

## 2002 ENGINE PERFORMANCE

### Removal, Overhaul & Installation

## INTRODUCTION

Removal, overhaul, and installation procedures are covered in this article. If component removal and installation is primarily an unbolt and bolt-on procedure, only a torque specification may be furnished.

## AIR INDUCTION SYSTEM

**CAUTION:** When battery is disconnected, vehicle computer and memory system may lose memory data. Driveability problems may exist until computer system have completed a relearn cycle. See **COMPUTER RELEARN PROCEDURES** article in **GENERAL INFORMATION** before disconnecting battery.

## THROTTLE BODY

### Cleaning & Inspection

1. Start engine and allow to idle. Turn ignition off when engine coolant temperature is 176-203°F (80-95°C). Disconnect intake air hose from throttle body. Plug the by-pass inlet passage to ensure solvent does not enter the by-pass passage. Spray cleaning solvent into throttle body and allow to soak about 5 minutes. Start engine. Race engine several times to clear solvent. Allow engine to run at idle for one minute.
2. Clean all components with solvent except Throttle Position (TP) sensor and Idle Air Control (IAC) actuator assembly. Check for restrictions in throttle body vacuum ports and passages. Blow out vacuum ports and passages using compressed air. Do not remove throttle valve from throttle body. Start engine. Race engine several times to clear solvent. Allow engine to run at idle for one minute.
3. Turn ignition off. Remove plug from by-pass inlet. Check throttle body for cracks. Ensure accelerator cable moves freely and does not bind or interfere when moving throttle valve. Clear any set DTCs with special service tool Hi-Scan pro or disconnecting negative battery cable for at least 10 seconds. Connect intake air hose. For adjustments, see **FUNCTIONAL CHECK & ADJUSTMENT** under **THROTTLE POSITION** sensor in **ON-VEHICLE ADJUSTMENTS** article.

### Removal & Installation (Optima, Rio & Sedona)

Removal and installation information is not available from manufacturer.

### Removal & Installation (Spectra)

Turn ignition off. Drain cooling system. Disconnect Throttle Position (TP) sensor 3-pin harness connector and Idle Air Control (IAC) valve 3-pin harness connector. Disconnect air intake hose from throttle body. Remove accelerator cable bracket. Disconnect accelerator cable. Disconnect 2 coolant hoses from throttle body. Remove 3 bolts and throttle body from intake manifold. For cleaning and inspection, see **CLEANING & INSPECTION**. To install, reverse removal procedure. Torque throttle body bolts to 18 ft. lbs. (25 N.m). Fully

close throttle valve and verify accelerator cable free play is .040-.120" (1-3 mm).

### **Removal & Installation (Sportage)**

Turn ignition off. Drain cooling system. Disconnect Throttle Position (TP) sensor 3-pin harness connector and Mass Air Flow (MAF) sensor 4-pin harness connector. Remove air intake hose assembly. Remove accelerator cable bracket bolts. Disconnect accelerator cable and set cable aside. Disconnect 2 coolant hoses from throttle body. Remove 2 throttle body mounting bolts/nuts. Remove throttle body and gasket. For cleaning and inspection, see **CLEANING & INSPECTION**. To install, reverse removal procedure. Torque throttle body bolts/nuts to 18 ft. lbs. (25 N.m). Fully close throttle valve and verify accelerator cable free play is .040-.120" (1-3 mm).

## **IDLE AIR CONTROL VALVE**

### **Removal & Installation (Except Sportage)**

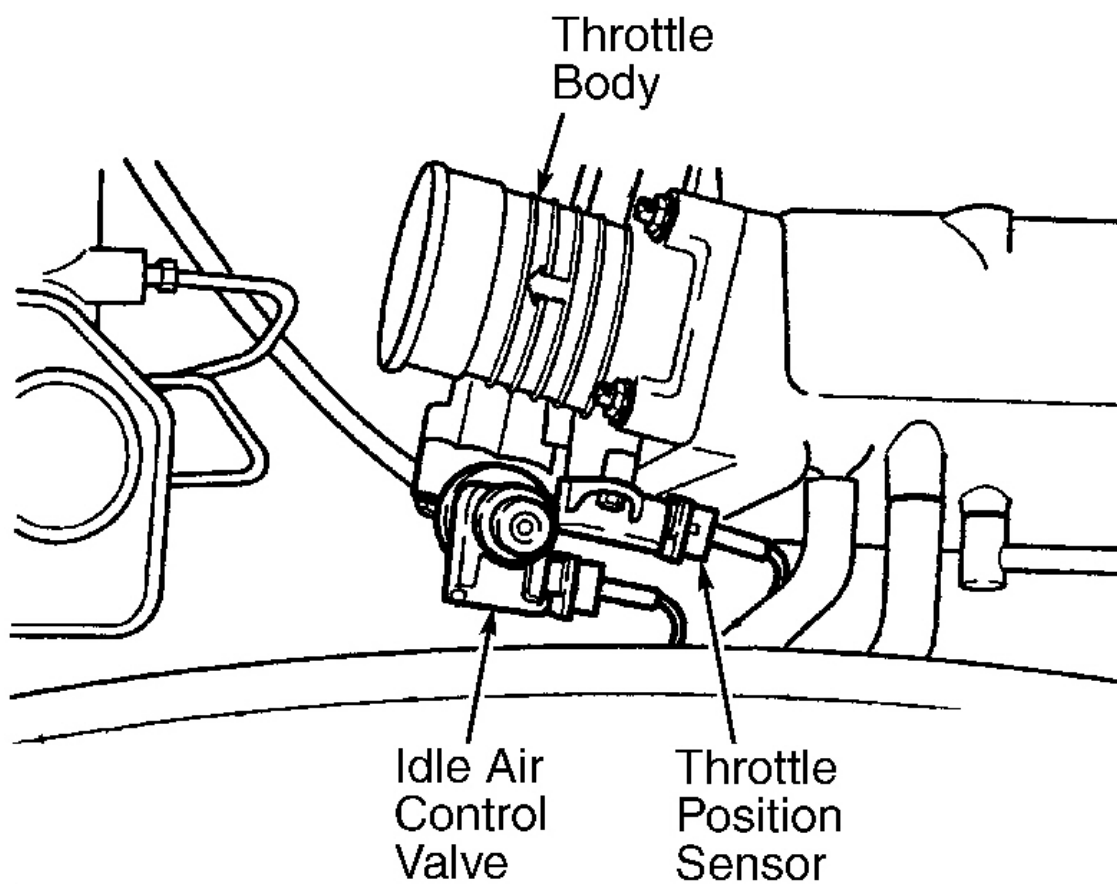
**NOTE:** When removing Idle Air Control (IAC) valve from throttle body for inspection or replacement, always use NEW gasket for installation.

**NOTE:** To remove IAC valve, removal of throttle body assembly may be necessary. For removal & installation procedure, see **THROTTLE BODY**.

Turn ignition off. Disconnect air intake hose from throttle body assembly. Disconnect IAC valve 3-pin harness connector. Locate IAC valve mounted on throttle body assembly. See **Fig. 1**. Remove two bolts from IAC valve. Remove IAC valve. To install, reverse removal procedure.

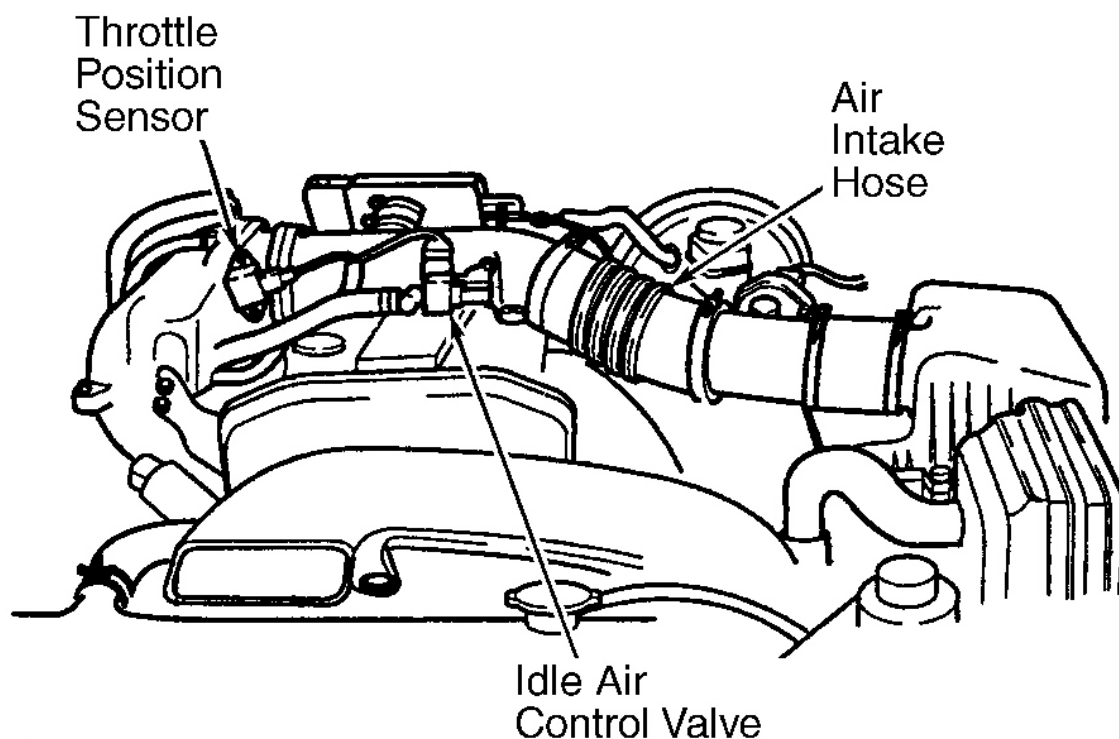
### **Removal & Installation (Sportage)**

Turn ignition off. Disconnect Idle Air Control (IAC) valve 3-pin harness connector. Locate IAC valve on air intake tube. See **Fig. 2**. Disconnect air intake by-pass hoses from IAC valve. Remove bolts from IAC valve bracket. Remove IAC valve. To install, reverse removal procedure.



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**Fig. 1: Locating Idle Air Control Valve (Except Sportage)**  
Courtesy of KIA MOTORS AMERICA, INC.



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**Fig. 2: Locating Idle Air Control Valve (Sportage)**  
Courtesy of KIA MOTORS AMERICA, INC.

## INTAKE MANIFOLD

### Removal & Installation

For removal and installation of intake manifold on all models, see appropriate article in ENGINES.

## COMPUTERIZED ENGINE CONTROL

**CAUTION:** When battery is disconnected, vehicle computer and memory system may lose memory data. Driveability problems may exist until computer system have completed a relearn cycle. See **COMPUTER RELEARN PROCEDURES** article in **GENERAL INFORMATION** before disconnecting battery.

## ENGINE CONTROL MODULE

**NOTE:** Engine Control Module (ECM), can also be referred to as Powertrain Control Module (PCM).

### Removal & Installation

Disconnect negative battery cable. On all models, disconnect all ECM harness connectors. Locate ECM in

vehicle. See **ENGINE CONTROL MODULE LOCATION** table. Remove bolts/nuts holding ECM brackets and remove ECM from vehicle. To install, reverse removal procedure.

**ENGINE CONTROL MODULE LOCATION**

Application	Location
Optima	Forward Of Center Console, Under Dash
Rio	Under Left Front Kick Trim Panel
Sedona	Under Right Front Passenger Floorboard
Spectra	Under Right Front Passenger Floorboard
Sportage	Under Right Front Passenger Floorboard

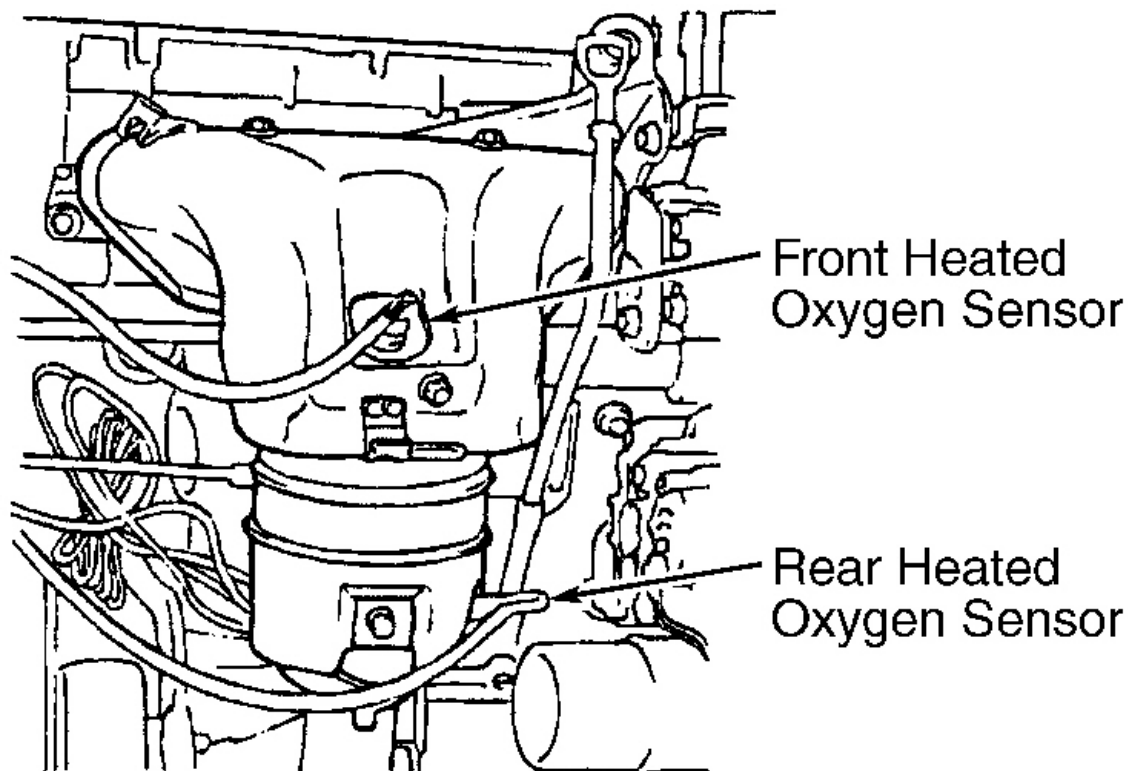
**ENGINE SENSORS & SWITCHES**

**HEATED OXYGEN SENSOR**

**Removal & Installation**

**CAUTION:** Protect Heated Oxygen (HO2S) sensor harness connector from damage when removing sensor. All sensors are removed in same manner. Access to HO2S varies between models.

1. Make note of harness connector location and wire routing. Turn ignition off. Disconnect HO2S 4-pin harness connector and remove HO2S sensor. Heat shield removal may be required on some models. HO2S sensors are located before and after Warm-up Catalytic Converter. See **Fig. 3**.
2. HO2S sensor may be difficult to remove when engine temperature is less than 120°F (48°C). Ensure HO2S sensor is free of contaminants. Do not use cleaning solvents of any type. If reusing old HO2S sensor, always apply anti-seize compound to HO2S sensor threads before installation. Torque to 22-36 ft. lbs. (30-49 N.m).



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**Fig. 3: Locating Front & Rear Oxygen Sensor (All Models Are Similar)**  
 Courtesy of KIA MOTORS AMERICA, INC.

## CAMSHAFT POSITION SENSOR

### Removal & Installation (Except Sedona)

Turn ignition off. Disconnect Camshaft Position (CMP) sensor 3-pin harness connector. Locate CMP sensor. See **CAMSHAFT POSITION SENSOR LOCATION** table. Remove CMP sensor mounting bolts. Remove CMP sensor from cylinder head. To install, reverse removal procedure.

### Removal & Installation (Sedona)

Turn ignition off. Remove left upper timing cover. Disconnect CMP sensor 3-pin harness connector. Locate CMP sensor. See **CAMSHAFT POSITION SENSOR LOCATION** table. Remove CMP sensor mounting bolts. Remove CMP sensor from left cylinder head. To install, reverse removal procedure.

## CAMSHAFT POSITION SENSOR LOCATION

Model	Location
Except Optima & Sedona	Rear Of Cylinder Head
Optima	
2.4L	Rear Of Cylinder Head

2.7L	Rear Of Right Cylinder Head
Sedona	Front Of Left Cylinder Head, Behind Camshaft Pulley

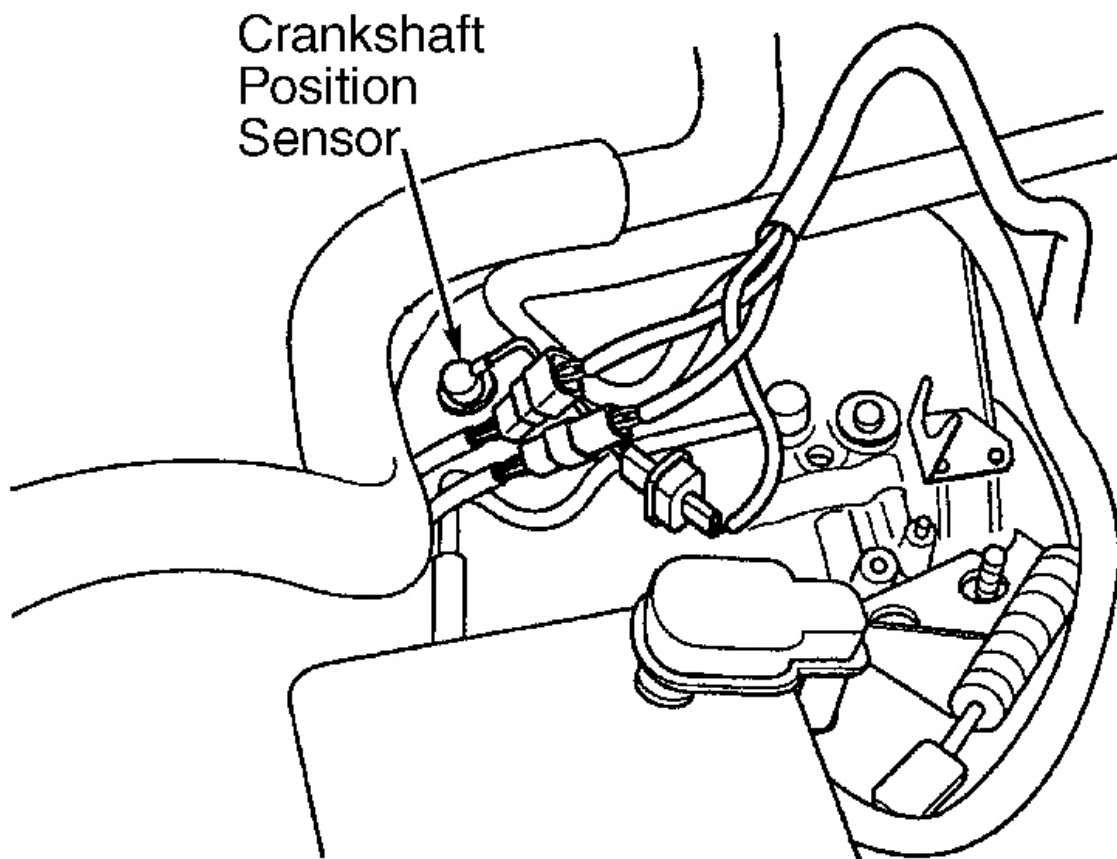
## CRANKSHAFT POSITION SENSOR

### Removal & Installation (Optima 2.7L, Rio, Spectra & Sportage)

Turn ignition off. Disconnect Crankshaft Position (CKP) sensor 3-pin harness connector. Locate CKP sensor in transmission bellhousing. See **Fig. 4** . Remove CKP sensor mounting bolt(s) and remove CKP sensor. To install, reverse removal procedure.

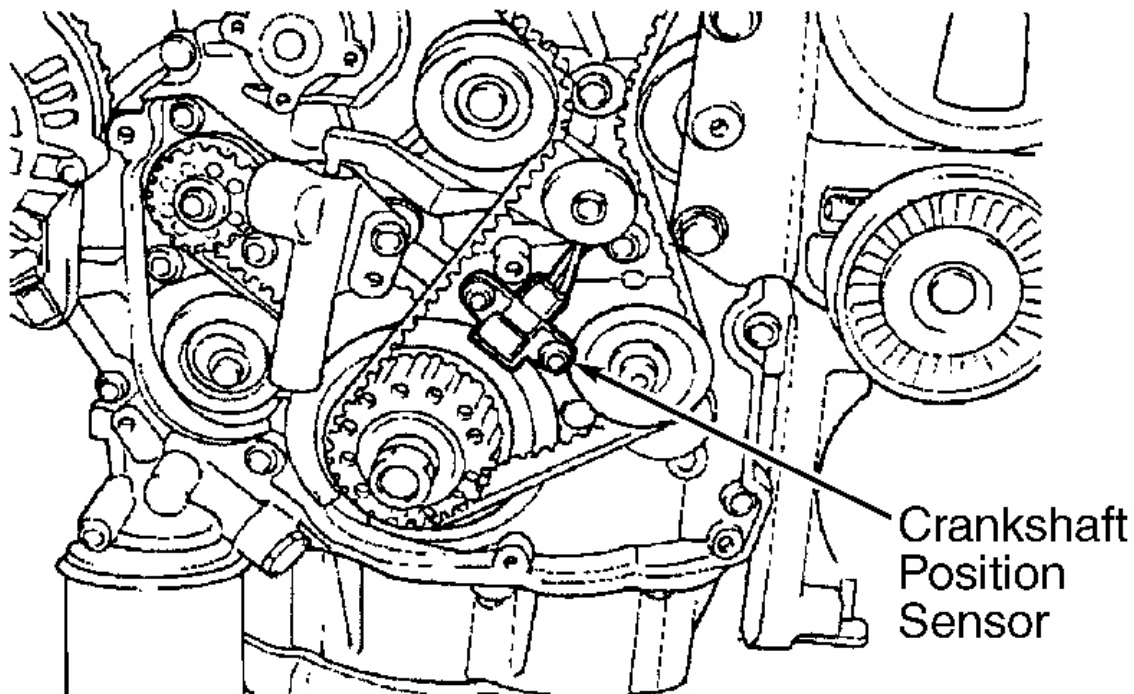
### Removal & Installation (Optima 2.4L & Sedona)

Turn ignition off. Disconnect Crankshaft Position (CKP) sensor 3-pin harness connector. Locate CKP sensor near crankshaft pulley. See **Fig. 5** . For timing belt cover removal and installation, see TIMING BELT, REMOVAL & INSTALLATION in appropriate ENGINES article.



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**Fig. 4: Locating Crankshaft Position Sensor (1.5L, 1.8L, 2.0L & 2.7L)**  
 Courtesy of KIA MOTORS AMERICA, INC.



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**Fig. 5: Locating Crankshaft Position Sensor (2.4L & 3.5L)**

Courtesy of KIA MOTORS AMERICA, INC.

## **THROTTLE POSITION SENSOR**

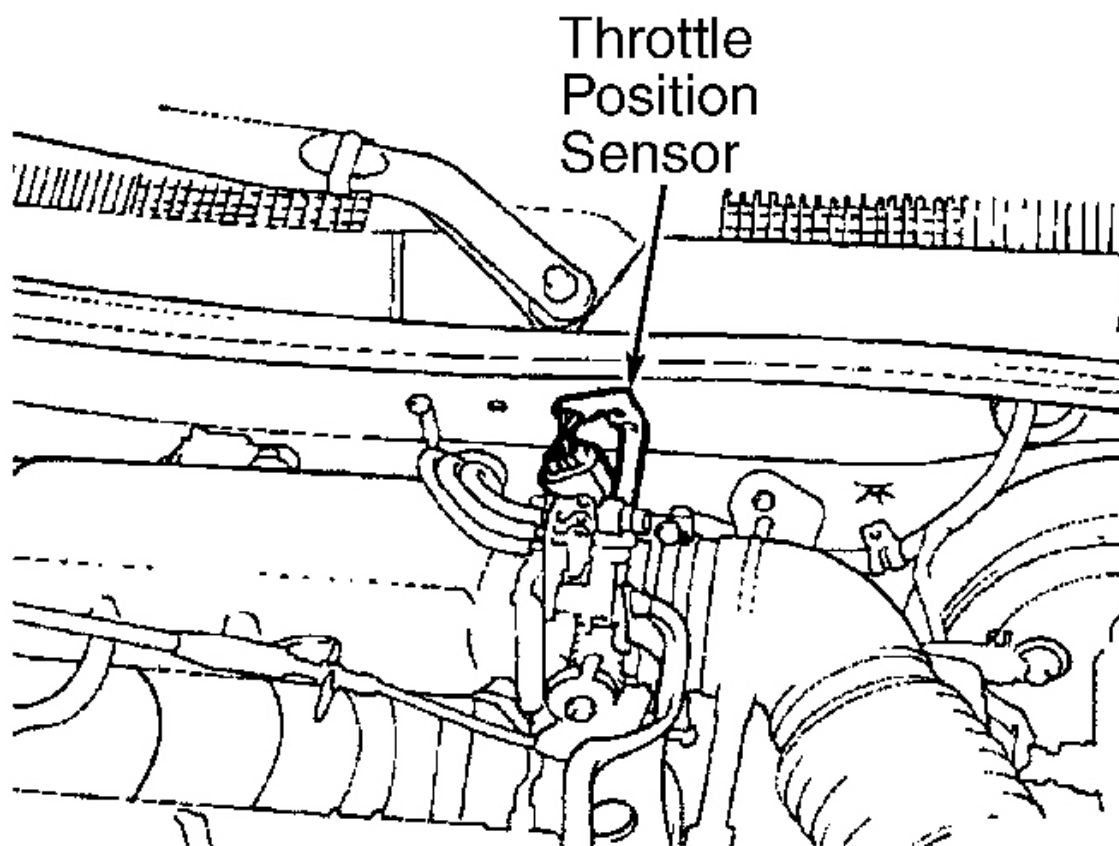
### **Removal & Installation (Optima, Rio & Sedona)**

Turn ignition off. Disconnect Throttle Position (TP) sensor 3-pin harness connector for Optima and Rio or 4-pin harness connector for Sedona. Locate TP sensor on throttle body assembly. See **Fig. 6** or **Fig. 7** . Remove TP sensor retaining bolts/nuts. Remove TP sensor from throttle body. To install, place TP sensor onto throttle body so the TP sensor actuating lever engages with throttle body lever. Install TP sensor retaining bolts/nuts finger tight and adjust TP sensor. For adjustment procedure, see THROTTLE POSITION SENSOR in ON-VEHICLE ADJUSTMENTS article. After adjustment is complete, torque TP sensor retaining bolts/nuts to 14-22 INCH. lbs. (1.5-2.5 N.m).

### **Removal & Installation (Spectra & Sportage)**

TP sensor is not replaceable or adjustable. TP sensor is part of the throttle body assembly. For throttle body assembly removal and installation procedure. See **THROTTLE BODY** .

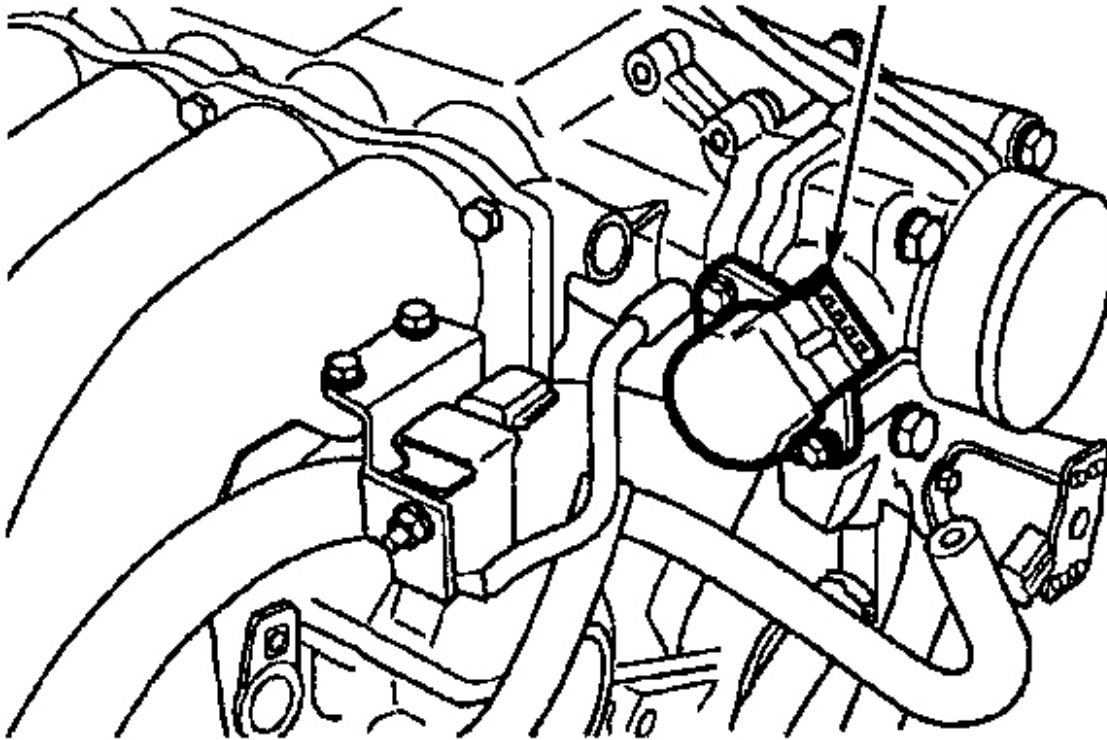




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**Fig. 6: Locating Throttle Position Sensor (Optima Shown; Rio Is Similar)**  
Courtesy of KIA MOTORS AMERICA, INC.

## Throttle Position Sensor



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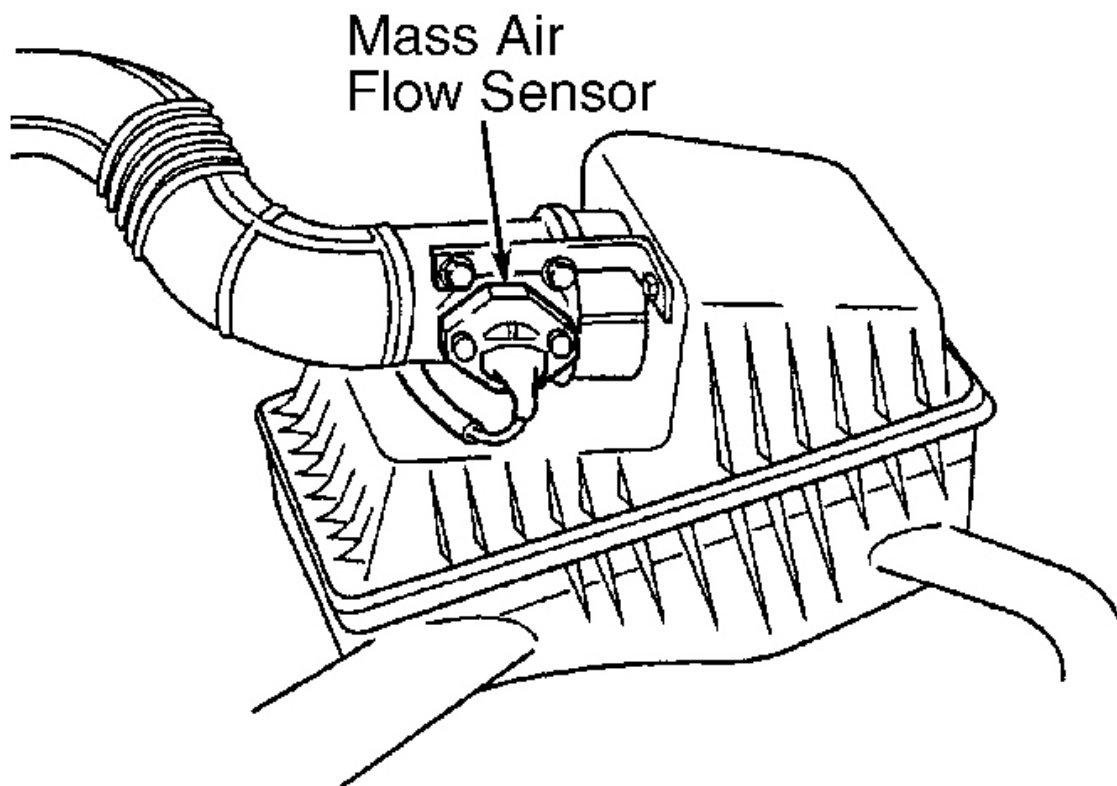
**Fig. 7: Locating Throttle Position Sensor (Sedona)**  
Courtesy of KIA MOTORS AMERICA, INC.

### MASS AIR FLOW SENSOR

**CAUTION:** Do not drop Mass Air Flow (MAF) sensor or subject MAF sensor to shock. Do not put objects inside the sensor, damage may occur. This MAF sensor is a hot film type.

#### Removal & Installation

Turn ignition off. Disconnect MAF sensor 3-pin harness connector for Optima (2.7L) & Rio, 4-pin harness connector for Sportage and 5-pin harness connector for Optima (2.4L), Sedona and Spectra. Locate MAF sensor near air cleaner assembly. See **Fig. 8**. Loose air intake hose retaining clamps on both sides of MAF sensor. Disconnect air intake hose from MAF sensor. Remove two bolts attaching MAF sensor to mounting bracket and remove MAF sensor. To install, reverse removal procedure. Always retain MAF sensor mounting bracket with 2 NEW bolts. Torque to 69-96.3 INCH. lbs. (7.8-10.8 N.m).



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**Fig. 8: Locating Mass Air Flow Sensor (All Models Are Similar)**

Courtesy of KIA MOTORS AMERICA, INC.

## **INTAKE AIR TEMPERATURE SENSOR**

### **Removal & Installation (Optima 2.4L, Spectra & Sedona)**

Intake Air Temperature (IAT) sensor, is built into Mass Air Flow (MAF) sensor. For removal and installation procedure. See **MASS AIR FLOW SENSOR**.

### **Removal & Installation (Optima 2.7L)**

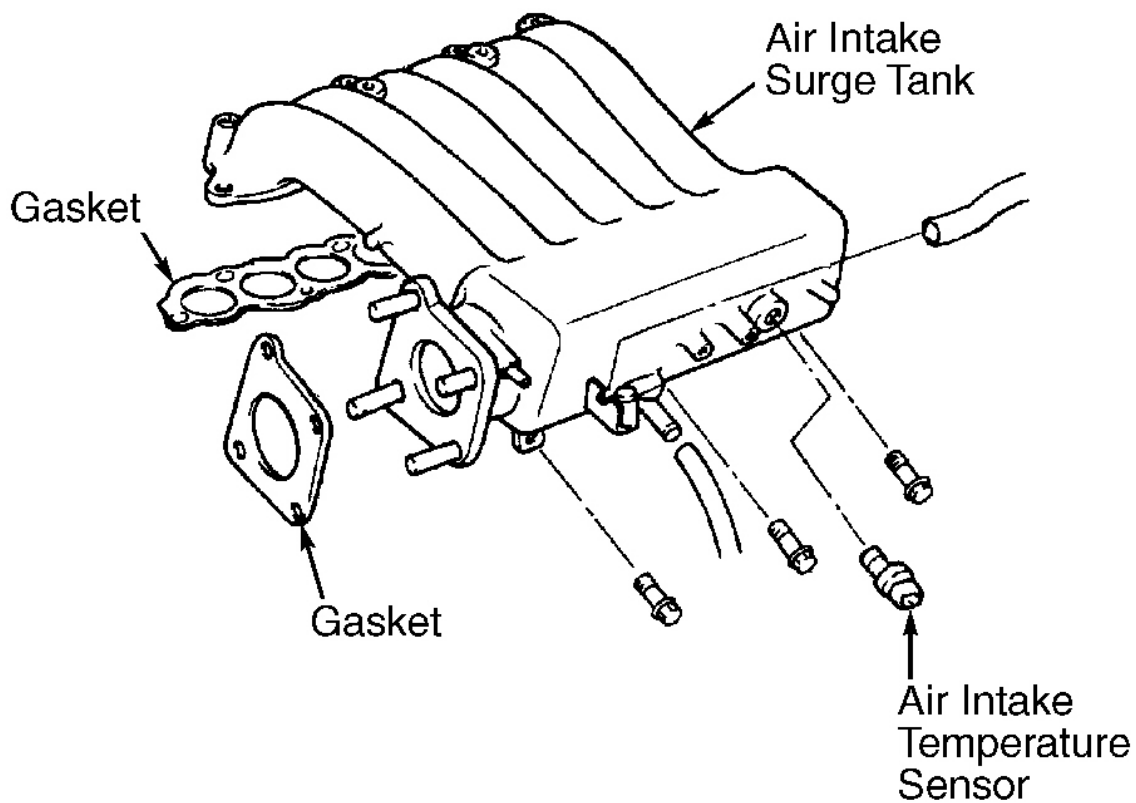
Turn ignition off. Disconnect IAT sensor 2-pin harness connector. Locate IAT sensor on intake manifold. See **Fig. 9** . Remove IAT sensor. To install, reverse removal procedure.

### **Removal & Installation (Rio)**

Turn ignition off. Disconnect IAT sensor 2-pin harness connector. Locate IAT sensor on back of intake manifold, near fuel injector No. 4. Remove IAT sensor. To install, reverse removal procedure.

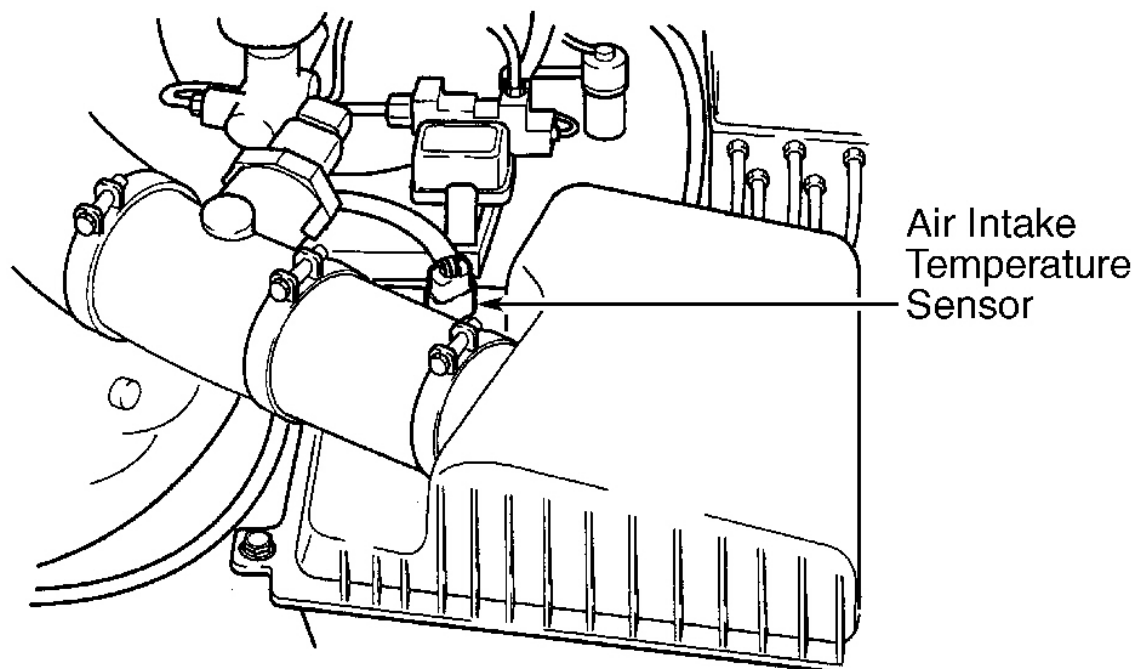
### **Removal & Installation (Sportage)**

Turn ignition off. Disconnect IAT sensor 2-pin harness connector. Locate IAT sensor on air cleaner assembly. See **Fig. 10** . Remove IAT sensor. To install, reverse removal procedure.



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**Fig. 9: Locating Intake Air Temperature Sensor (Optima 2.7L)**  
 Courtesy of KIA MOTORS AMERICA, INC.



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**Fig. 10: Locating Intake Air Temperature Sensor (Sportage)**

Courtesy of KIA MOTORS AMERICA, INC.

## ENGINE COOLANT TEMPERATURE SENSOR

Removal & Installation (Optima 2.4L, Rio, Spectra & Sportage)

**NOTE:** When removing Engine Coolant Temperature (ECT) sensor for inspection or replacement, always use NEW gasket.

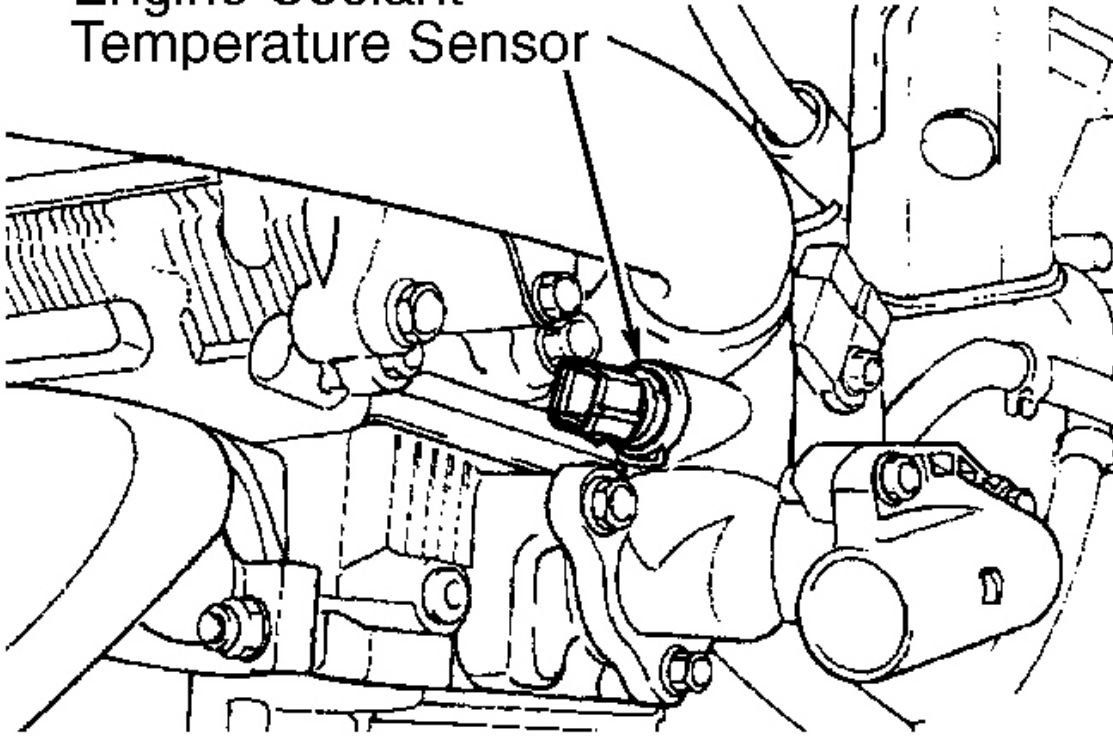
Turn ignition off. Disconnect ECT sensor 3-pin harness connector for Optima 2.4L, Rio and Spectra or 2-pin harness connector for Sportage. Locate ECT sensor near thermostat housing. See **Fig. 11** . Drain cooling system. Remove ECT sensor. To install, reverse removal procedure. Always using NEW gasket. Torque ECT sensor to 18-22 ft. lbs. (25-29 N.m). Fill and bleed cooling system.

Removal & Installation (Optima 2.7L & Sedona)

**NOTE:** When removing ECT sensor for inspection or replacement, always apply sealant (Loctite 962T or equivalent) to threaded portion of ECT sensor.

Turn ignition off. Drain cooling system. Disconnect ECT sensor 3-pin harness connector. Locate ECT sensor, installed in engine coolant passage of cylinder head. See **Fig. 12** . Remove ECT sensor. To install, reverse removal procedure. Apply sealant to threaded portion of ECT sensor. Torque ECT sensor to 14-29 ft. lbs. (20-40 N.m). Fill and bleed cooling system.

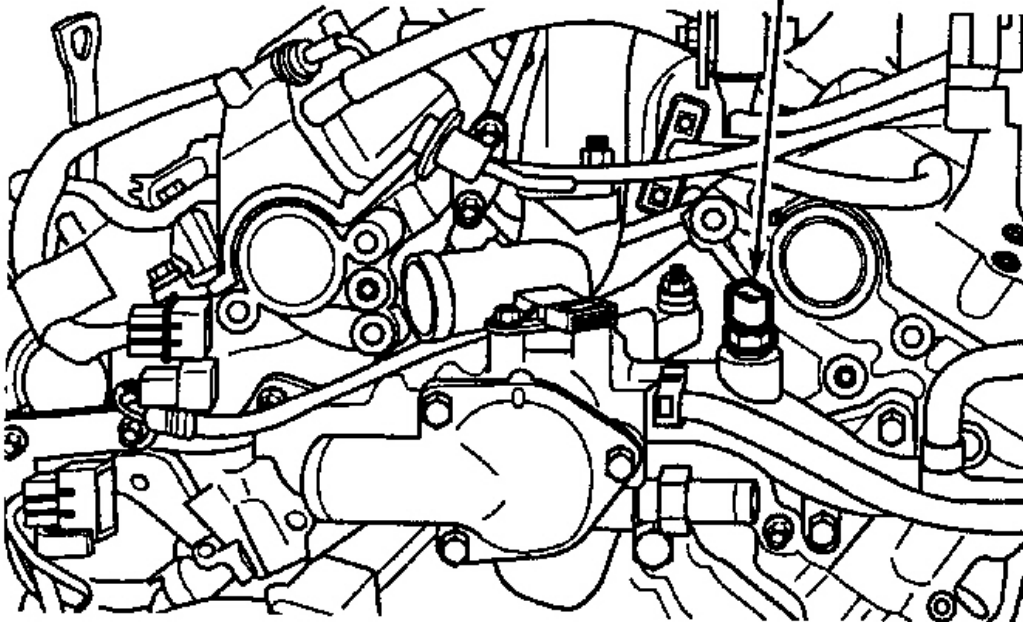
# Engine Coolant Temperature Sensor



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**Fig. 11: Locating Engine Coolant Temperature Sensor (1.5L, 1.8L, 2.0L & 2.4L)**  
Courtesy of KIA MOTORS AMERICA, INC.

## Engine Coolant Temperature Sensor



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**Fig. 12: Locating Engine Coolant Temperature Sensor (2.7L & 3.5L)**

Courtesy of KIA MOTORS AMERICA, INC.

## KNOCK SENSOR

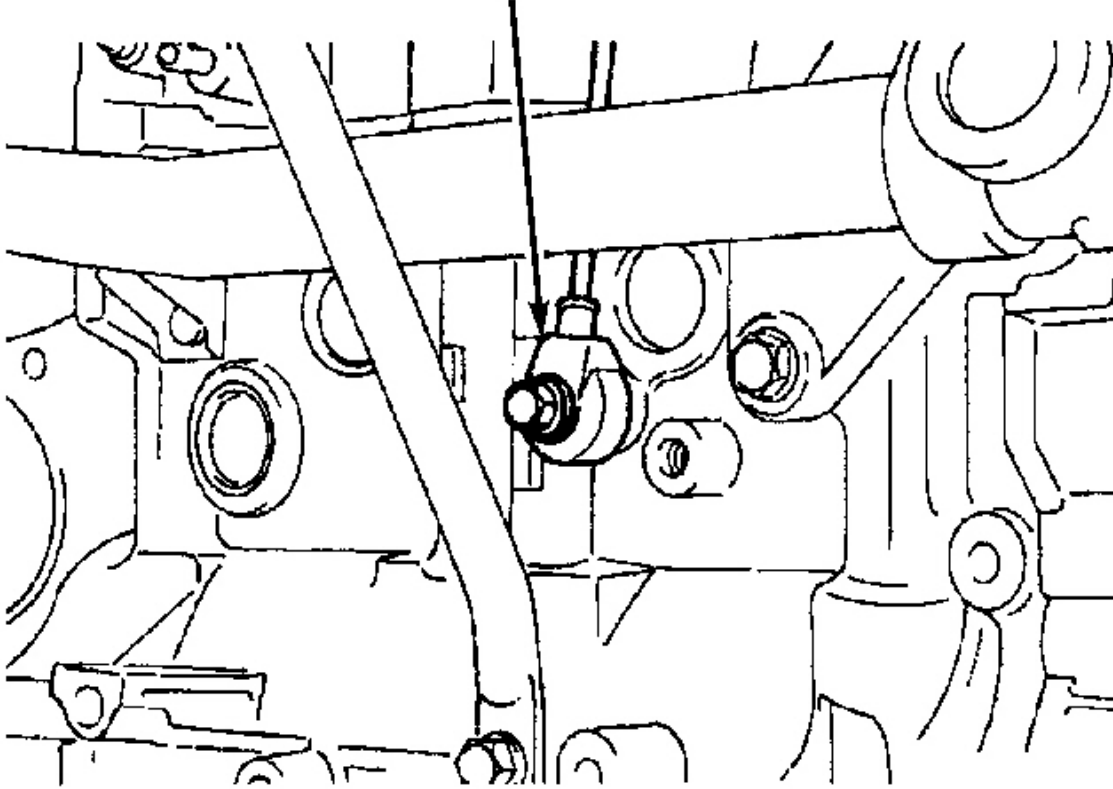
### Removal & Installation (Except Sedona)

Turn ignition off. Disconnect knock sensor 3-pin harness connector. Locate knock sensor, on cylinder block. On Optima 2.7L engine, sensors are located on both sides of cylinder block. See **Fig. 13** . Remove knock sensor from cylinder block. To install, reverse removal procedure.

### Removal & Installation (Sedona)

Turn ignition off. Disconnect knock sensor 2-pin harness connector. Locate knock sensor, at center of cylinder block under intake manifold. See **Fig. 14** . Remove intake manifold. See appropriate article in ENGINES. Remove knock sensor. To install, reverse removal procedure.

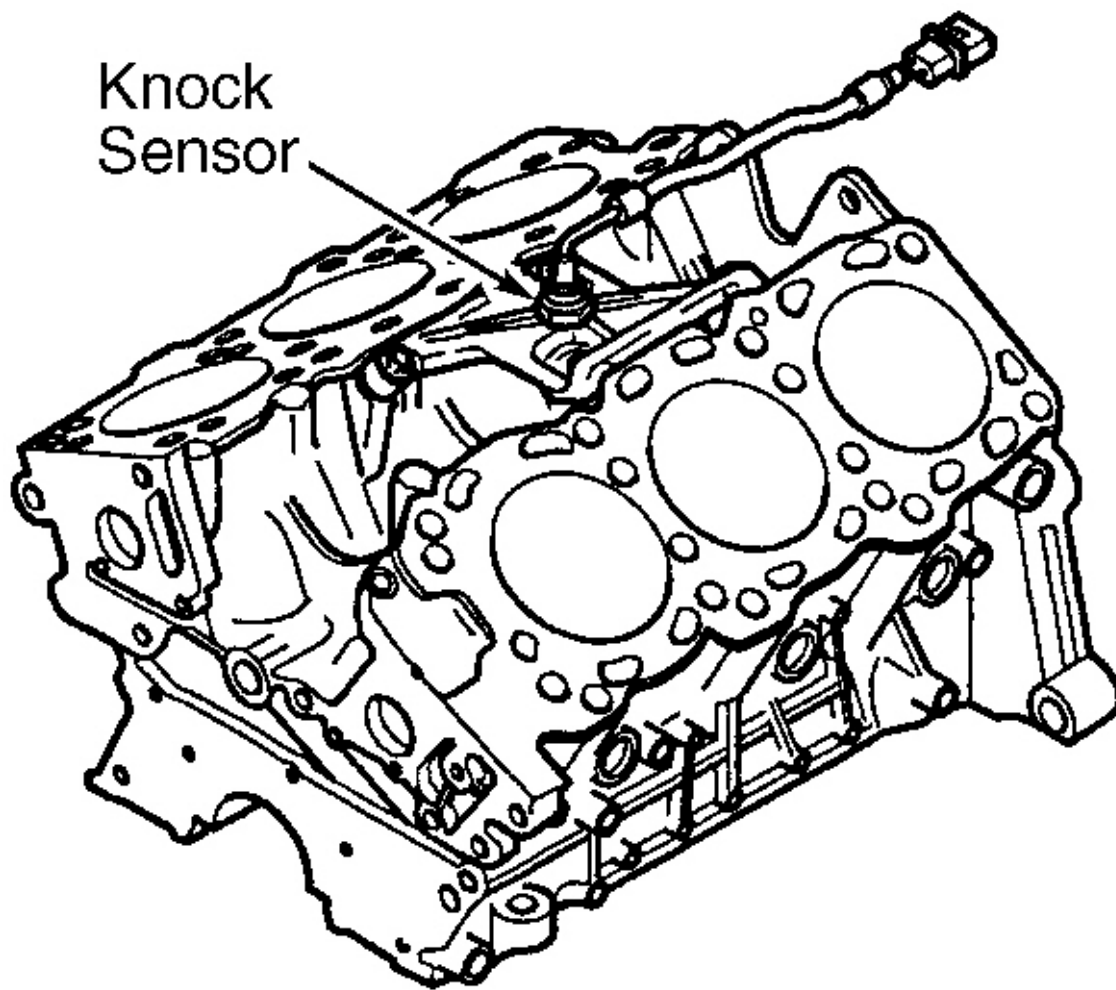
Knock  
Sensor



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**Fig. 13: Locating Knock Sensor (Except Sedona)**  
**Courtesy of KIA MOTORS AMERICA, INC.**





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**Fig. 14: Locating Knock Sensor (Sedona)**

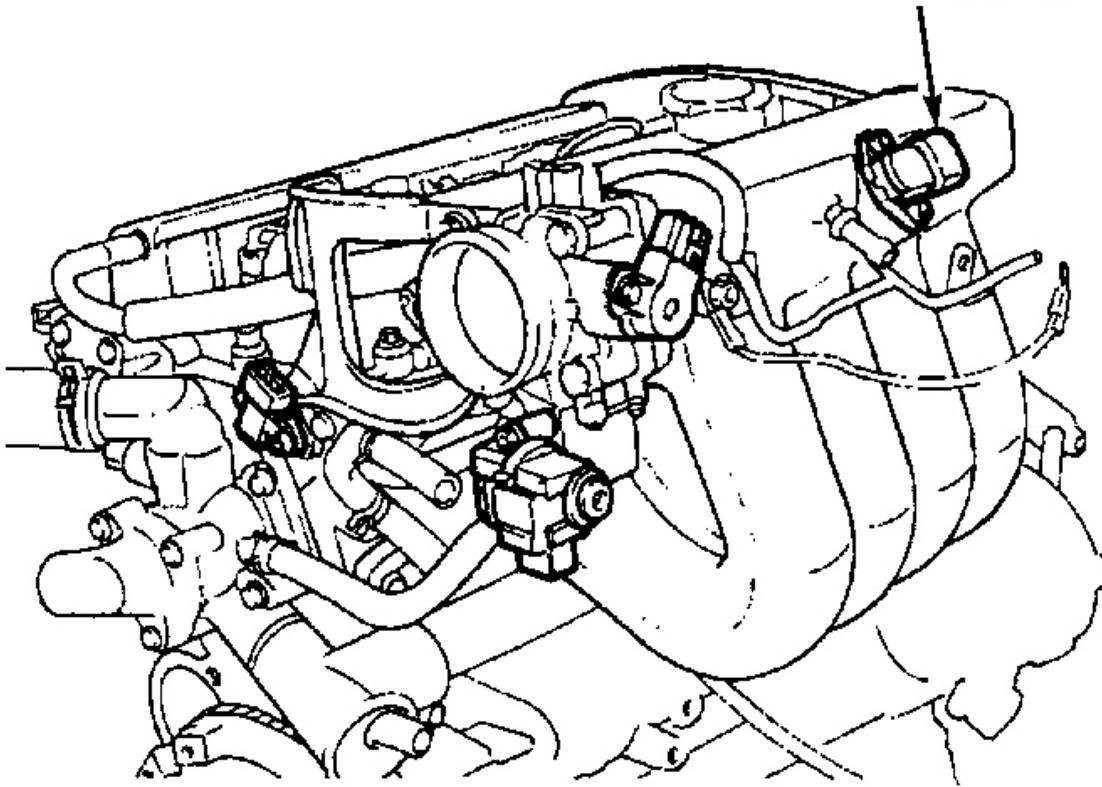
Courtesy of KIA MOTORS AMERICA, INC.

## **MANIFOLD ABSOLUTE PRESSURE SENSOR**

### **Removal & Installation (Optima 2.4L & Sedona)**

Turn ignition off. Disconnect Manifold Absolute Pressure (MAP) sensor 3-pin harness connector. Locate MAP sensor on upper center part of intake manifold. See **Fig. 15** . Remove bolts/nuts holding sensor onto intake manifold. Remove MAP sensor. To install, reverse removal procedure.

Manifold  
Absolute  
Pressure  
Sensor



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**Fig. 15: Locating Manifold Absolute Pressure Sensor (Optima 2.4L Shown; Sedona Is Similar)**  
Courtesy of KIA MOTORS AMERICA, INC.

## VEHICLE SPEED SENSOR

**NOTE:** Vehicle Speed (VS) sensor, is built into speedometer driven gear assembly.

### Removal & Installation (Except Sportage)

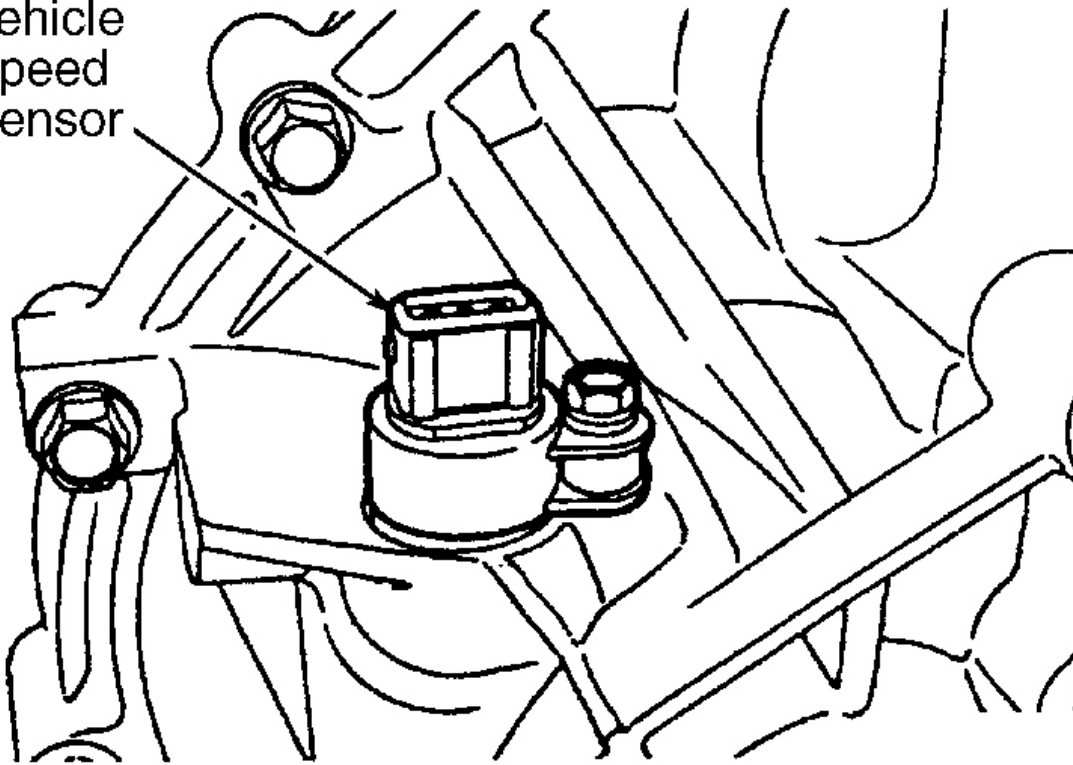
Turn ignition off. Disconnect Vehicle Speed (VS) sensor 3-pin harness connector. Locate VS sensor at rear of transaxle housing. See **Fig. 16** . Remove holding bolt/nut from VS sensor. Remove VS sensor from transaxle. To install, reverse removal procedure. Torque bolt/nut to 35-53 INCH lbs. (4-6 N.m).

### Removal & Installation (Sportage)

Turn ignition off. Disconnect Vehicle Speed (VS) sensor 3-pin harness connector. Locate VS sensor on left side of transmission tail housing. See **Fig. 17** . Remove holding bolt/nut from VS sensor. Remove VS sensor from

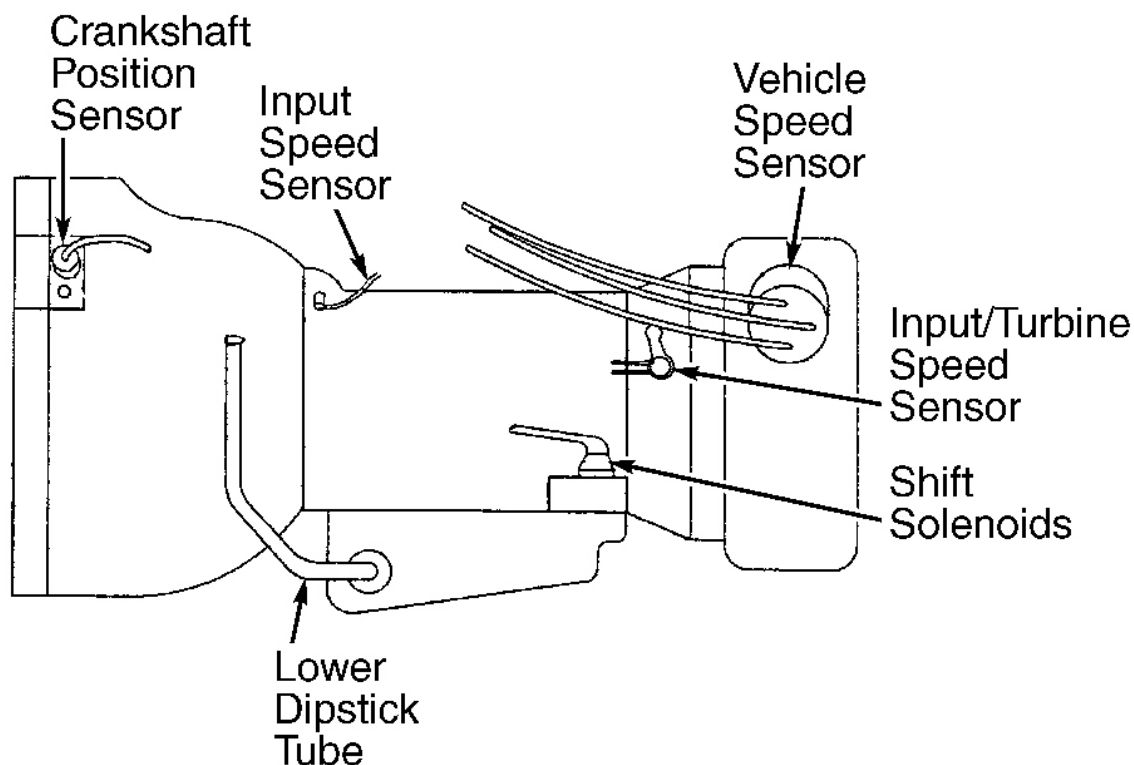
transmission tail housing. To install, reverse removal procedure. Torque bolt/nut to 35-53 INCH lbs. (4-6 N.m).

Vehicle  
Speed  
Sensor



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**Fig. 16: Locating Vehicle Speed Sensor (Sedona Shown; Optima, Rio & Spectra Are Similar)**  
Courtesy of KIA MOTORS AMERICA, INC.



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**Fig. 17: Locating Vehicle Speed Sensor (Sportage)**

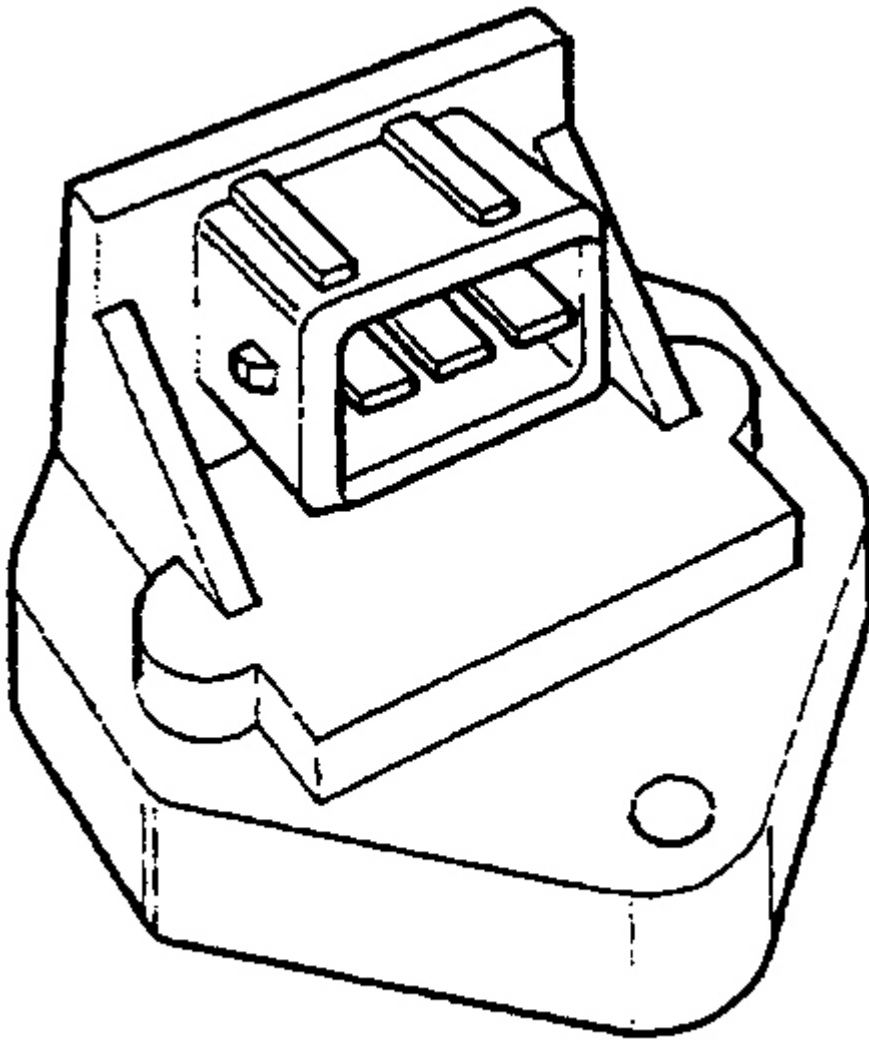
Courtesy of KIA MOTORS AMERICA, INC.

## CHASSIS ACCELERATION SENSOR

### Removal & Installation (Spectra & Sportage)

**NOTE:** Chassis Acceleration (CA) sensor is directional and must be installed with the CA sensor connector facing to the rear of vehicle.

Turn ignition off. Disconnect CA sensor 3-pin harness connector. Locate CA sensor. On Spectra, CA sensor is located on right side of engine compartment, near shock tower. On Sportage, CA sensor is located at lower right side of engine compartment, below starter. For CA sensor identification, see **Fig. 18** . Remove holding bolt and remove CA sensor. To install, reverse removal procedure.



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**Fig. 18: Identifying Chassis Acceleration Sensor (Spectra & Sportage)**  
Courtesy of KIA MOTORS AMERICA, INC.

## **POWER STEERING PRESSURE SWITCH**

### **Removal & Installation**

Turn ignition off. Disconnect Power Steering Pressure (PSP) switch harness connector. Locate PSP switch on power steering pump assembly. See **Fig. 19** . Remove PSP switch from power steering pump assembly. To install, reverse removal procedure.

## Power Steering Oil Pressure Switch



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**Fig. 19: Locating Power Steering Pressure Switch (All Models Are Similar)**  
Courtesy of KIA MOTORS AMERICA, INC.

### AUTOMATIC TRANSAXLE/TRANSMISSION RANGE SWITCH

**NOTE:** Automatic Transaxle Range (TR) switch, can also be referred to as inhibitor switch.

#### Removal & Installation (Optima & Sedona)

Turn ignition off. Disconnect automatic TR switch 10-pin harness connector. Remove fresh air duct and air cleaner assembly. Locate TR switch on left top side of transaxle. See **Fig. 20**. Remove selector cable and manual selector lever. Remove bolts from TR switch. Remove TR switch. To install, reverse removal procedure. Adjust TR switch. See appropriate article in AUTOMATIC TRANSMISSION SERVICING. Torque TR switch adjusting bolts to 89-106 INCH lbs. (10-12 N.m).

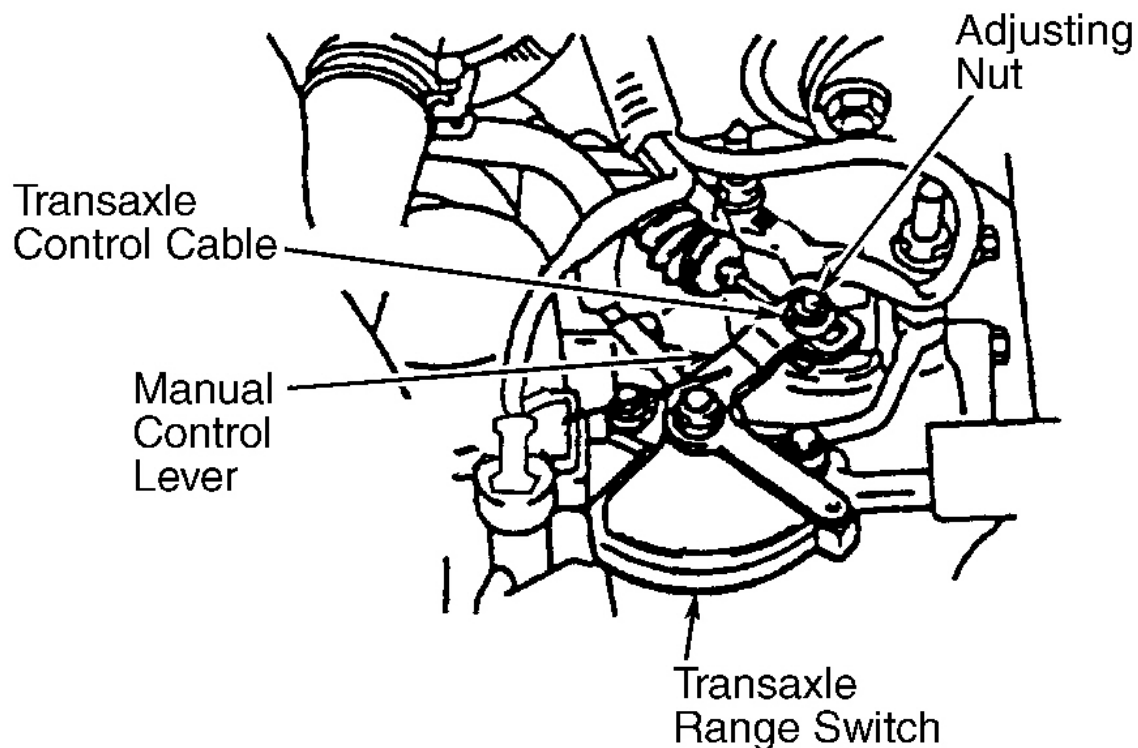
#### Removal & Installation (Rio & Spectra)

Turn ignition off. Remove fresh air duct and air cleaner assembly. Disconnect automatic TR switch 9-pin

harness connector. Locate TR switch on left top side of transaxle. See **Fig. 21** . Remove selector cable and manual selector lever. Remove bolts from TR switch. Remove TR switch. To install, reverse removal procedure. Adjust automatic TR switch. See appropriate article in AUTOMATIC TRANSMISSION SERVICING. Torque TR switch adjusting bolts to 71-97 INCH lbs. (8-11 N.m).

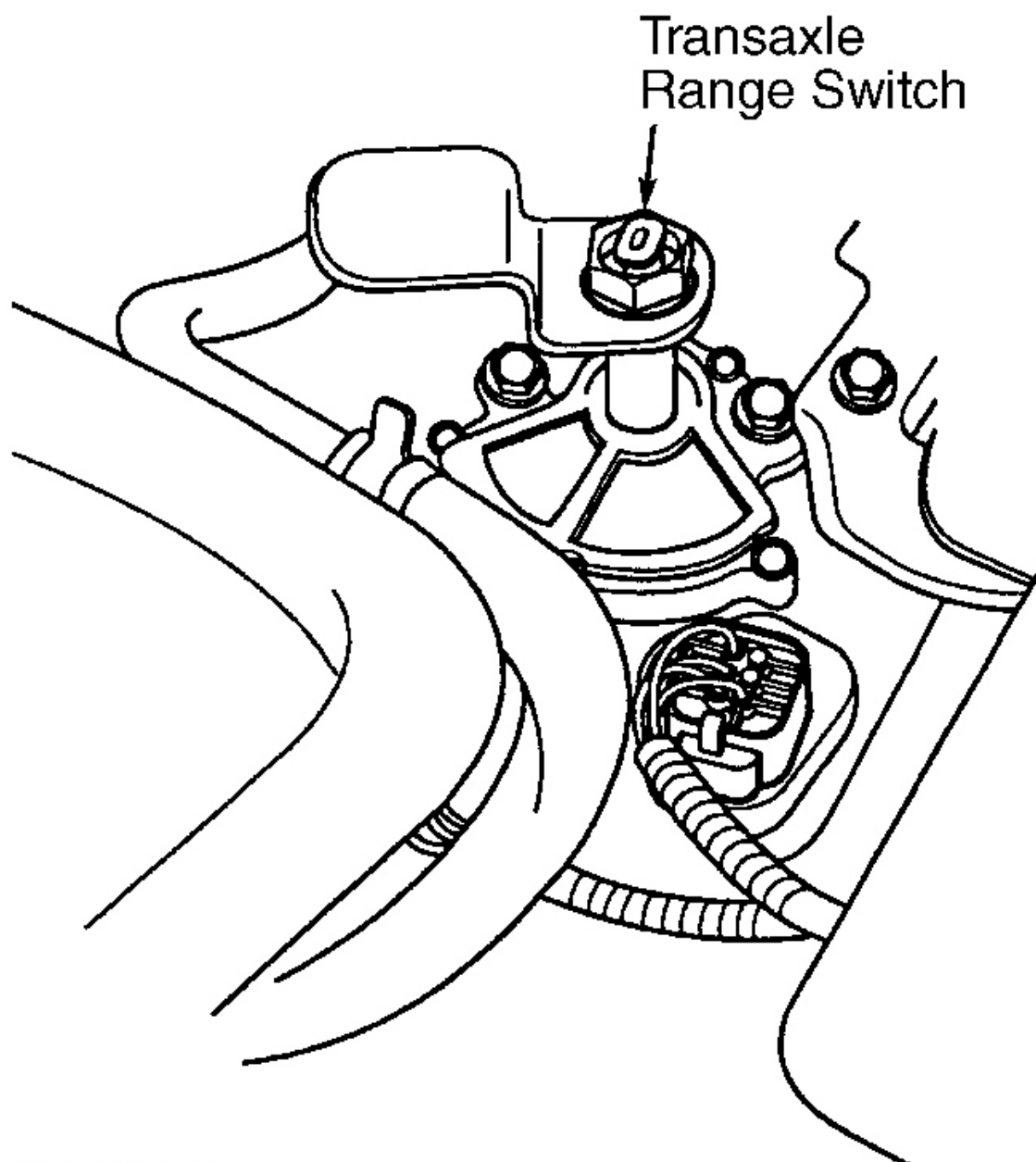
#### **Removal & Installation (Sportage)**

Turn ignition off. Disconnect Transmission (TR) switch 10-pin harness connector. Locate TR switch on left side of transmission. See **Fig. 22** . Remove selector cable and manual selector lever. Remove bolt from TR switch. Remove TR switch. To install, reverse removal procedure. Adjust TR switch, see appropriate AUTOMATIC article in TRANSMISSION SERVICING. Torque TR switch adjusting bolt to 31-65 INCH lbs. (3.9-6.1 N.m).



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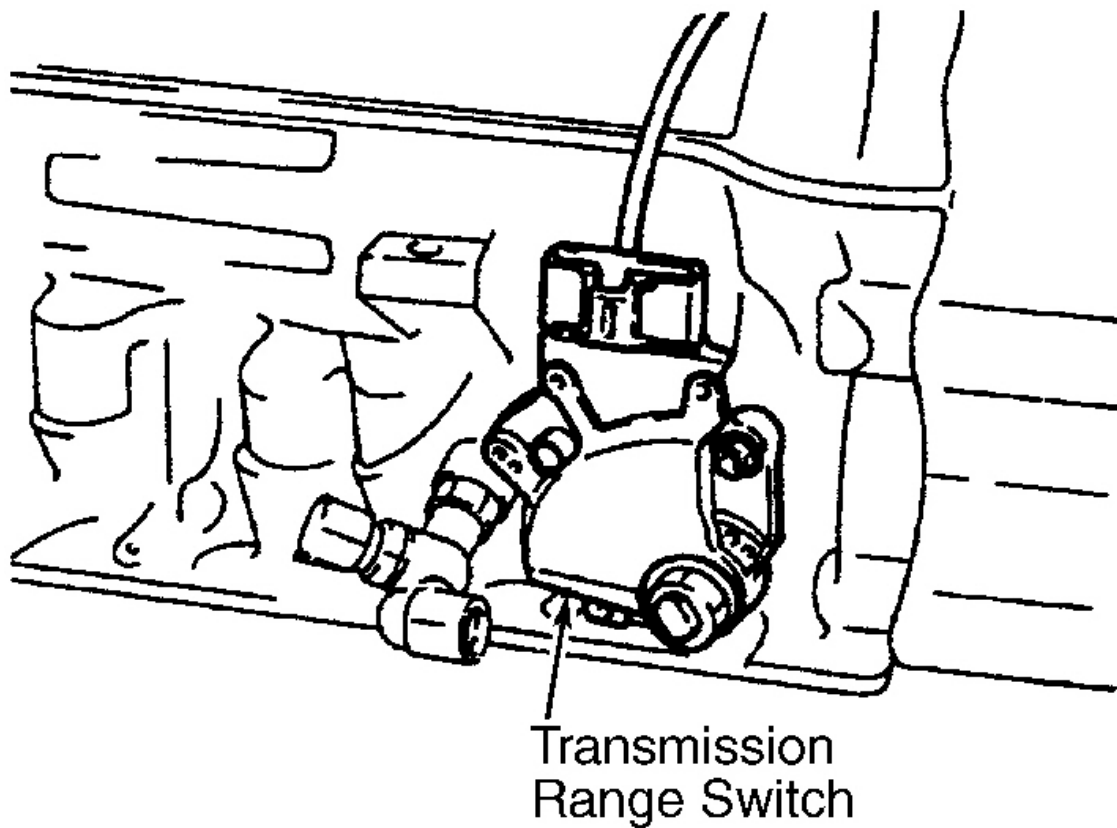
**Fig. 20: Locating Transaxle Range Switch (Optima & Sedona)**  
Courtesy of KIA MOTORS AMERICA, INC.



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**Fig. 21: Locating Transaxle Range Switch (Rio & Spectra)**  
Courtesy of KIA MOTORS AMERICA, INC.





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**Fig. 22: Locating Transmission Range Switch (Sportage)**

Courtesy of KIA MOTORS AMERICA, INC.

## IGNITION SYSTEM

**NOTE:** All models are equipped with a Distributorless Ignition System (DIS).

### IGNITION COIL(S)

**CAUTION:** When battery is disconnected, vehicle computer and memory system may lose memory data. Driveability problems may exist until computer system have completed a relearn cycle. See **COMPUTER RELEARN PROCEDURES** article in **GENERAL INFORMATION** before disconnecting battery.

### Removal & Installation

**NOTE:** Ensure high tension leads are routed properly after ignition coil(s) removal and installation.

Disconnect negative battery cable. Disconnect ignition coil harness connector. Locate ignition coil(s). See **IGNITION COIL(S) LOCATION** table. Disconnect high tension leads from ignition coil(s). Remove ignition

coil(s) mounting bolts and remove ignition coil(s). To install, reverse removal procedure. Torque bolts to specifications. See **TORQUE SPECIFICATIONS**.

**IGNITION COIL(S) LOCATION**

Model	Location
Optima	
2.4L	Cylinder head spark plug holes
2.7L	Rear of left cylinder head
Rio	Rear of cylinder head
Sedona	Left cylinder head spark plug holes
Spectra	Cylinder head spark plug holes
Sportage	Cylinder head spark plug holes

**FUEL SYSTEM**

**WARNING:** Always relieve fuel pressure before disconnecting any fuel injection-related component. DO NOT allow fuel to contact engine or electrical components.

**WARNING:** After repairs have been completed, Using fuel pump check connector terminal, activate fuel pump and check for leaks. Repair any leaks as necessary.

**FUEL PRESSURE RELEASE**

**Except Optima**

To release fuel pressure, remove rear seat cushion. Start engine. Disconnect fuel pump electrical connector. Run engine until it stalls. Turn ignition off. Disconnect negative battery cable. When testing or repair is complete, reconnect fuel pump connector and install rear seat cushion. Prime fuel system. See **PRIMING FUEL SYSTEM**.

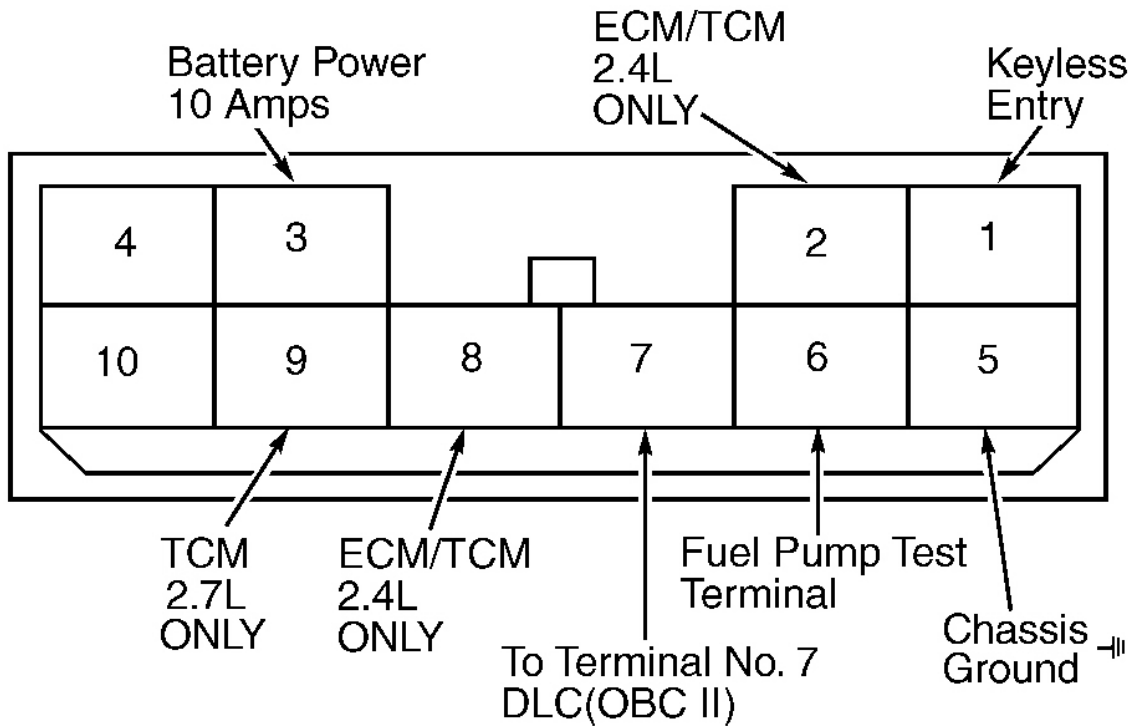
**Optima**

To release fuel pressure, disconnect fuel pump harness connector located in trunk. Start engine and allow to idle. After engine stalls, turn ignition off. Disconnect negative battery cable. When repairs are complete and fuel lines are properly secured, reconnect fuel pump harness connector and negative battery cable. Prime fuel system. See **PRIMING FUEL SYSTEM**.

**PRIMING FUEL SYSTEM**

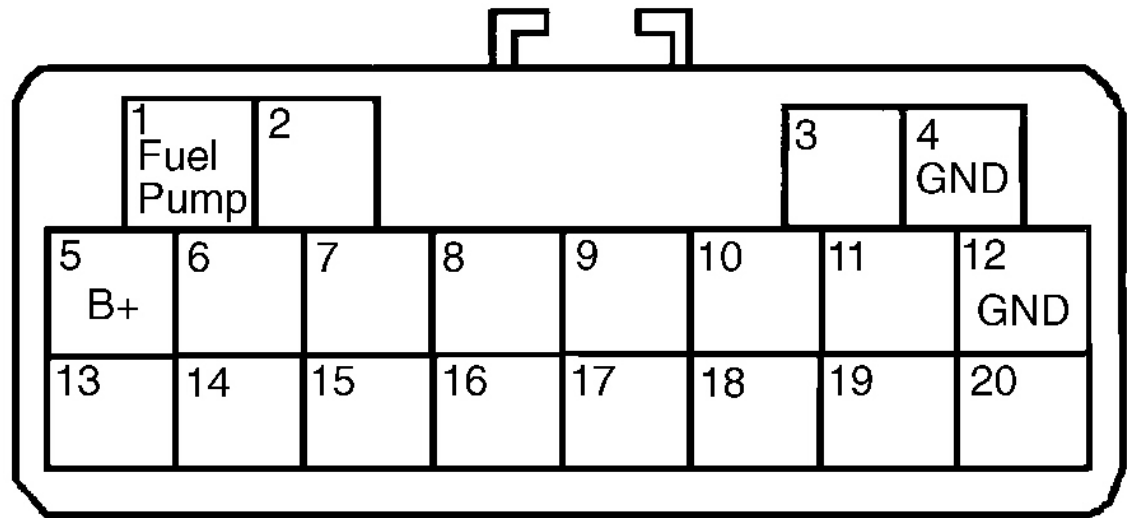
After performing any operation that requires releasing fuel pressure, fuel system should be primed to prevent long cranking times. To prime fuel system, jumper Data Link Connector (DLC) terminal FUEL PUMP and (B+). DLC (except Optima) is located on left side of engine compartment. Optima is located under left side of

dash. See **Fig. 23 -Fig. 25** . Turn ignition on for no longer than 10 seconds to run pump and pressurize fuel system. Turn ignition off and remove jumper wire. Check for leaks. Repair any leaks as necessary.



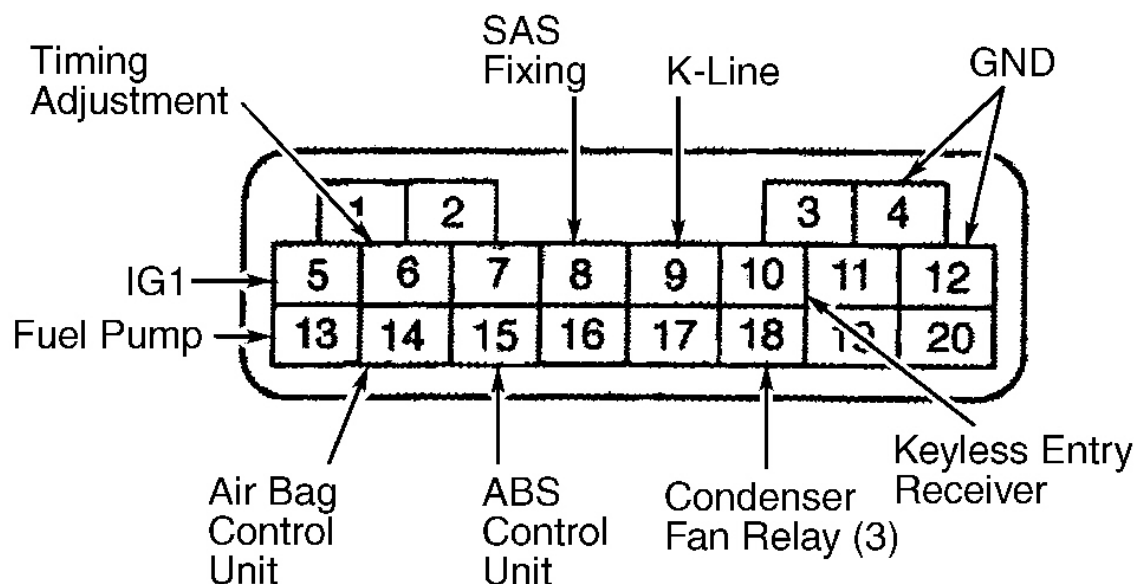
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**Fig. 23: Identifying Underdash Data Link Connector Terminals (Optima)**  
Courtesy of KIA MOTORS AMERICA, INC.



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**Fig. 24: Identifying Underhood Data Link Connector Terminals (Rio, Spectra & Sportage)**  
Courtesy of KIA MOTORS AMERICA, INC.



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**Fig. 25: Identifying Underhood Link Connector Terminal (Sedona)**  
 Courtesy of KIA MOTORS AMERICA, INC.

## FUEL FILTER

### Removal & Installation (Except Optima 2.7L & Sedona)

Location of fuel filters vary on each vehicle model. See **FUEL FILTER LOCATION** table. For fuel filter identification see **Fig. 26 -Fig. 29** . Release fuel system pressure. See **FUEL SYSTEM PRESSURE RELEASE** . Disconnect negative battery cable. Remove fuel lines from filter. Remove fuel filter clamp bolt and remove filter. To install, reverse removal procedure. Prime system and check for leaks. See **PRIMING FUEL SYSTEM** .

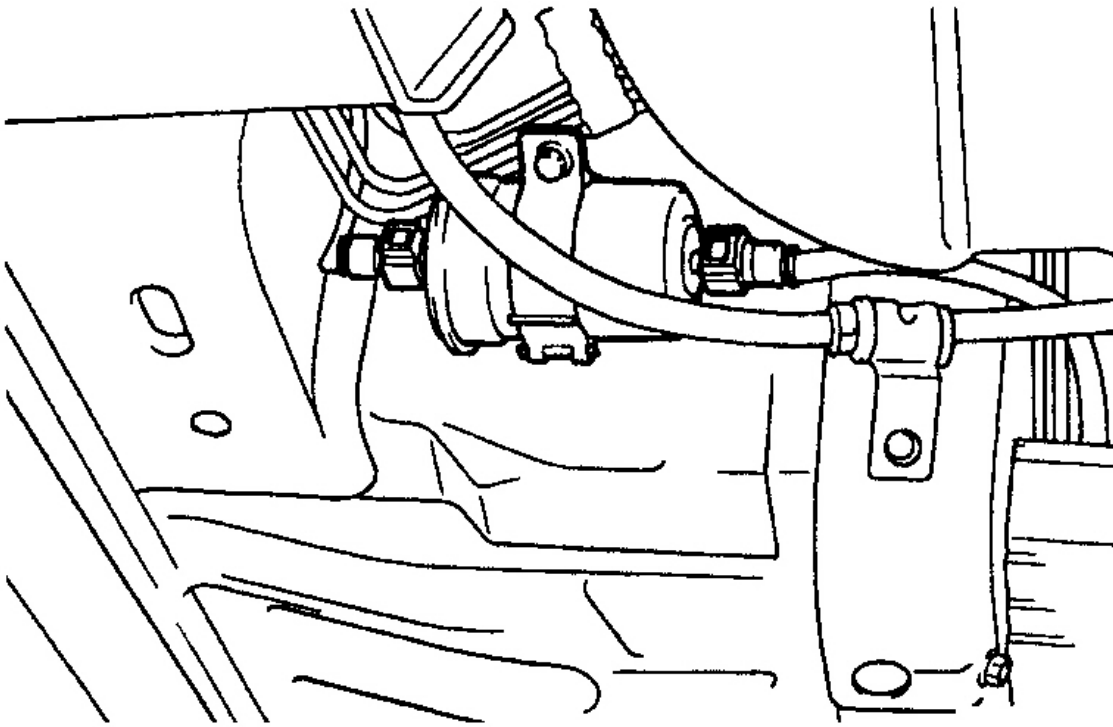
### Removal & Installation (Optima 2.7L & Sedona)

**NOTE:** Fuel filter is part of fuel pump and sending unit assembly.

Location of fuel filters vary on each vehicle model. See **FUEL FILTER LOCATIONS** table. Release fuel system pressure. See **FUEL SYSTEM PRESSURE RELEASE** . Disconnect negative battery cable. Locate fuel filter on fuel pump assembly. For fuel pump removal and installation see **FUEL PUMP** . Replace fuel filter. To install, reverse removal procedure. Prime system and check for leaks. See **PRIMING FUEL SYSTEM** .

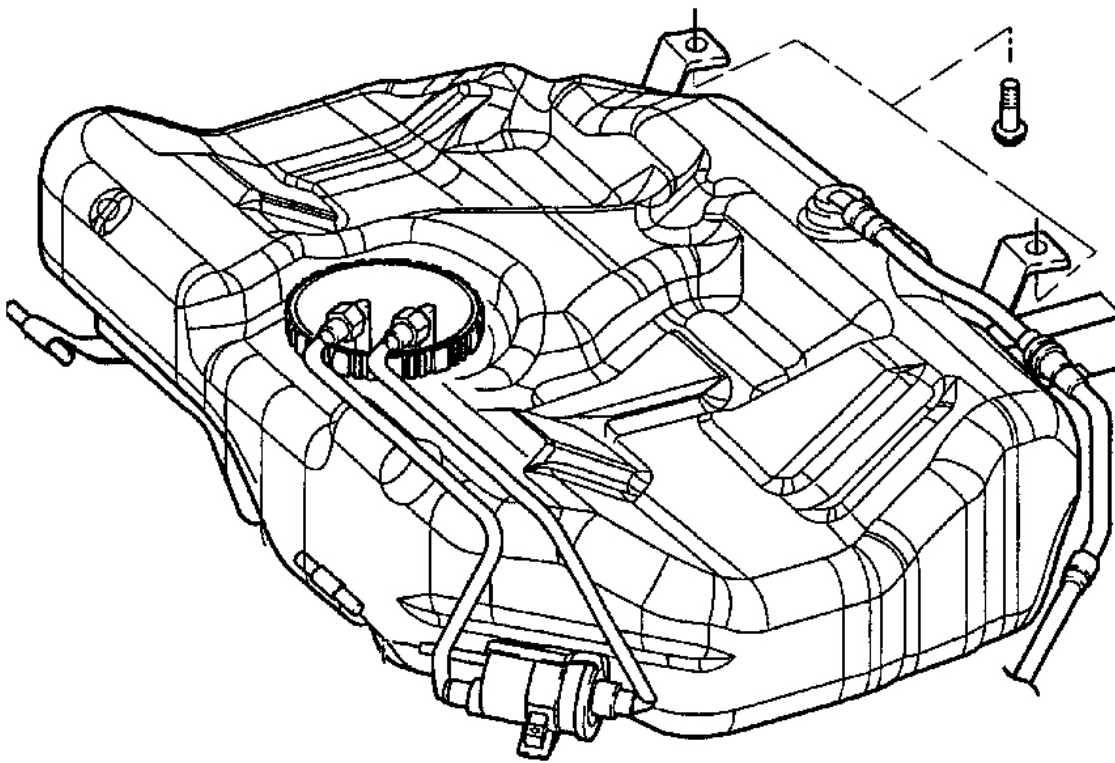
## FUEL FILTER LOCATIONS

Model	Location
Optima 2.4L & Rio	Under Left Side Of Vehicle, Forward Of Fuel Tank
Optima 2.7L & Sedona	In Fuel Tank As Fuel Pump & Filter Assembly
Spectra	Mounted On Frame Rail, Forward Of Right Rear Wheel
Sportage	Mounted On Frame Rail, At Front of Vehicle



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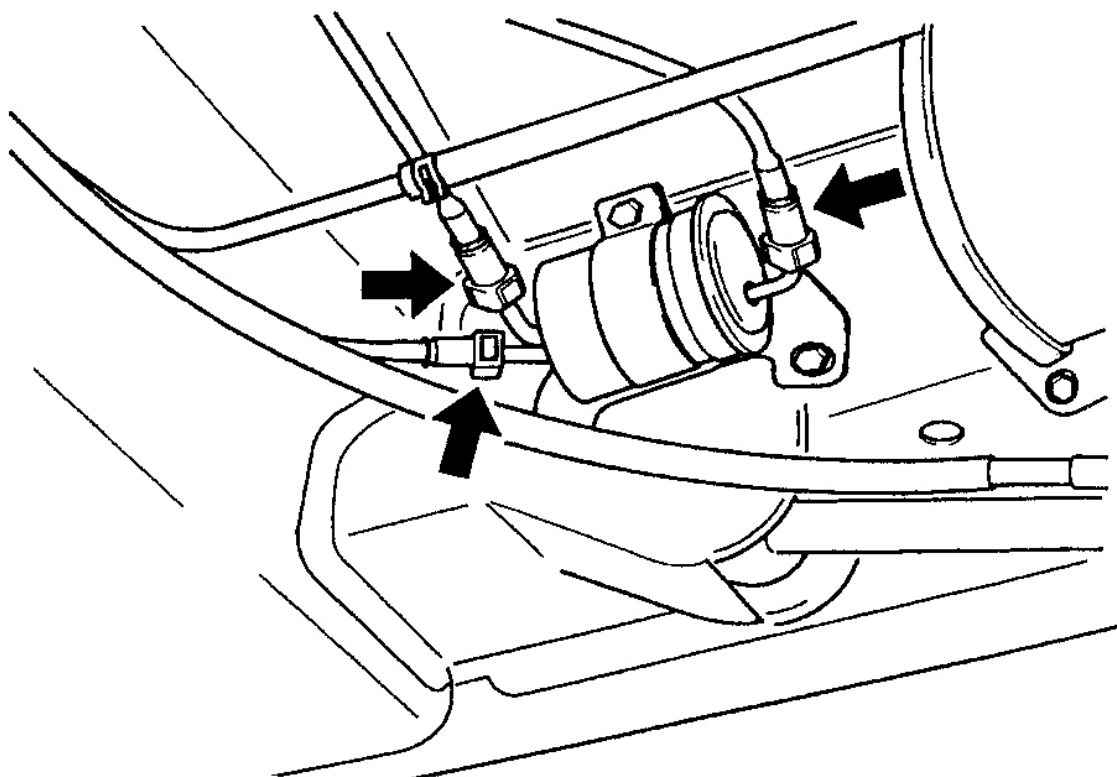
**Fig. 26: Identifying Fuel Filter (Optima 2.4L)**  
**Courtesy of KIA MOTORS AMERICA, INC.**



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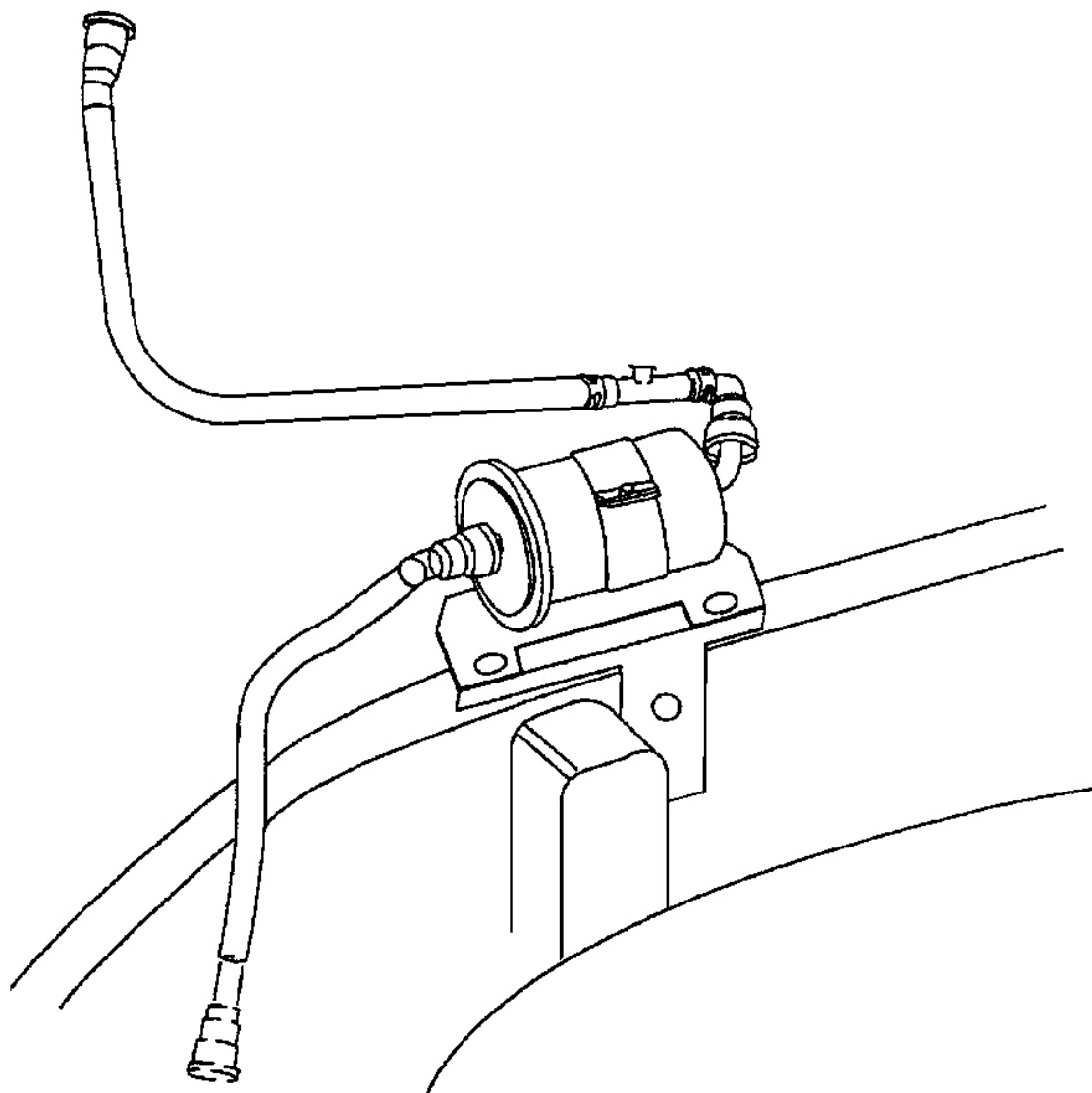
**Fig. 27: Identifying Fuel Filter (Rio)**

Courtesy of KIA MOTORS AMERICA, INC.



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**Fig. 28: Identifying Fuel Filter (Spectra)**  
Courtesy of KIA MOTORS AMERICA, INC.



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**Fig. 29: Identifying Fuel Filter (Sportage)**  
Courtesy of KIA MOTORS AMERICA, INC.

## **FUEL PRESSURE REGULATOR**

### **Removal & Installation (Except Spectra)**

Release fuel system pressure. See **FUEL SYSTEM PRESSURE RELEASE**. Disconnect negative battery cable. Disconnect fuel pump connector. Disconnect vacuum hose. Disconnect fuel return hose. Remove 2 pressure regulator mounting bolts and remove regulator. To install, reverse removal procedure. Install new "O" ring on regulator body. Torque regulator mounting bolts to 69-104 INCH lbs.

### **Removal & Installation (Spectra)**

Remove fuel pump assembly. See **REMOVAL (SPECTRA)** under FUEL PUMP. Remove pressure regulator



from fuel pump assembly. To install, reverse removal procedure.

## **FUEL PUMP**

**WARNING:** Always relieve fuel pressure before disconnecting any fuel injection-related component.

**NOTE:** The fuel pump assembly (Fuel Delivery Module) incorporates fuel pump and fuel level sending unit in to one unit. On Spectra, fuel pressure regulator is also part of fuel pump assembly.

### **Removal (Optima)**

Remove fuel tank filler cap to release fuel tank pressure. Release fuel system pressure. See **FUEL SYSTEM PRESSURE RELEASE**. Disconnect negative battery cable. In trunk remove fuel pump access cover. Disconnect fuel pump and sender harness connector. Disconnect high-pressure and fuel return lines at fuel tank. Cover high-pressure hose connection with shop towels to prevent fuel leakage. Remove fuel pump assembly installation screws and remove fuel pump assembly from fuel tank. Remove fuel pump from sending unit assembly.

### **Installation**

Install fuel pump, to gauge sending unit assembly. Install fuel pump assembly into fuel tank, using care to not pinch "O" ring (seal). Reinstall installation screws. Connect pressure and fuel return lines to fuel pump and carefully tighten fittings. Ensure fuel lines do not twist or bend. To complete installation, reverse removal procedure. Prime fuel system and check for leaks. See **PRIMING FUEL SYSTEM**.

### **Removal (Rio)**

Fuel pump is located in fuel pump assembly along with fuel sender unit. Remove fuel tank filler cap to release fuel tank pressure. Release fuel system pressure. See **FUEL SYSTEM PRESSURE RELEASE**. Disconnect negative battery cable. Remove rear seat cushion. Disconnect harness connectors and remove access cover. Disconnect fuel hoses from fuel pump assembly. Cover high-pressure hose connection with shop towels to prevent fuel leakage. Remove locking ring (cap) and lift fuel pump assembly from fuel tank.

### **Installation**

Lube "O" ring (seal) and install fuel pump assembly into fuel tank, using care to not pinch "O" ring. Reinstall locking ring (cap). Connect pressure and fuel return lines to fuel pump and carefully tighten fittings. Ensure fuel lines do not twist or bend. To complete installation, reverse removal procedure. Prime fuel system and check for leaks. See **PRIMING FUEL SYSTEM**.

### **Removal (Sedona)**

Fuel pump is located in fuel pump assembly along with fuel sender unit. Release fuel system pressure. See **FUEL SYSTEM PRESSURE RELEASE**. Disconnect negative battery cable. Remove rear seat cushion.

Disconnect harness connectors and remove access cover. Disconnect fuel hoses from fuel pump assembly. Remove 6 screws and lift fuel pump assembly from fuel tank. Cover high-pressure hose connection with shop towels to prevent fuel leakage. Lift fuel pump assembly from fuel tank.

### **Installation**

Install fuel pump assembly into fuel tank, using care to not pinch "O" ring (seal). Reinstall 6 retaining screws. Torque to 95.5-147.8 INCH. lbs. (10.8 16.7 N.m). Connect pressure and fuel return lines to fuel pump. Ensure fuel lines do not twist or bend. To complete installation, reverse removal procedure. Prime the system and check for leaks. See **PRIMING FUEL SYSTEM**.

### **Removal (Spectra)**

Fuel pump is located in fuel pump assembly along with fuel sender unit. Release fuel system pressure. See **FUEL SYSTEM PRESSURE RELEASE**. Disconnect negative battery cable. Remove rear seat cushion. Disconnect harness connectors and remove access cover. Disconnect fuel hoses from fuel pump assembly. Remove 6 screws and lift fuel pump assembly from fuel tank. Cover high-pressure hose connection with shop towels to prevent fuel leakage. Lift fuel pump assembly from fuel tank.

### **Installation**

Install fuel pump assembly into fuel tank, using care to not pinch "O" ring (seal). Reinstall 6 retaining screws. Torque to 95.5-147.8 INCH lbs. (10.8 16.7 N.m). Connect pressure and fuel return lines to fuel pump. Ensure fuel lines do not twist or bend. To complete installation, reverse removal procedure. Prime fuel system and check for leaks. See **PRIMING FUEL SYSTEM**.

### **Removal (Sportage)**

Release fuel system pressure. See **FUEL SYSTEM PRESSURE RELEASE**. Disconnect negative battery cable. Open rear door of vehicle. Release rear seat catch and tilt seat out of way. Pull up carpet which covers fuel pump assembly access panel. Disconnect harness connector. Disconnect ground wire. Remove access panel. Disconnect fuel hoses from fuel pump assembly. Cover high-pressure hose connection with shop towels to prevent fuel leakage. Remove 8 fuel pump assembly retaining screws. Carefully twist and tilt fuel pump assembly while lifting it out of fuel tank. Remove 4 screws holding fuel pump plastic retaining bracket to fuel pump assembly frame. Disconnect fuel hose from fuel pump. Remove fuel pump retaining plastic mounting bracket as necessary. Remove fuel tank pressure sensor.

### **Installation**

Install fuel pump assembly into fuel tank, using care to not pinch "O" ring (seal). Reinstall 8 retaining screws. Connect pressure and fuel return lines to fuel pump. Ensure fuel lines do not twist or bend. To complete installation, reverse removal procedure. Prime fuel system and check for leaks. See **PRIMING FUEL SYSTEM**.

## **FUEL DELIVERY PIPE & FUEL INJECTORS**

**CAUTION: When removing fuel delivery pipe be careful not to drop any fuel injectors.**

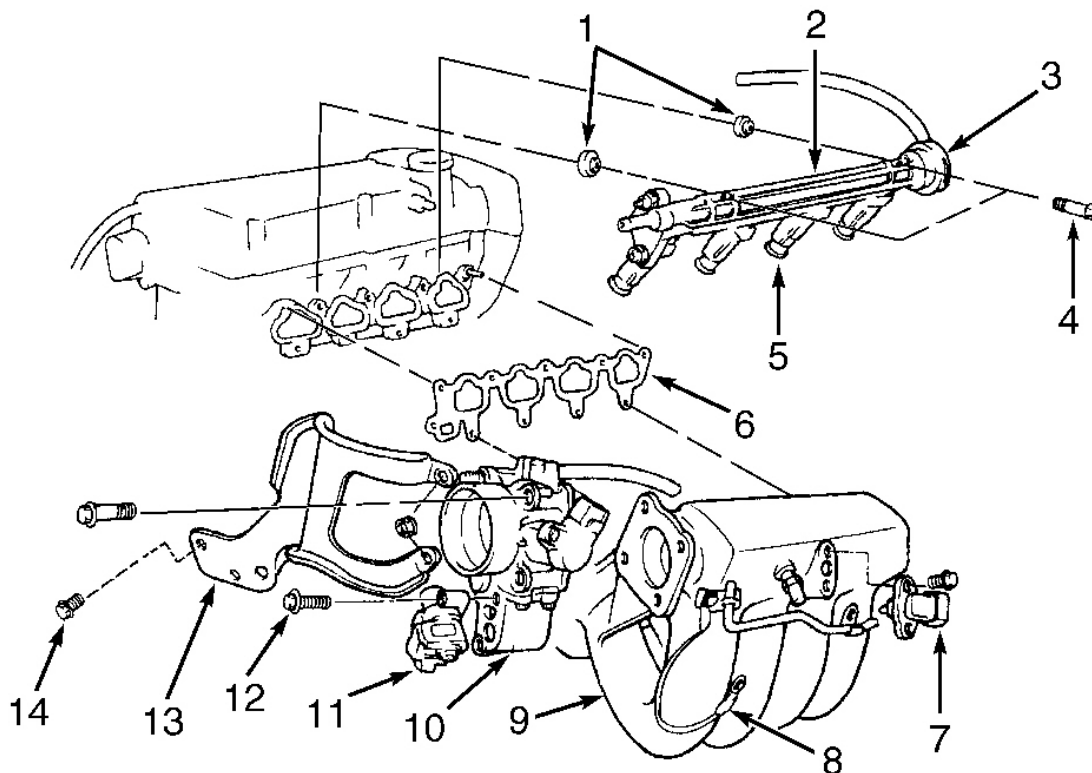
**Cover open end of fuel delivery pipe with a shop towel to prevent residual fuel from spilling from delivery pipe.**

### Removal (Optima 2.4L)

Release fuel system pressure. See **FUEL SYSTEM PRESSURE RELEASE** . Disconnect battery negative cable. Disconnect fuel injectors harness connectors. Disconnect fuel line from fuel rail. Remove accelerator cable bracket. Disconnect accelerator cable. Remove fuel rail retaining bolts. Remove fuel rail and injectors as an assembly. See **Fig. 30** . Carefully remove retaining clips and injectors from fuel rail.

### Installation

If replacing injectors, always replace it with an identical part. Lubricate NEW injector "O" rings with clean engine oil and install to fuel injectors. To complete installation, reverse removal procedure. Torque nuts/bolts to specification. See **TORQUE SPECIFICATIONS** .



- |                             |                                    |
|-----------------------------|------------------------------------|
| 1. Fuel Rail Insulators     | 8. Ground Strap                    |
| 2. Fuel Rail                | 9. Air Intake Plenum               |
| 3. Fuel Pressure Regulator  | 10. Throttle Body                  |
| 4. Fuel Rail Mounting Bolts | 11. Idle Speed Control Motor (ISC) |
| 5. Fuel Injectors           | 12. Mounting Bolts (ISC)           |
| 6. Air Intake Plenum Gasket | 13. Support Bracket                |
| 7. MAP & IAT Sensor         | 14. Throttle Body Mounting Bolts   |

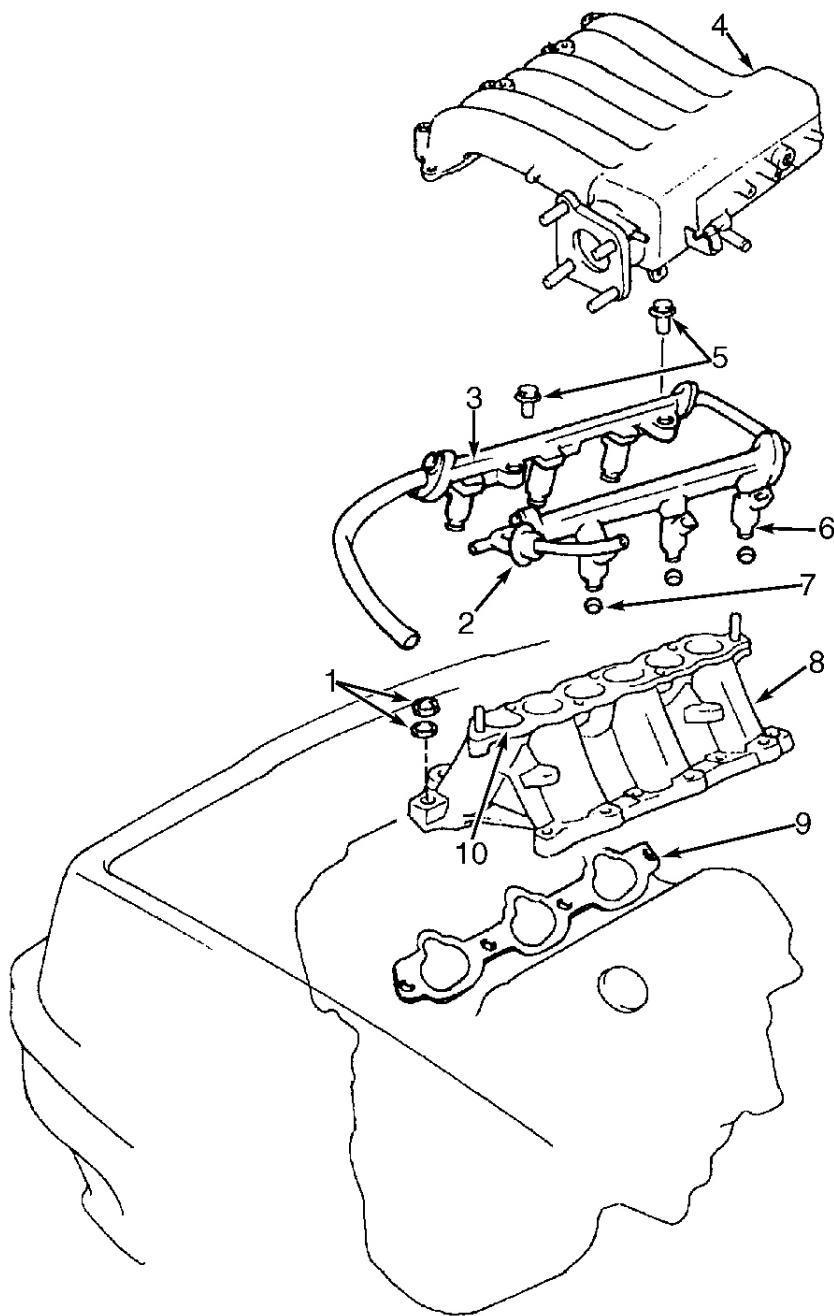
**Fig. 30: Removing Fuel Injectors (Optima 2.4L)**  
**Courtesy of KIA MOTORS AMERICA, INC.**

**Removal (Optima 2.7L)**

1. Dynamic chamber (air intake plenum) must be removed to access fuel rail. Release fuel system pressure. See **FUEL SYSTEM PRESSURE RELEASE**. Drain cooling system. Disconnect negative battery cable. Disconnect clamps and hoses attached to air intake hose assembly. Disconnect Mass Airflow (MAF) sensor harness connector. Remove air intake hose assembly.
2. Remove accelerator cable bracket bolts. Disconnect accelerator cable. Disconnect vacuum hoses and sensor wiring harness connectors as necessary. Disconnect 2 coolant hoses from throttle body. Remove clamp and hose from idle speed control valve.
3. Remove 2 bolts from stay bracket from dynamic chamber (air intake plenum). Remove nuts and bolts securing dynamic chamber to the intake manifold. Remove dynamic chamber assembly.
4. Disconnect fuel injector harness connectors. Remove fuel hoses from pressure regulator and fuel rail. See **Fig. 31**. Remove fuel rail retaining bolts. Remove 6 injector-to-fuel rail clips.
5. Remove fuel rail. Carefully remove fuel injectors and "O" rings from intake manifold.

**Installation**

If replacing fuel injectors, always replace it with an identical part. Lubricate NEW injector "O" rings with clean engine oil and install to fuel injectors. To complete installation, reverse removal procedure. Always use new gaskets on reassemble. Torque nuts/bolts to specification. See **TORQUE SPECIFICATIONS**. Refill and bleed cooling system.



- |                                      |                               |
|--------------------------------------|-------------------------------|
| 1. Intake Manifold Nuts/Lock Washers | 6. Fuel Injectors             |
| 2. Fuel Pressure Regulator           | 7. Injector "O" Rings (Seals) |
| 3. Fuel Rail                         | 8. Intake Manifold            |
| 4. Air Intake Plenum                 | 9. Intake Manifold Gaskets    |
| 5. Fuel Rail Mounting Bolts          | 10. Gasket                    |

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**Fig. 31: Removing Fuel Injectors (Optima 2.7L)**  
**Courtesy of KIA MOTORS AMERICA, INC.**

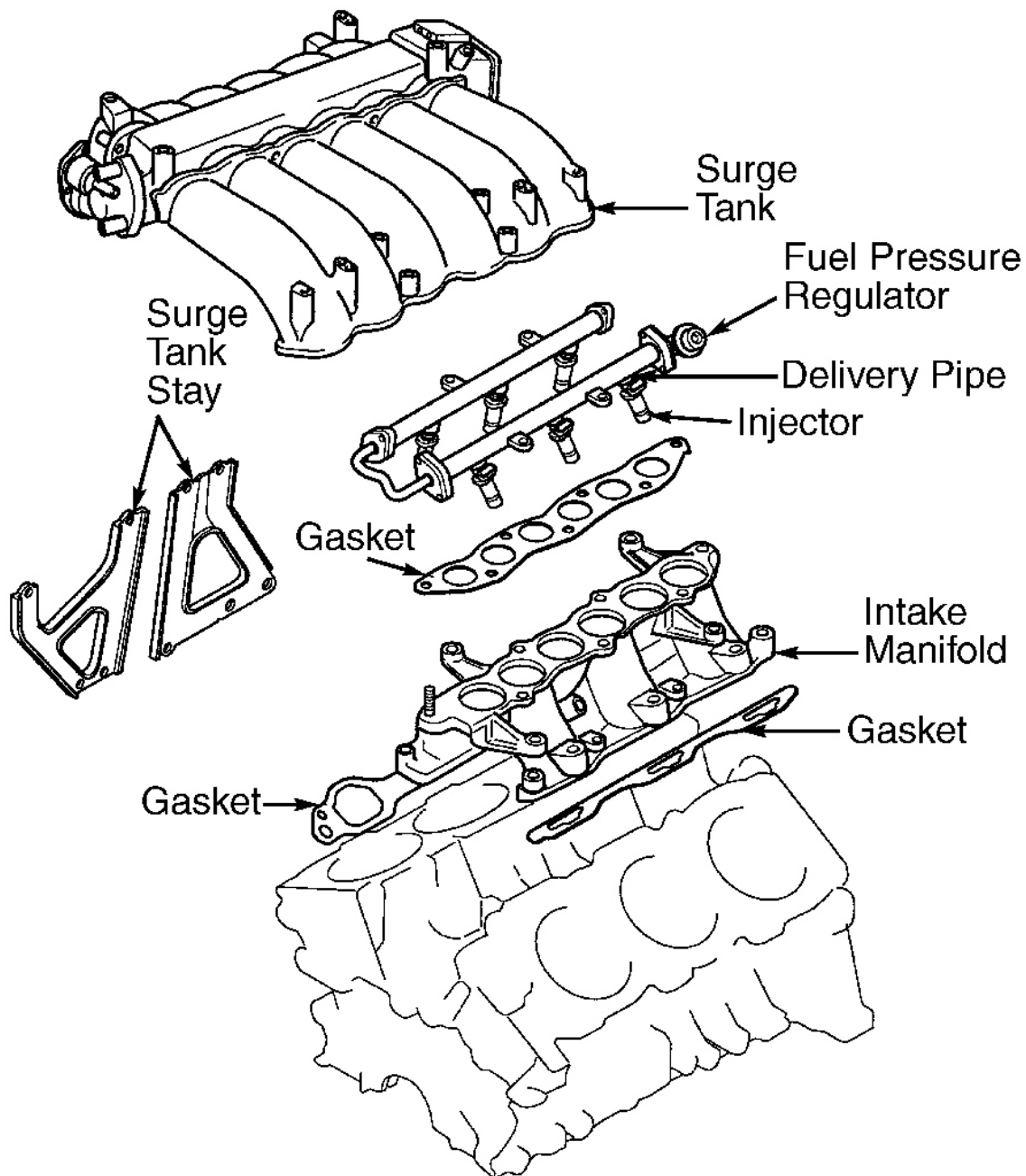
Removal and installation information is not available from manufacturer.

### **Removal (Sedona)**

1. Dynamic chamber (air intake plenum) must be removed to access fuel rail. Release fuel system pressure. See **FUEL SYSTEM PRESSURE RELEASE**. Drain cooling system. Disconnect negative battery cable. Disconnect clamps and hoses attached to air intake hose assembly. Disconnect Mass Airflow (MAF) sensor harness connector. Remove air intake hose assembly.
2. Remove accelerator cable bracket bolts. Disconnect accelerator cable. Disconnect vacuum hoses and sensor wiring harness connectors as necessary. Disconnect 2 coolant hoses from throttle body. Remove clamp and hose from idle speed control valve.
3. Remove 4 bolts from stay bracket on dynamic chamber (air intake plenum). Remove nuts and bolts securing dynamic chamber to the intake manifold. Remove dynamic chamber assembly.
4. Disconnect fuel injector harness connectors. Remove fuel hoses from pressure regulator and fuel rail. See **Fig. 32**. Remove fuel rail retaining bolts. Remove 6 injector-to-fuel rail clips.
5. Remove fuel rail. Carefully remove fuel injectors and "O" rings from intake manifold.

### **Installation**

If replacing injectors, always replace it with an identical part. Lubricate NEW upper injector "O" rings with clean engine oil and install to injectors. Always install NEW injector clips. To install, reverse removal procedure. Torque nuts/bolts to specification. See **TORQUE SPECIFICATIONS**. Refill and bleed cooling system.



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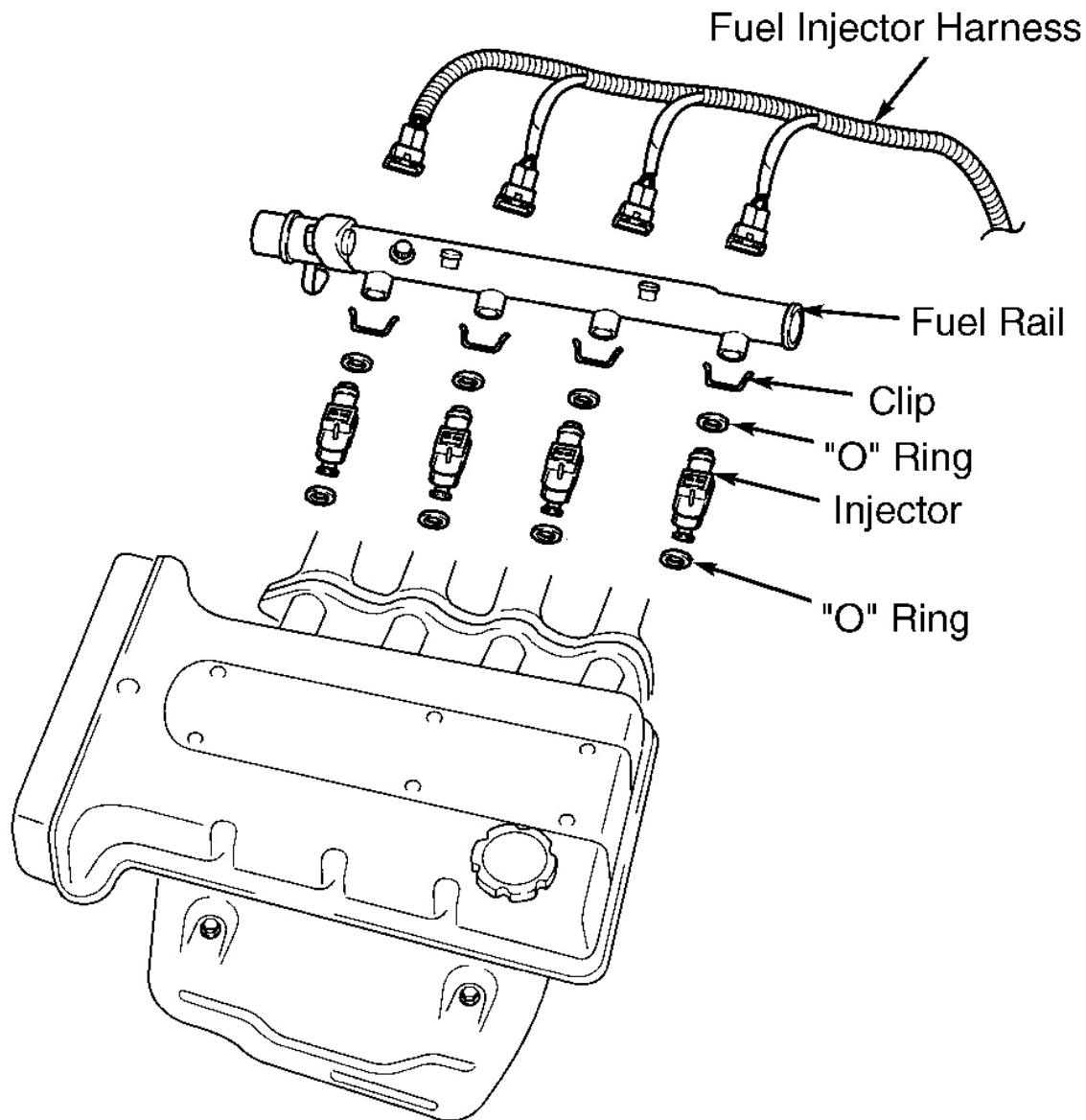
**Fig. 32: Removing Fuel Injectors (Sedona)**  
 Courtesy of KIA MOTORS AMERICA, INC.

#### Removal (Spectra)

Release fuel system pressure. See **FUEL SYSTEM PRESSURE RELEASE** . Disconnect battery negative cable. Disconnect fuel injectors harness connectors. Disconnect fuel line quick connector from fuel rail. Remove accelerator cable bracket. Disconnect accelerator cable. Remove fuel rail retaining bolts. Remove fuel rail and injectors as an assembly. See **Fig. 33** . Carefully remove retaining clips and injectors from fuel rail.

## Installation

If replacing injector, always replace it with an identical part. Lubricate NEW injector "O" rings with clean engine oil install to fuel injectors. To complete installation, reverse removal procedure.



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**Fig. 33: Removing Fuel Injectors (Spectra)**  
Courtesy of KIA MOTORS AMERICA, INC.

## Removal (Sportage)

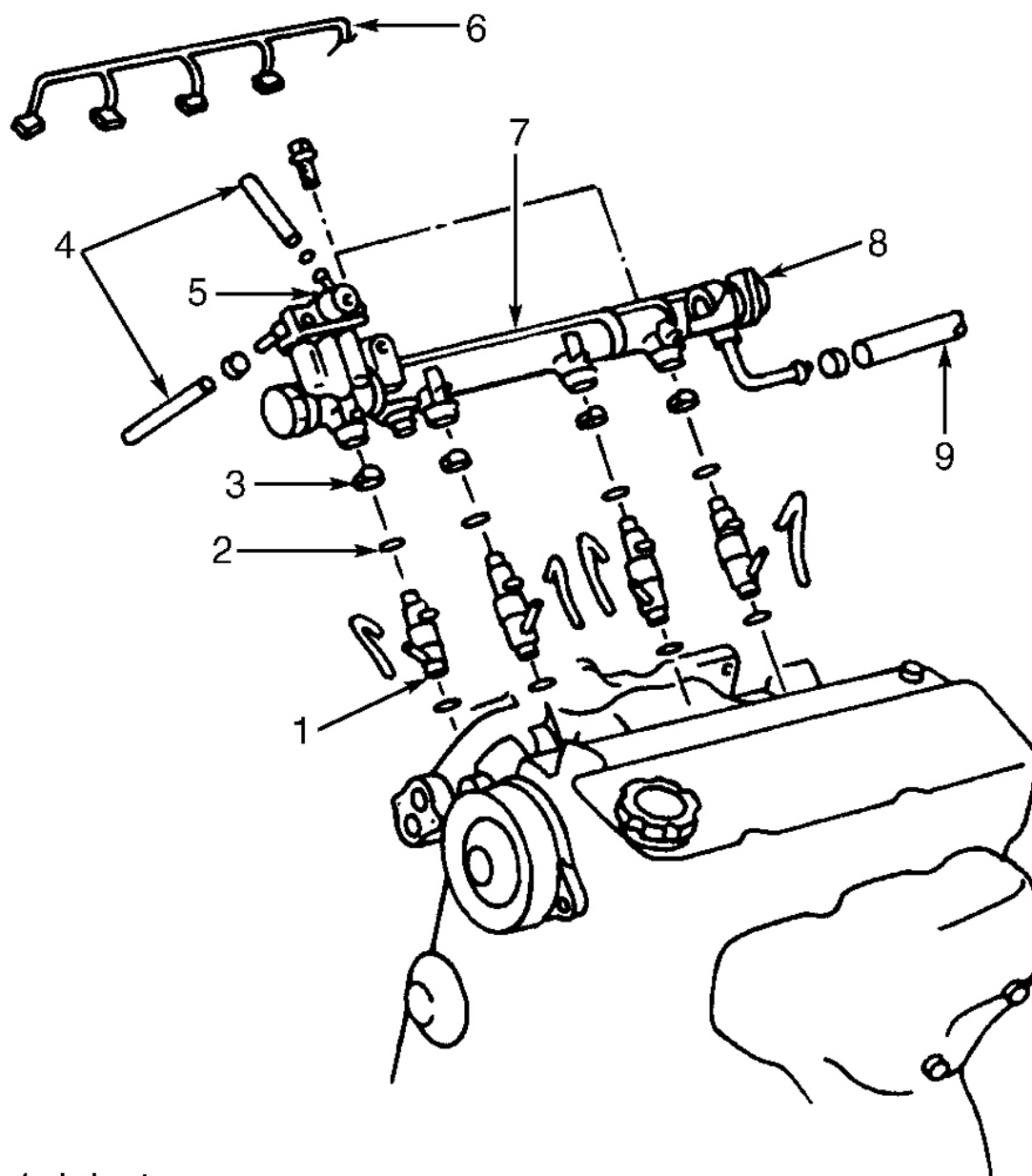
1. Fuel injectors are removed with fuel rail. Release fuel system pressure. See **FUEL SYSTEM PRESSURE RELEASE** . Drain cooling system. Disconnect negative battery cable. Disconnect clamps and hoses attached to air intake hose assembly. Disconnect Mass Airflow (MAF) sensor harness connector. Remove air intake hose assembly.



2. Remove accelerator cable bracket bolts. Disconnect accelerator cable. Disconnect vacuum hoses and wiring harness connectors as necessary. Disconnect 2 coolant hoses from throttle body. Remove clamp and hose from idle speed control valve.
3. Remove 2 bolts and stay bracket from dynamic chamber (air intake plenum). Remove bolt from bottom of idle actuator bracket. Remove 2 bolts from top of manifold bracket. Raise and support vehicle. Remove 2 lower bolts and manifold bracket. Lower vehicle.
4. Remove heater inlet hose at elbow. Remove nuts/bolts from dynamic chamber. Remove dynamic chamber assembly. Disconnect fuel injector harness connectors. Remove fuel hoses from pressure regulator and fuel rail. See **Fig. 34** . Remove fuel rail retaining bolts. Remove 4 injector-to-fuel rail clips.
5. Remove fuel rail. Carefully remove fuel injectors and "O" rings from intake manifold.

### **Installation**

If replacing injectors, always replace it with an identical part. Lubricate NEW upper injector "O" rings with clean engine oil and install to injector. Always install NEW injector clips. To install reverse removal procedure. Torque nuts/bolts to specification. See **TORQUE SPECIFICATIONS** . Refill and bleed cooling system.



1. Injector
2. "O" Ring
3. Clip
4. Fuel Lines
5. Fuel Pressure Regulator

6. Injector Wiring Harness
7. Fuel Rail
8. Pulsation Damper
9. Fuel Hose

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**Fig. 34: Removing Fuel Injectors (Sportage)**  
 Courtesy of KIA MOTORS AMERICA, INC.

## FUEL TANK PRESSURE SENSOR

**WARNING:** Fuel is explosive. When working on fuel system parts, make sure to supply adequate ventilation to the work area. Do not smoke, keep sparks and open flames away.

**Removal & Installation (Except Optima)**

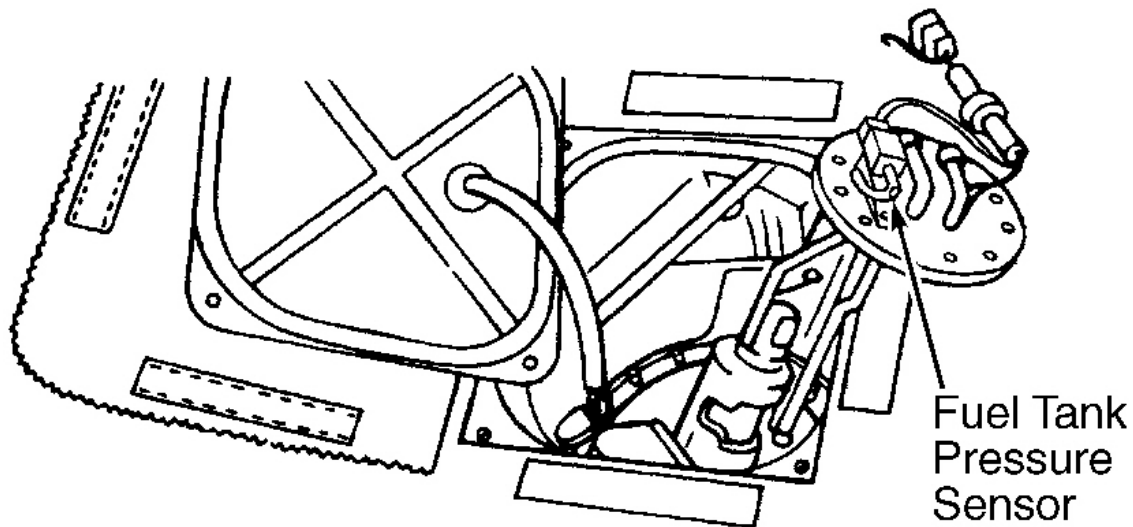
**NOTE:** Vent fuel tank by removing fuel filler cap

Disconnect negative battery cable. Disconnect Fuel Tank Pressure (FTP) sensor 3-pin harness connector. Locate FTP sensor, under rear seat. See **Fig. 35** . Release catch for the rear seat and tilt it out of the way. Pull back square of carpet in area behind tilted seat which covers fuel pump assembly access panel on vehicle floor. Remove FTP sensor bolt/nut holding ground wire lug to ground. Remove access cover screws and move access cover out of the way. Remove FTP sensor bolt/nut and replace FTP sensor. To install, reverse removal procedure.

**Removal & Installation (Optima)**

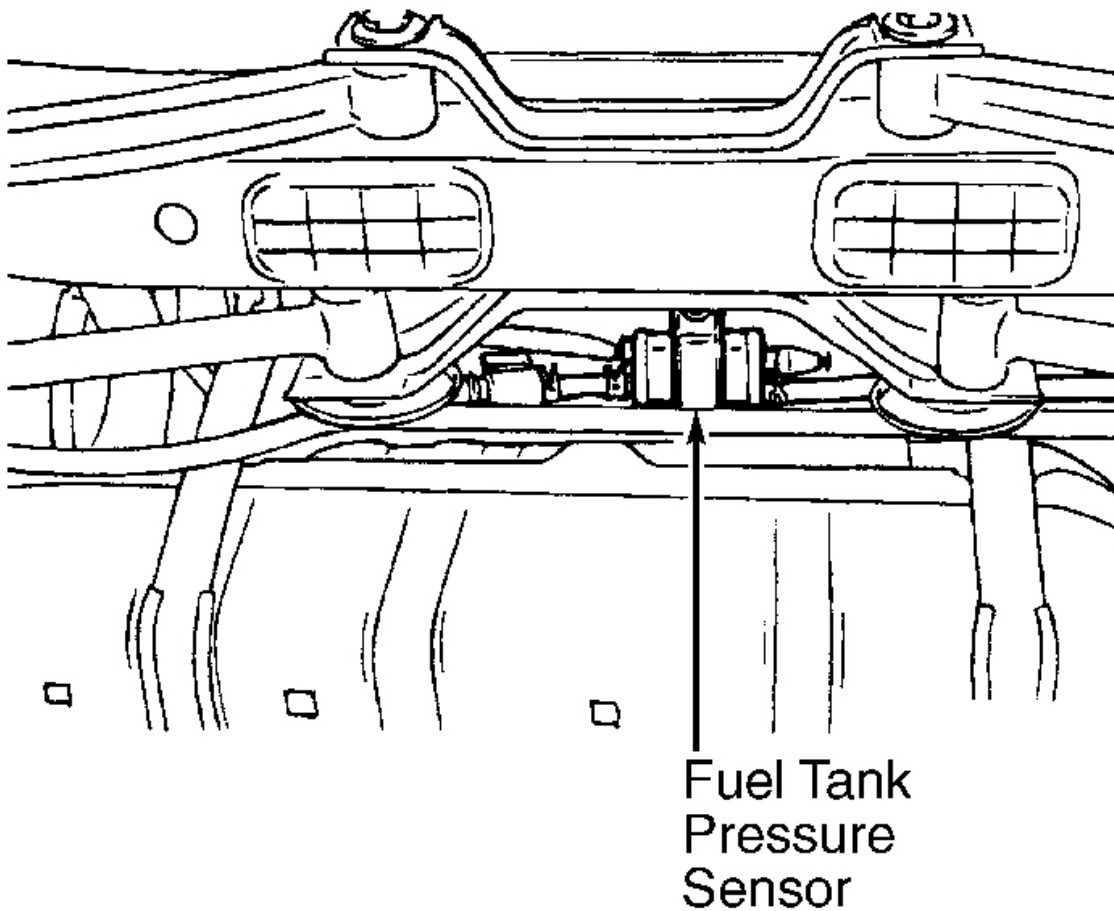
**NOTE:** Vent fuel tank by removing fuel filler cap

Disconnect negative battery cable. Disconnect FTP sensor 3-pin harness connector. Locate FTP sensor, under vehicle at rear of fuel tank. See **Fig. 36** . Remove FTP sensor mounting bracket bolt/nut. Replace FTP sensor. To install, reverse removal procedure.



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**Fig. 35: Locating Fuel Tank Pressure Sensor (Except Optima)**  
Courtesy of KIA MOTORS AMERICA, INC.



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**Fig. 36: Locating Fuel Tank Pressure Sensor (Optima)**  
Courtesy of KIA MOTORS AMERICA, INC.

## **EMISSION SYSTEMS & SUB-SYSTEMS**

### **POSITIVE CRANKCASE VENTILATION VALVE**

#### **Removal & Installation (Optima 2.4L & Rio)**

Disconnect ventilation hose from Positive Crankcase Ventilation (PCV) valve. Locate PCV valve on right rear of valve cover. Remove PCV valve. To install, reverse removal procedure. Torque PCV valve to 72-106 INCH lbs. (8-12 N.m).

#### **Removal & Installation (Optima 2.7L & Sedona)**

Disconnect ventilation hose from PCV valve. Locate PCV valve on right rear of left side valve cover. Remove PCV valve. To install, reverse removal procedure. Torque PCV valve to 72-106 INCH lbs. (8-12 N.m).

#### **Removal & Installation (Spectra & Sportage)**

Disconnect ventilation hose from PCV valve. Locate PCV valve on right front of valve cover. Remove PCV valve. To install, reverse removal procedure.

**EVAPORATIVE CANISTER**

**Removal & Installation (Optima)**

Turn ignition off. Disconnect Canister Control (CC) valve 2-pin harness connector, at Evaporative (EVAP) canister. Locate EVAP canister on right rear of frame rail, forward of left rear wheel. Disconnect ventilation hoses from EVAP canister. Remove EVAP canister bracket bolts. Remove EVAP canister. To install, reverse removal procedure.

**Removal & Installation (Rio)**

Turn ignition with off. Disconnect CC valve 2-pin harness connector, at EVAP canister. Locate EVAP canister under left side of vehicle, near fuel tank. Disconnect ventilation hoses from EVAP canister. Remove EVAP canister bracket bolts. Remove EVAP canister. To install, reverse removal procedure.

**Removal & Installation (Sedona)**

Disconnect ventilation hoses from EVAP canister. Locate EVAP canister at left side of engine compartment, near brake master cylinder. Loose EVAP canister bracket clip. Remove EVAP canister. To install, reverse removal procedure.

**Removal & Installation (Spectra)**

Disconnect ventilation hoses from EVAP canister. Locate EVAP canister at right rear of vehicle frame rail. Remove EVAP canister mounting bracket bolts. Remove EVAP canister. To install, reverse removal procedure.

**Removal & Installation (Sportage)**

Disconnect ventilation hoses from EVAP canister. Locate EVAP canister at right side of engine compartment, near engine fuse and relay box. Remove two bolts/nuts and hold down bracket. Remove EVAP canister. To install, reverse removal procedure.

**EVAPORATIVE CANISTER CLOSE VALVE**

**Removal & Installation**

Turn ignition off. Disconnect Evaporative Canister Close (ECC) valve 2-pin harness connector. Locate ECC valve, see **EVAPORATIVE CANISTER CLOSE VALVE LOCATION** table. Remove bolts/nuts ECC valve holding bracket. Remove ECC valve. To install, reverse removal procedure.

**EVAPORATIVE CANISTER CLOSE VALVE LOCATION**

Model	Location
Optima	On EVAP Canister, Under Right Rear Of Vehicle
Rio	On EVAP Canister, Under Left Side Of Vehicle, Near Fuel Tank

Sedona	On Frame Rail, Under Right Rear Of Vehicle, Near Fuel Tank
Spectra	On Frame Rail, Under Right Rear Of Vehicle, Near Fuel Tank
Sportage	Right Side Of Engine Compartment, Near To EVAP Canister

## EVAPORATIVE PURGE CONTROL SOLENOID VALVE

### Removal & Installation (Optima 2.4L)

Turn ignition off. Remove evaporative Purge Control Solenoid (PCS) valve 2-pin harness connector. Locate PCS valve on front of intake manifold. See **Fig. 37** . Remove vacuum hoses. Remove PCS valve bracket bolts. Remove PCS valve. To install, reverse removal procedure.

### Removal & Installation (Optima 2.7L)

Turn ignition off. Remove evaporative PCS valve 2-pin harness connector. Locate PCS valve on left side of engine compartment, near brake master cylinder. See **Fig. 38** . Remove PCS valve vacuum hoses. Remove PCS valve. To install, reverse removal procedure.

### Removal & Installation (Rio)

Turn ignition off. Remove evaporative PCS valve 2-pin harness connector. Locate PCS valve, on upper part of firewall. See **Fig. 40** . Remove PCS valve vacuum hoses. Remove PCS valve. To install, reverse removal procedure.

### Removal & Installation (Sedona)

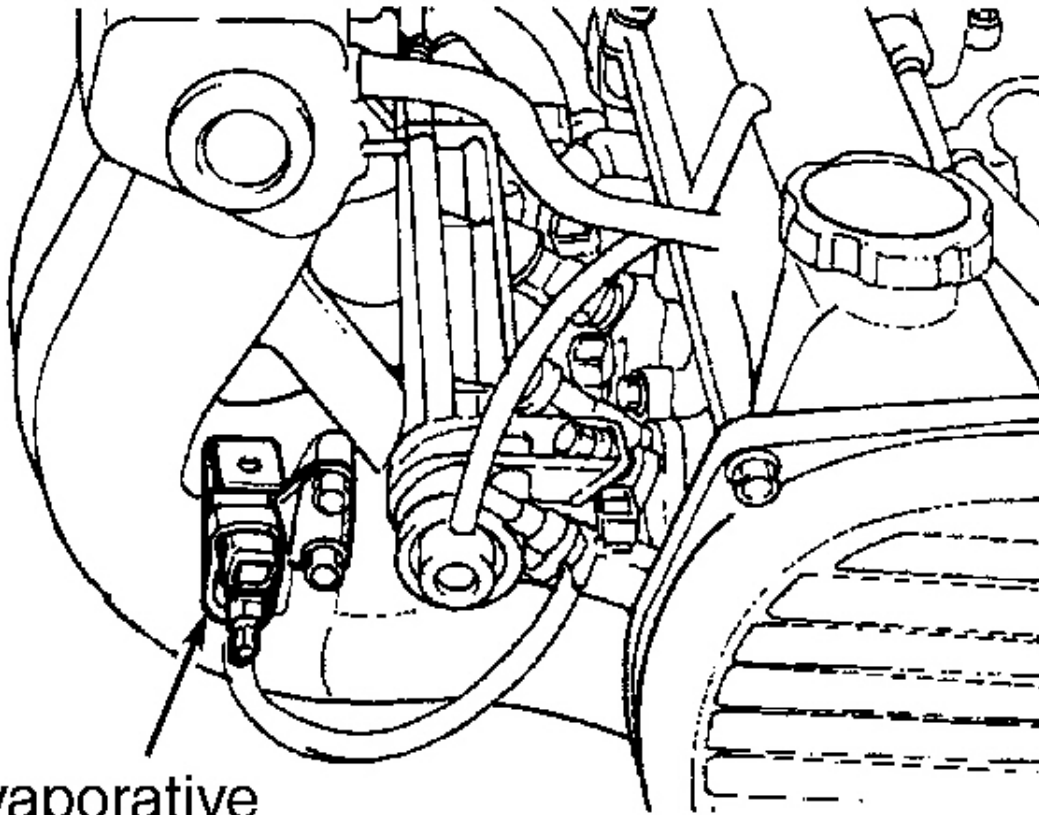
Turn ignition off. Remove evaporative PCS valve 2-pin harness connector. Locate PCS valve on intake plenum, near throttle body assembly. See **Fig. 39** . Remove PCS valve vacuum hoses. Remove PCS valve bracket bolts. Remove PCS valve. To install, reverse removal procedure.

### Removal & Installation (Spectra)

Turn ignition off. Remove evaporative PCS valve 2-pin harness connector. Locate PCS valve on upper part of firewall. See **Fig. 40** . Remove vacuum hoses. Remove PCS valve. To install, reverse removal procedure.

### Removal & Installation (Sportage)

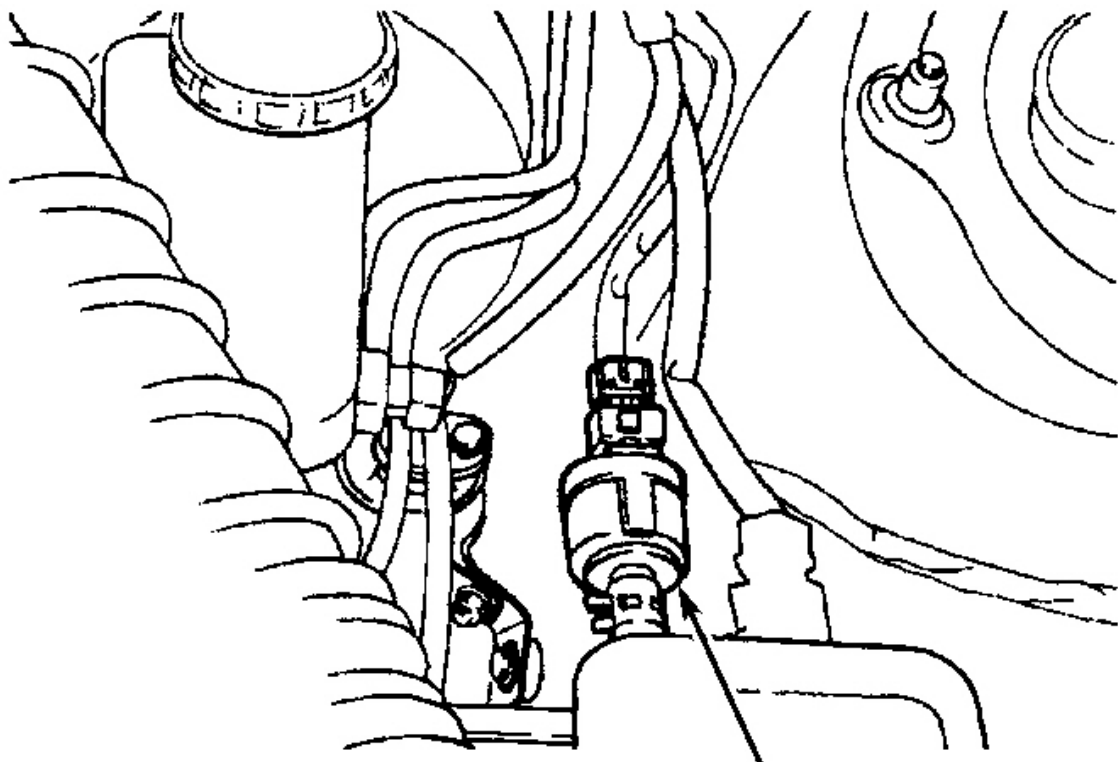
Turn ignition off. Remove evaporative PCS valve 2-pin harness connector. Locate PCS valve on right front side of engine compartment, near EVAP canister. See **Fig. 41** . Remove PCS valve vacuum hose. Remove PCS valve bracket bolts. Remove PCS valve. To install, reverse removal procedure.



## Evaporative Canister Purge Solenoid Valve

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**Fig. 37: Locating Evaporative Purge Control Solenoid Valve (Optima 2.4L)**  
Courtesy of KIA MOTORS AMERICA, INC.



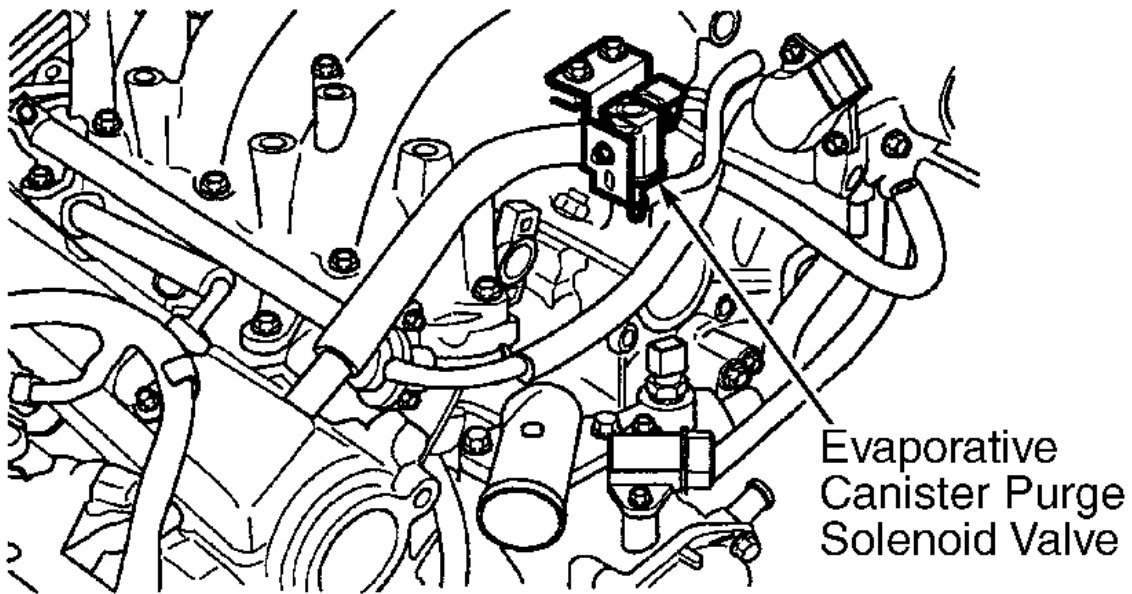
Evaporative  
Canister Purge  
Solenoid Valve

G00082381

**Fig. 38: Locating Evaporative Purge Control Solenoid Valve (Optima 2.7L)**

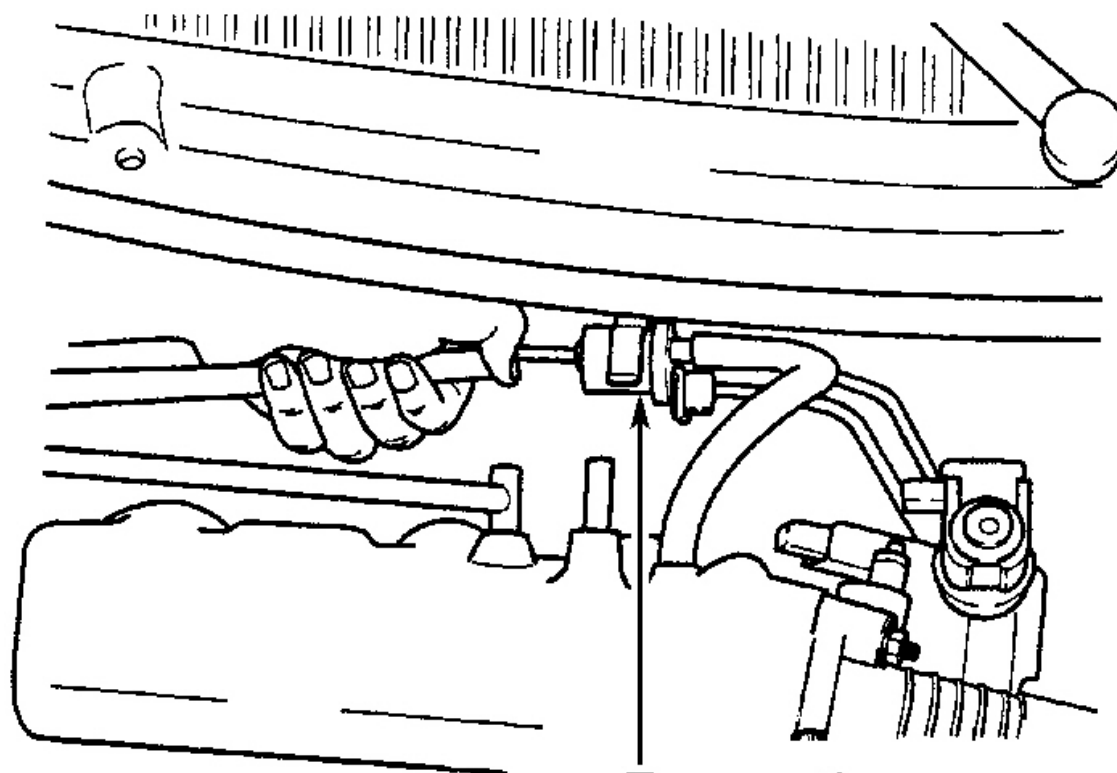
Courtesy of KIA MOTORS AMERICA, INC.





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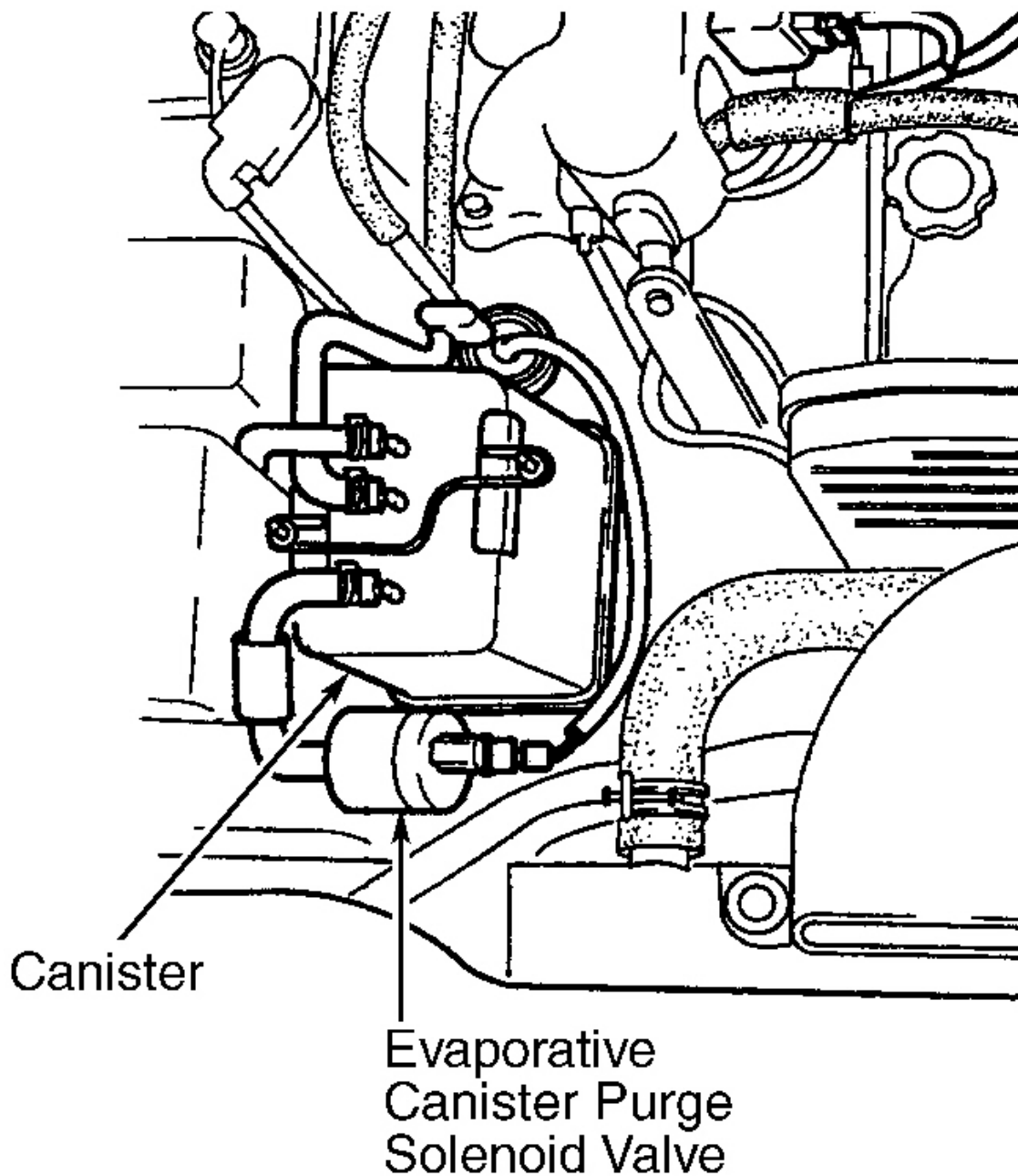
**Fig. 39: Locating Evaporative Purge Control Solenoid Valve (Sedona)**  
Courtesy of KIA MOTORS AMERICA, INC.



Evaporative  
Canister Purge  
Solenoid Valve

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**Fig. 40: Locating Evaporative Purge Control Solenoid Valve (Spectra Shown; Rio Is Similar)**  
Courtesy of KIA MOTORS AMERICA, INC.



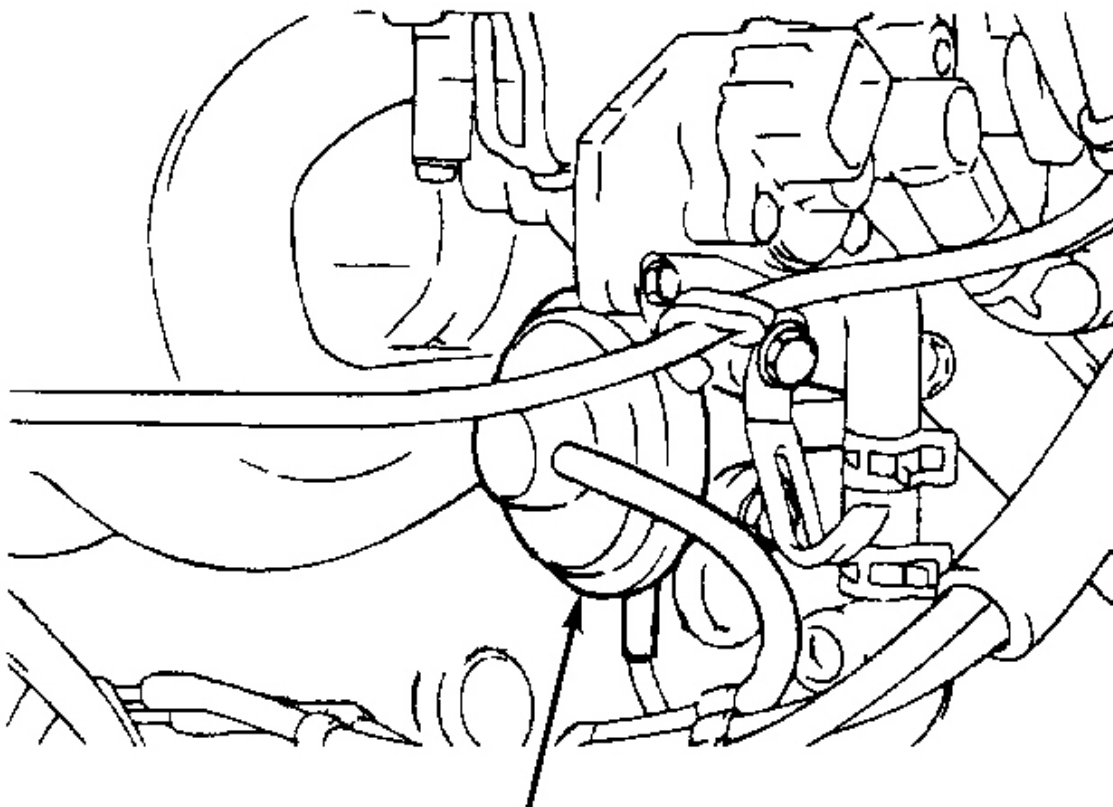
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**Fig. 41: Locating Evaporative Purge Control Solenoid Valve (Sportage)**  
Courtesy of KIA MOTORS AMERICA, INC.

#### EXHAUST GAS RECIRCULATION VALVE

**NOTE:** When removing Exhaust Gas Recirculation (EGR) valve, for inspection or replacement, On installation always use NEW gasket.

Disconnect vacuum hose from Exhaust Gas Recirculation (EGR) valve. Locate EGR valve, on bottom of intake manifold, near throttle body. See **Fig. 42** . Remove bolts/nuts from EGR valve. Remove EGR valve. To install, reverse removal procedure.



Exhaust Gas  
Recirculation  
Valve

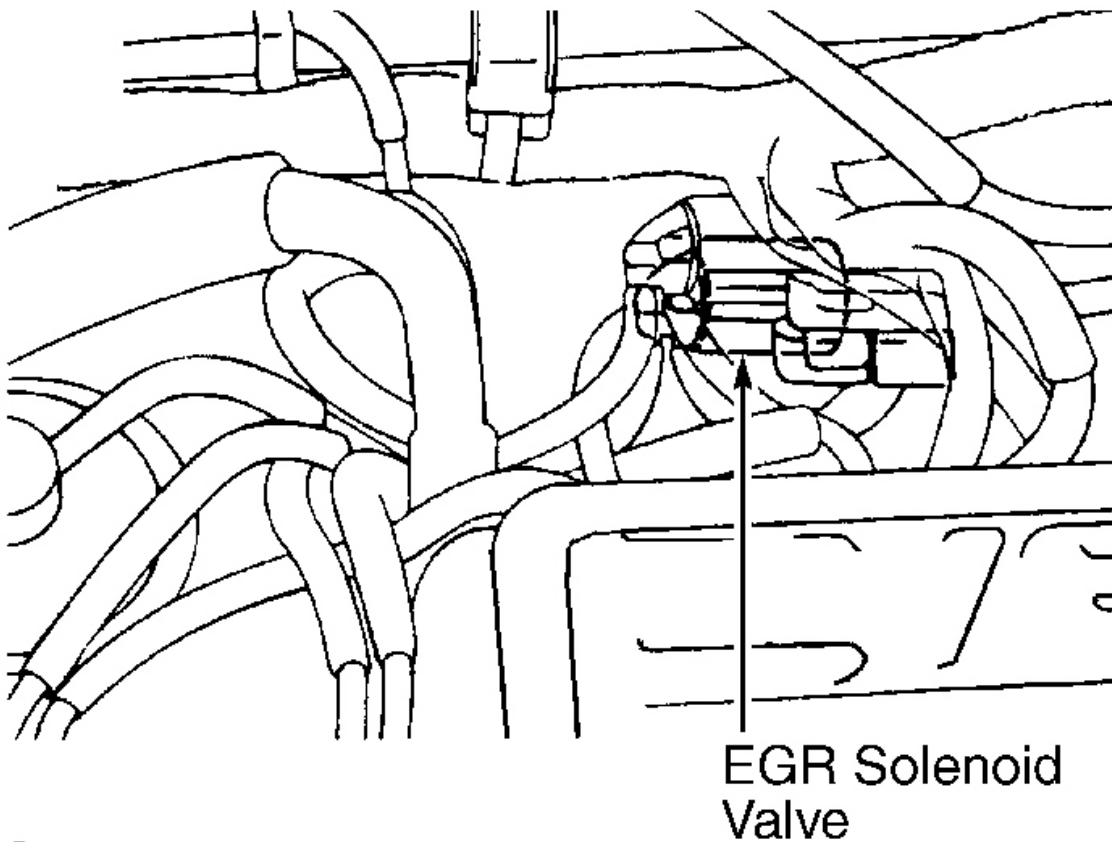
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**Fig. 42: Locating Exhaust Gas Recirculation Valve (Optima 2.4L)**  
Courtesy of KIA MOTORS AMERICA, INC.

## EXHAUST GAS RECIRCULATION SOLENOID VALVE

### Removal & Installation (Optima 2.4L)

Turn ignition off. Disconnect 2-pin Exhaust Gas Recirculation (EGR) solenoid valve harness connector. Locate EGR solenoid valve, on firewall next to intake plenum. See **Fig. 43** . Disconnect vacuum hoses. Remove EGR bracket bolt(s). Remove EGR solenoid valve. To install, reverse removal procedure.



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**Fig. 43: Locating Exhaust Gas Recirculation Solenoid Valve (Optima 2.4L)**

Courtesy of KIA MOTORS AMERICA, INC.

## TORQUE SPECIFICATIONS

**NOTE:** If torque specification is not listed, information is not available from manufacturer.

### TORQUE SPECIFICATIONS (OPTIMA)

Application	Ft. Lbs. (N.m)
Throttle Body Bolts	11-16 (15-22)
Air Intake Manifold Bolts	
2.4L	
M8	11-14 (15-28)
M10	13-18 (18-25)
2.7L	11-14 (15-20)
Engine Coolant Temperature Sensor	18-22 (25-29)
Exhaust Gas Recirculation Valve	12-19 (17-26)
Fuel Rail	

2.4L	7-11 (10-15)
2.7L	7-9 (10-12)
Oxygen Sensor	22-36 (30-49)
Spark Plugs	15-21 (20-30)
<b>INCH Lbs. (N.m)</b>	
Fuel Pump Assembly Bolts	96-148 (10.8-16.7)
Ignition Coil Bolts	70-106 (8-12)
Mass Air Flow Sensor Bolts	69-96 (7.8-10.8)
Positive Crankcase Ventilation Valve	72-106 (8-12)
Throttle Position Sensor Bolts	14-22 (1.5-2.5)
Transmission Range Switch Bolts	89-106 (10-12)
Vehicle Speed Sensor Bolt	35-53 (4-6)

**TORQUE SPECIFICATIONS (RIO)**

Application	Ft. Lbs. (N.m)
Engine Coolant Temperature Sensor	18-22 (25-29)
Ignition Coil Bolts	11.5-16.6(15.6-22.6)
Oxygen Sensor	22-36 (30-49)
Spark Plugs	18-22 (25-29)
<b>INCH Lbs. (N.m)</b>	
Fuel Pump Assembly Bolts	96-148 (10.8-16.7)
Mass Air Flow Sensor Bolts	69-96 (7.8-10.8)
Positive Crankcase Ventilation Valve	72-106 (8-12)
Throttle Position Sensor Bolts	14-22 (1.5-2.5)
Transmission Range Switch Bolts	71-97 (8-11)
Vehicle Speed Sensor Bolt	35-53 (4-6)

**TORQUE SPECIFICATIONS (SEDONA)**

Application	Ft. Lbs. (N.m)
Air Intake Manifold Bolts	14-22 (20-30)
ECT Sensor	15-29 20-39)
Fuel Rail	7-11 (10-15)
Oxygen Sensor	22-36 (30-49)
Spark Plugs	15-21 (20-30)
Throttle Body Bolts	11-16 (15-22)
<b>INCH Lbs. (N.m)</b>	
Fuel Pump Assembly Bolts	96-148 (10.8-16.7)
Ignition Coil Bolts	70-106 (10-12)
MAF Sensor Bolts	69-96 (7.8-10.8)

PCV Valve	72-106 (8-12)
TP Sensor Bolts	14-22 (1.5-2.5)
Transmission Range Switch Bolts	89-106 (10-12)
VS Sensor Bolt	35-53 (4-6)

**TORQUE SPECIFICATIONS (SPECTRA)**

Application	Ft. Lbs. (N.m)
Engine Coolant Temperature Sensor	18-22 (25-29)
Ignition Coil Bolts	14-19 (19-25)
Oxygen Sensor	22-36 (30-49)
Spark Plugs	18-22 (25-29)
Throttle Body Bolts	18 (25)
<b>INCH Lbs. (N.m)</b>	
Fuel Pump Assembly Bolts	96-148 (10.8-16.7)
Mass Air Flow Sensor Bolts	69-96 (7.8-10.8)
Throttle Position Sensor Bolts	14-22 (1.5-2.5)
Transmission Range Switch Bolts	71-97 (8-11)
Vehicle Speed Sensor Bolt	35-53 (4-6)

**TORQUE SPECIFICATIONS (SPORTAGE)**

Application	Ft. Lbs. (N.m)
Air Intake Manifold Bolts	14-22 (19-30)
Engine Coolant Temperature Sensor	18-22 (25-29)
Ignition Coil Bolts	14-19 (19-25)
Oxygen Sensor	22-36 (30-49)
Spark Plugs	11-17 (15-23)
Throttle Body Bolts	18 (25)
<b>INCH Lbs. (N.m)</b>	
Fuel Pressure Regulator Bolts	69-104 (7.8-11.7)
Fuel Pump Assembly Bolts	96-148 (10.8-16.7)
Mass Air Flow Sensor Bolts	69-96 (7.8-10.8)
Throttle Position Sensor Bolts	13-22 (1.5-2.5)
Transmission Range Switch Bolts	35-61 (4-7)
Vehicle Speed Sensor Bolt	35-53 (4-6)