

Technical Service Bulletin

Mazda North American Operations
Irvine, CA 92618-2922

**Subject:**

**MULTI-MODEL - DETERMINING EVAPORATIVE SYSTEM LEAK
LOCATION FOR DTCs P0441 / P0442 / P0455 / P0456**

Bulletin No.: 01-002/18

Last Issued: 01/30/2018

BULLETIN NOTES

This bulletin supersedes the previously issued bulletin(s) listed below. The changes are noted below in Red.

Previously Issued TSBs:	Date(s) Issued
01-023/10	10/15/10 and 04/16/10
01-021/09	06/16/09

APPLICABLE MODEL(S) / VINS

2006-2015 MX-5	2007-2010 Mazdaspeed3	2006-2007 Mazdaspeed6
2007-2010 CX-7	2006-2010 Mazda5	
2004-2010 Mazda3	2003-2010 Mazda6	

DESCRIPTION

Some vehicles may have a MIL illumination with DTC's P0441, P0442, P0455, or P0456 stored in memory. To determine the location of the evaporative system leak, follow the repair procedure below.

P0441 - Evaporative emission control system incorrect purge flow

P0442 - EVAP system leak detected (small leak)

P0455 - EVAP system leak detected (gross leak)

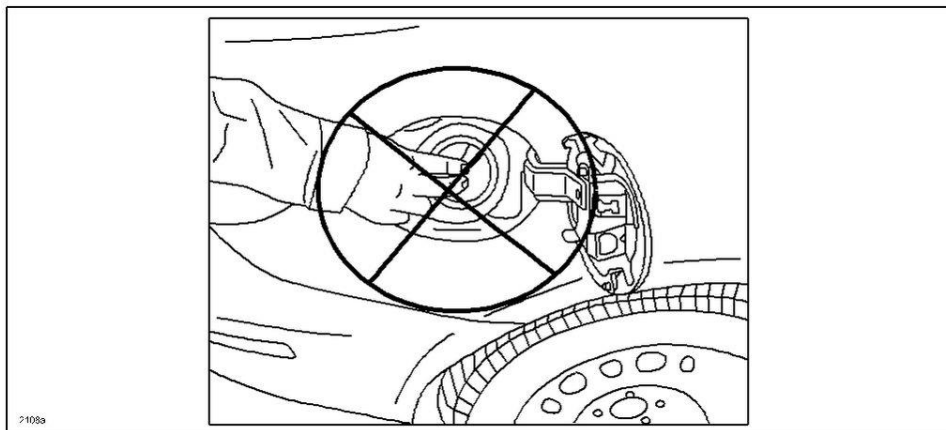
P0456 - EVAP system leak detected (very small leak)

NOTE:

- P0441 is a DTC for purge flow, however, it can be stored when evaporative emissions are leaking from the fuel filler cap.
- Evaporative emissions leak from the fuel filler cap when the cap is not closed properly after refueling.
- When diagnosing an evaporative emissions leak from the fuel filler cap, DO NOT TOUCH the fuel filler cap.

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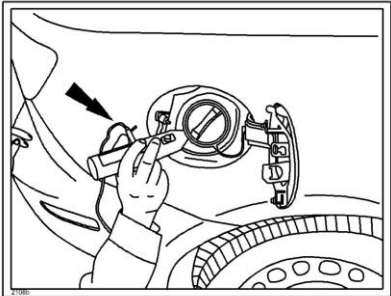
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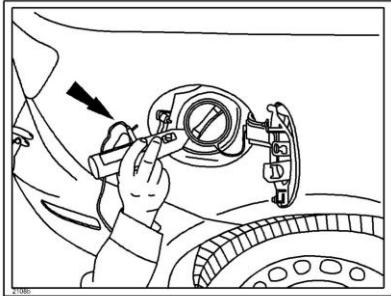
REPAIR PROCEDURE

Step	Inspection	Result	Action
1	Check if the EVAP system leak DTC is stored by any other cause. Are any of the DTCs below stored? - P0442: Purge valve malfunction - P2177 / P2178 / P2187 / P2188 / P0171 / P0172: Fuel system malfunction.	Yes	Troubleshoot the stored DTC(s) according to the appropriate MGSS online instructions or Workshop Manual.
		No	Go to the next step.

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2	Perform inspection for leakage from fuel filler cap: Connect Mazda Modular Diagnostic System (M-MDS) and perform EVAP test (KOEO). NOTE: EVAP test (KOEO) will finish in approx. two (2) minutes if the fuel tank is nearly full. In this case, perform the EVAP test (KOEO) again. While performing EVAP test (KOEO), use an Ultrasonic Leak Detector Kit and check for leakage from fuel filler cap.  Is EVAP leakage found from fuel filler cap?	Yes	Go to the next step.
3	Take action based on the affected model.	No	Go to Step 6.
		N/A	2006-2007 MX-5 (VIN: JM1NC*****111723 - 125568) 2007 CX-7 (VIN: JM3ER*****100057 - 128616) Refer to TSB 01-040/09 (MIL ILLUMINATED - P0455 SET) and perform the repair, then go to the next step.
			2004-2009 Mazda3 2007-2009 Mazdaspeed3 2006-2009 Mazda5 If the fuel cap is not a modified (improved) part, replace it with a modified part according to TSB 01-020/10 (LOOSE FUEL FILLER CAP WITH DTC P0442, P0455 AND P0456), then go to the next step.
			Models other than above: Go to the next step.

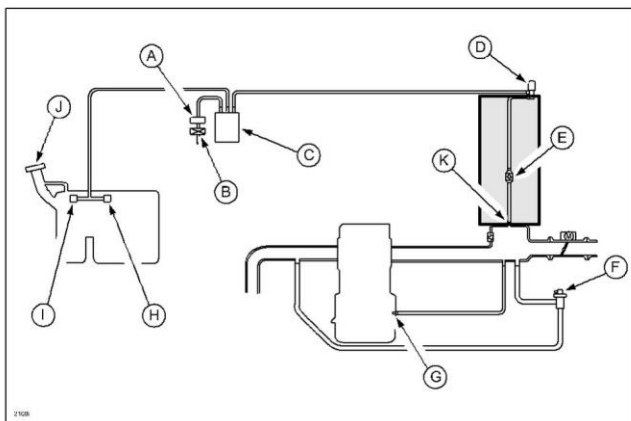
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4	Check the fuel filler cap, pipe and neck. How is the condition of the fuel filler cap and pipe?	N/A	Loose filler cap: Tighten the filler cap, then go to the next step.
			Foreign material, damage and/or rust on threads: Remove the foreign material. If the threads are damaged or rusted, replace it, then go to the next step.
			No trouble found: Go to the next step.
5	Perform inspection for leakage from fuel filler cap: Connect Mazda Modular Diagnostic System (M-MDS) and perform EVAP test (KOEO). NOTE: EVAP test (KOEO) will finish in approx. two (2) minutes if the fuel tank is nearly full. In this case, perform the EVAP test (KOEO) again. While performing EVAP test (KOEO), use an Ultrasonic Leak Detector Kit and check for leakage from fuel filler cap.  Is EVAP leakage found from fuel filler cap?	Yes	If the cap and/or filler pipe has not been replaced, replace them with modified (improved) parts, then perform this step again.
		No	Go to the next step.
6	Check EVAP leak from other than fuel filler cap/filler neck. Connect Mazda Modular Diagnostic System (M-MDS) and perform EVAP test (KOEO). Is any EVAP leak detected?	Yes	Go to the next step.
		No	Go to Step 11.

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7	Check gas-tightening of purge valve referring to the "System Structure" below. NOTE: In prior, perform "Vacuum Pump Leak Test" and verify the function of the vacuum pump tester. 1. Disconnect purge control valve vacuum tube at location (K) below, then connect vacuum pump to the disconnected tube using appropriate generic adapter. NOTE: DO NOT disconnect to the charcoal canister side (C). 2. Check if both vacuum (a and b below) can be held between locations (K and D). a. Apply 60 kPa {18 inHg} of vacuum and verify it is within 60 kPa – 30 kPa {18 inHg - 9 inHg} when checked ten (10) seconds later. b. Apply 10 kPa {3 inHg} of vacuum and verify it is within 10 kPa – 5 kPa {3 inHg - 2 inHg} when checked ten (10) seconds later.	Yes	Both conditions (a and b) are met. Go to Step 9.
		No	Neither conditions (a or b) are met. Replace purge solenoid valve (D) with a new part according to the appropriate MGSS online instructions or Workshop Manual (section 01-16 PURGE SOLENOID VALVE REMOVAL/INSTALLATION), then go to the next step.

System Structure:



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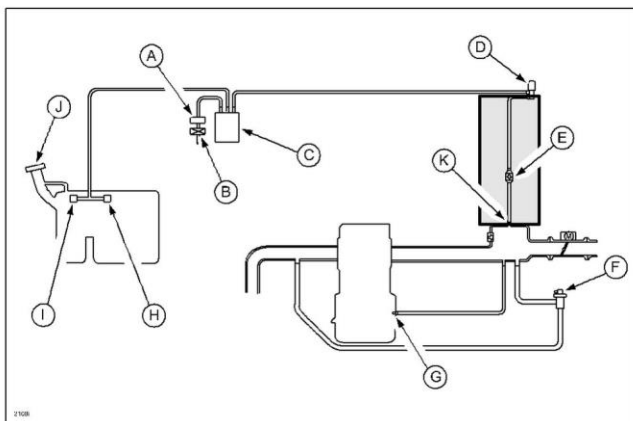
A - EVAP System Leak Detection Pump	G - PCV Valve
B - Air Filter	H - Rollover Valve
C - Charcoal Canister	I - Fuel Shut-Off Valve
D - Purge Solenoid Valve	J - Fuel Filler Cap
E - Check Valve - (DISI Engine only)	K - Insert Generic Adapter (Purge Side)
F - EGR Valve	---

8	Check EVAP leak from other locations. Connect Mazda Modular Diagnostic System (M-MDS) and perform EVAP test (KOEO). Is any EVAP leak detected?	Yes	Go to the next step.
		No	Repair complete.
9	Verify the point of EVAP leakage. Disconnect vacuum tube between purge solenoid valve and canister. Connect Smoke Tester to canister side, then perform the test. NOTE: Refer to "EVAP System Leak Detection Using Smoke Tester" for precaution. Is the EVAP leak point verified?	Yes	Fix the leak, then go to the next step.
		No	You may not be able to duplicate the trouble. Go back to Step 6.
10	Check EVAP leak from other locations. Connect Mazda Modular Diagnostic System (M-MDS) and perform EVAP test (KOEO). Is any EVAP leak detected?	Yes	EVAP leak from other location is possible. Go back to Step 9.
		No	Repair complete.
11	Check if EVAP system leak DTC is stored by malfunction of purge solenoid valve. Was DTC P0441 stored at the beginning?	Yes	Go to the next step.
		No	Go to Step 15.

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Check gas-tightening of purge valve referring to the "System Structure" below. 1. Disconnect purge control valve vacuum tube, then connect vacuum pump using appropriate generic adapter at location (K) (intake manifold side). NOTE: DO NOT disconnect to the charcoal canister side (C). 122. Check if both vacuum (a and b below) can be held between locations (K and D). a. Apply 60 kPa {18 inHg} of vacuum and verify it is within 60 kPa – 30 kPa {18 inHg - 9 inHg} when checked ten (10) seconds later. b. Apply 10 kPa {3 inHg} of vacuum and verify it is within 10 kPa – 5 kPa {3 inHg - 2 inHg} when checked ten (10) seconds later.	Yes Both conditions (a and b) are met. Go to the next step.
	No Neither conditions (a or b) are met. Replace purge solenoid valve (D) with a new part according to the appropriate MGSS online instructions or Workshop Manual (section 01-16 PURGE SOLENOID VALVE REMOVAL/INSTALLATION).

System Structure:

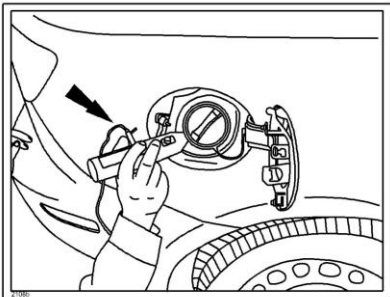


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B - Air Filter	H - Rollover Valve
C - Charcoal Canister	I - Fuel Shut-Off Valve
D - Purge Solenoid Valve	J - Fuel Filler Cap
E - Check Valve - (DISI Engine only)	K - Insert Generic Adapter (Purge Side)
F - EGR Valve	---

13	Check if purge solenoid valve is stuck closed. a. Re-connect intake manifold side vacuum hose previously disconnected. b. Connect M-MDS, then perform KOER (Self Test) for purge flow. Is the result of KOER (Self Test) fail (DTC P0441 is retrieved)?	Yes	Replace purge solenoid valve with a new part according to the appropriate MGSS online instructions or Workshop Manual (section 01-16 PURGE SOLENOID VALVE REMOVAL/INSTALLATION), then perform KOER (Self Test) for purge flow and verify the purge valve is working properly.
		No	Go to the next step.
14	Check EVAP leak from other locations. Connect Mazda Modular Diagnostic System (M-MDS) and perform EVAP test (KOEO). Is any EVAP leak detected?	Yes	Trouble is duplicated. It may be able to detect with smoke tester. Go back to Step 9.
		No	Repair complete.
15	Verify the point of EVAP leakage. Disconnect vacuum tube between purge solenoid valve and canister. (A) Connect Smoke Tester to canister side, then apply pressure without smoke. (B) Connect Smoke Tester to purge solenoid side, then apply pressure without smoke. NOTE: Refer to "EVAP System Leak Detection Using Smoke Tester" for precaution. Is the pressure retained on both tests (A B)?	Yes	Go to the next step.
		No	Trouble is duplicated. It may be able to detect with smoke tester. Go back to Step 9.
16	Take action based on the affected model.	N/A	2006-2007 MX-5 (VIN: JM1NC*****111723 - 125568) 2007 CX-7 (VIN: JM3ER*****100057 - 128616) Refer to TSB 01-040/09 (MIL ILLUMINATED - P0455 SET) and perform the repair, then go to the next step.
			2004-2009 Mazda3 2007-2009 Mazdaspeed3 2006-2009 Mazda5

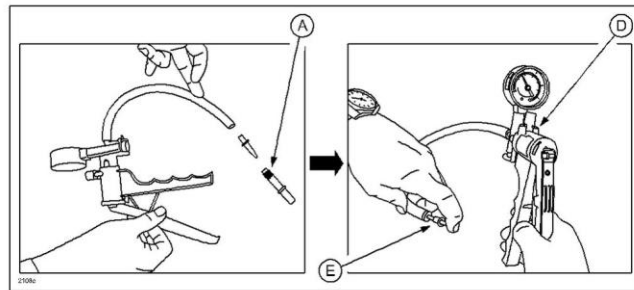
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			If the fuel cap is not a modified (improved) part, replace it with a modified part according to TSB 01-020/10 (LOOSE FUEL FILLER CAP WITH DTC P0442, P0455 AND P0456), then go to the next step.
			Models other than above: Go to the next step.
17	Perform inspection for leakage from fuel filler cap: Connect Mazda Modular Diagnostic System (M-MDS) and perform EVAP test (KOEO). NOTE: EVAP test (KOEO) will finish in approx. two (2) minutes if the fuel tank is nearly full. In this case, perform the EVAP test (KOEO) again. While performing EVAP test (KOEO), use an Ultrasonic Leak Detector Kit and check for leakage from fuel filler cap.  Is EVAP leakage found from fuel filler cap?	Yes	Go back to Step 4 and check the fuel filler cap and/or fuel filler neck.
		No	Go to the next step.
18	Check EVAP leak from other than fuel filler cap. Connect Mazda Modular Diagnostic System (M-MDS) and perform EVAP test (KOEO). Is any EVAP leak detected?	Yes	Trouble is duplicated. It may be able to detect with smoke tester. Go back to Step 9.
		No	Repair complete.

Vacuum Pump Leak Test:

1. Perform leak test between vacuum pump and appropriate generic adapter (A) to be used during the testing:
 - a. Connect appropriate generic adapter to vacuum pump and ensure vacuum pressures (b and c) can be held between locations (D and E).
 - b. Apply vacuum pressure of 60 kPa {18 inHg} of vacuum and monitor for 20 seconds.
 - c. Apply vacuum pressure of 10 kPa {3 inHg} of vacuum and monitor for 20 seconds.

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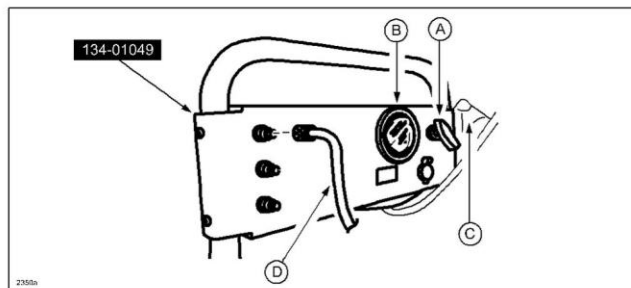
d.

EVAP System Leak Detection Using Smoke Tester:

NOTE: For additional information regarding the following procedure, reference the EVAP system leak detection owners manual.

2. Calibrate the leak tester for diagnosis.

- a. Verify that the control valve on the panel is in the HOLD position, then open the nitrogen bottle valve.



A - Control Valve

B - Gauge

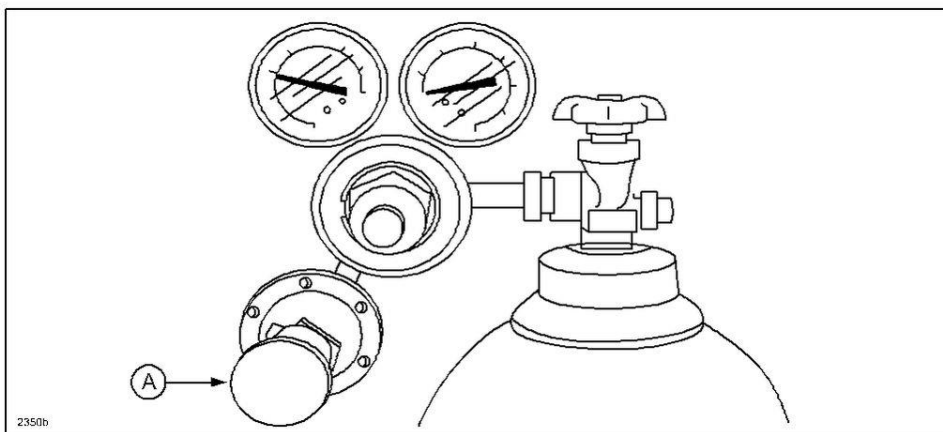
C - Flow Meter

D - EVAP Tester Hose

- b. Connect the vehicle interface hose (part of generic adapter) to the SELF-TEST port located on the control panel. Hand tighten the fitting (do not over-tighten).

- c. Turn the control valve to the TEST position (the gauge should read 331 - 381 mm {13 - 15 in} of water).

NOTE: If the gauge is not reading in above range, adjust the pressure by turning the black knob (A) on the low pressure regulator on the nitrogen bottle.



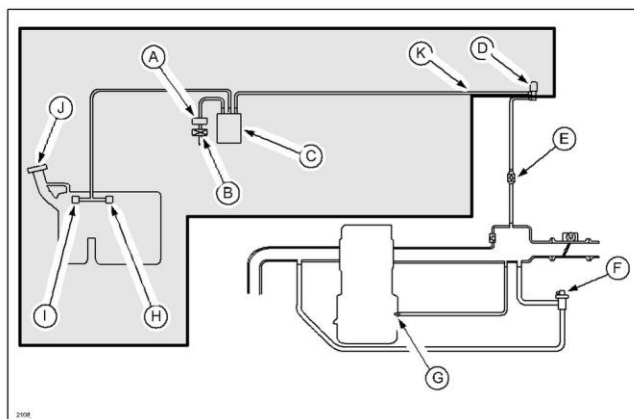
d. After verifying the regulator is properly calibrated, turn the control valve to the HOLD position.

e. Verify the gauge holds pressure and the flow meter reads no flow.

3. Disconnect the vacuum tube at or near the purge control valve on the charcoal canister side (shaded area below); Insert the appropriate smoke tester adapter into the vacuum tube at location (K).

NOTE: If the smoke tester is input using the fuel filler cap adapter (as shown on MGSS online instructions or the Workshop Manual), leakage from the fuel filler cap will not be detected.

- a. Close the change over valve (COV) using Mode 8.
- b. **NOTE:** M-MDS Mode 8 will release the COV after ten (10) minutes. Close the COV again as necessary to finish the inspection.
- c. Induce smoke into the system.
- d. Loosen the fuel cap (J) until the smoke starts coming out. Close the fuel cap and inspect the EVAP system for leaks.



A - EVAP System Leak Detection Pump	G - PCV Valve
B - Air Filter	H - Rollover Valve
C - Charcoal Canister	I - Fuel Shut-Off Valve
D - Purge Solenoid Valve	J - Fuel Filler Cap
E - Check Valve	K - Hook Up SmokeTester (Canister Side)
F - EGR Valve	---

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