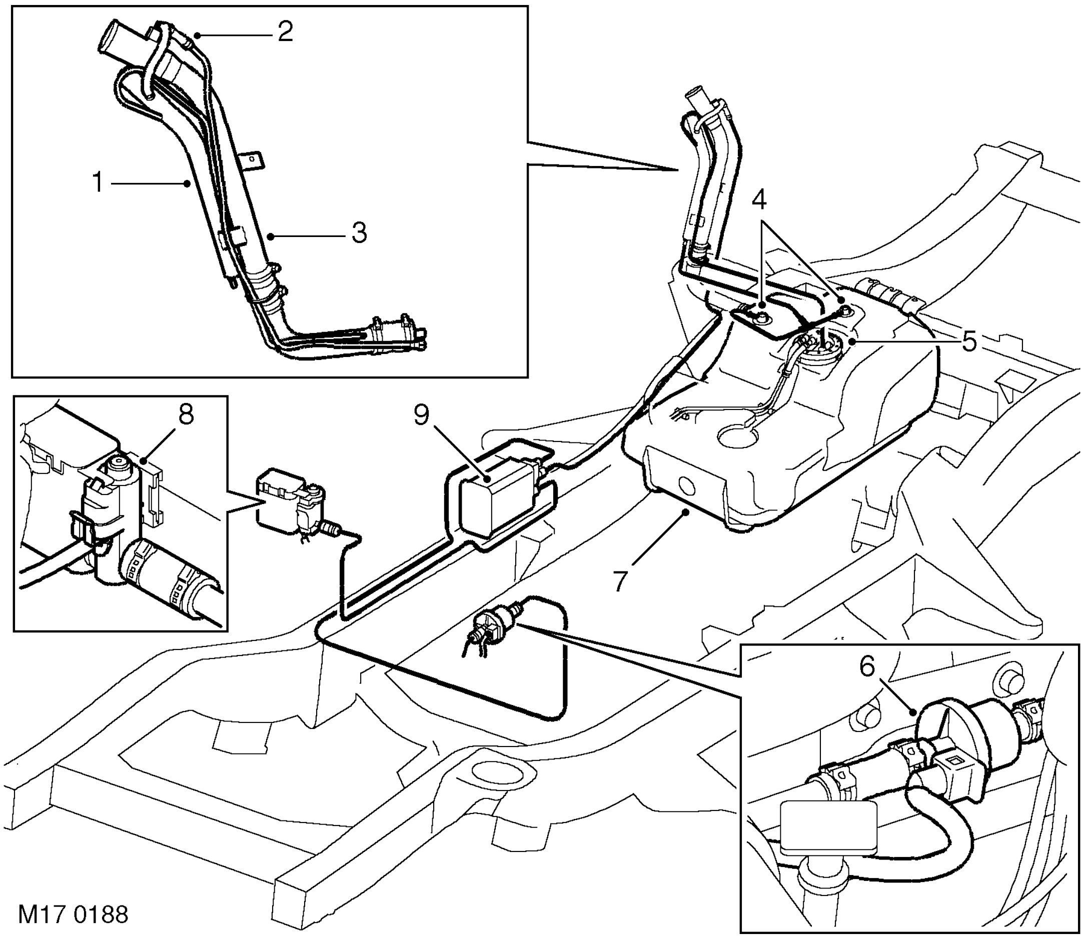
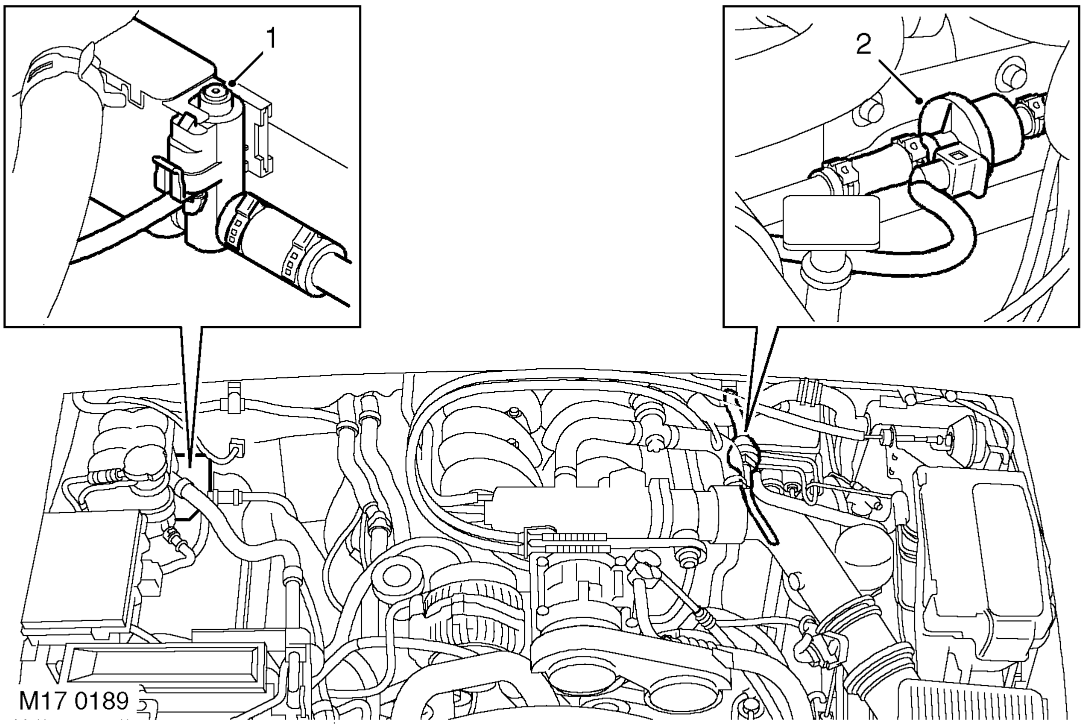
EVAPORATIVE EMISSION CONTROL SYSTEM - ADVANCED EVAPS (from 99MY)



Component location

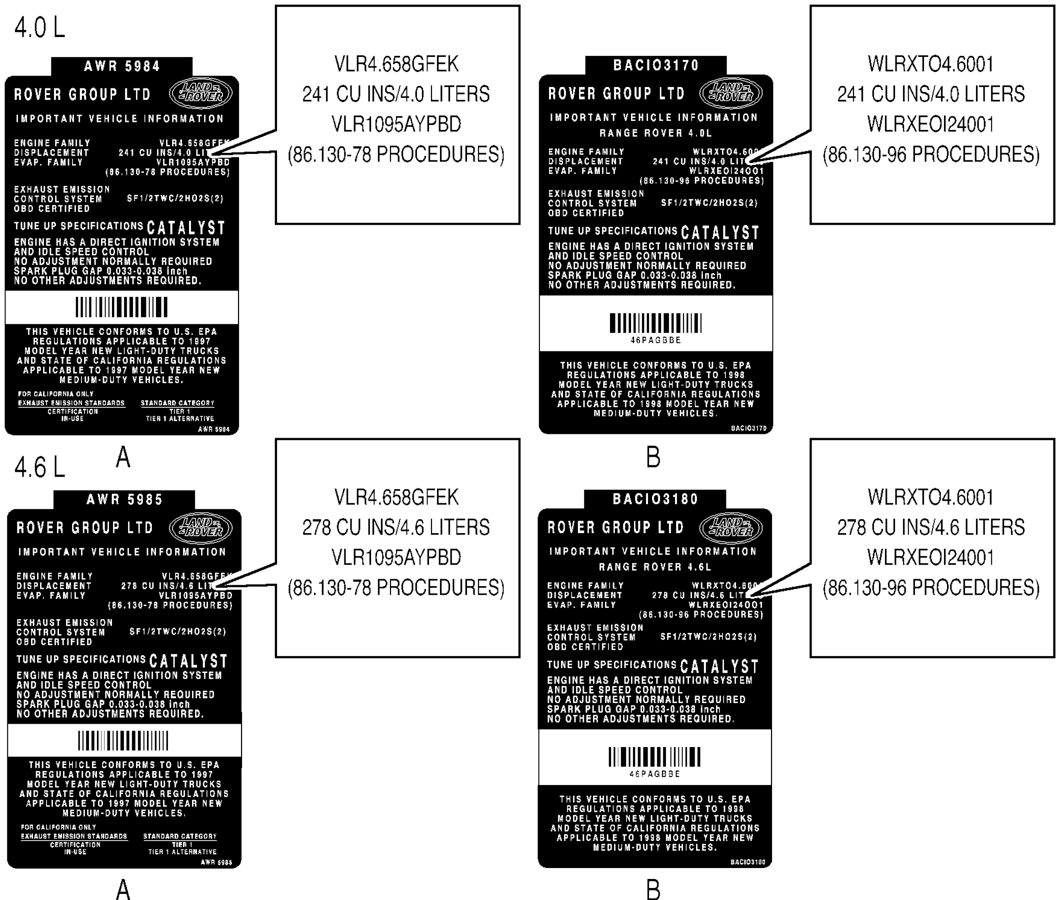
1. Liquid/vapour separator
2. Anti-trickle fill valve
3. Fuel filler neck assembly
4. Roll over valves
5. Fuel pump and gauge sender unit, incorporating fuel tank pressure sensor (NAS only)
6. EVAP canister purge valve
7. Fuel tank
8. Canister vent solenoid (CVS) unit
9. EVAP canister

99MY component location continued:



1. Canister Vent Solenoid (CVS) unit - (NAS only)
2. Purge valve

Identification



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The system was introduced on all North American specification vehicles from 1998 Model Year. Advanced EVAP vehicles can be recognised by the information contained in the **EVAP. FAMILY** entry on the underbonnet Emission label (mounted on the bonnet lock platform).

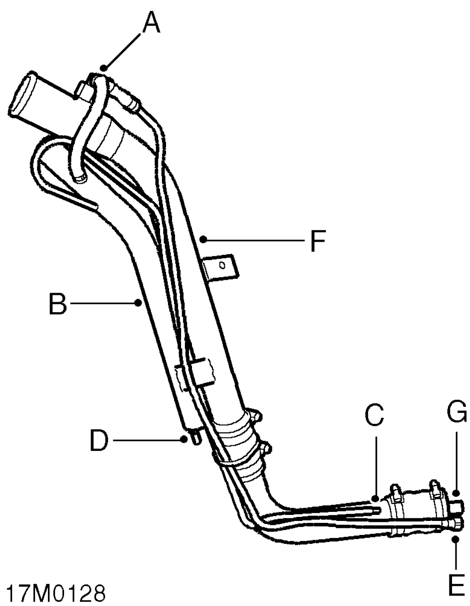
A - Vehicles without advanced EVAPS
VLR1095AYPBD

B - Vehicles with advanced EVAPS
WLRXEO124001

Evaporative emission control system - Advanced EVAPS.

The evaporation emission control system is used to reduce the level of hydrocarbons emitted into the atmosphere from the fuel system. The system comprises a vapour separator (B) and an anti-trickle valve (A), both located on the fuel filler neck (F), an Evaporative Emissions (EVAP) canister and an EVAP canister purge valve. A Canister vent solenoid (CVS) unit is mounted in front of the EVAP canister on vehicles up to 99MY. On vehicles from 99MY the CVS unit is mounted near the bulkhead on the RHS of the engine bay. The CVS unit is used by the ECM to control fresh air supply to the canister.

On NAS vehicles, the fuel pump and gauge sender unit incorporates a pressure sensor which is used by the ECM, in conjunction with the CVS unit, to determine the presence of leaks which may cause vapour to escape. This system is added for compliance with OBD measures.



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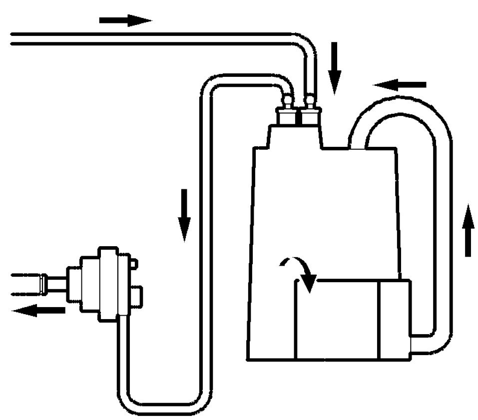
A Anti-trickle fill valve
B Liquid/Vapour Separator
C Vent line to pressure sensor
D From fuel tank to liquid/vapour separator
E From EVAP canister to anti-trickle fill valve
F Fuel filler neck assembly
G Internal fill breather hose

During conditions of high ambient temperatures, fuel in the tank vapourises, and pressure rises. Fuel vapour enters the vapour separator and any liquid fuel runs back to the tank. Two roll over valves are fitted in the fuel tank vapour lines. These valves prevent liquid fuel entering the vapour separator if the vehicle rolls over. The advanced EVAPS system has no two way valve, so vapour is free to flow to the EVAP canister, where it is stored in the canister's activated charcoal element. When the correct engine operating conditions are met, the Engine Control Module (ECM) opens the EVAP canister purge valve and vapour is drawn from the canister, into the plenum chamber to be burned in the engine. Fresh air is drawn into the canister through the EVAP canister vent solenoid to take up the volume of displaced vapour. During normal operating conditions, and when the engine is switched off, the vent solenoid remains open and the fuel tank is free to breath through the EVAP canister. If the vent solenoid should fail, or the main vapour line becomes blocked, excess pressure is vented to atmosphere through a valve in the fuel filler cap. Similarly, the cap vent valve will open to prevent the tank collapsing if excessive vacuum is present.



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When the temperature of fuel in the tank reduces, pressure also reduces and vapour must be drawn back into the tank. Fresh air is drawn into the canister, through the open vent solenoid, to take up the displaced volume.

An anti-trickle fill valve is fitted to the filler neck in the line between the tank and EVAP canister. The function of this valve is to prevent the user overfilling the tank by trickling fuel into the neck, thereby preserving the vapour space in the tank to allow for fuel expansion during hot weather.

The valve creates a blockage in the vent line during the fuel filling process. The valve is operated by the action of inserting the fuel filler gun. With the valve in the closed position, air displaced during filling exits the tank only through the internal fill breather. When the fuel level reaches the level of the fill breather, the filler neck fills with fuel, shutting off the filler gun.

The breather ports from the EVAP canister are located high up in the engine bay (CVS unit on NAS vehicles, snorkel tubes on ROW vehicles), to prevent water ingress during vehicle wading.

The advanced evaporative loss control system used on NAS vehicles is similar to the standard system, but also includes a CVS unit and an in-tank pressure sensor to monitor the pressure build-up for determining whether leaks are present.

The function of the CVS unit is to block the atmospheric vent side of the EVAP canister to enable the ECM to carry out the EVAP system leak check. The leak check is only carried out when the vehicle is stationary and the engine is running at idle speed. The test uses the natural rate of fuel evaporation and engine manifold depression. Failure of the leak check will result in illumination of the Malfunction Indicator Lamp (MIL).

The fuel evaporation leak detection is included as part of the On-Board Diagnostics (OBD) strategy and checks for leaks greater than 1mm (0.04 in.) in diameter. During checking, the vent and purge lines are closed for a reference check on system pressure to be determined. Then the purge valve is opened, exposing the fuel tank and vent lines to engine vacuum. The ECM then checks the signal from the fuel tank pressure sensor for any pressure increase (i.e loss of vacuum) which would indicate a leakage.

Any fuel evaporation system leaks which occur between the output of the purge valve and the connection to the inlet manifold cannot be determined using this test, but this type of fault will be detected through the fuelling adaption diagnostics.

EXHAUST EMISSION CONTROL COMPONENTS - (from 99MY)

Catalytic converters

The catalytic converters are located in each of the front pipes from the exhaust manifolds. The catalytic converter's housings are fabricated from stainless steel and are fully welded at all joints. Each catalytic converter contains two elements of an extruded ceramic substrate which is formed into a honeycomb of small cells with a density of 62 cells / cm^2. The ceramic element is coated with a special surface treatment called 'washcoat' which increases the surface area of the catalyst element by approximately 7000 times. A coating is applied to the washcoat which contains the precious elements Platinum (Pt), Palladium (PD) and Rhodium(Rh) in the following relative concentrations: **1 Pt : 21.6 PD : 1 Rh**.

The metallic coating of platinum and palladium oxidize the carbon monoxide and hydrocarbons and convert them into water (H_2O) and carbon dioxide (CO_2). The coating of rhodium removes the oxygen from nitrogen oxide (NO_x) and converts it into nitrogen (N_2).

NOTE: Catalytic converters for NAS low emission vehicles (LEVS) from 2000MY have active constituents of Palladium and Rhodium only. The proportion of active constituents are 14 PD: 1 Rh, and the Palladium coating is used to oxidise the carbon monoxide and hydrocarbons in the exhaust gas.

CAUTION: Catalytic converters contain ceramic material which is very fragile. Avoid heavy impacts on the converter casing.

CAUTION: Serious damage to the catalytic converter will occur if leaded fuel or a lower octane number fuel than recommended is used. The fuel tank filler neck is designed to accomodate only unleaded fuel pump nozzles.

WARNING: To prevent personal injury from a hot exhaust system, do not attempt to disconnect any components until the exhaust system has cooled down.