

### 3. FUEL EVAPORATIVE EMISSION CONTROL (EVAP) SYSTEM

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### 3. FUEL EVAPORATIVE EMISSION CONTROL (EVAP) SYSTEM

#### GENERAL

The function of the EVAP system is to lead the hydrocarbon (HC) evaporated from the fuel system to the combustion chambers where the hydrocarbon is burned and discharged into the atmosphere in the form of non-injurious gas.

#### OPERATION

##### 1. EVAP system

[Vehicle stopped or running at low speed]

- The computer interprets the signals from the speed sensor and will not transmit the "ON" signal to the vacuum switching valve (VSV) until the vehicle speed reaches the specified value.
- Since the VSV has the vacuum passage closed, the evaporated HC that is generated in the fuel tank will be absorbed by the activated carbon in the charcoal canister.

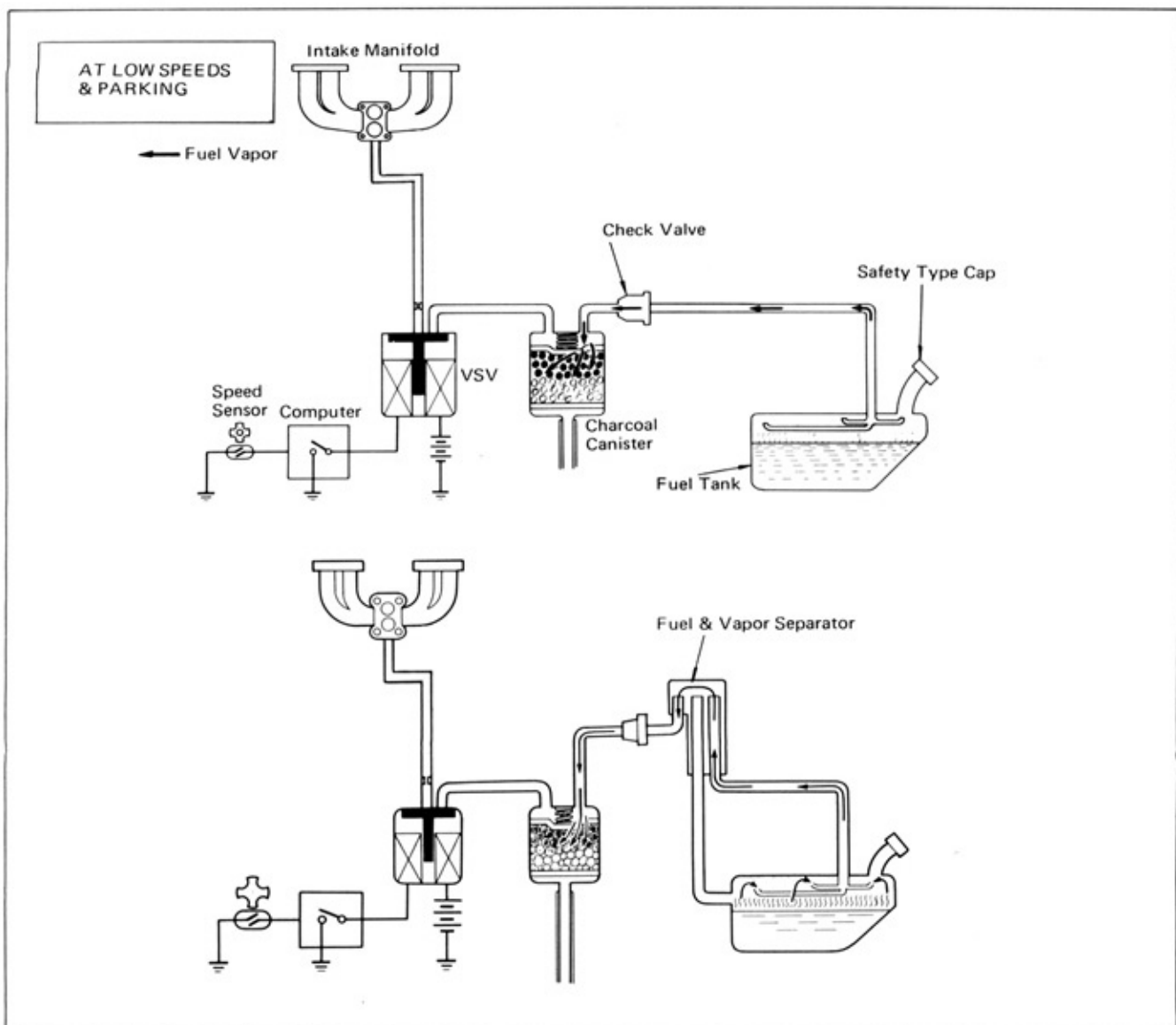


Fig. 3-1 Operation When Vehicle is Stopped or Running at Low Speed

[At high speed operation]

- When the vehicle speed reaches the specified value, the VSV transmits the "ON" signal.
- Since the VSV magnet coil will then be energized and cause the solenoid valve to open, the passage from the charcoal canister to the intake manifold will be opened.
- Therefore, the evaporated HC from the fuel tank, together with fresh air, will be drawn into the intake manifold and burned in the combustion chambers.

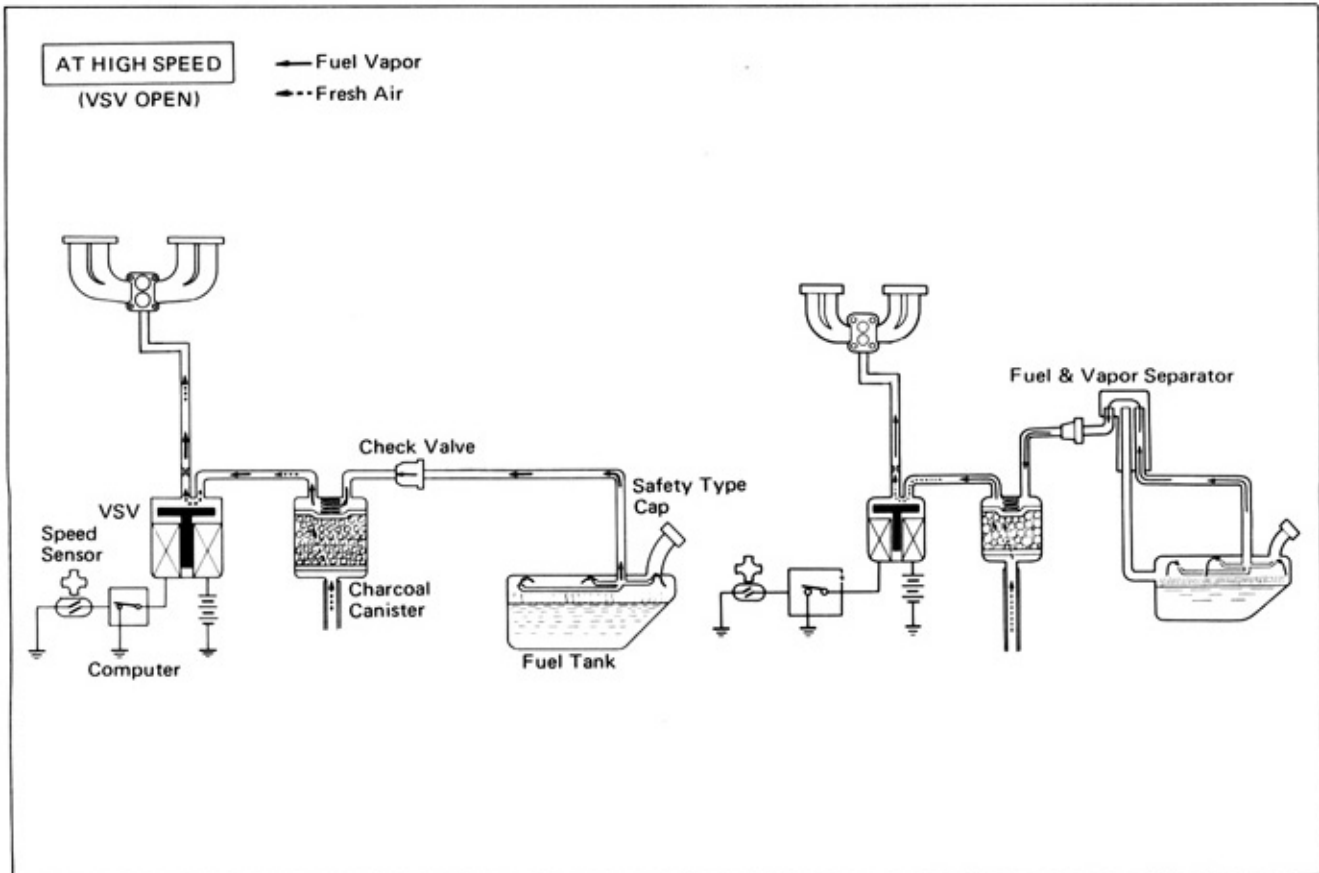


Fig. 3-2 Operation at High Speed Driving

[VSV operating range]

- At acceleration, VSV turns "ON" at "A" point.
- At deceleration, VSV returns to "OFF" at "B" point.

Table 3-1 VSV Operating Speed Ranges

Family	B Point (mph)	Hysteresis C = A - B (mph)
2T-C	11 ± 3	4 ± 2
20R	17 ± 3	4 ± 2
2F	9 ± 2	3 ± 2

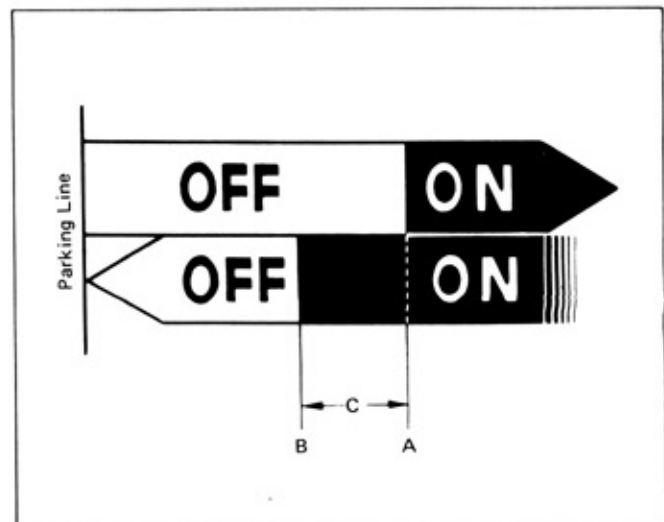


Fig. 3-3 Vehicle Speed Ranges

2. EVAP system (MX only)

[Engine stopped or idling]

When the fuel tank internal pressure rises above the specified value, the evaporated HC will be absorbed by the activated carbon in the charcoal canister.

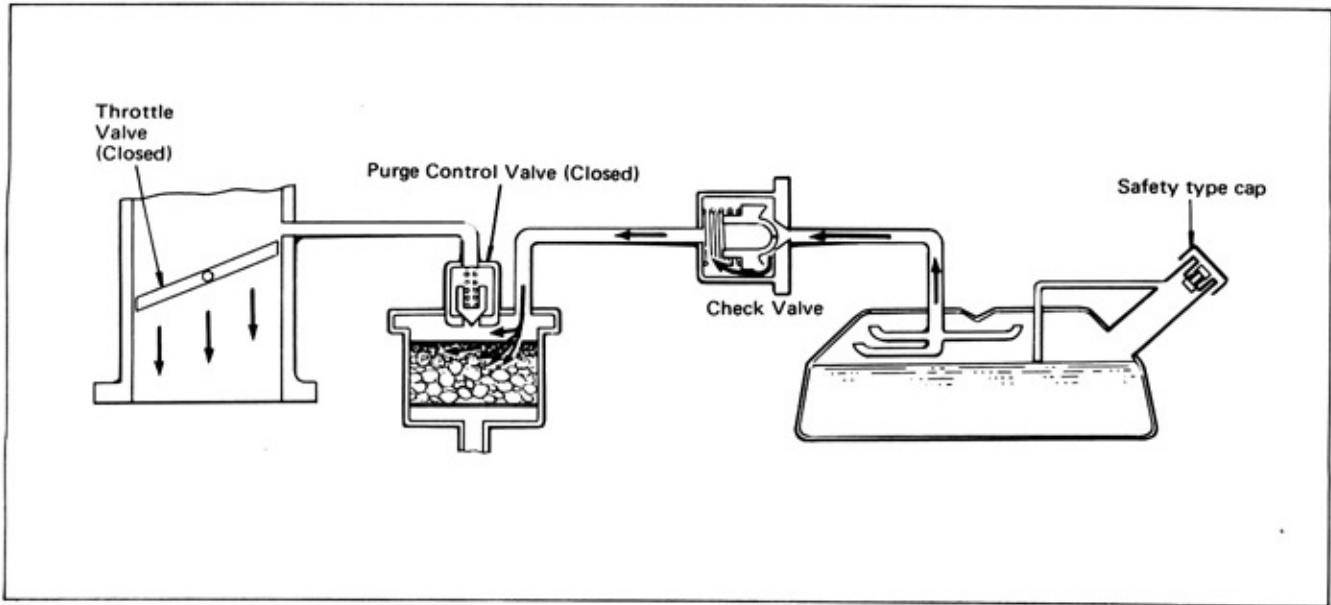


Fig. 3-4 Operation When Engine is Stopped or Idling

[At normal driving]

When the throttle valve is opened, the intake vacuum acts on the purge control valve and causes it to open. The evaporated HC in the fuel tank, purge line, and charcoal canister, together with fresh air, is drawn into the carburetor and burned.

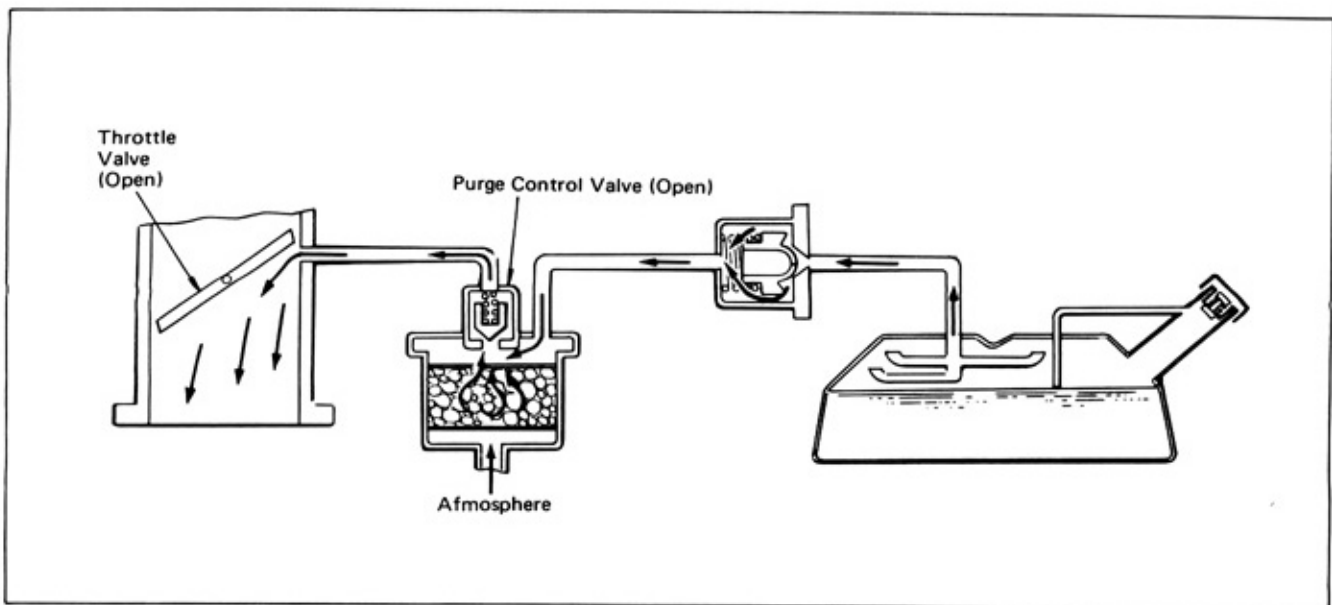


Fig. 3-5 Operation at Normal Driving

### 3. Safety type fuel tank cap

[Fuel tank interior at normal pressure]

The safety valve remains closed and prevents the evaporated HC from escaping out into the atmosphere.

[Fuel tank interior under vacuum]

When the vacuum inside the fuel tank overcomes the safety valve spring tension, the valve opens and allows atmospheric air to enter in and prevent the fuel tank from deforming.

Opening Pressure	-0.43 to -0.86 Psi
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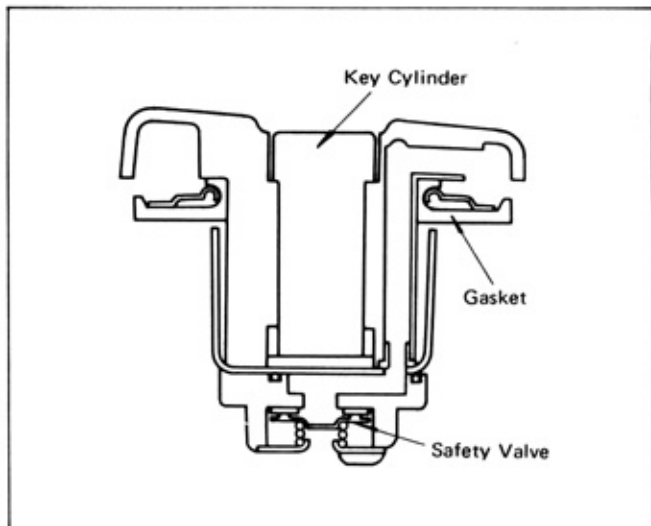


Fig. 3-6 Safety Type Cap Operation

### 4. Check valve

[Fuel tank interior at normal pressure]

The evaporated HC inside the fuel tank pushes open the valve and flows into the vapor line.

[Fuel tank interior under vacuum]

The slit ("A") at the center of valve is opened, allowing fresh air to flow in from the canister end and prevent the fuel tank from deforming.

Opening Pressure	$P_1 \rightarrow P_2$	0.48 in. Hg
	$P_2 \rightarrow P_1$	0.60 in. Hg

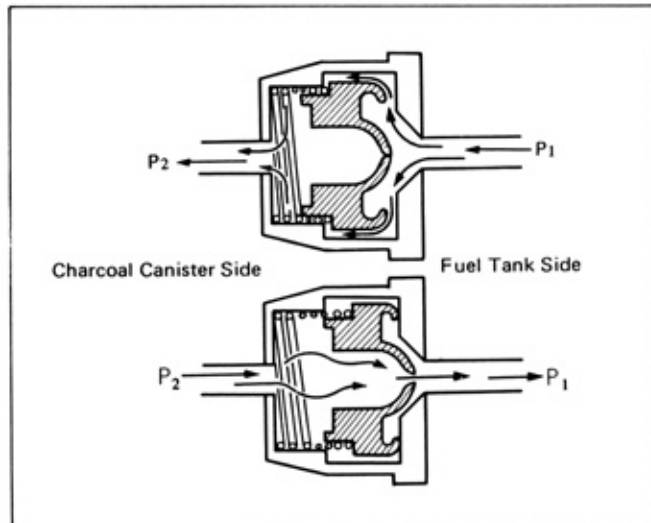


Fig. 3-7 Check Valve Operation

### 5. Purge control valve (MX series only)

[Engine stopped or idling]

The carburetor vacuum sensing port is located slightly above the throttle valve so that the intake manifold vacuum does not act on the purge control valve. Thus, the valve is held closed by spring tension.

[At normal driving]

When the throttle valve is opened, the intake manifold vacuum acts on the purge control valve, causing the valve to open against spring tension and allowing the evaporated gas in the vapor line to flow into the carburetor.

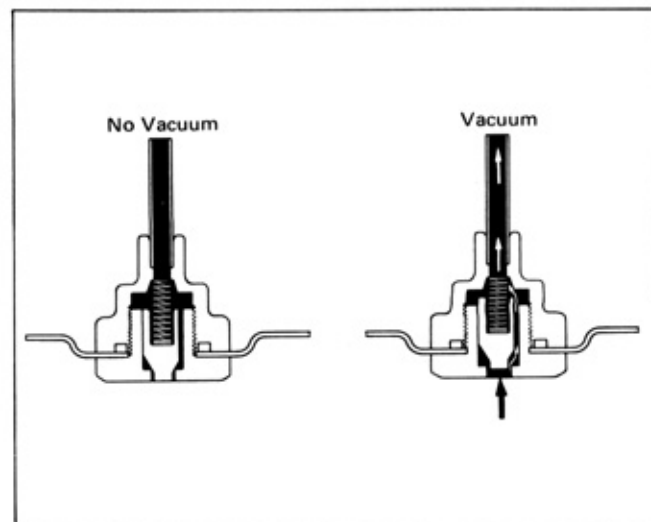


Fig. 3-8 Purge Control Valve Operation

**INSPECTION**

**1. Fuel tank and vapor line inspection**

- Examine fuel tank visually for deformation, cracks, and fuel leakage.
- Examine the hoses and lines visually for condition of connections, presence of damage, security of clamps, and excessive bending of hose.

**Note**

1. The vapor line also passes through the fuel tank cover and quarter trim board. Remove these parts and make thorough check.
2. Examine the fuel line visually in the same manner as vapor line.

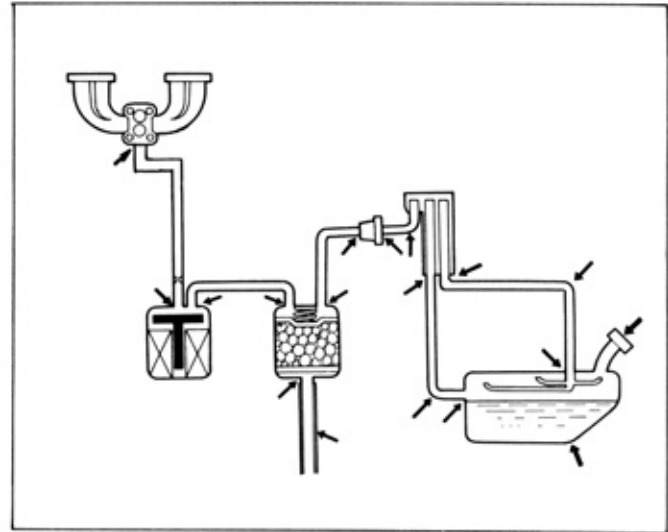
**2. Charcoal canister inspection**

- Examine the case visually for cracks and damages.
- As shown in Fig. 3-10, close pipe "B" with finger and with an air gun, blow in 40 psi. (3kg/cm<sup>2</sup>) air to pipe "A". The air should blow out from pipe "C" without resistance and without containing activated carbon.

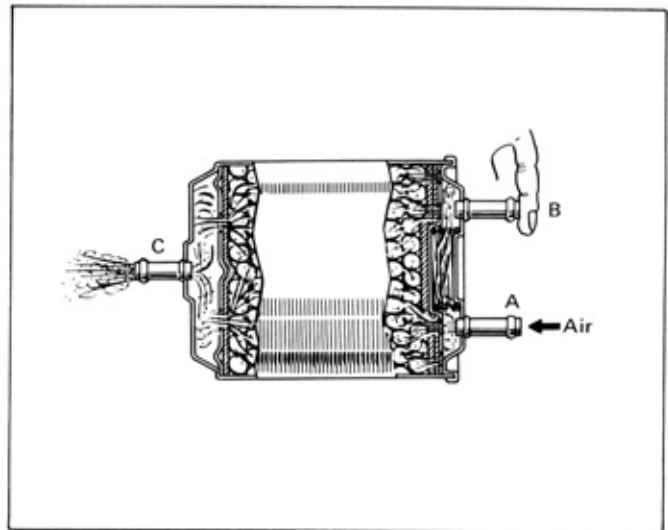
- In the canister for MX series, the air should flow out without resistance from pipes "B" and "C" when blown in from pipe "A". When air is blown in from pipe "B", there should be no air coming out from pipes "A" and "C". There should also be no activated carbon coming out.

**Caution**

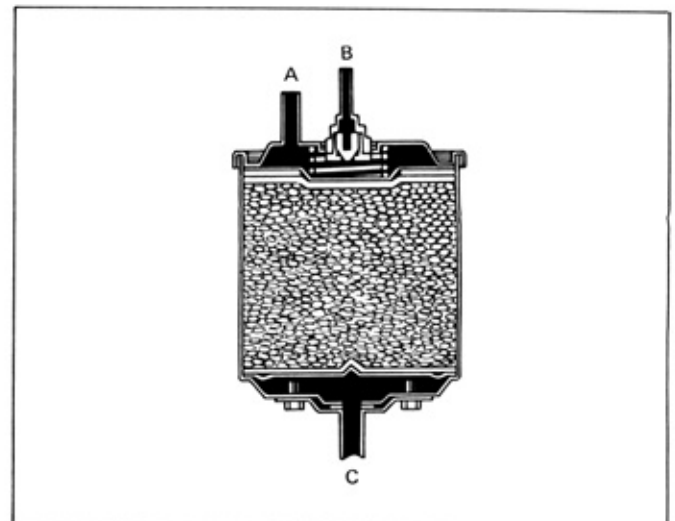
A used canister is highly flammable as it has absorbed evaporated gasoline vapor. It must be kept away from open flames. The canister must never be washed.



*Fig. 3-9 Vapor Line Inspection*



*Fig. 3-10 Charcoal Cannister Inspection*



*Fig. 3-11 Charcoal Canister Inspection (MX Series)*

### 3. Check valve inspection

- Examine the check valve visually for presence of cracks.
- When blown in from the fuel tank side, the valve should open after showing slight resistance at first.
- When blown in from the canister side, the valve should open after showing slight resistance at first.

Note

1. Make sure to test by blowing in. Testing by sucking will be injurious to health.
2. In connecting the check valve into the pipe line, use care to see that it is positioned in the correct direction.

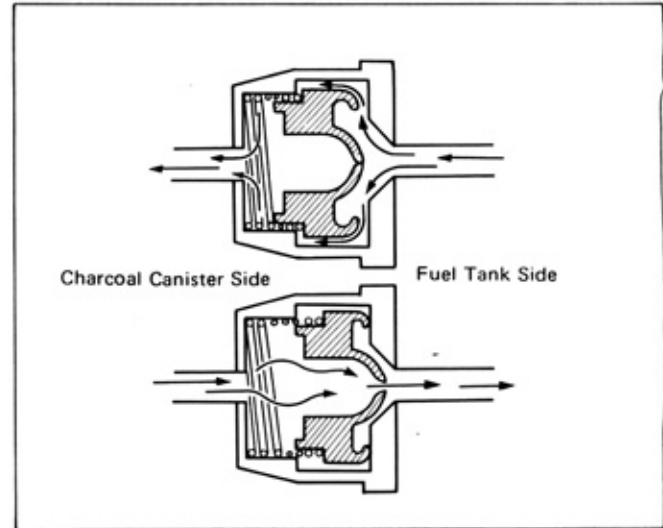


Fig. 3-12 Check Valve Inspection

### 4. Safety type fuel tank cap inspection

- Examine the gasket visually for damage and deformation.
- Visually check the safety valve for rust and sticking.

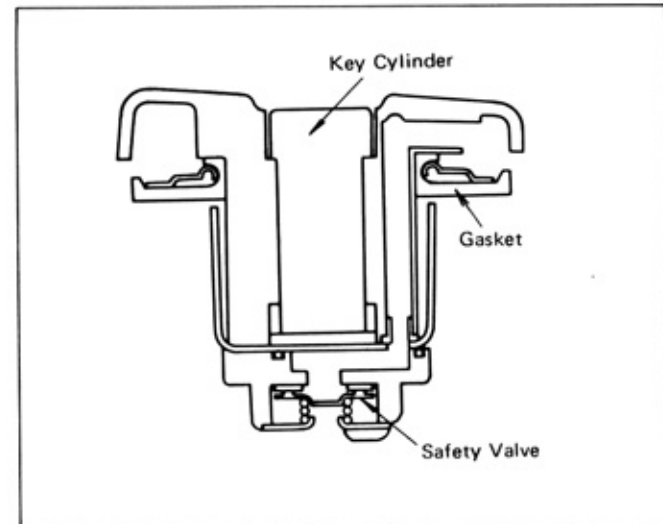


Fig. 3-13 Safety Type Cap Inspection

### 5. Inspection from speed sensor to VSV (except MX series)

- (1) Visually check the vacuum hoses and wiring connectors to see that all are securely connected, and the fuses to see that none are burnt out.
- (2) Disconnect the hose between the canister and VSV.
- (3) Connect a vacuum gauge on the VSV pipe from which the hose had be disconnected, and set the gauge at the driver's seat.
- (4) Perform road test while observing the speedometer and vacuum gauge.

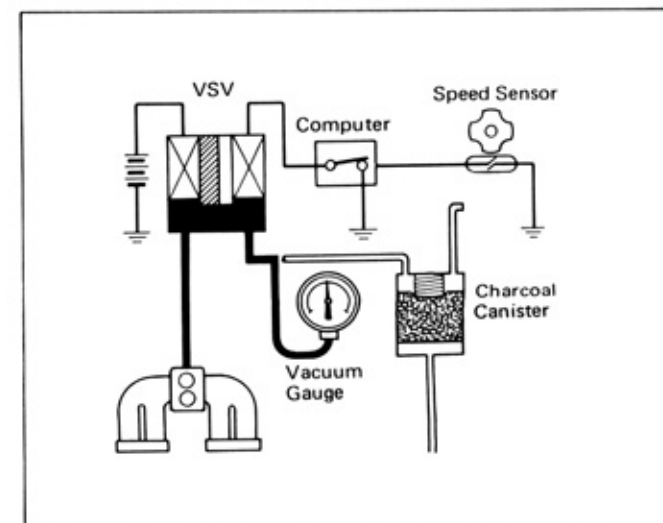


Fig. 3-14 Vacuum Gauge Installation

(5) Inspection procedure:

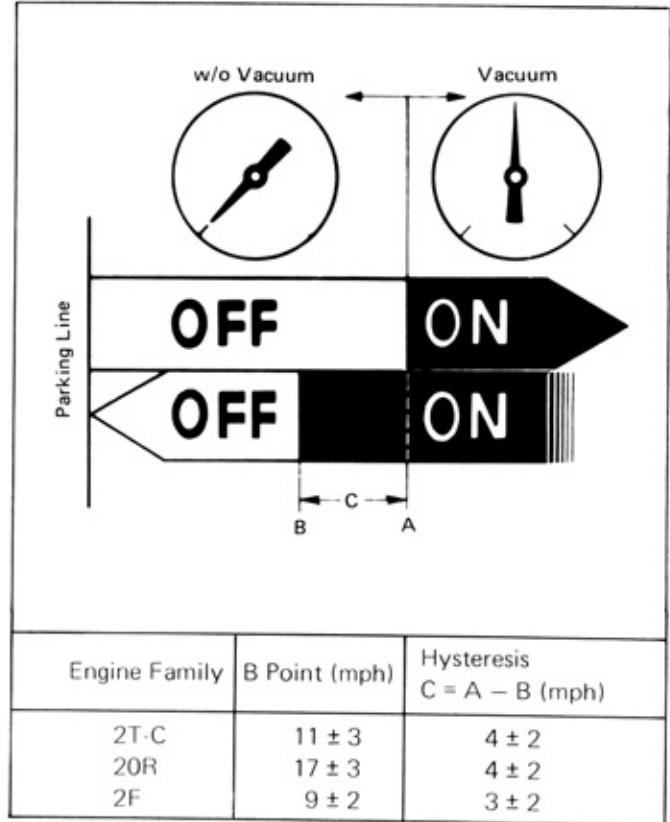
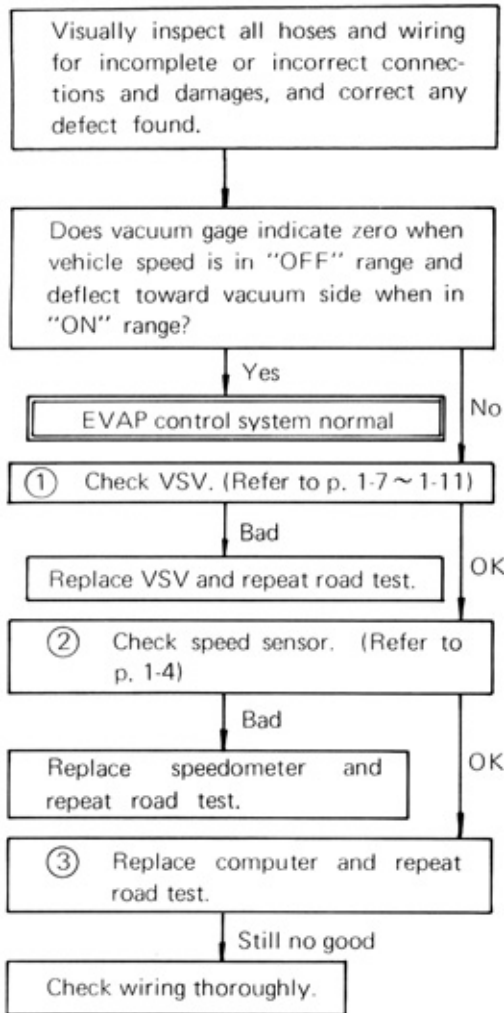


Fig. 3-15 Vehicle Speed Range

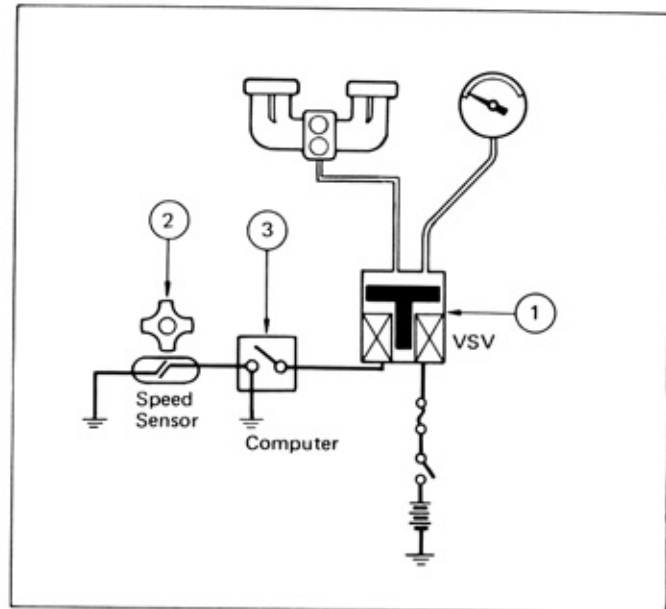


Fig. 3-16 Inspection Points

Note

1. In case the system turns "ON" and "OFF" in accordance with the vehicle speed but the speed range has shifted widely from that shown above, replace the computer and repeat the road test.
2. After completing inspection, make sure to properly reconnect all hoses and wiring connectors that were disconnected for the test. Also do not fail to refasten the clamps.



6. Inspection from speed sensor to VSV

[Method of using checker (except MX series and TE series other than for California)]

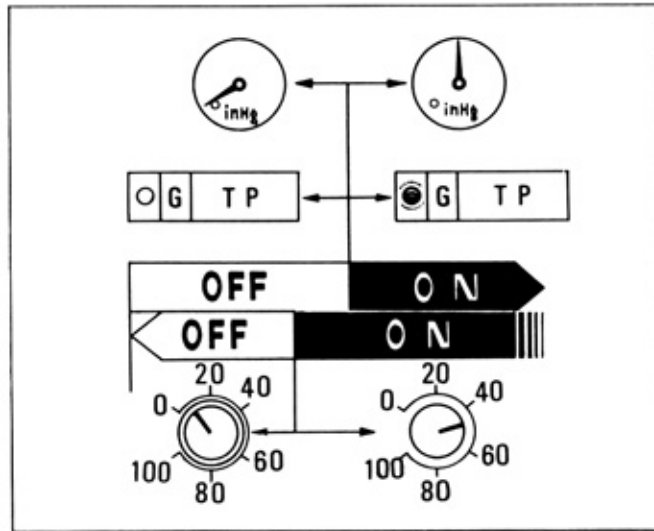
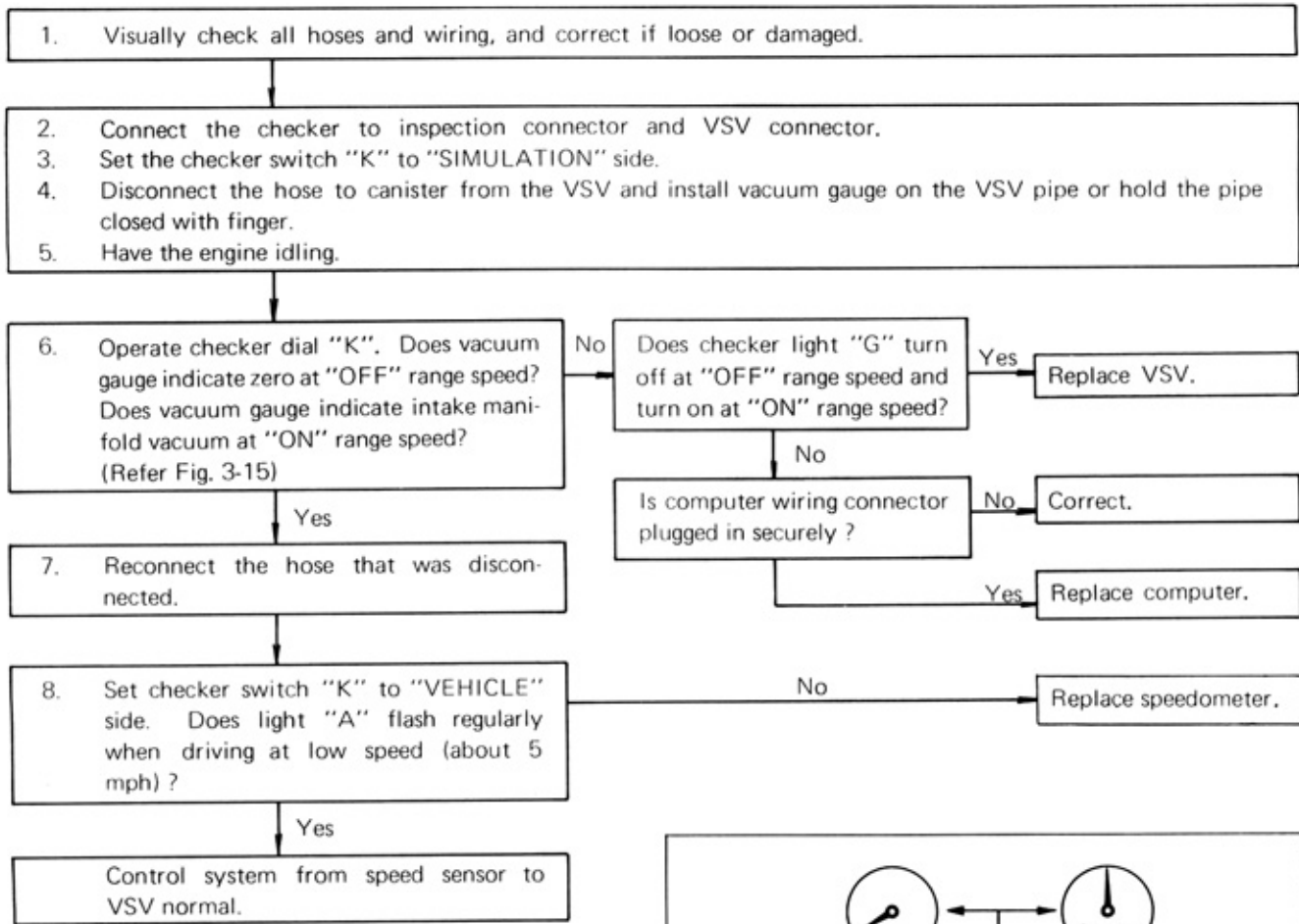


Fig. 3-17 Vehicle Speed Ranges

Note:  
After removing the checker, plug in the VSV connector securely.

EVAP SYSTEM SCHEMATIC DRAWINGS

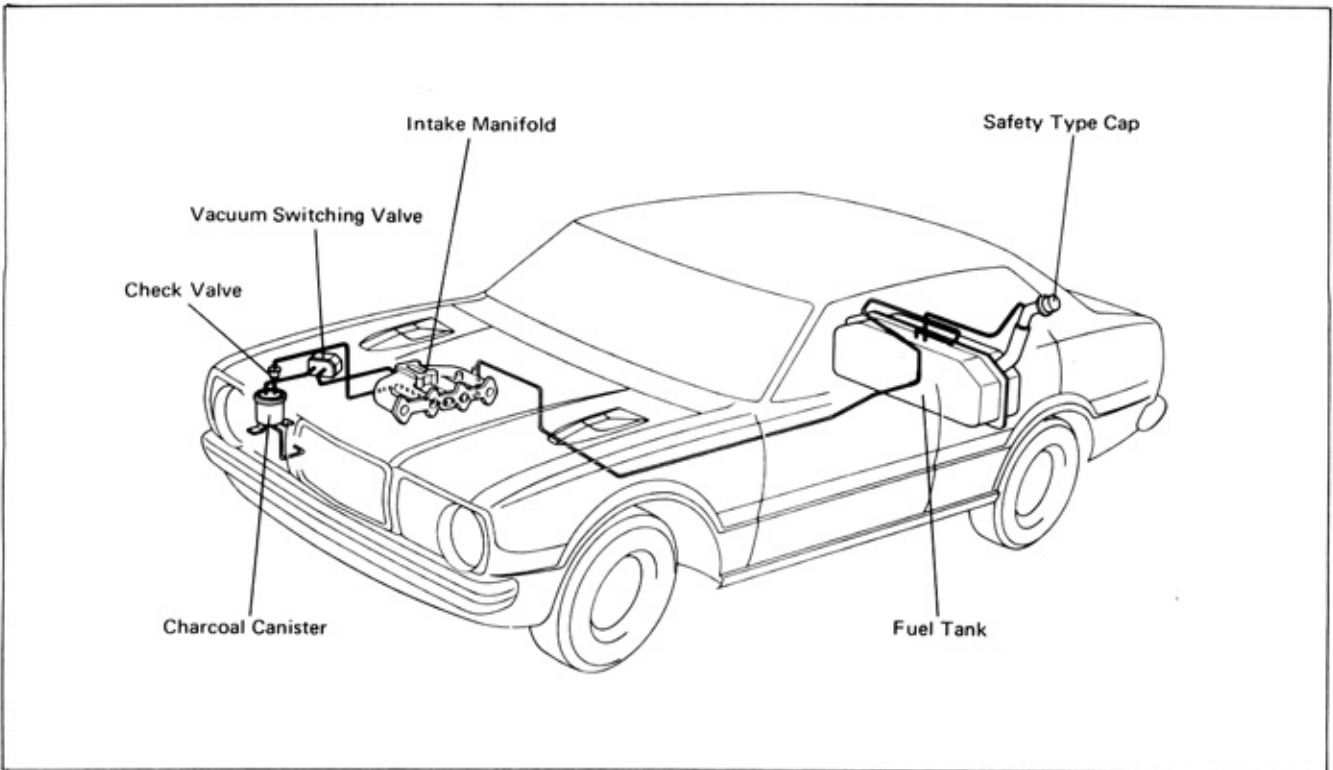


Fig. 3-18 Corolla Sedan and Hardtop (TE) Piping

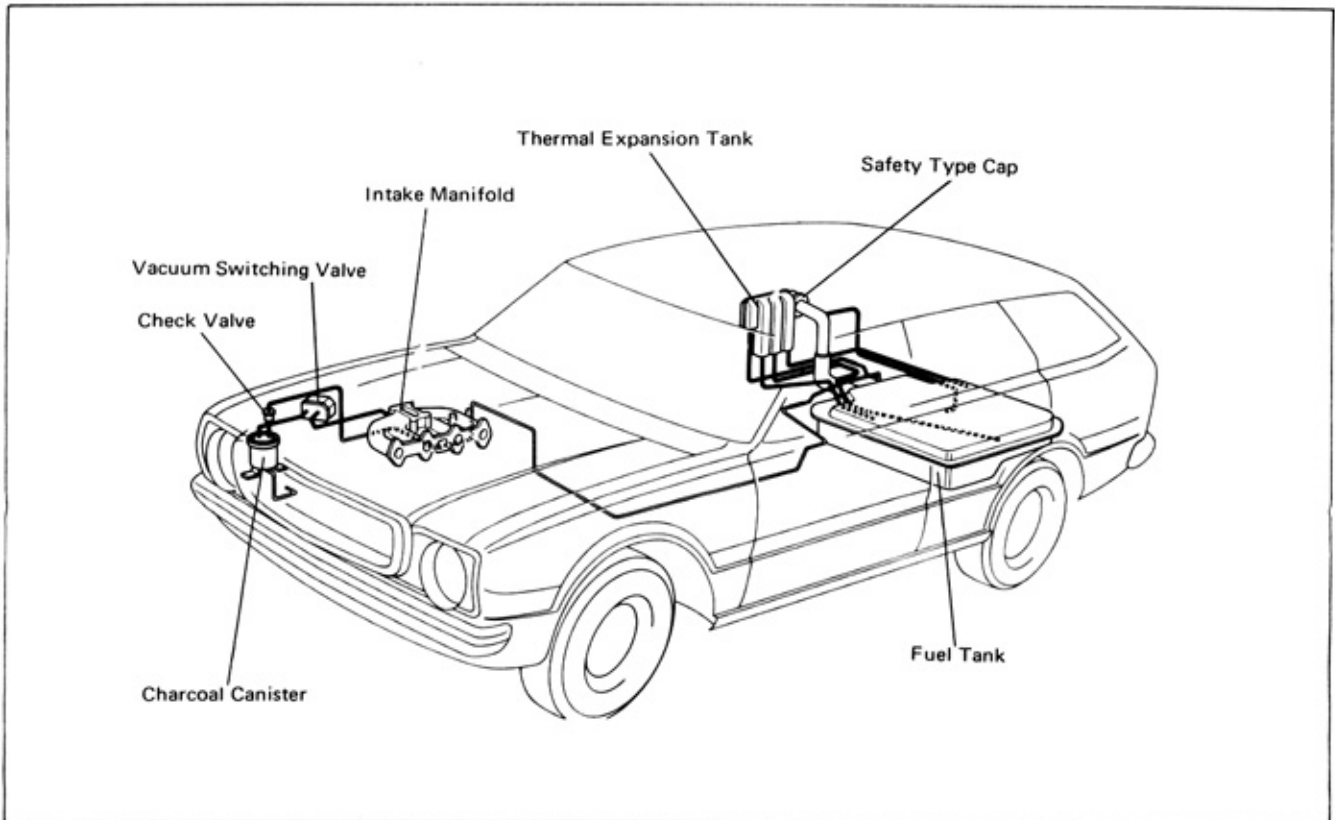


Fig. 3-19 Corolla Station Wagon (TE) Piping

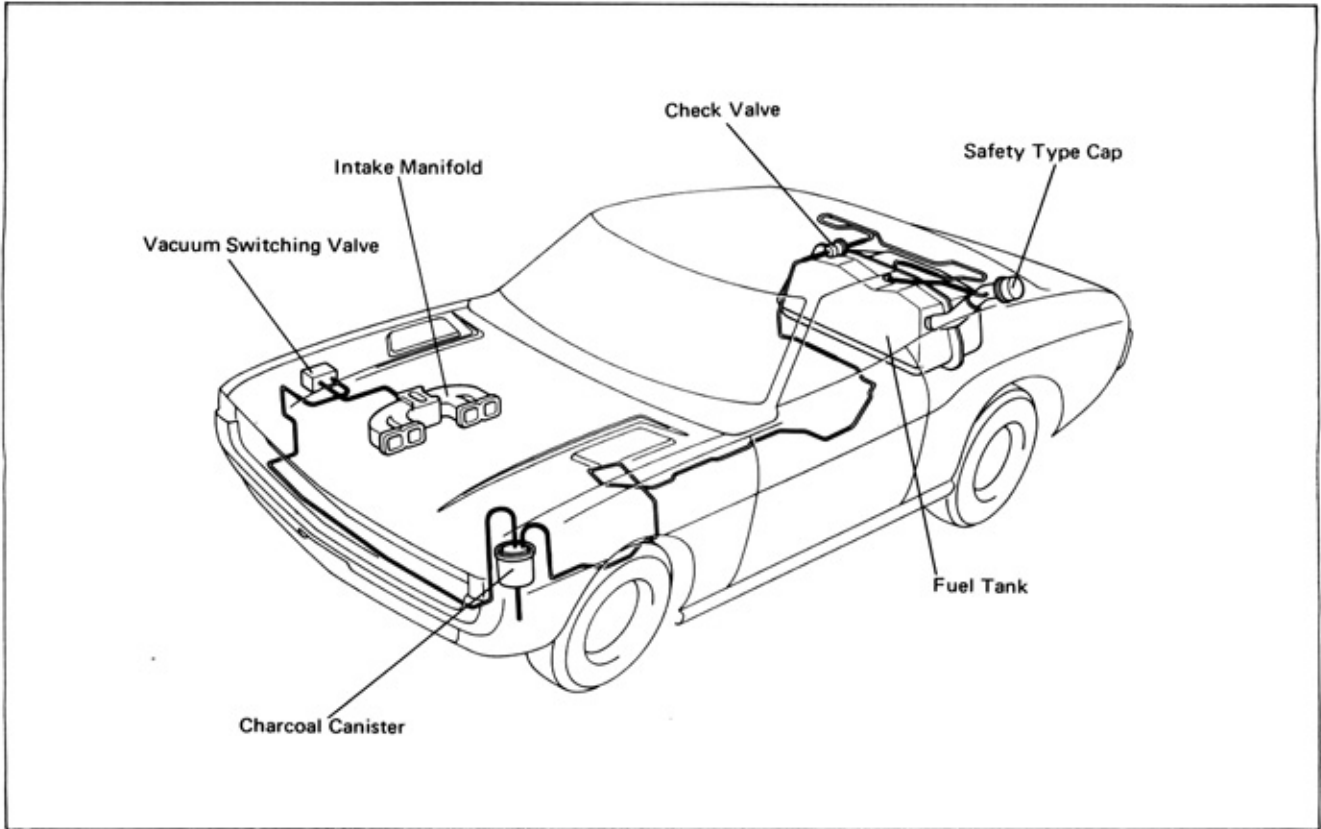


Fig. 3-20 Celica Hardtop (RA) Piping

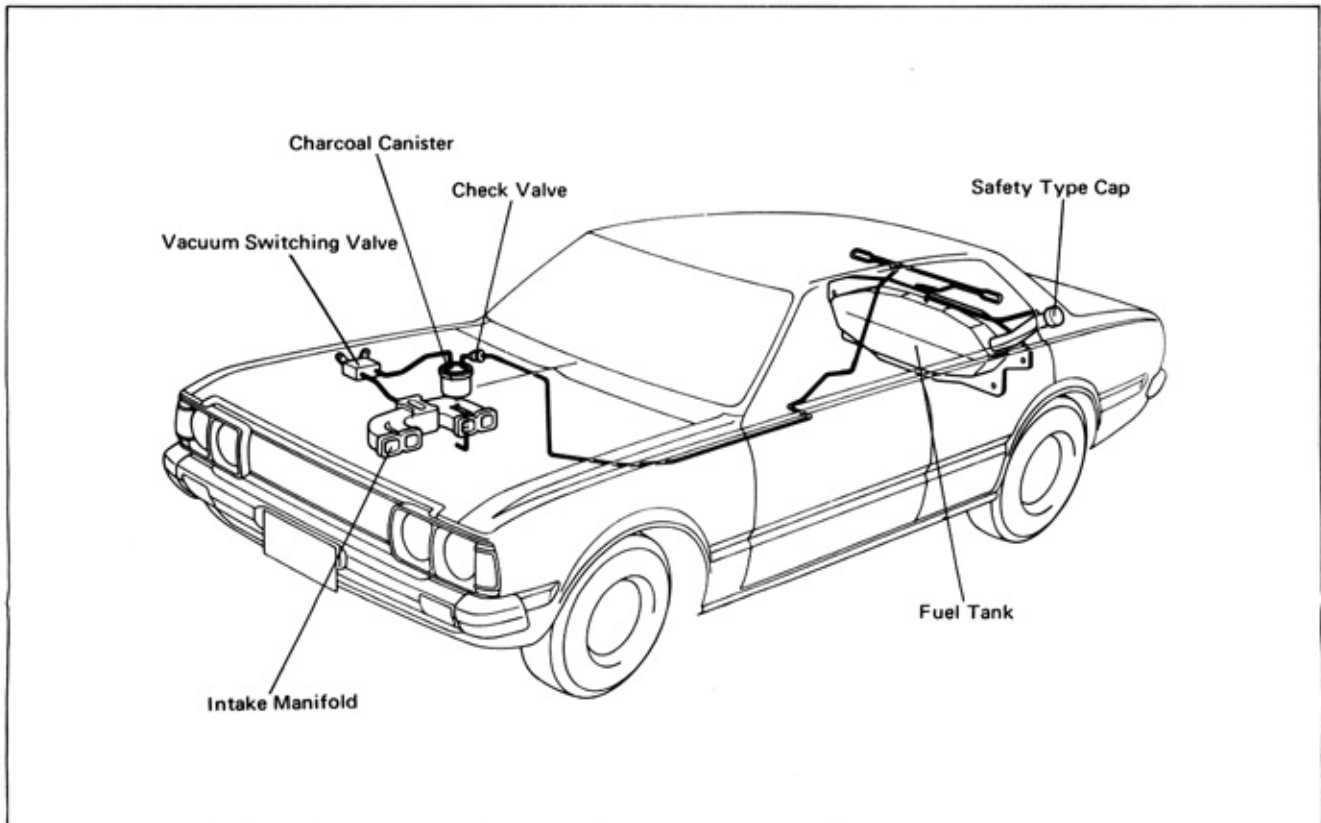


Fig. 3-21 Corona Sedan and Hardtop (RT) Piping

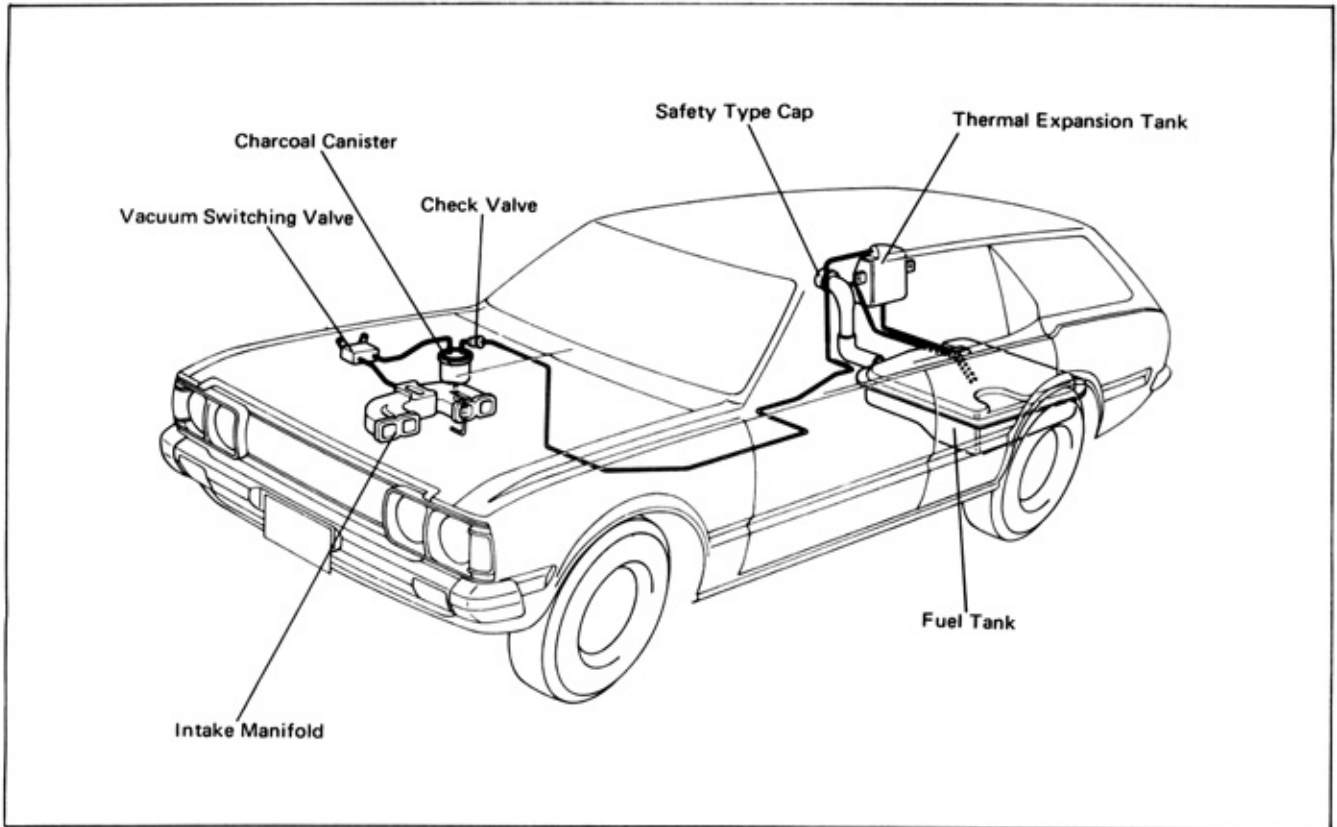


Fig. 3-22 Corona Station Wagon (RT) Piping

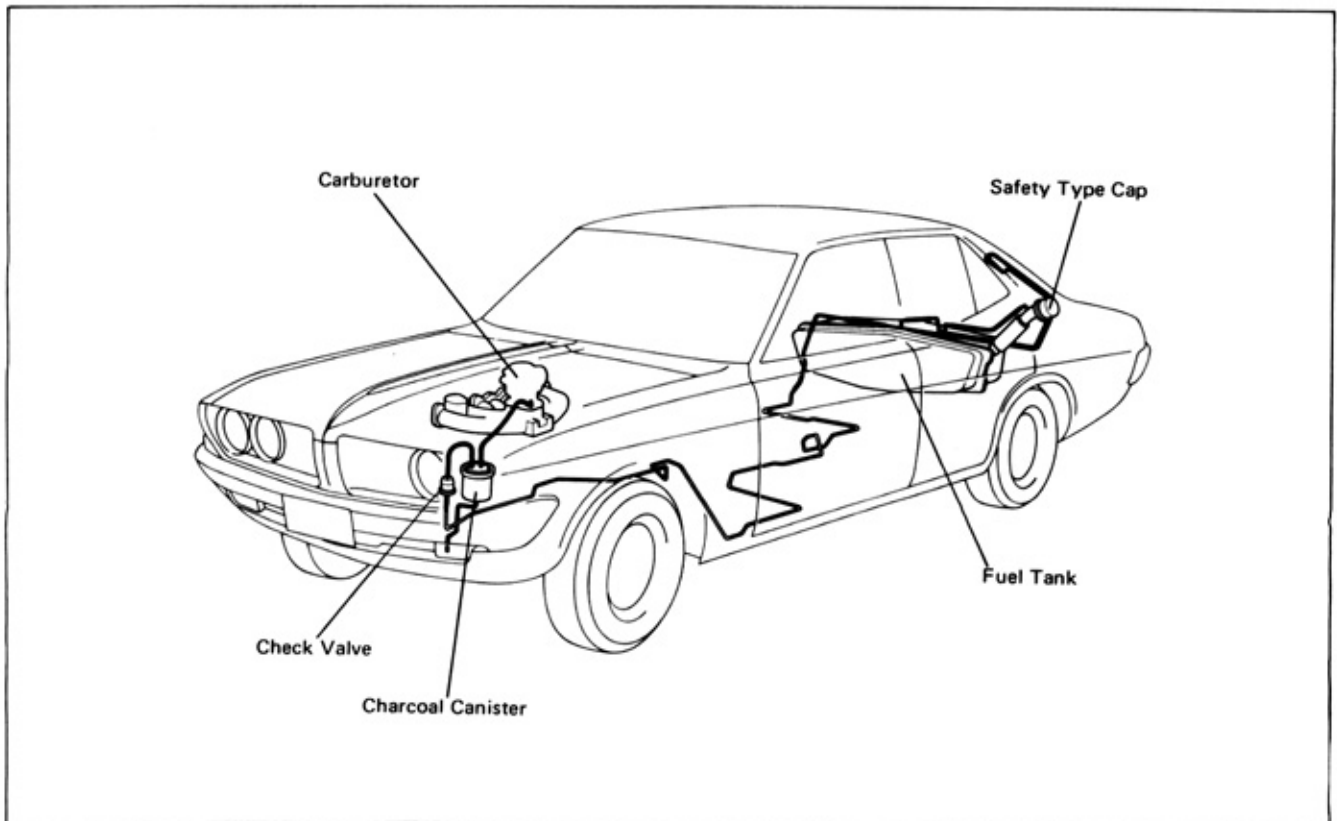


Fig. 3-23 Mark II Sedan and Hardtop (MX) Piping

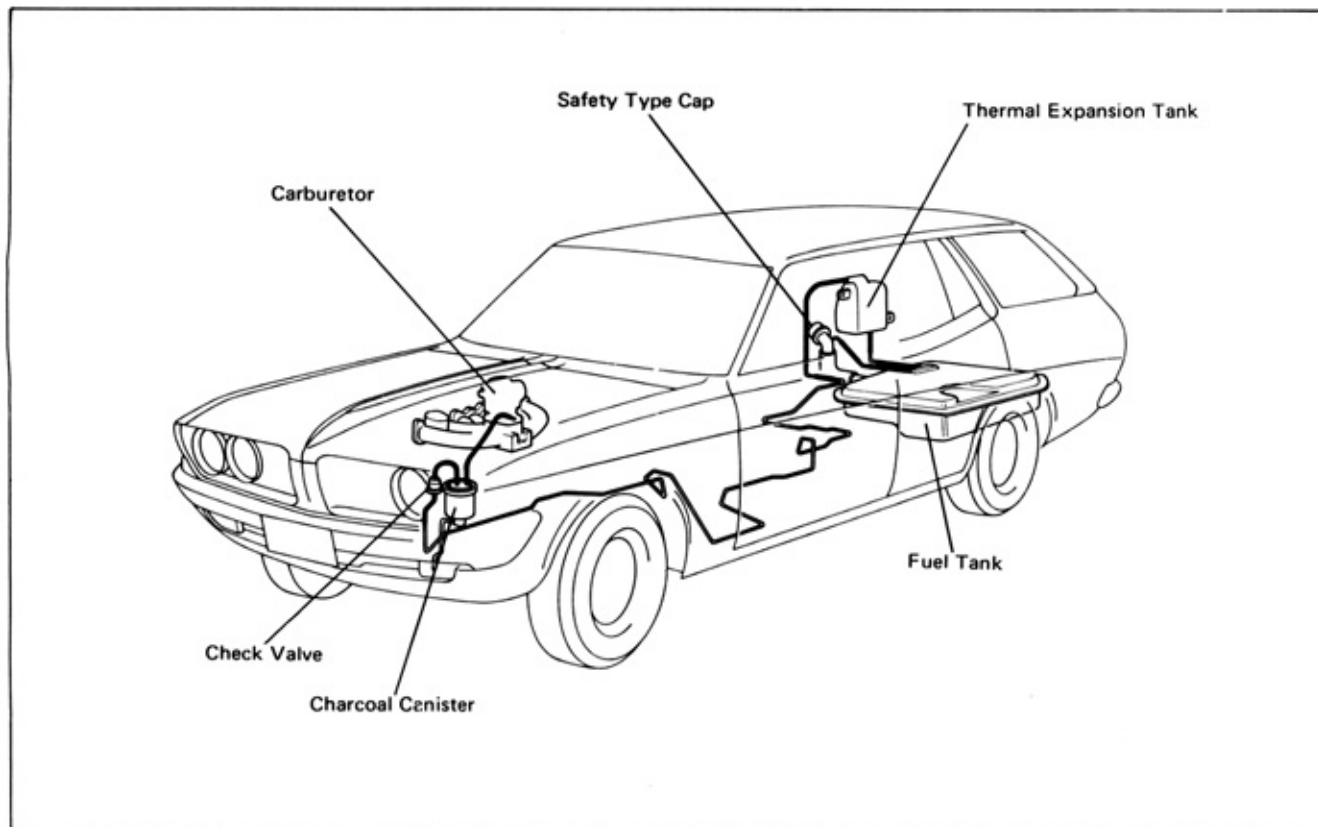


Fig. 3-24 Mark II Station Wagon (MX) Piping

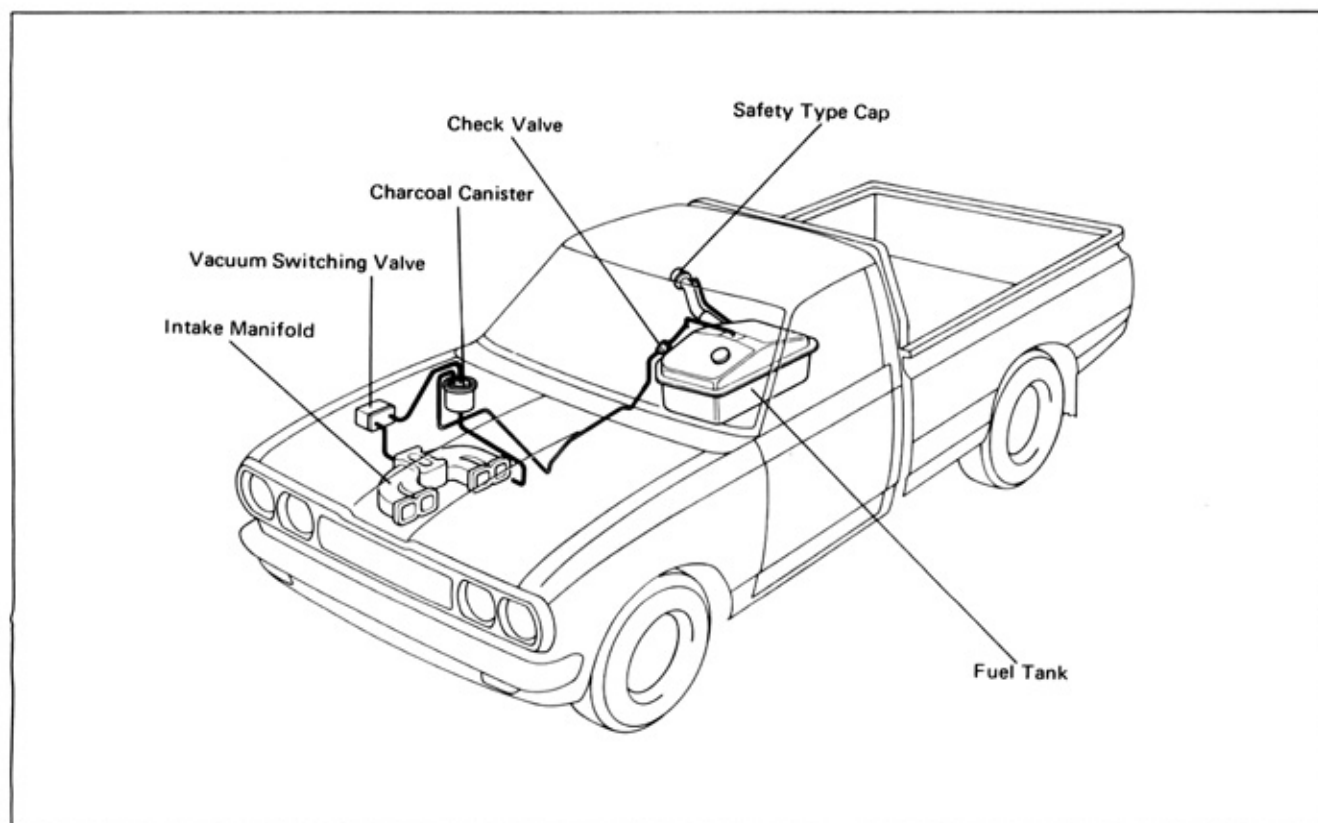


Fig. 3-25 Hi-Lux (RN) Piping

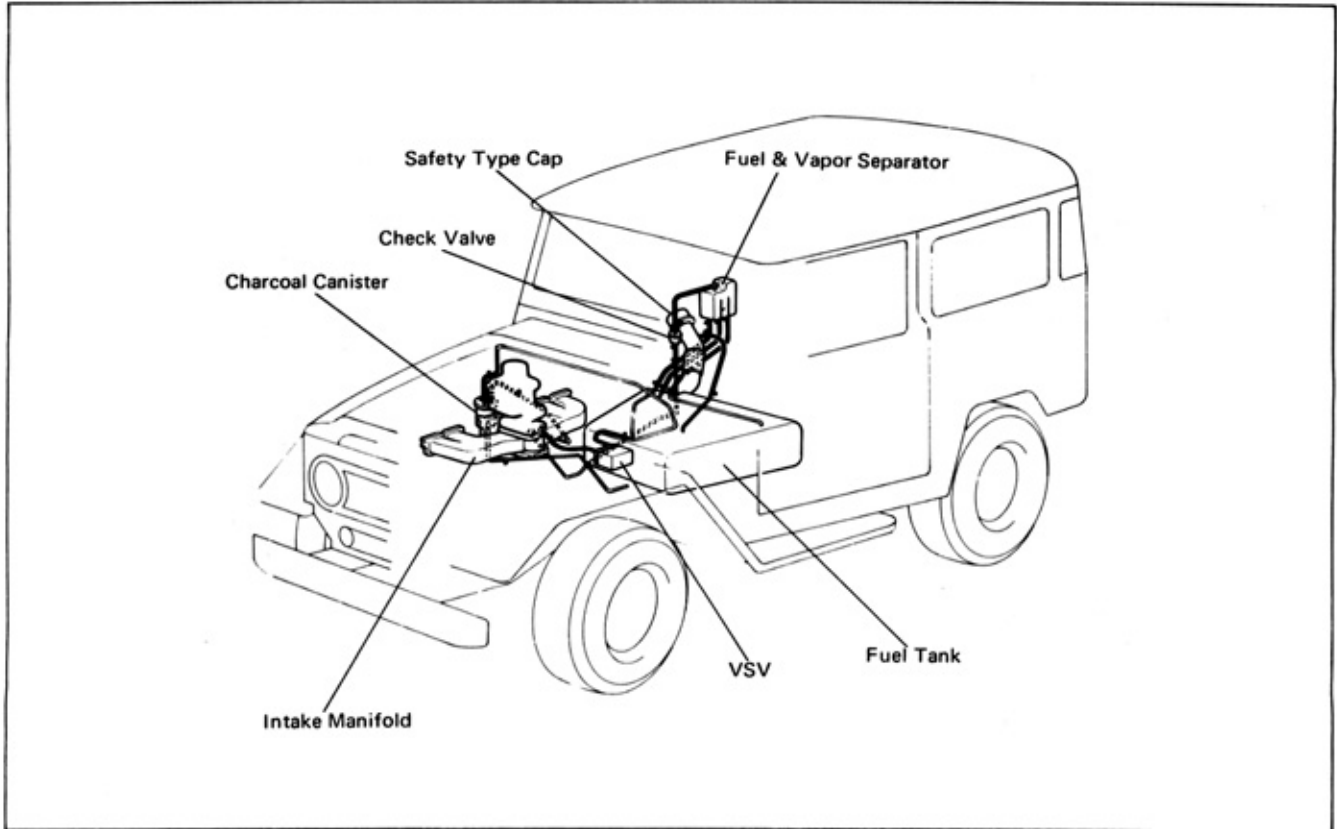


Fig. 3-26 Land Cruiser Hardtop and Softop (FJ) Piping

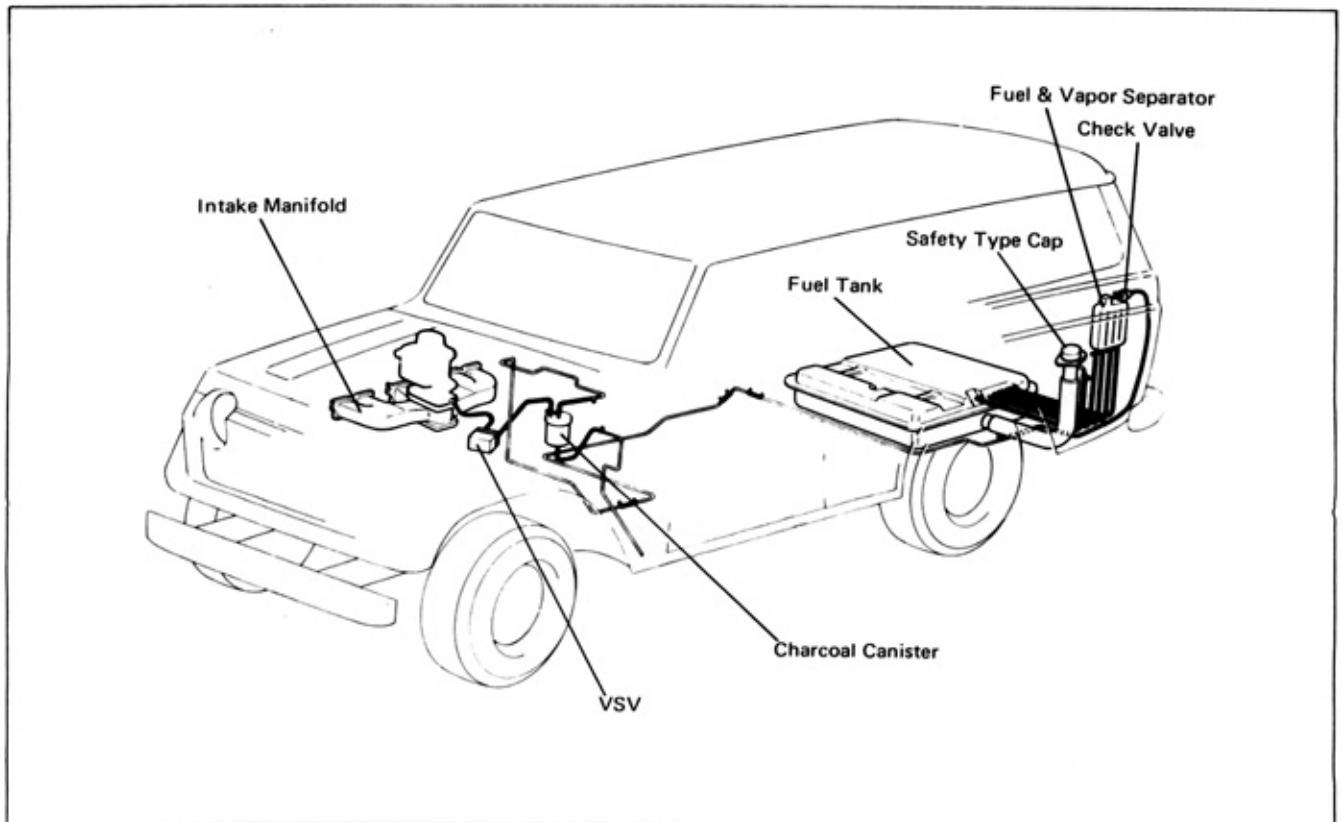


Fig. 3-27 Land Cruiser Station Wagon (FJ) Piping

## TROUBLESHOOTING

## 1. In case gasoline odor is present.

- Check the fuel line and vapor line to see if piping is damaged or disconnected.
- Check the fuel tank, fuel vapor separator and canister for damage and fuel leakage.

## Caution

Do not allow any open flame in the vicinity if there is presence of gasoline odor.

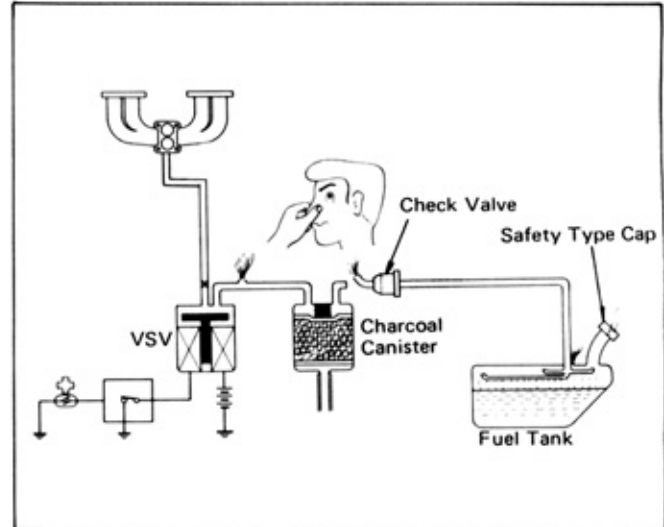


Fig. 3-28 Vapor Line Inspection

## 2. In case fuel tank is deformed without signs of external injury.

- Check the safety valve in the fuel tank cap.
- Check the vapor check valve for clogging.
- Check the canister for clogging.
- Check the piping for excessive bending and clogging.

## Note

If the fuel tank deforms due to change in internal pressure while driving, the deforming sound can sometimes be heard. In such case, make above check.

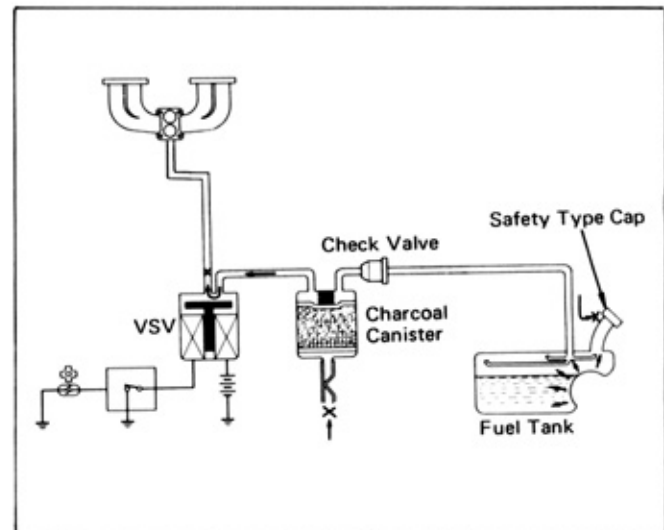


Fig. 3-29 Fuel Tank Inspection

## 3. In case the engine runs poorly

- Check vacuum hose between VSV and intake manifold for disconnection and damage.
- Check the other systems.

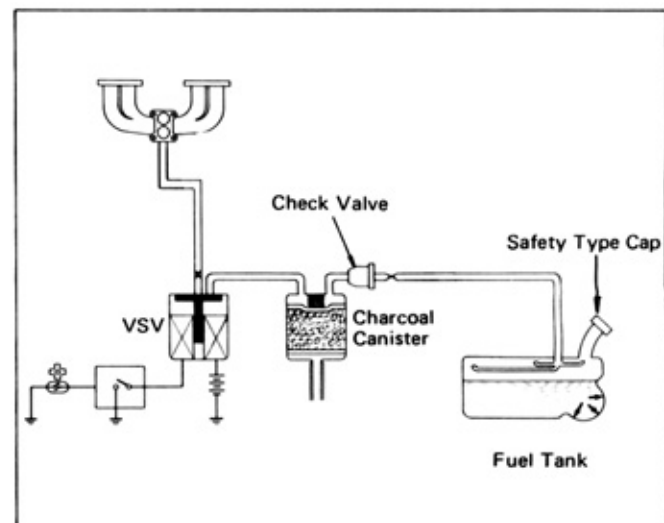


Fig. 3-30 Fuel Tank Inspection