

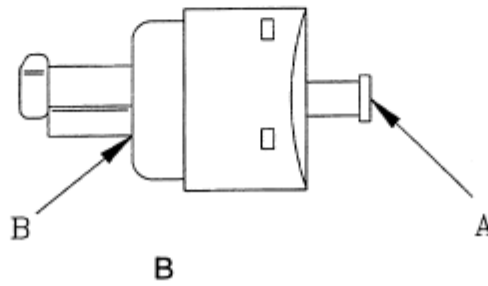
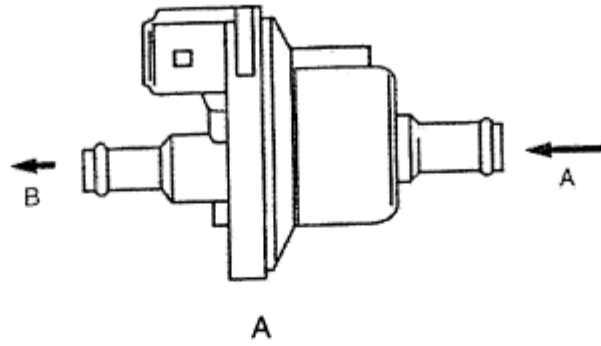


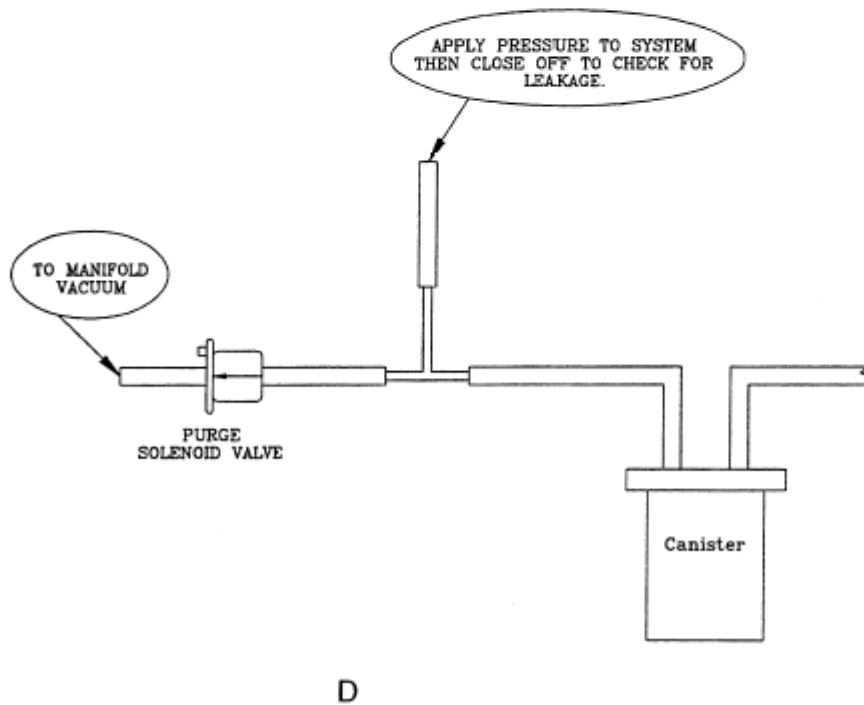
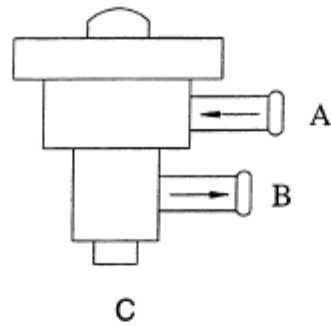
Diagnostic Trouble Code Diagnosis Charts

P0440 / P0442	Evaporative emission control malfunction / small leak detected
<p>Threshold Values (P0440) ~</p> <ol style="list-style-type: none"> At start of leak check ~ <ul style="list-style-type: none"> Fuel tank pressure:< -14.89 hPa in 20 seconds Fuel tank pressure variation: >4.88 hPa in 20 seconds Fuel tank pressure (while purge solenoid valve and canister close valve are both closed):< -0.73 hPa in 4 seconds Fuel tank pressure drop (both canister close valve and purge solenoid valve are open):< -1.71 hPa in 3.5 seconds Fuel tank pressure variation (after canister close valve is closed and purge solenoid valve is kept open):< 0.49 hPa in 2.5 seconds Fuel tank pressure (with canister close valve closed and purge solenoid valve open)(after #4 is checked): >-6.10 hPa in 7.5 seconds Gradient of fuel tank pressure (variation while vacuum is being applied to fuel tank):< 0.55 hPa per second Fuel tank pressure (after closing of purge solenoid valve at completion of vacuum build-up of fuel tank):< -23.93 hPa <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p style="text-align: center; background-color: #008000; color: white; margin: 0;">NOTE</p> <p>Multiply hPa by 0.0295 to get inches of mercury</p> </div> <p>(P0442) ~</p> <p>Gradient index (compensated): >1</p> <p>Enable Conditions ~</p> <p>Engine speed: idling</p> <p>Vehicle speed: 0 MPH</p> <p>Load value (ti):< 2.2 milliseconds</p> <p>Canister load factor: < 4.0</p> <p>Fuel tank pressure:< 15.14 hPa</p> <p>Engine ECT reading (at engine start-up):<= 150°F</p> <p>IAT reading: >9.05 degrees? F</p> <p>Battery voltage: >10.9v</p> <p>Time after engine start-up: >1005 seconds or long term fuel trim has stabilized and idle control system has passed diagnostic checks</p> <p>Fuel system status: closed loop</p> <p>Time Requirements ~ Once per driving cycle (where enabling conditions are met)(approximately 30 seconds duration)</p> <p>MIL Illumination ~ 2 driving cycles</p>	<p>Related Items</p> <ul style="list-style-type: none"> ⇒ Fuel filler cap loose or missing. ⇒ Fuel filler cap o-ring missing or damaged. ⇒ Faulty or damaged fuel filler pipe. ⇒ Leaking, disconnected or plugged fuel vapor lines. ⇒ Fuel in lines due to faulty Rollover and/or Check Valves or stuck closed CCV. ⇒ Canister Close Valve (CCV) clogged, stuck open or closed. ⇒ Improperly installed Purge Solenoid valve (PSV). ⇒ PSV stuck open or closed. ⇒ Faulty Fuel Tank Pressure Sensor (FTPS). ⇒ Leaking canister or catch tank. <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p style="text-align: center; background-color: #008000; color: white; margin: 0;">NOTE</p> <p>If any codes relating to FTPS, CCV or PSV circuits are present, do ALL REPAIRS associated with those codes before proceeding with this troubleshooting tree.</p> </div> <p>IMPORTANT!</p> <p>Record all freeze frame, CID and TID data before disconnecting any connectors or clearing code(s).</p>

STEP	INSPECTION	Y/N	ACTION
	Check fuel filler cap for being tightly installed, has o-ring seal installed and is in good condition. Verify cap releases pressure / vacuum at specified values	YES	Go to step 2.

1	(approximately 3 psi pressure and approximately 2 inches of mercury vacuum). Are cap, o-ring and release pressures okay?	NO	Replace fuel filler cap.
2	Check fuel filler pipe for cracks, damage and o-ring seat for deformation. Is fuel filler pipe okay?	YES	Go to step 3.
		NO	Replace fuel filler pipe.
3	Thoroughly check all fuel vapor hoses and hose clamp between: ⇒ Canister and fuel tank. ⇒ Canister and CCV. ⇒ Canister and PSV. ⇒ PSV and intake manifold. (At this point, verify arrow on PSV is pointing towards intake manifold. If it is not, reverse installation.) Are vapor hoses and clamps okay?	YES	Go to step 4.
		NO	Replace ALL cracked/ damaged hoses or loose clamps.
4	With ignition off connect adapter cable #K99U-2106-G17 to BOB and disconnect C211 from ECM. Connect adapter cable C211 to ECM and vehicle C211 to adapter cable. Remove gas cap and turn ignition on. Measure FTPS output voltage at BOB terminal 76 (2.5v +/- 0.32v). Is FTPS base voltage within specs?	YES	Go to step 5.
		NO	Replace FTPS and go to step 5.
5	Turn ignition off and disconnect hose leading from PSV to intake manifold at PSV. Per diagram "B", draw a vacuum at nipple "B" with a mityvac and verify PSV holds vacuum. Turn ignition on and jumper a wire from BOB pin 36 to GND (should here a faint click from PSV). Vacuum should bleed off. Repeat this procedure 4 or 5 times to ensure PSV reliability. Is PSV working properly?	YES	Go to step 6.
		NO	Replace PSV and then go to step 6.
6	Turn ignition off and disconnect hose connecting CCV to canister at canister. Per diagram "C", blow air into hose removed from canister and verify air escapes from "B". Turn ignition on and jumper a wire to GND at BOB pin 18 (CCV valve should click). Blow air into hose and verify air does not escape from port "B". Repeat this procedure 4 or 5 times to ensure CCV reliability. Is CCV working properly?	YES	Go to step 7.
		NO	Replace CCV. If CCV was stuck closed, inspect all lines and canister for liquid fuel. Replace any contaminated components and blow out lines then go to step 7.





STEP	INSPECTION	Y/N	ACTION
7	Remove Check Valve from vehicle and verify part number "K01G" is stamped on valve. Visually inspect for any signs of cracking around mounting boss or in body. Blow air through both nipples, verify valve is open (with slight restriction) in both directions and diaphragm "pops" open when blown in direction of arrow on valve. Does check valve pass inspection?	YES	Go to step 8.
		NO	Replace check valve and then go to step 8.
8	Remove Rollover Valve from vehicle and (per diagram "C") verify air passes only in direction of arrows in diagram (not arrows on side of valve) when tilted more than 40° From vertical in any direction and in both	YES	Go to step 9.

	directions with valve in right-side-up position. Does rollover valve pass inspection?	NO	Replace rollover valve and then go to step 9.
9	Return vehicle to original condition (but leave BOB connected). Per diagram "D", insert "T" in evap hose between PSV and Canister. Make sure fuel filler cap is installed and tight. Attach a jumper wire from GND to BOB terminal 18 (CCV ground control). Attach ground lead of digital voltmeter to GND and positive lead to BOB terminal 76 (FTPS output voltage). Turn ignition on (engine off) and, using pressure port on Mityvac or similar tool, apply pressure to system through "T" until FTPS output voltage is approximately 4v. Clamp off hose to Mityvac and monitor FTPS output voltage for 1 minute. After 1 minute FTPS output voltage should not drop more than 0.1v. Did voltage drop more than 0.1v?		<div style="border: 1px solid black; padding: 5px;"> <p>NOTE</p> <p>If voltage does not increase as described, check:</p> <ul style="list-style-type: none"> ⇒ Remove gas cap and verify release of pressure. If release of pressure is verified, replace FTPS. If no release of pressure is noticed, proceed to check #2. ⇒ Plugged vapor lines between PSV and fuel tank. ⇒ Fuel in canister due to stuck closed CCV (refer to step 6). Repair as necessary. </div>
		YES	Remove clamp from hose to Mityvac, pressurize system to a maximum of 2 psi and clamp off system again. With system sealed and pressurized, check for leaks with a R134-A leak detector (be sure to check hoses at rollover/check valves, canister and gasket at Tank Unit). Repair as necessary and then redo step 9.
		NO	Go to step 10.
10	Remove jumper wire to GND from BOB pin 18. Voltage at BOB pin 76 should drop (within approximately 15 seconds) to within 10% of base voltage measured in step 4. Did voltage drop as described?	YES	Go to step 11.
		NO	Recheck evap lines, check/rollover valves, CCV and canister for obstructions. Repair as necessary and redo steps 9 and 10.
11	Repeat steps 9 and 10. However, instead of removing jumper wire to GND from BOB pin 18, jumper a wire from BOB pin 36 (PSV ground control) to GND and monitor FTPS output voltage at BOB pin 76. Again, output voltage should drop but a little slower as PSV has a small controlling orifice in it (voltage should drop to within 10% of base voltage within approximately 30 seconds). Did voltage drop as described?	YES	Go to step 12.
		NO	Recheck PSV operation and canister for obstructions. Repair as necessary and redo step 11.
12	Clear codes and return vehicle to original condition. Verify any repairs by driving vehicle per following Readiness Drive Cycle. Make sure ECT is below 150 degrees F before starting drive cycle. After completing test, check for any pending codes (refer to section 3 of the KIA Data Pro Generic OBD-II Program Card reference manual).		