

Last Modified: 1-31-2018	6.8:8.0.48	Doc ID: RM0000013HB019X
Model Year Start: 2010	Model: GX460	Prod Date Range: [11/2009 -]
Title: 1UR-FE ENGINE CONTROL: SFI SYSTEM: P2431-P2433,P2436-P2438; Secondary Air Injection System Air Flow / Pressure Sensor Circuit Range / Performance Bank1; 2010 MY GX460 [11/2009 -]		

DTC	P2431	Secondary Air Injection System Air Flow / Pressure Sensor Circuit Range / Performance Bank1
------------	--------------	--

DTC	P2432	Secondary Air Injection System Air Flow / Pressure Sensor Circuit Low Bank1
------------	--------------	--

DTC	P2433	Secondary Air Injection System Air Flow / Pressure Sensor Circuit High Bank1
------------	--------------	---

DTC	P2436	Secondary Air Injection System Air Flow / Pressure Sensor Circuit Range / Performance Bank 2
------------	--------------	---

DTC	P2437	Secondary Air Injection System Air Flow / Pressure Sensor Circuit Low Bank 2
------------	--------------	---

DTC	P2438	Secondary Air Injection System Air Flow / Pressure Sensor Circuit High Bank 2
------------	--------------	--

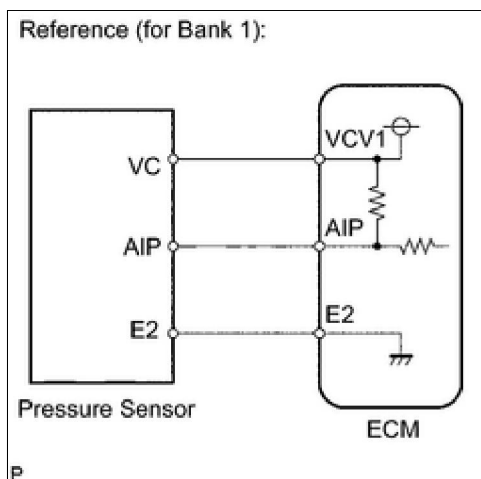
DESCRIPTION

Refer to DTC P0412 [INFO](#) .

Refer to DTC P0416 [INFO](#) .

DTC NO.	DTC DETECTION CONDITION	TROUBLE AREA
P2431 P2436	Pressure sensor indicates a value below 45.6 kPa (342 mmHg), or higher than 135 kPa (1013 mmHg) (2 trip detection logic).	<ul style="list-style-type: none"> • Pressure sensor • Open or short in pressure sensor circuit • ECM
P2432 P2437	While the engine is running, the voltage output of the pressure sensor is below 0.5 V (1 trip detection logic).	<ul style="list-style-type: none"> • Pressure sensor • Open or short in pressure sensor circuit • ECM
P2433 P2438	While the engine is running, the voltage output of the pressure sensor is higher than 4.5 V (1 trip detection logic).	<ul style="list-style-type: none"> • Pressure sensor • Open or short in pressure sensor circuit • ECM

MONITOR DESCRIPTION



The ECM monitors the pressure in the secondary air passage using the pressure sensor located on the air switching valve in the secondary air injection system. Using this pressure value, the ECM determines whether the secondary air injection system is malfunctioning or not.

If there is a defect in the sensor or the sensor circuit, the voltage level deviates from the normal operating range. The ECM interprets this deviation as a malfunction in the pressure sensor or circuit and stores a DTC.

MONITOR STRATEGY

Related DTCs	P2431: Air flow/Pressure sensor circuit rationality P2432: Air flow/Pressure sensor circuit range check (Low voltage) P2433: Air flow/Pressure sensor circuit range check (High voltage) P2436: Air flow/Pressure sensor circuit rationality P2437: Air flow/Pressure sensor circuit range check (Low voltage) P2438: Air flow/Pressure sensor circuit range check (High voltage)
Required Sensors/Components (Main)	Pressure sensor
Required Sensors/Components (Related)	-
Frequency of Operation	Continuous
Duration	P2432, P2433, P2437, P2438: 0.5 seconds P2431, P2436: 5 seconds
MIL Operation	P2432, P2433, P2437, P2438: Immediate P2431, P2436: 2 driving cycles
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

P2431 and P2436

Monitor runs whenever following DTCs not present	P2432, P2433, P2437, P2438 (AIR pressure sensor - Low/High)
Starter	OFF
Battery voltage	8 V or higher
Engine switch	On (IG)

P2432, P2433, P2437 and P2438

Monitor runs whenever following DTCs not present	None
Starter	OFF
Battery voltage	8 V or higher
Engine switch	On (IG)

TYPICAL MALFUNCTION THRESHOLDS

P2431 and P2436

Secondary air injection system pressure	Below 45.63 kPa (342 mmHg), or higher than 135 kPa (1013 mmHg)
---	--

P2432 and P2437

Secondary air injection system pressure sensor voltage	Below 0.5 V
--	-------------

P2433 and P2438

Secondary air injection system pressure sensor voltage	Higher than 4.5 V
--	-------------------


COMPONENT OPERATING RANGE

Secondary air injection system pressure sensor voltage	Between 0.5 V and 4.5 V
--	-------------------------

CONFIRMATION DRIVING PATTERN

NOTICE:

- This Air Injection Check only allows technicians to operate the secondary air injection system for a maximum of 5 seconds. Furthermore, the check can only be performed up to 4 times per trip. If the test is repeated, intervals of at least 30 seconds are required between checks. While secondary air injection system operation using the Techstream is prohibited, the Techstream display indicates the prohibition (WAIT or ERROR). If ERROR is displayed on the Techstream during the test, stop the engine for 10 minutes, and then try again.
- Performing Air Injection Check repeatedly may cause damage to the secondary air injection system. If it is necessary to repeat the check, leave an interval of several minutes between System Check operations to prevent the system from overheating.
- When performing the Air Injection Check operation after the battery cable has been reconnected, wait for 7 minutes with the engine switch turned on (IG) or the engine running.
- Turn the engine switch off when the Air Injection Check operation finishes.

1. Start the engine and warm it up.
2. Turn the engine switch off.
3. Connect the Techstream to the DLC3.
4. Turn the engine switch on (IG).
5. Turn the Techstream on.
6. Clear DTCs (even if no DTCs are stored, perform the clear DTC operation)  .
7. Turn the engine switch off and wait for at least 30 seconds.
8. Turn the engine switch on (IG) and turn the Techstream on.
9. Enter the following menus: Powertrain / Engine and ECT / Utility / Air injection check / Automatic Mode.
10. Start the engine after the Techstream initialization is finished.
11. Perform the System Check operation by pressing ENTER (Next).
12. Perform the following to confirm the secondary air injection system pending codes: Press ENTER (Exit).
13. Check for pending DTCs.

OK:

No pending DTC is output.

14. After "Air injection check" is completed, check for All Readiness by entering the following menus:
Powertrain / Engine and ECT / Utility / All Readiness.
15. Input the DTC: P2431, P2432, P2433, P2436, P2437 or P2438.
16. Check the DTC judgment result.

TECHSTREAM DISPLAY	DESCRIPTION
NORMAL	<ul style="list-style-type: none"> • DTC judgment completed • System normal
ABNORMAL	<ul style="list-style-type: none"> • DTC judgment completed • System abnormal
INCOMPLETE	<ul style="list-style-type: none"> • DTC judgment not completed • Perform driving pattern after confirming DTC enabling conditions
UNKNOWN	<ul style="list-style-type: none"> • Unable to perform DTC judgment • Number of DTCs which do not fulfill DTC preconditions has reached ECU memory limit

HINT:

- If the judgment result shows **NORMAL**, the system is normal.
- If the judgment result shows **ABNORMAL**, the system has a malfunction.

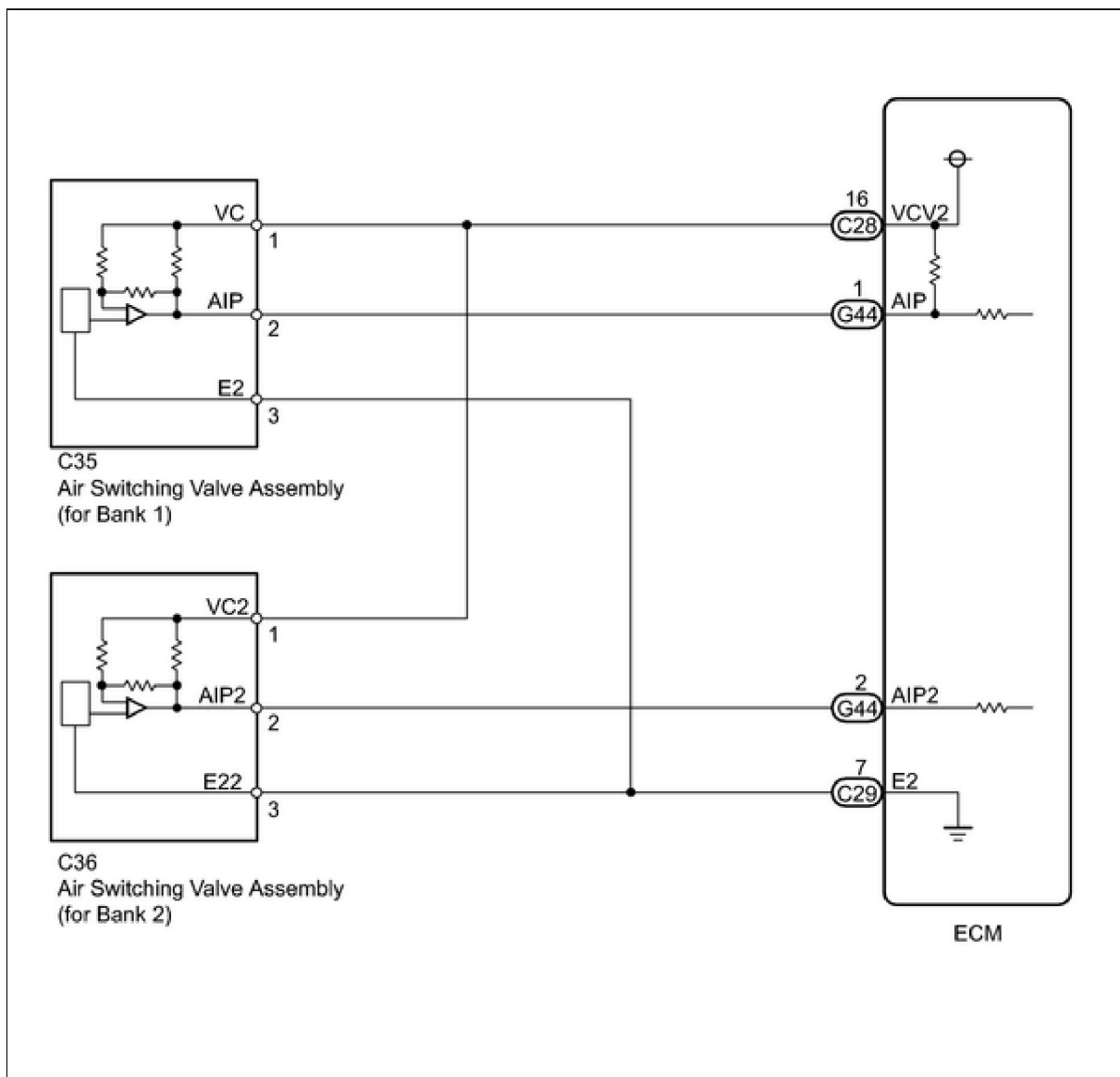
17. If the judgment result is INCOMPLETE or UNKNOWN and no pending DTC is output, perform a universal trip and check for permanent DTCs  .

HINT:

- If no permanent DTC is output, the system is normal.
- If a permanent DTC is output, the system is malfunctioning.

18. Turn the engine switch off.

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

- Refer to "Data List / Active Test" [Air Pump Pressure (Absolute) and Air Pump2 Pressure (Absolute)] INFO
 - Read freeze frame data using the Techstream. Freeze frame data records the engine condition when malfunctions are detected. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.
 - Bank 1 refers to the bank that includes the No. 1 cylinder*.
- *: The No. 1 cylinder is the cylinder which is farthest from the transmission.
- Bank 2 refers to the bank that does not include the No. 1 cylinder.

PROCEDURE

1. CHECK HARNESS AND CONNECTOR (PRESSURE SENSOR - ECM)

- Disconnect the air switching valve connector.
- Disconnect the ECM connectors.
- Measure the resistance according to the value(s) in the table below.

Standard Resistance:

TESTER CONNECTION	CONDITION	SPECIFIED CONDITION
C35-2 (AIP) - G44-1 (AIP)	Always	Below 1 Ω
C35-1 (VC) - C28-16 (VCV2)	Always	Below 1 Ω
C35-3 (E2) - C29-7 (E2)	Always	Below 1 Ω
C36-2 (AIP2) - G44-2 (AIP2)	Always	Below 1 Ω
C36-1 (VC2) - C28-16 (VCV2)	Always	Below 1 Ω
C36-3 (E22) - C29-7 (E2)	Always	Below 1 Ω
C35-2 (AIP) or G44-1 (AIP) - Body ground	Always	10 k Ω or higher
C35-1 (VC) or C28-16 (VCV2) - Body ground	Always	10 k Ω or higher
C36-2 (AIP2) or G44-1 (AIP2) - Body ground	Always	10 k Ω or higher
C36-1 (VC2) or C28-16 (VCV2) - Body ground	Always	10 k Ω or higher

NG  **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

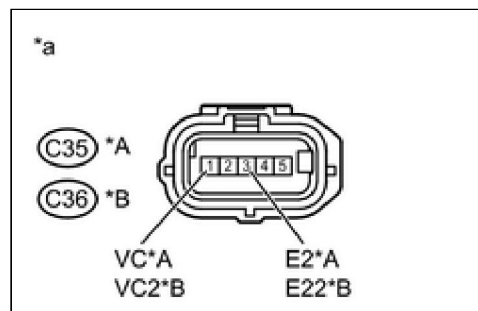


2. CHECK TERMINAL VOLTAGE (VC OF AIR SWITCHING VALVE)

- (a) Disconnect the air switching valve connector.
- (b) Turn the engine switch on (IG).
- (c) Measure the voltage according to the value(s) in the table below.

Standard Resistance:

TESTER CONNECTION	CONDITION	SPECIFIED CONDITION
C35-1 (VC) - C35-3 (E2)	Engine switch on (IG)	4.5 to 5.5 V
C36-1 (VC2) - C36-3 (E22)	Engine switch on (IG)	4.5 to 5.5 V



Text in Illustration

*A	Bank 1
*B	Bank 2
*a	Front view of wire harness connector (to Air Switching Valve Assembly)

NG  **REPLACE ECM**

OK
▼

3. REPLACE AIR SWITCHING VALVE ASSEMBLY

(a) Replace the air switching valve assembly.

HINT:

- Replace the air switching valve assembly for bank 1  .
- Replace the air switching valve assembly for bank 2  .

NEXT
▼

4. CHECK WHETHER DTC OUTPUT RECURS

(a) Perform the Confirmation Driving Pattern.

Result

DISPLAY (DTC OUTPUT)	PROCEED TO
NORMAL (No DTC output)	A
ABNORMAL (P2431, P2432, P2433, P2436, P2437 or P2438 output)	B

B ► REPLACE ECM

A ► END

