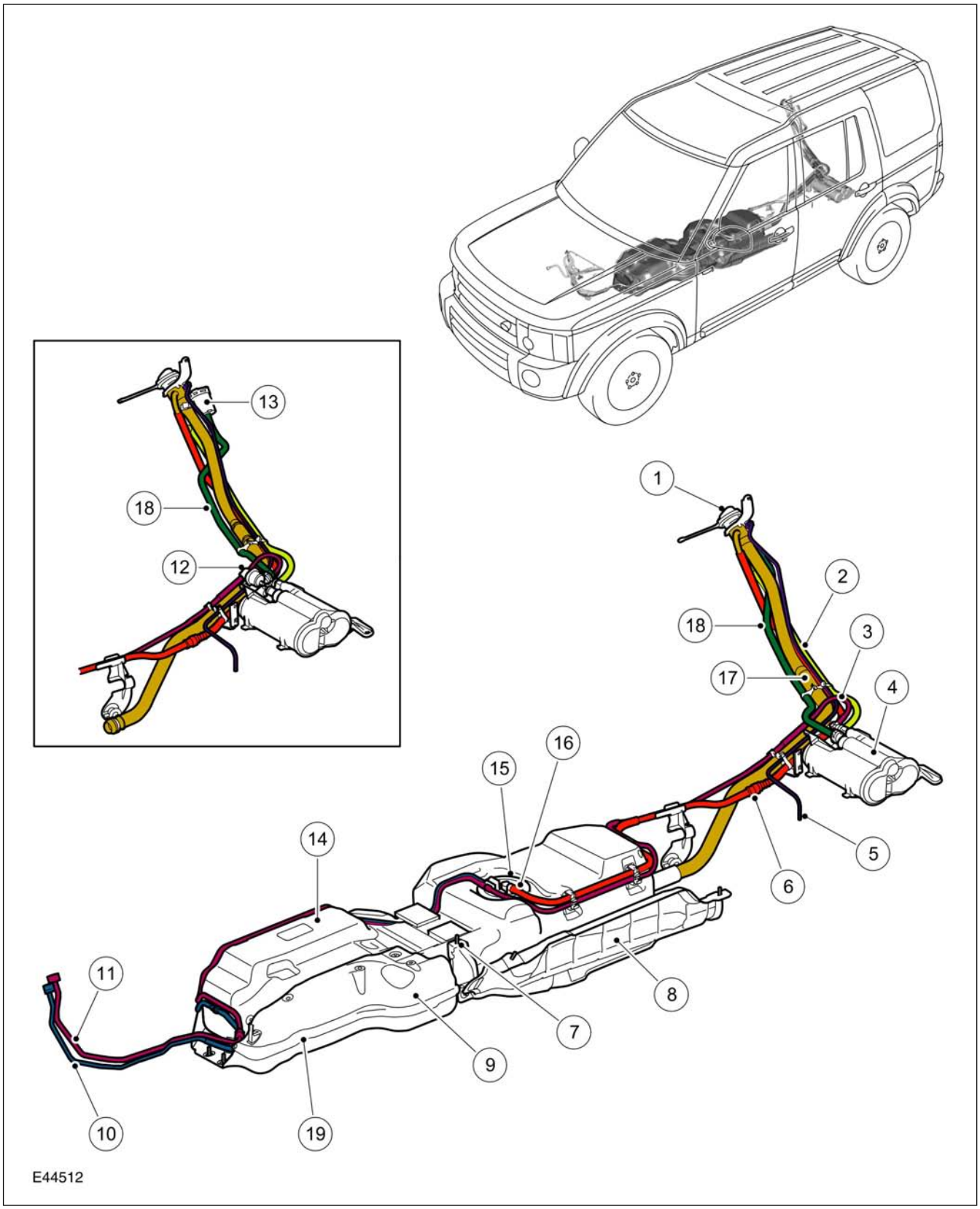
Fuel Delivery System Component Location



1 Filler cap and lanyard

2 Breather line 'Y' piece to charcoal canister

3 Charcoal canister purge line

4 Charcoal canister

5 Rear differential breather pipe
6 Tank breather pipe
7 Mounting screw (6 off)
8 Heat shield
9 Cover
10 Pipe - Fuel pump to engine (feed)
11 Pipe - EVAP purge valve to charcoal canister
12 DMTL pump (NAS only)
13 DMTL filter (NAS only)
14 Fuel tank
15 Fuel pump module assembly
16 Tank breather pipe
17 Fuel filler pipe
18 Charcoal canister vent pipe
19 Cradle

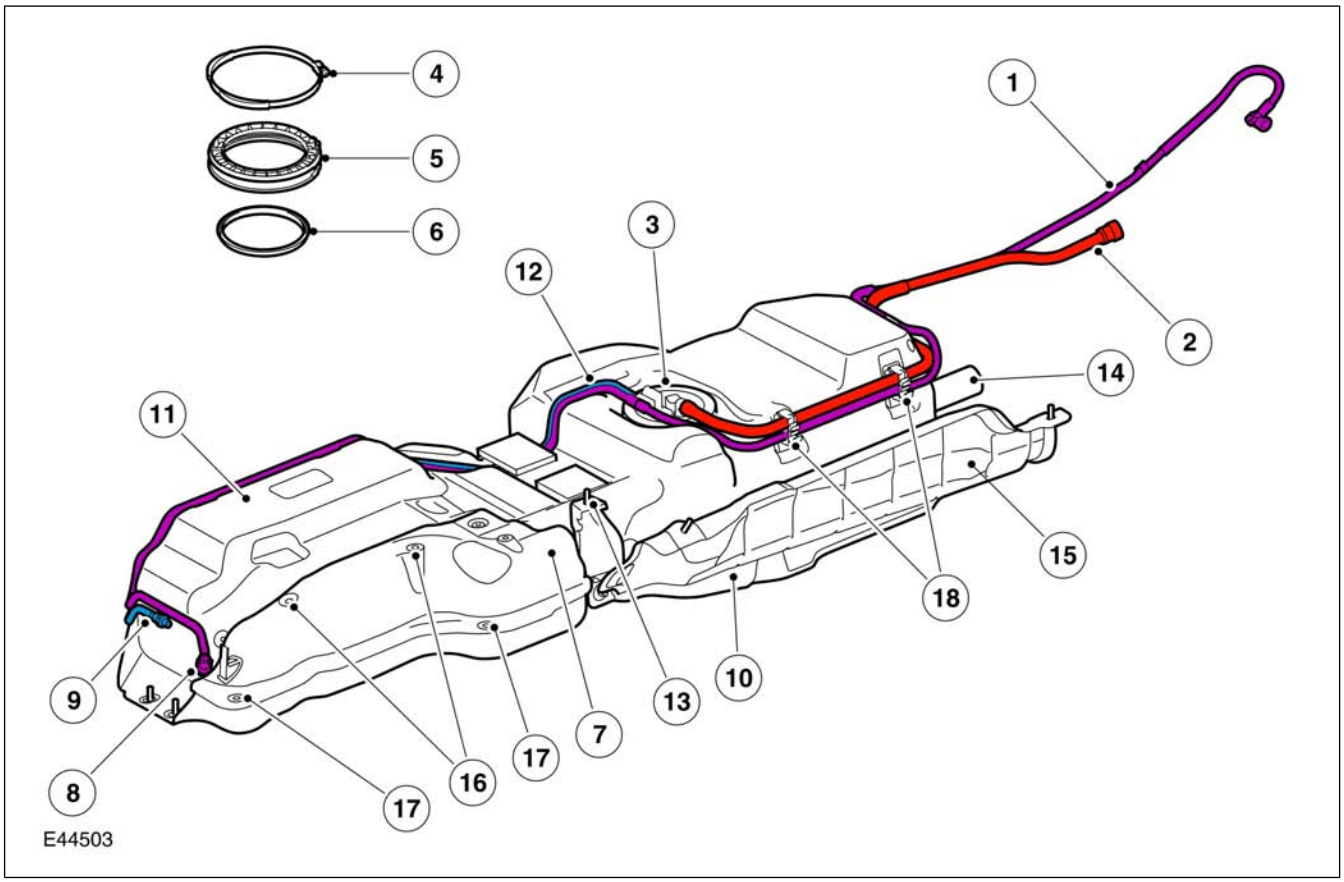
GENERAL

The major components of the 4.4L V8 fuel system comprise a fuel tank, a fuel pump, a fuel filler assembly and two fuel level sensors.

The 4.4L V8 fuel system uses a fuel pump mounted in the fuel tank to deliver a uniform level of pressure to the fuel rails which supply fuel to all fuel injectors. The fuel rails and the injectors are described in Fuel & Charging Controls – 4.4L V8.

Fuel system emission control is described in Engine Emission Control - 4.4L V8

FUEL TANK ASSEMBLY



1 Pipe - purge valve to charcoal canister
2 Tank breather pipe
3 Fuel pump module flange
4 Pump module clamp
5 Pump module collar
6 Pump module seal
7 Cover
8 Pipe connection - purge valve
9 Pipe connection - fuel feed
10 Cradle
11 Fuel tank
12 Pipe - fuel feed
13 Mounting screws (6 off)
14 Fuel filler hose
15 Heat shield
16 Scrivet
17 Screw M6
18 Clip cover

The fuel tank is located on the right hand side of the vehicle, between the transmission and the right hand chassis longitudinal. The tank is located on a mounting cradle which secures the whole fuel tank assembly to the vehicle. The tank has a useable capacity of 86.3 litres (22.8 US gallons).

The cradle is attached to the chassis with six screws. When the cradle is attached to the chassis, the tank is positively secured via foam pads which bear against the central chassis cross beam. A protective cover is fitted to the front right hand corner of the tank and provides additional protection.

The fuel tank is manufactured from moulded plastic which is a minimum of 3 mm thick. The tank is a sealed unit with the only internal access being via the pump module flange aperture on the top of the tank.

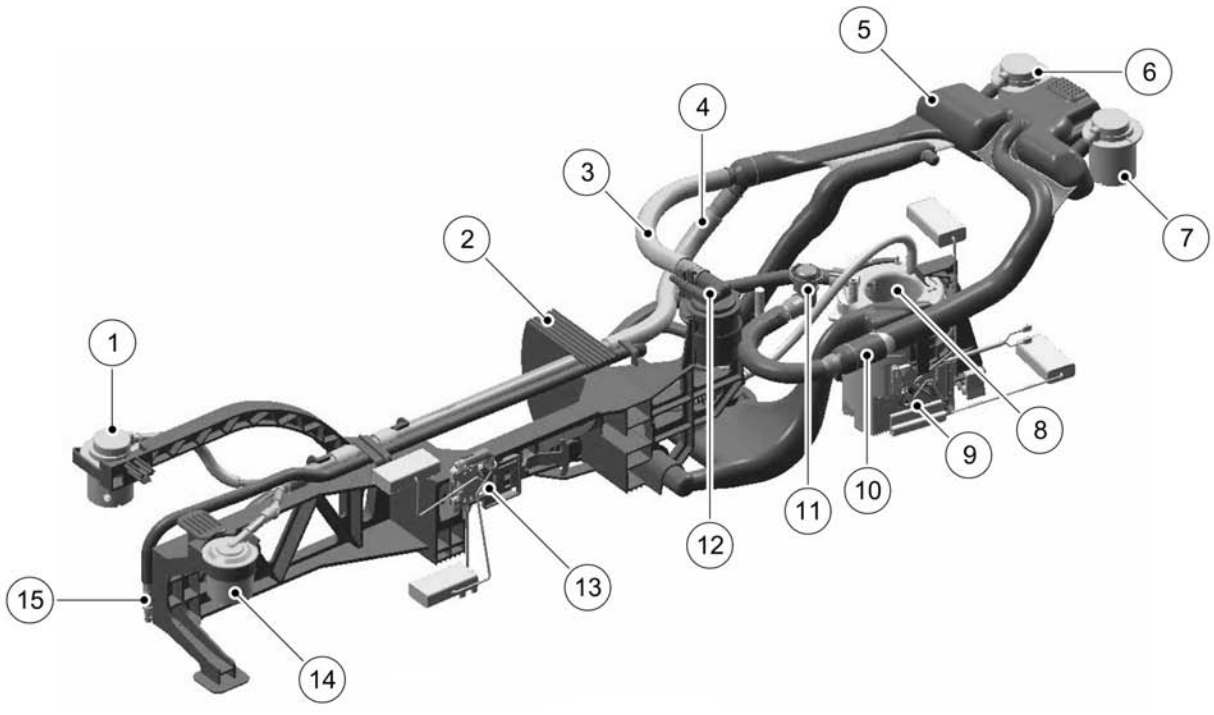
The flange assembly comprises a pump module flange which contains all external pipe and electrical connections for the tank internal components, a collar and a clamp. The flange is fitted with a seal which locates in the tank aperture. An arrow on the flange must be aligned between two moulded lines on the tank, adjacent to the pump module flange aperture, to obtain the correct orientation of the flange. The collar is located over the flange and is secured with the clamp. The flange, seal, collar and clamp arrangement meets the sealing requirements of LEV2 emissions.

The flange has a six pin external connector which provides for electrical connections for the level sensors and the fuel pump. This connector is wired to three push fit connectors on the underside of the flange. A quick release connector provides for the connection of the fuel feed pipe and breather.

A tank carrier assembly is attached inside the tank and is used to locate the internal tank components. The carrier provides location for the fuel pump module, the front level sensor, the Roll Over Valves (ROVs) and the front jet pump.

The fuel pump module contains a number of components. The module comprises the fuel pump, the rear fuel level sensor, the rear jet pump, the pump inlet filter, a second fine mesh filter and the fuel pressure regulator, which is housed in a manifold that is mounted in the carrier assembly. Only the pump module assembly and level sensors are available as serviceable components, the individual assembly components are not available separately.

Fuel Tank Internal Components



1 Front right hand Roll Over Valve (ROV)
2 Carrier assembly
3 Fuel Level Vent Valve (FLVV) breather corrugated tube
4 Front ROV corrugated tube
5 Liquid Vapor Separator (LVS)
6 Rear right hand ROV
7 Rear left hand ROV
8 Fuel pump module
9 Rear fuel level sensor
10 Tank breather tube
11 Connector
12 Fuel Level Vent Valve (FLVV)
13 Front fuel level sensor
14 Front left hand ROV
15 Front jet pump

The 4.4L V8 vent system is identical to the system used on the 4.0L V6 models. The vent system comprises:

- four Roll Over Valves (ROV)
- one Fuel Level Vent Valve (FLVV)
- one Liquid Vapor Separator (LVS)

The vent system is mounted on the fuel tank internal carrier which is assembled outside of the tank and inserted into the tank during the blow moulding process. None of the internal tank venting components are serviceable.

The two rear ROVs are mounted directly onto the LVS with rubber grommets and secured with clips.

The two front ROVs are located in the front of the tank and are attached to the main beam of the carrier by a moulded clip. Both ROVs are connected to the LVS with a plastic corrugated tube.

The four ROVs vent directly into the LVS. Any liquid fuel is separated from the vapor in the LVS and drains back into the tank via the FLVV. The LVS is connected by a corrugated tube to the fuel pump module flange. This allows fuel vapor to exit the tank during venting.

The main purpose of the FLVV is to control the fill volume of the tank. During filling, excess vapor is passed via the FLVV to the LVS. The vapor then passes from the LVS to the fuel pump module flange vent connection via a corrugated tube. The flange vent connection is connected to the charcoal canister which stores the fuel vapor. During filling, when the tank reaches its full level, the FLVV closes and prevents fuel vapor passing through to the LVS. This causes the pressure in the tank to rise which in turn causes the pump filling nozzle to turn off.

Fuel Pump Module

The fuel pump module is attached to the carrier and is located at the bottom of the swirl pot. The pump module flange has three electrical connectors; one for the fuel pump motor and one for each of the fuel level sensors. All are connected to the external electrical connector via the connectors on the underside of the fuel pump module flange.

The pump module has a rated flow of 122 litres/hour (32.2 US gallons/hour) at a voltage of 12.3V and an output pressure of 4.5 bar (65.2 lbf/in^2).

The fuel pump is energised by the fuel pump relay which is located in the battery junction box. The relay is controlled by the engine control module and energises the relay at all times when the ignition switch is in ignition position II.

A pump inlet filter is attached to the pump inlet port at the bottom of the pump. The filter has a 'winged' section which is located vertically at the side of the pump to ensure that a portion of the filter is off the base of the swirl pot, to prevent premature blocking of the filter. The filter has a 31 micron fine mesh filter with a surface area of 70 cm^2 (10.8 in^2).

A second fine mesh filter is located around the top of the fuel pump. This provides additional filtration to the fuel before it is passed into the manifold and onto the fuel rail. The filter has an electrical connection which is attached to ground. The ground is required to dissipate electrostatic charges that can build up on the fine filter.

The fuel filter outlet also incorporates a non-return valve which prevents fuel returning to the pump when the engine is not running. This ensures that system pressure is maintained in the fuel feed line to the fuel rail when the engine is not running.

Fuel Level Sensors

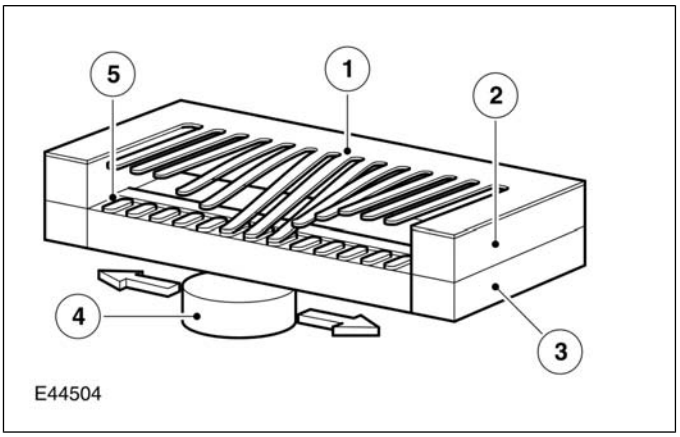
The sensor is a MAgnetic Passive Position Sensor (MAPPS) which provides a variable resistance to earth for the output from the fuel gauge. The sensor is sealed from the fuel preventing contamination of the contacts, increasing reliability. The front and rear fuel level sensors are connected to the external electrical connector on the flange via the connectors on the underside of the fuel pump module flange.

The front sensor is attached to the front of the carrier and is accessible via the fuel pump flange aperture. The rear sensor is attached to the side of the swirl pot and is also accessible via the flange aperture.

The sensor comprises a series of 51 film resistors mounted in an arc on a ceramic surface. The resistors are wired in series with individual contacts. A soft magnetic foil with 51 flexible contacts is mounted a small distance above the film resistors. A magnet, located below the ceramic surface, is attached to the sender unit float arm. As the float arm moves the magnet

follows the same arc as the film resistors. The magnet pulls the flexible contacts onto the opposite film resistor contacts forming an electrical circuit.

Sensor Operating Principle



1 Magnetic foil
2 Spacer
3 Ceramic surface
4 Magnet
5 Resistance film

The film resistors are arranged in a linear arc with resistance ranging from 51.2 to 992.11 Ohms. The electrical output signal is output proportional to the amount of fuel in the tank and the position of the float arm. The measured resistance is processed by the instrument pack to implement an anti-slosh function. This monitors the signal and updates the fuel gauge pointer position at regular intervals, preventing constant pointer movement caused by fuel movement in the tank due to cornering or braking.

A warning lamp is incorporated in the instrument cluster and illuminates when the fuel level is at or below 10 litres (2.64 US gallons).

The fuel level sender signal is converted into a CAN message by the instrument pack as a direct interpretation of the fuel tank contents in litres. The ECM uses the CAN message to store additional OBD P Codes for misfire detection when the fuel level is below a predetermined capacity.

Front Fuel Level Sensor Resistance/Fuel Gauge Read out Table

Sender Unit Resistance, Ohms	Nominal Gauge Reading
NOTE: These figures are with the vehicle on level ground. Sensor readings will differ with varying vehicle inclinations.	
51	Empty
51	Low fuel level illumination
294	Half full
798	Full

Rear Fuel Level Sensor Resistance/Fuel Gauge Read out Table

Sender Unit Resistance, Ohms	Nominal Gauge Reading
NOTE: These figures are with the vehicle on level ground. Sensor readings will differ with varying vehicle inclinations.	
75.5	Empty
120	Low fuel level illumination
280	Half full
675	Full

Fuel Pressure Regulator

The fuel pressure regulator is located in the manifold inside the fuel tank. The regulator controls the fuel pressure in the feed pipe to the fuel rail by allowing some fuel to be diverted to the front jet pump.

The regulator is subject to pump output pressure and controls the pressure of the fuel delivered to the fuel rail to a 4.5 bar (65.2 lbf/in^2). At pressures above this

figure, the regulator opens, decaying the pressure supplied to the fuel rail by allowing fuel to pass to the front jet pump. The regulator is required to maintain the fuel pressure at the optimum pressure for correct fuel injection.

Swirl Pot

The swirl pot is located at the rear of the fuel tank and provides for the attachment or location of most of the fuel pump assembly components.

The swirl pot acts as a fuel reserve, providing a constant supply of fuel to the fuel pump irrespective of fuel quantity or vehicle attitude. When the vehicle is level the swirl pot contains approximately 400 cm^3 (24.4 in^3) of fuel when the engine is running. The two jet pumps ensure that fuel is constantly supplied to the swirl pot to provide a sufficient fuel supply for the pump.

A one way valve is located in the base of the swirl pot. The valve allows fuel from the tank to enter the swirl pot, but prevents it from escaping.

Jet Pumps

The fuel system incorporates two jet pumps. The front jet pump is located on the carrier near the front of the fuel tank. The rear jet pump is located in the swirl pot below the fuel pump. Both jet pumps operate on a venturi effect created by the fuel at pump output pressure passing through the jet pump. This draws additional fuel from the tank through ports in the jet pump body, delivering additional fuel to the swirl pot.

The front jet pump is mainly used when the vehicle is driving downhill. The jet pump is connected via a pipe from the fuel manifold and receives fuel diverted from the fuel feed pipe by the pressure regulator. The front jet pump collects fuel from the front of the tank and transfers it into the swirl pot, ensuring a constant supply of fuel to the pump. The jet pump has a jet nozzle of 2.1 mm diameter.

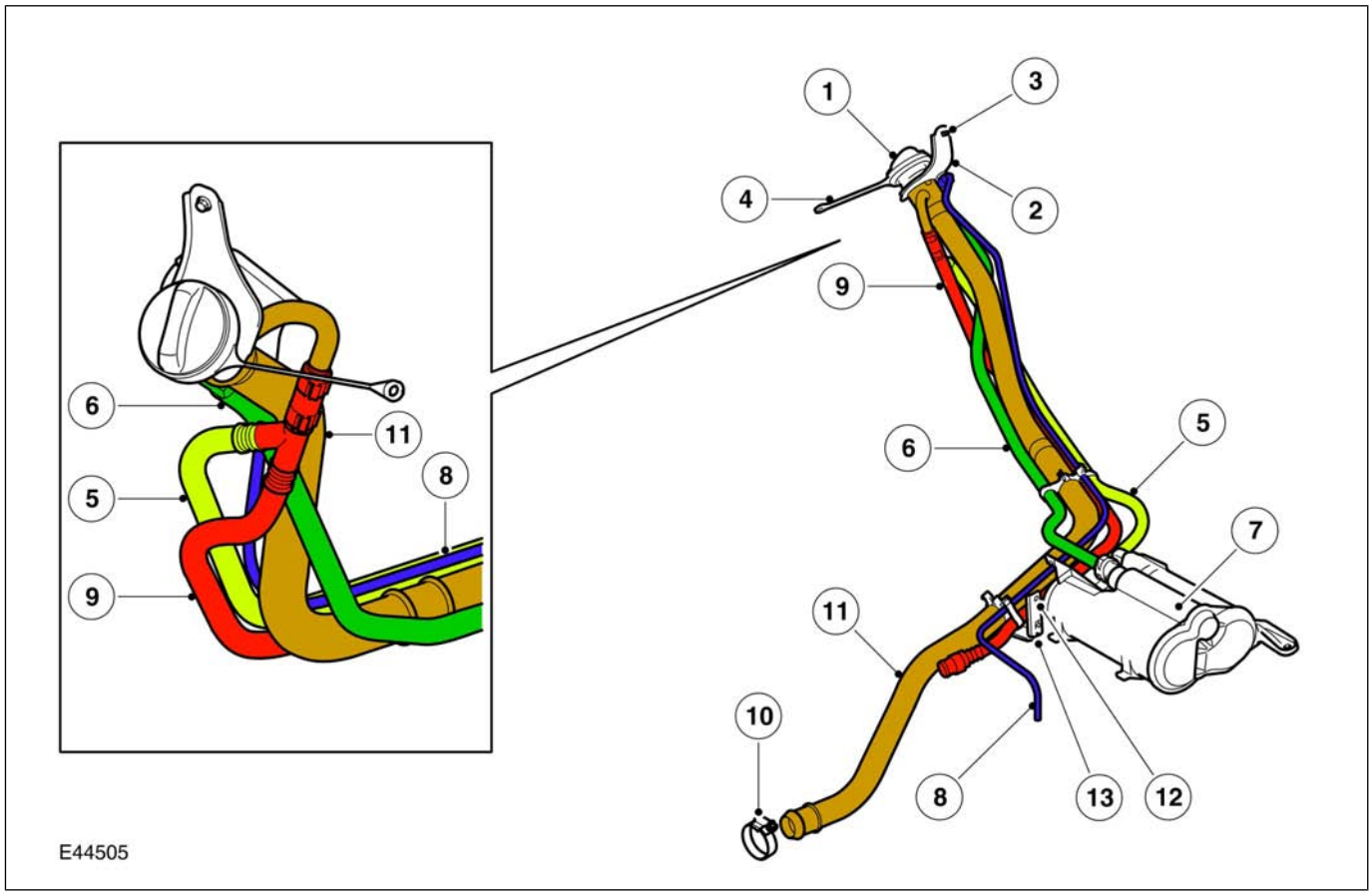
The rear jet pump operates at pump output pressure and delivers some of the fuel at pump pressure from the rear of the tank.

Roll Over Valves (ROVs)

Four ROVs are located on the carrier and are connected via pipes to a liquid vapour separator. The separator, which is also attached to the carrier, is connected via a pipe to the tank breather outlet in the pump module flange. The ROVs contain non-return valves which close in the event of the vehicle overturning, preventing liquid fuel escaping from the tank via the breather pipe.

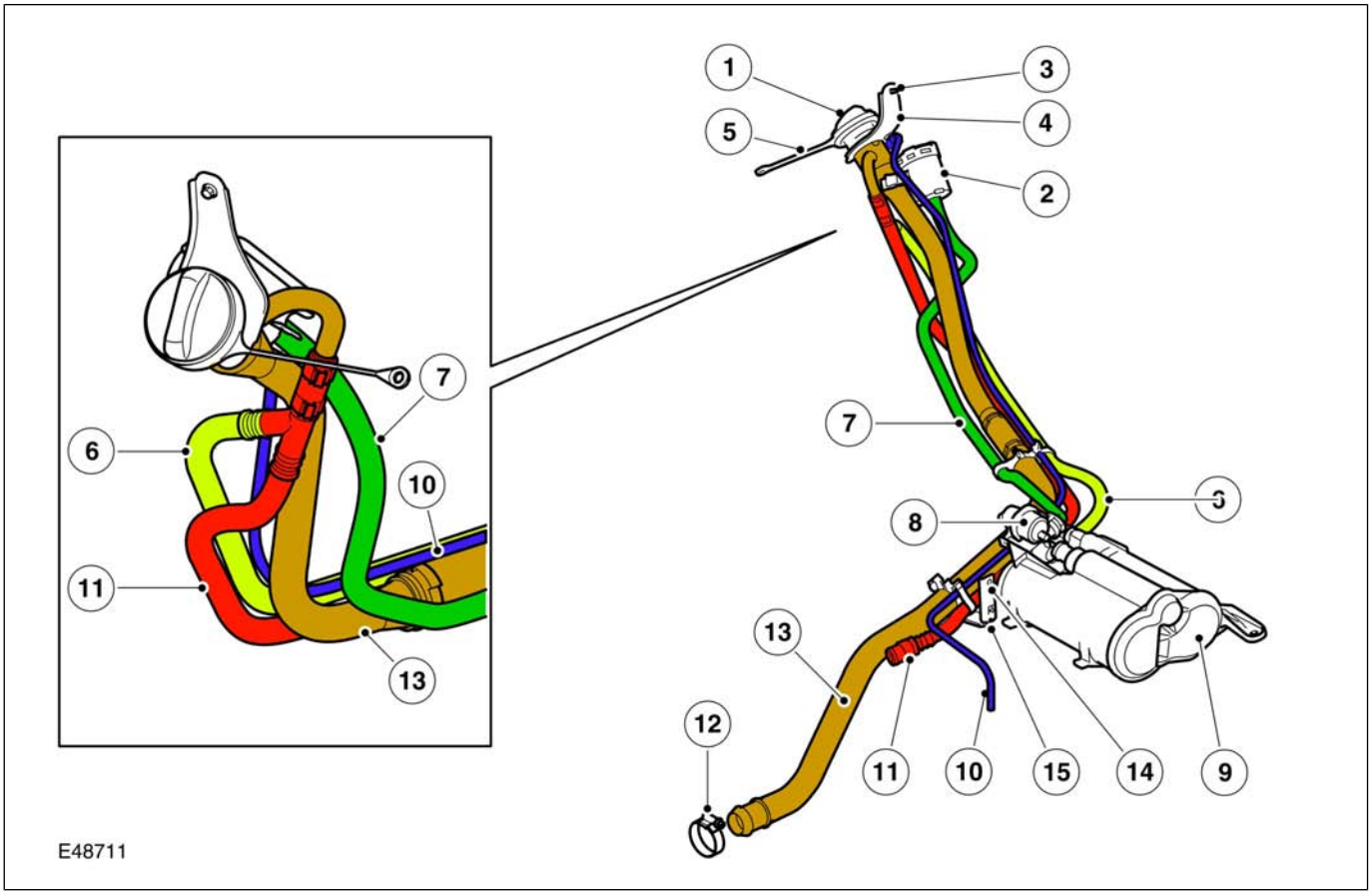
FUEL FILLER PIPE ASSEMBLY

Fuel Filler - ROW



1 Filler cap
2 Bracket
3 Screw M6
4 Filler cap lanyard
5 Charcoal canister breather hose
6 Charcoal canister vent hose to atmosphere
7 Charcoal canister (ROW)
8 Rear differential breather pipe
9 Tank breather pipe
10 Clamp - filler hose
11 Fuel filler pipe
12 Screw M8
13 Lower mounting bracket to EPB bracket

Fuel Filler - NAS



1 Filler cap
2 DMTL pump filter
3 Screw M6
4 Bracket
5 Filler cap lanyard
6 Charcoal canister breather hose
7 DMTL pump vent hose to filter
8 DMTL pump
9 Charcoal canister (NAS)
10 Rear differential breather pipe
11 Tank breather pipe
12 Clamp - filler hose
13 Fuel filler pipe
14 Screw M8
15 Lower mounting bracket to EPB bracket

The fuel filler head is positioned at the rear of the vehicle, above the right hand rear wheel. The filler head is covered by a moulded plastic cover which is electrically locked when the vehicle is locked. The filler cap is a conventional screw in type which is secured to the vehicle with a lanyard.

NOTE: The fuel filler head plastic cover does not lock on NAS vehicles.

The filler head is a stainless steel fabrication. Two brackets provide for the attachment of the filler head to the vehicle body and the chassis electronic park brake bracket.

Connections on the rear of the filler head allow for the connection of the fuel tank breather pipe from the fuel tank flange, the fuel filler pipe to the tank and the charcoal canister breather pipe.

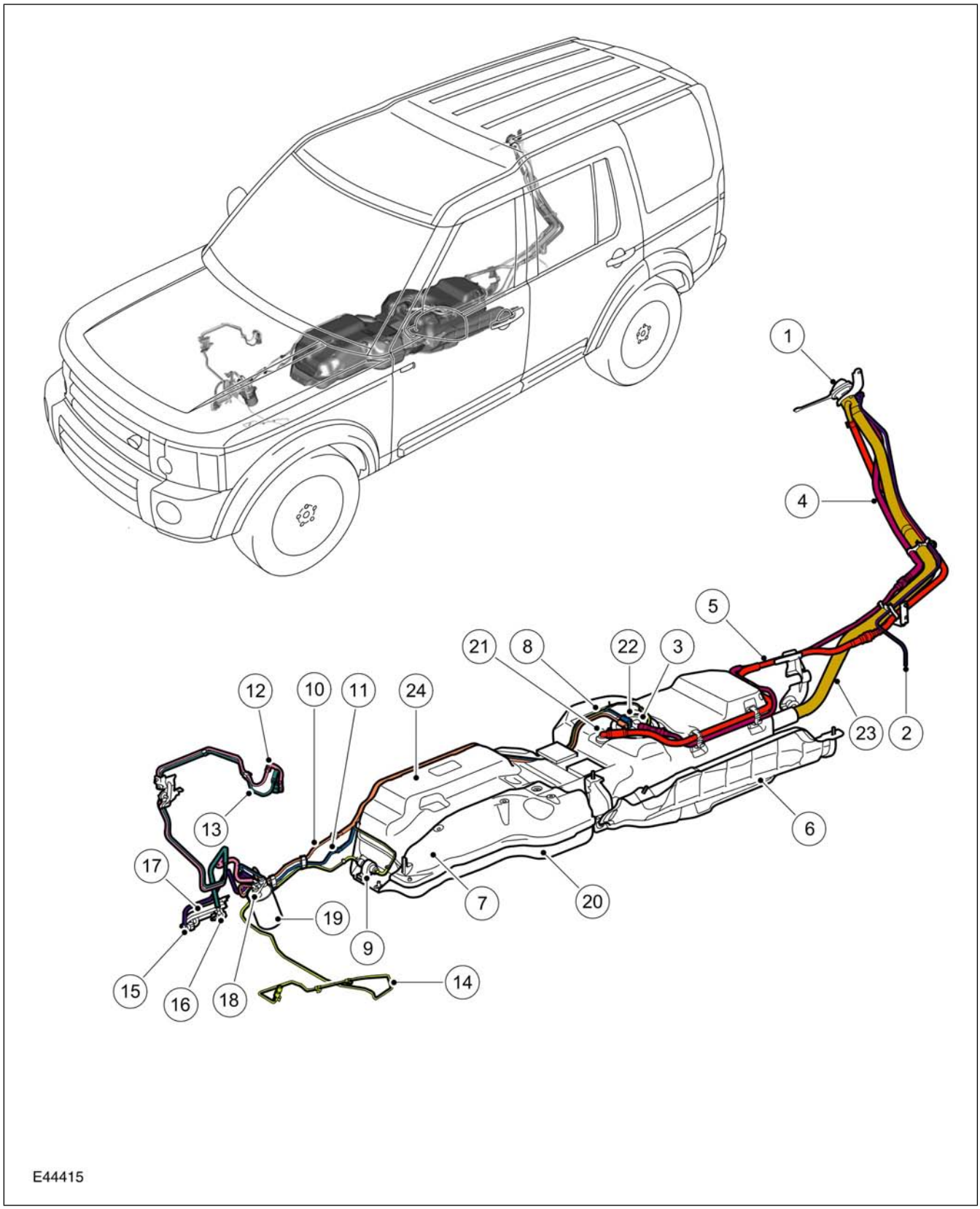
The fuel tank breather pipe has a quick release fitting and connects to the breather pipe from the fuel tank flange.

The fuel filler pipe locates in a short flexible hose attached to the tank and is secured with worm drive clamps. The canister breather pipe is routed alongside the fuel filler pipe and attaches to the canister with a quick release coupling.

A fourth pipe is also routed alongside the fuel filler pipe and provides air ventilation for the charcoal canister. On all petrol vehicles, except NAS vehicles, the pipe is connected to the air pump port on the charcoal canister with a quick release coupling and connects to an insect trap at the fuel filler head. On NAS vehicles fitted with a DMTL pump, the pipe connects to the pump vent port and is also connected to a filter which is attached to the filler head.

A smaller pipe, which is not associated with the fuel system, is attached to the side of the fuel filler pipe. This pipe connects to the rear differential and provides breathing for the differential case. The pipe terminates near the fuel filler head.

Fuel Delivery System Component Location



1 Filler cap and lanyard
2 Rear differential breather pipe
3 Fuel pump module assembly
4 Fuel tank vent pipe

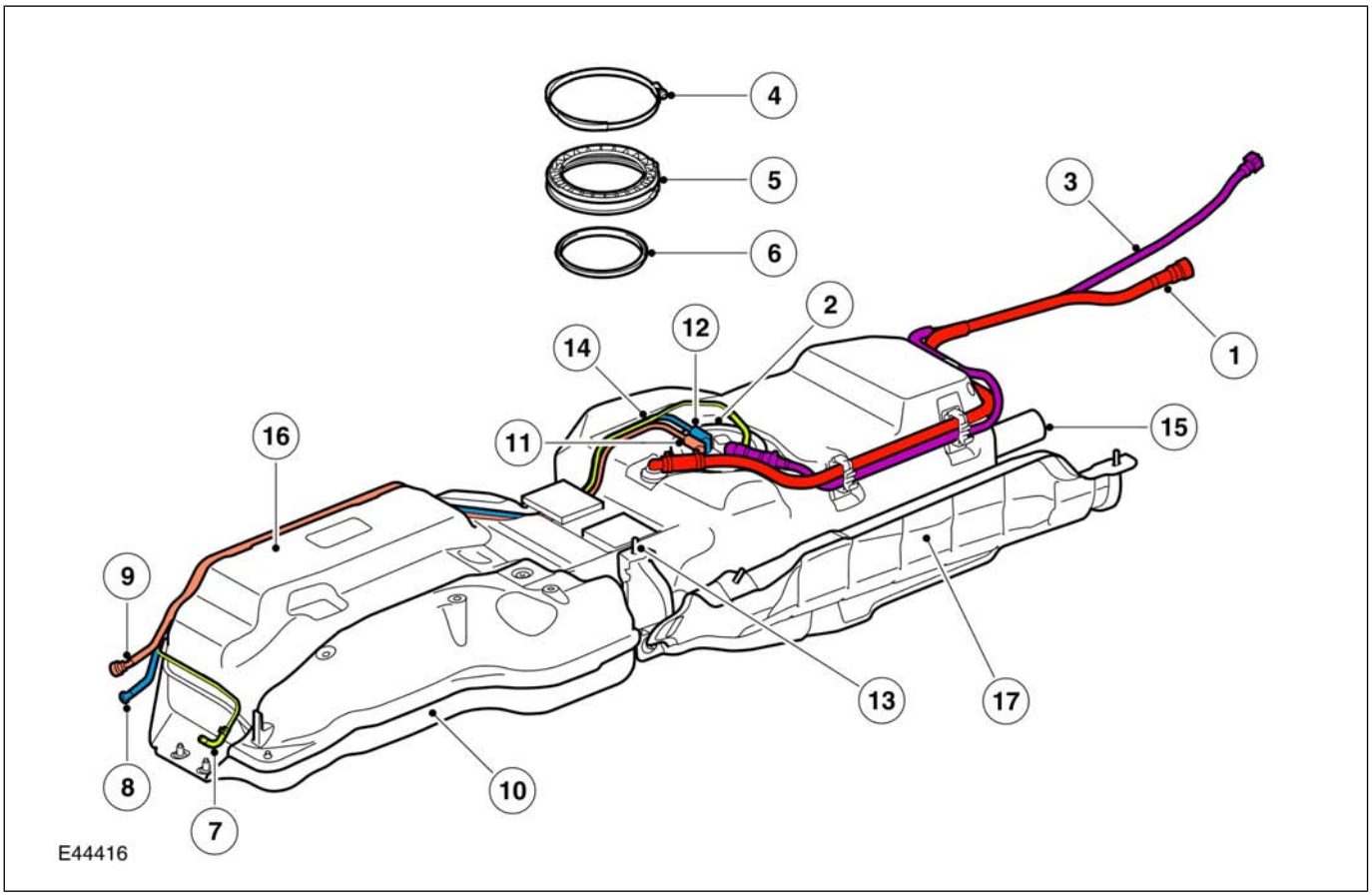
5 Tank breather pipe
6 Heat shield
7 Cover
8 Pipe - Fuel Burning Heater (FBH) pump feed (if fitted)
9 FBH pump (if fitted)
10 Pipe - Pump to filter (fuel feed)
11 Pipe - Filter to pump module (fuel return)
12 Pipe - Filter to engine (fuel feed)
13 Pipe - Engine to fuel cooler (fuel return)
14 Pipe - FBH pump to FBH (if fitted)
15 Pipe - Fuel cooler to filter (fuel return)
16 Pipe - HP pump to fuel cooler (fuel return)
17 Fuel cooler
18 Fuel filter bracket
19 Fuel filter assembly
20 Cradle
21 Pipe - Fuel pump to filter (fuel feed)
22 Pipe - Filter to pump module (fuel return)
23 Fuel filler pipe
24 Fuel tank

GENERAL

The major components of the TdV6 fuel system comprise a fuel tank, a fuel pump module, a fuel filter, a fuel cooler, a fuel filler pipe and cap assembly and two fuel level sensors.

The TdV6 fuel system is a high pressure common rail system. This system uses an engine mounted and driven high pressure pump to deliver a uniform level of pressure to the common fuel rail which supplies all fuel injectors.

FUEL TANK ASSEMBLY



1 Tank breather pipe
2 Fuel pump module assembly
3 Vent pipe
4 Pump module clamp
5 Pump module collar
6 Pump module seal
7 FBH pump feed pipe (if fitted)
8 Pipe - Fuel return
9 Pipe - Fuel feed
10 Cradle
11 Fuel feed pipe connection
12 Fuel return pipe connection
13 Mounting bolt (6 off)
14 FBH feed pipe connection (if fitted)
15 Fuel filler hose
16 Fuel tank
17 Heat shield

The fuel tank is located on the right hand side of the vehicle, between the transmission and the right hand chassis longitudinal. The tank is located on a mounting cradle which secures the whole fuel tank assembly to the vehicle. The tank has a useable capacity of 82.0 liters (18 gallons).

The cradle is attached to the chassis with six screws. When the cradle is attached to the chassis, the tank is positively secured via foam pads which bear against the central chassis cross beam. A protective cover is fitted to the front right hand corner of the tank and provides additional protection.

The fuel tank is manufactured from moulded plastic which is a minimum of 3 mm thick. The tank is a sealed unit with the only internal access being via the pump module flange aperture on the top of the tank.

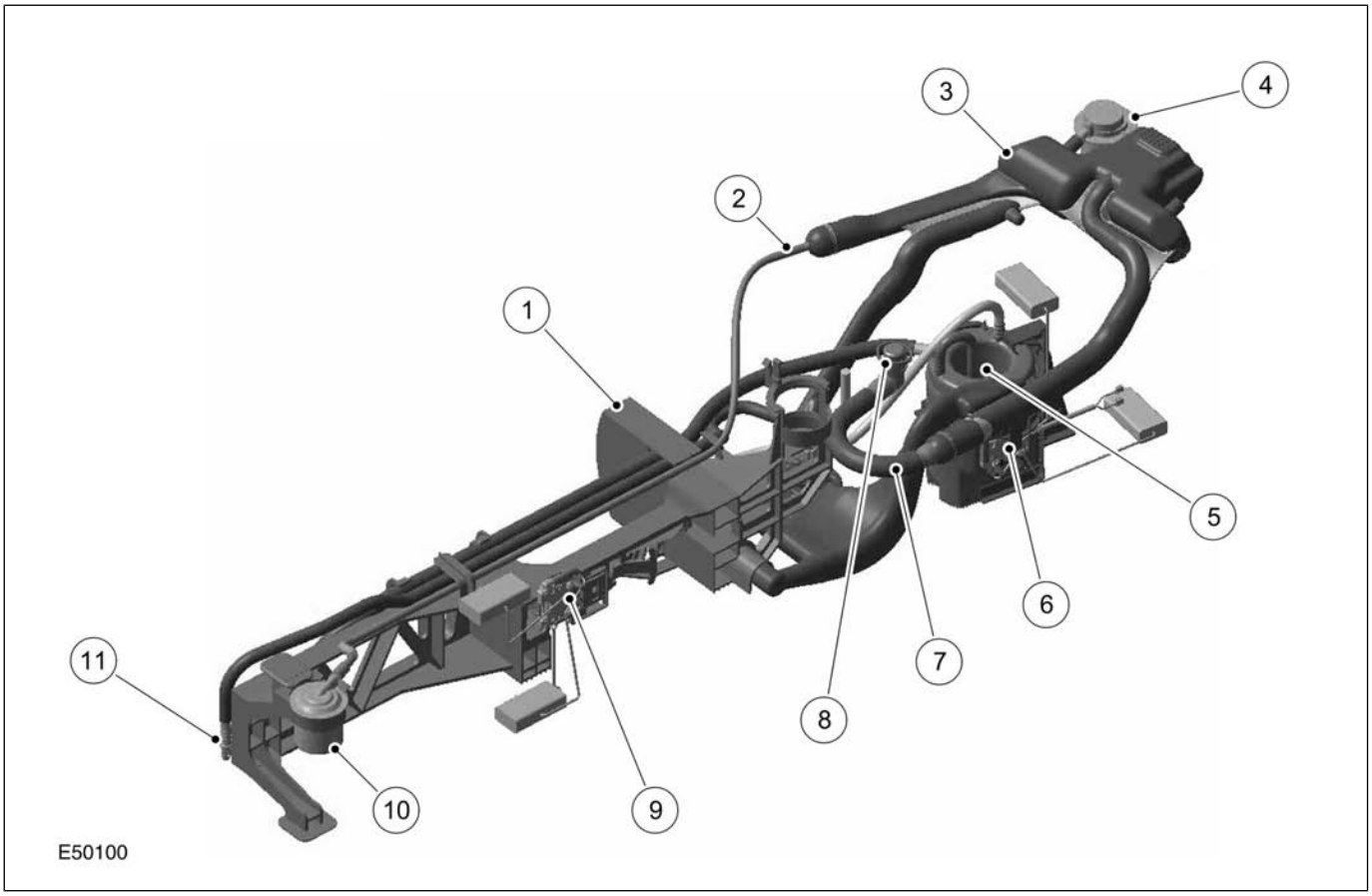
The flange assembly comprises a pump module flange which contains all external pipe and electrical connections for the tank internal components, a collar and a clamp. The flange is fitted with a seal which locates in the tank aperture. An arrow on the flange must be aligned between two moulded lines on the tank, adjacent to the pump module flange aperture, to obtain the correct orientation of the flange. The collar is located over the flange and is secured with the clamp.

The flange has a six pin external connector which provides for electrical connections for the level sensors and the fuel pump. This connector is wired to three push fit connectors on the underside of the flange. Two quick release connectors provide for the connection of the fuel feed and return pipes and the vent pipes. The fuel return connection contains a non return valve which prevents fuel escaping from the connection in the event of a vehicle roll over and the pipe becoming detached. On vehicles with a fuel burning heater, a third connection provides the connection for the fuel feed supply to the fuel burning heater.

A tank carrier assembly is attached inside the tank and is used to locate the internal tank components. The carrier provides location for the fuel pump module, the front level sensor, the Roll Over Valves (ROVs) and the front jet pump.

The fuel pump module contains a number of components. The module comprises the fuel pump, the rear fuel level sensor, the rear jet pump, the pump inlet filter and the fuel pressure regulator which is mounted in a manifold which is attached on the carrier. Only the pump module assembly and the fuel level sensors are available as serviceable components, the individual assembly components are not available separately.

Fuel Tank Internal Components



1 Carrier assembly
2 Front ROV corrugated tube
3 Liquid Vapor Separator (LVS)
4 Rear Roll Over Valve (ROV)
5 Fuel pump module
6 Rear fuel level sensor
7 Tank breather corrugated tube
8 Tank breather connection
9 Front fuel level sensor
10 Front ROV
11 Front jet pump

The TdV6 vent system is different to the system used on the petrol models. The TdV6 vent system comprises:

- two Roll Over Valves (ROV)
- one Liquid Vapor Separator (LVS)
- breather spout.

The vent system is mounted on the fuel tank internal carrier which is assembled outside of the tank and inserted into the tank during the blow moulding process. None of the internal tank venting components are serviceable.

The rear ROV is mounted in the rear right hand corner of the fuel tank. It is mounted directly onto the LVS with a rubber grommet and secured with a clip.

The front ROV is located in the front left hand corner of the tank. It is attached by a moulded clip to the main beam of the carrier. The ROV is connected to the LVS by a corrugated tube.

Both ROVs vent directly into the LVS. Any liquid fuel is separated from the vapor in the LVS and drains back into the tank via the front ROV.

The LVS vent outlet is connected to the underside of the tank flange. The vent line is then routed from the flange to atmosphere at the top of the filler neck. This line allows for pressure and vacuum relief during normal tank operation. It also allows air to enter the tank as fuel is used.

The main purpose of the tank breather connection is to control the fill volume of the tank. During filling, vapor exits the fuel tank via the breather connection and the breather tube to the filler neck. When the tank reaches its full level, the liquid fuel closes off the breather connection by filling it with fuel. The closure of the breather connection causes the back pressure in the tank to increase, which in turn causes the pump filling nozzle to turn off.

Fuel Pump Module

The fuel pump is attached to the carrier and is located at the bottom of the swirl pot. The pump and the fuel level sensors are connected to the external electrical connector via the connectors on the underside of the fuel pump module flange.

The pump module has a rated flow of 70 liters/hour (18.5 US gallons/hour) at a voltage of 12.3V and an output pressure of 0.5 bar (7.25 lbf/in^2).

The fuel pump is energised by the fuel pump relay which is located in the battery junction box. The relay is controlled by the engine control module and energises the relay at all times when the ignition switch is in ignition position II.

A filter is attached to pump inlet port at the bottom of the pump. The filter has a 'winged' section which is located vertically at the side of the pump to ensure that a portion of the filter is off the base of the swirl pot, to prevent premature blocking of the filter. The filter has two sections, a normal filter and a by-pass filter. The normal filter is a 31 micron fine mesh filter with a surface area of 70 cm^2 (10.8 in^2). The by-pass filter is a 300 micron coarse mesh filter which is closed in normal conditions and has a surface area of 4 cm^2 (0.62 in^2). In cold conditions, 'waxing' of the fuel can occur which can restrict fuel passing through the fine mesh filter. If this occurs, the by-pass opens allowing fuel to pass through the coarse mesh filter.

The top face of the fuel pump module has three pipe connections. One connection is the fuel pump outlet connection which feeds into the manifold. A second connection allows fuel at pump outlet pressure to flow back through the pump module housing from the manifold to the rear jet pump. The third connection allows fuel from the pressure regulator to return to the swirlpot when the regulator has opened due to excessive pump output pressure.

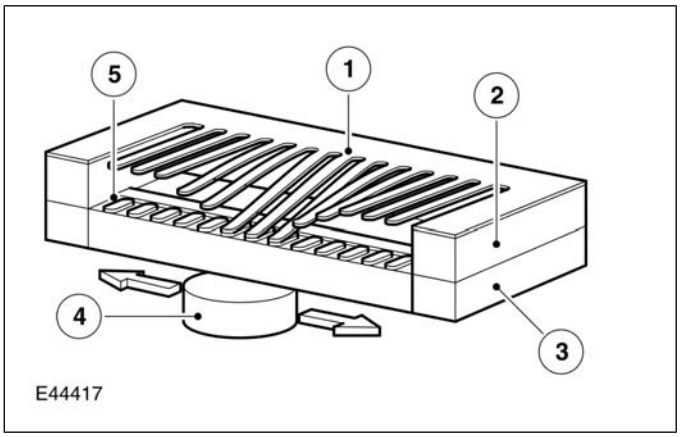
Fuel Level Sensors

The sensor is a MAgnetic Passive Position Sensor (MAPPS) which provides a variable resistance to earth for the output from the fuel gauge. The sensor is sealed from the fuel preventing contamination of the contacts, increasing reliability. The front and rear fuel level sensors are connected to the external electrical connector on the flange via the connectors on the underside of the fuel pump module flange.

The front sensor is attached to the front of the carrier and is accessible via the fuel pump flange aperture. The rear sensor is attached to the side of the swirl pot and is also accessible via the flange aperture.

The sensor comprises a series of 51 film resistors mounted in an arc on a ceramic surface. The resistors are wired in series with individual contacts. A soft magnetic foil with 51 flexible contacts is mounted a small distance above the film resistors. A magnet, located below the ceramic surface, is attached to the sender unit float arm. As the float arm moves the magnet follows the same arc as the film resistors. The magnet pulls the flexible contacts onto the opposite film resistor contacts forming an electrical circuit.

Sensor Operating Principle



1 Magnetic foil
2 Spacer
3 Ceramic surface
4 Magnet
5 Resistance film

The film resistors are arranged in a linear arc with resistance ranging from 51.2 to 992.11 Ohms. The electrical output signal is output proportional to the amount of fuel in the tank and the position of the float arm. The measured resistance is processed by the instrument pack to implement an anti-slosh function. This monitors the signal and updates the fuel gauge pointer position at regular intervals, preventing constant pointer movement caused by fuel movement in the tank due to cornering or braking.

A warning lamp is incorporated in the instrument cluster and illuminates when the fuel level is at or below 10 liters (2.64 US gallons).

The fuel level sender signal is converted into a CAN message by the instrument pack as a direct interpretation of the fuel tank contents in liters.

Front Fuel Level Sensor Resistance/Fuel Gauge Read out Table

Sender Unit Resistance, Ohms	Nominal Gauge Reading
NOTE: These figures are with the vehicle on level ground. Sensor readings will differ with varying vehicle inclinations.	
51.2	Empty
67	Low fuel level illumination (17L)
281	Half full
872	Full

Rear Fuel Level Sensor Resistance/Fuel Gauge Read out Table

Sender Unit Resistance, Ohms	Nominal Gauge Reading
NOTE: These figures are with the vehicle on level ground. Sensor readings will differ with varying vehicle inclinations.	
75	Empty
150	Low fuel level illumination (17L)
267	Half full
768	Full

Fuel Pressure Regulator

The fuel pressure regulator is located in the manifold inside the fuel tank. The regulator controls the fuel pressure in the feed pipe to the HP injection pump. If

the pump outlet pressure becomes too high, the regulator controls the fuel pressure in the feed pipe by allowing some fuel to return to the swirl pot.

The regulator is subject to pump output pressure and controls the pressure of the fuel delivered to the HP injection pump to a maximum of 0.5 bar (7.25 lbf/in^2). At pressures above this figure, the regulator opens, decaying the pressure supplied to the HP injection pump by allowing fuel to flow back into the swirl pot. The primary reason for the regulator is to protect the HP fuel injection pump from high fuel input pressures from the LP fuel pump if a high voltage condition occurs.

Swirl Pot

The swirl pot is located at the rear of the fuel tank and provides for the attachment or location of most of the fuel pump assembly components.

The swirl pot acts as a fuel reserve, providing a constant supply of fuel to the fuel pump irrespective of fuel quantity or vehicle attitude. When the vehicle is level the swirl pot contains approximately 400 cm^3 (24.4 in^3) of fuel when the engine is running. The two jet pumps ensure that fuel is constantly supplied to the swirl pot to provide a sufficient fuel supply for the pump.

A one way valve is located in the base of the swirl pot. The valve allows fuel from the tank to enter the swirl pot, but prevents it from escaping.

Jet Pumps

The fuel system incorporates two jet pumps. The front jet pump is located on the carrier near the front of the fuel tank. The rear jet pump is located in the swirl pot below the fuel pump. Both jet pumps operate on a venturi effect created by fuel at pump output pressure passing through the jet pump. This draws additional fuel from the tank through ports in the jet pump body, delivering additional fuel to the swirl pot.

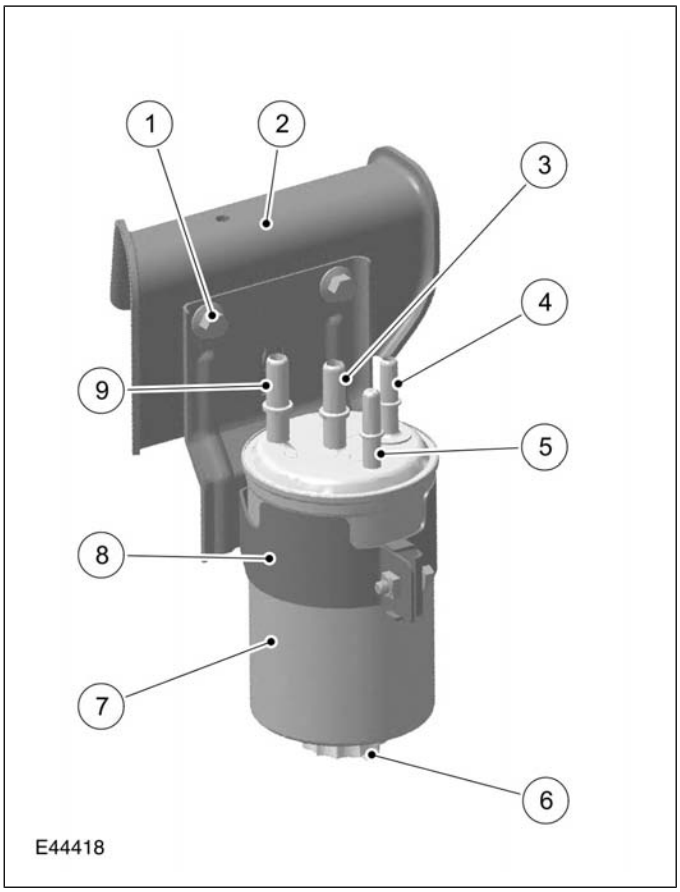
The front jet pump is mainly used when the vehicle is driving downhill. The jet pump is connected via a pipe from the fuel manifold and receives fuel at pump output pressure. Because of its location at the front of the tank, it collects fuel from the front of the tank and transfers it into the swirl pot, ensuring a constant supply of fuel to the pump. The jet pump has a jet nozzle of 1 mm diameter.

The rear jet pump operates at pump output pressure and delivers some of the fuel from the rear of the tank back into the swirl pot.

Roll Over Valves (ROVs)

Two ROVs are located on the carrier and are connected via pipes to a liquid vapour separator. The separator, which is also attached to the carrier, is connected via a pipe to the tank breather outlet in the pump module flange. The ROVs contain non-return valves which close in the event of the vehicle overturning, preventing liquid fuel escaping from the tank via the breather pipe.

FUEL FILTER



1 Screw M8 (2 off)

2 Bracket

3 Fuel feed to engine (HP injection pump)

4 Fuel return from cooler

5 Fuel return/air bleed to tank

6 Water drain valve

7 Filter canister

8 Clamp bracket

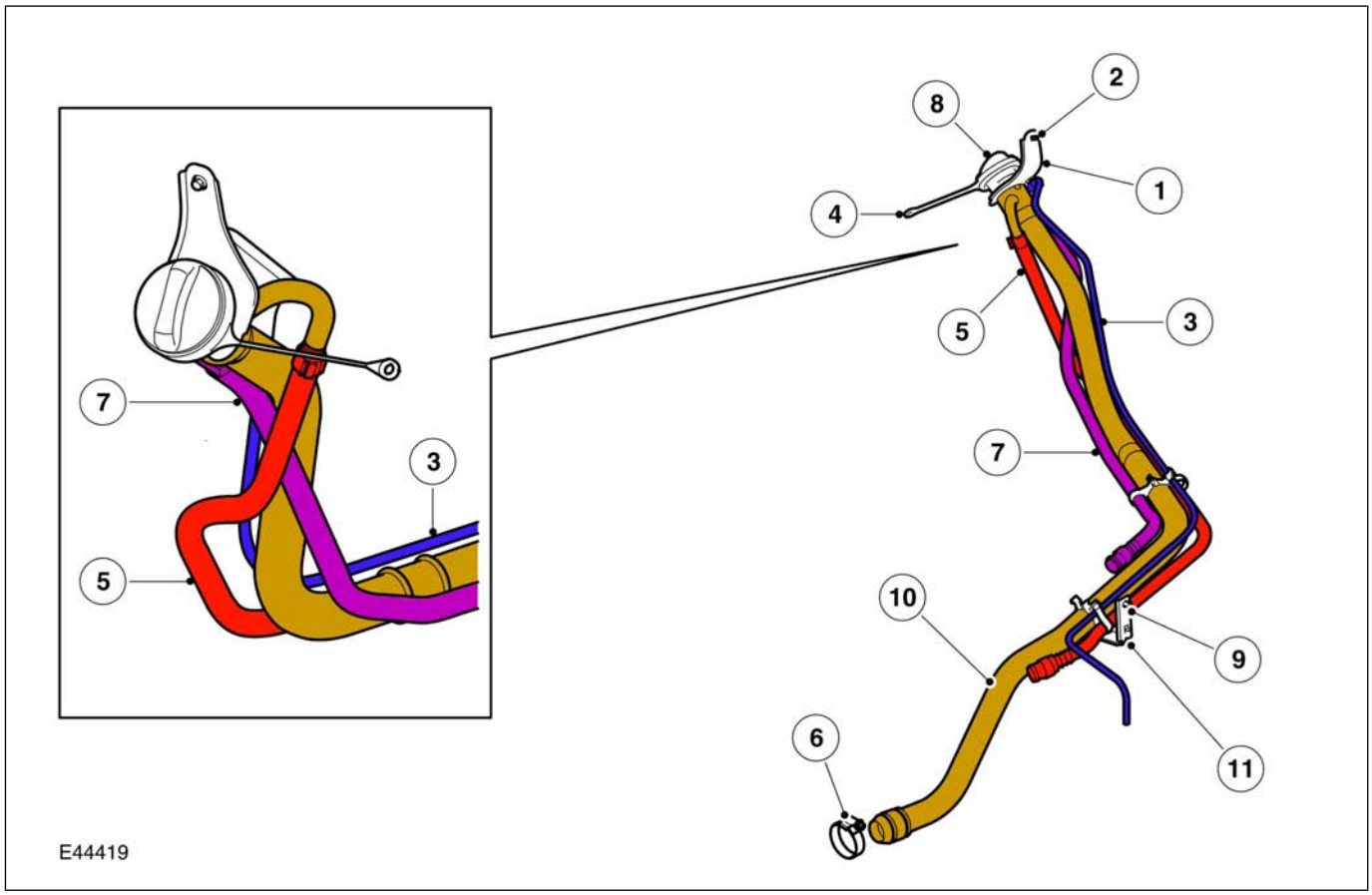
9 Fuel feed from pump module

The fuel filter is located behind the fuel cooler, at the rear of the engine and is protected by the engine undertray. The fuel filter assembly comprises a bracket and the filtration element which is contained within a canister.

The filter canister is attached to a circular bracket which is clamped around the filter canister with a bolt and nut. The bracket is attached on the inside of the right hand chassis rail with two screws. Removal of the fuel filter requires loosening of the bolt and nut and removing the filter canister from the circular bracket.

The filter element has a capacity of 500 cm^3 (30.5 in^3). The filtration element can filter particulate matter larger than 2 microns. A water drain plug is located on the base of the filter. The filter can be purged of water by partially unscrewing the filter element plug and allowing fuel to drain into a suitable container. The plug must tightened to a torque specified in the Service Repair Manual.

FUEL FILLER



1 Bracket
2 Screw M6
3 Rear differential breather pipe (Ref.)
4 Filler cap lanyard
5 Tank breather pipe
6 Clamp - filler hose
7 Vent pipe
8 Filler cap
9 Screw M8
10 Filler pipe
11 Lower mounting bracket to EPB bracket

The fuel filler head is positioned at the rear of the vehicle, above the right hand rear wheel. The filler head is covered by a moulded plastic cover which is electrically locked when the vehicle is locked. The filler cap is a conventional screw in type which is secured to the vehicle with a lanyard.

NOTE: The fuel filler head plastic cover does not lock on NAS vehicles.

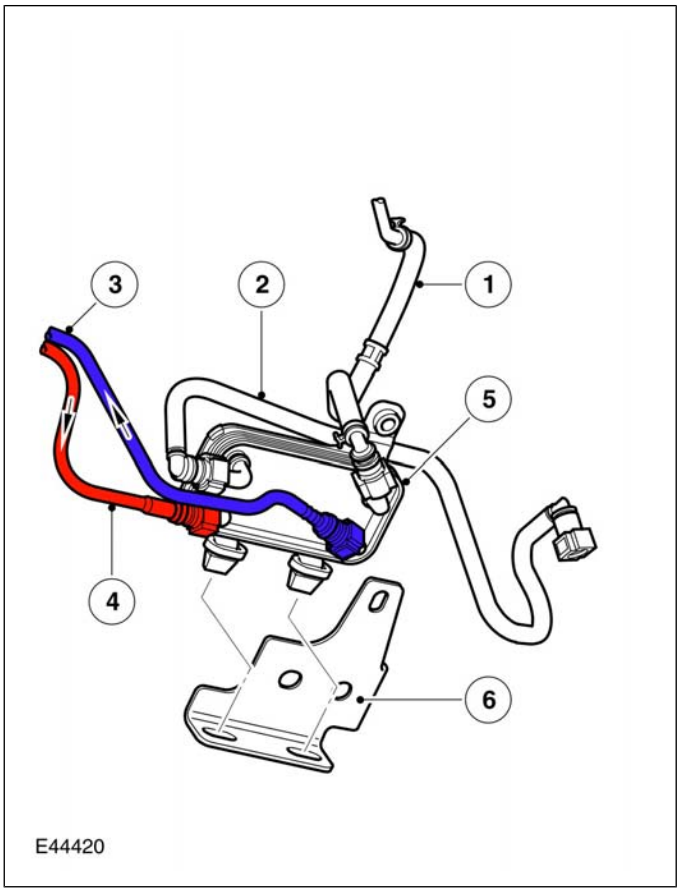
The filler head is a stainless steel fabrication. Two brackets provide for the attachment of the filler head to the vehicle body and the chassis electronic park brake bracket.

A connection on the rear of the filler head allows for the connection of the fuel tank breather pipe from the fuel tank breather stub. The fuel tank breather pipe has a quick release fitting and connects to the breather pipe from the fuel tank breather stub. The fuel filler vent pipe from the tank is vented to atmosphere. The vent pipe

incorporates an insect trap at its termination near the filler head. The fuel filler pipe locates in a short flexible hose attached to the tank and is secured with two worm drive clamps.

A smaller pipe, which is not associated with the fuel system, is attached to the side of the fuel filler pipe. This pipe connects to the rear differential and provides breathing for the differential case. The pipe terminates near the fuel filler head.

FUEL COOLER



1 Pipe - HP pump to cooler
2 Pipe - cooler to fuel filter
3 Coolant outlet
4 Coolant inlet
5 Fuel cooler
6 Bracket

The fuel cooler uses engine coolant, direct from the lower part of the radiator, to cool fuel returning to the tank from the HP injection pump.

The fuel cooler is located on the right hand side of the chassis, at the rear of the engine, near to the starter motor. A bracket, which is attached to the right hand chassis rail, provides for the attachment of the cooler. The bracket has two slots which accept two plastic pegs which are attached to the cooler. A bolt is inserted through a hole in the bracket and screws into a captive nut on the cooler to positively secure the cooler to the bracket.

The cooler has four quick fit connector pipes which provide for the attachment of the fuel inlet hose from the HP injection pump, the fuel outlet hose to the fuel filter, the coolant inlet hose from the radiator and the coolant outlet hose to the coolant thermostat housing. The coolant pipes can be identified by their smaller diameter.