

SECTION 6C

ENGINE FUEL

CAUTION: This vehicle is equipped with Supplemental Inflatable Restraint (SIR). Refer to **CAUTIONS** in Section 9J under "ON-VEHICLE SERVICE" and the SIR Component and Wiring Location view in Section 9J before performing service on or around SIR components or wiring. Failure to follow **CAUTIONS** could result in possible air bag deployment, personal injury, or otherwise unneeded SIR system repairs.

NOTICE: When fasteners are removed, always reinstall them at the same location from which they were removed. If a fastener needs to be replaced, use the correct part number fastener for that application. If the correct part number fastener is not available, a fastener of equal size and strength (or stronger) may be used. Fasteners that are not reused, and those requiring thread-locking compound will be called out. The correct torque value must be used when installing fasteners that require it. If the above conditions are not followed, parts or system damage could result.

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GENERAL DESCRIPTION

The fuel supply is stored in the fuel tank. An electric fuel pump, attached to the fuel sender assembly (inside the fuel tank) pumps fuel through an in-line filter to the fuel rail assembly. The pump is designed to provide fuel at a pressure above the pressure needed by the injectors. A pressure regulator keeps fuel available to the injectors at the correct pressure. Unused fuel is returned to the fuel tank via a separate pipe. For further information on the fuel injection system, refer to "Fuel Metering System" located in SECTION 6E3-C2.

Unleaded fuel must be used with all gasoline engines for proper emission control system operation. Using unleaded fuel will also decrease spark plug fouling and extend engine oil life. Leaded fuel can damage the emission control system, and its use can result in loss of emission warranty coverage.

All vehicles with gasoline engines are equipped with an evaporative emission system that minimizes the escape of fuel vapors to the atmosphere. Information on this system is located in SECTION 6E3-C3.

FUEL TANK FILLER NECK

Figure 2

To prevent refueling with leaded fuel, the fuel filler neck has a built-in restrictor and deflector.

FUEL TANK

The fuel tank is used to store fuel for the vehicle. The tank is located in the rear of the vehicle and is held in place by two metal straps that are attached to the frame. The fuel tank is made of steel and is coated internally with a special corrosion inhibitor.

Fuel Tank Vent Valve (Remote Mounted)

Figure 1

The fuel tank vent valve, located in the right rear of the vehicle by the fuel tank, is a pressure/vacuum relief valve. When fuel tank pressure exceeds a specified pressure the valve will open allowing tank pressure to bleed off. When the fuel tank is in a vacuum condition, the vent valve will open when the vacuum is within a specified range allowing fresh air to be pulled in.

Fuel Filler Cap

Figure 2

Failure to use the correct cap can result in a serious malfunction of the system. The fuel tank filler neck is equipped with a non-vented threaded-type cap. The threaded part of the cap requires several turns

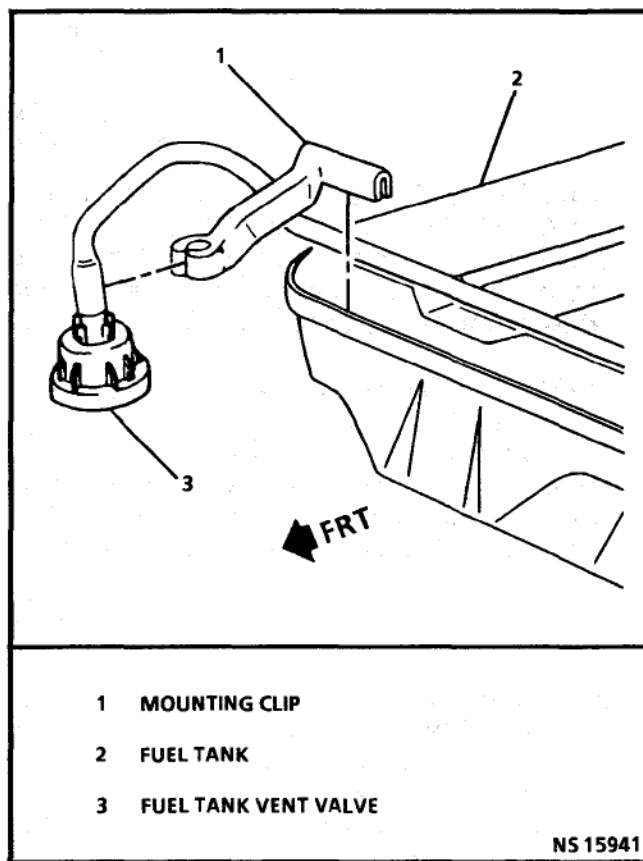


Figure 1 - Fuel Tank Vent Valve

counterclockwise to remove. A built-in torque-limiting device prevents over tightening. To install, turn the cap clockwise two full turns until a clicking noise is heard. This signals that the correct torque has been reached and the cap is fully seated.

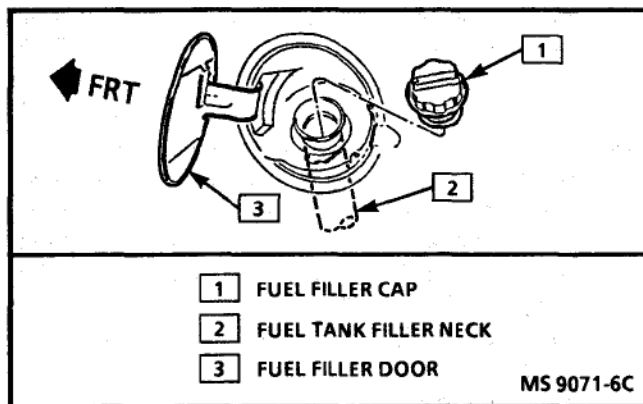


Figure 2 - Fuel Filler Cap

NOTICE: If a fuel filler cap requires replacement, use only a cap with the same features.

FUEL SENDER ASSEMBLY

The fuel sender assembly is attached to the top of the tank, and extends from the top of the tank to the sump located in the bottom of the tank.

The fuel sender assembly consists of the following major components: a fuel sender, fuel pump and reservoir assembly, fuel pump strainer and a roll-over valve.

Fuel Sender Figure 3

The fuel sender consists of the fuel tank cover plate, fuel feed, return, and vent pipes, a float, wire float arm, sensor and roll-over valve. The fuel level is sensed by the position of the float arm, and a signal is sent to the display in the vehicle instrument cluster.

The roll-over valve is pressed into the vapor tube of the fuel sender and is not serviced separately. The roll-over valve prevents fuel spilling from the fuel sender vapor pipe if the vehicle rolls over.

Fuel Pump and Reservoir Assembly Figure 4

An electric high pressure roller vane fuel pump is mounted inside the fuel reservoir, which is located in the fuel tank. The fuel is pumped to the engine at a specified flow and pressure through the fuel feed pipe. Excess fuel is returned to the fuel tank via the return line. The fuel pump delivers a constant flow of fuel to the engine even during low fuel conditions and aggressive vehicle maneuvers. As part of the fuel pump and reservoir assembly, three hoses are permanently attached. The fuel pump feed hose has the quick-connect fitting, the fuel return hose has a square end and the fuel vapor hose is cut on an angle. The fuel pump feed hose also acts to dampen fuel pulses and noise generated by the fuel pump.

The electric fuel pump operation is controlled by the Powertrain Control Module (PCM) through a fuel pump relay.

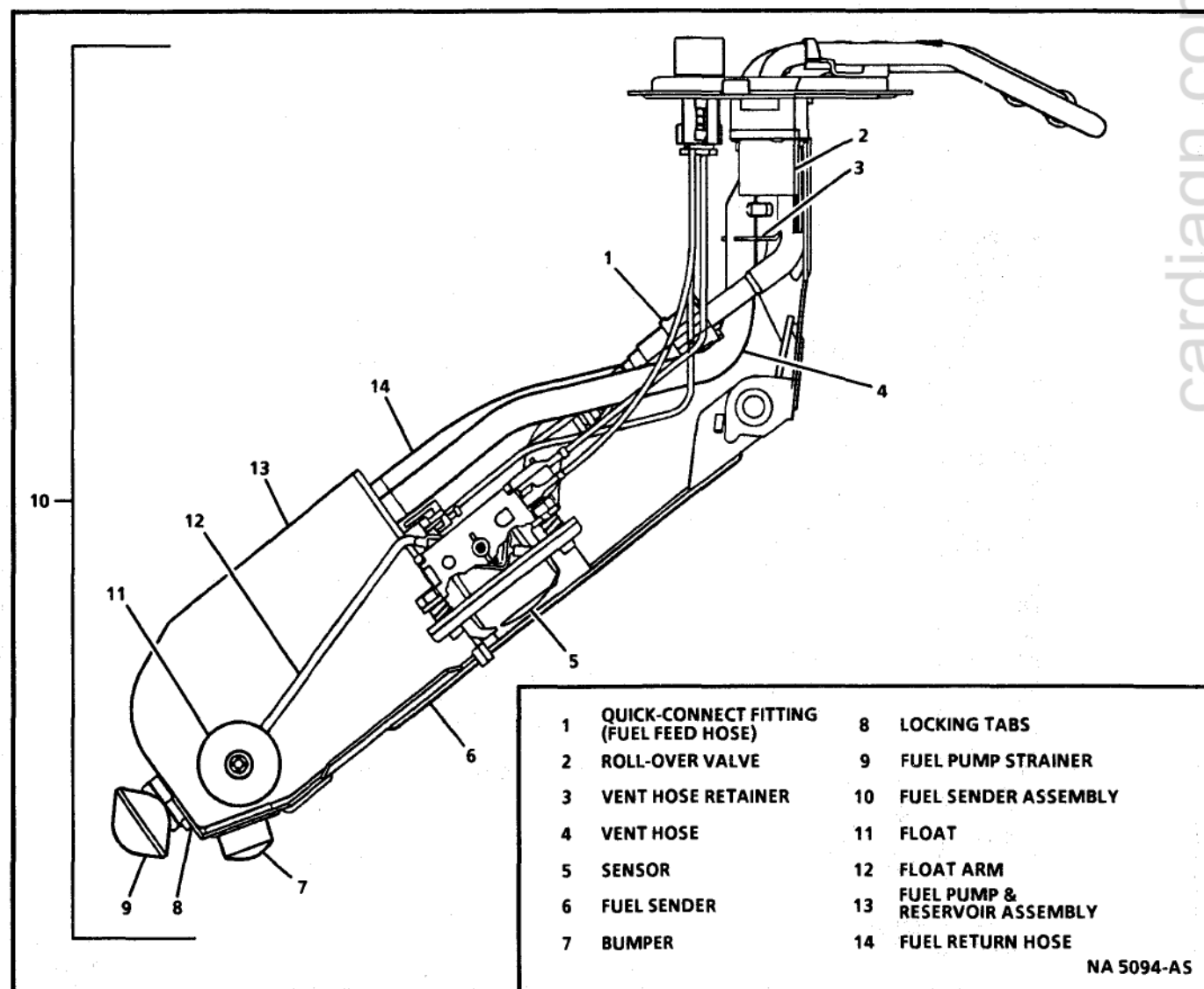


Figure 3 - Fuel Sender Assembly

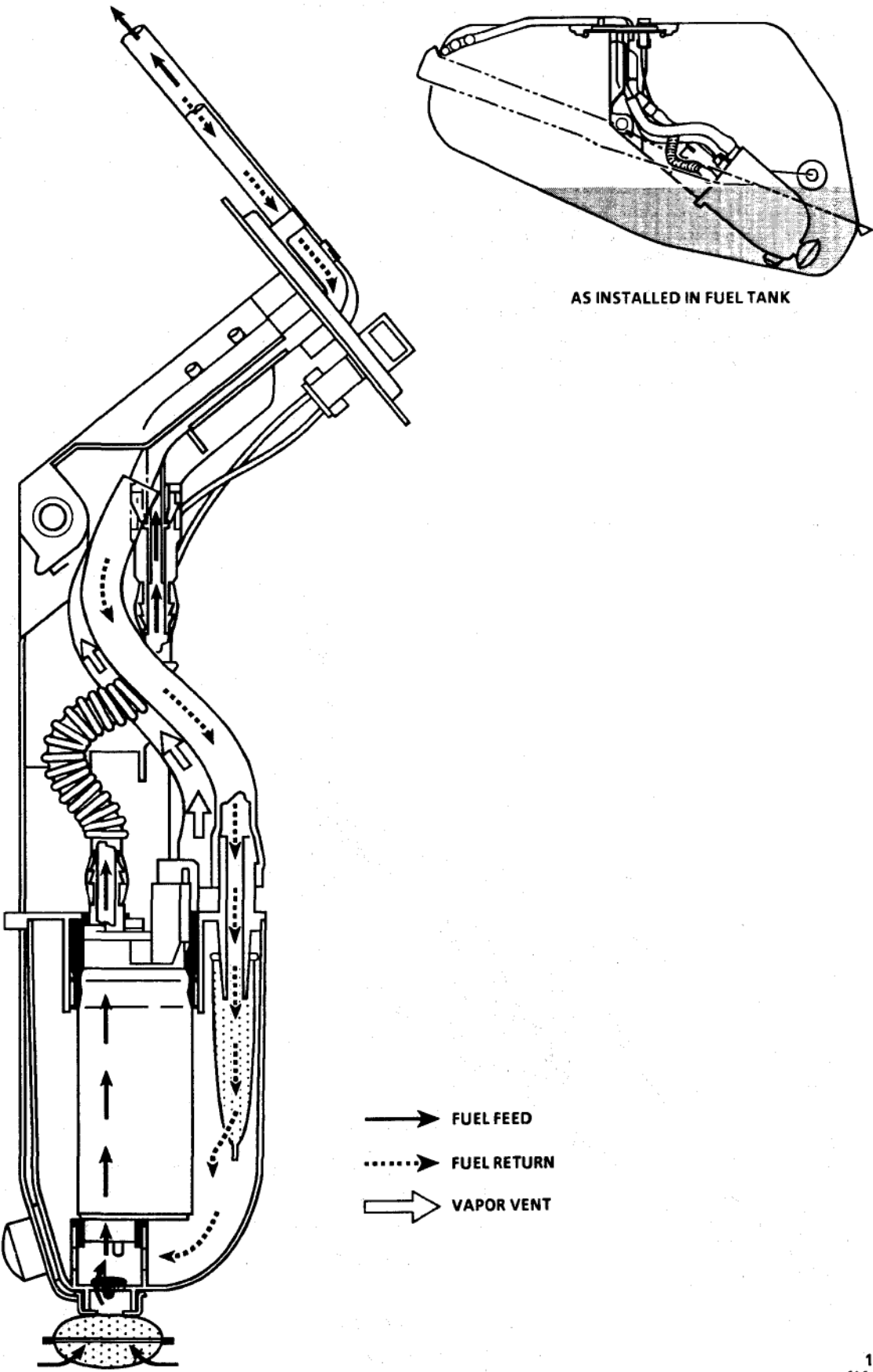


Figure 4 - Fuel Pump and Reservoir Fuel Flow

Refer to to "Fuel Metering System" located in SECTION 6E3-C2 and SECTION 8A of this manual for further description and a wiring diagram of fuel pump relay.

Fuel Pump Strainer

Figure 4

A woven plastic fuel pump strainer is attached to the lower end of the fuel pump and reservoir assembly in the fuel tank. The functions of the fuel pump strainer is to filter contaminants and to wick fuel.

The life of the fuel pump strainer is generally considered to be that of the fuel pump. The fuel pump strainer is self-cleaning and normally requires no maintenance. Fuel stoppage at this point indicates that the fuel tank contains an abnormal amount of sediment or water. In which case, the tank should be thoroughly cleaned. (See "Fuel System Cleaning.") If the fuel pump strainer is plugged, replace it with a new one.

IN-LINE FUEL FILTER

Figure 5

A fuel filter is used in the fuel feed pipe ahead of the fuel injection system and mounted directly in front of the rear axle. The filter housing is constructed of steel with a quick-connect inlet and threaded outlet fittings. The filter element is made of paper, and is designed to trap particles in the fuel that may damage the injection system. There is no service interval for fuel filter replacement. Only replace fuel filter if it is restricted.

FUEL FEED AND RETURN PIPES/HOSES

The fuel feed and return pipes and hoses carry fuel from the fuel sender assembly to the fuel rail assembly. The fuel feed and return pipes and hoses consist of four sections:

- The rear fuel pipe assemblies are located from the top of the fuel tank to the chassis fuel pipes. The rear fuel pipes are constructed of nylon.
- The chassis fuel pipes are located under the vehicle and connect the rear fuel pipes to the engine compartment connecting fuel pipes. These pipes are constructed of steel.
- The engine compartment connecting fuel pipes connect the chassis pipes to the engine fuel pipes. These fuel pipes are routed from the chassis fuel pipes under the vehicle and behind the front driver side wheel house liner to the engine compartment. These fuel pipes are constructed of nylon.

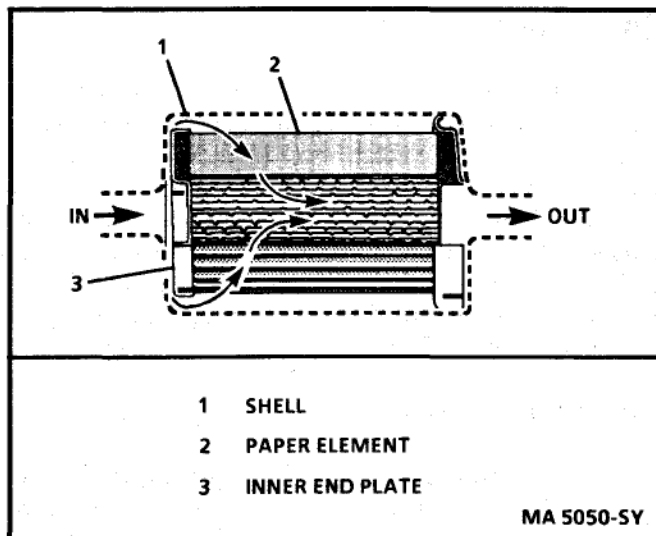


Figure 5 - In-Line Fuel Filter (Typical)

Nylon Fuel Pipes

Nylon fuel pipes are designed to perform the same job as the steel or flexible fuel lines they replace. Nylon pipes are constructed to withstand maximum fuel system pressure, exposure to fuel additives, and changes in temperature. There are two sizes used: 3/8" ID for the fuel feed, and 5/16" ID for the fuel return.

The fuel feed and return pipes are assembled as a harness. Retaining clips hold the pipes together and provide a means for attaching the pipes to the vehicle. Sections of the pipes that are exposed to chafing, high temperature or vibration are protected with heat resistant rubber hose and/or corrugated plastic conduit.

Nylon fuel pipes are somewhat flexible and can be formed around gradual turns under the vehicle. However, if forced into sharp bends, nylon pipes will kink and restrict fuel flow. Also, once exposed to fuel, nylon pipes may become stiffer and are more likely to kink if bent too far. Special care should be taken when working on a vehicle with nylon fuel pipes:

CAUTION: To Reduce the Risk of Fire and Personal Injury:

- Always cover nylon fuel lines with a wet towel before using a torch near them. Also, never expose the vehicle to temperatures higher than 115°C (239°F) for more than one hour, or more than 90°C (194°F) for any extended period.
- Take care not to nick or scratch the nylon fuel lines. If damaged, they must be replaced.

Quick-Connect Fittings

Quick-connect type fittings provide a simplified means of installing and connecting fuel system components. Depending on the vehicle model, there are two types of quick-connect fittings, each used at different locations in the fuel system. Each type consists of a unique female connector and a compatible male pipe end. O-rings, located inside the female connector, provide the fuel seal. Integral locking tabs or fingers hold the fittings together.

Fuel Pipe O-Rings

The feed and return pipe threaded connections are sealed with O-ring seals. Fuel system O-ring seals are made of special material, and should only be serviced with the correct service part.

FUEL VAPOR PIPES AND HOSES

The fuel vapor pipe extends from the fuel sender assembly to the charcoal canister.

ACCELERATOR CONTROLS

The accelerator control system is cable type. There are no linkage adjustments. Therefore, the specific cable must be used.

DIAGNOSIS

ALCOHOL-IN-FUEL

Alcohol-in-fuel can be detrimental to fuel system components and may cause drivability problems such as hesitation, lack of power, stall, no start, etc.

The problems may be due to fuel system corrosion and subsequent fuel filter plugging, deterioration of rubber components and/or air-fuel mixture leaning.

Various types and concentrations of alcohols are used in commercial fuel. Some alcohols are more detrimental to fuel system components than others. If an excessive amount of alcohol in the fuel is suspected as the cause of a drivability condition, the following procedure may be used to detect the presence of alcohol in the fuel.

Testing Procedure

The fuel sample should be drawn from the bottom of the tank so that any water present in the tank will be detected. The sample should be bright and clear. If the sample appears cloudy, or contaminated with water (as indicated by a water layer at the bottom of the sample), this procedure should not be used, and the fuel system should be cleaned see "Fuel System Cleaning" in this section.

1. Using a 100 ml cylinder with 1 ml graduation marks, fill with fuel to the 90 ml mark.
2. Add 10 ml of water to bring the total fluid volume to 100 ml and install a stopper.
3. Shake vigorously for 10 to 15 seconds.
4. Carefully loosen the stopper to release pressure.
5. Close the stopper and shake vigorously again for 10 to 15 seconds.
6. Put the graduated cylinder on a level surface for approximately 5 minutes to allow adequate liquid separation.

If alcohol is present in the fuel, the volume of the lower layer (which would now contain both alcohol and water) will be greater than 10 ml. For example, if the volume of the lower layer is increased to 15 ml, it will indicate at least 5 percent alcohol in fuel. The actual amount of alcohol may be somewhat greater because this procedure does not extract all of the alcohol from the fuel.

FUEL TANK LEAK CHECK

Important

- Before attempting "Fuel Tank Leak Check" place a dry chemical (Class B) fire extinguisher near work area.
 - Before removing the fuel tank for a suspected leak, make sure fuel pipes are not leaking onto the tank. Once removed, make sure fuel is not leaking around fuel sender assembly O-ring.
 - This check requires a fuel sender assembly, fuel filler cap, and a O-ring to be installed in the fuel tank.
1. Relieve fuel system pressure (see "Fuel System Pressure Relief").
 2. Drain fuel tank (see "Draining Fuel Tank").
 3. Remove fuel tank (see "Fuel Tank Replacement").
 4. Cap fuel feed tube, fuel return tube, and vapor tube on fuel sender assembly.
 5. Connect a piece of hose to the vent tube.
 6. Submerge tank in water or apply soap solution to outside of tank.
 7. Apply 7 to 10 kPa (1 to 1½ psi) air pressure to the piece of hose on the fuel tank vent tube.
 - Air bubbles appearing from fuel tank indicate a leak. Replace fuel tank if it is leaking (see "Fuel Tank Replacement").

FUEL TANK VENT VALVE CHECK

The fuel tank vent valve, located in the right rear of the vehicle by the fuel tank, is a pressure/vacuum relief valve. If the valve is not functioning properly it could cause excessive pressure or vacuum to build up in the tank. The result may be possible fuel discharge when removing cap or possible damage to the tank or fuel sender.

Checking procedure:

1. Loosen fuel filler cap to relieve tank pressure.
2. Remove tank vent valve from vehicle.
3. Wrap vent valve in shop towel and shake out any remaining fuel.
4. Using the appropriate adapters, connect vent valve to a radiator pressure check device.
5. Slowly apply pressure to vent valve. The valve should open at approximately 1 psi. If not, replace vent valve.
6. Disconnect vent valve from pressure tester.
7. Using the appropriate adapters, connect vent valve to a hand operated vacuum pump.
8. Slowly apply vacuum to the vent valve. The valve should open at approximately 1-2" Hg. If not, replace vent valve.

ON-VEHICLE SERVICE

Important

- Before attempting any "On-Vehicle Service" place a dry chemical (Class B) fire extinguisher near work area.

FUEL SYSTEM PRESSURE RELIEF

Tool Required:

J 34730-1, Fuel Pressure Gage

CAUTION: To reduce the risk of fire and personal injury, it is necessary to relieve the fuel system pressure before servicing fuel system components.

After relieving system pressure, a small amount of fuel may be released when servicing fuel pipes or connections. In order to reduce the chance of personal injury, cover fuel pipe fittings with a shop towel before disconnecting, to catch any fuel that may leak out. Place the towel in an approved container when disconnect is completed.

1. Ignition "OFF."
2. Disconnect negative battery cable to avoid possible fuel discharge if an accidental attempt is made to start the engine.
3. Loosen fuel filler cap to relieve tank pressure. (Do not tighten until service has been completed.)
4. Connect J 34730-1 to fuel pressure connection. Wrap a shop towel around fitting while connecting gage to avoid spillage.
5. Install bleed hose into an approved container and open valve to bleed system pressure. Fuel connections are now safe for servicing.
6. Drain any fuel remaining in gage into an approved container.

SERVICING QUICK-CONNECT FITTINGS

Figure 6

Tools Required:

J 37088-A, tool set, Fuel Line Quick-Connect Separator

Remove or Disconnect

Important

- Relieve fuel system pressure before servicing any fuel system connection (see "Fuel System Pressure Relief").
 - Slide dust covers from quick-connect fittings, if equipped.
1. Grasp both sides of fitting. Twist female connector $\frac{1}{4}$ turn in each direction to loosen any dirt within fitting.

CAUTION: Safety glasses must be worn when using compressed air, as flying dirt particles may cause eye injury.

2. Using compressed air, blow dirt out of fitting.

- For plastic (Hand Releasable) Fitting -

3. Squeeze plastic retainer release tabs.
4. Pull connection apart.

-OR-

- For Metal Fitting -

3. Choose correct tool from J 37088-A tool set for size of fitting. Insert tool into female connector, then push inward to release locking tabs.
4. Pull connection apart.

Clean and Inspect

NOTICE: If it is necessary to remove rust or burrs from fuel pipe: use emery cloth in a radial motion with the pipe end to prevent damage to O-ring sealing surface.

- Using a clean shop towel, wipe off male pipe end.
- Inspect both ends of fitting for dirt and burrs. Clean or replace components/assemblies as required.



Metal Collar Quick-connect Fitting



Plastic Collar Quick-connect Fitting

Removal

①

CAUTION: TO REDUCE THE RISK OF FIRE AND PERSONAL INJURY, RELIEVE FUEL SYSTEM PRESSURE BEFORE DISCONNECTING FUEL LINE FITTINGS.

②

IF EQUIPPED, SLIDE DUST COVER BACK TO ACCESS FITTING

③

Twist

④

Blow

⑤

J 37088
OR
J 39504

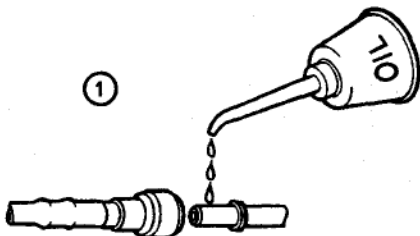
OR

⑥



Installation

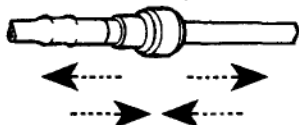
①



②



③



④

IF EQUIPPED, REPOSITION
DUST COVER AFTER SERVICE



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NA 5089-AS

Figure 6 - Quick-Connect Fittings

Install or Connect

CAUTION: To Reduce the Risk of Fire and Personal Injury:

• Before connecting fitting, always apply a few drops of clean engine oil to the male pipe end. This will ensure proper reconnection and prevent a possible fuel leak. (During normal operation, the O-rings located in the female connector will swell and may prevent proper reconnection if not lubricated.)

1. Apply a few drops of clean engine oil to the male pipe end.
2. Push both sides of fitting together to cause the retaining tabs/fingers to snap into place.
3. Once installed, pull on both sides of fitting to make sure connection is secure.
- Reposition dust cover over quick-connect fitting, if equipped.

IN-LINE FUEL FILTER REPLACEMENT

Figure 7

Important

- There is no service interval for fuel filter replacement. Only replace fuel filter if it is restricted.

Remove or Disconnect

1. Negative battery cable.
2. Relieve fuel system pressure (see "Fuel System Pressure Relief").
3. Raise vehicle.

Clean

- Clean both fuel feed pipe connections and surrounding areas at in-line fuel filter before disconnecting to avoid possible contamination of the fuel system.
4. Quick-connect fitting at fuel filter inlet (see "Servicing Quick-Connect Fittings").
 5. Threaded outlet fitting from chassis fuel pipe.
 6. Slide fuel filter from bracket.

Inspect

- Fuel pipe O-ring for cuts, nicks, swelling or distortion. Replace if necessary.

Install or Connect

1. Slide fuel filter into bracket.
2. Threaded outlet fitting to chassis fuel pipe.

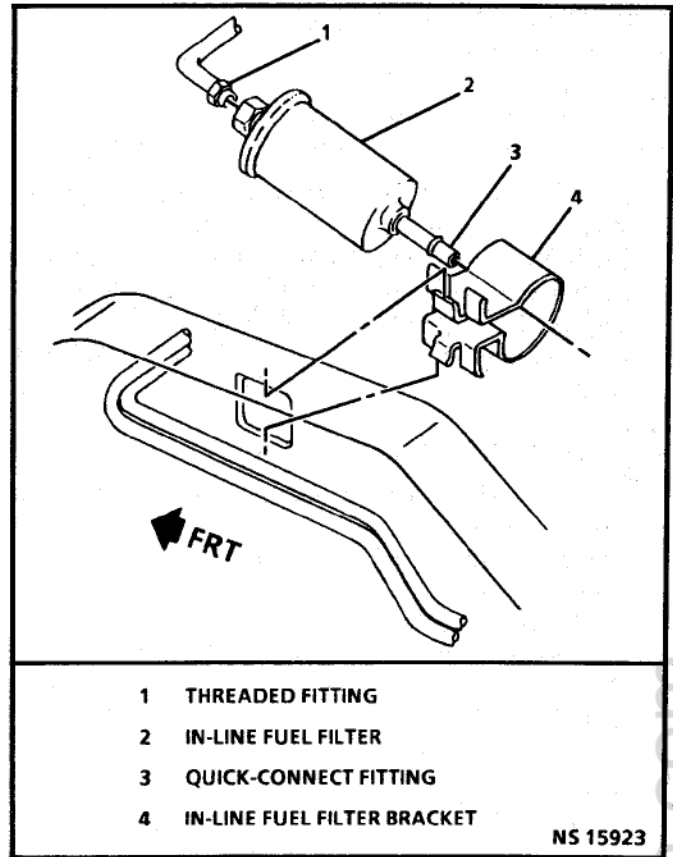


Figure 7 - In-Line Fuel Filter Replacement

Tighten

- In-line fuel filter fitting to 27 N·m (20 lb. ft.).
3. Quick-connect fitting to fuel filter inlet (see "Servicing Quick-Connect Fittings").
 4. Lower vehicle.
 5. Tighten fuel filler cap.
 6. Ignition "OFF."
 7. Negative battery cable.

Inspect

- Turn ignition switch to "ON," position for two seconds, then turn to "OFF" for ten seconds. Again, turn to "ON" position and check for fuel leaks.

DRAINING FUEL TANK

CAUTION: Never drain or store fuel in an open container due to the possibility of fire or explosion.

- Use a hand operated pump device to drain fuel through the fuel filler neck. Remove fuel and install fuel filler cap.

FUEL TANK REPLACEMENT

Figure 8

Remove or Disconnect

CAUTION: To help avoid personal injury when a vehicle is on a hoist, provide additional support for the vehicle on the opposite end from which components are being removed. This will reduce the possibility of the vehicle falling off the hoist.

Remove or Disconnect

1. Relieve fuel system pressure (see "Fuel System Pressure Relief").
2. Drain fuel tank (see "Draining Fuel Tank").
3. Raise vehicle.
4. Fuel filler neck shield.
5. Rear axle assembly, refer to SECTION 4B.
6. Exhaust system (pipe and muffler), refer to SECTION 6F.
7. Muffler heat shield.

Clean

- Clean all fuel pipe and hose connections and surrounding areas before disconnecting to

avoid possible contamination of the fuel system.

8. Rear fuel feed pipe assembly from fuel sender assembly, fuel return, vapor, and vent hoses at fuel sender assembly (see "Servicing Quick-Connect Fittings").
9. Electrical connector.

NOTICE: Do Not bend fuel tank straps, as this may damage straps.

10. With aid of an assistant, support fuel tank, and remove fuel tank strap front attaching bolts, fuel tank straps and remove fuel tank.

- Fuel tank from vehicle and place in a suitable work area.

Disassemble

1. Fuel tank insulator pads and tank strap insulator pads if damaged, otherwise leave on.
2. Fuel sender assembly (see "Fuel Sender Assembly Replacement").

Assemble

1. Install fuel sender assembly (see "Fuel Sender Assembly Replacement").
2. Install tank strap insulator pads and fuel tank insulator pads, if needed.

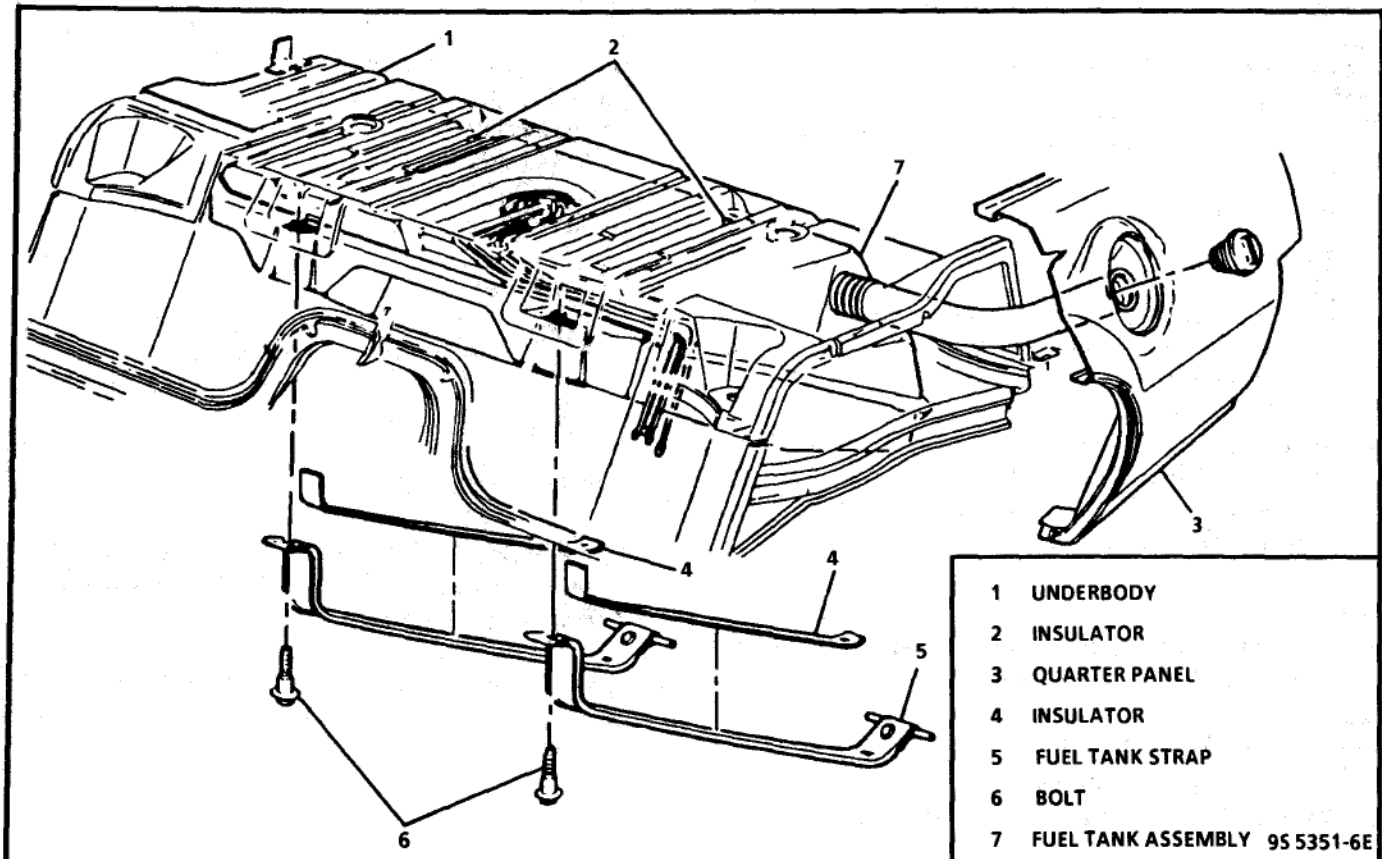


Figure 8 - Fuel Tank Insulators and Fuel Tank Mounting

- Peel off release paper on insulators and apply to tank and straps.

Install or Connect

1. Hook rear end of fuel tank straps into underbody bracket.
2. With the aid of assistant, position and support fuel tank. Position fuel tank straps and loosely install front fuel tank strap attaching bolts.

Tighten

- Front fuel tank strap attaching bolts to 34 N·m (25 lb. ft.).
3. Electrical connector.
 4. Fuel return, vapor, and vent hoses and clamps at fuel sender assembly, rear fuel feed and return pipe assemblies to fuel sender assembly (see "Servicing Quick-Connect Fittings").
 5. Muffler heat shield and attaching screws.
 6. Exhaust system (pipe and muffler), refer to SECTION 6F.
 7. Rear axle assembly, refer to SECTION 4B.
 8. Fuel filler neck shield.
 9. Lower vehicle.
 10. Add fuel and install fuel filler cap.
 11. Ignition "OFF."
 12. Negative battery cable.

Inspect

- Turn ignition switch to "ON," position for two seconds, then turn to "OFF" for ten seconds. Again, turn to "ON" position and check for fuel leaks.

FUEL TANK VENT VALVE

The fuel tank vent valve is located above the passenger side rear tire and exhaust heat shield.

Remove or Disconnect

1. Ignition "OFF."
2. Negative battery cable.
3. Fuel filler cap.
4. Raise vehicle.
5. Fuel tank vent valve hose.
6. Squeeze tabs and remove valve from bracket.

Install or Connect

- Reverse removal procedure.

FUEL SENDER ASSEMBLY REPLACEMENT Figure 9

NOTICE: Do Not handle the fuel sender by the fuel sender pipes. Due to the length of the tubes,

the amount of leverage generated could damage the solder joints.

Important

- Always replace fuel sender assembly O-rings, when reinstalling fuel sender assembly.

Remove or Disconnect

1. Relieve fuel system pressure (see "Fuel System Pressure Relief").
2. Drain fuel tank (see "Draining Fuel Tank").
3. Fuel tank (see "Fuel Tank Replacement").

Clean

- Clean all fuel pipe and hose connections and surrounding areas before disconnecting to avoid possible contamination of the fuel system.

Disassemble

1. Fuel sender retaining nuts and retaining ring.
2. Discard fuel sender O-ring.

CAUTION: To reduce risk of fire and personal injury, drain fuel from fuel sender assembly into an approved container.

Clean and Inspect

- Fuel sender assembly O-ring sealing surfaces.

Assemble

1. Position new fuel sender assembly O-ring on fuel tank.

Important

- Fuel pump strainer must be in a horizontal position. When installing the fuel sender assembly, assure that the fuel pump strainer does not block full travel of float arm.
2. Gently fold fuel strainer over itself.
 - Slowly position fuel sender assembly in fuel tank so that fuel strainer is not damaged or trapped by sump walls.
 3. Install fuel sender assembly into fuel tank.

Tighten

- Fuel sender assembly retaining nuts to 7 N·m (63 lb. in.).

Install or Connect

- Fuel tank and check for leaks (see "Fuel Tank Replacement").

FUEL SENDER ASSEMBLY SERVICE

Figure 10

Remove or Disconnect

1. Relieve fuel system pressure (see "Fuel System Pressure Relief").
2. Drain fuel tank (see "Draining Fuel Tank").
3. Fuel tank (see "Fuel Tank Replacement").
4. Fuel sender assembly (see "Fuel Sender Assembly Replacement").

Disassemble

1. Support fuel sender assembly with one hand and grasp strainer with other hand.
 - Rotate strainer in one direction and pull fuel strainer off of pump. Discard strainer after inspection.

Inspect

- Fuel pump strainer. If strainer is contaminated, the fuel tank should be cleaned.
- Fuel pump inlet for dirt and debris. If found, fuel pump and reservoir should be replaced.

- If fuel pump and reservoir is being replaced, proceed to step 2. -

2. Vent hose and fuel return hose from under cover.

3. Quick-connect fitting on fuel feed hose (see "Servicing Quick-Connect Fittings").
4. Electrical connector from fuel pump.
5. Pry locking tabs on bottom of fuel reservoir, lift reservoir to clear locking tabs and pull reservoir downward to clear guides on fuel sender.
6. Bumper on fuel sender.

Assemble

1. New bumper on fuel sender.
2. Align tabs on reservoir with guide on fuel sender, push upward to stop on top of reservoir and snap locking tabs over ramps on bottom of reservoir.
3. Fuel vent and return hose.
4. Quick-connect fitting on fuel feed hose (see "Servicing Quick-Connect Fittings").
5. Electrical connector on fuel pump.
6. Push new fuel pump strainer onto fuel pump inlet. Push on outer edge of strainer ferrule until fully seated.

Install or Connect

1. Fuel sender assembly (see "Fuel Sender Assembly Replacement").
2. Fuel tank and check for leaks (see "Fuel Tank Replacement").

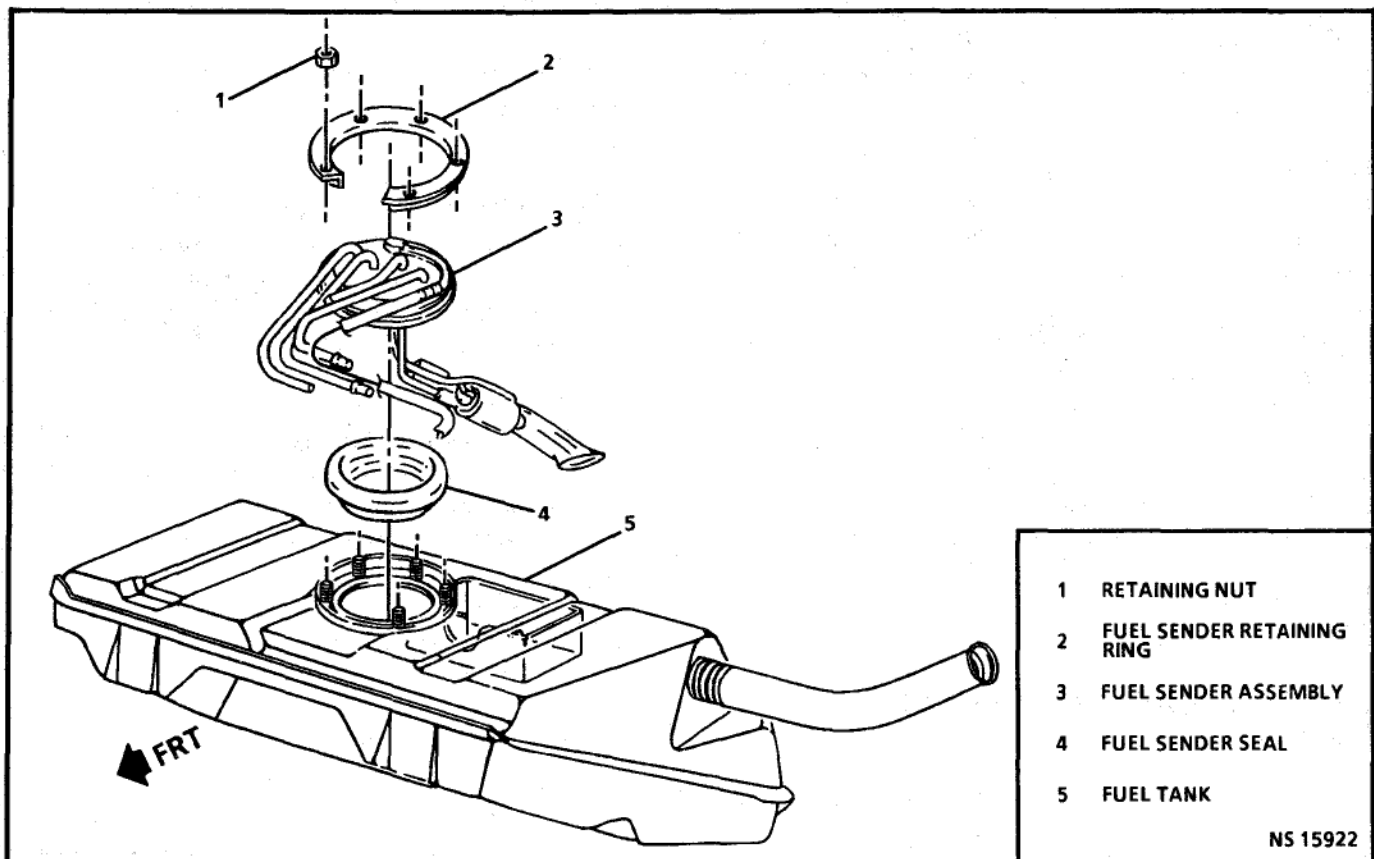


Figure 9 - Fuel Sender Assembly Replacement

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FUEL SYSTEM CLEANING

 Important

- Only use oil free compressed air to blow out fuel pipes.
- If the in-line fuel filter is plugged, the fuel tank should be inspected internally and cleaned if necessary.

Fuel Tank

 Remove or Disconnect

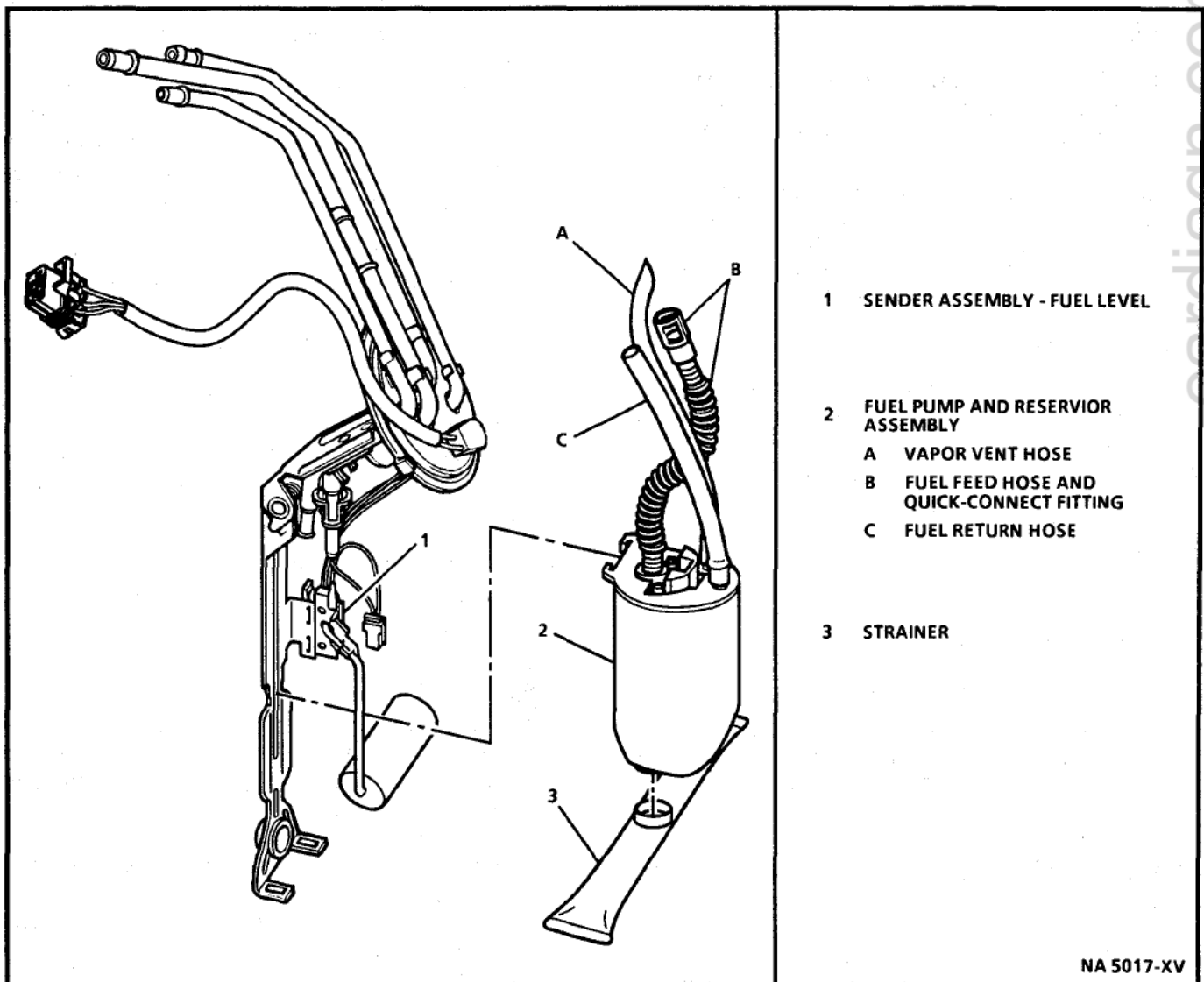
1. Ignition "OFF."
2. Negative battery cable.
3. Relieve fuel system pressure (see "Fuel System Pressure Relief").
4. Drain fuel tank (see "Draining Fuel Tank").
5. Fuel tank (see "Fuel Tank Replacement").
6. Fuel sender assembly (see "Fuel Sender Assembly Replacement").

 Inspect

- Fuel pump strainer. If contaminated, it must be replaced and the fuel pump must be inspected.
 - Fuel pump inlet for dirt and debris. If found, fuel pump should be replaced.
7. Flush fuel tank with running hot water for at least five minutes.
 8. Pour water out of fuel sender assembly opening. (Rock tank to be sure that removal of water from tank is complete.)

 Install or Connect

1. Fuel sender assembly (see "Fuel Sender Assembly Replacement").
2. Fuel tank (see "Fuel Tank Replacement").
3. Add fuel and install fuel filler cap.
4. Ignition "OFF."
5. Negative battery cable.



NA 5017-XV

Figure 10 - Fuel Sender Assembly Disassembly

 Inspect

- Turn ignition switch to "ON" position for two seconds, then turn to "OFF" for ten seconds. Again turn to "ON" position and check for fuel leaks.

FUEL FEED AND RETURN PIPES/HOSES REPLACEMENT

Rear Fuel Feed Pipe/Hose Assembly (Fuel Tank)

Figure 11

NOTICE: Do Not attempt to repair rear fuel feed pipe/hose assembly. If damaged, replace.

 Remove or Disconnect

1. Relieve fuel system pressure (see "Fuel System Pressure Relief").
2. Raise vehicle.

 Clean

- Clean all fuel pipe and hose connections and surrounding areas before disconnecting to avoid possible contamination of the fuel system.
3. Rear fuel feed pipe assembly from chassis fuel pipes (see "Servicing Quick-Connect Fittings").
 4. Fuel tank (Refer to "Fuel Tank Replacement").
 5. Rear fuel pipes from fuel sender assembly (see "Servicing Quick-Connect Fittings").

 Install or Connect

1. Rear fuel feed pipe assembly to fuel sender assembly (see "Servicing Quick-Connect Fittings").
2. Fuel tank (Refer to "Fuel Tank Replacement").
3. Rear fuel pipes to chassis fuel pipes (see "Servicing Quick-Connect Fittings").
4. Lower vehicle.
5. Ignition "OFF."
6. Negative battery cable.
7. Tighten fuel filler cap.

 Inspect

- Turn ignition switch to "ON," position for two seconds, then turn to "OFF" for ten seconds. Again turn to "ON" position, and check for fuel leaks.

Chassis Fuel Feed and Return Pipes

Figure 12

NOTICE: When replacing fuel pipes, always replace them with original equipment or parts that meet the GM specifications for those parts. The

replacement pipes must have the same type of fittings as the original pipes to ensure the integrity of the connection.

- Do not use copper or aluminum tubing to replace steel tubing. Only tubing meeting the 124-M specification or its equivalent is capable of meeting all pressure, corrosion and vibration characteristics necessary to ensure the durability standard required.

- When replacing fuel hoses or repairing fuel pipes with hoses, always replace them with original equipment or parts meeting GM specifications, use only reinforced fuel-resistant hose which is identified with the word "Fluoroelastomer" or "GM 6163-M" on the hose. Inside hose diameter must match outside pipe diameter.

- Do not use rubber hose within 100 mm (4") of any part of the exhaust system or within 254 mm (10") of the catalytic converter.

- A minimum of 13 mm ($\frac{1}{2}$ ") clearance must be maintained around sharp edges such as flanges, pinch welds, etc., to prevent contact and chaffing. A minimum of 19 mm ($\frac{3}{4}$ ") clearance must be maintained around all moving parts.

- If more than a 6 inch length of pipe is removed, use a combination of steel pipe and hose so that the total hose lengths, including the 100mm (4") additional length will not be more than 254 mm (10") long. Follow the same routing as the original pipe.

- Cut ends of pipe remaining on car square with a tube cutter. Using the first step of a double flaring tool, form a bead on the end of both pipe sections. If pipe is too corroded to withstand the beading operation without damage, the pipe should be replaced. If a new section of pipe is used, form a bead on both ends of it also.

- Use screw type hose clamps. Slide clamps onto pipe and push 51 mm (2") onto each portion of fuel pipe.

 Remove or Disconnect

1. Relieve fuel system pressure (see "Fuel System Pressure Relief").

 Clean

- Clean all fuel feed and return pipe/hose connections and surrounding areas before disconnecting to avoid possible contamination of the fuel system.
2. Raise vehicle.
 3. Engine compartment connecting fuel feed and return pipe/hose assemblies from chassis fuel feed and return pipes (see "Servicing Quick-Connect Fittings").
 4. Fuel feed pipe from outlet side of in-line fuel filter. Discard O-ring.

5. Fuel return pipe from rear fuel pipe (see "Servicing Quick-Connect Fittings").
6. Desired fuel pipe and attaching hardware from under body.
 - Note position of fuel pipe to be removed for installation.

Inspect

- Pipes for bends, kinks and cracks. Repair or replace pipe or pipes as required.

Install or Connect

1. Position new or repaired fuel pipe or pipes in body clips as noted during removal and install with attaching hardware.
2. Position new O-ring on fuel feed pipe and connect to outlet side of in-line fuel filter.

Tighten

- Fuel feed pipe fitting to 27 N·m (20 lb. ft.).
3. Fuel return pipe to rear fuel pipes (see "Servicing Quick-Connect Fittings").
 4. Chassis fuel pipes to engine compartment connecting fuel pipes (see "Servicing Quick-Connect Fittings").
 5. Lower vehicle.
 6. Tighten fuel filler cap.
 7. Ignition "OFF."

8. Negative battery cable.

Inspect

- Turn ignition switch to "ON," position for two seconds, then turn to "OFF" for ten seconds. Again turn to "ON" position, and check for fuel leaks.

Engine Compartment Connecting Fuel Pipes (Chassis to Engine)

Figure 13

NOTICE: Do Not attempt to repair sections of engine compartment connecting fuel pipes. If damaged, replace.

Remove or Disconnect

1. Relieve fuel system pressure (see "Fuel System Pressure Relief").

Clean

- Clean all engine compartment connecting fuel pipe connections and surrounding areas before disconnecting to avoid possible contamination of the fuel system.
2. Quick-connect fittings at engine fuel pipes (see "Servicing Quick-Connect Fittings").

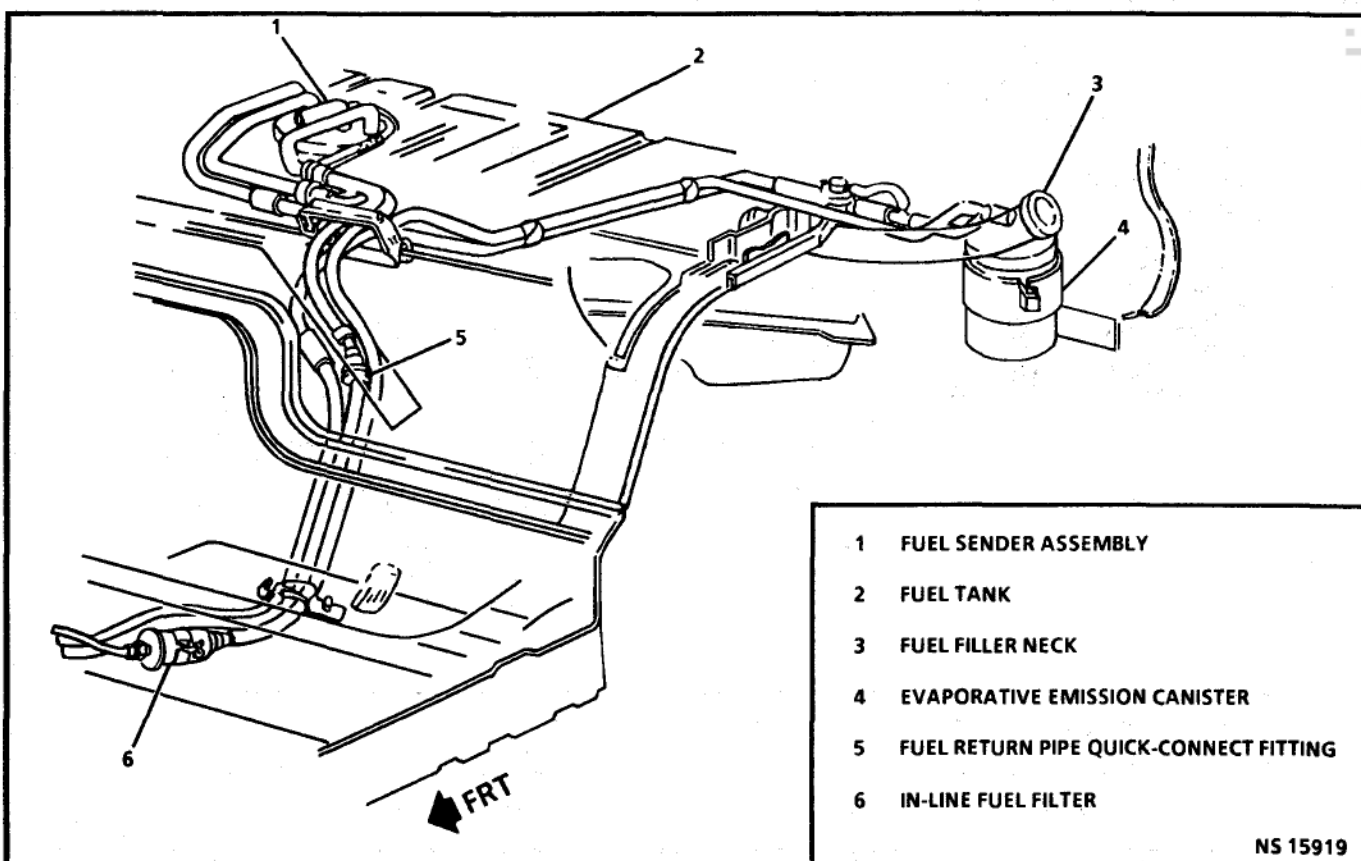


Figure 11 - Fuel and Vapor Pipe Replacement (Rear Fuel Pipes)

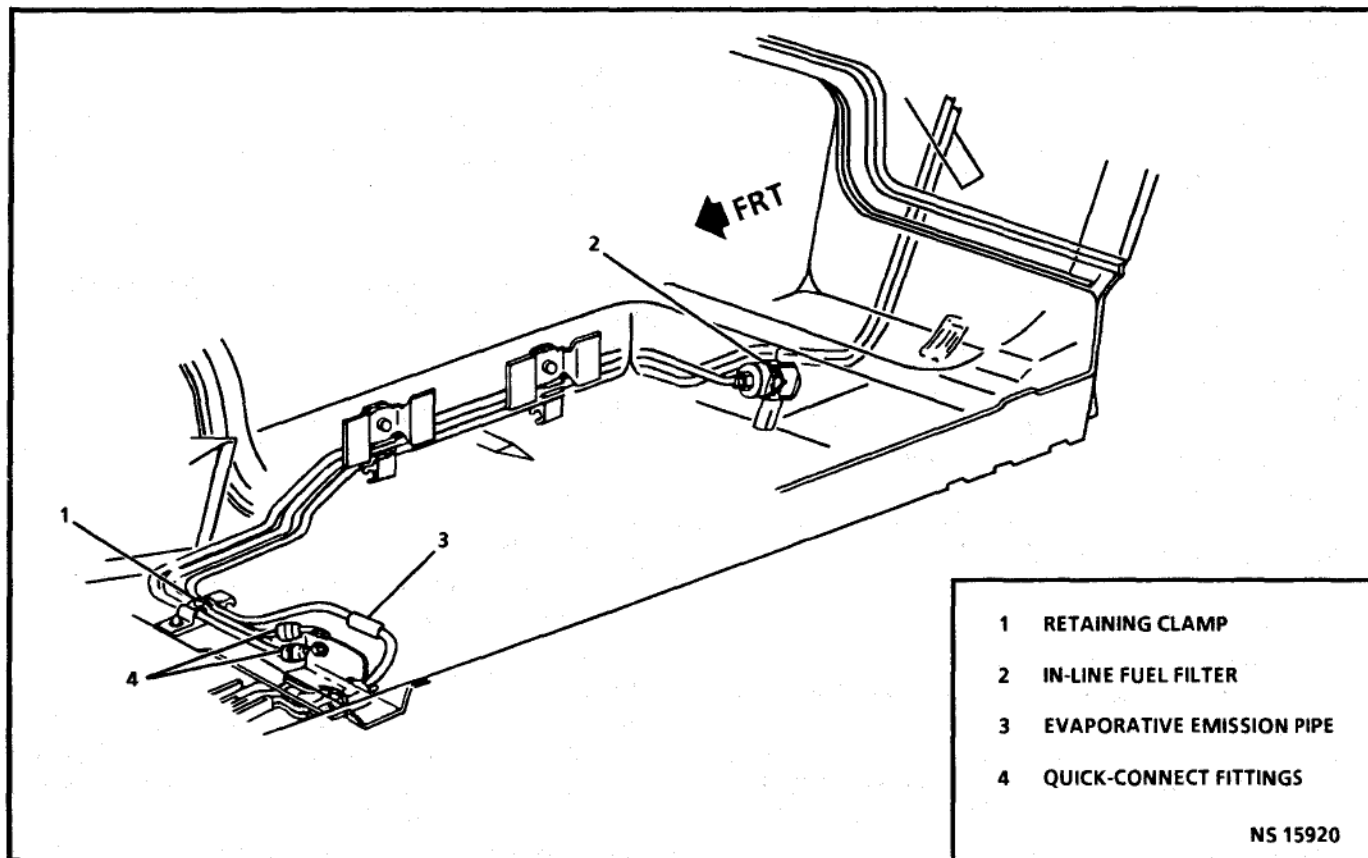


Figure 12 - Fuel and Vapor Pipe Replacement (Chassis Fuel Pipes)

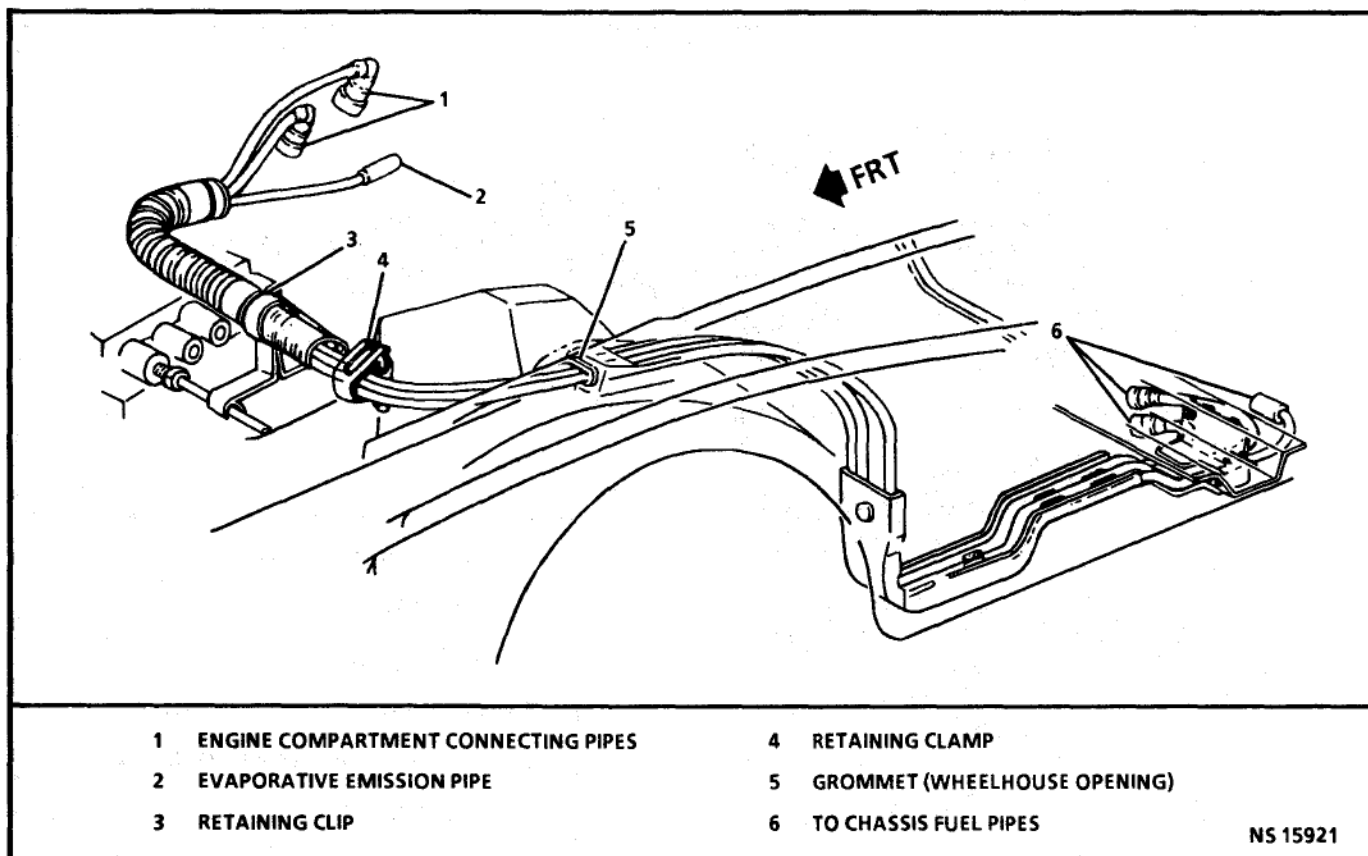


Figure 13 - Fuel and Vapor Pipe Replacement (Engine Compartment Connecting Fuel Pipes)

3. Fuel pipes from routing clip and conduit. (note position for installation.)
4. Fuel pipes through grommet in wheel house.
5. Raise vehicle.
6. Quick-connect fittings at chassis fuel pipes (see "Servicing Quick-Connect Fittings").
7. Fuel pipes from clips and routing bracket (note positions for installation.)

Install or Connect

1. Quick-connect fittings at chassis fuel pipes (see "Servicing Quick-Connect Fittings").
2. Route pipes through clips, brackets, and conduits as noted during disassembly.
3. Lower vehicle.
4. Engine compartment connecting fuel pipes to engine fuel pipes (see "Servicing Quick-Connect Fittings").
5. Tighten fuel filler cap.
6. Ignition "OFF."
7. Negative battery cable.

Inspect

- Turn ignition switch to "ON," position for two seconds, then turn to "OFF" for ten seconds. Again turn to "ON" position and check for fuel leaks.

FUEL VAPOR PIPES AND HOSES REPAIR/REPLACEMENT Figures 11 through 13

NOTICE: When replacing vapor pipes, always replace them with original equipment or parts that meet the GM specifications for those parts.

- Do not use copper or aluminum tubing to replace steel tubing. Only tubing meeting the 124-M specification or its equivalent is capable of meeting all pressure, corrosion and vibration characteristics necessary to ensure the durability standard required.

- When replacing vapor hoses or repairing sections of vapor pipe with vapor hoses, always replace them with original equipment or parts meeting GM specifications, use only reinforced fuel-resistant hose which is identified with the word "Fluoroelastomer" or "GM 6163-M" on the hose. Inside hose diameter must match outside pipe diameter.

- Do not use rubber hose within 100 mm (4") of any part of the exhaust system or within 254 mm (10") of the catalytic converter.

- A minimum of 13 mm ($\frac{1}{2}$ ") clearance must be maintained around sharp edges such as flanges, pinch welds, etc., to prevent contact and chaffing. A minimum of 19 mm ($\frac{3}{4}$ ") clearance must be maintained around all moving parts.

- Use screw-type hose clamps. Slide clamps onto pipe and push 51 mm (2") onto each portion of vapor pipe.

Remove or Disconnect

1. Hardware retaining section of pipe to be replaced.
 - Note location of attaching hardware for installation.
2. Section of pipe and hoses.

Inspect

- Hoses for cuts, swelling, cracks and distortion. Replace as required.
- Pipes for kinks and cracks. Repair or replace sections as required.

Install or Connect

Important

- Follow the same routing as the original hoses and pipes.
 - Hoses and pipes must be properly secured to prevent chafing.
1. Reverse removal procedure.

ACCELERATOR CONTROL CABLE REPLACEMENT Figures 14, 15 and 16

Remove or Disconnect

1. Lower instrument panel trim.
2. Sound insulator.
3. Accelerator cable from accelerator pedal.
4. Squeeze accelerator cable cover tangs and push cable through bulkhead.
5. Accelerator cable retainer and accelerator cable from throttle body lever.
6. Squeeze accelerator cable cover tangs and push cable through accelerator cable bracket.

Install or Connect

NOTICE: To prevent possible interference, flexible components (hoses, wires, conduits, etc.) must not be routed within 50 mm (2") of moving parts, unless routing is positively controlled.

1. Apply Accelerator Linkage Lubricant, 1052541 or equivalent to throttle body lever.
2. Reverse removal procedure.

Inspect

- Check for complete throttle opening and closing positions by operating accelerator pedal. Also check for poor carpet fit under the accelerator pedal.

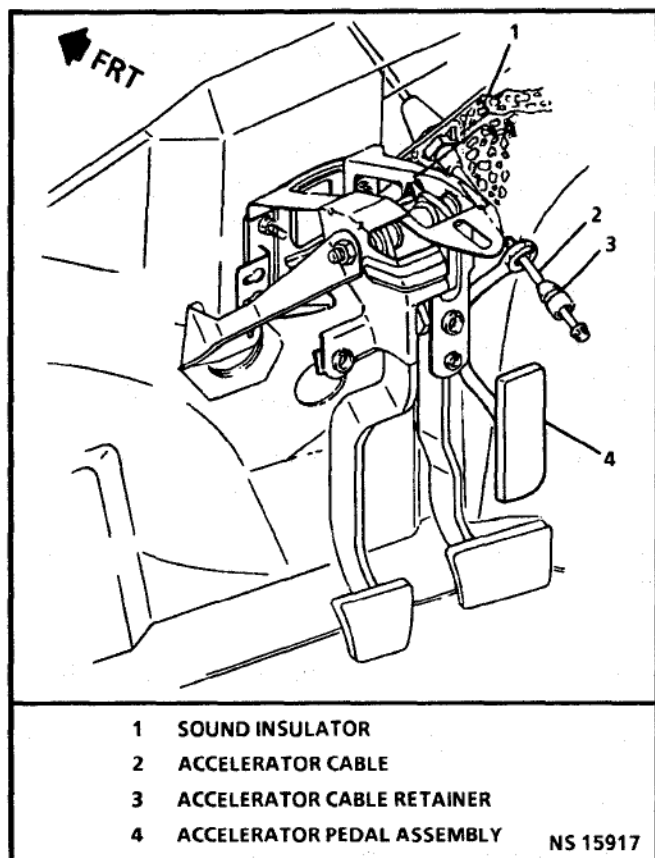


Figure 14 - Accelerator Controls - Pass Compartment

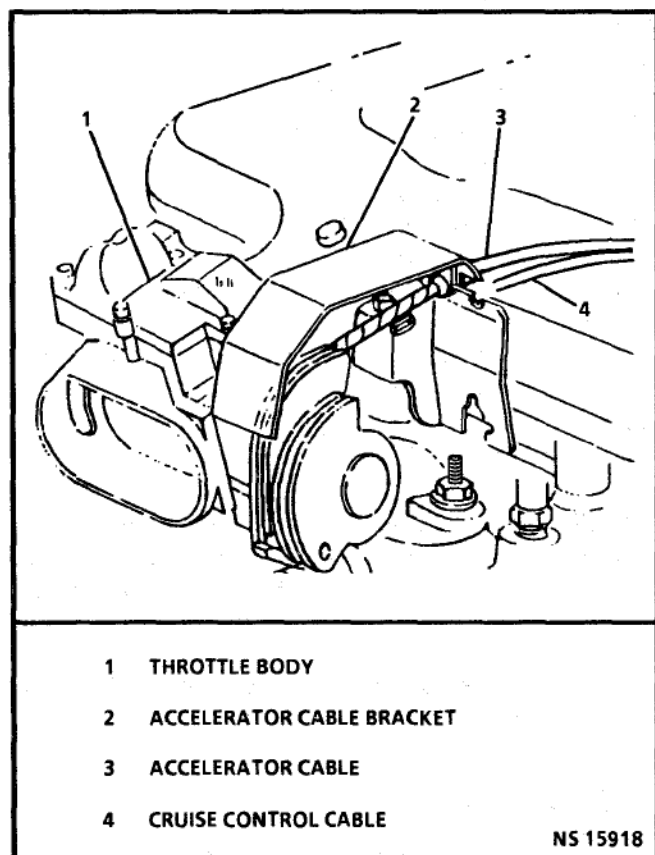


Figure 15 - Accelerator Controls - Engine Compartment (3.4L VIN S)

Throttle should operate freely without binding between full closed and wide open throttle.

3. Apply heavy bodied sealer around accelerator cable at engine compartment side of bulkhead.

ACCELERATOR PEDAL REPLACEMENT

Figure 14

↔ Remove or Disconnect

1. Lower instrument panel trim.
2. Sound insulator.
3. Accelerator cable from accelerator pedal rod.
4. Accelerator pedal retainer nut, bolt, and accelerator pedal.

→ Install or Connect

! Important

- The mounting surface between support and dash panel must be free of insulation. The carpet and padding in pedal and tunnel area must be positioned to lay flat and be free of wrinkles and bunches.

1. Accelerator pedal and accelerator pedal retainer nut and bolt.
2. Accelerator cable on accelerator pedal.

👁 Inspect

- Check for complete throttle opening and closing positions by operating accelerator pedal. Also, check for poor carpet fit under the accelerator pedal.
 - Throttle should operate freely without bind between full closed and wide open throttle.
3. Sound insulator.
 4. Lower instrument panel trim, lower instrument panel trim attaching screws and nut.

SPECIFICATIONS

TORQUE SPECIFICATIONS

In-line Fuel Filter Fitting . . .	27 N·m (20 lb. ft.)
Fuel Tank Strap Attaching	
Bolts	34 N·m (25 lb. ft.)
Fuel Sender Assembly Retaining	
Nuts	7 N·m (63 lb. in.)

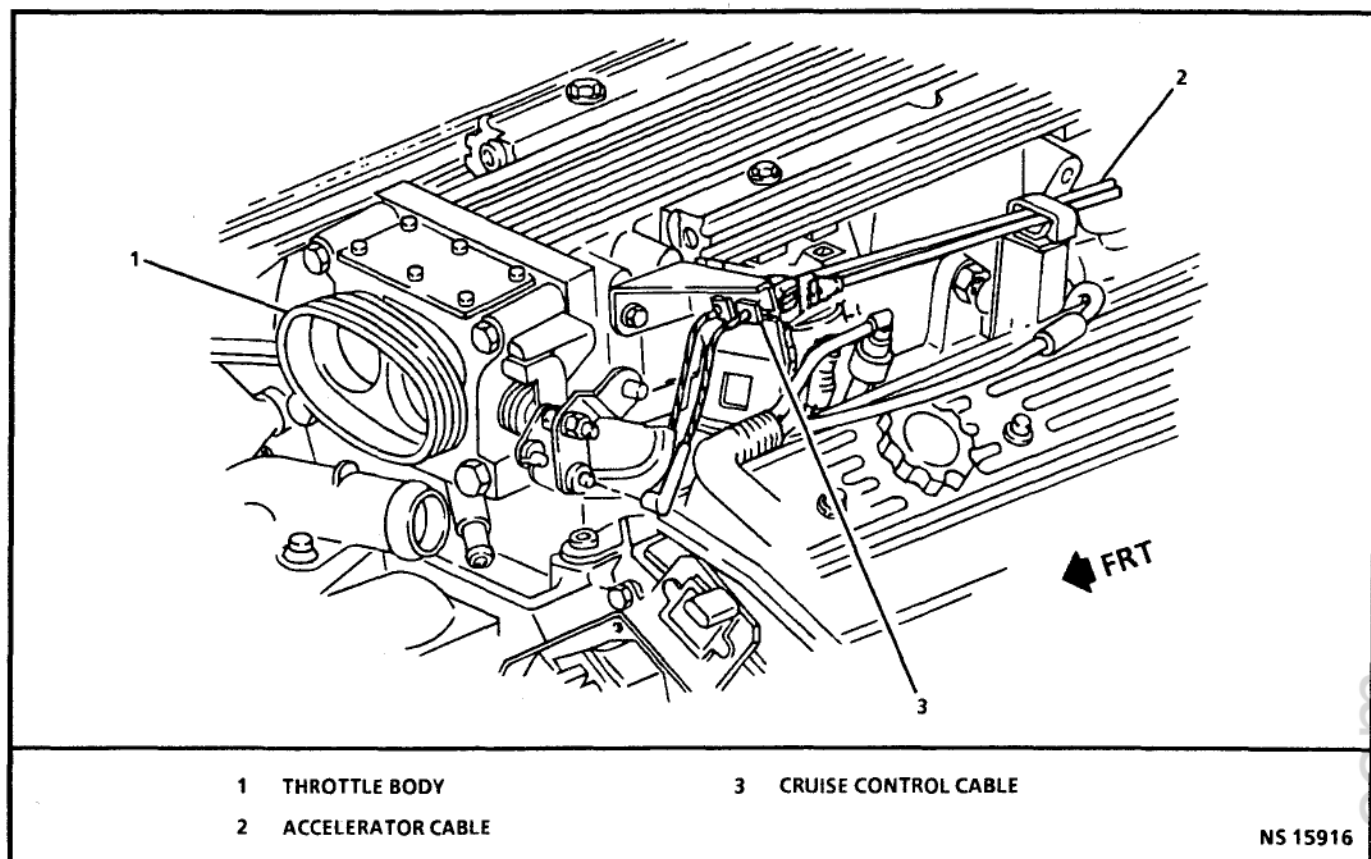


Figure 16 - Accelerator Controls - Engine Compartment (5.7L VIN P)

FUEL SPECIFICATIONS

The fuel must meet ASTM Standard: D4814(U.S.), CGSB 3.5-M87 (Canada).

Octane Requirements

5.7L (VIN P)

Min. Octane Recommended: $87[(R+M)/2]$ (pump) octane Where R= research octane number, and M= motor octane number.

Gasoline With Alcohol

NOTICE: Do Not spill fuel containing alcohol on the vehicle. Alcohol can cause damage to the paint finish and trim.

Methyl Tertiary-Butyl Ether (MTBE)

Fuel containing Methyl Tertiary-Butyl Ether (MTBE) may be used, providing there is no more than 15% MTBE by volume.

Ethanol

Fuel containing ethanol (ethyl) or grain alcohol may be used, providing that there is no more than 10% ethanol alcohol by volume.

Methanol

Fuel containing methanol (methyl) or wood alcohol may be used, providing that there is no more than 5% methanol by volume.

NOTICE: Do not use fuel that contains more than 5% methanol. Use of a fuel (gasahol) that contains more than 5% of methanol can corrode metal fuel system components and damage plastic and rubber parts.

SPECIAL TOOLS

Fuel Pressure Gage	J 34730-1
Fuel Line Quick-Connect	
Separator Set	J 37088-A

BLANK