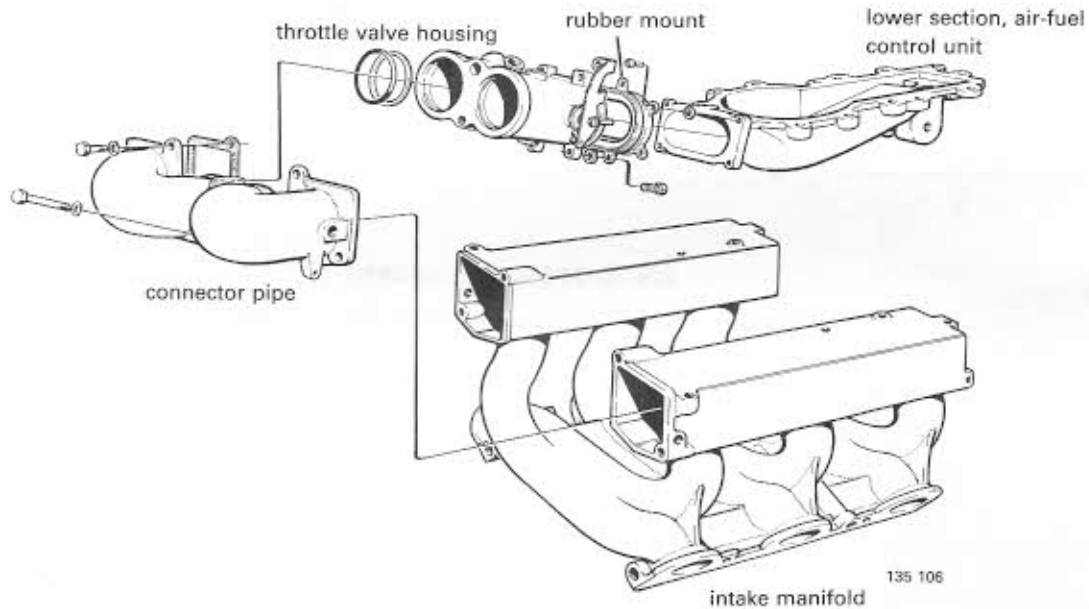
When idling, vacuum is low. Vacuum valve is closed and any fuel tank vapor is absorbed by the charcoal in canister.

Upstream vacuum increases with engine speed and the valve then opens thereby drawing in and combusting any vapor stored in the charcoal in canister.

System includes a roll-over valve which closes if car leans more than 45°. This prevents fuel leakage through evaporative system hose in the event of roll-over, accident, etc.

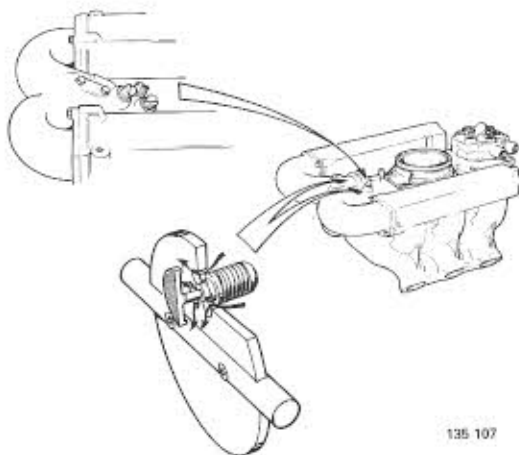
Group 25 Intake and exhaust systems

Intake system



Throttle body rubber mount dampens intake system vibrations. This also helps to stabilize idle speed and CO-content in exhaust.

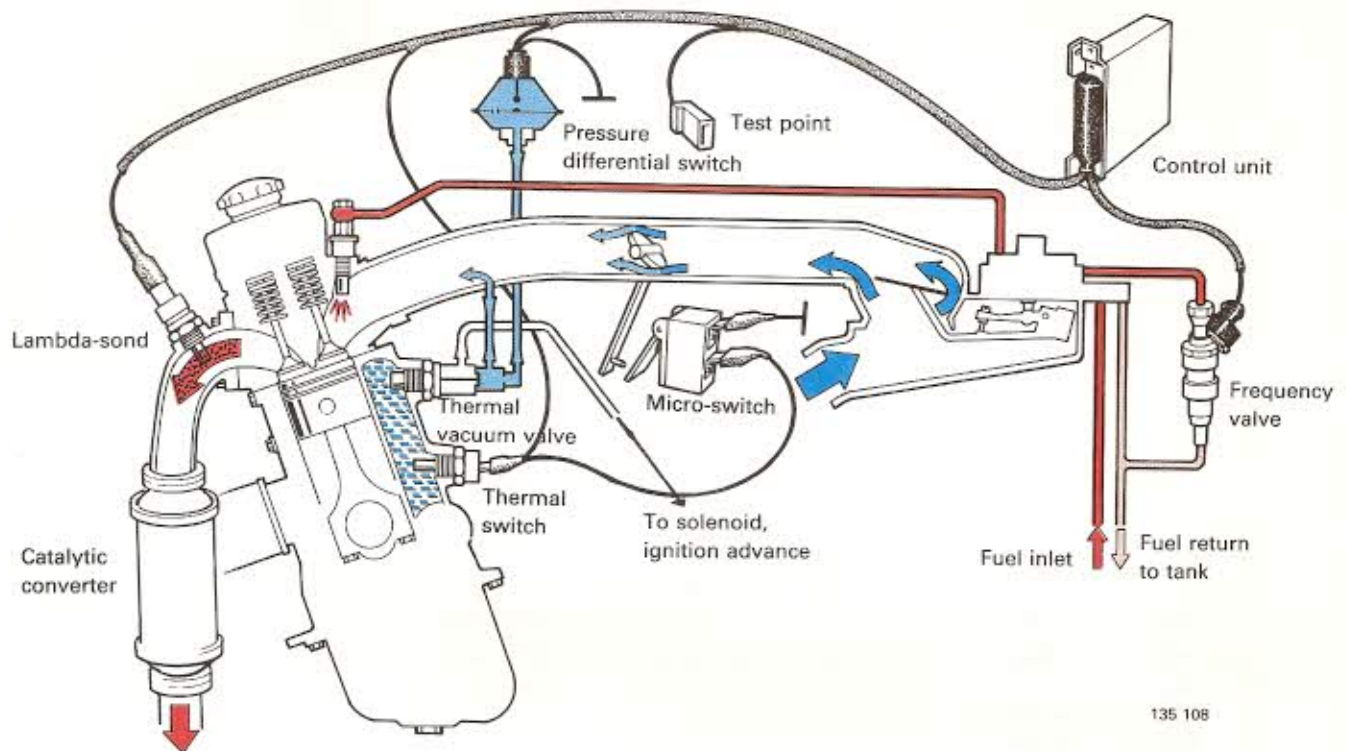
Note: Left-hand side of intake manifold is connected to right-hand cylinder bank (cylinders 4, 5 and 6), and right-hand side to left cylinder bank (cylinders 1, 2 and 3).



There are 3 "adjustment" screws in throttle valve housing. They are not used on engines equipped with constant idle speed system (CIS-system) and should therefore be bottomed.

The two throttle valves in throttle valve housing are equipped with relief valves. Relief valves are closed when driving normally. High intake manifold vacuum during engine braking (throttle valves closed) opens relief valves thereby allowing a small quantity of air to flow past. This increases combustion efficiency and decreases exhaust emissions.

Lambda-sond system



135 108

System

CI-system carefully controls fuel quantity in relation to intake air quantity. This is, however, not careful enough to permit catalytic converter to function effectively.

Lambda-sond system continuously "fine-tunes" quantity of fuel injected.

This "fine-tuning" by the Lambda-sond system means:

- more effective combustion
- relatively clean exhaust
- permits effective catalytic converter function yielding even cleaner exhaust

Regardless of combustion efficiency there is always a certain amount of oxygen remaining in the exhaust. This oxygen content is low when fuel-air mixture is rich and high when mixture is lean.

The Lambda-sond is located in exhaust manifold before the catalytic converter and when hot produces a voltage according to actual oxygen content.

Control unit senses this voltage and grounds the frequency valve in cycles (duty cycle). The time frequency valve is grounded depends on Lambda-sond voltage and controls frequency valve closed time.

The frequency valve controls fuel pressure in the air-fuel control unit's pressure differential valves. It therefore "fine-tunes" quantity of fuel injected.

Duty cycle can be measured by connecting a dwell meter to test point.

If the Lambda-sond is damaged control unit operates on a fixed duty cycle.

Under certain operating conditions the engine requires a richer mixture. To accomplish this the system has other components which temporarily ground the control unit resulting in a fixed duty cycle producing a richer mixture.

Cold engine

Thermal switch senses engine coolant temperature and grounds control unit at temperatures under approx 15°C (59°F).

Acceleration-cold engine

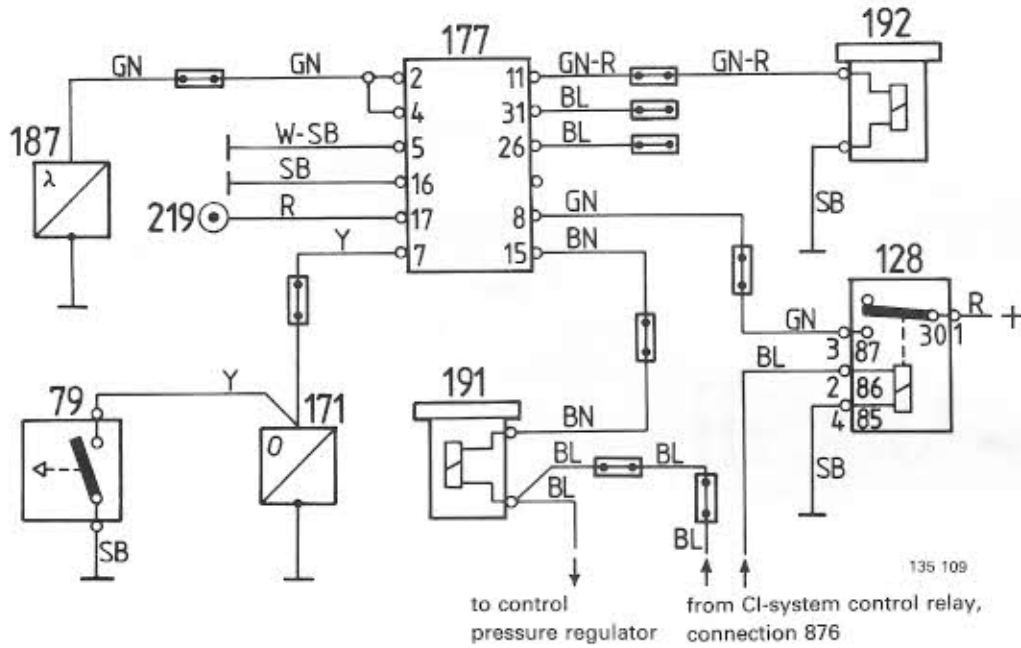
A pressure differential switch is connected to intake manifold via thermal vacuum valve and senses intake manifold pressure. During acceleration intake manifold pressure drops for a short time and the switch grounds the control unit 0.25—1.5 seconds depending on pressure drop (how hard acceleration).

The thermal vacuum valve connects pressure differential switch to intake manifold at temperatures under 55°C (131°F). At higher temperatures the valve disconnects switch and instead connects a solenoid for temperature controlled ignition advance, see page 21.

Full throttle enrichment

Micro-switch at throttle control pulley closes at full throttle and grounds control unit.

Important. Vehicles sold for principal use at altitudes over 1219 meters (4000 feet) must have the micro-switch disconnected.



Wiring diagram

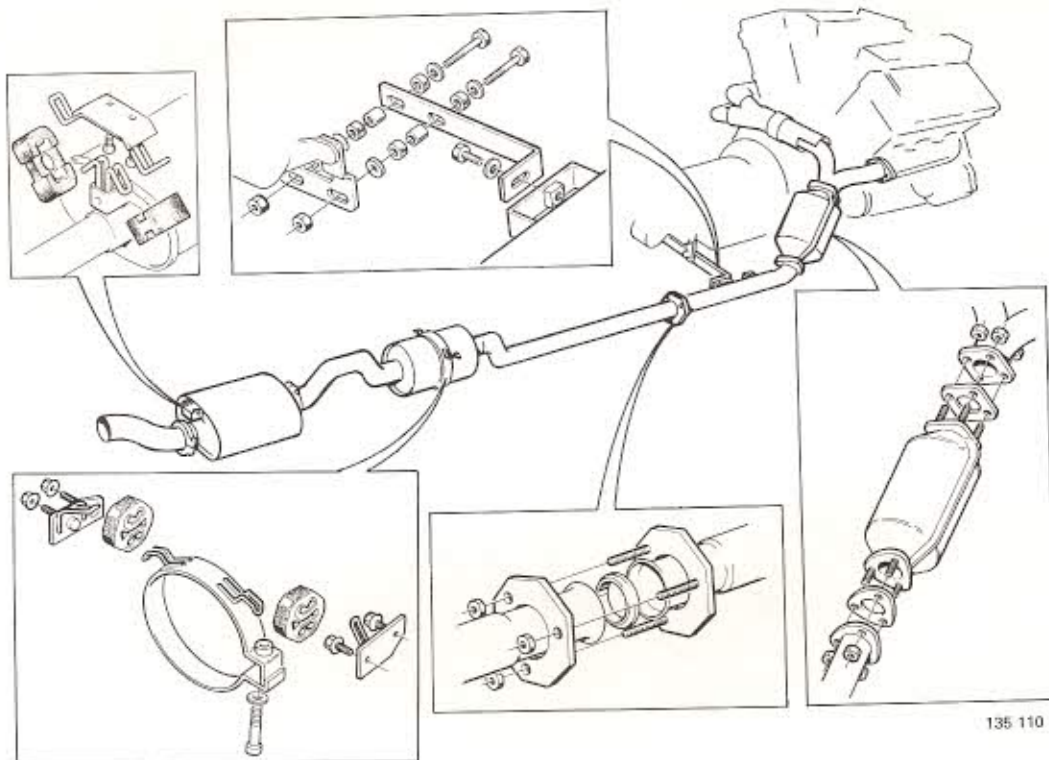
Component code

- 79 = micro-switch
- 128 = relay
- 171 = thermal switch
- 177 = control unit
- 187 = Lambda-sond
- 191 = frequency valve
- 192 = pressure differential switch
- 219 = test point

Color code

- | | |
|------------|------------|
| W = white | GN = green |
| SB = black | BL = blue |
| R = red | BN = brown |
| Y = yellow | |

Exhaust system



135 110



120 999

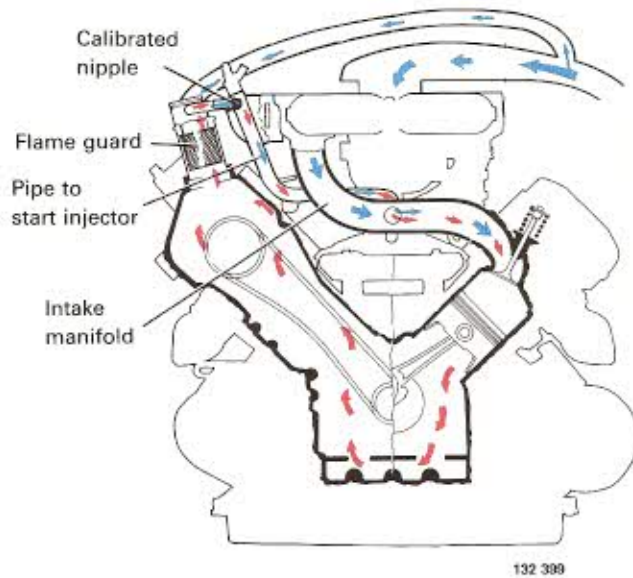
Catalytic converter

A "single-bed" platinum and rhodium type converter. A catalytic converter is a device which starts and conducts chemical reactions without being consumed or changed by the reaction. The reaction which occurs in catalytic converter heavily reduces carbon monoxide (CO), hydrocarbons (HC) and oxides of nitrogen (NO_x) in the exhaust gas. In order to function effectively the engine's air-fuel mixture must be kept as close to ideal as possible. This is achieved by the Lambda-sond system, see page 16.

Caution. Converter consists of components that can be easily damaged and it is therefore always necessary to use unleaded fuel. While lead in small quantities may not damage the converter it may cause it to overheat eventually dissolving some components. These dissolved components may then block the exhaust gas passages.

Overheating results from:

- leaded fuel
- incorrect adjustment of fuel or ignition systems
- incorrect parts in fuel or ignition systems
- extensive cranking time (engine becomes flooded)
- towing vehicle to start it (engine becomes flooded)



Crankcase ventilation

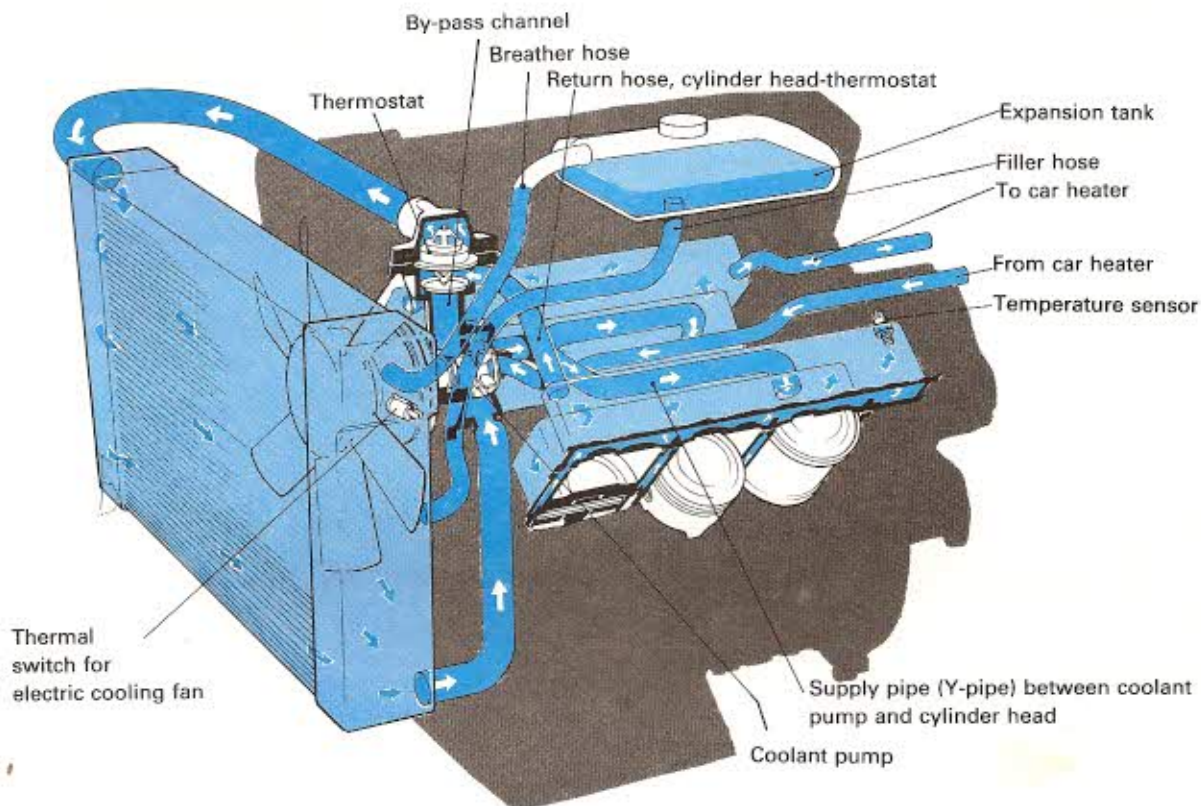
Crankcase ventilation is positive i.e. crankcase gases are not released directly into atmosphere but are directed to intake manifold, where they are burned in the combustion process.

A calibrated nipple in intake manifold regulates gas flow and ensures that vacuum in crankcase does not become too large.

At idle and low loads, the vacuum in intake manifold is large. Crankcase gases are then mixed with air from air cleaner and consequently vacuum does not increase.

At full load and/or large crankcase gas flow, vacuum in the intake manifold decreases. Crankcase gases then flow in two different directions, partly through the calibrated nipple and partly through the air cleaner.

Group 26 Cooling system



Engine is water-cooled and equipped with a closed cooling system.

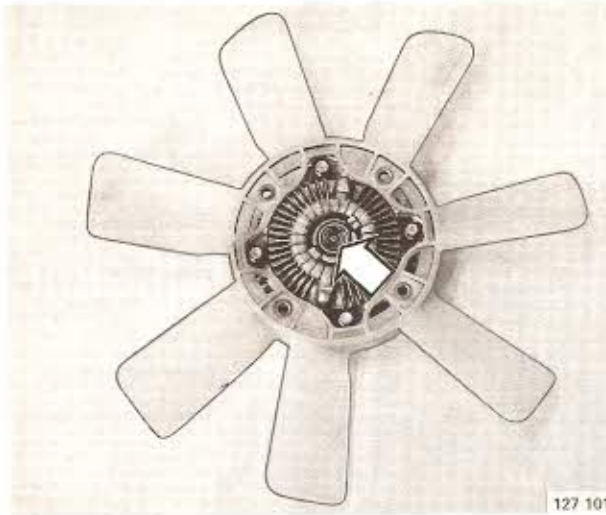
Cooling system consists of an inner and an outer circuit. Outer circuit comprises radiator and expansion tank; remaining parts of cooling system and car heating system are called the inner circuit.

As long as the temperature of engine is below opening temperature of the thermostat, the outer circuit is not used and coolant flows along the by-pass channel in cylinder head to coolant pump. Coolant pump is of the centrifugal type, and is located between cylinder banks.

There are two relief valves in the expansion tank cap. One, which regulates overpressure in cooling system, opens at approx. 75 kPa (10.6 psi). The other opens at a vacuum of approx. 7 kPa (1.0 psi).

Coolant is added to system via expansion tank. A breather hose is connected between radiator and expansion tank.

Cooling system is filled with a mixture of 50% concentrated coolant and 50% water. This mixture protects against both corrosion and damage by freezing and should be changed regularly since the coolant corrosion protective additives lose effectiveness with time.



Thermally controlled fan with viscous coupling drive

Regulated by engine speed and temperature of air passing through radiator.

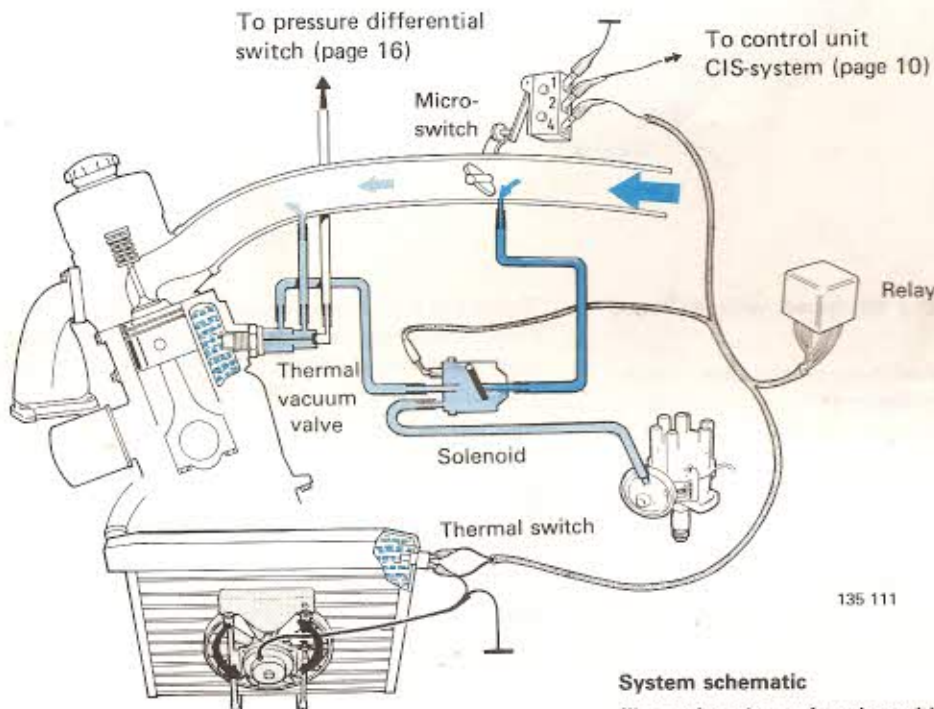
A bimetallic spring located in center of coupling senses air temperature and regulates a valve controlling oil circulation within coupling.

At low temperatures valve is closed thus causing fan to slip resulting in low speed.

When air temperature exceeds approx +80°C (176°F) the valve opens and oil flow increases resulting in higher fan speed.

Max fan speed is approx 16.7 r/s (1.000 r/min) when valve is closed and 41.7 r/s (2.500 r/min) when valve is fully open.

Electric cooling fan. Temperature controlled ignition advance



System schematic

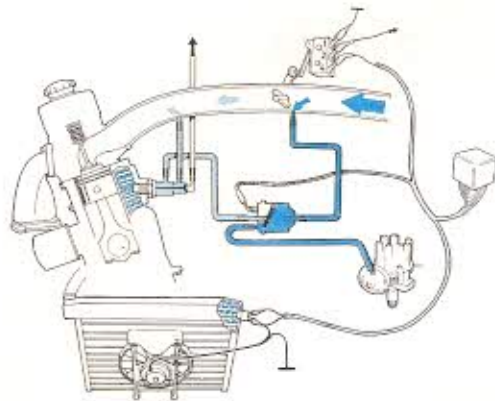
illustration shows function with engine idling and coolant temperature over 100°C (212°F).

When driving in high ambient temperatures or when idling with A/C system switched on for extended periods there is risk that coolant temperature becomes too high.

To avoid this vehicle is equipped with a temperature controlled ignition advance system and an electric cooling fan. When coolant temperature exceeds 100°C (212°F) the system and the fan are activated until coolant temperature drops to 95°C (203°F).

The ignition advance system and the fan are controlled by a thermal vacuum valve, a micro-switch and thermal switch.

Continued on next page



Coolant temperature under +55°C (131°F)

Engine mounted thermal vacuum valve senses coolant temperature and is closed below 55°C (131°F). Ignition advance system is not connected.

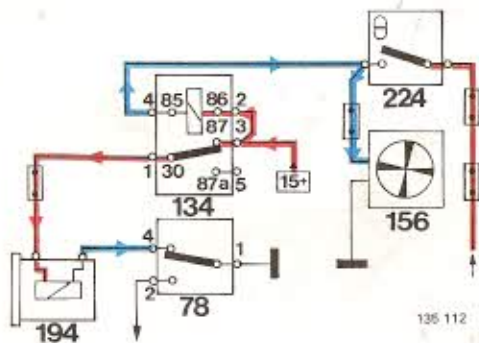
Coolant temperature under +100°C (212°F)

- Radiator mounted thermal switch is open.
- Relay is grounded via electric cooling fan.
- Current is supplied by relay to solenoid.

When idling the solenoid is grounded by the micro-switch. The solenoid engages and the distributor ignition advance is affected by the vacuum upstream of the throttle valves (no vacuum). Ignition is therefore not advanced (retarded).

Retarded ignition during idle results in smooth running.

When the accelerator pedal is depressed (even slightly) the micro-switch opens and the solenoid is disengaged. Ignition advance is then affected by the vacuum (large) in the intake manifold and the ignition advances. Advanced ignition results in lower fuel consumption.



Function with engine idling and coolant temperature under 100°C (212°F).

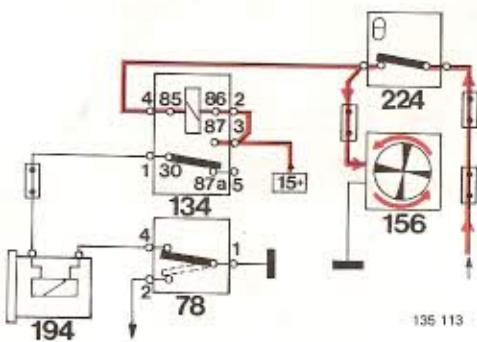
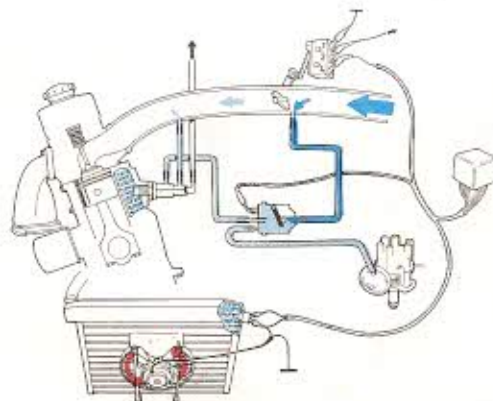
Coolant temperature over 100°C (212°F)

- Radiator mounted thermal switch closes.
- Current is supplied to electric fan which then switches on.
- Relay ground is broken. Relay opens and current flow to solenoid is stopped (current is supplied to both sides of the solenoid coil and thus no current flows).
- Solenoid disengages.
- Ignition advance is affected by the vacuum (large) in the intake manifold and the ignition advances.

When the ignition advances the engines efficiency increases and the combustion temperature decreases.

Coolant temperature quickly decreases with electric cooling fan operating and the ignition advanced. When the temperature decreases to approx 95°C (203°F) the thermal switch opens.

Coolant temperature quickly decreases with electric cooling fan operating and ignition advanced. When temperature decreases to approx 95°C (203°F) the thermal switch opens.

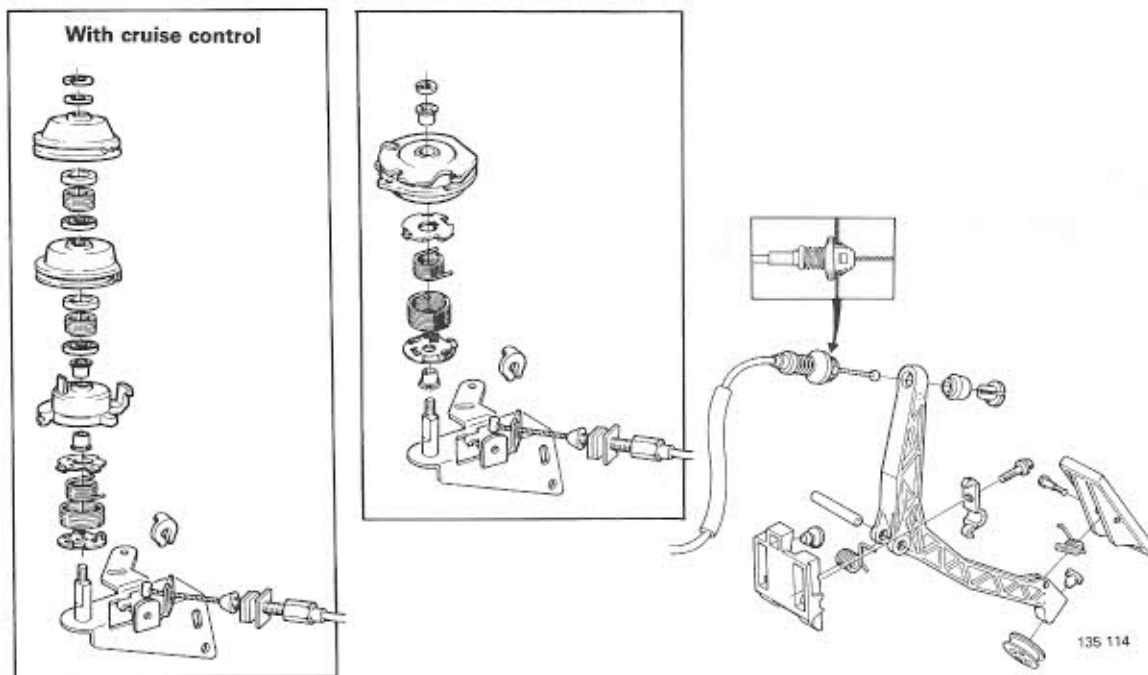


Function with coolant temperature over 100°C (212°F).

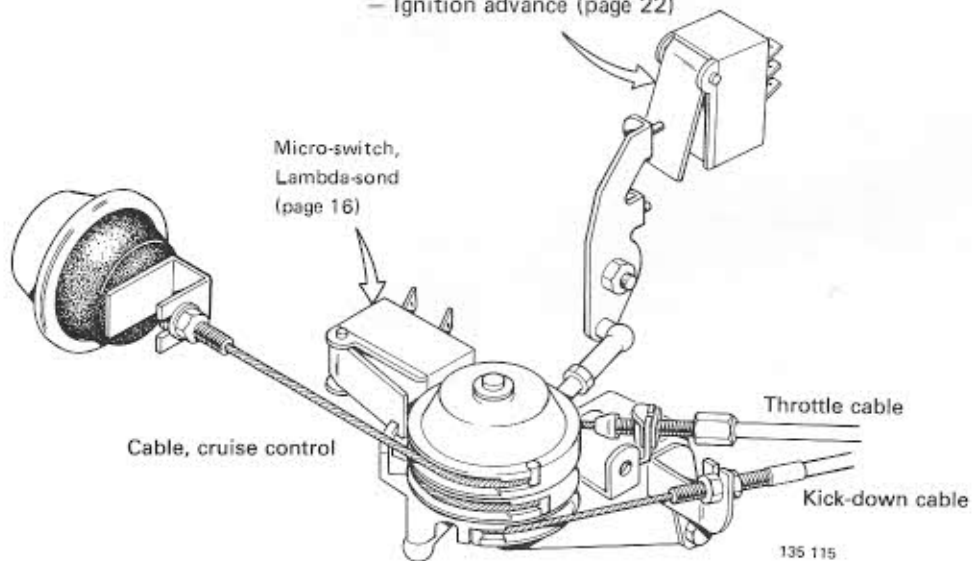
Component code

- | | |
|-------------------|----------------------------|
| 78 = micro-switch | 156 = electric cooling fan |
| 134 = relay | 224 = thermal switch |
| 194 = solenoid | |

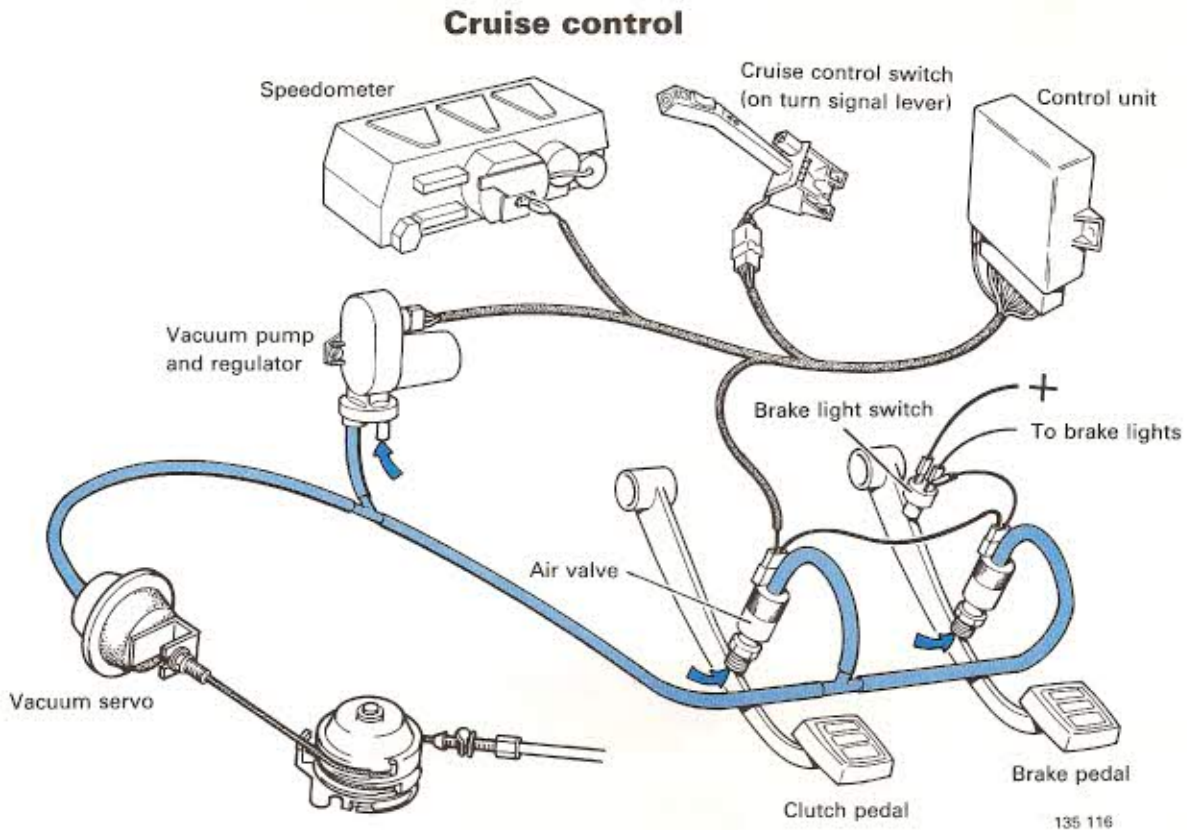
Group 27 Engine controls



Micro-switch,
- CIS-system (page 10)
- Ignition advance (page 22)



Note. Only certain models are equipped with cruise control.



135 116

Cruise control system is switched on/off and desired cruise speed is set by a switch located on turn signal lever. Switch positions are: OFF, ON, RESUME and SET SPEED. System can be switched on but will not function at vehicle speeds under 40 km/h (24 mph).

Control unit senses vehicle's speed via pulses from the electronic speedometer.

When switched ON and SET SPEED button is pushed the pulse rate corresponding to the desired cruise speed is recorded in the control unit's memory. Control unit then signals vacuum pump regulator which in turn continuously regulates vacuum in vacuum servo in order to maintain vehicle at set cruise speed. In other words, vacuum servo is controlled so that speedometer pulse is equal to the recorded pulse rate.

Depressing the accelerator pedal when, for example, passing, does not affect the system and when pedal is released system returns vehicle to set speed.

Control unit is grounded via the brake lights. When either brake or clutch is depressed system is disconnected. The air valves simultaneously allow air to flow into the system and throttle control quickly returns to idle position. The set speed is, however, retained in controls unit's memory and when brake (or clutch) pedal is released vehicle can be returned to set speed by moving cruise control switch to RESUME position.

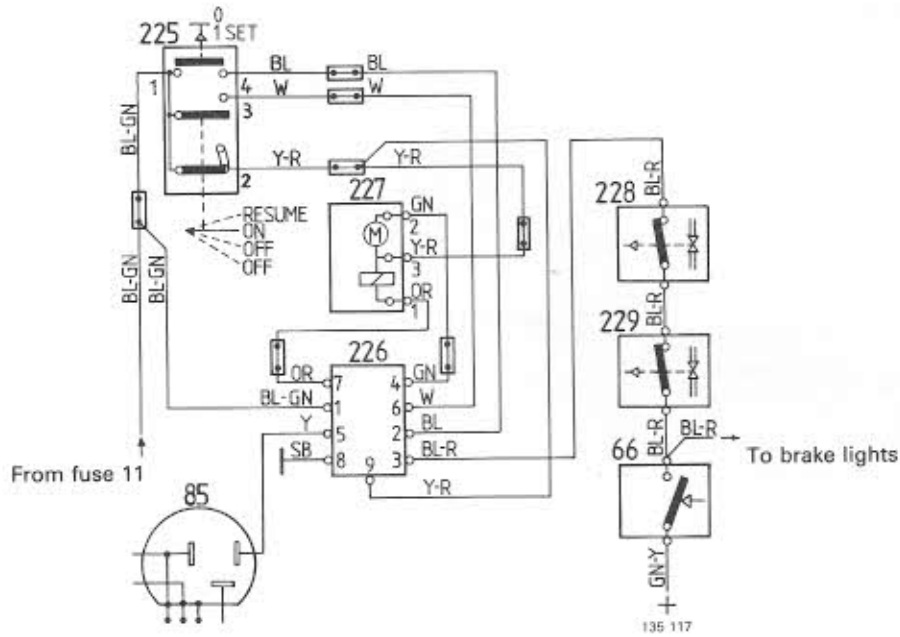
System is disconnected and recorded set speed erased when:

- vehicle speed drops below 40 km/h (24 mph) when, for example, braking
- vehicle speed differs by more than 30 km/h (18 mph) from set speed when, for example, load increases
- cruise control switch moved to OFF position. Throttle control is then slowly returned to idle position
- ignition is switched off

Warning!

- Cruise control system should not be used when driving on wet or icy roads or when in congested traffic.

- If gear selector lever is unintentionally shifted to neutral position when cruise control is ON:
 - lightly depress brake or clutch pedal or move cruise control switch to OFF. The system will then be shut off and risk for engine overspeed prevented.



Wiring diagram

Component code

- 66 = brake light switch
- 85 = speedometer
- 225 = cruise control switch
(in turn signal lever)
- 227 = vacuum pump and regulator
- 228 = clutch pedal switch (air valve)
- 229 = brake pedal switch (air valve)

Color code

- R = red
- Y = yellow
- BL = blue
- GN = green
- W = white
- OR = orange
- BN = brown
- SB = black



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