

2002 ENGINE PERFORMANCE

On-Vehicle Adjustments

ENGINE MECHANICAL

NOTE: Before performing any on-vehicle adjustments to fuel or ignition systems, ensure engine mechanical condition is okay.

VALVE CLEARANCE

NOTE: All engines use hydraulic valve lash adjusters. No adjustments are required.

IGNITION TIMING

BASE IGNITION TIMING INSPECTION

NOTE: Base ignition timing is not adjustable. The following procedure is for inspection only.

NOTE: Before base ignition timing inspection. Ensure base idle speed is within specifications. See IDLE SPEED SPECIFICATIONS table under IDLE SPEED & MIXTURE.

Optima

Base ignition timing inspection procedure, is not available from manufacture.

Rio & Spectra

Ensure engine is at normal operating temperature. Turn off all electrical loads. Set transaxle in Park or Neutral and steering wheel in straight ahead position. Remove provided inspection rubber plug on plastic coils cover, over number one spark plug wire. Connect timing light inductive pick-up to number one spark plug wire. If timing light inductive pick-up is too large, plastic coils cover have to be removed. Start engine and allow it to idle. Check base ignition timing. Timing mark on crankshaft pulley and mark on timing belt cover should be aligned to specification. See **BASE IGNITION TIMING** table. If timing is not within specification, check for faulty sensor or incorrect camshaft timing. Check power and grounds. If camshaft timing, sensors, power and grounds are okay, replace Engine Control Module (ECM).

Sedona

Ensure engine is at normal operating temperature. Turn off all electrical loads. Set transaxle in Park or Neutral and steering wheel in straight ahead position. Ground ignition timing adjustment terminal of underhood Data Link Connector (DLC). See **Fig. 2** . Start engine and allow it to idle. Check base ignition timing. Timing mark on crankshaft pulley and mark on timing belt cover should be aligned to specification. See **BASE IGNITION**

TIMING table. If timing is not within specification, check for faulty sensor or incorrect camshaft timing. Check power and grounds. If camshaft timing, sensors, power and grounds are okay, replace Engine Control Module (ECM).

Sportage

Ensure engine is at normal operating temperature. Turn off all electrical loads. Set transmission in Park or Neutral and steering wheel in straight ahead position. Connect timing light inductive pick-up to number one spark plug wire. Start engine and allow it to idle. Check base ignition timing. Timing mark on crankshaft pulley and mark on timing belt cover should be aligned to specification. See **BASE IGNITION TIMING** table. If timing is not within specification, check for faulty sensor or incorrect camshaft timing. Check power and grounds. If camshaft timing, sensors, power and grounds are okay, replace Engine Control Module (ECM).

BASE IGNITION TIMING

Application	Degrees BTDC @ Idle
Optima	
2.4L	3-7
2.7L	7-17
Rio	1-11
Sedona	8-12
Spectra	(1)
Sportage	0-12
(1) 5 degrees ATDC to 15 degrees BTDC.	

IDLE SPEED & MIXTURE

BASE IDLE SPEED INSPECTION/ADJUSTMENT

- NOTE:

Base idle speed is not adjustable (except Sedona). The following procedure is for checking base idle speed only. If base idle speed is not within specification, check for dirty throttle bore(s), faulty Intake Air Control (IAC) motor or defective Engine Control Module (ECM).
- NOTE:

Before base idle speed inspection or adjustment. Ensure base ignition timing is under specification. See **BASE IGNITION TIMING** table under **IGNITION TIMING**.

Optima

Base idle speed inspection procedure, is not available from manufacture.

Rio, Spectra & Sportage

Ensure engine is at normal operating temperature. Turn off all electrical loads. Set transaxle or transmission in

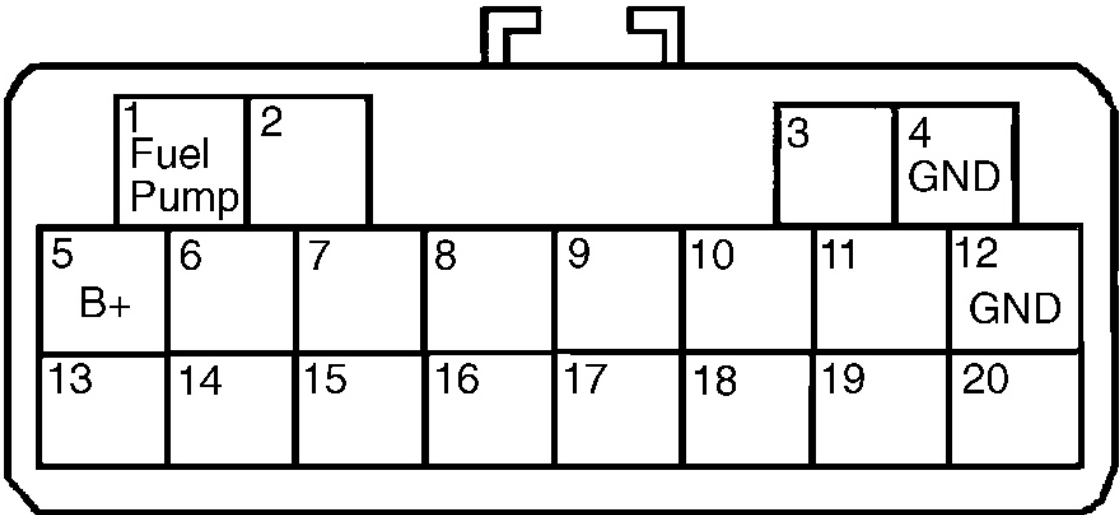
Park or Neutral and steering wheel in straight ahead position. Connect non-inductive tachometer positive lead to terminal No. 3 of underhood Data Link Connector (DLC) or tachometer inductive pick-up on spark plug wire. See **Fig. 1** . Start engine and allow it to idle. Check idle speed. See **IDLE SPEED SPECIFICATIONS** table.

Sedona

Ensure engine is at normal operating temperature. Turn off all electrical loads. Set transaxle in Park or Neutral and steering wheel on straight forward position. Loosen the accelerator cable. Connect tachometer to spark plug wire. Ground No. 8 and ignition timing adjustment terminals of underhood Data Link Connector (DLC). See **Fig. 2** . Run engine for 5 seconds at 2000 to 3000 RPM. Let engine idle for 2 minutes. Check engine base idle speed. See **IDLE SPEED SPECIFICATIONS** table. If base idle speed is out of specification, adjust using the idle speed adjustment screw, located on throttle body assembly. Turn ignition off. Disconnect ground lead wires from DLC. Run engine for 10 minutes. Re-check engine idle speed. Adjust accelerator cable.

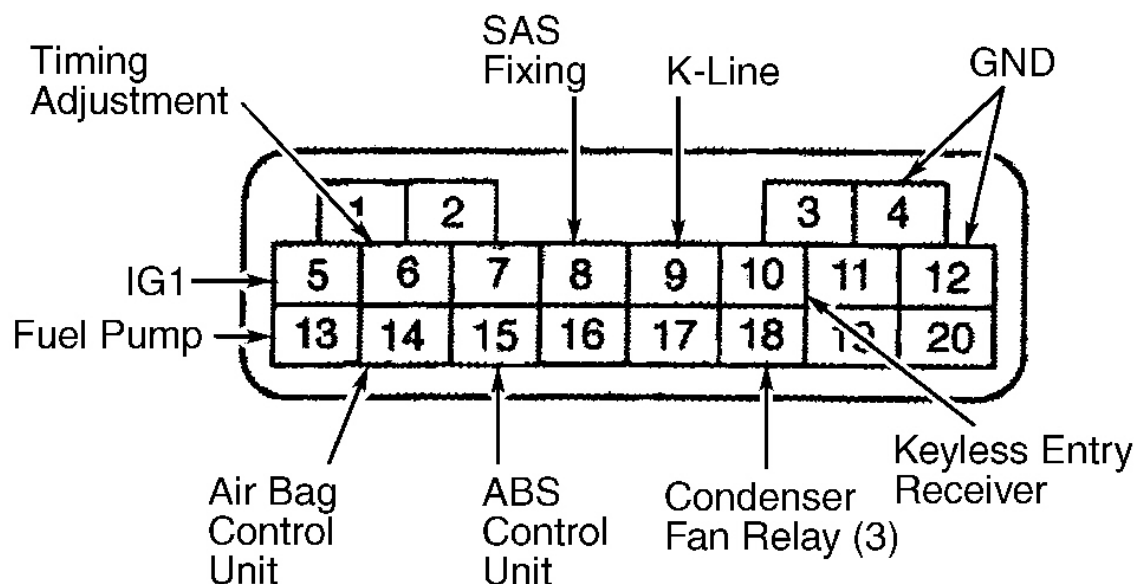
IDLE SPEED SPECIFICATIONS

Application	(1) RPM
Optima	
2.4L	700-900
2.7L	600-800
Rio	700-800
Sedona	600-800
Spectra	750-850
Sportage	770-870
(1) With engine at normal operating temperature and all electrical loads off.	



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Fig. 1: Identifying Underhood Data Link Connector Terminals (Rio, Spectra & Sportage)
Courtesy of KIA MOTORS AMERICA, INC.



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Fig. 2: Identifying Underhood Data Link Connector Terminals (Sedona)
 Courtesy of KIA MOTORS AMERICA, INC.

IDLE MIXTURE

NOTE: Mixture is computer-controlled and is not adjustable.

THROTTLE POSITION SENSOR

ADJUSTMENT

Optima 2.4L

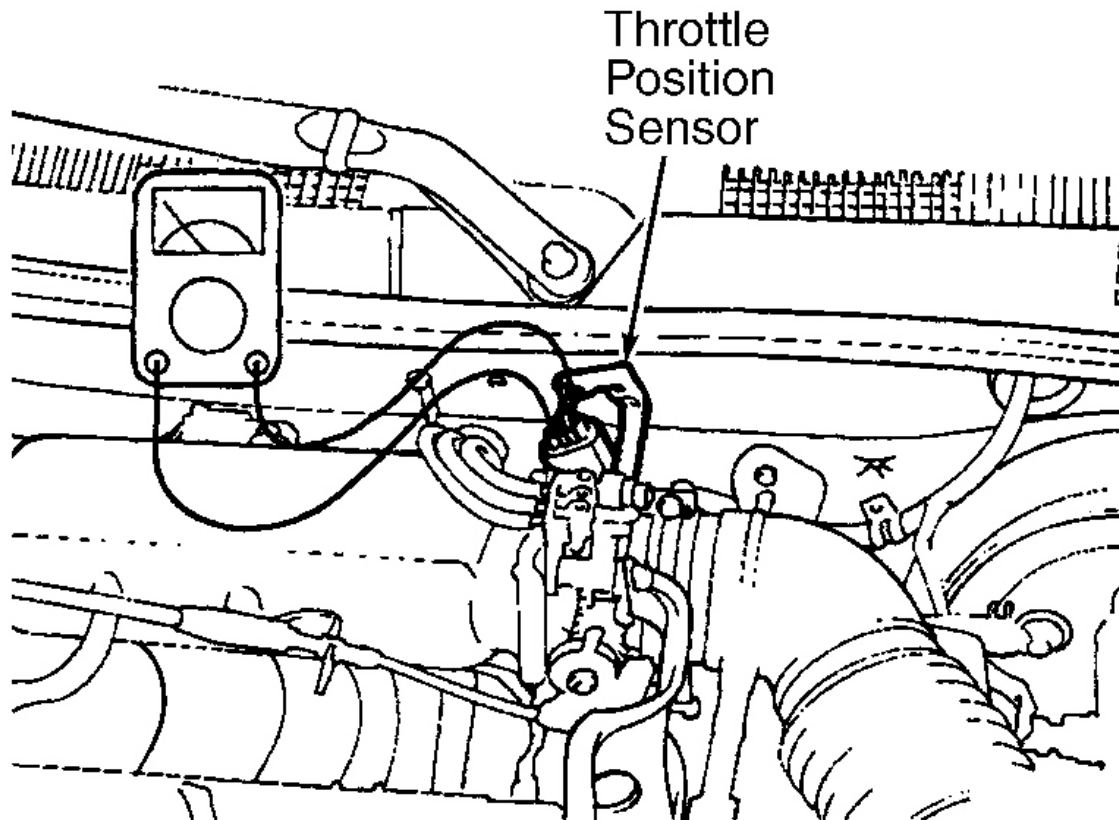
NOTE: Throttle Position (TP) sensor is adjustable only on Optima and Sedona. Perform adjustment if necessary.

NOTE: A poorly functioning TP sensor may cause several driveability problems. For testing and functional check, See **ENGINE SENSORS & SWITCHES** in **SYSTEM & COMPONENT TESTING** article.

NOTE: Cleaning of the throttle body may be necessary before any adjustments are made.

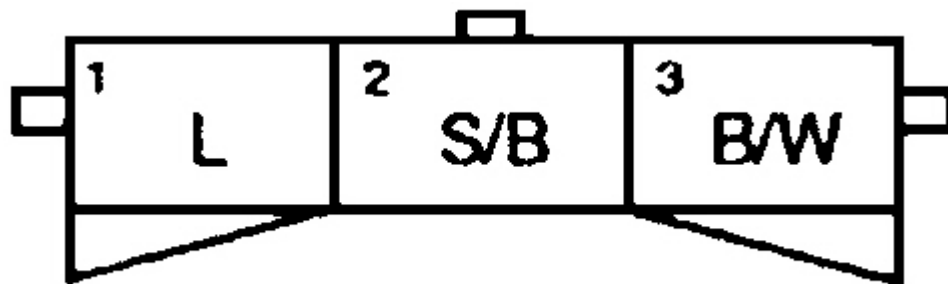
Turn ignition switch off. While backprobing TP sensor 3-pin harness connector, connect a DVOM, set to volts; between TP sensor terminals No. 1 (Blue wire) and No. 3 (Black/White wire). See **Fig. 3** and **Fig. 4**. Turn ignition on. Do not start engine. Measure voltage with throttle in idle position. Voltage should be 300-900 millivolts. With throttle fully open, voltage should be 4.0-4.6 volts. If voltage is not as specified, loosen TP sensor mounting bolts and adjust by turning the TP sensor. Turning TP sensor clockwise increases output

voltage. Make adjustments with throttle in idle position. See **Fig. 5** . After adjustment, torque TP sensor mounting bolts to 14-22 INCH lbs. (1.5-2.5 N.m). If problem still exists, replace TP sensor and repeat test.



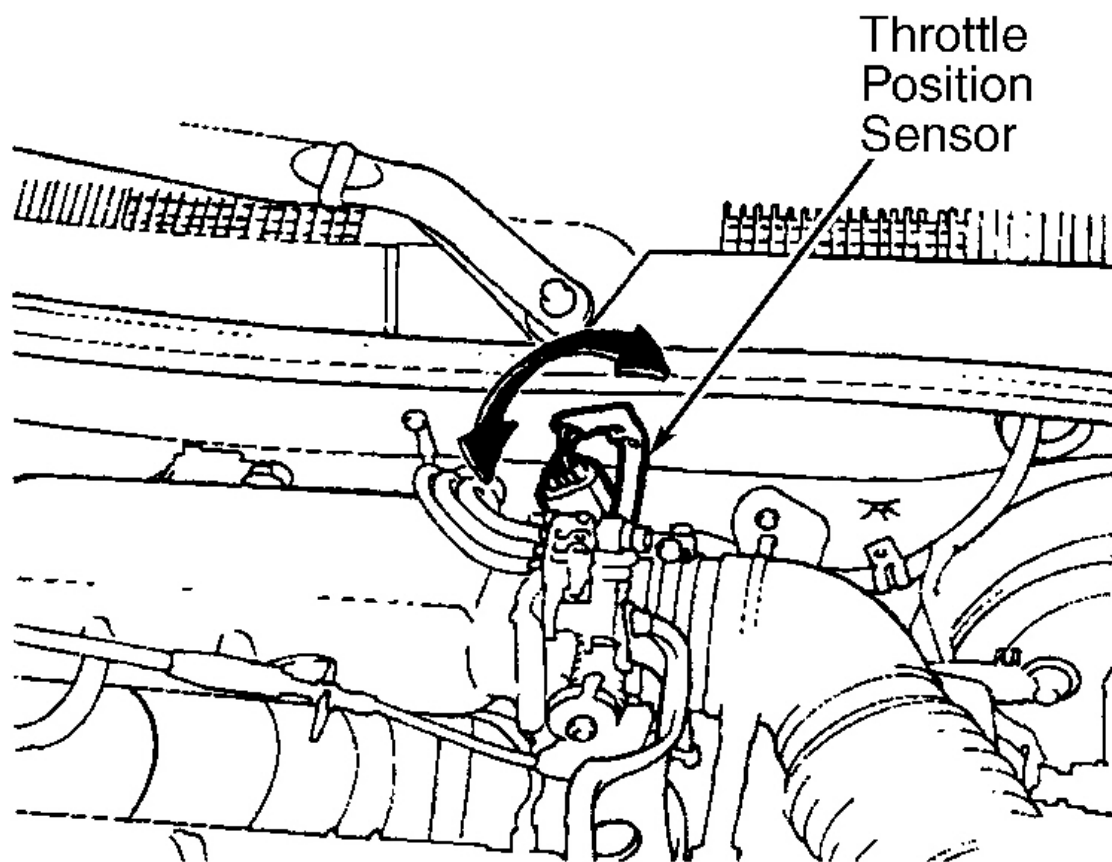
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Fig. 3: Testing Throttle Position Sensor Voltage (Optima 2.4L)
Courtesy of KIA MOTORS AMERICA, INC.



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Fig. 4: Throttle Position Sensor Harness Side Connector (Optima 2.4L)
Courtesy of KIA MOTORS AMERICA, INC.



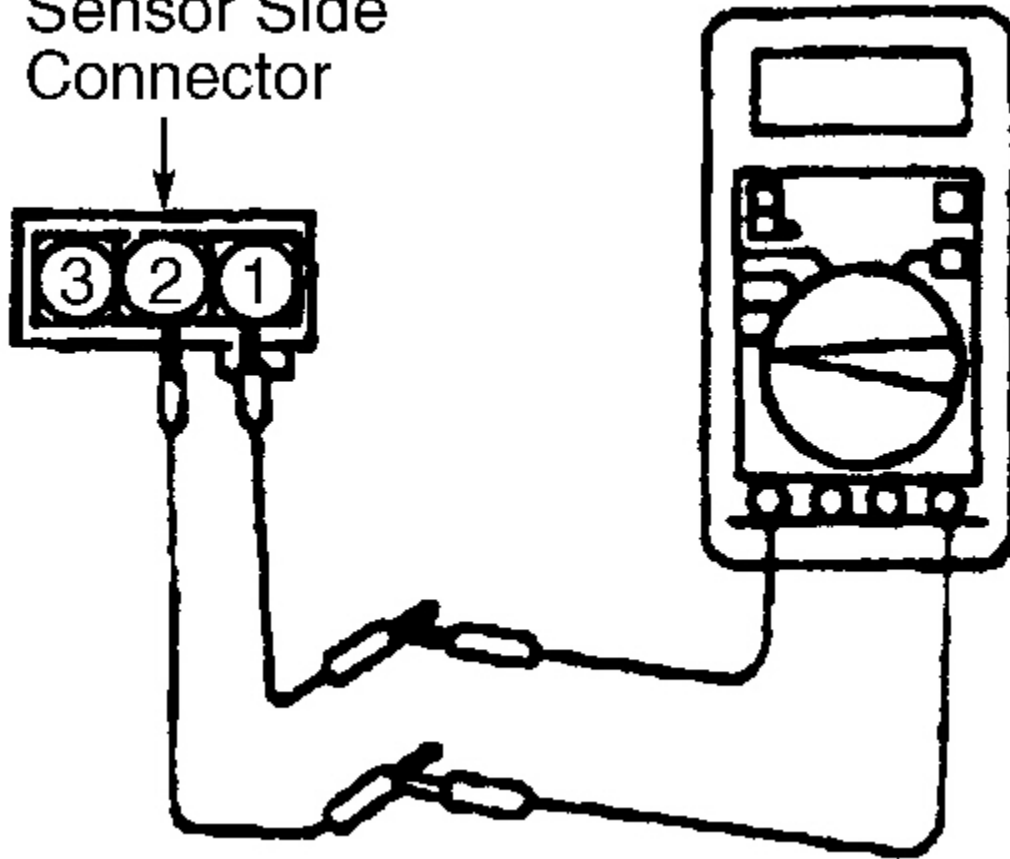
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Fig. 5: Adjusting Throttle Position Sensor (Optima 2.4L)
 Courtesy of KIA MOTORS AMERICA, INC.

Optima 2.7L

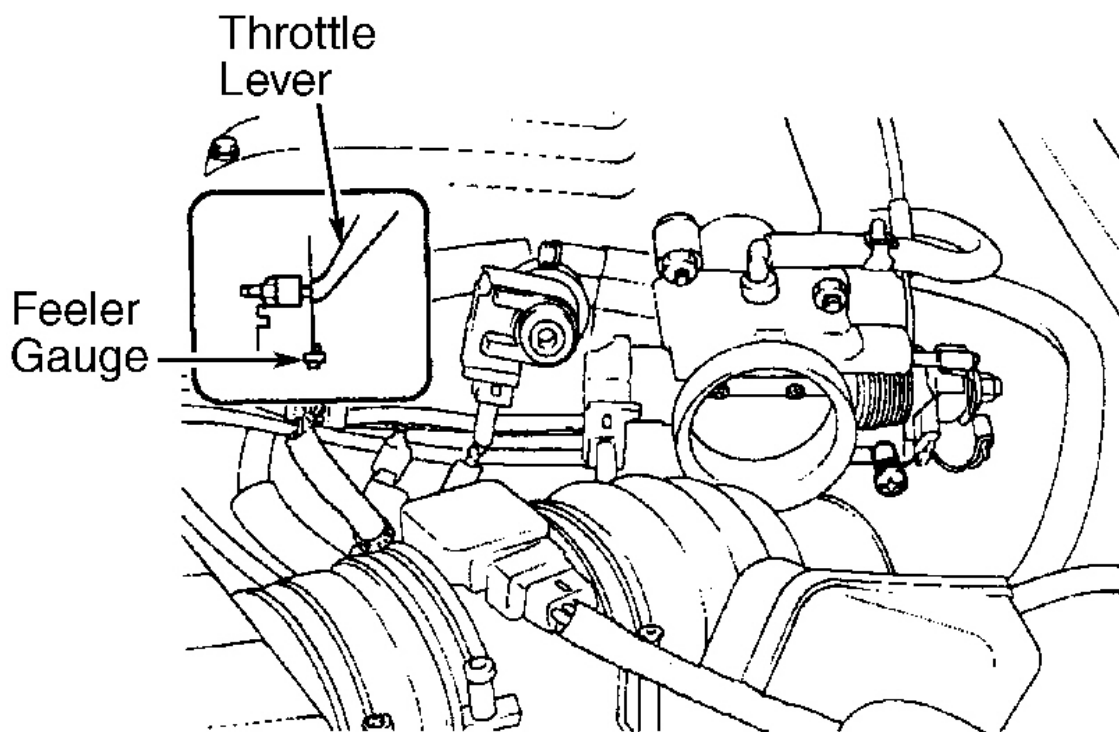
Turn ignition switch off. Disconnect TP sensor 3-pin harness connector. Connect a DVOM, set to ohms, between TP sensor terminals No. 1 and 2. See **Fig. 6** . Insert a 0.0256 in. (0.65 mm) thick feeler gauge between the fixed SAS and throttle lever. See **Fig. 7** . Loosen TP sensor mounting bolts and turn fully counter clockwise. In this position, ensure there is continuity between terminals No. 1 and 2. Slowly turn TP sensor clockwise until no continuity exists between terminals No. 1 and 2. Tighten mounting bolts to 14-22 INCH lbs. (1.5-2.5 N.m) and reconnect sensor connector. Backprobing TP sensor harness connector, connect a DVOM between TP sensor terminals No. 2 (Black/White wire) and No. 3 (Green/White wire). See **Fig. 8** . Turn ignition on. Do not start car. Measure voltage with throttle in idle position. Voltage should be 250-800 millivolts. If voltage is not as specified, replace TP sensor and repeat test. Remove feeler gauge after adjustments.

Throttle Position
Sensor Side
Connector



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Fig. 6: Testing Throttle Position Sensor Continuity (Optima 2.7L)
Courtesy of KIA MOTORS AMERICA, INC.

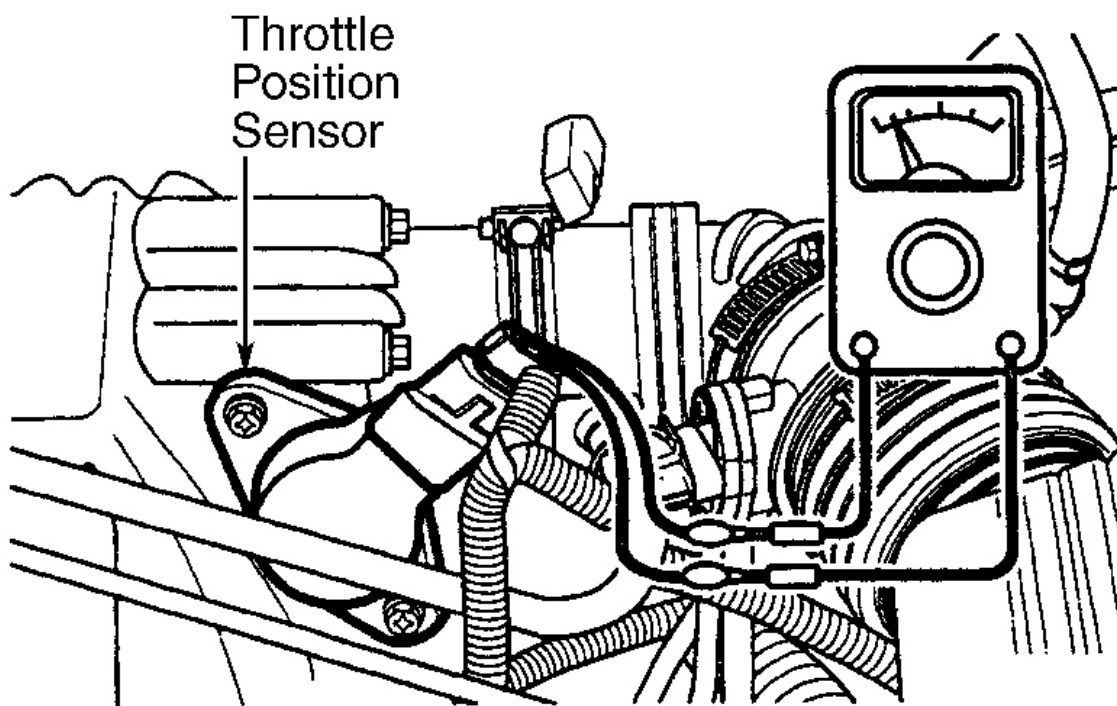


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Fig. 7: Locating Fixed SAS & Throttle Lever (Optima 2.7L)
 Courtesy of KIA MOTORS AMERICA, INC.

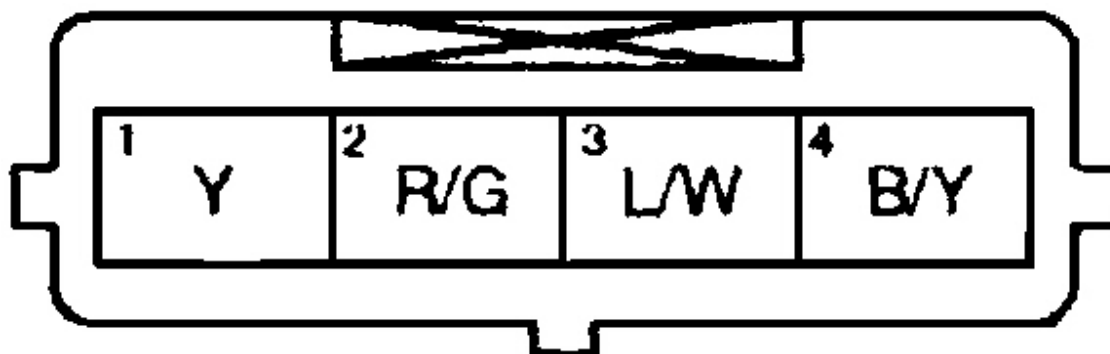
Sedona

Turn ignition switch off. While backprobing TP sensor 4-pin harness connector, connect a DVOM, set to volts, between TP sensor terminals No. 1 (Yellow wire) and No. 3 (Blue/White wire). See **Fig. 8** and **Fig. 9** . Turn ignition on. Do not start engine. Measure voltage with throttle in idle position. Voltage should be 300-900 millivolts. With throttle fully open, voltage should be 4.0-4.6 volts. If voltage is not as specified, loosen TP sensor mounting bolts and adjust by turning the TP sensor. Turning TP sensor clockwise increases output voltage. Make adjustments with throttle in idle position. See **Fig. 10** . After adjustment, torque TP sensor mounting bolts to 14-22 INCH lbs. (1.5-2.5 N.m). If problem still exists, replace TP sensor and repeat test.



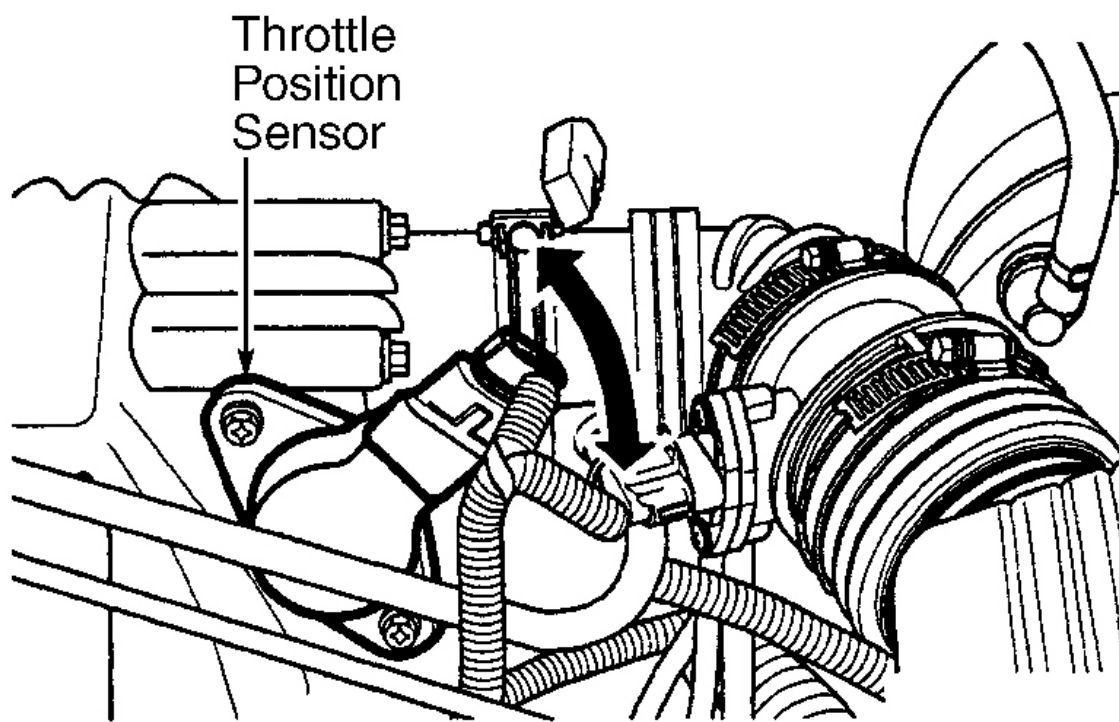
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Fig. 8: Testing Throttle Position Sensor Voltage (Sedona Shown, Optima 2.7L Similar)
Courtesy of KIA MOTORS AMERICA, INC.



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Fig. 9: Throttle Position Sensor Harness Side Connector (Sedona)
Courtesy of KIA MOTORS AMERICA, INC.



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Fig. 10: Adjusting Throttle Position Sensor (Sedona)
Courtesy of KIA MOTORS AMERICA, INC.