SECTION 8A - FUEL TANK

CAUTION:

This vehicle will be equipped with a Supplemental Restraint System (SRS). An SRS will consist of either seat belt pre-tensioners and a driver's side air bag, or seat belt pre-tensioners and a driver's and front passenger's side air bags. Refer to CAUTIONS, Section 12M, before performing any service operation on or around any SRS components, the steering mechanism or wiring. Failure to follow the CAUTIONS could result in SRS deployment, resulting in possible personal injury or unnecessary SRS system repairs.

CAUTION:

This vehicle may be equipped with LPG (Liquefied Petroleum Gas. In the interests of safety, the LPG fuel system should be isolated by turning 'OFF' the manual service valve and then draining the LPG service lines, before any service work is carried out on the vehicle. Refer to the LPG leaflet included with the Owner's Handbook for details or LPG Section 2 for more specific servicing information.

CAUTION:

Whenever any component that forms part of the ABS or ABS/ETC (if fitted), is disturbed during Service Operations, it is vital that the complete ABS or ABS/ETC system is checked, using the procedure as detailed in 4. DIAGNOSIS, ABS or ABS/ETC FUNCTION CHECK, in Section 12L ABS & ABS/ETC.

1. GENERAL INFORMATION

The 75 litre fuel tank fitted to all VT Series models is a multi-layer polycarbonate construction with an integral fuel filler neck. The fuel tank is not serviceable and if damaged, must be replaced as an assembly.

The fuel tank is supported by three mounting straps and a seal is fitted around the fuel filler neck where it protrudes through the vehicle body.

An in-tank, modular fuel sender assembly is used, that incorporates a fuel reservoir, the fuel sender unit and the fuel pump in the one unit.

Apart from the complete assembly, serviced components for the modular fuel sender, are the fuel pump, pick-up strainer and fuel sender assembly.

Servicing details for these and other fuel tank/line related items are covered in this Section.

Quick-connect fuel line fittings are used for all fuel line connections, including, the modular fuel sender assembly, fuel vapour canister, fuel filter, fuel feed and return lines, both at the fuel tank and engine ends.

1.1 MODULAR FUEL SENDER ASSEMBLY

The modular fuel sender assembly is designed to maintain an optimum fuel level in the reservoir. This ensures a continuous fuel flow under all fuel level conditions and vehicle attitudes. As there are two different construction fuel pumps used, two fuel flow descriptions are required.

The first details fuel flow through the turbine fuel pump that is used with both the V6 and V8 engines.

Turbine Fuel Pump (View A, in Figure 8A-1)

Fuel is drawn into the reservoir from the fuel tank, through the external strainer (3) and into the fuel pump's first stage impeller, via the primary fuel pump inlet. First stage fuel is then directed to the reservoir, filling the reservoir bucket..

Fuel levels in the reservoir are also maintained by return engine fuel, via the return line. Reservoir fuel flow proceeds through the fuel pump strainer, bypassing the first stage impeller. Fuel proceeds to the second impeller and the high pressure third stage of the impeller pump.

High pressure fuel then flows through the end cap, the lower connector and the fuel pump flex pipe. From the flex pipe, fuel then exits the modular fuel sender assembly through the fuel feed fitting and flows on to the externally mounted fuel filter.

Roller Vane Fuel Pump, (View B, in Figure 8A-1)

This pump design is used with the V6 Supercharged engine and in a similar manner to the first, fuel enters the roller vane pump via the two strainers (3 and 5). The initial function of the pump is to separate vapour from the fuel and this is done in the first stage. This vapour separation maximises hot fuel handling and allows the vapour to return to the tank at a lower pressure and temperature.

The pump then discharges the liquid fuel into the roller vane section of the pump. Attached to the pump outlet is a diverter that allows the primary fuel volume to flow into the flex pipe and also deliver a portion of the flow to the jet pump.

Action of this diverted fuel from the outlet of the fuel pump, passing through the jet pump filter (6) and creates a low pressure area at its base, causing the umbrella valve (2) to unseat, drawing cooler fuel into the reservoir area.

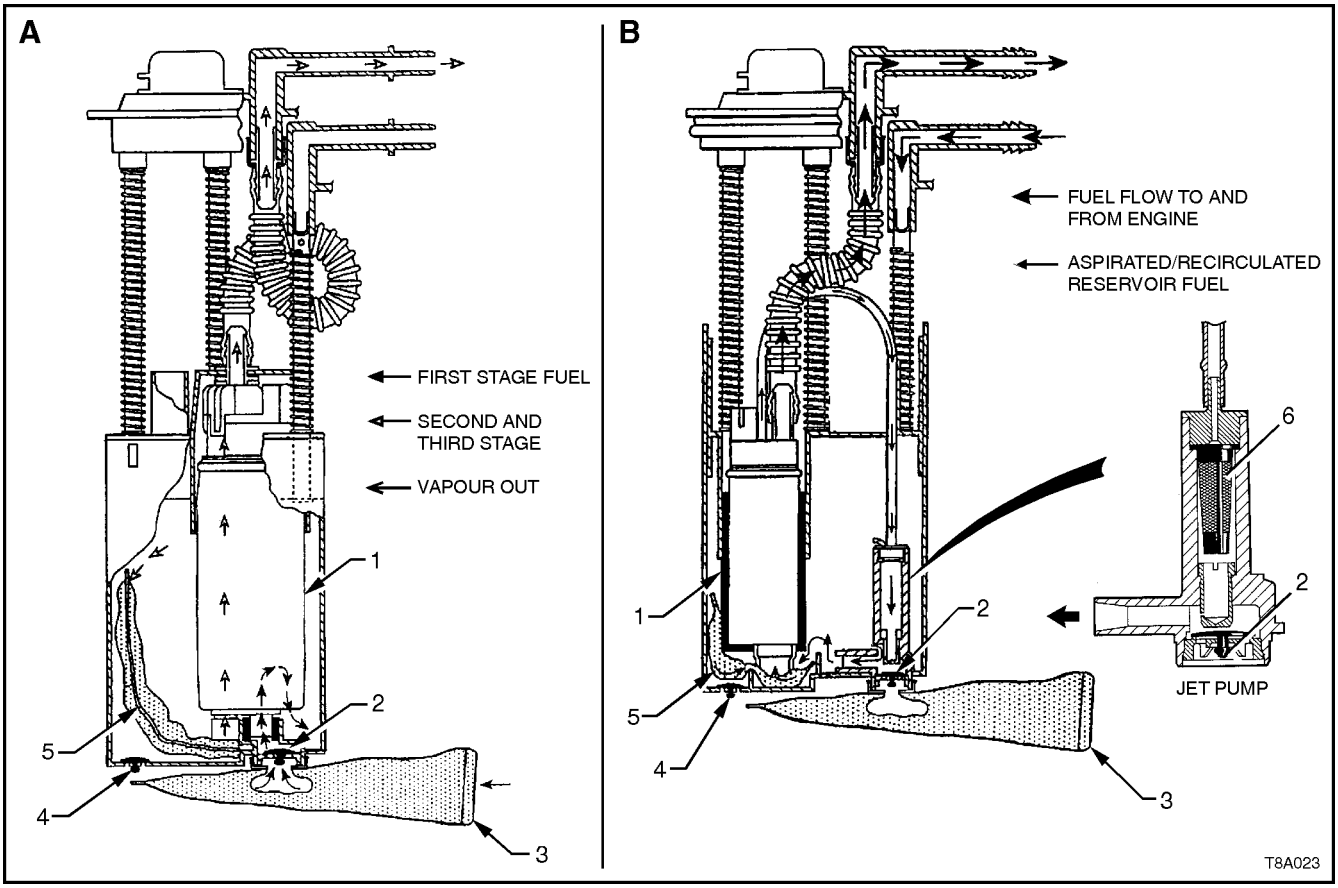


Figure 8A-1

With either pump, when power is switched off, the reservoir remains full of fuel, because of the action of the primary (2) and secondary (4) umbrella valves. During refuelling operations, the secondary umbrella valve (4) unseats, allowing fuel to enter the reservoir up to the fuel tank fuel level. Fuel tank overflow fuel enters the reservoir over the top of the assembly.

Should the external strainer (3) become blocked or restrict fuel entry, then the secondary umbrella valve (4) will unseat, allowing fuel to enter the reservoir area.

Electrical power to the fuel pump enters the unit via a connector that is secured to the cover. An internal harness assembly completes the connection to the pump (not shown).

Also incorporated into the cover design, is a 'roll over' valve that limits vapour venting to the canister through the use of a sized orifice. In the event that the vehicle rolls over, the vent line to the canister is safely shut off by the roll-over valve.

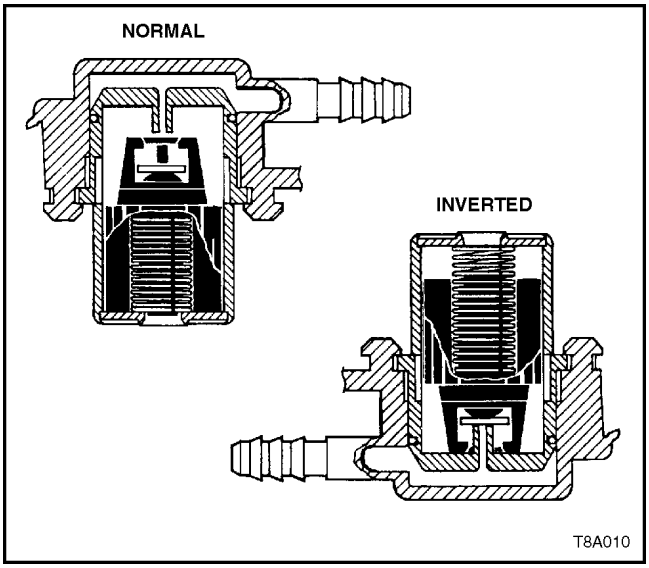
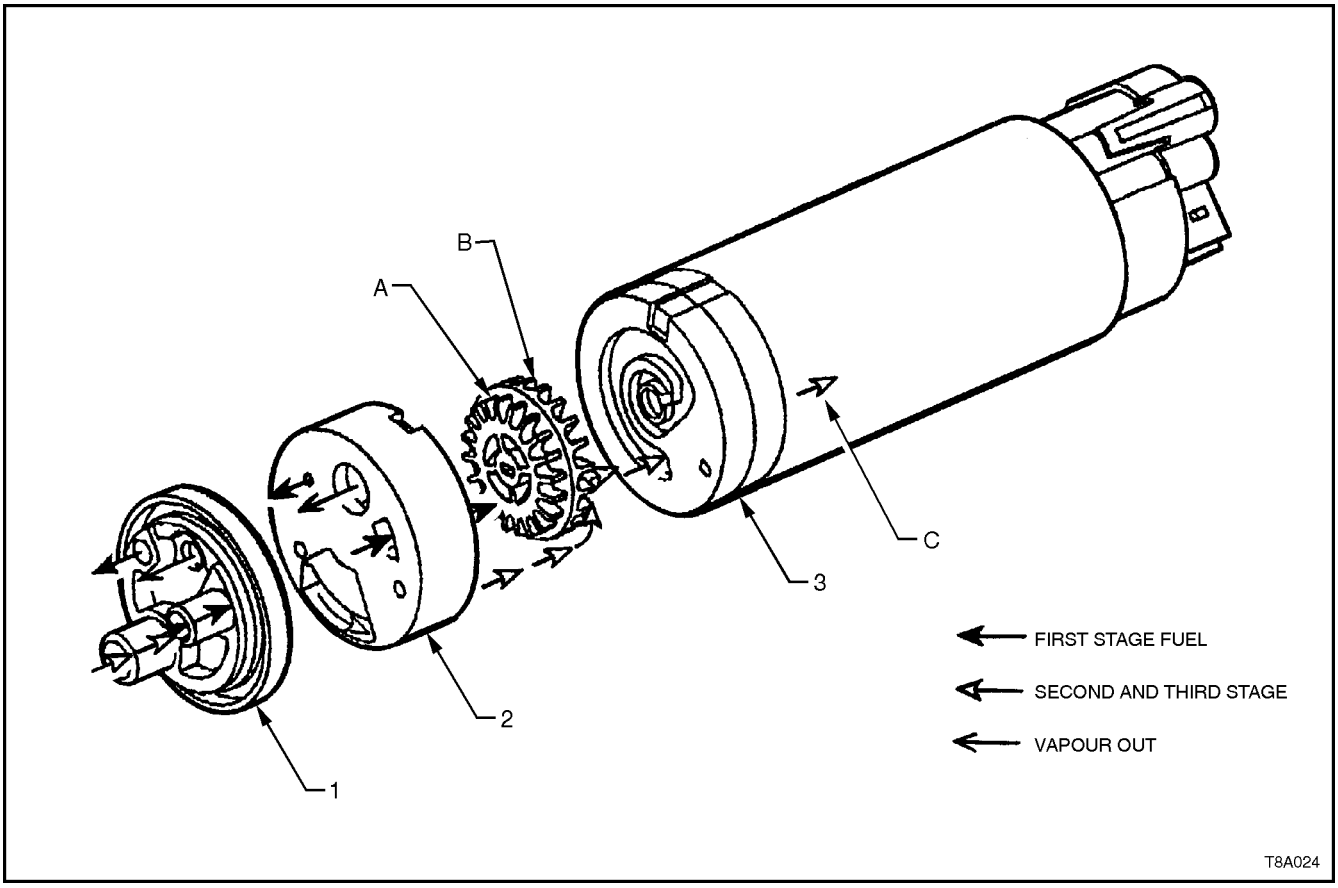


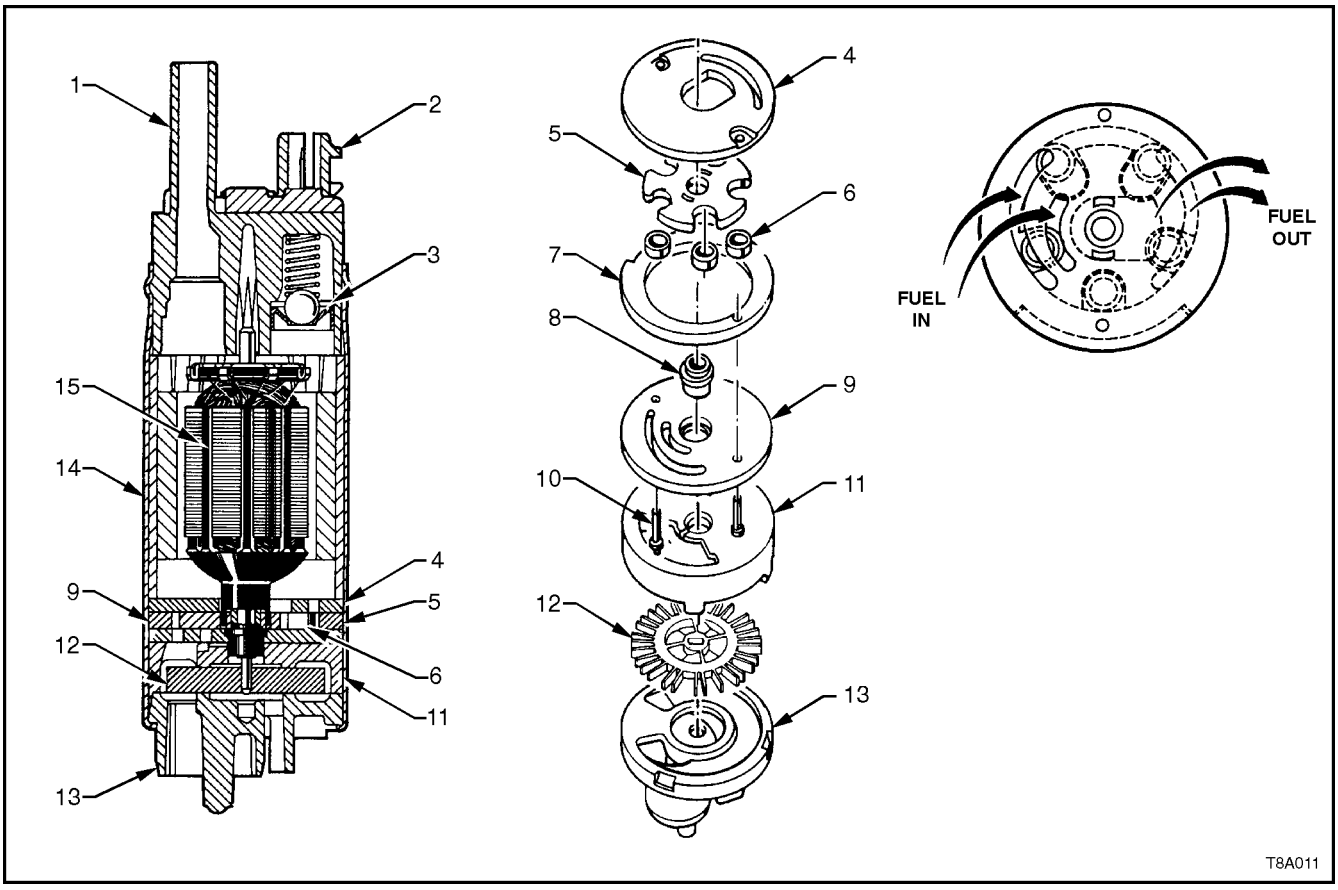
Figure 8A-2



1. Inlet Body
2. Inlet Housing
3. Inlet Plate

A 1st Stage Impeller
B 2nd Stage Impeller
C To the 3rd Stage Impeller

Figure 8A-3 Turbine Fuel Pump



1. End Cap
2. RFI Module
3. Relief Valve
4. Outlet Plate
5. Rotor
6. Rollers
7. Eccentric Ring
8. Bearing
9. Face Plate
10. Rivets
11. Housing
12. Impeller
13. Inlet Body
14. Shell
15. Electric Motor

Figure 8A-4 Roller Vane Fuel Pump Assembly

1.2 FUEL GAUGE TANK SENDER UNIT

The ceramic resistor card fuel level sensor assembly, consists of a ceramic resistor card (1), wiper arm (2), float arm assembly (3) and a below cover, wiring harness (4). Action of these components converts the fuel level in the fuel tank into a variable electrical signal used to drive the fuel gauge in the instrument panel.

The assembly is attached to the outside surface of the modular fuel sender assembly and secured with a retainer. The electrical harness (4) attached to the fuel sender cover connects the ceramic resistor card to the vehicle wiring harness.

The function of the ceramic resistor card is to vary the resistance, dependent upon the float position and to send that signal to the Body Control Module (BCM). This resistance signal changes, relative to the wiper contact position on the conductive bars of the ceramic resistor card.

New electronics in the BCM average out any slosh variation, which means that fuel tank baffling is not as critical to maintaining accurate gauge readings.

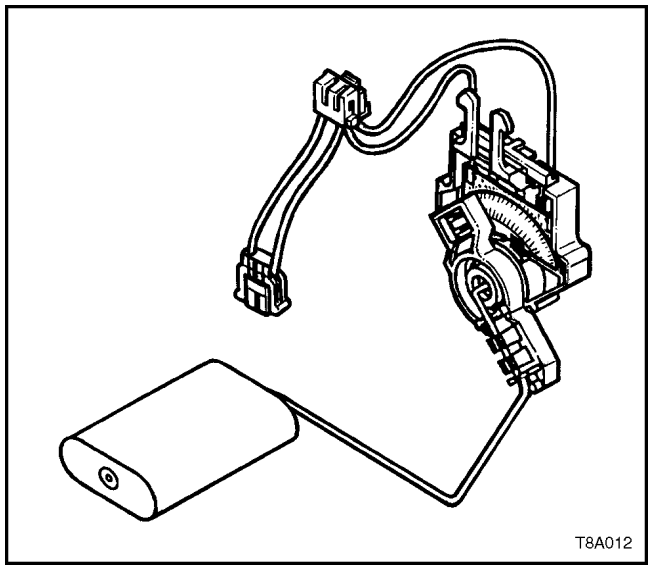


Figure 8A-5

1.3 FUEL FILLER CAP

The fuel filler cap is the 'SCREW ON' type with a ratcheting feature to tighten. When installing the cap, tighten it until a ratcheting (clicking) sound is heard, indicating the cap is properly tightened.

IMPORTANT:

Should a replacement cap be required, use only an all black fuel cap that is specified for VT Series Models. Use of an incorrect cap will cause malfunction of the emission control system.

The warning 'UNLEADED FUEL ONLY' is embossed on the cap.

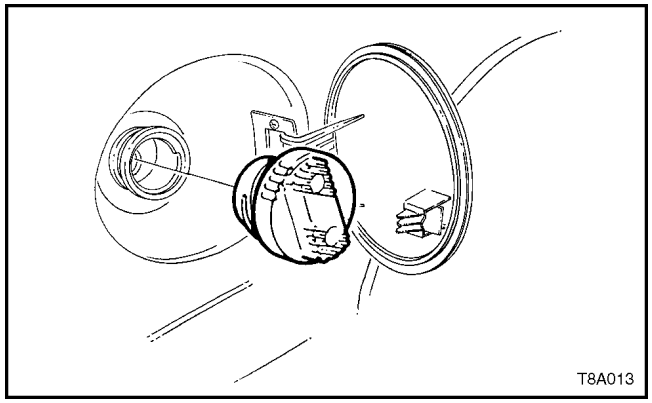


Figure 8A-6

2. SERVICE OPERATIONS

2.1 FUEL TANK

REMOVE

1. Depressurise the fuel system. Refer to Section 6C1-3 (V6 engine) or Section 6C2-3 (V8 engine).

CAUTION:

Even though the fuel system may have been de-pressurised, the fuel filter and lines will contain fuel that will be spilled during service operations. Therefore, ensure that no naked flames or other ignition sources are in the immediate area.

2. Syphon fuel from tank, using commercially available equipment.

CAUTION:

Never drain or store fuel into an open container, due to the possibility of fire or explosion.

3. Raise vehicle, preferably on a hoist.
4. Remove three stone guard retaining screws (2), then remove the stone guard (1), from under the right hand rear guard.
5. Remove the fuel sender electrical connector (1) from its mounting foot (2) by pulling forward to dislodge the assembled connector forward. Once released, depress the locking tab (3) and separate the connector halves (1 and 4).
6. Place a drain tray under the fuel filter area.

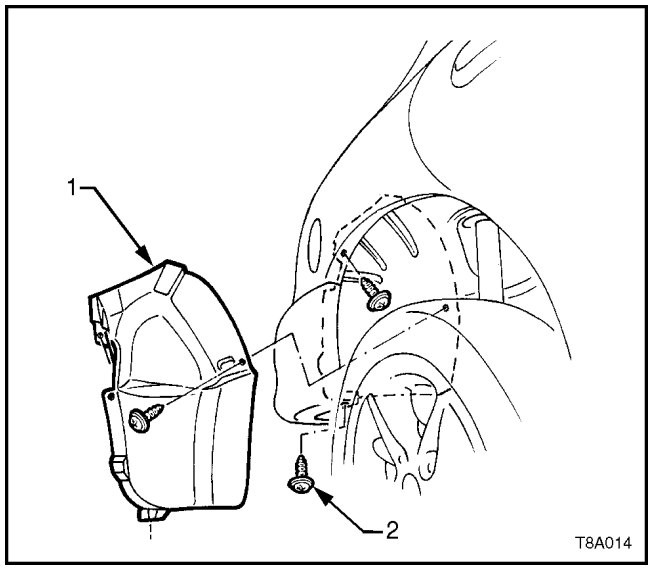


Figure 8A-7

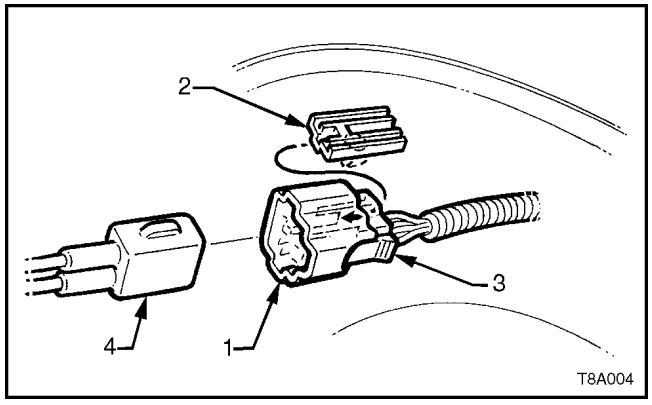


Figure 8A-8

7. Remove the quick connect fittings to the vapour canister (1), return line (3) and fuel filter (4), using the following method:

   Push inwards to release the seal pressure, depress the side tangs of the connector, then pull to disconnect.
8. Disconnect the vapour canister breather hose at the canister (2).

NOTE:

Ensure that all dirt and foreign material is removed from any fuel connection, prior to removal.

9. If required, remove the fuel filter (5) by removing the fuel feed line quick connector (6), then depressing the two barbs on the mounting strap nipple (7).

CAUTION:

Fuel will spill from the disconnected filter.

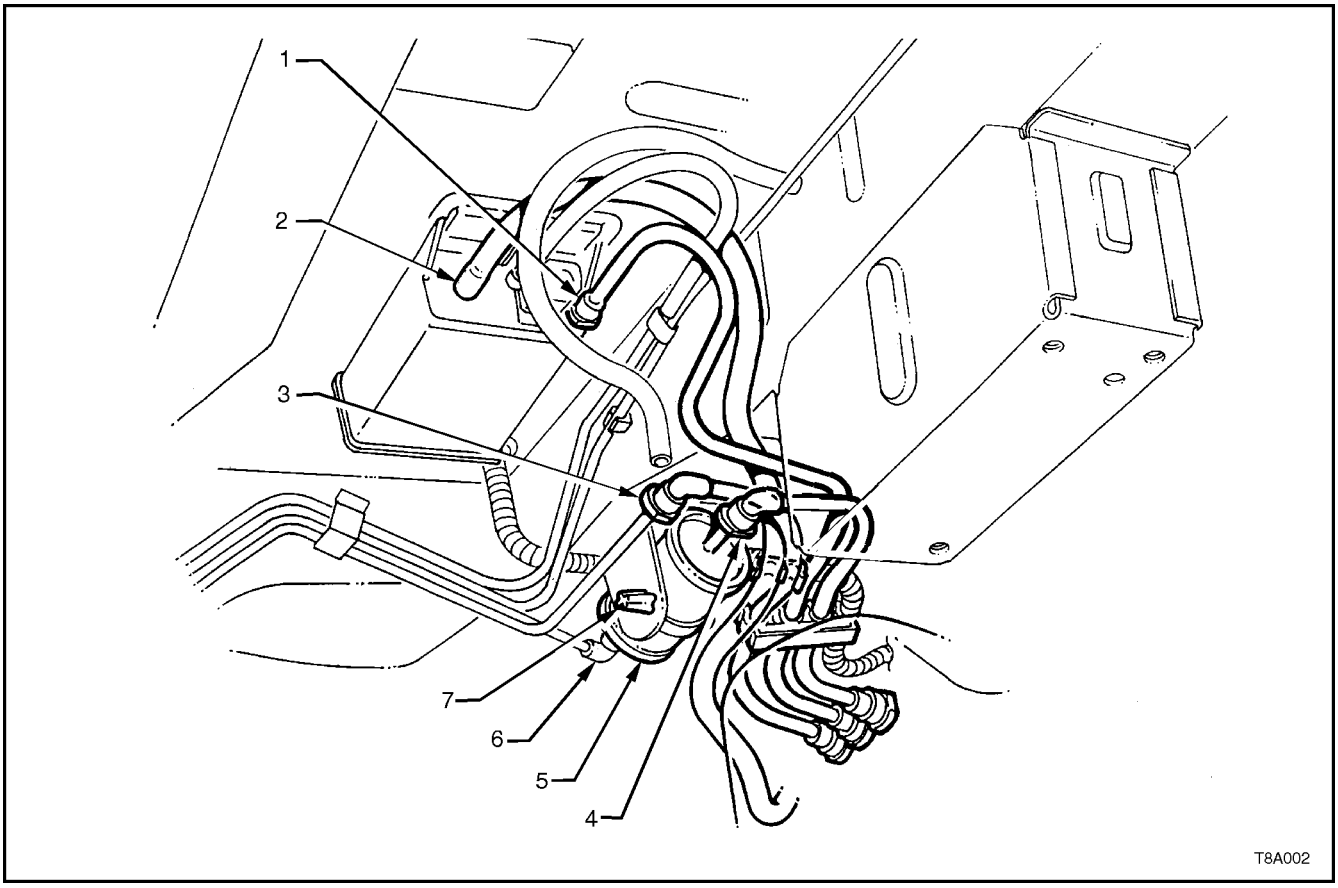


Figure 8A-9

9. Disconnect the earth strap from the spade connector (A, in view E) under the front right hand strap mounting bolt (4) of the right hand tank support strap (3). See Figure 8A-10.
10. Remove the fuel tank support straps as follows;

    Remove the centre strap (2) by removing the rear retaining nut (5) and washer, then unhook the strap from the front support (view C).

    While supporting the fuel tank in the centre, remove strap (3) (closest to the filler neck), after removing the bolt at the front and unhooking the strap from the rear support (views A and B).

    Finally remove strap (1) after removing the nuts and washers from each end of the strap (views C and D).
11. Lower the fuel tank from the vehicle, left side first, to release the fuel filler neck from the body opening.

REINSTALL

Is the opposite to removal except for the following;

1. Check that the insulation has not become dislodged from the top of the tank (Refer Figure 8A-10).
2. Offer up the fuel neck with the insulator installed, to the body opening, then raise the up, tank into place.

3. Fit the support straps in the following suggested order:

   Loosely install straps 1 and 3.

   Check that the filler neck seal is correctly located in the body opening. While pushing the fuel tank firmly to the right-hand side, tighten the strap (1) bolt (4 in view E) and nut.

   Tighten the front bolt (4 in view A) of strap (3). Ensure that the earth strap spade connector is also fitted.

   Hook strap (2) into the front retainer and install the retaining nut.

FUEL TANK MOUNTING STRAP BOLTS AND NUTS TORQUE SPECIFICATION	15 - 25 Nm

5. Connect the electrical connector, ensuring that both locking tabs are in place. Then, engage the assembled connector with its mounting foot and push rearwards to engage the locking tab.
6. Install the disconnected fittings to the fuel filter, canister and return line, routing correctly, as shown in Figure 8A-9, using the following assembly sequence:
   - **a.** Canister vent hose to canister (2).
   - **b.** Fuel vapour return line to canister (1).
   - **c.** Fuel tank vent line to canister (1).
   - **d.** Fuel return line to brake and fuel pipe harness assembly (3).
   - **e.** Fuel lines (4) and (6) to the fuel filter (5).
   - **f.** Fuel filter (5) and strap assembly (7) to the filter mounting bracket (if removed).
7. Reinstall the stone guard to the right-hand wheel opening, tightening the mounting screws to secure.
8. Before starting the vehicle, carry out a fuel system leak test, as detailed in **Section 6C1 POWERTRAIN MANAGEMENT-V6 ENGINE** or **Section 6C2 POWERTRAIN MANAGEMENT-V8 ENGINE**.

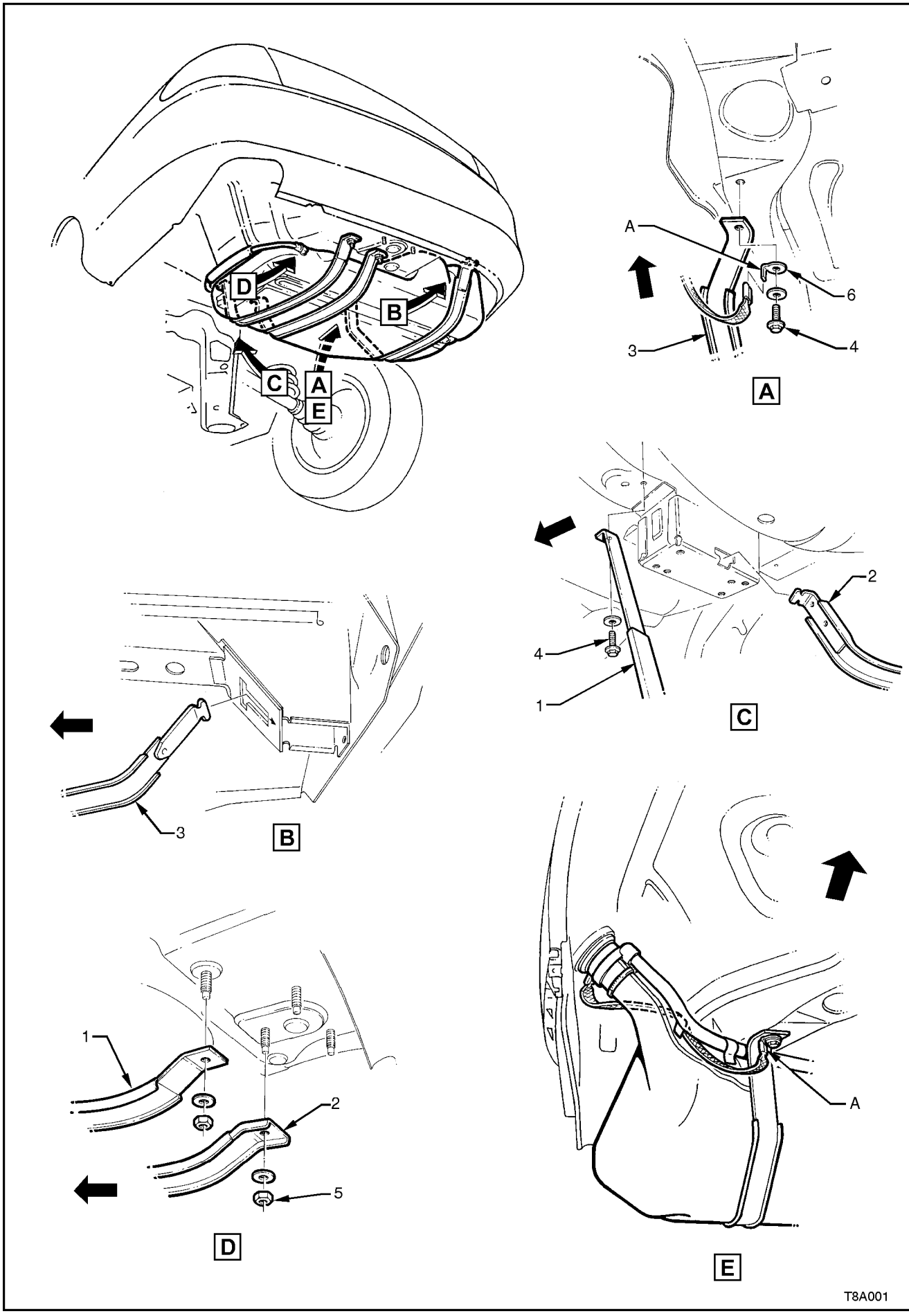
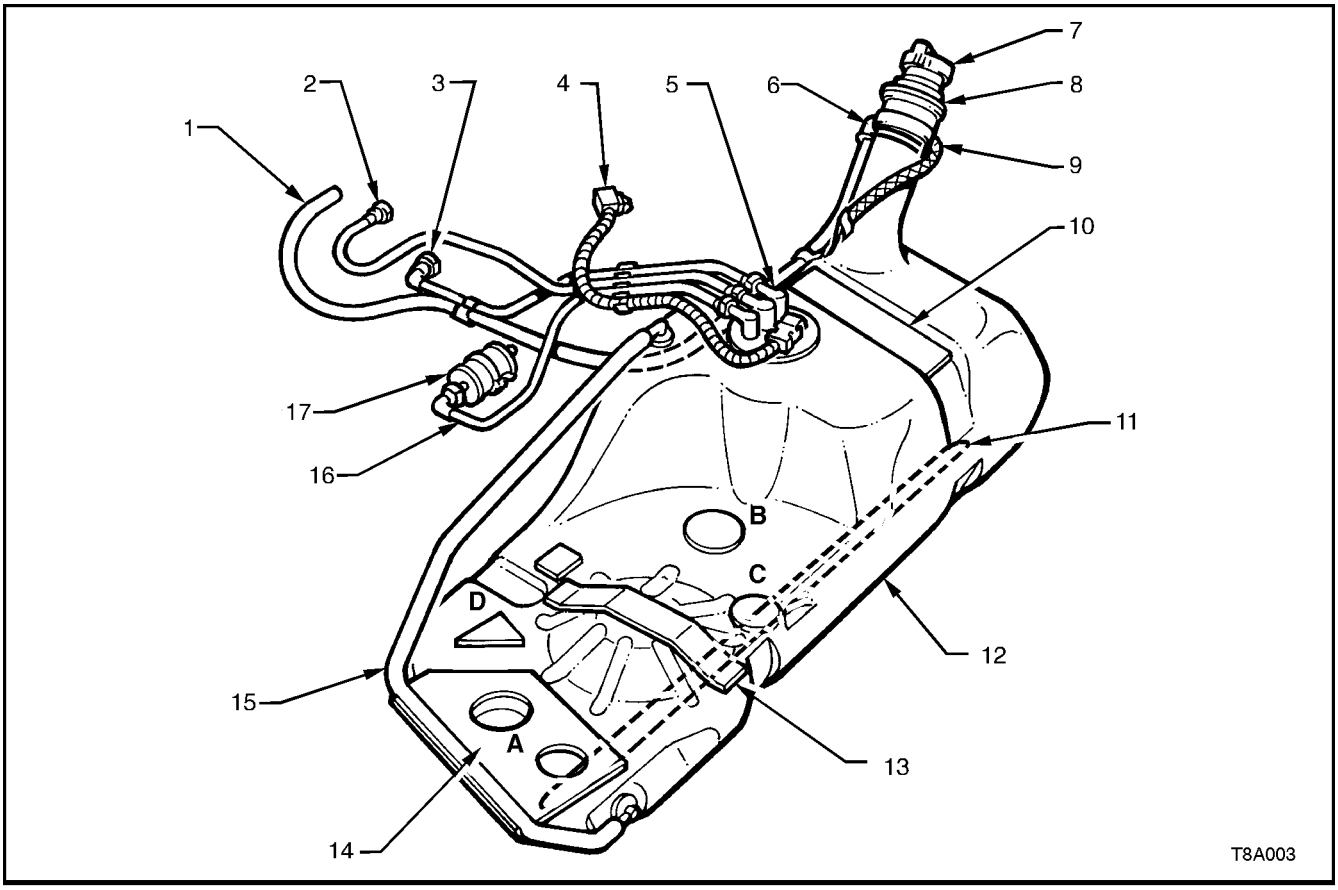


Figure 8A-10



1. Hose, Filler Neck Breather
2. Hose Fuel Tank Vent
3. Hose Fuel Return
4. Connector Electrical Harness
5. Sender Assembly, Modular Fuel
6. Fitting, Canister Vent Hose
7. Cap, Fuel Filler
8. Insulator, Fuel Filler Neck
9. Strap, Fuel Filler Earth
10. Insulator - Top R.H. Side
11. Reinforcement, Fuel Tank
12. Tank, Fuel
13. Insulator
14. Insulator Kit - A, B, C, D.
15. Line, Fuel Tank Vent
16. Hose, Fuel Feed
17. Filter Fuel

Figure 8A-11

2.2 MODULAR FUEL SENDER ASSEMBLY

REMOVE

1. Remove the fuel tank. See **Operation 2.1** in this Section for the procedure.

IMPORTANT:

Clean all traces of dirt and other foreign material from the top of the fuel tank, in the vicinity of the modular fuel sender assembly, before proceeding.

2. Using Tool No. J39765 and a ½" socket bar (1), remove the module assembly retaining ring (2) by turning in an anti-clockwise direction.

NOTE:

The Modular fuel sender unit will spring up when the locking ring is removed.

3. Carefully lift the module assembly from the fuel tank, taking care not to damage the fuel sender float and arm.

IMPORTANT:

The reservoir will be full of fuel. Because the modular unit needs to be tipped to one side to free the float arm on the fuel sender, be careful of fuel spillage. When the modular fuel sender assembly is removed from the fuel tank, pour any remaining fuel in the reservoir into a suitable container.

4. Discard the sealing O-ring.

CAUTION:

An empty fuel tank contains a potentially explosive mixture of fuel vapour and air. Do not permit naked flames or sparks in the vicinity.

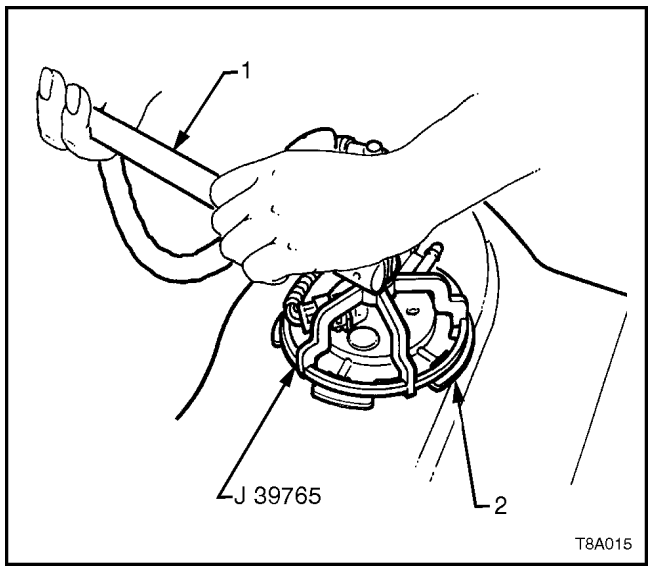


Figure 8A-12

REINSTALL

1. Locate a new O-ring seal in the fuel tank recess.
2. Reinstall the module assembly to the fuel tank, taking care not to damage the fuel sender float or arm in the process.

NOTE:

Care should be taken not to fold or twist the fuel pick-up strainer during module installation. Also assure that the fuel pump pick-up strainer does not interfere with the full travel of the float arm.

3. Install the retaining ring over the module assembly and use a ½" socket bar and Tool No. J39765, to rotate the retainer in a clockwise direction until the tangs are engaged.
4. Reinstall the fuel tank as described in **Operation 2.1**, in this Section.

2.3 FUEL SENDER ASSEMBLY

REPLACE

1. Remove the modular fuel sender assembly as described in **Operation 8A-2** in this Section.
2. Remove the fuel pump/sender patch harness connector as follows;
   - **a.** Using a small screwdriver, first remove the red Connector Position Assurance (CPA) locking tab (2), then the grey one (1). Depress the connector lock and remove from the top cover.

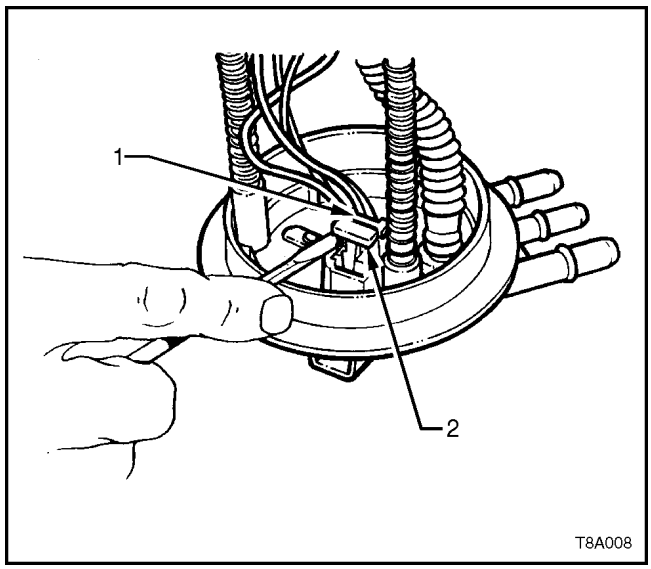


Figure 8A-13

   - **b.** Release the locking tabs on the fuel pump harness connector (1) and remove the connector from the fuel pump.
   - **c.** Release each of the two fuel sender wires from the retainers (arrows) on the side of the module body.

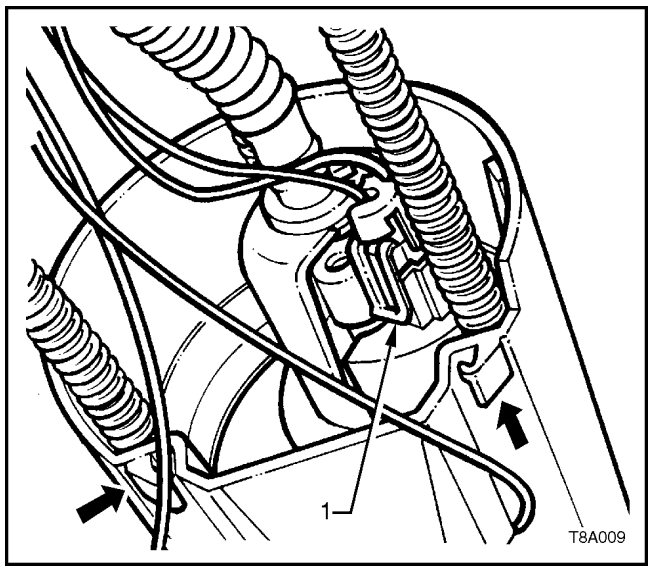


Figure 8A-14

3. Remove the fuel sender Connector Position Assurance (CPA) locking tab (2), using a piece of broken hacksaw blade (1), ground to a width of 1.5 mm and push the tab down, as shown.

NOTE:

Because of the fragile nature of this CPA, it is recommended that a replacement tab be used afer installation of the fuel sender assembly.

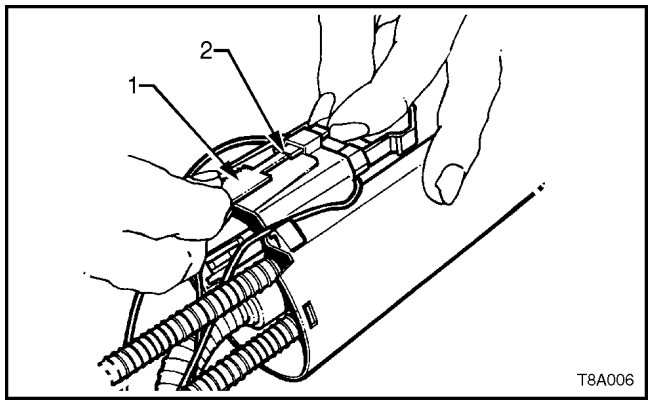


Figure 8A-15

4. Use long nosed pliers (1) to press the sender locking tabs and push down to remove, as shown.
5. Before installation into the fuel tank, check the fuel sender float position, as follows:
   a. Stand the assembly upright on a flat surface.
   b. Measure the distance between the base of the fuel sender float and the flat surface.
   c. If required, the float position should be adjusted to achieve a nominal measurement of 10 mm.
6. Installation is the reverse of the removal process.

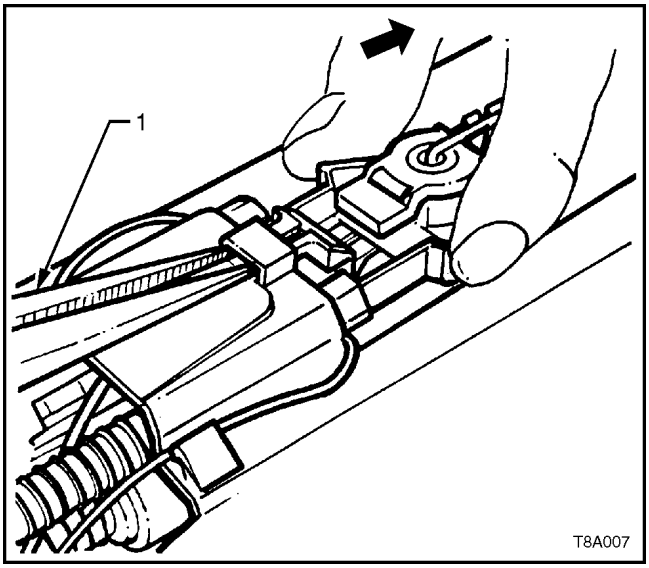


Figure 8A-16

2.4 FUEL PUMP

REPLACE

1. Remove fuel gauge tank unit as outlined in **Operation 2.1** in this Section.
2. Remove Modular Fuel Sender assembly as outlined in **Operation 2.2**, in this Section.
3. Remove the fuel pump/sender patch harness connector as follows;
   - **a.** Using a small screwdriver, first remove the red Connector Position Assurance (CPA) locking tab (2), then the grey one (1). Depress the connector lock and remove from the top cover.

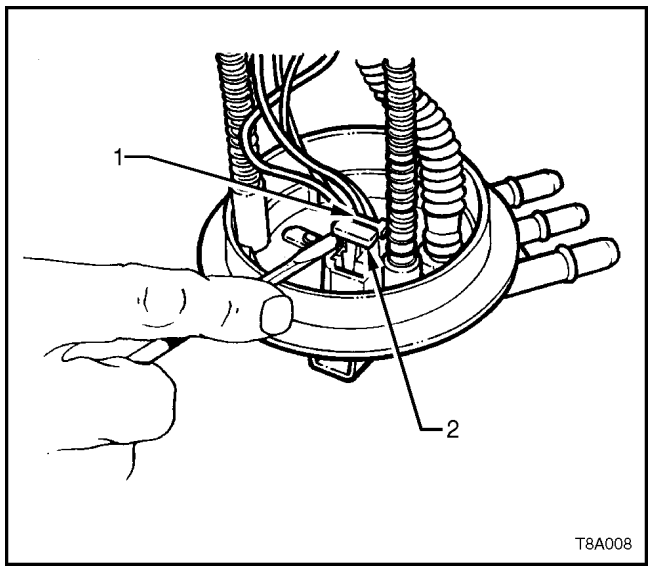


Figure 8A-17

   - **b.** Release the locking tabs (1) on the fuel pump harness connector and remove the connector from the fuel pump.

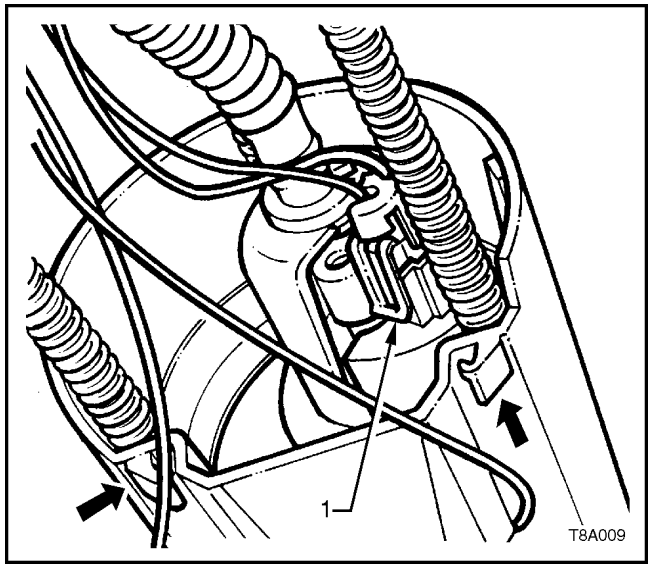


Figure 8A-18

3. Separate the inner member from the outer reservoir, by releasing the two tangs (arrow) with a small screwdriver, as shown.

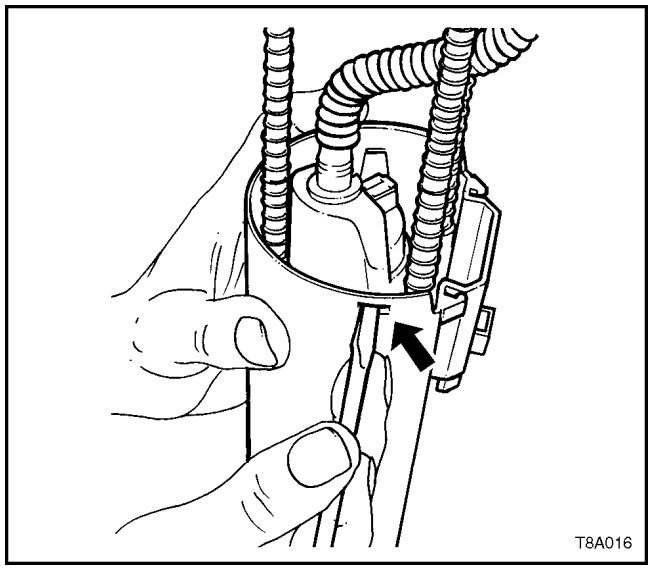


Figure 8A-19

4. Slide the inner member (1), cover assembly and fuel pump (2) from the outer reservoir shell (3).

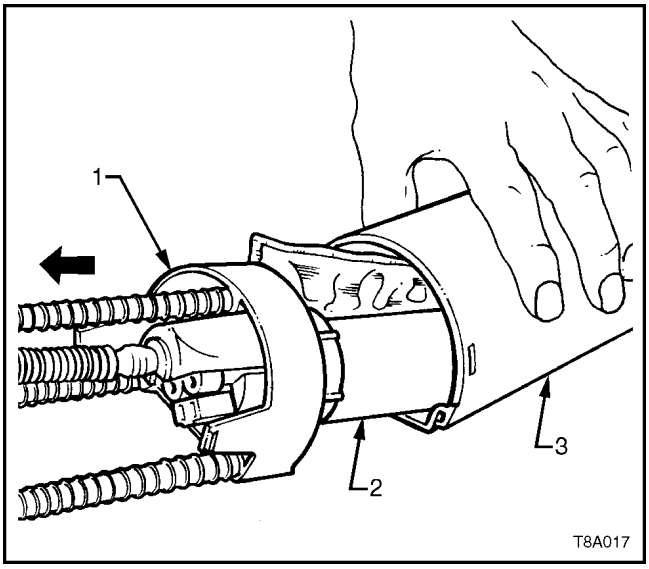


Figure 8A-20

5. Using a twisting/pulling motion, remove the fuel pump (1) and integral strainer from the inner member assembly.
6. Installation is the reverse of the removal process, noting that the fuel pump inlet sealing grommet is to be installed in the base of the outer shell, before the pump is installed.

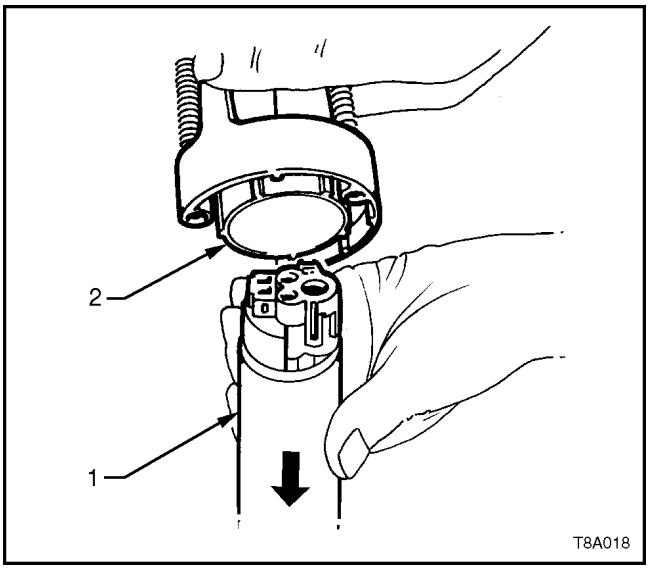


Figure 8A-21

2.5 FUEL PUMP PICK-UP STRAINER

REPLACE

1. Remove the modular fuel sender assembly, as described in **Operation 2.2** in this Section.
2. Using a screwdriver (2), prise the pick-up strainer (1) from the base of the reservoir, noting the strainer position for installation. Discard the strainer and O-ring (3).

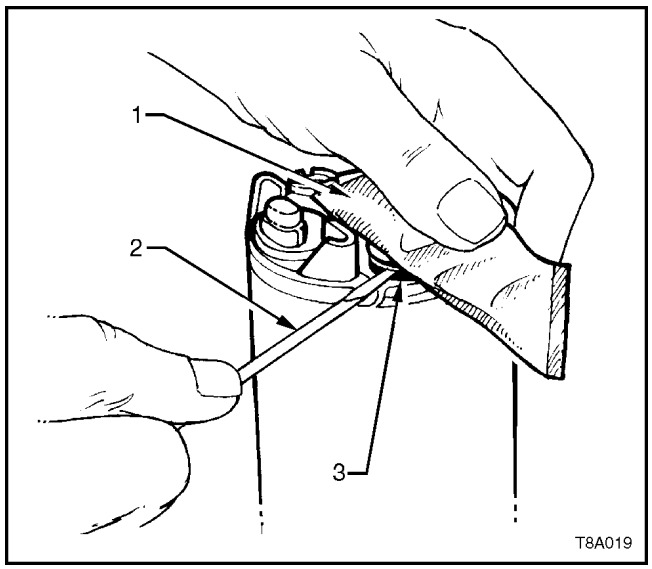


Figure 8A-22

3. With a new O-ring (2) installed on a replacement strainer (1), firmly press into place on the reservoir in the same position noted on removal.
4. Reinstall the modular fuel sender assembly, as described in **Operation 2.2** in this Section.

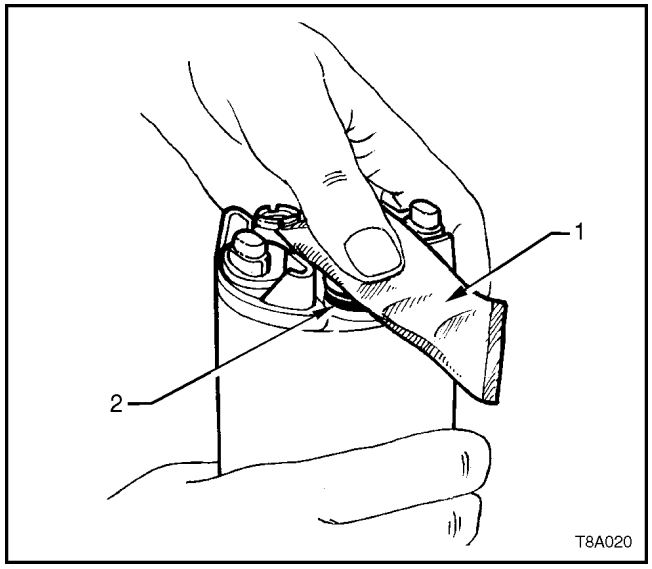
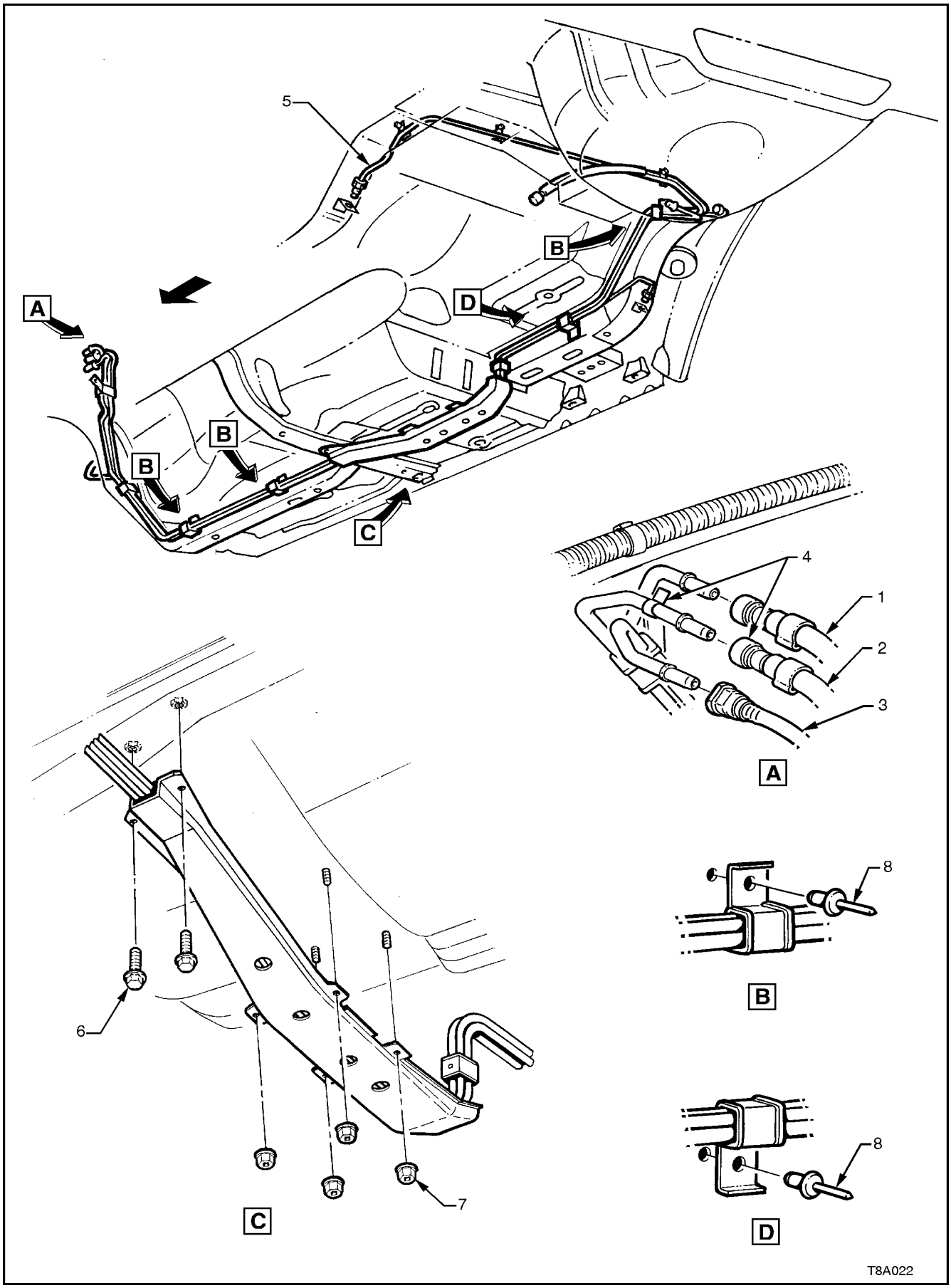


Figure 8A-23

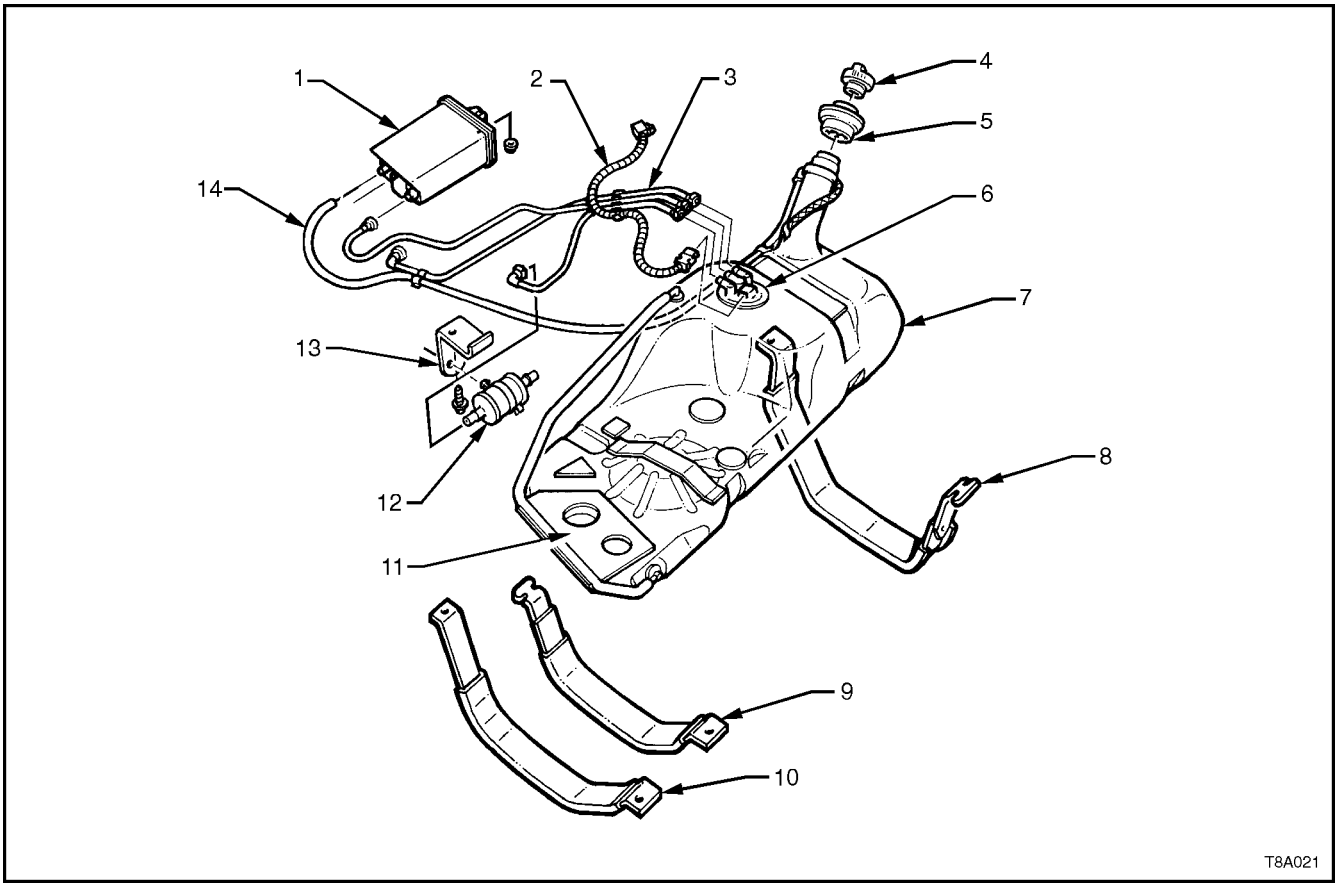
2.6 FUEL PIPE ARRANGEMENT

Figures 8A-24 and 8A-25 illustrate the fuel pipe layout and location of other fuel tank related items.



1. Hose, Fuel Return from Engine
2. Hose, Fuel Feed to Engine
3. Hose, Fuel Vapour
4. Tab, White Identifying
5. Pipe, Brake Fluid
6. Bolt, Stone Guard Securing
7. Nut, Stone Guard Securing
8. Rivet, Fuel Line Bracket Pop

Figure 8A-24



1. Canister, Fuel Vapour
2. Harness, Electrical Patch
3. Hoses, Fuel and Vapour
4. Cap, Fuel Filler
5. Insulator, Fuel Filler Neck
6. Sender Assembly, Modular Fuel
7. Tank, Fuel
8. Strap, Fuel Tank Mounting, RHS
9. Strap, Fuel Tank Mounting, Centre
10. Strap, Fuel Tank Mounting, LHS
11. Insulator, Fuel Tank to Underbody
12. Filter Fuel
13. Bracket, Fuel Filter Mounting
14. Hose Fuel Tank Vent

Figure 8A-25

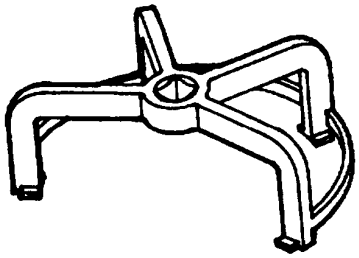
3. SPECIFICATIONS

Fuel Tank Capacity:	
All VT Models	75 litres
Fuel Pump Capacity:	
High Pressure Pump - V6 and V8 Engines	21 grams/sec @ 350 ± 5 kPa with 12.5 ± 0.1 Volt applied
V6 Supercharged Engine	30 grams/sec @ 410 ± 5 kPa with 12.5 ± 0.1 Volt applied

4. TORQUE WRENCH SPECIFICATIONS

	Nm
Fuel Tank Strap Nuts/Bolts	15 - 25
Fuel Filter Bracket Screw	5.0 - 8.0
Canister mounting Nut	2.0 - 5.0

5. SPECIAL TOOLS

TOOL NO. REF IN TEXT	TOOL DESCRIPTION	COMMENTS
J39765	MODULAR FUEL SENDER ASSEMBLY REMOVER/INSTALLER 	NEW RELEASE