

Subject: Fuel system pressure tests

Symptom: Hard starting when cold; loss of power climbing hills; overall poor performance; engine surges and then stops running

Source: Kia service manuals and Kia master technicians

Follow these warnings, precautions, and guidelines while testing fuel system pressure:



Risk of fire.

- **Wear safety goggles and protective clothing, user and bystander.**
- **Relieve fuel system pressure before opening lines and connections.**
- **Disconnect the battery ground before opening any fuel system fittings. Reconnect the cable to run the engine or operate the fuel pump for testing.**
- **Keep cigarettes, sparks, open flame, and other sources of ignition away from vehicle.**
- **Gasoline, methanol, and oxygenated fuels are toxic and flammable. They must be handled appropriately.**
- **Keep a dry chemical (Class B) fire extinguisher rated for gasoline, chemical, and electrical fires in the work area.**

Fire can cause death or serious injury

IMPORTANT:

Late model vehicle fuel lines use plastic snap-lock connections that are easily damaged. The fuel line must be replaced if the snap-lock connection is damaged when disassembled to install a fuel pressure gauge. The sealing O-rings should be replaced whenever a connection is opened.

**NOTE:**

Operating a vehicle with a low fuel level may overheat the fuel pump.

**NOTE:**

The ECM/PCM controls ground to the fuel pump through a relay.

Relieving Fuel Pressure

Pressure must be relieved before testing the fuel system and connecting a gauge. To relieve fuel pressure, wrap a rag around the gauge connection fitting and slowly loosen the fitting.

Table KA007-1 shows the correct fuel system pressure test procedure and pressure specifications:

Table KA007-1 Fuel pressure specifications

MODEL	YEAR	ENGINE	FUEL PRESSURE (psi)			GO TO
			REGULATED	UNREGULATED	MAXIMUM	
Amanti	2004–06	3.5L	—	47.6	—	Procedure G
	2007–09	3.8L	—	54.3 to 55.8	—	
Borrego	2009	3.8L, 4.6L	—	55.0	—	Procedure G
Optima	2001	2.5L	37	46 to 49	75	Procedure D
	2001–03	2.4L				Procedure E
	2002–03	2.7L				Procedure E
	2006–08	2.7L	—	54.3 to 55.8	—	Procedure G
	2006–10	2.4L	—	49.0 to 50.5	—	
	2009–10	2.7L	—	55.0	—	
Rio	2001–03	1.5L, 1.6L	55 to 58	—	—	Procedure B
	2005–2011	1.6L	—	49.8	—	Procedure G
Rondo	2007–08–	2.7L	—	49.0 to 50.5	—	Procedure G
	2007–10	2.4L	—	49.0 to 50.5	—	
	2009–10	2.7L	—	55.0	—	
Sedona	2002–03	3.5L	39	46 to 49	—	Procedure F
	2006–10	3.8L	—	54.3 to 55.8	—	Procedure G
	2001	3.5L	—	55.0	—	Procedure H
Sephia	1993–97	1.6L, 1.8L	35	45	70	Procedure A
	1998–2001	1.8L	55 to 58	—	—	Procedure B
Sorento	2003–06	3.5L	39	46.9 to 49.0	—	Procedure F
	2007–09	3.8L	—	54.3 to 55.8	—	Procedure G
Spectra	2000–05	1.8L	55 to 58	—	—	Procedure B
	2004–09	2.0L	—	49.0 to 50.5	—	Procedure G
Sportage	1994–2002	2.0L	35	45	70	Procedure C
	2005–08	2.0L, 2.7L	—	49.8	—	Procedure G
	2009–10	2.0L, 2.7L	—	49.0 to 50.5	—	



Procedure A

1. Switch the ignition off and disconnect the battery ground. Relieve fuel system pressure and tee into the fuel line at the fuel filter outlet in the engine compartment.
2. Connect a pressure gauge (Snap-on gauge set MT3370A or an equivalent). Or use the Vantage® power graphing meter with the 0 to 100 psi transducer and a suitable adapter.
3. Reconnect the battery. Use a fused jumper to ground the fuel pump test terminal in the underhood diagnostic link connector (DLC) (Figure KA007-1). Connect the jumper wire between terminals 1 and 4. Turn the ignition switch to the ON position. Note the gauge reading for unregulated fuel pressure, and compare it with the specified value listed in Table KA007-1.
4. Replace the vacuum line at the pressure regulator with the line from a hand vacuum pump. Apply 17 in-Hg (432 mm-Hg) of vacuum, and note regulated fuel pressure. Compare it with the specified value listed in Table KA007-1.
5. Using an appropriate tool, such as a long-nose Vise-Grip™-type pliers with sections of fuel line covering the jaws, pinch or clamp off the fuel line between the gauge and the fuel rail. Note the gauge reading, and compare it with the specified value for maximum fuel pressure in Table KA007-1.
6. Remove the vacuum pump and the jumper wire, and reconnect the pressure regulator vacuum line. Turn the ignition to the OFF position, and wait 10 minutes. During this period, note how quickly the fuel pressure drops. Pressure should not drop more than about 1 psi per minute. A leakage rate greater than 1 psi per minute may indicate a leaking injector, faulty pressure regulator, or a leaking fuel pump check valve.
7. Start the engine, and allow it to run until it reaches operating temperature. Disconnect and plug the pressure regulator vacuum line. Quickly open and close the throttle plate while checking the fuel pressure. Fuel pressure should drop momentarily, by no more than 3 psi. Pressure drops greater than 3 psi probably indicate insufficient fuel volume. Troubleshoot the fuel system by checking for a restricted fuel line or fuel filter, a defective fuel pump, or a faulty fuel pump ground.
8. It may be necessary to road test the vehicle to verify output volume. If vehicle loses power while under load, suspect inadequate fuel volume. While driving under full throttle note the fuel pressure. Pressure should not drop more than about 3 psi, or progressively decrease. If output volume is insufficient, suspect a clogged fuel filter, dirty fuel lines, faulty pump, a poor power circuit, or an unreliable ground.
9. After testing, reconnect the fuel pressure regulator vacuum line, then remove the pressure gauge and tee fitting.
10. Start the engine, and check for fuel leaks.
11. Clear any codes generated during this procedure.

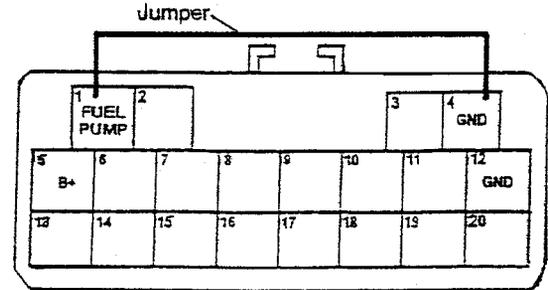


Figure KA007-1



Procedure B

1. With the engine warm and ignition off, locate the Schrader valve on the fuel rail. Relieve fuel pressure and connect a pressure gauge (Snap-on gauge set MT3370A or

equivalent). Or use the Vantage® power graphing meter to read pressure through the 0 to 100 psi transducer and suitable adapter.

2. Locate the underhood data link connector (DLC). Use a fused jumper to connect the fuel pump test terminal to the B+ terminal of the DLC (Figure KA007-2). Turn the ignition on and note the gauge reading. Compare reading to the regulated fuel pressure specified in Table KA007-1.

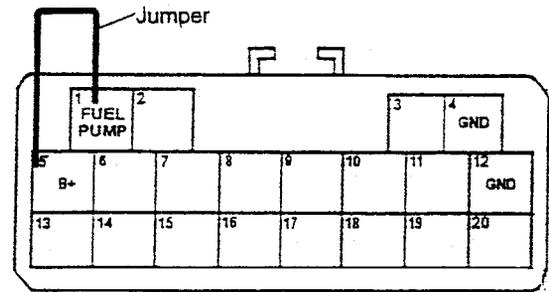


Figure KA007-2

3. Remove the jumper wire and switch the ignition off. Wait 10 minutes, then take a gauge reading. Fuel pressure should drop no more than about 1 psi per minute.
4. Start the engine and allow it to idle. Quickly open and close the throttle plate while observing the fuel pressure gauge. Pressure should drop momentarily, but no more than about 3 psi. A pressure drop greater than 3 psi may indicate insufficient fuel volume. Possible causes include a restricted fuel line or filter, a defective fuel pump, a faulty fuel pump power circuit, or an unreliable ground.
5. It may be necessary to road test the vehicle under full throttle to verify output volume. If vehicle loses power or fuel pressure while under load, suspect insufficient fuel volume. Pressure should drop no more than about 3 psi, or progressively decrease under load.
6. Turn the ignition off, relieve fuel pressure, remove the pressure gauge, and restore fuel system connections.
7. Start the engine, and check for fuel leaks.
8. Clear any codes generated during this procedure.



Procedure C

1. Turn the ignition off, disconnect battery ground, and relieve fuel system pressure. Locate the fuel pump access panel underneath the rear carpet. Identify the fuel pump output line, and tee into it.
2. Connect a pressure gauge to the tee. The pressure gauge may be the Snap-on gauge set MT3370A, an equivalent, or the Vantage® power graphing meter set to read pressure through the 0 to 100 psi transducer. Meter use requires a suitable adapter.
3. Reconnect the battery ground. With a fused jumper, connect the fuel pump test terminal 1 to the B+ terminal (5) in the underhood diagnostic link connector (DLC) (Figure KA007-2). Turn the ignition switch to the ON position. Note the gauge reading for unregulated fuel pressure, and compare it with the specified value listed in Table KA007-1.
4. Replace the vacuum line at the pressure regulator with the line from a hand vacuum pump. Apply 17 in-Hg (432 mm-Hg) vacuum, and note regulated fuel pressure. Compare it with the specified value listed in Table KA007-1.
5. Using an appropriate tool, such as a long-nose Vise-Grip™-type pliers with sections of fuel line covering the jaws, pinch or clamp off the fuel line after the pressure gauge tee. Note the gauge reading, and compare it with the specified value for maximum fuel pressure in Table KA007-1.
6. Turn the ignition off, remove the vacuum pump, jumper wire, and clamping tool. Reconnect the pressure regulator vacuum line. Start the engine and allow it to idle until it reaches operating temperature. Quickly open and close the throttle plate while noting the

change in fuel pressure. Pressure should drop no more than about 3 psi momentarily. Pressure drops greater than 3 psi probably indicate insufficient fuel volume. Troubleshoot the fuel system by checking for a restricted fuel line or fuel filter, a defective fuel pump, or a faulty fuel pump ground.

7. It may be necessary to drive the vehicle under full throttle to verify output volume. If vehicle loses power under load, suspect inadequate fuel volume. Pressure should drop no more than about 3 psi, or progressively decrease.
8. Turn the ignition switch to the OFF position, relieve fuel pressure, and remove the pressure gauge and tee.
9. Start the engine, and check for fuel leaks.
10. Clear any codes generated during this procedure.



Procedure D

1. With the engine warm and ignition off, locate and disconnect the fuel pump harness connector in the trunk. Start the engine and allow it to stall to relieve fuel system pressure. Repeat and switch the ignition off. Reattach the fuel pump harness connector.
2. Locate the fuel pump outlet line on the fuel pump module inside the trunk. Carefully tee into the outlet line and attach a fuel pressure gauge (Snap-on gauge set MT3370A or equivalent). Or use the Vantage® power graphing meter to read pressure through the 0 to 100 psi transducer and a suitable adapter.
3. Start the engine, allow to idle, and carefully check for fuel leaks. With the engine at idle, note the gauge reading and compare it to the regulated fuel pressure specified in Table KA007-1.
4. Locate the fuel pressure regulator at the end of the fuel rail. Disconnect the vacuum line from the fuel pressure regulator and take a gauge reading. Compare reading to the unregulated fuel pressure specified in Table KA007-1.
5. Switch the ignition off and reconnect the pressure regulator vacuum line.
6. Locate the fuel return line at the fuel rail and switch the ignition on. Use an appropriate tool, such as needle-nose locking pliers with sections of hose covering the jaws, to carefully clamp off the fuel return line. Watch the pressure gauge and note the maximum fuel pressure. See Table KA007-1.
7. Remove the pliers or clamp and pressure should drop to regulated pressure. Switch the ignition off, wait 10 minutes, then take a gauge reading. Fuel pressure should drop no more than about 1 psi per minute.
8. Start the engine and allow it to idle. Quickly open and close the throttle while observing the fuel pressure gauge. Pressure should drop momentarily, but no more than about 3 psi. A drop of more than 3 psi indicates insufficient fuel volume, which may be the result of a restricted fuel line or filter, a defective fuel pump, a faulty fuel pump power circuit, or an unreliable ground.
9. It may be necessary to road test the vehicle under full throttle to verify pump output volume. If vehicle loses power or fuel pressure under load, suspect insufficient fuel volume. Pressure should drop no more than about 3 psi, or progressively decrease while under load.
10. Turn the ignition off, relieve fuel pressure, remove the pressure gauge, and restore fuel system connections.
11. Start the engine, and check for fuel leaks.
12. Clear any codes generated during this procedure.

**Procedure E**

1. With the engine warm and ignition off, locate and disconnect the fuel pump harness connector in the trunk. Start the engine and allow it to stall to relieve fuel system pressure. Repeat and switch the ignition off. Reattach the fuel pump harness connector.
2. Locate the Schrader valve on the fuel rail. Connect a pressure gauge (Snap-on gauge set MT3370A or equivalent). Or use the Vantage® power graphing meter to read pressure through the 0 to 100 psi transducer and suitable adapter.
3. Start the engine, allow to idle, and carefully check for fuel leaks. With the engine at idle, note the gauge reading and compare it to the regulated fuel pressure specified in Table KA007-1.
4. Locate the fuel pressure regulator at the end of the fuel rail. Disconnect the vacuum line from the fuel pressure regulator and take a gauge reading. Compare reading to the unregulated fuel pressure specified in Table KA007-1.
5. Switch the ignition off and reconnect the pressure regulator vacuum line.
6. Locate the fuel return line at the fuel rail and switch the ignition on. Use an appropriate tool, such as needle-nose locking pliers with sections of hose covering the jaws, to carefully clamp off the fuel return line. Watch the pressure gauge and note the maximum fuel pressure. See Table KA007-1.
7. Remove the pliers or clamp and pressure should drop to regulated pressure. Switch the ignition off, wait 10 minutes, then take a gauge reading. Fuel pressure should drop no more than about 1 psi per minute.
8. Start the engine and allow it to idle. Quickly open and close the throttle while observing the fuel pressure gauge. Pressure should drop momentarily, but no more than about 3 psi. A drop of more than 3 psi indicates insufficient fuel volume, which may be the result of a restricted fuel line or filter, a defective fuel pump, a faulty fuel pump power circuit, or an unreliable ground.
9. It may be necessary to road test the vehicle under full throttle to verify output volume. If vehicle loses power or fuel pressure while under load, suspect insufficient fuel volume. Pressure should drop no more than about 3 psi, or progressively decrease under load.
10. Turn the ignition off, relieve fuel pressure, remove the pressure gauge, and restore fuel system connections.
11. Start the engine, and check for fuel leaks.
12. Clear any codes generated during this procedure.

**Procedure F**

1. With the engine warm and ignition off, locate and disconnect the fuel pump harness connector under the fuel pump access panel. Start the engine and allow it to stall to relieve fuel system pressure. Repeat and switch the ignition off. Reattach the fuel pump harness connector.
2. Using a Kia fuel pressure test adapter, or other suitable adapter, on the fuel rail, connect a pressure gauge or a 0 to 100 psi transducer and suitable adapter.
3. Connect the negative battery cable, start and run the engine at idle, and carefully check for fuel leaks. Note the gauge reading and compare it to the regulated fuel pressure specified in Table KA007-1.
4. Locate the fuel pressure regulator at the end of the fuel rail. Disconnect the vacuum line from the fuel pressure regulator and take a gauge reading. Compare reading to the unregulated fuel pressure specified in Table KA007-1.
5. Switch the ignition off and reconnect the pressure regulator vacuum line.

6. Wait 10 minutes, then check the gauge reading. Pressure should not drop by more than about 1 psi per minute.
7. Start the engine and allow it to idle. Quickly open and close the throttle while observing the fuel pressure gauge. Pressure should drop momentarily, but no more than about 3 psi. A drop of more than 3 psi indicates insufficient fuel volume, which may be the result of a restricted fuel line or filter, a defective fuel pump, a faulty fuel pump power circuit, or an unreliable ground.
8. It may be necessary to road test the vehicle under full throttle to verify output volume. If vehicle loses power or fuel pressure while under load, suspect insufficient fuel volume. Pressure should drop no more than about 3 psi, or progressively decrease under load.
9. Turn the ignition off, relieve fuel pressure, remove the pressure gauge, and restore fuel system connections.
10. Start the engine, and check for fuel leaks.
11. Clear any codes generated during this procedure.

**Procedure G**

1. With the engine warm and ignition off, locate and disconnect the fuel pump harness connector under the fuel pump access panel. Start the engine and allow it to stall to relieve fuel system pressure. Repeat and switch the ignition off. Reattach the fuel pump harness connector.
2. Disconnect the fuel feed hose from the fuel delivery pipe.
3. Connect a pressure gauge or a 0 to 100 psi transducer between the feed hose and the delivery pipe with a suitable adapter.
4. Connect the negative battery cable, start and run the engine at idle, and carefully check for fuel leaks. Note the gauge reading and compare it to the regulated fuel pressure specified in Table KA007-1.
5. Switch the ignition off and wait 5 minutes, then check the gauge reading. Pressure should not drop by more than about 1 psi per minute.
6. Relieve fuel pressure, remove the pressure gauge, and restore fuel system connections.
7. Start the engine, and check for fuel leaks.
8. Clear any codes generated during this procedure.

**Procedure H**

1. Relieve residual pressure in the fuel line.
2. Disconnect the fuel feed hose from the fuel delivery pipe.
3. Connect a pressure gauge or a 0 to 100 psi transducer between the feed hose and the delivery pipe with a suitable adapter.
4. Connect the negative battery cable, start and run the engine at idle, and carefully check for fuel leaks. Note the gauge reading and compare it to the regulated fuel pressure specified in Table KA007-1.
5. Switch the ignition off and wait 5 minutes, then check the gauge reading. Pressure should not drop by more than about 1 psi per minute.
6. Relieve fuel pressure, remove the pressure gauge, and restore fuel system connections.
7. Start the engine, and check for fuel leaks.
8. Clear any codes generated during this procedure.