Introduction

The fuel tank components, operation and layout are new to Jaguar and have no commonality with previous systems. The major features of the fuel delivery system are the use of a saddle type tank and a returnless fuel system. The evaporative loss management system is similar in operation to that fitted to the XJ and XK Series vehicles and on-board refuelling vapour recovery (ORVR) is a standard feature. For NAS markets only, leak test diagnostics are performed.

Returnless Fuel System

The returnless fuel system delivers the correct amount of fuel to the engine under all conditions and at a constant pressure differential with respect to manifold pressure. This is without the need for a return line to the tank or a fuel rail pressure regulator. The use of a return line and the pressure drop across a regulator contribute to vapour formation which can affect fuelling calibration and requires a complex vapour management system to meet legislative requirements. Elimination of these components, together with closed loop control of the variable speed fuel pump, causes a reduction in the vapour generated, lower fuel temperatures and better fuel pressure control. Additional advantages include a reduced load on the electrical system and improved fuel economy.

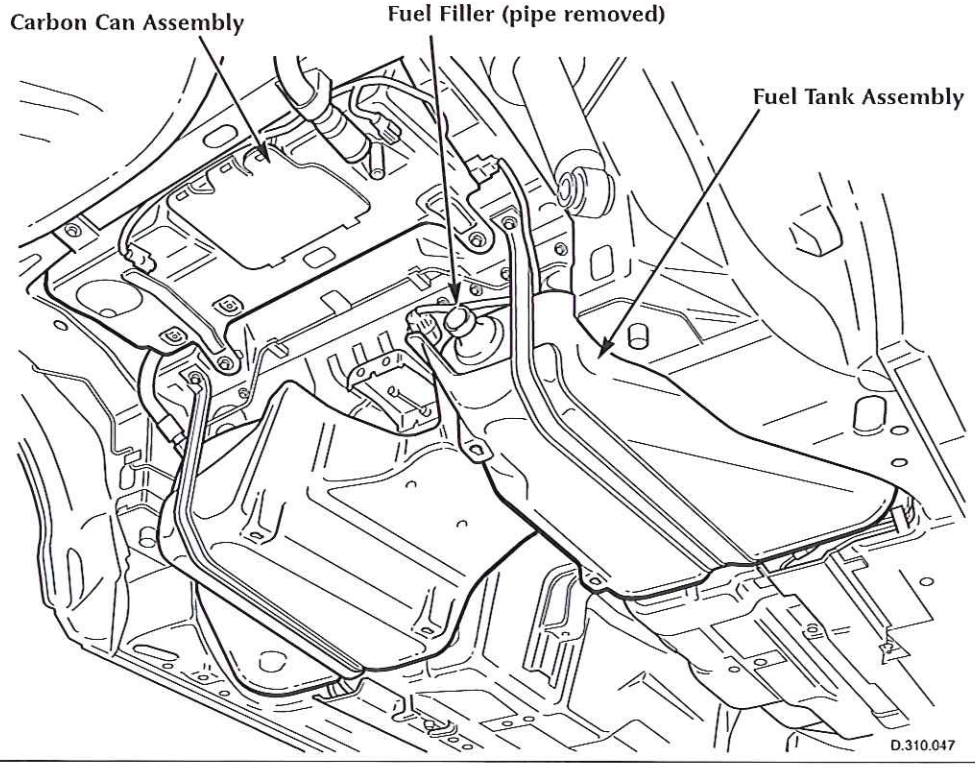
Fuel Tank

The fuel tank is of the 'saddle' type shape with LH and RH fuel compartments and is constructed of high density polyethylene (HDPE), a plastic blow moulded material. The tank is located below the rear passenger seat with the drive shaft and exhaust running through the arch of the tank. The underside of the tank is protected by a fitted heat shield and the tank assembly is retained by two metal straps which are fixed to the underbody at the front by removeable hinge pins and at the rear by bolts.

Refuelling is via a separate filler pipe and connecting hose to a stub pipe on the RH fuel compartment.

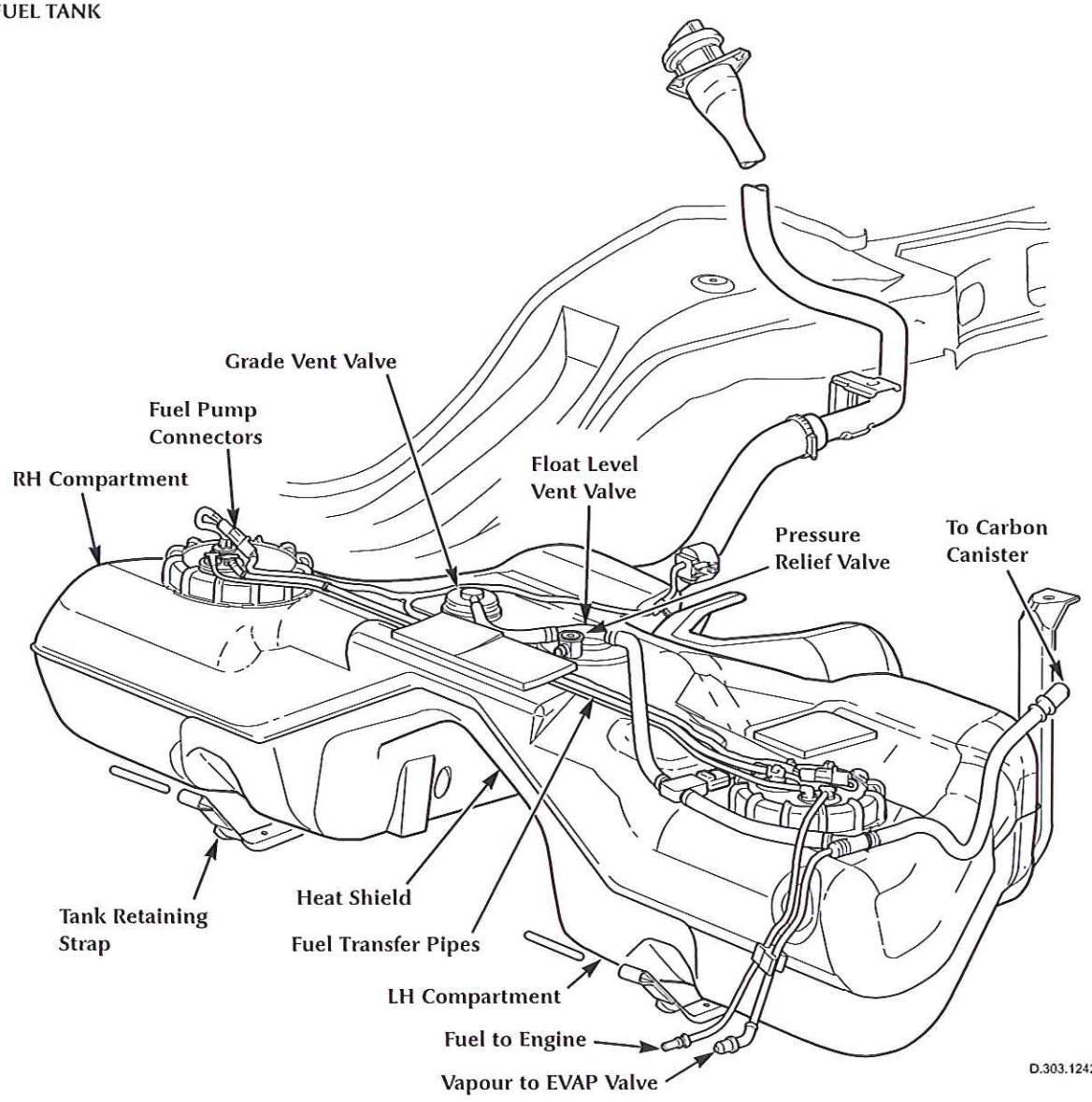
A fuel pump module is located in the RH

UNDERFLOOR FUEL TANK AND CARBON CAN SYSTEM LAYOUT



compartment and a transfer module in the LH compartment with external cross-over pipes for fuel transfer between the compartments. Both module assemblies have integral top plates for external pipework and electrical connectors. These are secured in the tank using screw on plastic closure rings. The closure rings are accessible from inside the vehicle via two access holes in the floor panel below the rear seat. Due to the confined working space and the possibility of fuel spillage within the vehicle, it is advisable to remove the tank completely before attempting to remove the internal assemblies.

FUEL TANK



Fuel Flow

The variable speed fuel pump is contained in a fuel reservoir in the RH module assembly. Fuel is pumped from the reservoir through an external cross-over pipe to the LH compartment where it flows via a T junction to the parallel pressure relief valve and then out to the engine fuel rail. The reservoir is maintained by fuel supplied by jet pumps in the LH and RH compartments. Pressurised fuel from the variable speed pump is forced through the small jet nozzles (diameter 0.5mm) creating a suction which draws fuel up from the tank. From the LH tank, this fuel is pumped through an external cross-over pipe and then into the reservoir. In the RH tank, the jet pump is located in the base of the reservoir.

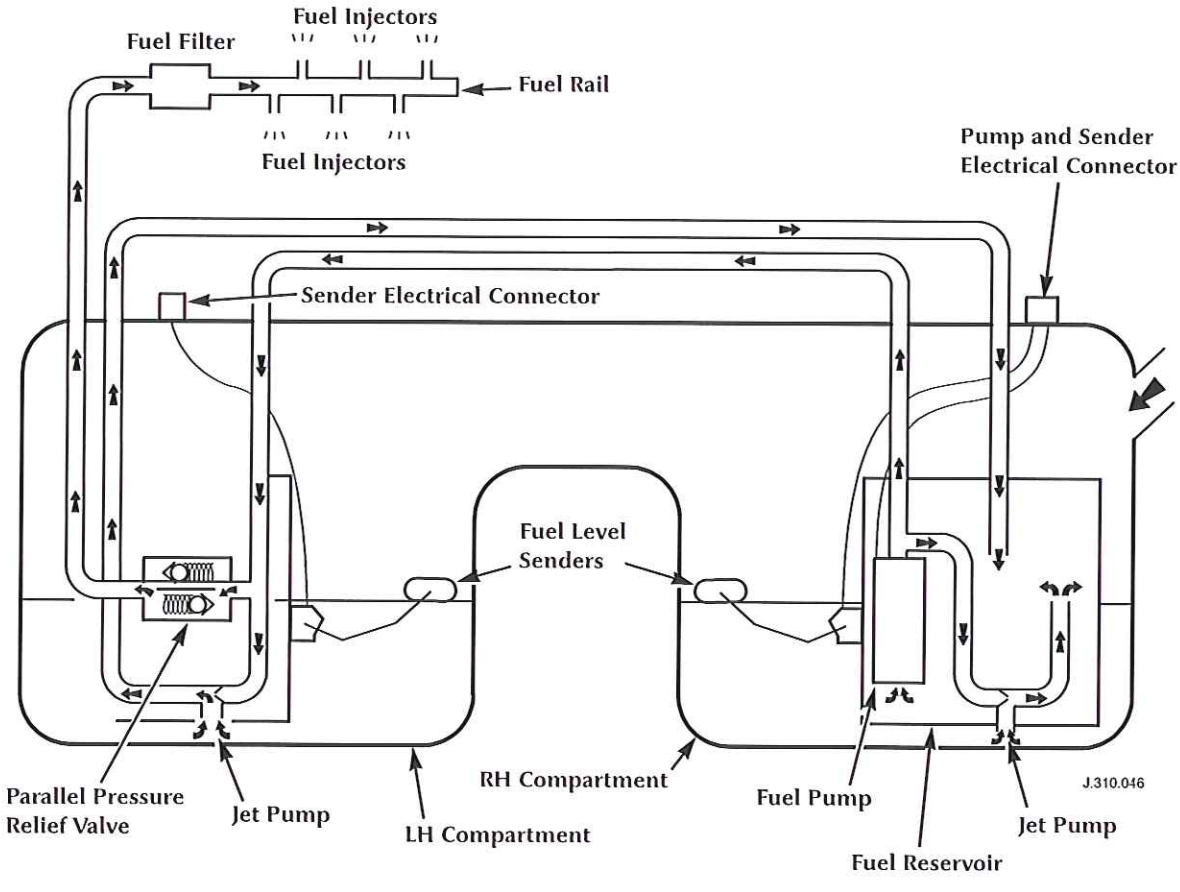
The parallel pressure relief valve assembly contains two spring loaded valves which operate in opposite directions, a fuel rail feed valve which opens at approximately 2 psi during normal operation and a second valve which opens at approximately 45-70 psi to relieve excessive rail pressure.

The main functions of the valves are:

- To help engine starting by retaining fuel in the supply lines and rail.
- To limit rail pressure due to temporary vapour increase during hot soak conditions (temperature and thus pressure drop after approximately 20 minutes).
- To limit rail pressure caused by sudden load changes such as a full to closed throttle transition.
- To prevent siphoning from the tank in the event of the fuel line being severed with the pump inactive.

Each side of the tank has an independently

FUEL FLOW



operating fuel level sender assembly mounted on the respective module assembly.

Control and Operation

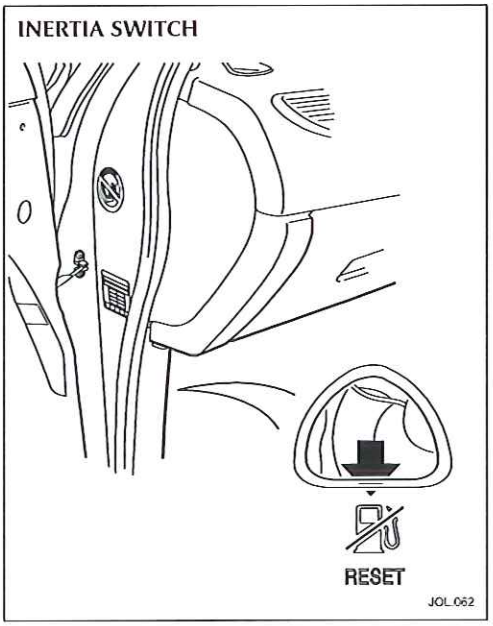
The speed of the fuel pump is varied under closed loop control so as to deliver the required fuel rail injection pressure in accordance with factors such as driver demand, manifold pressure and temperature changes. The control loop sensors, providing feedback information to the powertrain control module (PCM), are the engine fuel temperature (EFT) sensor and the injection pressure (IP) sensor which are both mounted directly on the engine fuel rail (see S-TYPE Powertrain Technical Guide). The IP sensor also has a vacuum feed from the intake manifold so as to measure the pressure differential.

The required fuel flow is determined by the PCM and sent to the rear electronic control module (RECM) which is the power driver for the fuel pump. The PCM demand to the RECM is a pulse width modulated (PWM) signal over a single line at a frequency of approximately 256 Hz and a duty cycle of 0-50%. The RECM effecively amplifies this signal by increasing the frequency by 64 and doubling the duty cycle, thus providing the necessary high current drive for the fuel pump. The fuel pump relay, located in the rear power distribution box, is energised by the PCM relay and provides a dedicated fused supply to the RECM for the pump drive.

When the ignition switch is turned from OFF to RUN or START, the PCM primes the system by running the pump for 1 second at full speed. The pump is switched off 1 second after the engine is stopped. During hot starts, fuel pressure is increased to prevent vapour lock.

Fuel pump drive status is monitored by the RECM and communicated to the PCM via the SCP network.

Outputs from the fuel senders are connected by independent wires to the RECM which sends the data to the instrument pack and the PCM.



Inertia Switch

The inertia switch is located behind the trim on the left side of the vehicle, forward of the front door post and below the fascia. A finger access hole in the trim allows the switch to be reset.

Evaporative Emissions System

The function and operation of the on-board refueling vapor recovery (ORVR) evaporative emissions system are similar to the system fitted to the XJ and XK Series vehicles in NAS markets but use different components. For the S-TYPE the system is fitted as standard for all markets.

Fuel Tank Components

To meet ORVR evaporative emission requirements, the tank and associated components are designed to minimise vapour losses. During re-fuelling, the narrowed fuel filler tube below the nozzle region provides a liquid seal against the escape of vapour and a check valve in the tank inlet pipe opens to incoming fuel only to prevent splashback. As the tank fills, vapour escapes through the open float level vent valve, at the top of the tank, and passes through the adsorption canisters to atmosphere. When the rising fuel level closes the float valve, the resulting back pressure causes refuelling cut-off. While the float valve is closed, any further rise in vapour pressure is relieved by the grade vent valve which connects to the canisters via the outlet of the float valve. At less than full tank level, the float valve is always open, providing an unrestricted vapour outlet to the canisters.

If the tank is over filled (eg a fault in the delivery system) an integral pressure relief valve in the float valve assembly opens to provide a direct vent to atmosphere.

The float level vent valve/pressure relief valve assembly and the grade valve are welded to the tank top and are non-serviceable. Note that both valve assemblies incorporate roll-over protection.

The fuel filler cap uses a 1/8 turn action and is tethered to the body. The filler cap assembly incorporates both pressure relief and vacuum relief valves (the latter is a new feature to Jaguar).

FUEL TANK CONNECTIONS