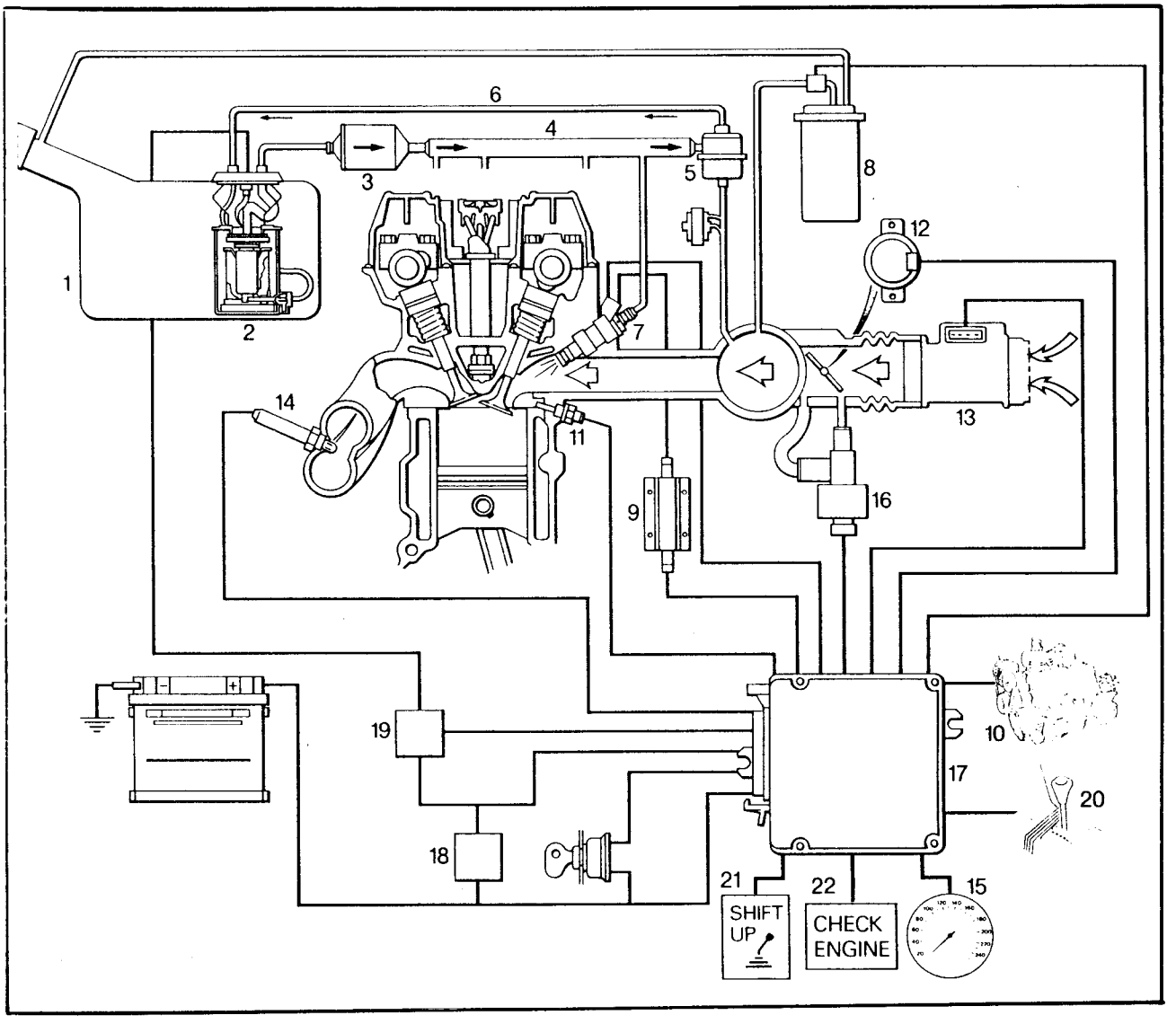
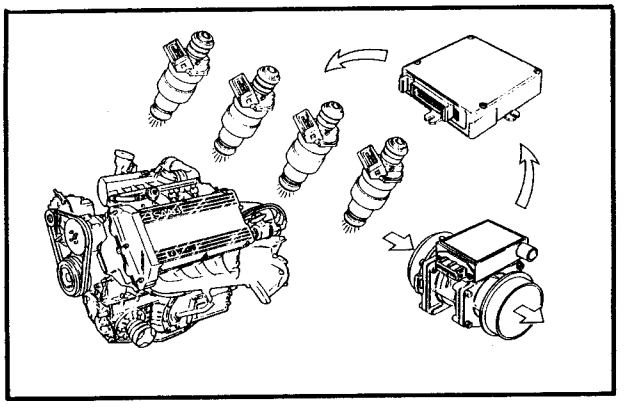
Technical description



CU14 Fuel-injection system

1 Fuel tank
2 Fuel pump
3 Fuel filter
4 Fuel-injection rail
5 Fuel-pressure regulator
6 Fuel return line
7 Injectors
8 ELCD system
9 Ballast resistor (injectors)
10 Engine rpm signal
11 Temperature sensor
12 Throttle potentiometer
13 Air mass meter
14 Lambda sensor
15 Road speed sensor
16 AIC valve
17 ECU
18 Main relay
19 Pump relay
20 Drive signal
21 Shift-up signal
22 CHECK ENGINE

Function



The quantity of fuel to be injected is determined by the ECU, which continuously regulates the length of time that the injectors are open, allowing fuel under pressure to be injected into the inlet ports.

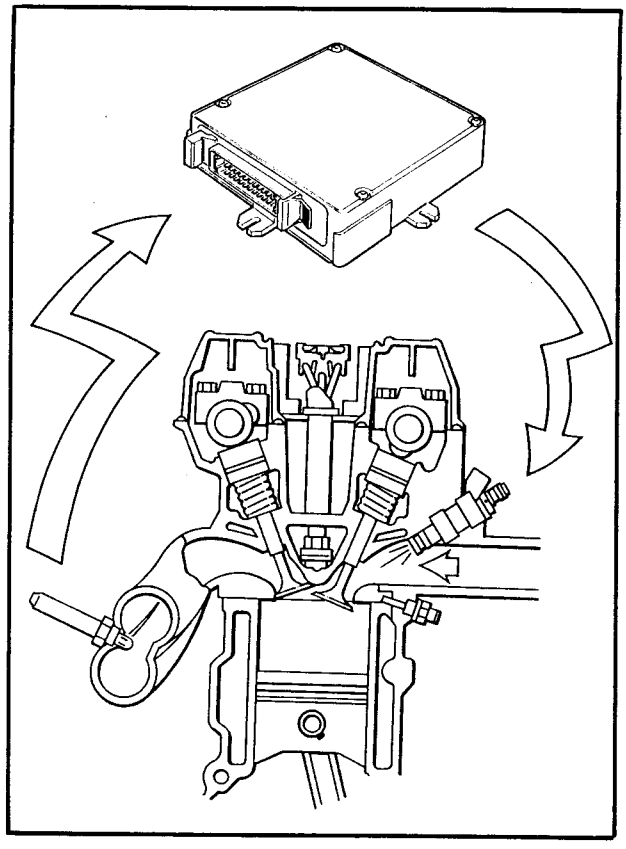
The ECU determines the length of time the injectors are open by comparing the engine speed and intake air mass with the fuel map in its memory.

The function for controlling the mixture is based on the signal from the Lambda sensor.

If the signals received by the ECU from the sensor deviate from a value in the middle of the control range, this is corrected by an adaptive factor programmed into the ECU.

Such correction only takes place when the engine is idling, although it influences the mixture in all driving conditions and right across the engine-rpm range.

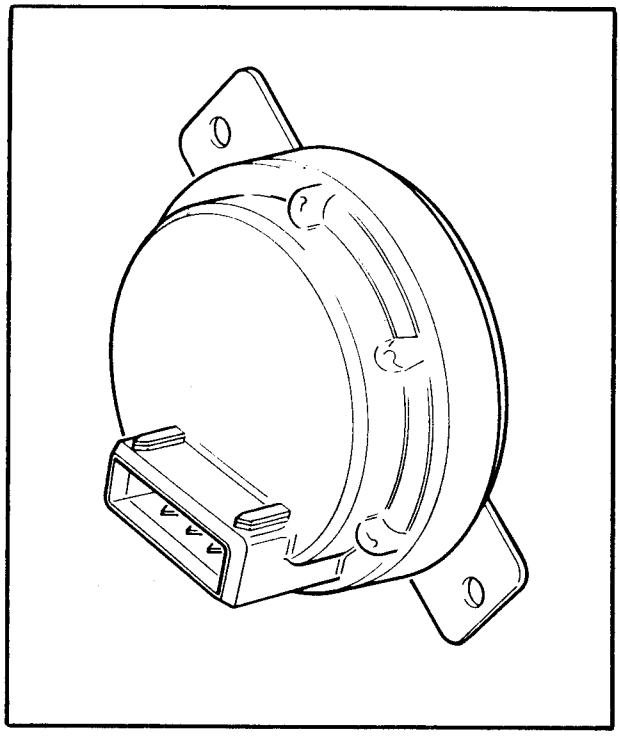
This function, together with corrections for a number of other factors, guarantees supply of the optimum amount of fuel under all driving conditions.



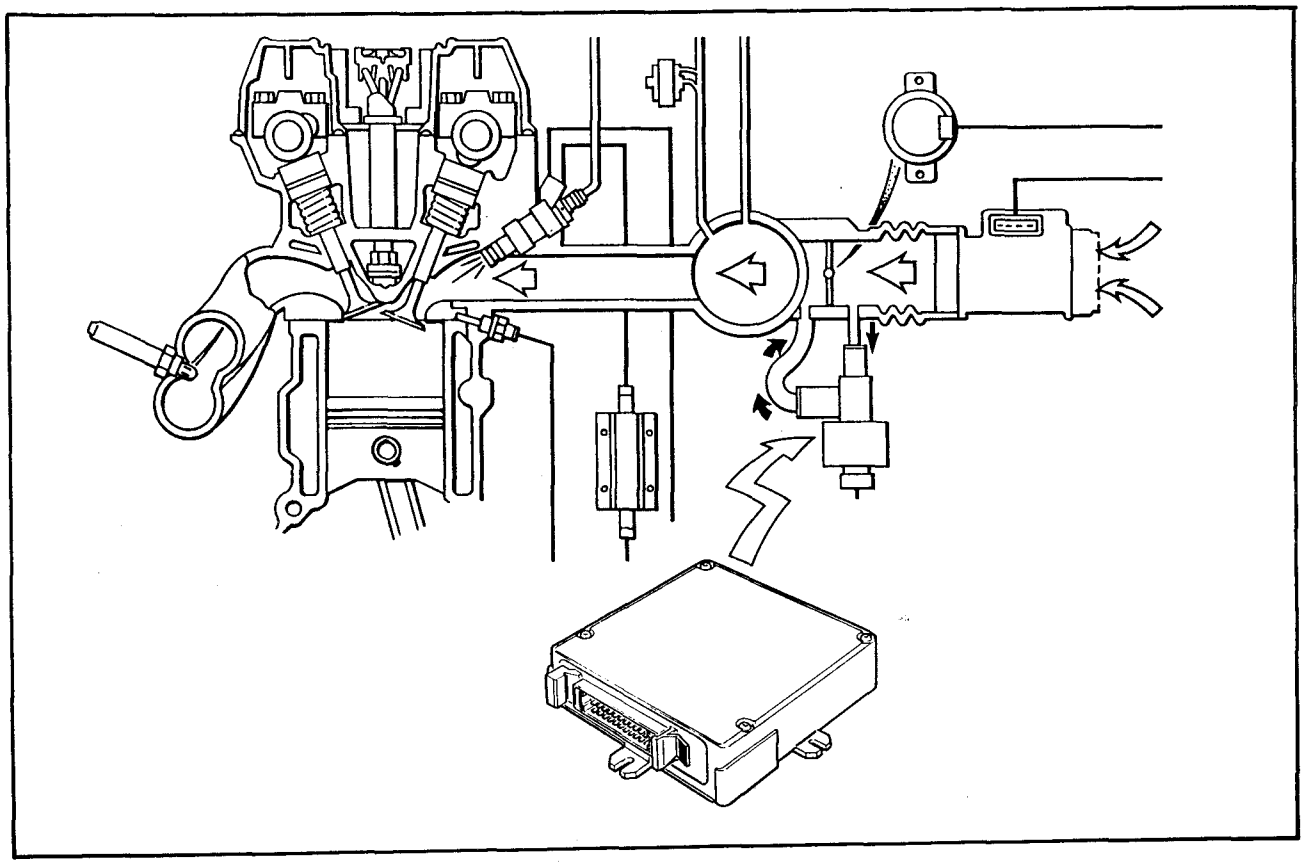
In addition to control of the air-fuel mixture, the ECU also controls the ELCD valve, for purging of the charcoal canister, and for idling.

The throttle potentiometer provided a continuous signal to the ECU with information on the position of the throttle butterfly. The lowest signal voltage is interpreted by the ECU as idling and a much higher signal voltage as full throttle, i.e. throttle butterfly open wide.

A sharp rise in the signal voltage indicates acceleration, whereupon enrichment takes place to match the prevailing driving conditions.



Enrichment when the engine is cold is governed not only by the coolant temperature but also by the engine speed and load. This function usually stops when the coolant temperature reaches 72°C (162°F).



The idling function is adaptive and controlled by the ECU. When the signal from the throttle potentiometer indicates idling, a signal from the ECU sets the AIC valve stepper motor in the position that last gave the correct idling speed. The system therefore starts with the best position from which to make any further adjustment necessary.

Idling control is thus effected by the automatic idling control (AIC) valve, fitted to the front of the cylinder head.

The AIC valve is fitted in the throttle-butterfly air bypass, and the position of the valve regulates the amount of air bypassing the butterfly. The valve itself is regulated by a stepper motor in response to control signals from the ECU.

Via the AIC valve, the ECU can compensate continuously for different conditions when the engine is idling, e.g. starter motor running, engine cold or hot, selection of the Drive position in Automatics, cut-in of the AC compressor, etc.

Idling control takes place under the following conditions:

- Road speed below 5 mph (8 km/h)
- Throttle butterfly in position for idling (closed)

As well as idling control, the signal from the road speed sensor is also taken into account by the ECU when determining when to trigger the shift-up signal (certain variants only), and for control of fuel shut-off during deceleration (engine over-run). This latter function is necessary to ensure that fuel shut-off does not take place at low speeds.

In the event of a break in the signal from the air mass meter, throttle potentiometer or temperature sensor, the ECU goes into the Limp-home mode, in which standard values are assumed for the signals.

The Limp-home mode can also be initiated by a break in the signal from the Drive function or engine-rpm sensor.

If there should be a break in the signal from the temperature sensor, the ECU simulates a signal corresponding to 10°C (50°F) on starting or 35°C (95°F) during driving.

The ECU sends a signal via pin 21 to switch on the AC compressor when the AC function is selected by means of the switch on the dash panel.

However, before the AC compressor cuts in, the ECU opens the AIC valve to compensate for the increased load applied by the AC compressor cutting in. This improves the behaviour of the engine when the AC is switched on.

On starting, cut-in of the AC system is delayed by about 10 seconds to give the engine time to settle into a steady tick-over.

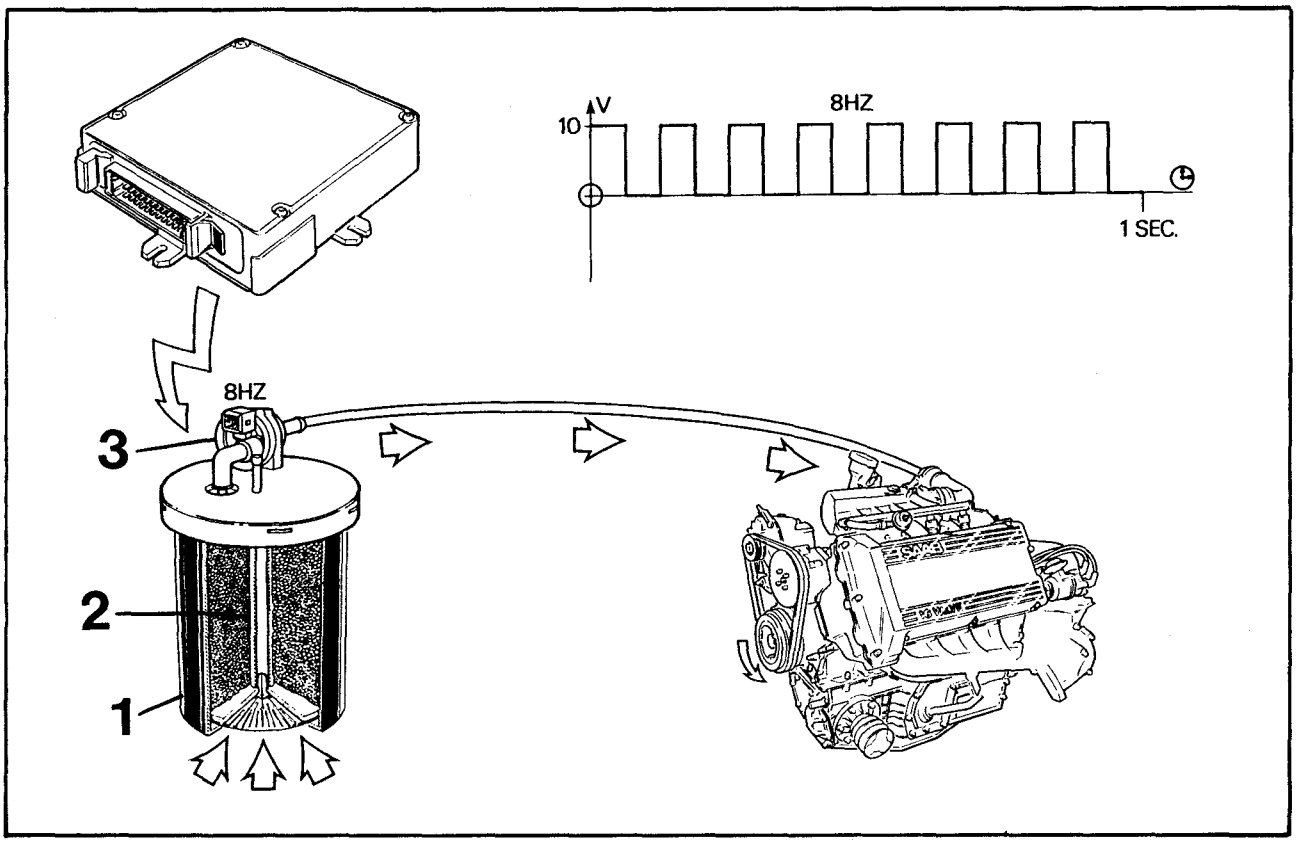
The ECU activates the AC system by earthing the circuit from the AC relay via pin 36.

Purging of fuel vapour from the charcoal canister is controlled by the ECU via the ELCD valve, located on top of the canister, in the line to the inlet manifold.

The ECU opens the valve when the coolant temperature is higher than 20°C (68°F).

When the engine is running faster than idling speed, the valve operates continuously, with the ECU controlling the pulse ratio (open/close cycle) on the basis of engine load and speed. Under some conditions, the valve will also operates when the engine is idling.

During engine overrun, no purging of the ELCD valve takes place. The valve also remains closed on starting, opening only after the Lambda sensor has become operative.



Evaporative loss control device (ELCD)

1 Charcoal canister
2 Charcoal
3 ELCD valve

The fuel pump starts running for about two seconds in conjunction with starting, to raise the fuel pressure. The pump will not start running continuously until the ECU receives engine-speed signals from the ignition coil.