



Fuel evaporative emission control system

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	Rolls-Royce		Corniche / Corniche II	Bentley	Mulsanne / Mulsanne S	Turbo R	Continental
Silver Spirit	Silver Spur	Eight					
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Issue record sheet

The dates quoted below refer to the issue date of individual pages within this chapter.

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Fuel evaporative emission control system

A fuel evaporative emission control system is fitted on all cars conforming to the following specifications.

- Australian
- Japanese
- Middle East
- North American
- Taiwan

The system eliminates direct venting of the fuel tank and therefore, prevents the release of hydrocarbons into the atmosphere.

Fuel vapours from the fuel tank are collected and stored in a charcoal filled canister situated under the

left-hand front wing. When the canister is purged, the stored fuel vapours are extracted from the charcoal and burnt in the engine.

The fuel tank is located at the forward end of the luggage compartment, behind the carpet covered panel.

An expansion tank situated within the fuel tank inhibits complete filling and provides fuel expansion volume to cope with extreme temperature conditions.

A combined pressure/vacuum relief valve is located in the fuel filler cap.

A rollover tube with a restrictor is incorporated in the vent line from the fuel tank to the control canister.

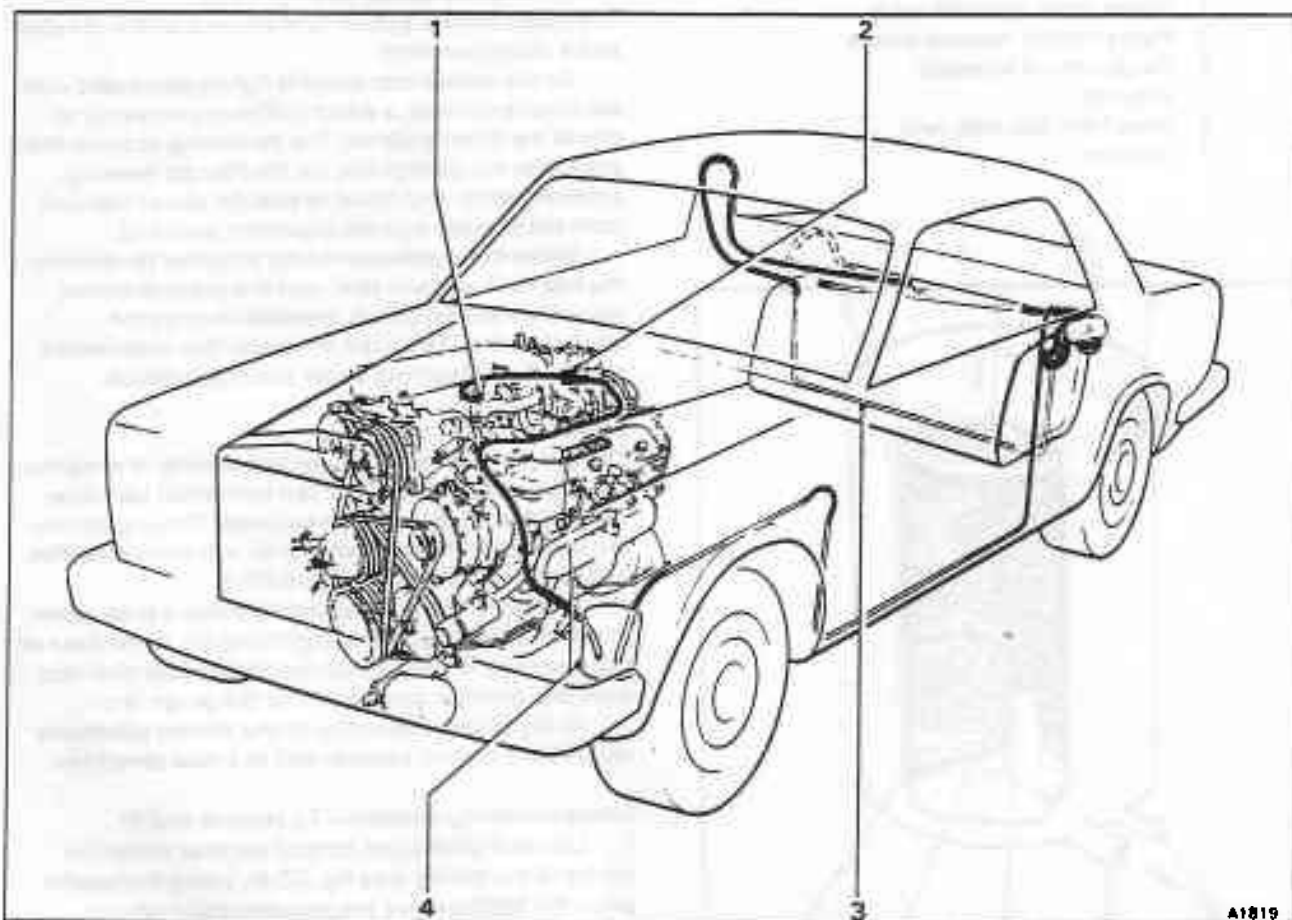


Fig. G2-1 Fuel evaporative emission control system

- 1 Purge connection
- 2 Control solenoid
- 3 Rollover tube

- 4 Canister
- 4 door cars
- - - 2 door cars

Note The purge connection to the engine varies slightly depending upon the specification of the vehicle.

On cars conforming to either the North American or Japanese specifications the purge

connection is to the the air guide housing (as illustrated above).

On cars conforming to the Australian, Middle East, or Taiwan specifications the purge connection is to the throttle housing.

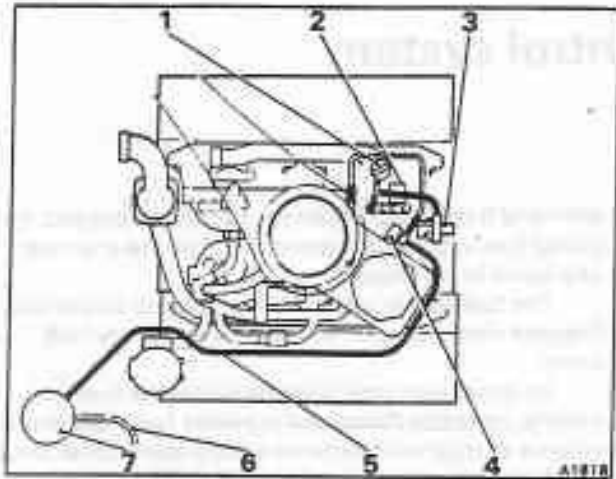


Fig. G2-2 Purge control system (Turbocharged engines)

- 1 Dump valve vacuum switch
- 2 Dump valve solenoid valve
- 3 Purge control vacuum switch
- 4 Purge control solenoid
- 5 Adapter
- 6 Hose from fuel tank vent
- 7 Canister

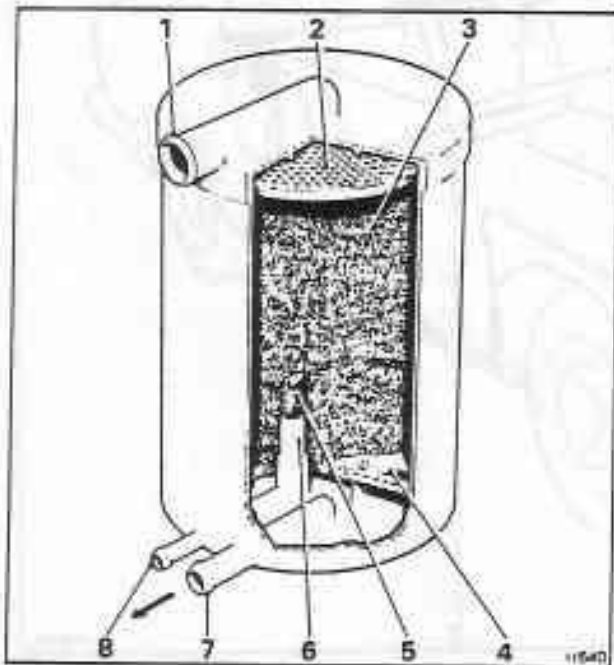


Fig. G2-3 Emission control canister

- 1 Air intake
- 2 Baffle
- 3 Carbon granules
- 4 Baffle mat
- 5 Screen
- 6 Stand tube
- 7 Purge line connection
- 8 Fuel tank vent connection

This prevents fuel from reaching the canister during harsh manoeuvres or in the event of vehicle inversion.

For details of the servicing and maintenance requirements of the system, refer to the Service Schedules Manual TSD 4702.

Naturally aspirated engines (see fig. G2-1)

Operation of the purge system is controlled by a solenoid mounted in front of the ignition distributor. This solenoid is controlled by the throttle position switch and also on cars conforming to an Australian, Japanese, or North American specification, by a switch mounted in the thermostat housing.

The canister is purged whenever the engine is running except at the idle speed setting, or on cars fitted with the thermostat housing switch, if the coolant temperature is low.

Turbocharged engines (see fig. G2-2)

The purge control system comprises a solenoid valve and a vacuum switch.

As the accelerator pedal is lightly depressed with the engine running, a gated orifice is uncovered by one of the throttle plates. The increasing vacuum then applied to the control line via the throttle housing, solenoid valve, and hoses draws the stored vapours from the canister into the induction manifold.

When the accelerator pedal is further depressed, the manifold vacuum falls, and at a predetermined value the vacuum switch operates to close the solenoid valve. This seals the purge line to prevent a reverse flow occurring under boost conditions.

Emission control canister

The evaporative emission control canister is mounted under the left-hand wing. It is a cylindrical container filled with activated carbon granules. These granules are retained within the canister by a system of baffles and screens as shown in figure G2-3.

The top of the canister incorporates a tube, open to atmosphere to admit purge intake air. In the base of the assembly is one connection for the fuel tank vent hose and another connection for the purge line.

At the mileage specified in the service schedules remove the control canister and fit a new assembly.

Emission control canister – To remove and fit

1. Locate the emission control canister under the left-hand front wing (see fig. G2-4). Using the special pliers RH 8090 remove the securing clip from the canister end of the purge hose.
2. Withdraw both hoses fitted to the canister. Label each one to facilitate assembly.
3. Unscrew the four setscrews retaining the control canister in position.
4. Withdraw the canister from under the wing.
5. Note the position of the canister in relation to the mounting bracket and unscrew the retaining worm drive clip.
6. Fit the new canister to the mounting bracket and tighten the retaining worm drive clip.

7. Ensure that the canister is in the correct position relative to the mounting bracket.
8. Fit the assembly to the vehicle by reversing the procedure given for removal, noting that a new hose securing clip should be used.

Fuel tank vent

The fuel tank is vented to the filler neck via two connections. This allows adequate venting of the tank during filling.

A separate vapour line from the centre of the tank (the rollover tube) almost encircles the tank before passing to the evaporative loss canister. The vent line is situated under the floor of the car on the left-hand side as shown in figure G2-1. It includes a restrictor at its highest point and passes around the tank to prevent liquid fuel from entering the canister during harsh manoeuvres or in the event of vehicle inversion.

In the event of a blockage in the vapour line to the control canister, a combined pressure and vacuum relief valve is incorporated into the fuel filler cap. The valve prevents an excessive pressure build-up in the fuel tank caused by fuel vaporization or vacuum as the fuel is consumed.

For all other details of the fuel tank refer to Chapter C, Fuel system.

Fuel evaporative emission control system – To leak check

Whenever the various pipes, hoses, and components of the fuel evaporative emission control system are disturbed, the system should be checked for air leaks upon assembly.

To test the system proceed as follows.

1. Withdraw the fuel tank hose from the canister and connect it to the test equipment shown in figure G2-5.
2. Apply air pressure to the fuel tank hose via the test equipment. Apply pressure until a reading of 380 mm (15 in) H₂O is attained and then close the pressure supply.
3. After five minutes again check the pressure reading. The reading should not have fallen by more than 12,7 mm (0.50 in).
4. If the pressure drop is more than 12,7 mm (0.50 in) progressively treat all joints in the system with a soap solution to detect air leaks.
5. Rectify any air leaks and again 'leak check' the system.
6. During the five minutes leak down, visually inspect the hoses, pipes, and connections that are routed under the car. Commence where the hose exits from the body at the rear and follow the system to the loss control canister.

Ensure that the hoses are secure in the mounting clips.

7. When the system is satisfactory, detach the test equipment and connect the hose to the control canister.

Purge line

The purge line connects the control canister to the engine induction system.



Fig. G2-4 Fuel evaporative control canister and mounting bracket setscrews.

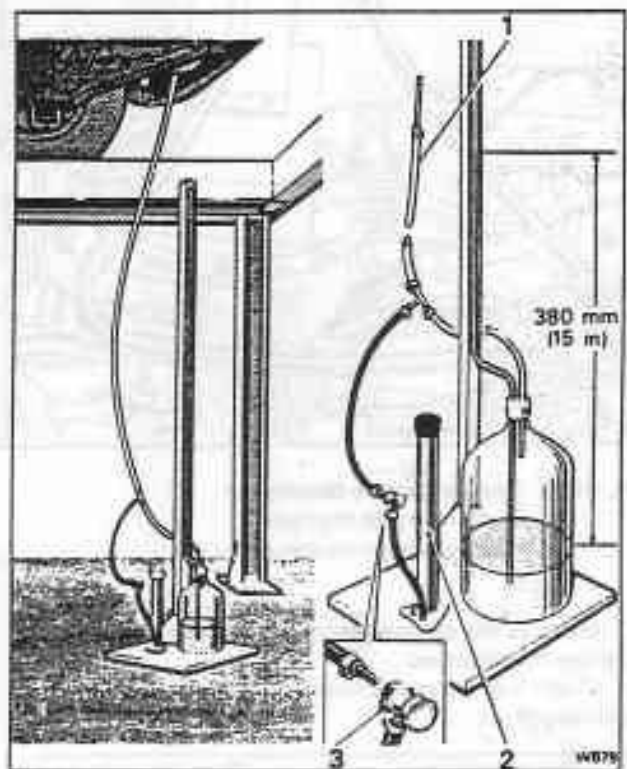


Fig. G2-5 Leak check test equipment

- 1 Connection to fuel tank/canister hose
- 2 Pump
- 3 One-way pressure valve

Air from the atmosphere is drawn downwards through the carbon granules in the canister and collects the stored fuel vapours. This mixture then passes from the base of the canister to the throttle body or the air guide housing, where it is drawn into the engine induction system.

Purge flow rate – To check

Naturally aspirated engines

1. Fit a flowmeter RH 8725 between the pipe from the canister and the hose to the control solenoid (see fig. G2-6).
2. Start the engine.
3. On cars conforming to an Australian, Japanese, or North American specification, ensure that the coolant temperature is above 33°C (91°F).

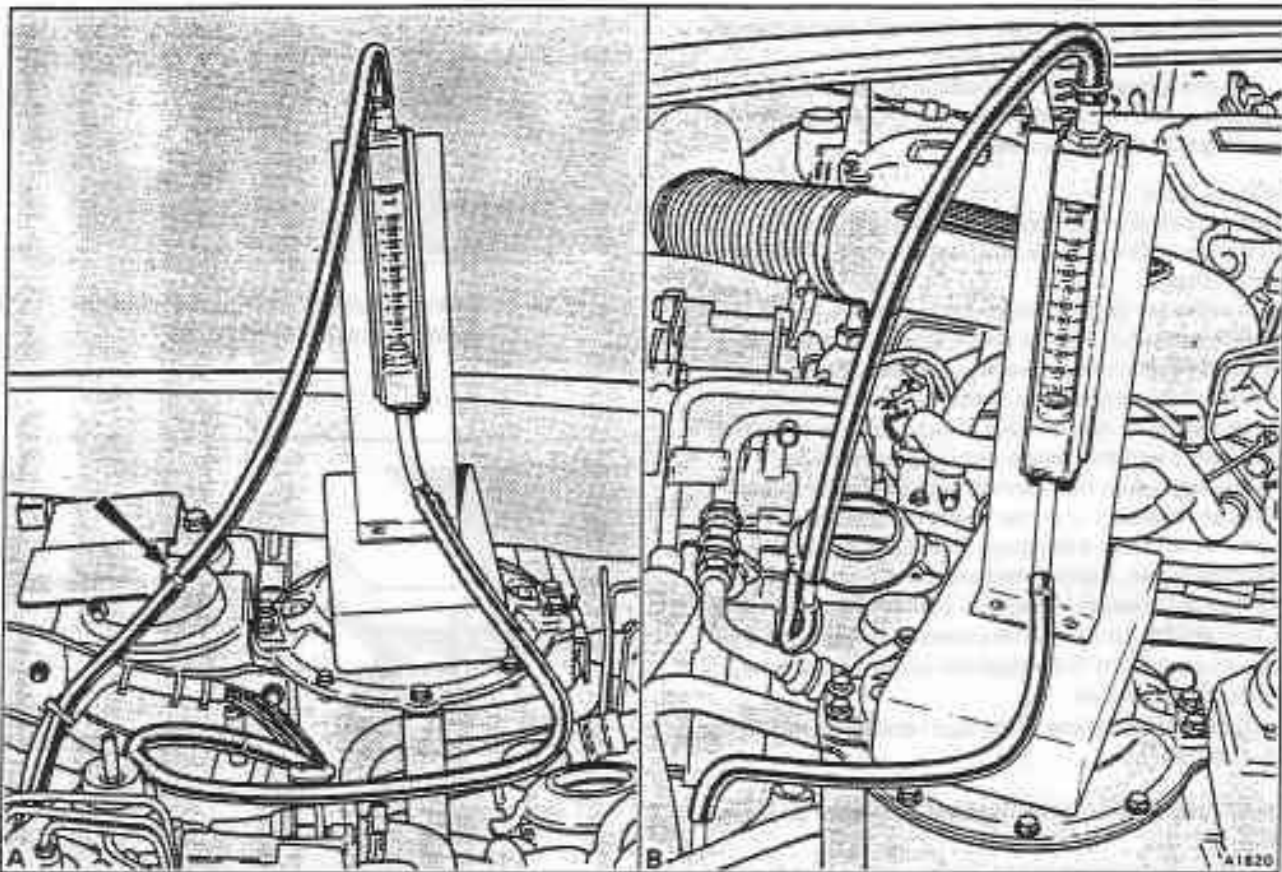


Fig. G2-6 Connecting the flowmeter
 A Turbocharged engines
 B Naturally aspirated engines

4. Increase the engine speed to 2500 rev/min by opening the throttles.
5. Check that the purge flow rate complies with the following chart.

Specification	Flow rate	
	ft ³ /h	litres/min
Japanese	15-30	7,1-14,1
North American		
Australian	20-40	9,4-18,8
Middle East		
Taiwan		

Turbocharged engines

1. Fit a flowmeter RH 8725 between the hose from the canister and the adapter (see fig. G2-6).
2. Disconnect the hose from the purge control vacuum switch.
3. Connect the Mityvac pump RH 12495 to the vacuum switch.
4. Start the engine and apply a vacuum of 381 mm Hg (15 in Hg) to the vacuum switch.
 The control solenoid should now open and the flow through the system register on the flowmeter.
5. Increase the engine speed to 2500 rev/min.

6. Check that the purge flow rate is between 20 ft³/h and 40 ft³/h (9,4 litres/min and 18,8 litres/min).

All cars

If the flow is less than the minimum, check for the following.

1. Air leak in hoses/pipes.
2. Blockage in hoses/pipes.
3. Control system malfunction.
4. Incorrect ignition timing.

If the flow is in excess of the maximum, check for the following.

1. Excessive lean mixture strength.
2. Incorrect ignition timing.
3. Air leak between the throttle body and the induction manifold.



Figure G2-7

Purge control system – fault diagnosis chart

(Naturally aspirated engines)

Check the purge flow rate

Detach the hose from the wing valve pipe (see item A)
Fit an additional hose to the valve pipe
Can you blow down the hose and through the canister?

NO
Investigate and rectify a blocked pipe and/or canister

Ignition off
Can you blow down the hose and through the solenoid?

NO
Investigate and rectify blocked hoses to the throttle body or renew the control solenoid (see item 7)

Ignition on
Can you blow down the hose and through the solenoid?

NO
Measure the voltage on the white/purple cable at the solenoid plug and socket (see item B and 6)
Is it 12 volts?

NO
Check a. Throttle position switch circuit
b. Temperature switch and circuit

YES
Disconnect the solenoid plug and socket
Check the black cable to earth for continuity
Is it continuous?

Disconnect the throttle position switch at the plug and socket (see item C and 9)
Ignition on
Can you blow down the hose and through the solenoid?

YES
Check the temperature switch circuit
Leave the throttle position switch disconnected.
Disconnect the temperature switch plug (see item D and 3).
Bridge the cables in the plug.
Ignition on
Can you blow down the hose and through the solenoid?

YES
Unbridge the temperature switch plug
Measure the voltage on the white cable at the temperature switch plug.
Is it 12 volts?

Detach the temperature switch plug (see item D and 3)
Ignition on
Can you blow down the hose and through the solenoid?

NO
Replace the temperature switch

NO
Refer to TSD 4701
Check the ignition feed white cable at the temperature switch plug
Is it 12 volts?

Detach the temperature switch plug (see item D and 3)
Ignition on
Partially open the throttles
Can you blow down the hose and through the solenoid?

YES
Check the throttle switch circuit
leave the temperature switch plug disconnected.
Measure the voltage on the white cable at the throttle position switch plug and socket (see item C and 9).
Is it 12 volts?

NO
Ensure that the throttles are closed
Measure the voltage on the blue cable at the throttle position switch plug
Is it 12 volts?

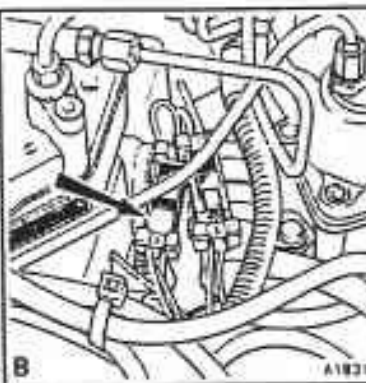
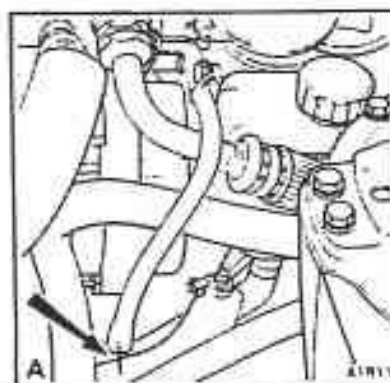
YES
Replace the throttle position switch

Control systems function satisfactorily

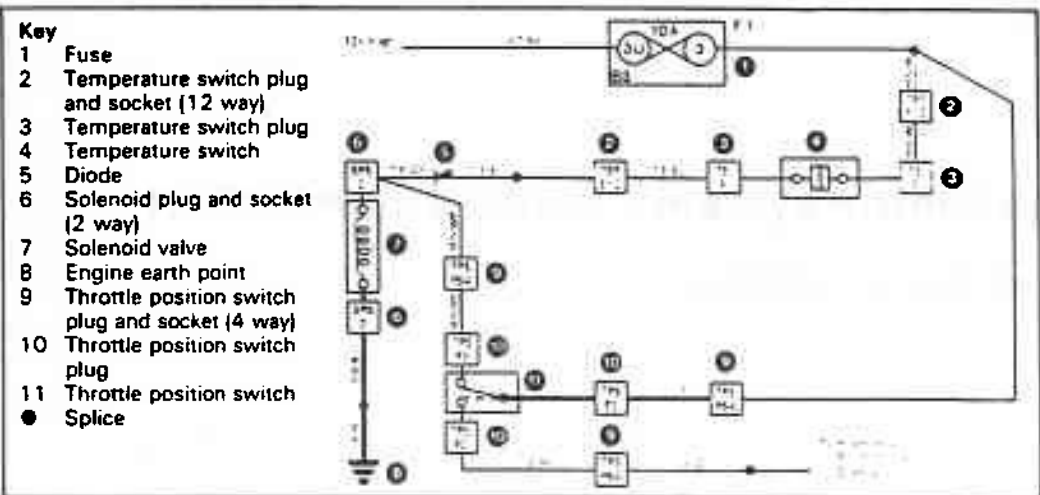
Cars produced to a Middle East and Taiwan specification do not have a temperature switch

Important
Before carrying out a test ensure the following conditions apply.

1. The battery is fully charged
2. The engine is cold
3. Use a multimeter to carry out tests
4. The ignition is switched off when disconnecting or connecting electrical connections
5. Always remake any connection immediately a test is complete
6. Ensure that fuse B3 on fuseboard is intact
7. Visually inspect the hoses for leaks



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socket continuity

YES → Replace the solenoid

NO → Rectify the fault on the black earth cable

plug cable in the

YES → Measure the voltage on the slate/blue cable as it enters the diode (see item F and 5) Is it 12 volts?

NO → Check for continuity of the slate/blue cable from the diode to the temperature switch plug (see item D and 5). This will include the 12 way connector (see item E and 2)

YES → Measure the voltage on the white/purple cable as it exits from the diode Is it 12 volts?

NO → Replace the diode

to fuse B3

YES → Measure the voltage on the white/purple cable at the solenoid plug and socket (see item B and 6) Is it 12 volts?

NO → Check for continuity of the white purple cable from the control solenoid plug and socket (see item B and 6) to either
Temperature switch circuit - The diode (see item F and 5)
The throttle switch circuit - The switch plug and socket (see item C and 9)

purple cable and socket

Disconnect the solenoid plug and socket. Check for continuity on the black cable from this plug to the engine earth point (see item G and 8) Is it continuous?

NO → Rectify the fault on the black earth cable

YES → Replace the solenoid

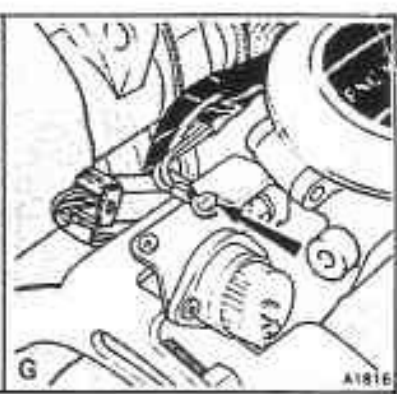
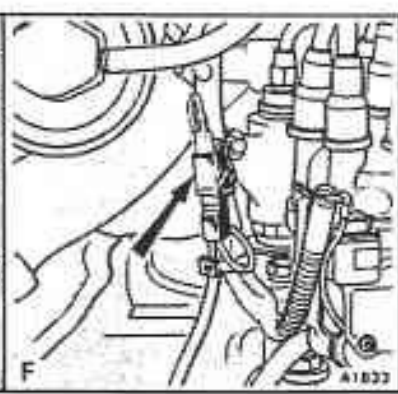
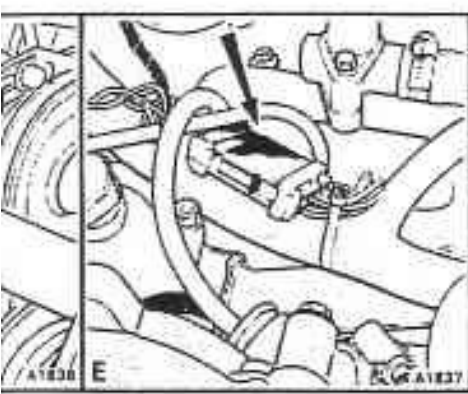




Figure G2-8

Purge control system – fault diagnosis chart

(Turbocharged engines)

Check the purge flow rate

Detach the hose from the adapter (see item A)
Can you blow down the hose and through the canister?

NO

Investigate and rectify a blocked pipe and/or canister

YES

Ignition off
Can you blow down the hose and through the solenoid?

YES

Replace the solenoid

NO

Ignition on
Connect the Mityvac pump RH 12495 to the purge control system vacuum switch (see item B and 5). Apply 381 mm Hg (15 in Hg) to the switch
Can you blow down the hose and through the solenoid?

NO

Maintain the 381 mm Hg (15 in Hg) vacuum to the switch throughout these tests.
Measure the voltage on the white/blue cable at the vacuum switch 4 way plug and socket (see item C and 4)
Is it 12 volts?

YES

Measure the voltage of the white/blue purge control solenoid 2 way socket (see item F and 6)
Is it 12 volts?

NO

Measure the voltage on the white/blue vacuum switch 4 way plug and socket (see item C and 4)
Is it 12 volts?

YES

Ignition on
Release the vacuum
Can you blow down the hose and through the solenoid?

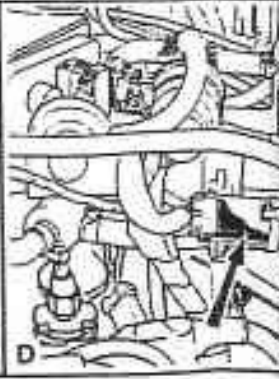
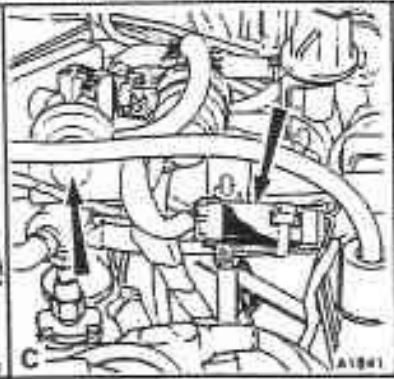
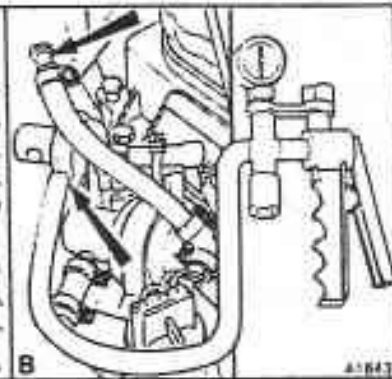
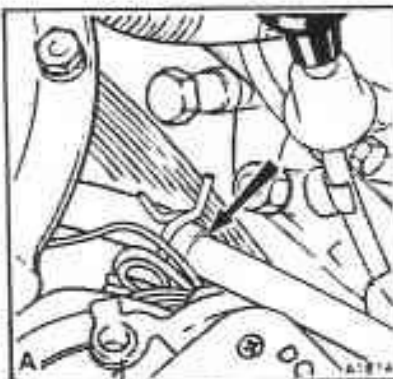
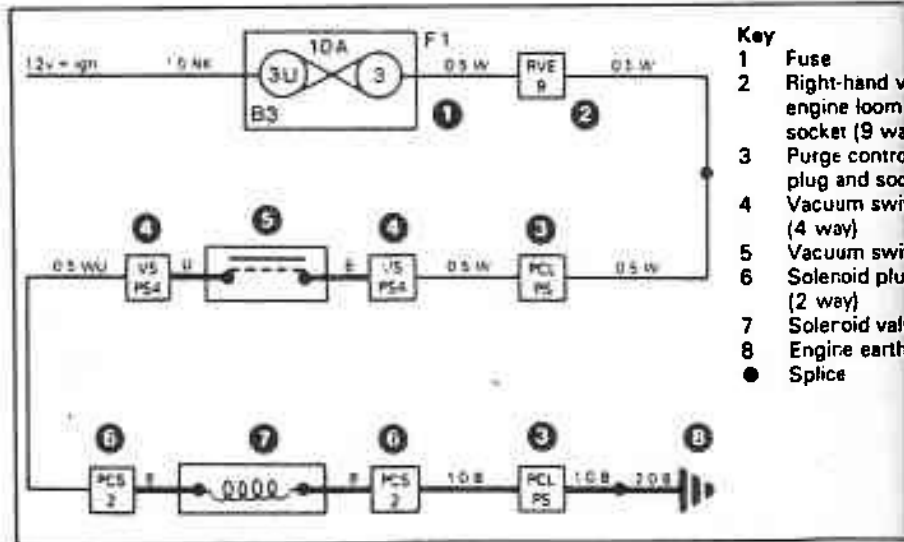
YES

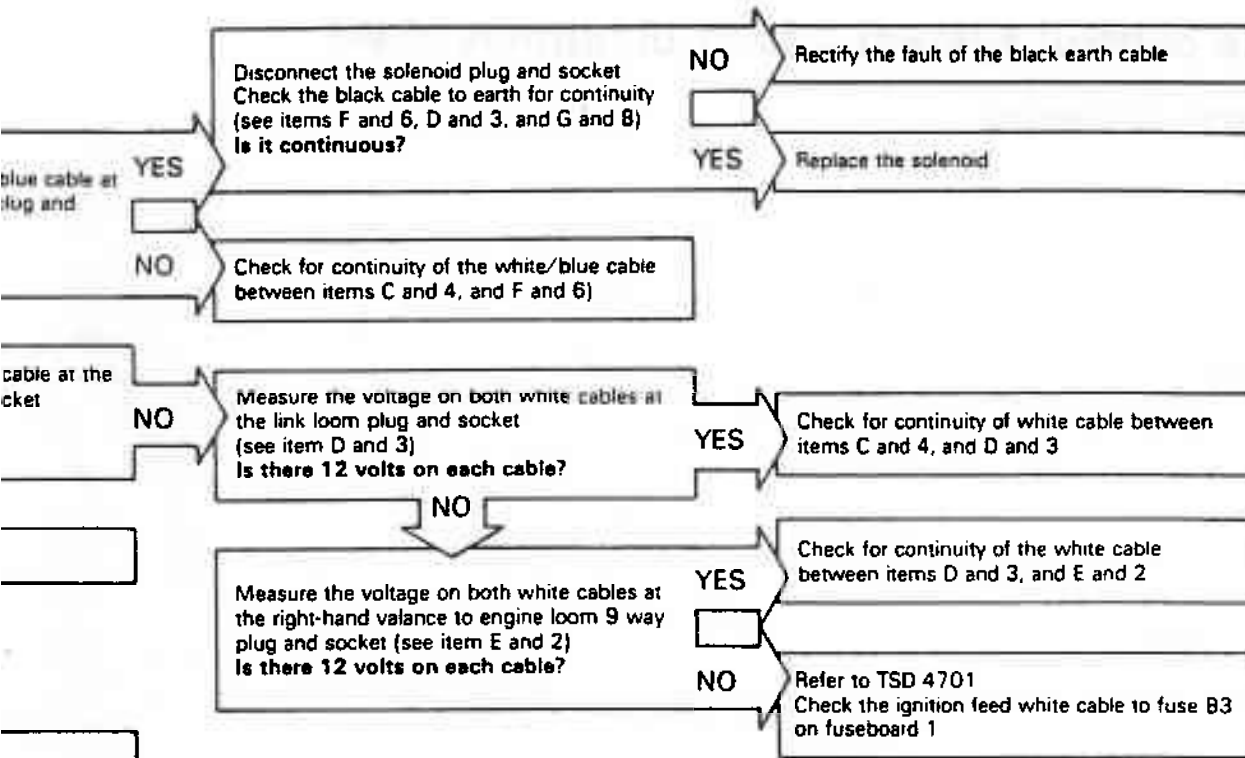
Replace the solenoid

NO

Control system functions satisfactorily

Replace the vacuum switch

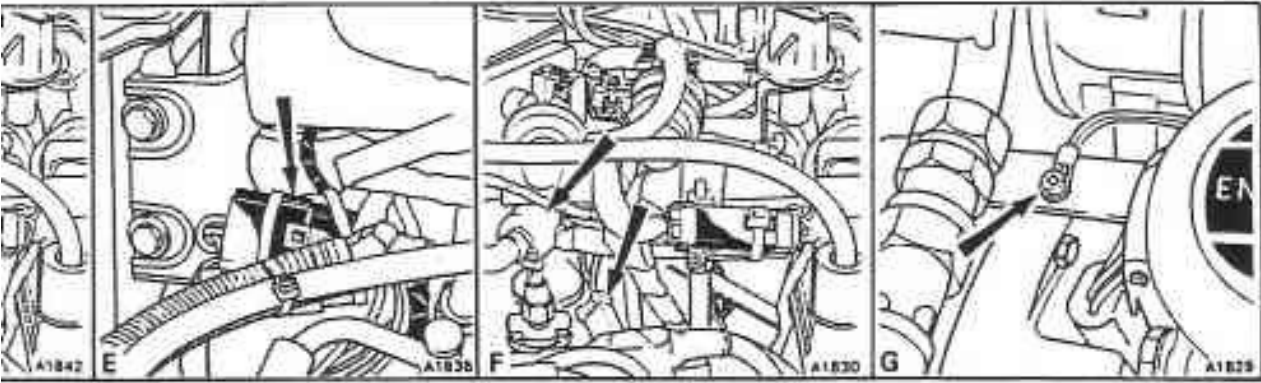




Important

Before carrying out a test ensure that the following conditions apply.

1. The battery is fully charged
2. The engine is cold
3. Use a multimeter to carry out the tests
4. The ignition is switched off when either disconnecting or connecting electrical connections
5. Always remake any connections immediately a test is completed
6. Visually inspect the system hoses for deterioration
7. Ensure fuse B3 on fuseboard 1 is intact





Fuel evaporative emission control system

The fuel evaporative emission control system differs between turbocharged and naturally aspirated cars and also, between naturally aspirated 4 door saloons and 2 door convertibles (see figs. G3-1 and G3-2).

With all systems however, the principle of operation is to eliminate direct venting of the fuel tank and therefore, to prevent the release of hydrocarbons to the atmosphere.

Fuel vapours from the fuel tank are collected and stored in a charcoal filled adsorption canister situated under the front left-hand wing of the vehicle. When the canister is purged, the stored fuel vapours are extracted from the charcoal and burnt in the engine.

The fuel tank is located at the forward end of the luggage compartment, behind a carpet covered panel.

An expansion tank situated within the main fuel tank inhibits complete filling and provides fuel expansion volume to cope with extreme ambient temperature conditions.

A combined pressure/vacuum relief valve is located in the fuel filler cap.

A rollover tube with a restrictor is incorporated in the vent line from the fuel tank to the control canister. This prevents fuel from reaching the canister during harsh manoeuvres or in the event of vehicle inversion.

For details of the servicing and maintenance requirements of the system, refer to the Service Schedules Manual TSD 4702.

Naturally aspirated cars

The principle of operation for both 2 door and 4 door cars is identical, however, the emission control canister fitted under the front left-hand wing, is installed forward of the wheel arch on 2 door cars and behind the wheel arch on 4 door cars.

Fuel vapour that accumulates in the top of the fuel tank is routed from the centre vent, around the tank and to the inlet connection on the control

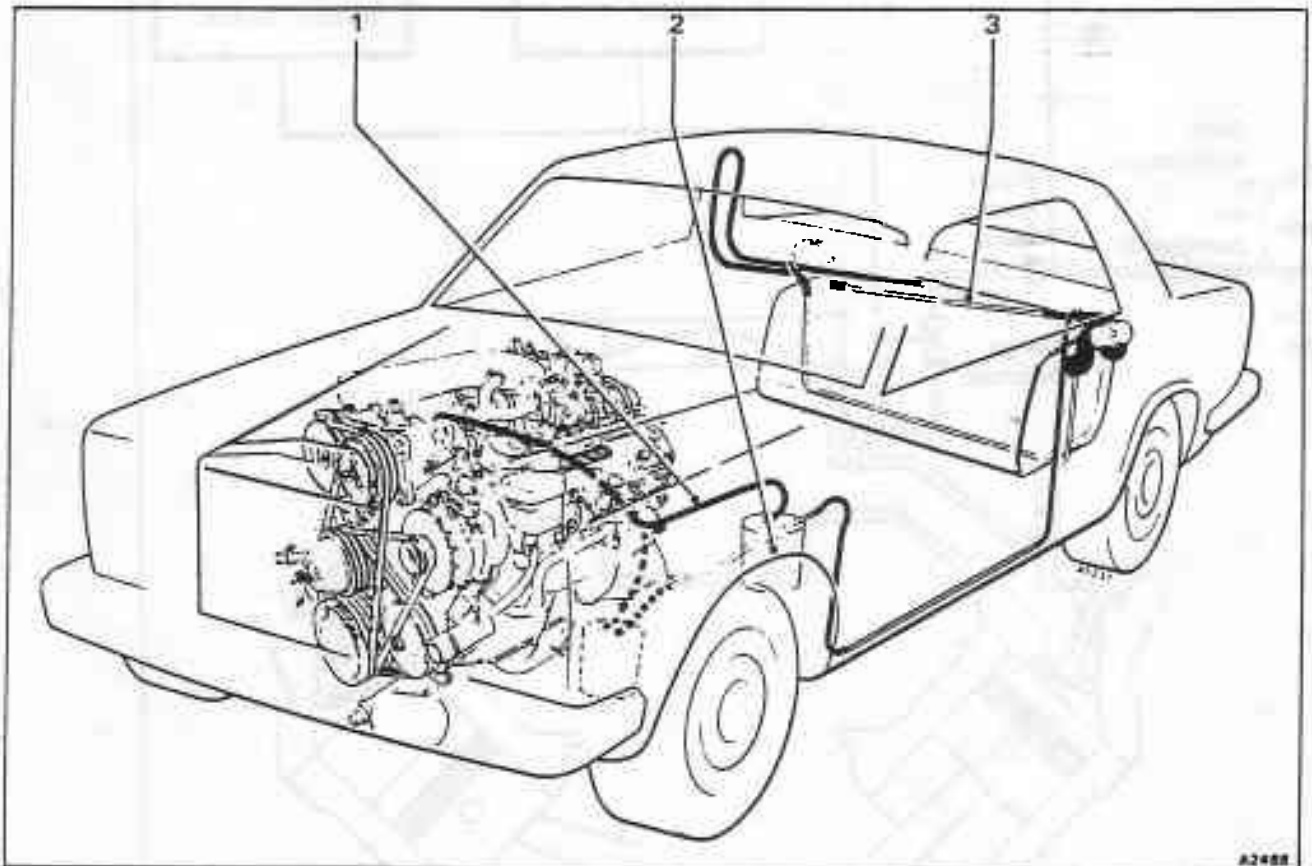


Fig. G3-1 Fuel evaporative emission control system – General view

- | | |
|-----------------|---------------|
| 1 Purge line | ■ Saloon |
| 2 Canister | □ Convertible |
| 3 Rollover tube | |



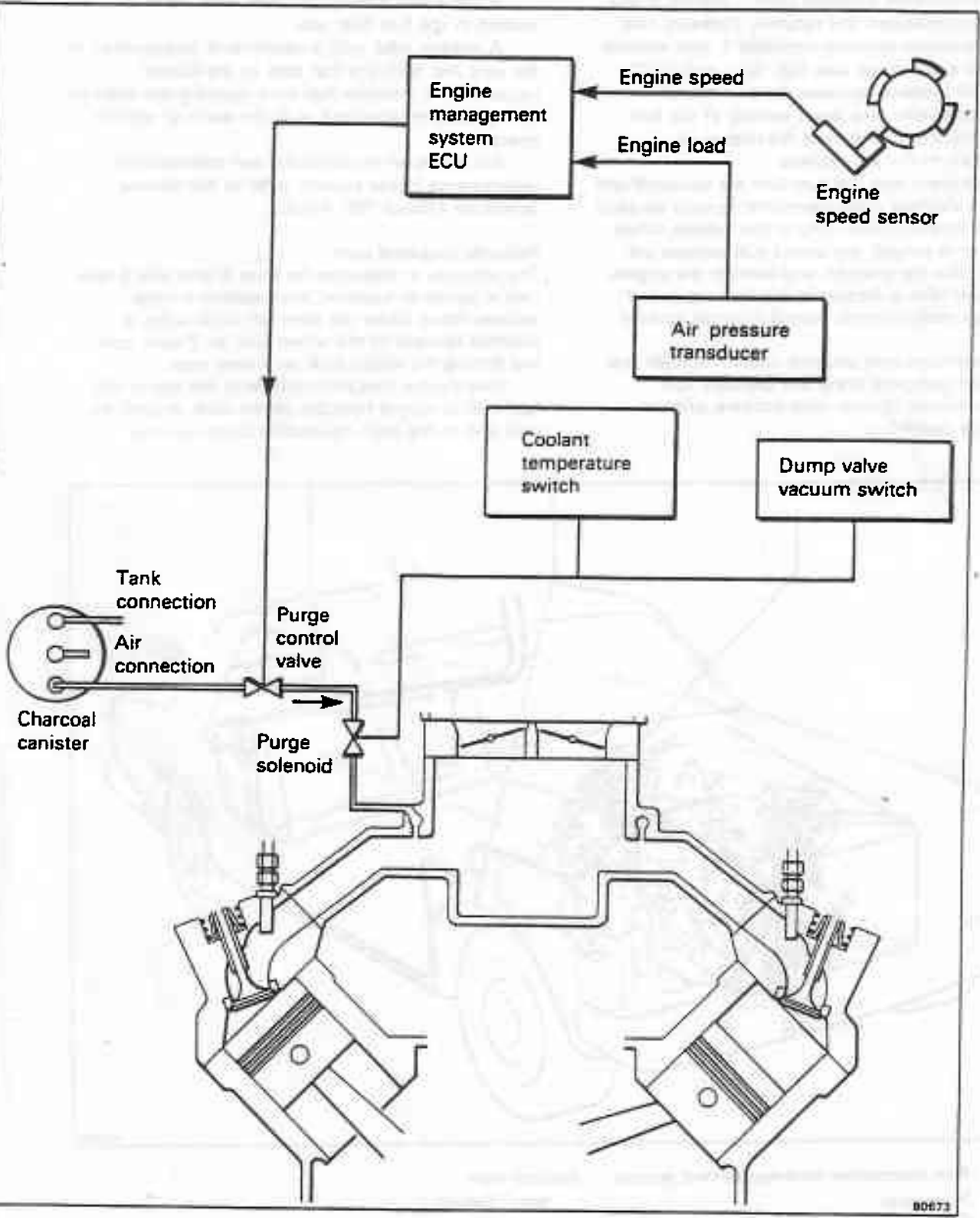
Vacuum test

3. Pressure in the tank tube to be less than 1,5 kPa (2,17 mbar) with 4,2 kPa (6,1 mbar) applied to the vacuum tube and with 1600 cm³/min flow through the valve.

Purge line

The purge line connects the control canister to the engine induction system.

Air from the atmosphere is drawn downwards through the carbon granules in the canister and



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G3-4 K-Motronic ECU - Canister purge control