EMISSION CONTROLS

Description.

The Discovery is fitted with various items of emission and evaporative control components to comply with emission regulation requirements of the territory in which it will operate.
Three control systems are used to reduce harmful emissions to the atmosphere from the vehicle at all times, and under all conditions.

1. Crankcase emission control.

2. Exhaust emission control.

3. Fuel vapour emission control.

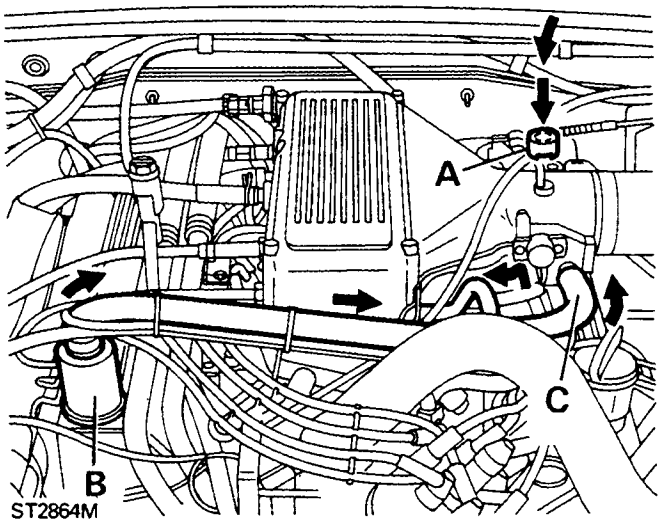
In many areas it is against the law for a vehicle owner or an unauthorised repair shop to modify or tamper with emission control equipment. In this event the vehicle owner and or the repairer may be liable for legal penalties.

The emission control system fitted to the Discovery is designed to keep the emissions within the legal limits provided that the engine is correctly maintained and is in good mechanical condition.

Crankcase emission control system.

Gases from the crankcase are vented into the Plenum chamber to be burnt in the combustion chambers with the air fuel mixture. The system provides effective emission control while the engine is running under all conditions.

Clean air is drawn into the crankcase through an intake filter located at the rear of the left hand rocker cover. Crankcase gases and clean air are drawn through a breather filter situated at the front of the right hand rocker cover into the plenum chamber and consumed in the combustion chambers. The cycle of operation is initiated by vacuum taken from the nose of the plenum chamber.



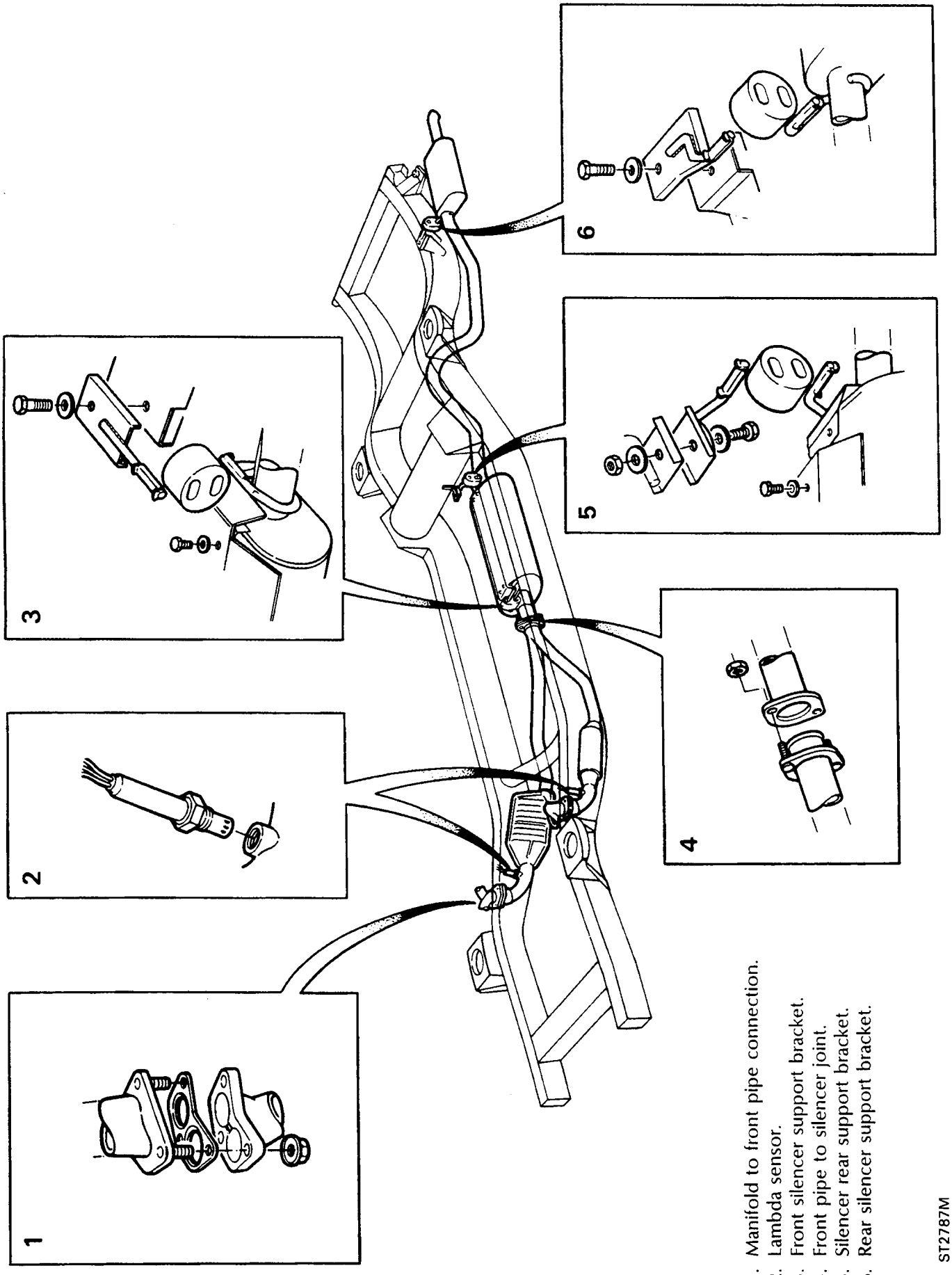
A. Air intake filter.
B. Breather filter.
C. Vacuum source.

Exhaust emission control.

The electronic fuel injection system provides accurately metered quantities of fuel to the combustion chambers to ensure the most efficient air to fuel ratio under all conditions of operation. A further improvement to combustion is made by measuring the oxygen content of the exhaust gases to enable the quantity of fuel injected to be varied, according to conditions, to correct any unsatisfactory composition of the exhaust.

The main components of the exhaust emission system are two Catalytic converters which are an integral part of the front exhaust pipe assembly. The Catalytic converters are included in the system to reduce the emission, to atmosphere, of carbon monoxide, oxides of nitrogen, and hydrocarbons. The active constituents of the converters are platinum and rhodium. The correct functioning of the converters is dependent upon close control of the oxygen concentration in the exhaust gas entering the catalyst. The oxygen content of the exhaust gas is signalled to the Electronic Control Unit (ECU) by oxygen sensors (Lambda sensors) located in the exhaust front pipes between the manifold and converter. The ECU can then make an appropriate adjustment to the fuel supply to correct the composition of the exhaust.

EXHAUST SYSTEM



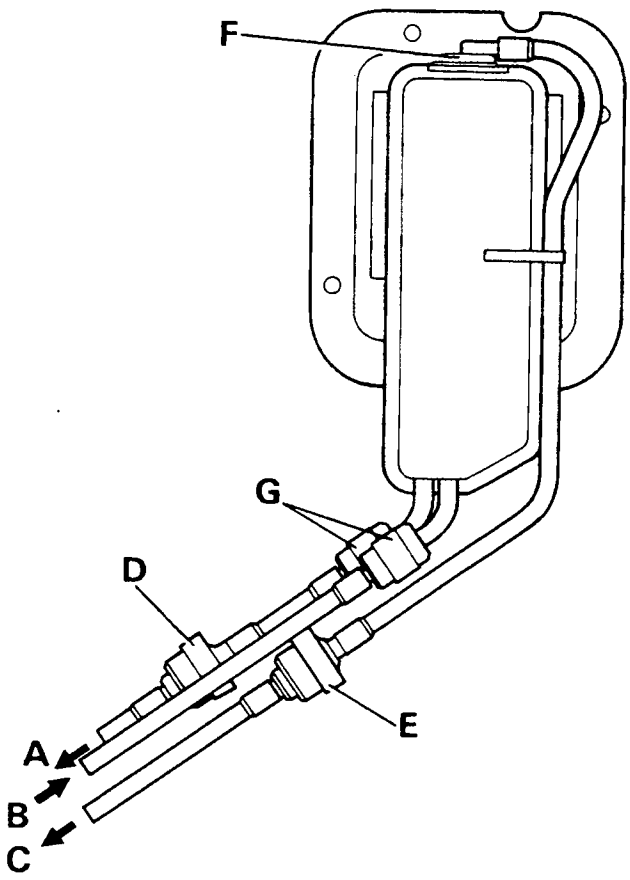
1. Manifold to front pipe connection.
2. Lambda sensor.
3. Front silencer support bracket.
4. Front pipe to silencer joint.
5. Silencer rear support bracket.
6. Rear silencer support bracket.

ST2787M

CAUTION: Unleaded fuel only must be used on vehicles fitted with catalytic converters. As a reminder,a label to indicate this is adhered to the inside of the fuel filler flap. Furthermore the filler neck is designed to accommodate only unleaded fuel pump nozzles.

Evaporative emission control system.

The system is designed to prevent harmful fuel vapour from escaping to the atmosphere. The system consists of a vapour separator tank, connected to the fuel tank and located between the body inner and outer panels on the right hand side of the vehicle near the rear wheel arch. An adsorption canister, containing activated charcoal, is positioned in the engine compartment attached to the front right hand wing valance. The two components are connected by a pipe running the length of the chassis.



ST2865M

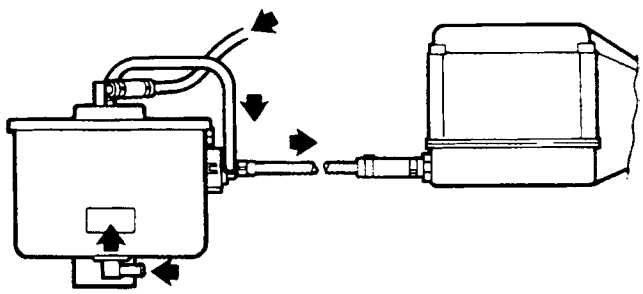
A Pressure relief to atmosphere.
B From fuel tank to separator.
C To adsorption canister.
D Pressure relief valve.
E Pressure relief valve.
F Shut-off valve.
G "Speed Fit" connectors.

A pressure relief valve is fitted in the hose open to atmosphere, which would act as a safety valve should a build-up of pressure occur in the system, for example if a hose became blocked or kinked. The volume of vapour emitted, in such an instance, would be acceptable.

A pressure relief valve is also fitted in the hose to the adsorption canister and releases vapour to the canister when the pressure in the separator reaches between 5 and 7 Kpa.

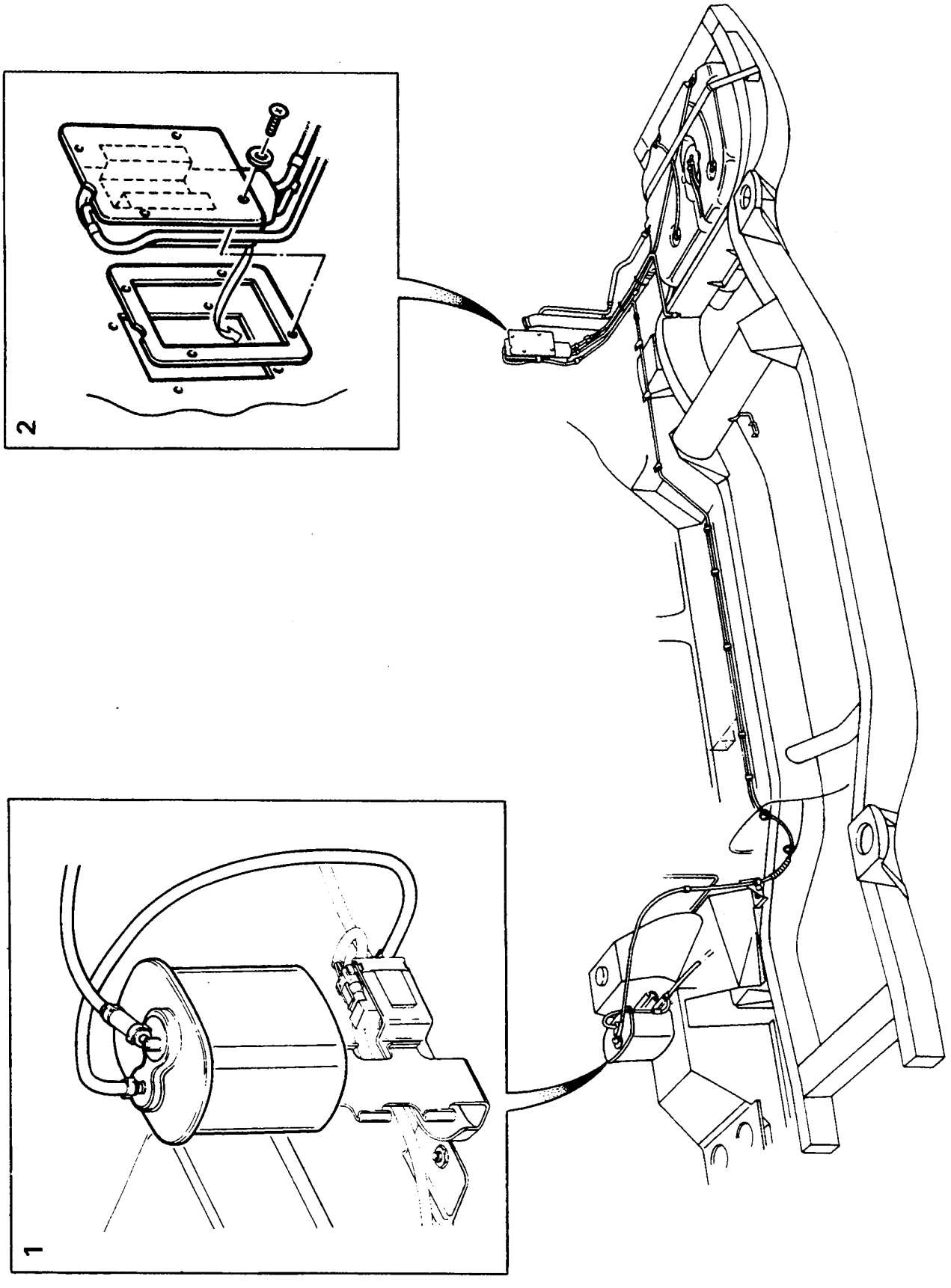
In the top of the separator a shut-off valve is incorporated in the vapour exit port to prevent the possible presence of any liquid fuel being transmitted to the adsorption canister should the vehicle roll over.

The adsorption canister, which is connected by a hose to the plenum chamber, adsorps and stores the fuel vapour from the fuel tank while the engine is not running. When the engine is started, the vapour is purged from the canister by air drawn through an orifice in the base of the canister and by the influence of vacuum at the top. The vapour drawn into the plenum chamber through a solenoid operated purge valve is finally burnt in the combustion chambers.


ST2866M

The purge valve, which is attached to the adsorption canister support bracket, is controlled by the fuel injection E.C.U. which determines the most emission acceptable time at which purging should take place. This will normally be at engine speeds above idle and when the vehicle is in motion. A signal from the E.C.U. to the purge valve operates the solenoid and opens the valve to purge the canister of fuel vapour.

EVAPORATIVE CONTROL SYSTEM

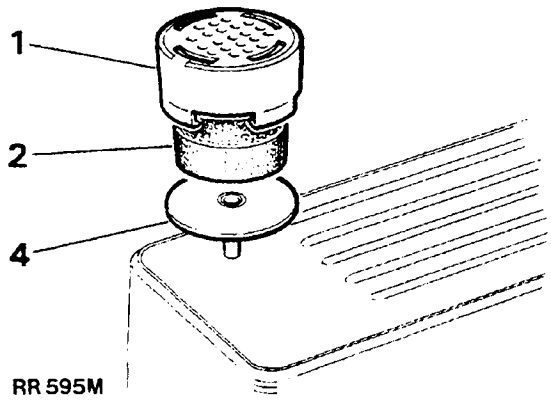


POSITIVE CRANKCASE VENTILATION AIR INTAKE FILTER

The PCV air intake filter is located at the rear of the left hand rocker cover, beneath the throttle linkage bracket.

Removing

1. Prise the filter outer cover upwards to release it from its mounting.
2. Remove the sponge filter from the cover and discard the sponge.



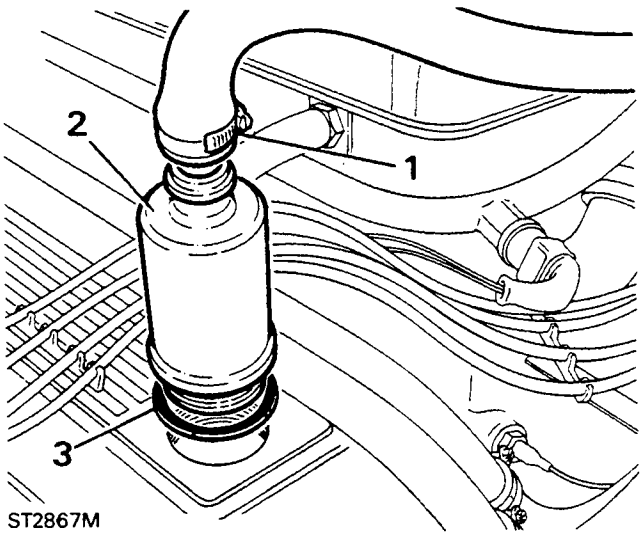
Refitting

3. Insert a new filter into the filter cover.
4. Press the filter onto its mounting until it clips firmly into position.

POSITIVE CRANKCASE VENTILATION BREATHER FILTER

Removing

1. Release the hose clamp and pull the hose off the canister.
2. Unscrew the canister and remove it from the rocker cover.
3. Remove the large rubber 'O' ring and inspect for deterioration.



4. Visually inspect the condition of the wire screen within the canister, if in poor condition, replace the whole assembly, if the filter unit is in an acceptable condition, clean as follows.
5. Immerse the canister in a small amount of solvent (mineral spirits) and allow time for the solvent to dissolve or loosen any debris.
6. Remove the canister from the solvent bath and allow to dry in still air.

WARNING: Do not use a compressed air line to dry, clean or remove any remaining particles of debris within the canister as this could cause fire or personal injury.

Refitting

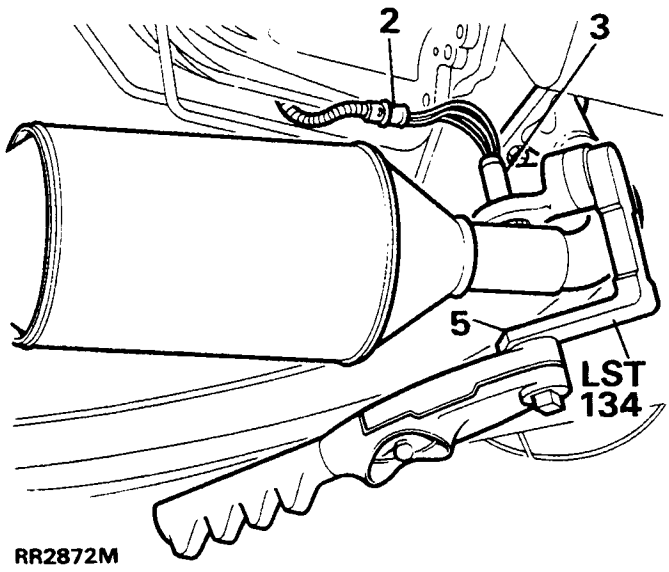
7. If the original canister is being refitted, fit a new 'O' ring.
8. Screw the canister into the rocker cover securely - hand tight only.
9. Refit the hose and tighten the hose clamp securely.

LAMBDA (OXYGEN) SENSOR

The removal of the sensors from the exhaust system must only be carried out when the engine is cold.

Removing

1. Disconnect the battery negative lead.
2. Disconnect the electrical plugs from the sensors.
3. Unscrew and remove the sensors from the two exhaust downpipes.



RR2872M

Refitting

4. Coat the threads of the sensors with anti-seize compound.

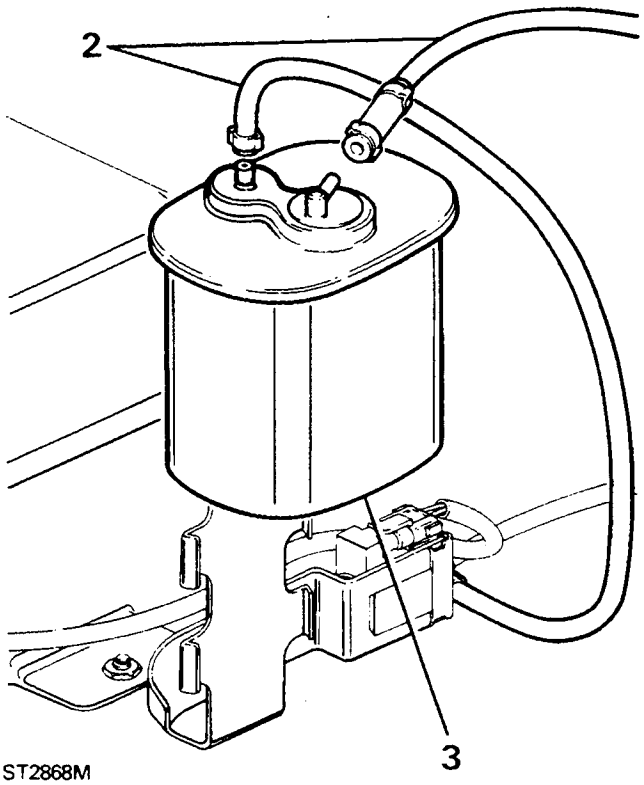
   CAUTION: To ensure that the efficiency of the sensor is not impaired, DO NOT allow anti-seize compound to come into contact with the sensor nose.

5. Screw in the sensor and tighten to the correct torque using special tool LST134.
6. Connect the electrical plugs and battery lead.

ADSORPTION (CHARCOAL) CANISTER

Removing

1. Disconnect the battery negative lead.
2. Disconnect both purge lines.
3. Lift the canister from its mounting brackets.



ST2868M

Refitting

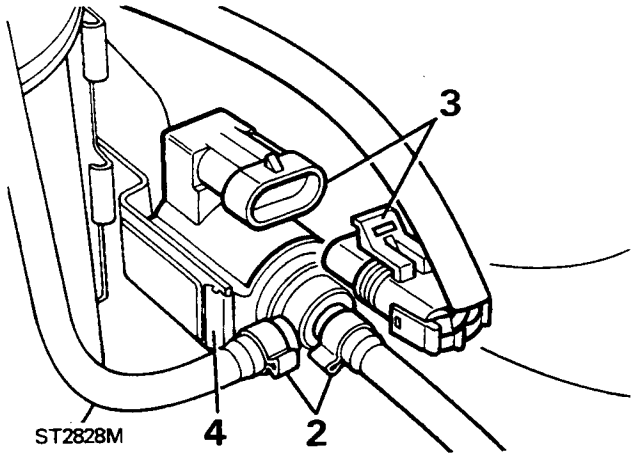
4. Reverse the removal procedure, ensuring that the canister is securely located in its mounting bracket and both purge lines are fitted correctly to the canister.

NOTE: If crimped hoses are removed it is essential that they are recrimped on reassembly to ensure a leak free joint.

PURGE VALVE

Removing

1. Disconnect the battery negative lead.
2. Remove the crimped connectors from the two purge valve pipes.
3. Disconnect the electrical connection.
4. Remove the edge clip retaining the purge valve and withdraw the purge valve.



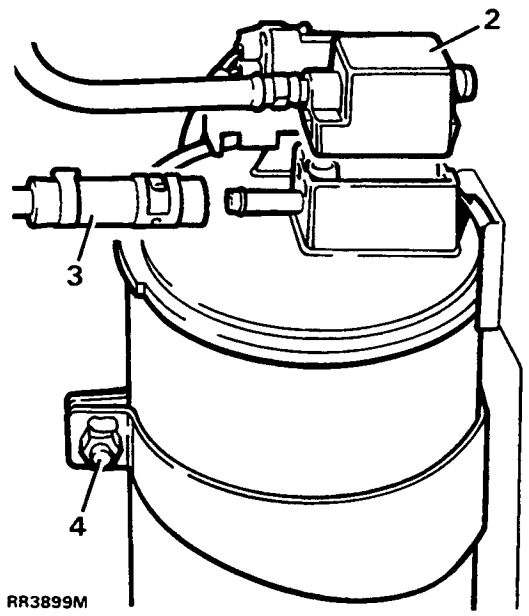
Refitting

5. Reverse the removal procedure ensuring the pipes are securely crimped.

CHARCOAL CANISTER - 93 MODEL YEAR

Remove

1. Disconnect battery negative lead.
2. Pry out purge valve.
3. Disconnect pipe.



4. Loosen bolt.
5. Remove charcoal canister.

Refit

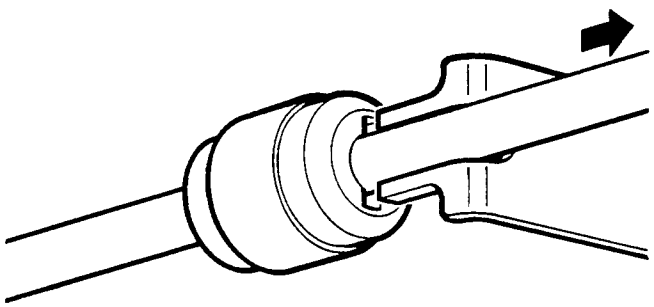
6. Reverse removal procedure.

VAPOUR SEPARATOR

Remove

WARNING: Ensure that all necessary precautions are taken against fuel spillage and fuel vapour to prevent fire or explosion.

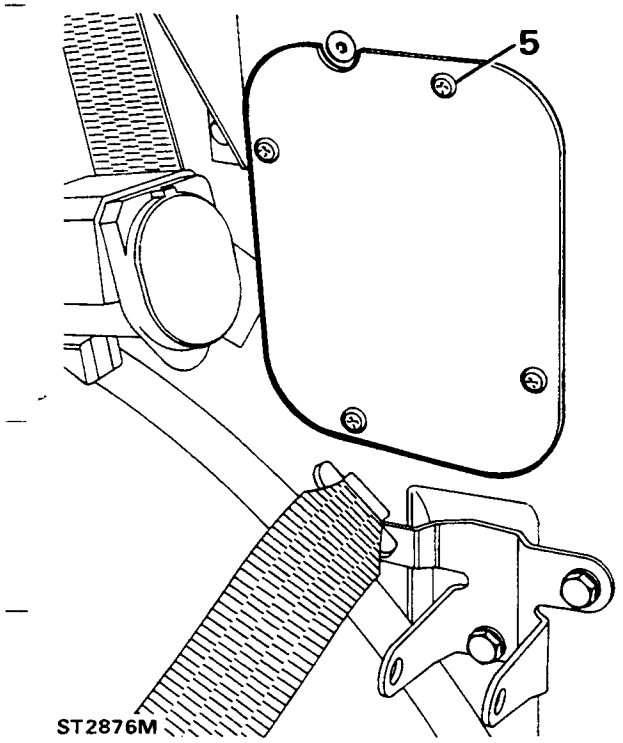
1. Disconnect the battery negative terminal.
2. Working from beneath the vehicle, disconnect the evaporative control pipes from the green end of the "speedfit" connectors. To achieve this, manufacture a suitable tool with a forked end to fit into the two slots in the end of the connector as shown in the illustration below. Press down on the collet and while depressed pull the pipe from the connector.



3. Remove the right hand side inward facing rear seat - if fitted.
4. Remove the rear lower trim panel.

NOTE: Refer to section 76 for instructions 3 and 4.

5. Remove the four screws securing the vapour separator support plate to the body panel and withdraw the separator and pressure relief valves from the vehicle.



NOTE: Whilst the pressure relief valves are renewable, the shut-off valve in the top of the separator is only available complete with a new separator assembly.

Fitting vapour separator.

6. Fit the separator and pipes into the vehicle side panel, if necessary using a new seal. Fit the self adhesive side to the separator. Secure with the four screws.
7. From beneath the vehicle, fit the pipes from the separator to the connectors. Push each pipe into the corresponding connector as far as it will go so that it is locked by the collet. Check that the pipes are free and not trapped or kinked. Secure the pipes to the under body clips.

TESTING EVAPORATIVE EMISSION CONTROL

The following pressure test procedure is intended to provide a method for ensuring that the system does not leak excessively and will effectively control evaporative emissions.

Equipment required.

Nitrogen cylinder (compressed air may be used to pressure the system when there has NEVER been fuel present in the fuel or evaporative control systems).

Water manometer (0 - 30" H2O or more).

Pipework and a "T" piece.

Method.

1. Ensure that there is at least two gallons of fuel in the petrol tank unless there has never been any fuel in the system.
2. Disconnect, at the adsorption canister, the pipe to the vapour separator.
3. Connect this pipe to the nitrogen cylinder and the water manometer using the "T" piece.
4. Pressurize the system to between 26.5 and 27.5 inches of water, allow the reading to stabilize, then turn off the nitrogen supply.
5. Measure the pressure drop within a period of 2 minutes 30 seconds. If the drop is greater than 2.5 inches of water the system has failed the test. Note that a fully sealed system will show a slight increase in pressure.
6. Should the system fail the test, maintain the pressure in the system and apply a soap solution round all the joints and connections until bubbles appear to reveal the source of the leak.
7. Repeat the test and if successful, dismantle the test equipment and reconnect the pipe to the adsorption canister.