# ENGINE FUEL SYSTEM

## 1623-06/2210-01/2210-06/2211-06/2221-01/2221-09/ 2241-01/2241-08/2241-20/



### GENERAL



### OVERVIEW AND OPERATION PROCESS



### CONFIGURATION AND FUNCTIONS



### REMOVAL AND INSTALLATION

# FUEL SYSTEM 2211-06

## GENERAL

## 1. FUEL SYSTEM SPECIFICATION

### ▶ Use Only Unleaded Fuel Rated at 89 Octane or Higher

Fuel quality and additives contained in fuel have a significant effect on power output, drivability, and life of the engine.

Fuel with too low an octane number can cause engine knock.

Caution: Use of fuel with an octane number lower than 89 may damage engine and exhaust system.

**CAUTION**

- To prevent accidental use of leaded fuel, the nozzles for leaded fuel are larger, and will not fit the fuel filler neck of your vehicle.

### ▶ Do Not Use Methanol

Fuels containing methanol (wood alcohol) should not be used in vehicle.

This type of fuel can reduce vehicle performance and damage components of the fuel system.

**CAUTION**

- Use of methanol may damage the fuel system.

### ▶ Vehicle Fueling from Drums or Storage Containers

For safety reasons (particularly when using noncommercial fueling systems) fuel containers, pumps and hoses must be properly earthed.

Static electricity build up can occur under certain atmospheric and fuel flow conditions if unearthed hoses, particularly plastic, are fitted to the fuel-dispensing pump.

It is therefore recommended that earthed pumps with integrally earthed hoses be used, and that storage containers be properly earthed during all noncommercial fueling operations.



| | |
|---|---|
| Modification basis | |
| Application basis | |
| Affected VIN | |

▶ **Temperature VS Resistance**

| °C | °F | ECT sensor | IAT sensor |
|---|---|---|---|
| | | ohms ( ) | |
| Temperature vs Resistance Values (Approximate) | | | |
| 130 | 266 | 88 | 102 |
| 120 | 248 | 111.6 | 127 |
| 110 | 230 | 143 | 159 |
| 100 | 212 | 202 | 202 |
| 90 | 194 | 261 | 261 |
| 80 | 176 | 340 | 340 |
| 70 | 158 | 452 | 452 |
| 60 | 140 | 609 | 609 |
| 50 | 122 | 835 | 835 |
| 40 | 113 | 1166 | 1166 |
| 30 | 86 | 1662 | 1662 |
| 20 | 68 | 2420 | 2420 |
| 10 | 50 | 3604 | 3604 |
| 0 | 32 | 5499 | 5499 |
| -10 | 14 | 8609 | 8609 |
| -20 | -4 | 13850 | 13850 |
| -30 | -22 | 22960 | 22960 |
| -40 | -40 | 39260 | 39260 |

# OVERVIEW AND OPERATION PROCESS

## 1. FUEL SYSTEM

The function of the fuel metering system is to deliver the correct amount of fuel to the engine under all operating conditions.

The fuel is delivered to the engine by the individual fuel injectors mounted into the intake manifold near each cylinder.

The main fuel control sensors are the Mass Air Flow (MAF) sensor and the oxygen (O2) sensors.

The MAF sensor monitors the mass flow of the air being drawn into the engine. An electrically heated element is mounted in the intake air stream, where it is cooled by the flow of incoming air. Engine Control Module (ECM) modulates the flow of heating current to maintain the temperature differential between the heated film and the intake air at a constant level. The amount of heating current required to maintain the temperature thus provides an index for the mass air flow. This

concept automatically compensates for variations in air density, as this is one of the factors that determines the amount of warmth that the surrounding air absorbs from the heated element. MAF sensor is located between the air filter and the throttle valve.

Under high fuel demands, the MAF sensor reads a high mass flow condition, such as wide open throttle. The ECM uses this information to enrich the mixture, thus increasing the fuel injector on-time, to provide the correct amount of fuel. When decelerating, the mass flow decreases. This mass flow change is sensed by the MAF sensor and read by the ECM, which then decreases the fuel injector on-time due to the low fuel demand conditions.

The O2 sensors are located in the exhaust pipe before catalytic converter. The O2 sensors indicate to the ECM the amount of oxygen in the exhaust gas, and the ECM changes the air/fuel ratio to the engine by controlling the fuel injectors. The best air/fuel ratio to minimize exhaust emissions is 14.7 to 1, which allows the catalytic converter to operate most efficiently. Because

of the constant measuring and adjusting of the air/fuel ratio, the fuel injection system is called a "closed loop" system.

The ECM uses voltage inputs from several sensors to determine how much fuel to provide to the engine. The fuel is delivered under one of several conditions, called "modes".

## 1) Starting Mode

When the ignition is turned ON, the ECM turns the fuel pump relay on for 1 second. The fuel pump then builds fuel pressure. The ECM also checks the Engine Coolant Temperature (ECT) sensor and the Throttle Position (TP) sensor and determines the proper air/fuel ratio for starting the engine. This ranges from1.5 to 1 at -36 ℃ (-33 ℉) coolant temperature to 14.7 to 1 at 94 ℃ (201 ℉) coolant temperature. The ECM controls the amountof fuel delivered in the starting mode by changing how long the fuel injector is turned on and off. This is done by "pulsing" the fuel injectors for very short times.

## 2) Run Mode

The run mode has two conditions called "open loop" and "closed loop".

## 3) Open Loop

When the engine is first started and it is above 690 rpm, the system goes into "open loop" operation. In "open loop", the ECM ignores the signal from the HO2S and calculates the air/fuel ratio based on inputs from the ECT sensor and the MAF sensor. The ECM stays in "open loop" until the following conditions are met:

- The O2 has a varying voltage output, showing that it is hot enough to operate properly.
- The ECT sensor is above a specified temperature (22.5 ℃).
- A specific amount of time has elapsed after starting the engine.

## 4) Closed Loop

The specific values for the above conditions vary with different engines and are stored in the Electronically Erasable Programmable Read-Only Memory (EEPROM).
When these conditions are met, the system goes into "closed loop" operation. In "closed loop", the ECM calculates the air/fuel ratio (fuel injector on- time) based on the signals from the O2 sensors. This allows the air/fuel ratio to stay very close to 14.7 to 1.

## 5) Acceleration Mode

The ECM responds to rapid changes in throttle position and airflow and provides extra fuel.

## 6) Deceleration Mode

The ECM responds to changes in throttle position and airflow and reduces the amount of fuel. When deceleration is very fast, the ECM can cut off fuel completely for short periods of time.



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| Modification basis | |
| Application basis | |
| Affected VIN | |

## 7) Battery Voltage Correction Mode

When battery voltage is low, the ECM can compensate for a weak spark delivered by the ignition module by using the following methods:

- Increasing the fuel injector pulse width.
- Increasing the idle speed rpm.
- Increasing the ignition dwell time.

## 8) Fuel Cut-Off Mode

No fuel is delivered by the fuel injectors when the ignition is off. This prevents dieseling or engine runon. Also, the fuel is not delivered if there are no reference pulses received from the CKP sensor. This prevents flooding.



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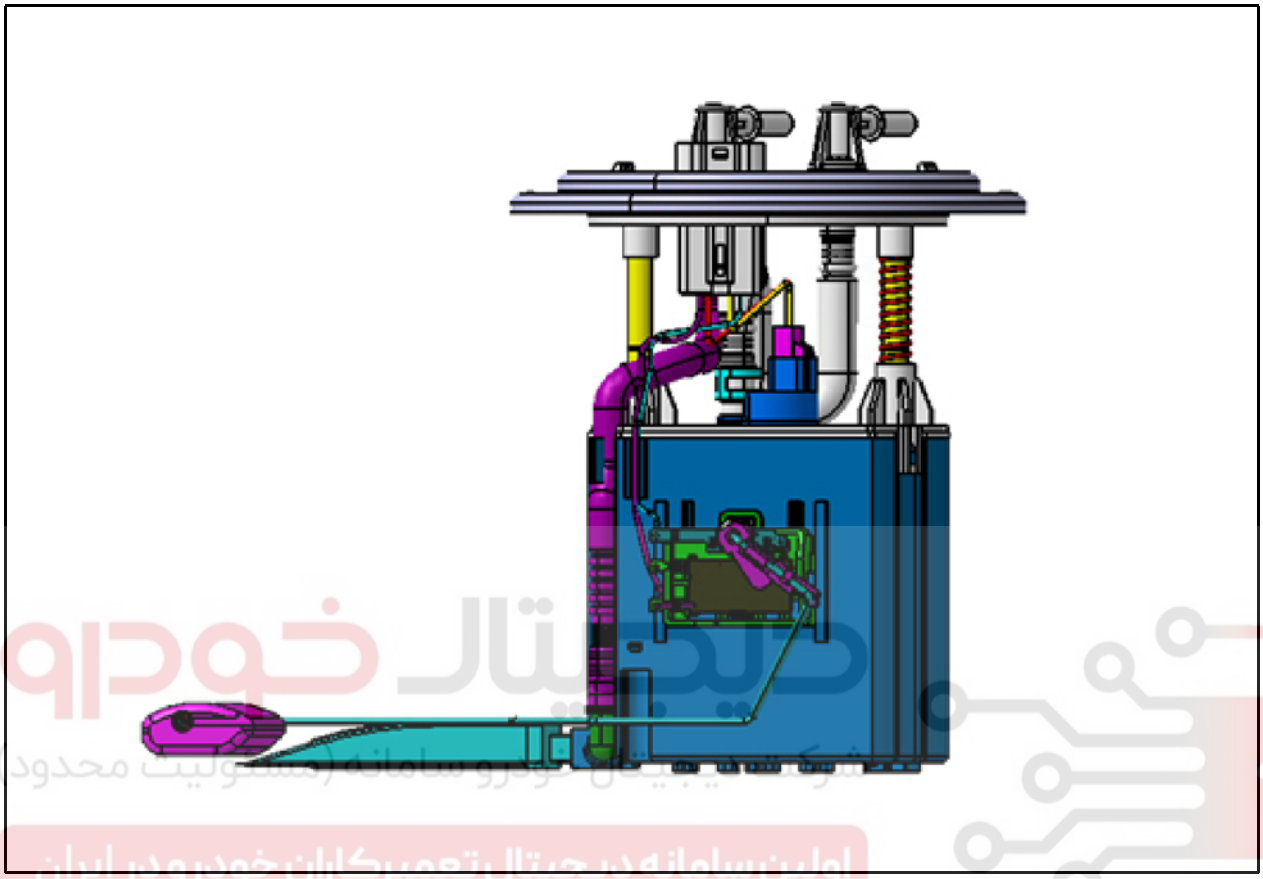
| Modification basis | |
| Application basis | |
| Affected VIN | |

# CONFIGURATION AND FUNCTIONS

S.G.N. 2211-06 FUEL PUMP



▶ **Requirements for Fuel Pump**

| Item | Specified Value | Item | Specified Value |
|---|---|---|---|
| System Pressure | 3.8 bar | Minimum Delivery at 8V | 30 Litre/ Hr |
| Maximum Pressure | 8.5 bar (12 V) | Operating Voltage | 8 V |
| Minimum Pressure | 5.0 bar (12 V) | Maximum Allowable Current | 7.5 A |
| Nominal Voltage | 12 V | Ambient Temperature | -30 ~ +70° C |
| Minimum Amount of Fuel Supply | 114 Liter/ Hr (12 V, 3.8 bar, -30 ~ +70° C) | Maximum Amount of Fuel Supply | 165 Liter/ Hr (12 V, 3.8 bar, -30 ~ +70° C) |



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|---|---|
| Modification basis | |
| Application basis | |
| Affected VIN | |

| DTC Code | Description | Trouble Area | Maintenance Hint |
|---|---|---|---|
| P0231 | Fuel pump relay short circuit to battery | When short circuit to power source | • Inspection the Engine Control Module (ECM) pin 33 about short circuit or open with bad contact<br>• Inspection the fuel pump relay<br>• Inspection the ECM |
| P0232 | Fuel pump relay short circuit to ground or open | When short circuit to ground or open | |

### ▶ Circuit Description

When the ignition switch is turned ON, the ECM will activate the pump relay and run the in-tank fuel pump. The fuel pump will operate as long as the engine is cranking or running and the ECM is receiving ignition reference pulses.
If there are no reference pulses, the ECM will shut off the fuel pump within 2 seconds after the ignitions witch is turned ON, engine stopped or engine stalled.

### ▶ Fuel Pump Relay Inspection

Measure the voltage between the ECM terminal No. 33 and ground.

| | |
|---|---|
| Ignition Switch : ON | 0 V (for 1 ~ 2 sec.) |
| Cranking | 0 V |

### ▶ Measure the Fuel Delivery from the Fuel Pump

1. Disconnect the return pipe from fuel distributor and insert the appropriate hose into it.
2. Place the hose end into the beaker with the minimum capacity of 1 Liter
3. Turn the ignition switch to "ON" position.
4. Connect the terminal No. 33 and No. 5 of ECM with a service wire.
5. Measure the fuel delivery from the fuel pump.

| | |
|---|---|
| Specified Value | 1 Liter/max. 35 sec. |

**CAUTION**
- Check the fuel filter and fuel line when the fuel delivery is not within specified value.

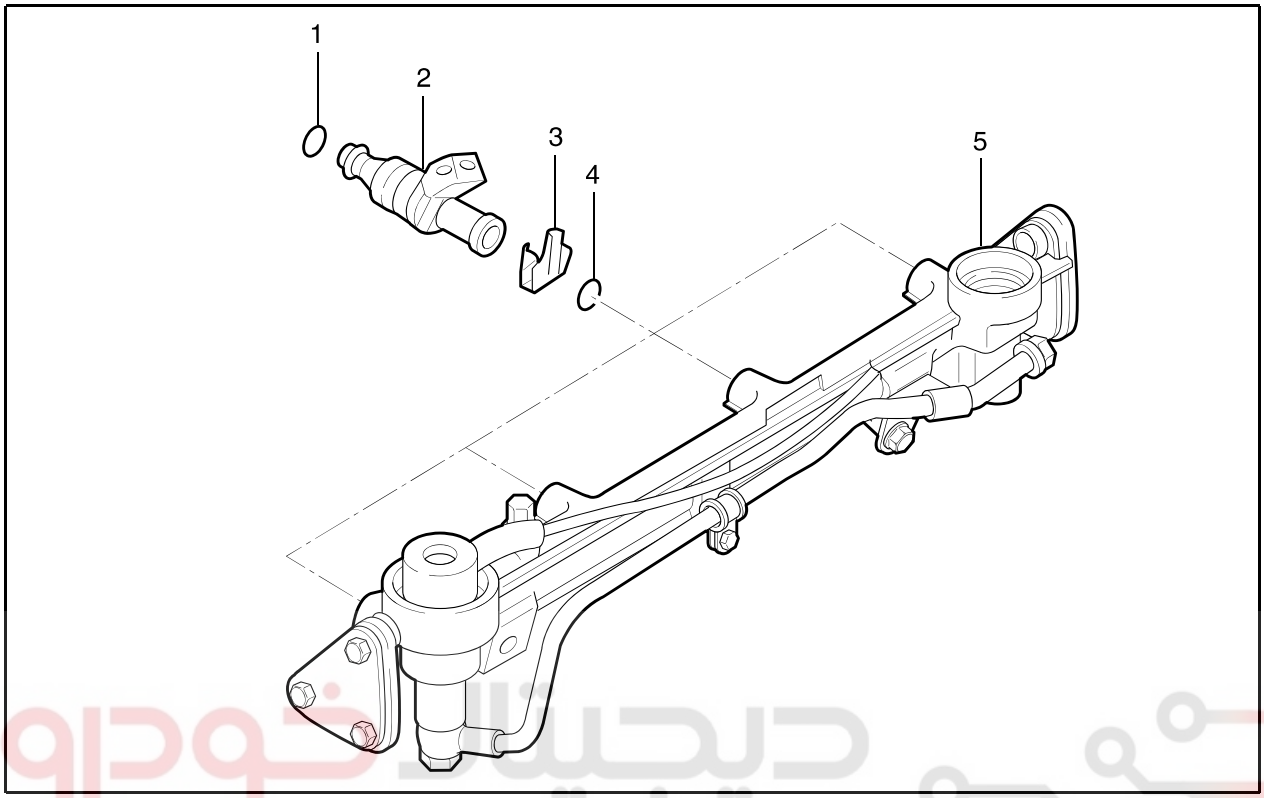
### ▶ Measure the Current Consumption of Fuel Pump

1. Remove the fuel pump relay from fuse and relay box in trunk, and turn the ignition switch to "ON" position.
2. Using a multimeter, measure the current consumption by connecting the terminal No. 30 and No. 87 of the fuel pump relay connector.

| | |
|---|---|
| Specified Value | 5 ~ 9 A |

**CAUTION**
- Replace the fuel pump relay if the measured value is over 9 A.

S.G.N.
# 2241-20 FUEL INJECTOR




1 O-Ring
2 Injector
3 Injector Bracket
4 O-Ring
5 Fuel Rail

The Multipoint Fuel Injection (MFI) assembly is a solenoid-operated device controlled by the Engine Control Module (ECM) that meters pressurized fuel to an each individual cylinder. The injector sprays the fuel, in precise quantities at a point in time determined by the ECM, directly towad the cylinder intake valve. ECM energizes the fuel injector solenoid to lift the needle valve and to flow the fuel through the orifice. This injector's discharge orificeis calibrated to meet the effective fuel atomization necessary for both ensuring the maximum homogeneity in the air-fuel mixture and holding the condensation along the walls of the intake tract to a minimum.

Fuel enters the top feed injector from above and flows through its vertical axis. The lower end extends into the intake valve. Fuel from the tip is directed at the intake valve, causing it to become further atomized and vaporized before entering the combustion chamber.

A fuel injector which is stuck partially open would cause a loss of fuel pressure after the engine is shut down.

Also, an extended crank time would be noticed on some engines. Dieseling could also occur because some fuel could be delivered to the engine after the ignition is turned off.



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| Modification basis | |
| Application basis | |
| Affected VIN | |

| DTC Code | Description | Trouble Area | Maintenance Hint |
|---|---|---|---|
| P0261 | No. 1 injector short circuit to ground or open | When malfunction of injector circuit<br>Injector #1 short circuit to ground or open | • Inspection the ECM pin 63 about short circuit or open with bad contact<br>• Inspection the injector<br>• Inspection the ECM |
| P0262 | No. 1 injector short circuit to battery | When malfunction of injector circuit<br>Injector #1 short circuit to power | • Inspection the power to injector #1 or bad contact<br>• Inspection the injector<br>• Inspection the ECM |
| P0264 | No. 2 injector short circuit to ground or open | When malfunction of injector circuit<br>Injector #2 short circuit to ground or open | • Inspection the ECM pin 64 about short circuit or open with bad contact<br>• Inspection the injector<br>• Inspection the ECM |
| P0265 | No. 2 injector short circuit to battery | When malfunction of injector circuit<br>Injector #2 short circuit to power | • Inspection the power to injector #2 or bad contact<br>• Inspection the injector<br>• Inspection the ECM |
| P0267 | No. 3 injector short circuit to ground or open | When malfunction of injector circuit<br>Injector #3 short circuit to ground or open | • Inspection the ECM pin 65 about short circuit or open with bad contact<br>• Inspection the injector<br>• Inspection the ECM |
| P0268 | No. 3 injector short circuit to battery | When malfunction of injector circuit<br>Injector #3 short circuit to power | • Inspection the power to injector #3 or bad contact<br>• Inspection the injector<br>• Inspection the ECM |
| P0270 | No. 4 injector short circuit to ground or open | When malfunction of injector circuit<br>Injector #4 short circuit to ground or open | • Inspection the ECM pin 66 about short circuit or open with bad contact<br>• Inspection the injector<br>• Inspection the ECM |
| P0271 | No. 4 injector short circuit to battery | When malfunction of injector circuit<br>Injector #4 short circuit to power | • Inspection the power to injector #4 or bad contact<br>• Inspection the injector<br>• Inspection the ECM |



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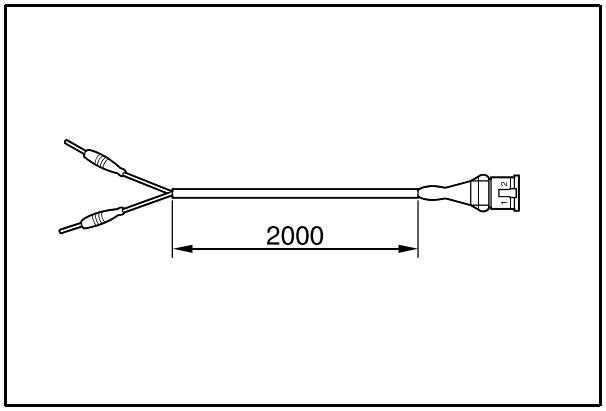
| Modification basis | |
| Application basis | |
| Affected VIN | |



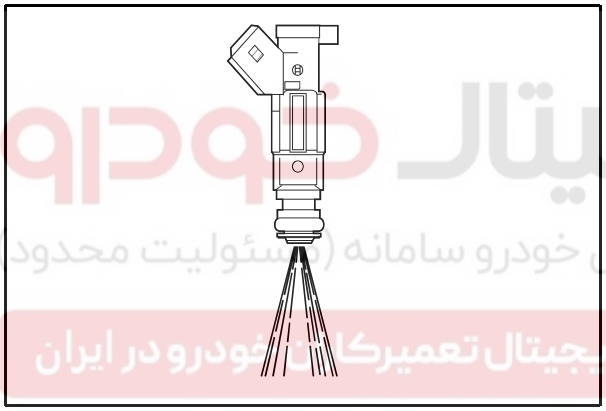

### ▶ Injector Spray Pattern Check

1. Turn the ignition switch OFF.
2. Remove the fuel injector connectors.
3. Remove the fuel distributor and injector with a unit. At this time, do not remove the supply and returnline.

**CAUTION**

- Prepare the beaker for taking the fuel.

4. Connect the shop made cable to the inject or with a firing order.
5. Connect the other end of shop made cable to the positive battery cable and negative battery cable.
6. Turn the ignition switch ON.
7. Check the inject or for normal spray pattern as shown in the figure. Check inject or for leaks or later drop



### ▶ Injector Resistance Inspection

1. Turn the ignition switch OFF.
2. Remove the fuel injector connectors .
3. Meas ure the fuel injector coil resistance using a multimeter.

| | |
|---|---|
| Specified Value | 14 ~ 17 Ω |

**CAUTION**

- Replace the fuel injector if the measured value is out of the specified values . Check the connector and wire connection between the ECM and the injector if the measured values are normal.

### ▶ Injector Pulse Width Inspection

1. Turn the ignition switch OFF.
2. Install the scan tool.
3. Turn the ignition switch ON.
4. Monitor the "INJECTION TIME" with a scan tool.

| | |
|---|---|
| Cranking | 8.0 ms |
| Engine Idle | 3 ~ 5 ms |
| Wide Open Throttle (WOT) | 14 ms |



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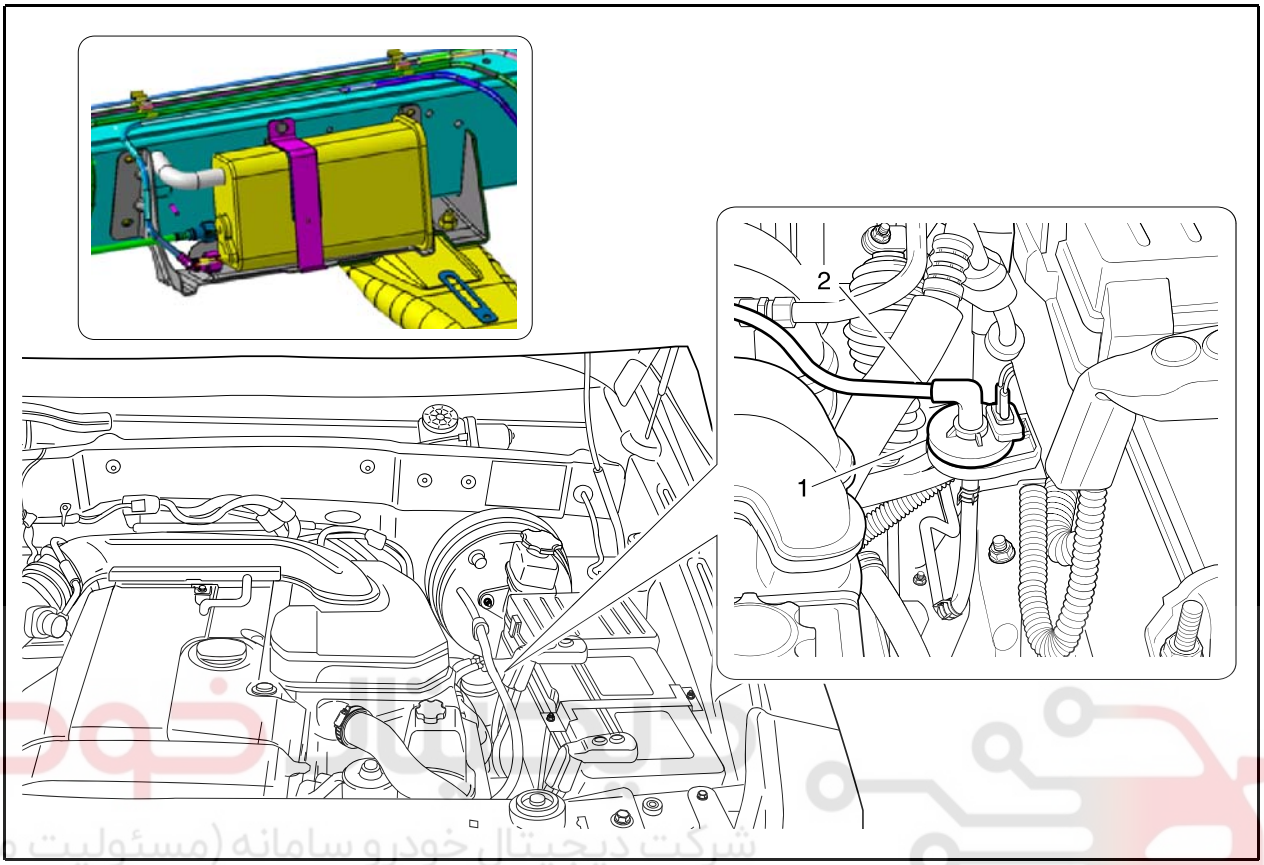
| Modification basis | |
| Application basis | |
| Affected VIN | |

S.G.N.

# 1623-06 PURGE CONTROL VALVE




1 Purge Control Valve
2 Line to Engine
3 Line to Canister
4 Canister

The fuel vaporization control system is installed to inhibit the fuel vaporized gas from discharging into the atmosphere. The fuel vaporized gas that is accumulated in the canister abstracts through the purge control valve purification during the engine combustion (except the decreasing mode) and coolant temperature of over 80 °C.

For this reason, the Engine Control Module (ECM) transacts the engine speed, air inflow quantity, coolant temperature, and intake temperature.

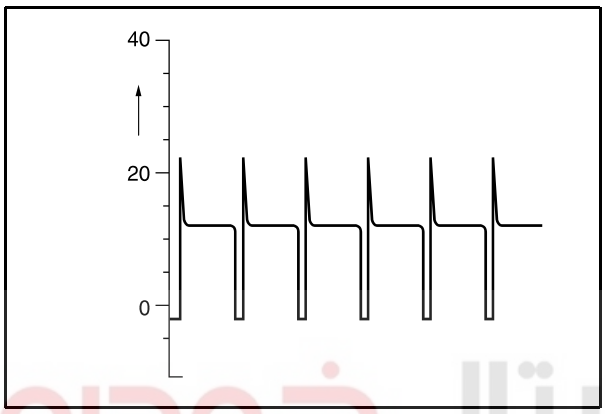
The purge control valve is activated by the ECM frequency according with the engine rotating speed to adjust the purification rate. The purification rate is determined by the continuous valve opening interval.

The purge control valve is activated by the ECM for the following conditions:

- Coolant temperature of over 80 °C
- Engine speed of over 1,000 rpm
- 2 minutes after starting
- When the fuel cut-off mode is not activated

| | |
|---|---|
| Modification basis | |
| Application basis | |
| Affected VIN | |

| DTC Code | Description | Trouble Area | Maintenance Hint |
|---|---|---|---|
| P0443 | Purge control circuit malfunction | When malfunction of purge control : not work | • Inspection the ECM pin 34 about short circuit or open with bad contact<br>• Inspection the source power of valve<br>• Inspection the purge control solenoid vale<br>• Inspection the ECM |
| P0444 | Purge control valve short circuit to ground or open | When short circuit to ground or open | |
| P0445 | Purge control valve short circuit to battery | When short circuit to power source | |




▶ **Test**

1. Maintain the normal temperature and idling state by operating the engine.
2. Connect the ECM terminal No. 11 and No. 34 and check for normal operation through the output waves using oscilloscope.

**CAUTION**
- Test during purge control valve operation after the minimum of 1 minute after the engine turned on.

3. Connect the ECM terminal No. 34 and No.10 and check for current consumption during the ignition switch ON.
4. Remove the line to canister and measure the pressure with the vacuum pressure gauge.

| | |
|---|---|
| Specified Value | > 500 mbar (after approx. 1 min) purge control valve operates at this time |

**CAUTION**
- Test while at normal temperature and at idling state by operating the engine.



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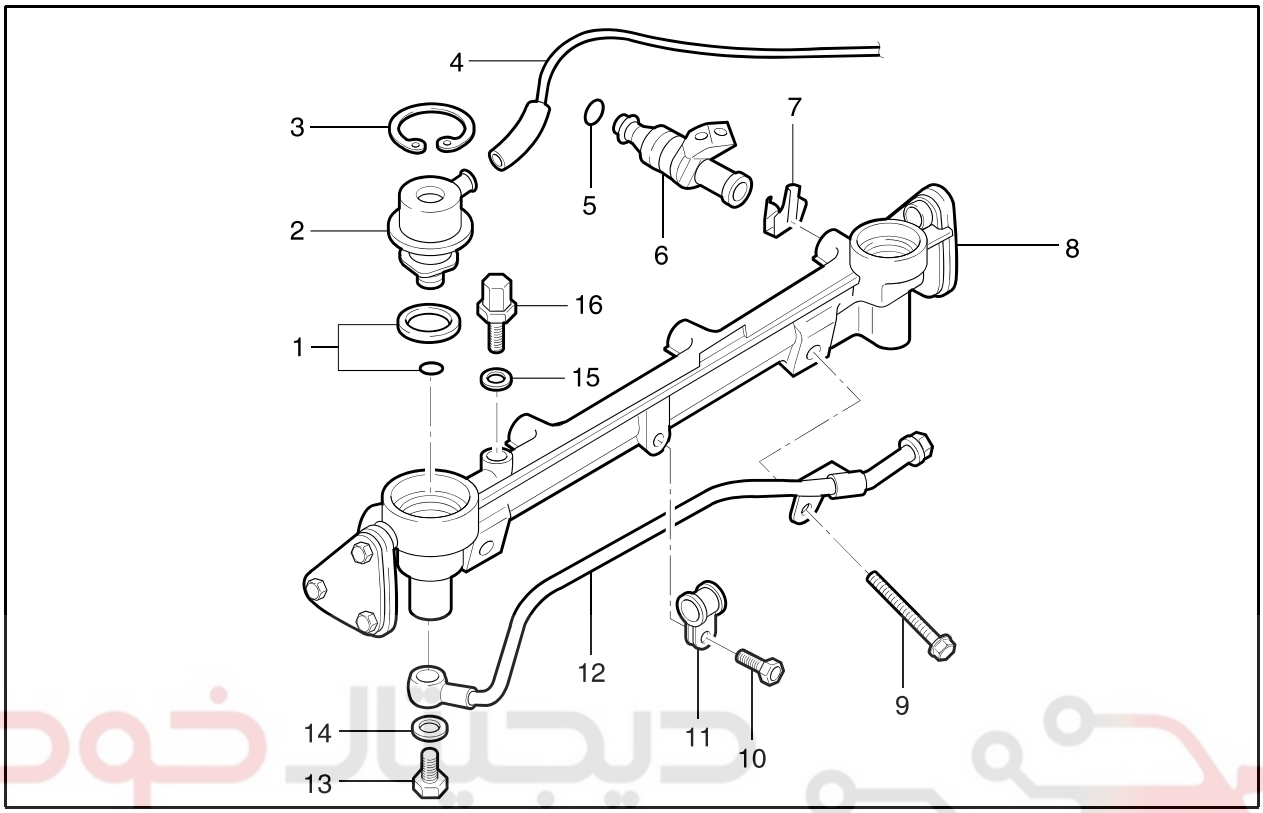
| Modification basis | |
| Application basis | |
| Affected VIN | |

S.G.N. 2241-01

# FUEL RAIL




1 O-Ring
2 Fuel Pressure Regulator
3 Circlip
4 Vacuum Hose
5 O-Ring
6 Injector
7 Injector Bracket
8 Fuel Rail
9 Combination Bolt
10 Bolt
11 Clamp
12 Fuel Return Line
13 Hollow Bolt
14 Seal Ring
15 Seal Ring
16 Fuel Pressure Test Connector



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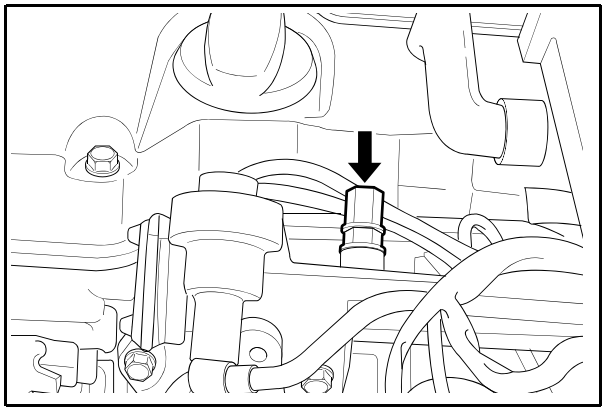
| Modification basis | |
| Application basis | |
| Affected VIN | |



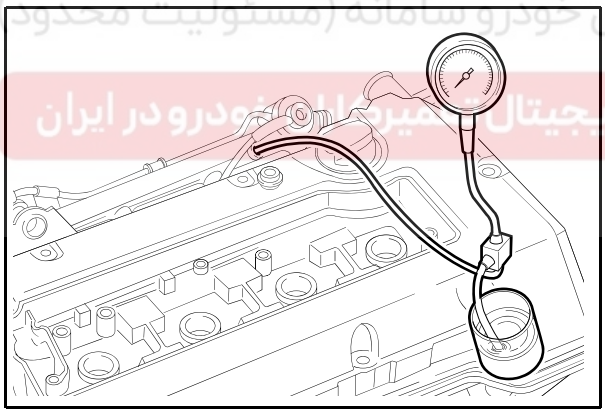
### ▶ Fuel Pressure Test

1. Turn the ignition switch to "OFF" position.
2. Remove the fuel pressure test connector.
3. Connect the fuel pressure gauge to the fuel pressure test connector.
4. Test the fuel pressure at idling by operating the engine using the fuel pressure gauge 103 589 00 21 00.

| | |
|---|---|
| Vacuum Hose Connected (bar) | 3.2 ~ 3.6 |
| Vacuum Hose Disconnected (bar) | 3.7 ~ 4.2 |

5. Replace the pressure regulator diaphragm if out of the specification.





### ▶ Internal Leakage Test

1. Connect the fuel pressure gauge103 589 002100 to the fuel pressure test connector. Stop the engine for approximately 30 minutes
2. and then check the fuel pressure changes.

| Pressure change | |
|---|---|
| Fuel pressure drops slowly | • Fuel leakage at the injector<br>• Faulty fuel pressure regulator's diaphragm and O-ring |
| Fuel pressure drops rapidly | • Faulty check valve in the fuel pump |

3. If there is no change in fuel pressure and maintain the following pressure over 30minutes, it is normal.

| | |
|---|---|
| Fuel pressure (bar) | ≥2.5 |



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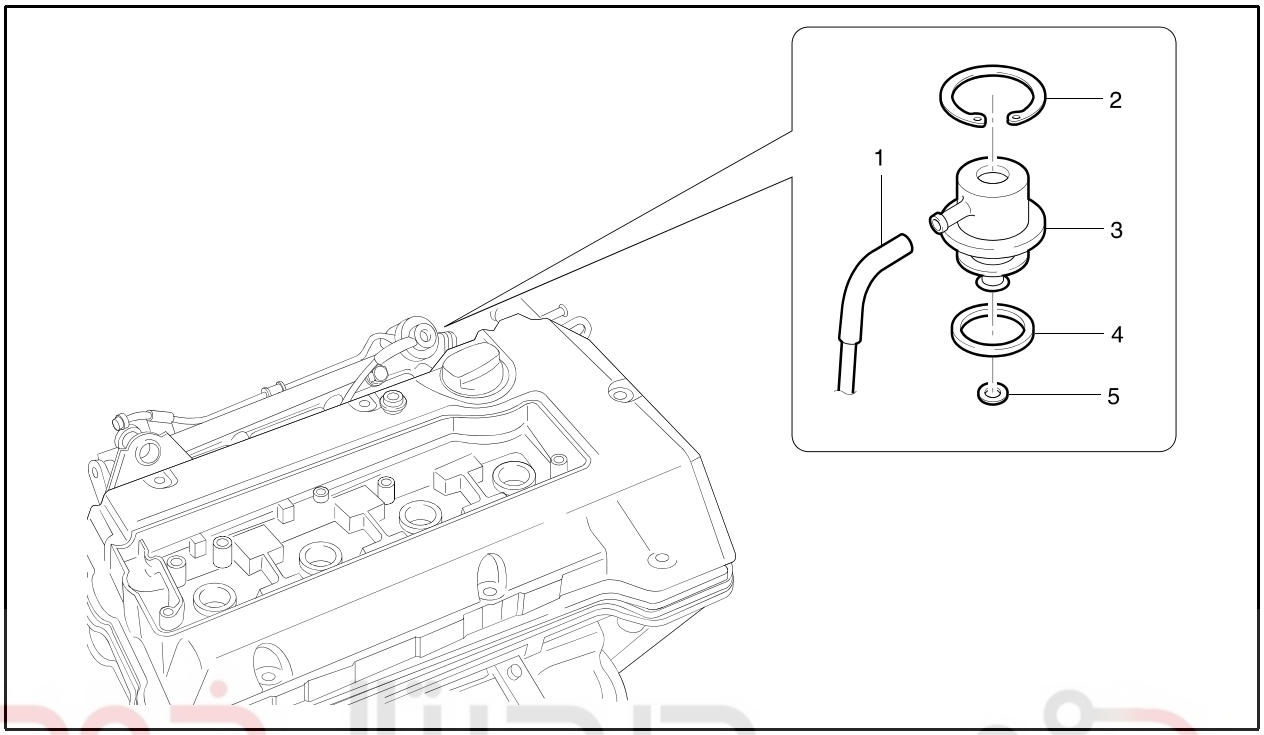
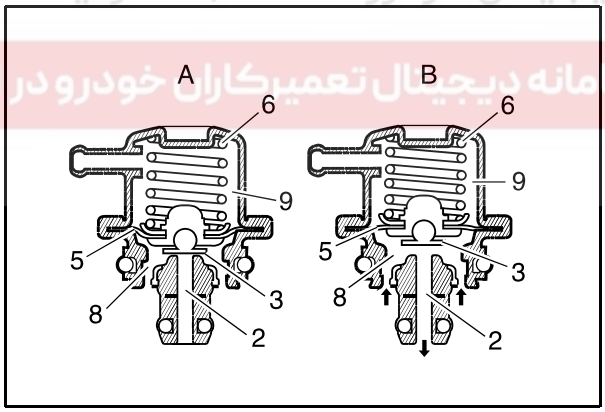
| Modification basis | |
| Application basis | |
| Affected VIN | |

S.G.N.
# 2241-08 FUEL PRESSURE REGULATOR




1 Vacuum Hose
2 Circlip
3 Fuel Pressure Regulator
4 O-Ring
5 O-Ring




2. Fuel return line
3. Valve
5. Diaphragm
6. Compression Spring
8. Fuel Chamber
9. Spring Chamber

A. Valves Closed
B. Valves Opened

### ▶ Function of the Fuel Pressure Regulator

The fuel pressure regulator maintains the fuel pressure in the fuel line with the pressure of 3.2 bars to 3.8 bars according to the intake manifold pressure. This operating pressure cannot be changed, and the fuel injection volume will be only determined by the injection time. Over supplied fuel returns to the fuel tank through the return line.

<Operating at full load>

There is no negative pressure applied to the spring chamber (9) during the full load, and it is separated from the fuel chamber (8) by the diaphragm (5).

When the fuel pressure goes up, the diaphragm forces the compression spring (6) in the direction of compression. At this moment, the valve (3) sticks to the diaphragm by the fuel pressure, and the fuel return line (2) opens. The fuel over supplied returns to the fuel tank through the return line.

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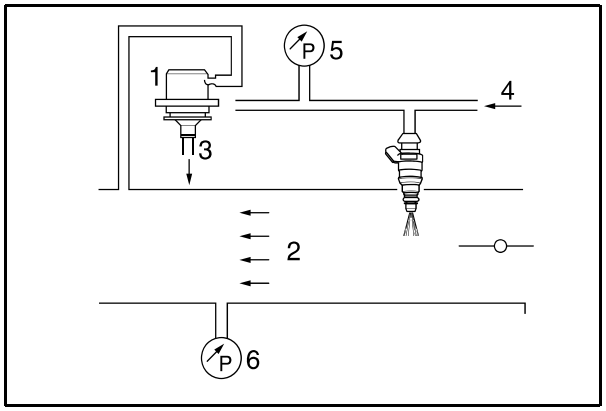
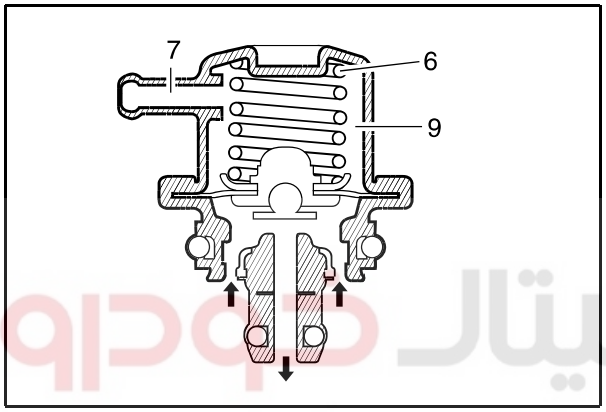
| Modification basis | |
| Application basis | |
| Affected VIN | |

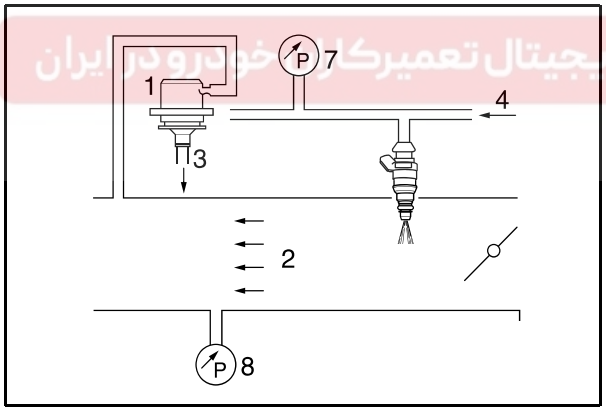



The pressure difference between the fuel pressure and the intake manifold is about 3.8 bars during the full load.

1. Fuel Pressure Regulator
2. Intake Manifold
3. Fuel Return (to fuel tank)
4. Fuel Supply (from fuel pump)
5. Fuel Pressure (approx. 3.8 bars)
6. Intake Manifold Negative Pressure (0 bar)




The spring chamber (9) is connected to the intake manifold with the vacuum hose at the intake pipe connection (7). The negative pressure generated in the intake manifold activates the diaphragm, and thus the fuel pressure gets reduced to the rate of the operating extent of the diaphragm by the intake manifold's negative pressure.



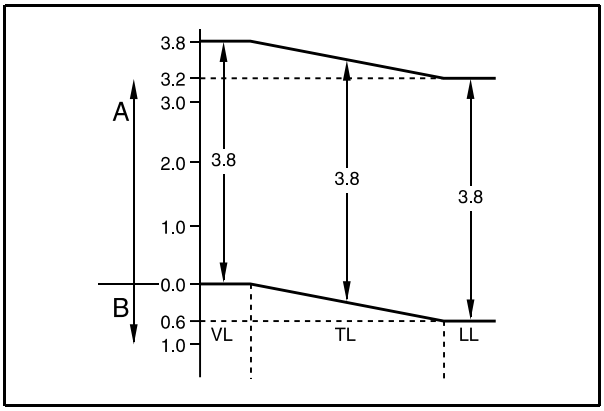

Consequently, the fuel pressure in the fuel distributor changes by the intake manifold's negative pressure, and the injector's fuel pressure gets reduced independently to the throttle valve's position. Thus, the fuel injection volume can only be determined according to the injector's injecting duration.

The pressure difference between the fuel pressure and the intake manifold is approx. 3.2 bars during idling.

1. Fuel Pressure Regulator
2. Intake Manifold
3. Fuel Return (to fuel tank)
4. Fuel Supply (from fuel pump)
7. Fuel Pressure (approx. 3.2 bars)
8. Intake Manifold Negative Pressure (0.6 bars)



| | |
|---|---|
| Modification basis | |
| Application basis | |
| Affected VIN | |




<Fuel Pressure Diagram>

A. Fuel pressure
B. Intake Manifold Negative Pressure
LL. Idling
TL. Partial load
VL. Full load





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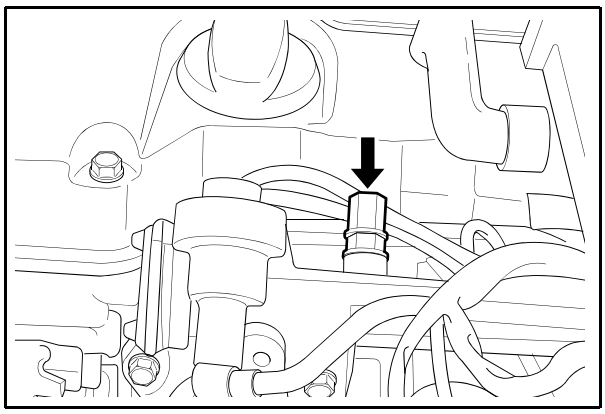
|---|---|
| Modification basis | |
| Application basis | |
| Affected VIN | |

## REMOVAL AND INSTALLION

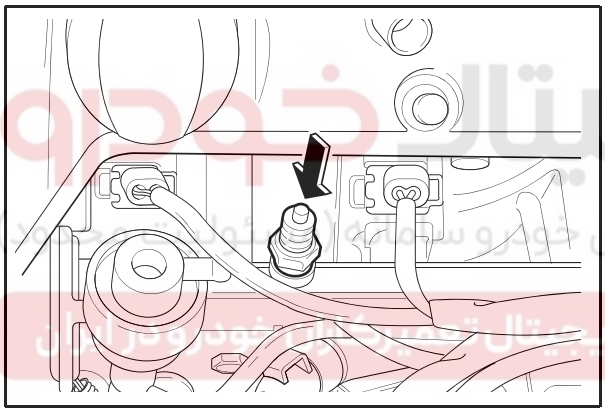
S.G.N.
2241-08

# DISCHARGING THE PRESSURE IN FUEL SYSTEM



1. Remove the fuel pressure test connector.

**Tightening torque** 25 Nm (18 lb-ft)



2. Remove the fuel pressure in fuel systemby pressing the service valve with a clean, pointy tool.

**CAUTION**
- Place a cloth so that the fuel doesn't stain around.

3. Installation should follow the removal procedure in the reverse order.



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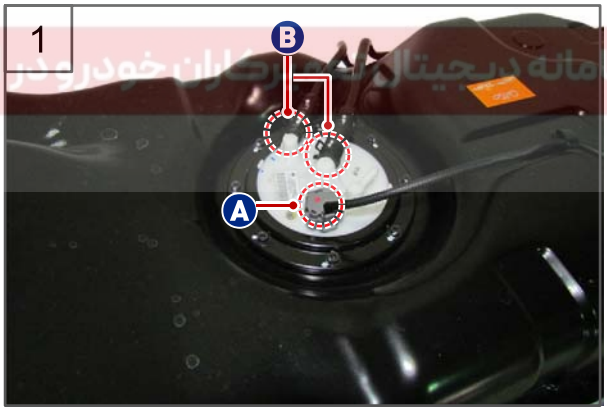
| Modification basis | |
| Application basis | |
| Affected VIN | |

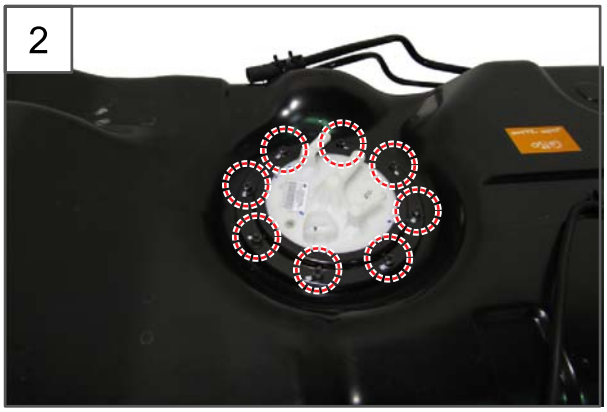
S.G.N.
# 2210-06 FUEL PUMP ASSEMBLY

**Preceding work**
- Disconnect the negative cable from the battery.
- Remove the fuel tank assembly.


1. Release two clamps (A) and disconnect the supply pipe tube & return pipe tube and pump wiring connector (B) from the fuel pump.






2. Unscrew eight bolts (8 mm) from the fuel pump assembly.

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| Modification basis | |
| Application basis | |
| Affected VIN | |

3

3. Remove the fuel pump assembly.

4

4. Install the fuel pump assembly in the reverse order of removal.





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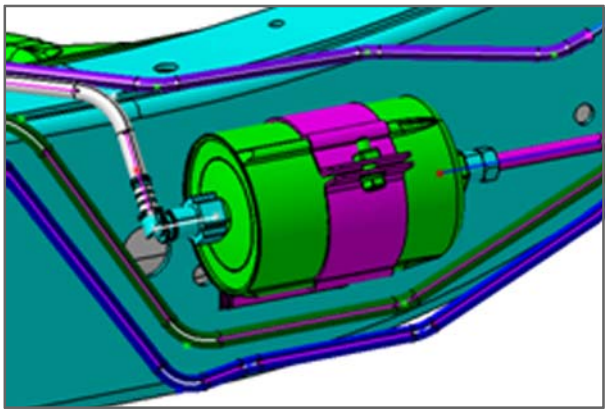
| Modification basis | |
| Application basis | |
| Affected VIN | |

S.G.N.
# 2221-01 FUEL FILTER



1. Disconnect the negative battery cable.

**CAUTION**
- The fuel system is under pressure. To avoid fuel spillage and the risk of personal injury or fire, it is necessary to relieve the fuel system pressure before disconnecting the fuel lines.

2. Relieve the fuel system pressure. Refer to "Discharging the Pressure in Fuel System" in this section.
3. Disconnect the fuel lines from the fuel filter.

**Tightening torque** 28 Nm (21 lb–ft)

4. Remove the fuel filter mounting bracket bolt .

**Tightening torque** 6 Nm (53 lb–in)

**CAUTION**
- Place the fuel pump pad. There may be acorrosion due to the contact between the fuel filter and the bracket.

5. Remove the fuel filter.
6. Install the fuel filter.
7. Perform a leak test of the fuel filter.
8. Installation should follow the removal procedure in the reverse order.



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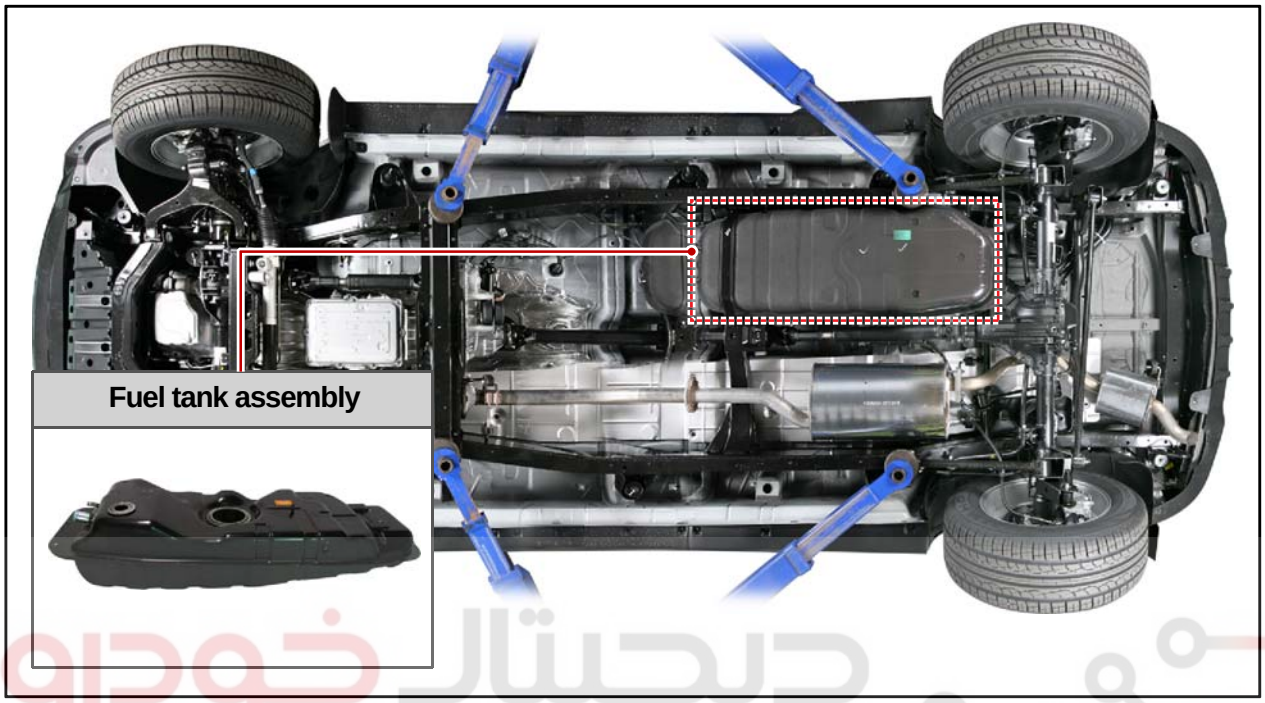
| Modification basis | |
| Application basis | |
| Affected VIN | |

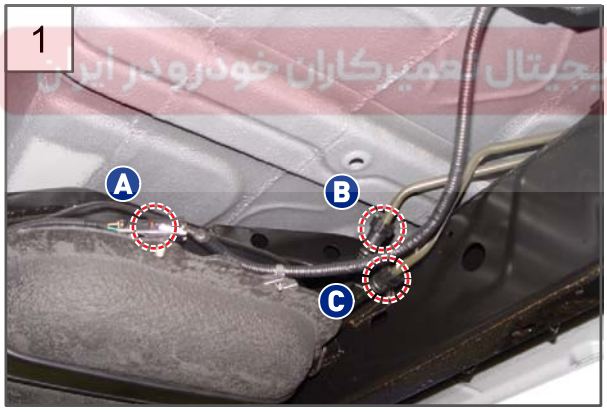
S.G.N.
# 2210-01 FUEL TANK ASSEMBLY

Preceding work - Disconnect the negative cable from the battery.

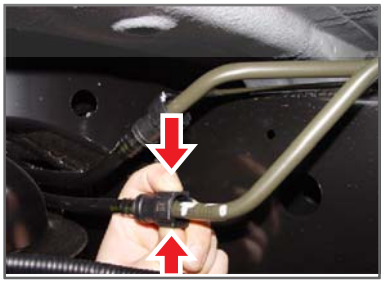




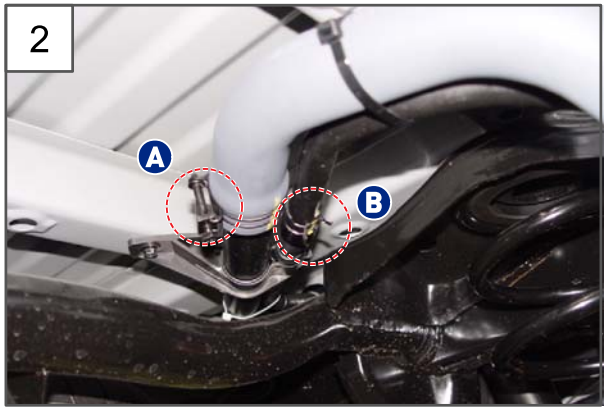

1




1. Disconnect the sender wiring connector (A), supply pipe tube (B) and return pipe tube (C).



2




2. Release the clamp (A, 10 mm), separate the clamp (B) with a pliers, and remove the fuel filler hose from the fuel tank.



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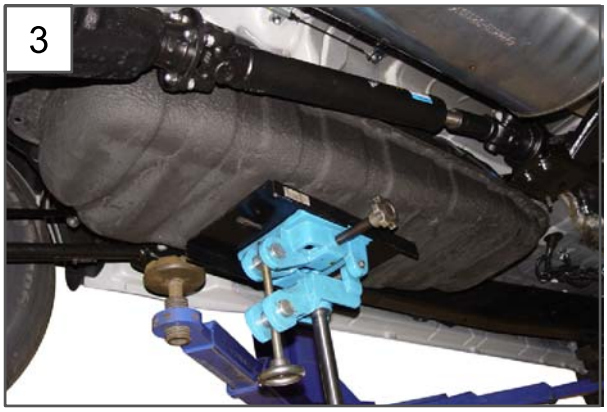
| Modification basis | |
| Application basis | |
| Affected VIN | |

3



3. Support the fuel tank with a safety jack as shown in the figure and unscrew three nuts (14 mm).

**Tightening torque** 34 ± 2.5Nm

4

4. Remove the fuel tank strap assembly.

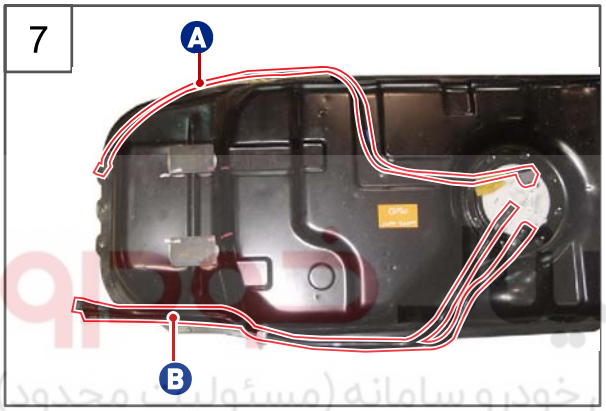
5

5. Remove the fuel tank assembly.

6

6. Release two clamps (10 mm) and remove the fuel filler hose from the fuel tank.

7

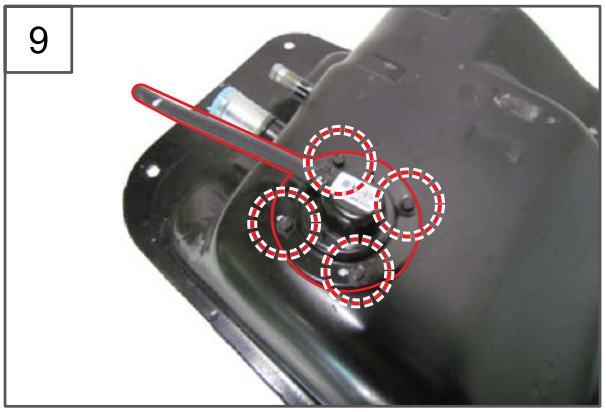



7. Remove the sender wiring (A) and supply pipe tube & return pipe tube from the fuel tank.

8

8. Unscrew eight bolts (8 mm) and remove the fuel sender assembly.

9



9. Unscrew four bolts (8 mm) and remove the ventilation tube assembly.



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| Modification basis | |
| Application basis | |
| Affected VIN | |

10

10.Install the fuel tank assembly in the reverse order of removal.



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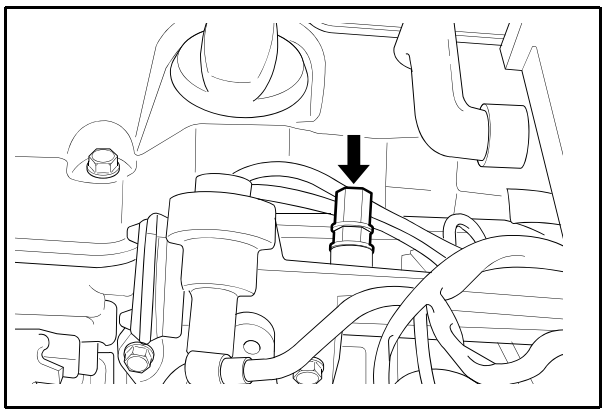
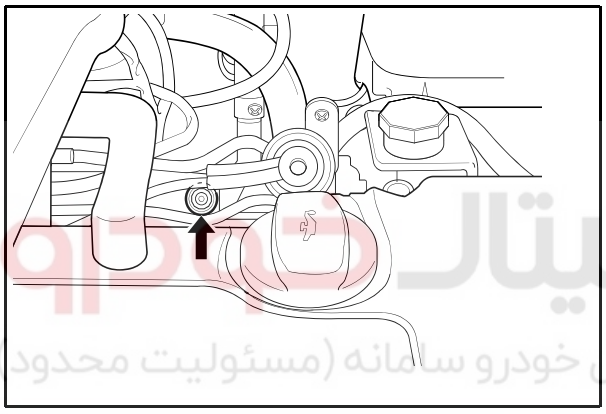
| Modification basis | |
| Application basis | |
| Affected VIN | |

S.G.N.
# 2241-08 FUEL PRESSURE REGULATOR



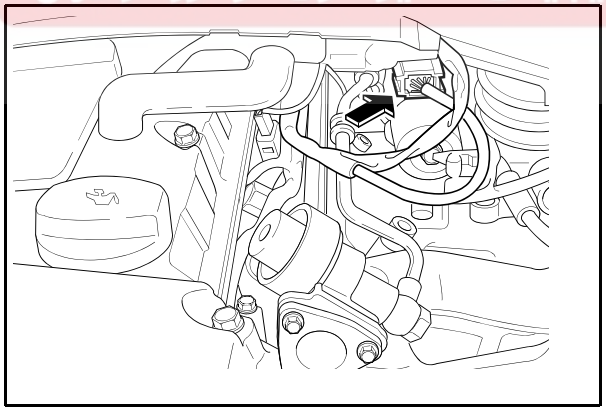
1. Disconnect the negative battery cable.
2. Remove the fuel pressure test connector.

**Tightening torque** 25 Nm (18 lb-ft)



**CAUTION**
- The fuel system is under pressure. To avoid fuel spillage and the risk of personal injury or fire, it is necessary to relieve the fuel system pressure before disconnecting the fuel lines.

3. Relieve the fuel pressure in fuel supply systemby pressing the service valve.



4. Disconnect the vacuum hose.
5. Disconnect the circlip and remove the fuel pressure regulator.
6. Apply the oil to O-ring lightly and then replace it.
7. Perform a leak test of the fuel pressure regulator with the engine off and the ignition on.
8. Installation should follow the removal procedure in the reverse order.





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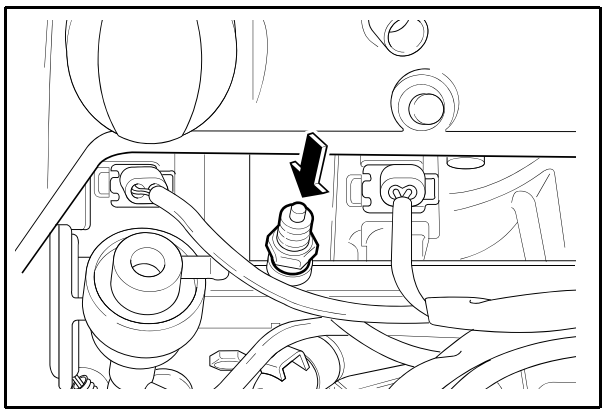
| Modification basis | |
| Application basis | |
| Affected VIN | |

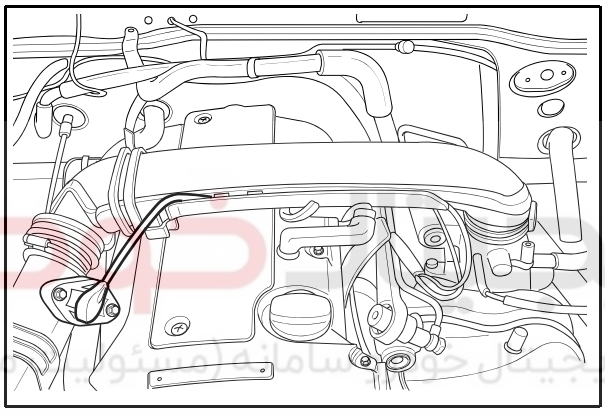
S.G.N. 2241-20

# FUEL RAIL AND INJECTORS



**CAUTION**
- The fuel system is under pressure. To avoid fuel spillage and the risk of personal injury or fire, it is necessary to relieve the fuel system pressure before disconnecting the fuel lines.

1. Discharge the fuel pressure from the fuel pressure test connector.
2. Disconnect the negative battery cable.
3. Disconnect the vacuumhose from the fuel pressure regulator.

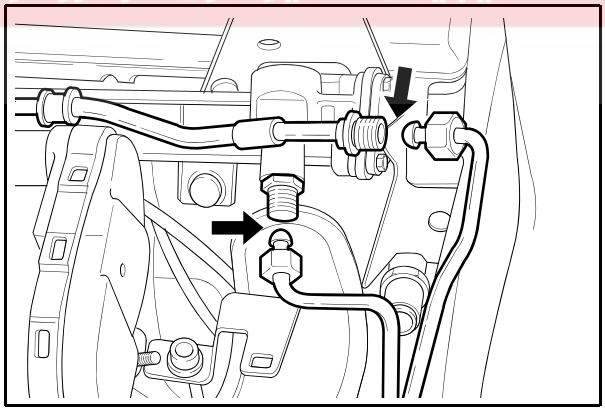


4. Remove the cable guide.
5. Disconnect the Hot Film Air Mass (HFM) sensor connector.
6. Remove the intake air duct mounting bolts.

**Tightening torque** 9 Nm (80 lb-in)

7. Remove the intake air duct clamps.
8. Remove the intake air duct.





9. Remove the fuel return and supply line.

**CAUTION**
- For removal, cover around parts with cloths not to be stained by fuel. In case of checking the injector only, do not remove the fuel return and supply line.

**Tightening torque** 23 Nm (17 lb-ft)

10. Remove the six injector connectors.

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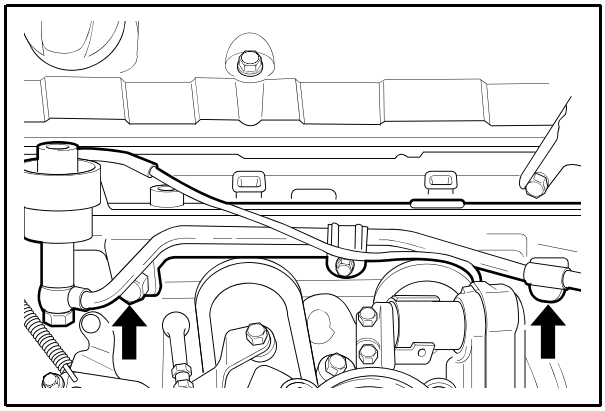
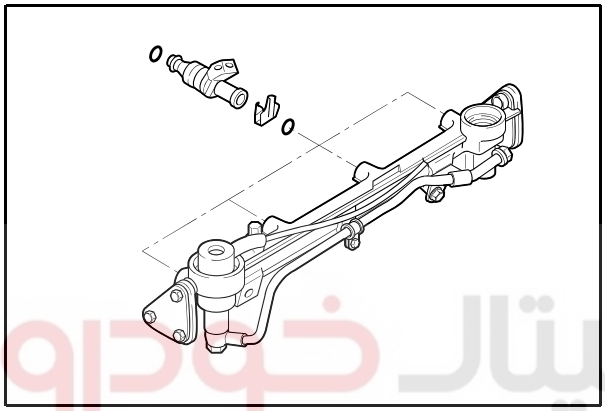
| Modification basis | |
| Application basis | |
| Affected VIN | |



11. Remove the two left and two right bolts and one center bolt of the fuel rail assembly from the intake manifold.

**Tightening torque** 25 Nm (18 lb–ft)



**CAUTION**

- Before removal, the fuel rail assembly may be cleaned with a spray-type cleaner, following package instructions. Do not immerse the fuel rails in liquid cleaning solvent. Use care in removing the fuel rail assembly to prevent damage to the electrical connectors and injector spray tips.
  Prevent dirt and other contaminants from entering open lines and passages. Fittings should be capped and holes plugged during service.



**CAUTION**

- If an injector becomes separated from the rail and remains in the cylinder head, replace the injector O-ring seals and the retaining clip.

12. Remove the injectors and the fuel rail carefully.
13. Remove the fuel injector retainer clips.
14. Remove the fuel injectors by pulling them down and out.
15. Discard the fuel injector O-rings.
16. Lubricate the new fuel injector O-rings with engine oil. Install the new O-rings on the fuel injectors.
17. Perform a leak check of the fuel rail and fuel injectors.
18. Installation should follow the removal procedure in the reverse order.



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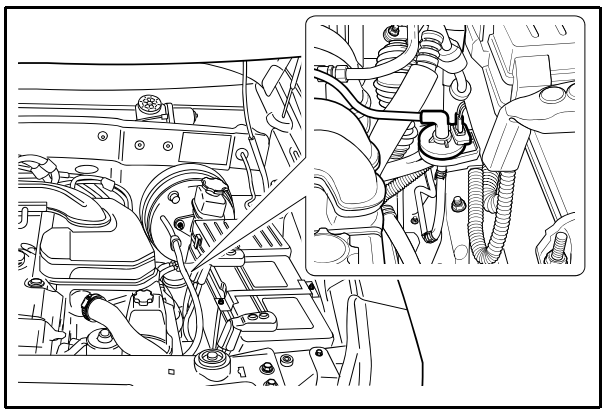
| Modification basis | |
| Application basis | |
| Affected VIN | |

S.G.N.
# 1623-06 PURGE CONTROL VALVE



1. Disconnect the negative battery cable.
2. Disconnect the purge control valve connector.
3. Disconnect the throttle body-to-purge control valve hose from the purge control valve.
4. Disconnect the canister-to-purge control valve hose from the purge control valve.
5. Remove the purge control valve.
6. Installation should follow the removal provedure in the reverse order.



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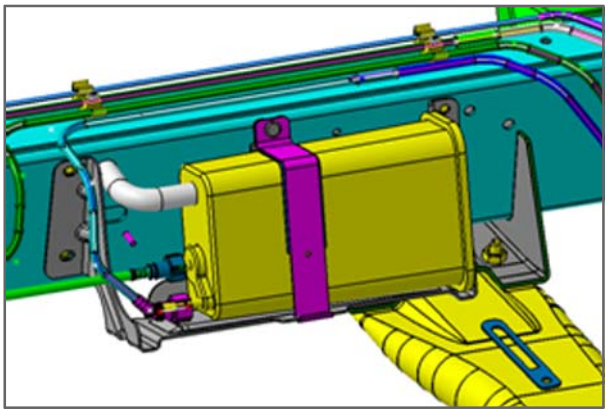
| Modification basis | |
| Application basis | |
| Affected VIN | |

S.G.N.
# 2221-09 CANISTER



**CAUTION**
- Canister and vacuum hoses contain fuel vapors. Do not smoke in the area or permit an open flame.

1. Disconnect the fuel tank-to-canister hose form the canister.
2. Disconnect the canister-to-purge control valve hose form the canister.

3. Remove the canister mounting bolts.

**Tightening torque** 6 Nm (53 lb-in)

4. Remove the canister.
5. Installation should follow the removal procedure in the reverse order.





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| Modification basis | |
| Application basis | |
| Affected VIN | |