

**Computers and Control Systems: Pinpoint Tests****Test HX: Evaporative Emission (EVAP) System and Monitor****PINPOINT TEST HX: EVAPORATIVE EMISSION (EVAP) SYSTEM AND MONITOR****Evaporative Emission (EVAP) System  
and Monitor****HX**

**⚠ WARNING: Crown Victoria Police Interceptor vehicles equipped with fire suppression system, refer to Fire Suppression System for Important Safety Warnings. Failure to follow these instructions may result in personal injury.**

**⚠ WARNING: Before repairing or installing a new component in the fuel system, reduce the possibility of injury or fire by following the warning, caution, and handling directions in pinpoint test HC. Failure to follow these instructions may result in personal injury.**

Note: Use this pinpoint test only when directed here.

The use of a soap solution around the fuel filler cap or capless fuel tank filler pipe (if equipped) or the use of the hydrocarbon emission analyzer to determine an evaporative emission system leak is not recommended. The mandatory Rotunda Evaporative Emission System Leak Tester for On Board Diagnostic (OBD) (including the ultrasonic tester) and the Rotunda Vacutec 522 Leak Detector Smoke Machine are the only devices to be used at this time for evaporative emission system leak detection.

When using the smoke machine, the fuel level in the fuel tank must be less than 85% full.

This pinpoint test is intended to diagnose the following:

- canister vent (CV) solenoid (9F945)
- fuel filler cap (9030)
- capless fuel tank filler pipe (9034)
- fuel tank pressure (FTP) sensor (9C052)
- EVAP canister purge (EVAPCP) valve (9C915). Also known as the vapor management valve (VMV).
- EVAP system leaks using the Rotunda Vacutec Leak Detector Smoke Machine.
- harness circuits: B+, CV, EVAPCP, FTP, FTPREF, SIGRTN, VPWR, VREF and CASE GND
- powertrain control module (PCM) (12A650)

For additional information on the EVAP system, refer to Description and Operation, Evaporative Emission (EVAP) Systems, Evaporative Emissions.

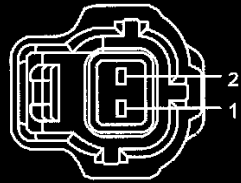
**Canister Vent (CV) Solenoid Connector**

For applications that use the engine off natural vacuum (EONV) EVAP leak check monitor, KAPWR provides voltage to the CV solenoid instead of VPWR.

# Evaporative Emission (EVAP) System and Monitor

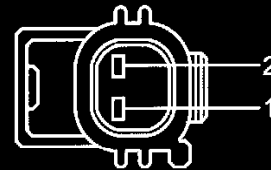
**HX**

**A**



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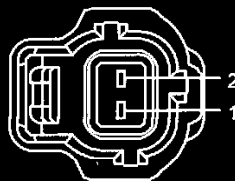
**B**



A0077524

Vehicle	Connector	Pin	Circuit
Escape/Mariner, Explorer, Explorer Sport Trac, Mountaineer	A	2 1	KAPWR CANV
Mustang	B	2 1	CANV VPWR
All other vehicles	A	1 2	KAPWR CANV

## EVAP Canister Purge (EVAPCP) Valve Connector



A0077550

Pin	Circuit
2	EVAPCP (EVAP Canister Purge)
1	VPWR (Vehicle Power)

Canister Vent (CV) Solenoid Connector And EVAP Canister Purge (EVAPCP) Valve Connector

# Evaporative Emission (EVAP) System and Monitor

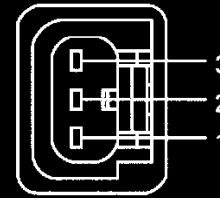
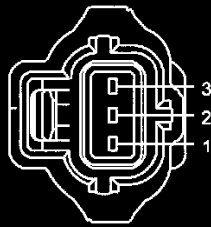
HX

## Fuel Tank Pressure (FTP) Sensor Connector

For applications that use the engine off natural vacuum (EONV) EVAP leak check monitor, FTPREF provides voltage to the FTP sensor instead of VREF.

A

B



A0077554

A0077573

Vehicle	Connector	Pin	Circuit
E-Series tank design, F-Super Duty tank design	A	3 1 2	FTP FTPREF SIGRTN
Mustang	B	3 2 1	FTP SIGRTN VREF
All other vehicles	B	3 1 2	FTP FTPREF SIGRTN

## Powertrain Control Module (PCM) Connector

For PCM connector views or reference values, refer to Reference Values.

# Evaporative Emission (EVAP) System and Monitor

## HX

Vehicle	Connector	Pin	Circuit
E-Series, F-Super Duty	170 Pin	B13 B3 B40 B41 B40 E1	CANV FTP FTPREF SIGRTN VREF EVAPCP
Edge, MKX, Sable, Taurus, Taurus X	190 Pin	B61 B44 B29 B58 B29, B64 B50	CANV FTP FTPREF SIGRTN VREF EVAPCP
Escape/Mariner	150 (50-50-50) Pin	B13 B9 B40 B41 B40 B34	CANV FTP FTPREF SIGRTN VREF EVAPCP
Expedition, Navigator	140 Pin	B61 B44 B29 B58 E57 B50	CANV FTP FTPREF SIGRTN VREF EVAPCP
F-150, Mark LT	190 Pin	B61 B44 B65 B58 B29 B50	CANV FTP FTPREF SIGRTN VREF EVAPCP
Focus	190 Pin	B20 B65 B66 B58 B52, B66 B55	CANV FTP FTPREF SIGRTN VREF EVAPCP
Fusion, Milan, MKZ	140 Pin	B61 B44 B29 B58 B33 B4	CANV FTP FTPREF SIGRTN VREF EVAPCP
Mustang	170 Pin	B13 B3 B41 B40 E6	CANV FTP SIGRTN VREF EVAPCP
All other vehicles	170 Pin	B13 B3 B40 B41 B40 E6	CANV FTP FTPREF SIGRTN VREF EVAPCP

Powertrain Control Module (PCM) Connector Continued

# Evaporative Emission (EVAP) System and Monitor

**HX**

Test Step		Results / Action to Take				
<b>HX1</b>	<b>CHECK FOR DIAGNOSTIC TROUBLE CODES (DTCs)</b> <ul style="list-style-type: none"> <li>Are DTCs P0442, P0443, P0446, P0451, P0452, P0453, P0455, P0456, P0457, P0460, P0461, P0462, P0463, P1443, P144A, P1450, P1451, or P260F present?</li> </ul>	<p><b>Yes</b>                      For DTCs P0442 or P0456, GO to <b>HX46</b>.                      For DTC P0443, GO to <b>HX2</b>.                      For DTCs P0446 or P1451, GO to <b>HX30</b>.                      For DTC P0451, GO to <b>HX39</b>.                      For DTC P0452, GO to <b>HX18</b>.                      For DTC P0453, GO to <b>HX23</b>.                      For DTCs P0455 or P0457, GO to <b>HX40</b>.                      For DTC P0460, GO to <b>HX38</b>.                      For DTCs P0461 through P0463, GO to <b>HX36</b>.                      For DTC P1443, GO to <b>HX43</b>.                      For DTC P144A, GO to <b>HX49</b>.                      For DTC P1450, GO to <b>HX8</b>.                      For DTC P260F, GO to <b>HX50</b>.</p> <p><b>No</b>                      For symptoms without DTCs, GO to <b>HX13</b>.                      For all others, GO to DTC Index, Diagnostic Trouble Code (DTC) Charts and Descriptions.</p>				
<b>HX2</b>	<b>DTC P0443: CHECK THE PCM OUTPUT TO EVAP CANISTER PURGE VALVE</b> <ul style="list-style-type: none"> <li>Key in OFF position.</li> <li>EVAPCP Valve connector disconnected.</li> <li>Connect a non-powered test lamp between:                             <table border="1"> <tr> <td>( + ) EVAPCP Valve Connector, Harness Side</td> <td>( - ) EVAPCP Valve Connector, Harness Side</td> </tr> <tr> <td>VPWR - Pin 1</td> <td>EVAPCP - Pin 2</td> </tr> </table> </li> <li>Key ON, engine OFF.</li> <li>Enter output test mode. Refer to Diagnostic Methods, Output Test Mode (OTM).</li> <li>Command the outputs ON.</li> <li>Command the outputs OFF.</li> <li>Exit output test mode.</li> <li><b>Does the test lamp turn on and off when the output(s) is commanded on and off?</b></li> </ul>	( + ) EVAPCP Valve Connector, Harness Side	( - ) EVAPCP Valve Connector, Harness Side	VPWR - Pin 1	EVAPCP - Pin 2	<p><b>Yes</b>                      GO to <b>HX3</b>.</p> <p><b>No</b>                      GO to <b>HX4</b>.</p>
( + ) EVAPCP Valve Connector, Harness Side	( - ) EVAPCP Valve Connector, Harness Side					
VPWR - Pin 1	EVAPCP - Pin 2					

# Evaporative Emission (EVAP) System and Monitor

## HX

Test Step		Results / Action to Take				
<b>HX3</b>	<b>CHECK THE EVAP CANISTER PURGE VALVE SOLENOID RESISTANCE</b> <ul style="list-style-type: none"> <li>Key in OFF position.</li> <li>EVAPCP Valve connector disconnected.</li> <li>Measure the resistance between: <table border="1"> <tr> <td>( + ) EVAPCP Valve Connector, Component Side</td> <td>( - ) EVAPCP Valve Connector, Component Side</td> </tr> <tr> <td>EVAPCP - Pin 2</td> <td>VPWR - Pin 1</td> </tr> </table> </li> <li>Is the resistance between 2.5 - 7 ohms?</li> </ul>	( + ) EVAPCP Valve Connector, Component Side	( - ) EVAPCP Valve Connector, Component Side	EVAPCP - Pin 2	VPWR - Pin 1	<b>Yes</b> Unable to duplicate or identify the concern at this time. GO to Pinpoint Test Z. <b>No</b> INSTALL a new EVAPCP valve.  CLEAR the DTCs. REPEAT the self-test.
( + ) EVAPCP Valve Connector, Component Side	( - ) EVAPCP Valve Connector, Component Side					
EVAPCP - Pin 2	VPWR - Pin 1					
<b>HX4</b>	<b>CHECK THE VPWR VOLTAGE TO THE EVAP CANISTER PURGE VALVE</b> <ul style="list-style-type: none"> <li>Key ON, engine OFF.</li> <li>Measure the voltage between: <table border="1"> <tr> <td>( + ) EVAPCP Valve Connector, Harness Side</td> <td>( - ) Vehicle Battery</td> </tr> <tr> <td>VPWR - Pin 1</td> <td>Negative terminal</td> </tr> </table> </li> <li>Is the voltage greater than 10 V?</li> </ul>	( + ) EVAPCP Valve Connector, Harness Side	( - ) Vehicle Battery	VPWR - Pin 1	Negative terminal	<b>Yes</b> GO to HX5. <b>No</b> REPAIR the open circuit. CLEAR the DTCs. REPEAT the self-test.
( + ) EVAPCP Valve Connector, Harness Side	( - ) Vehicle Battery					
VPWR - Pin 1	Negative terminal					
<b>HX5</b>	<b>CHECK THE EVAP CANISTER PURGE VALVE CIRCUIT FOR AN OPEN IN THE HARNESS</b> <ul style="list-style-type: none"> <li>Key in OFF position.</li> <li>PCM connector disconnected.</li> <li>Measure the resistance between: <table border="1"> <tr> <td>( + ) PCM Connector, Harness Side</td> <td>( - ) EVAPCP Valve Connector, Harness Side</td> </tr> <tr> <td>EVAPCP</td> <td>EVAPCP - Pin 2</td> </tr> </table> </li> <li>Is the resistance less than 5 ohms?</li> </ul>	( + ) PCM Connector, Harness Side	( - ) EVAPCP Valve Connector, Harness Side	EVAPCP	EVAPCP - Pin 2	<b>Yes</b> GO to HX6. <b>No</b> REPAIR the open circuit. CLEAR the DTCs. REPEAT the self-test.
( + ) PCM Connector, Harness Side	( - ) EVAPCP Valve Connector, Harness Side					
EVAPCP	EVAPCP - Pin 2					
<b>HX6</b>	<b>CHECK THE EVAP CANISTER PURGE VALVE CIRCUIT FOR A SHORT TO PWRGND IN THE HARNESS</b> <ul style="list-style-type: none"> <li>Measure the resistance between: <table border="1"> <tr> <td>( + ) PCM Connector, Harness Side</td> <td>( - )</td> </tr> <tr> <td>EVAPCP</td> <td>Ground</td> </tr> </table> </li> <li>Is the resistance greater than 10K ohms?</li> </ul>	( + ) PCM Connector, Harness Side	( - )	EVAPCP	Ground	<b>Yes</b> GO to HX7. <b>No</b> REPAIR the short circuit. CLEAR the DTCs. REPEAT the self-test.
( + ) PCM Connector, Harness Side	( - )					
EVAPCP	Ground					

HX3-HX6

# Evaporative Emission (EVAP) System and Monitor

**HX**

Test Step		Results / Action to Take				
<b>HX7</b>	<p><b>CHECK THE EVAP CANISTER PURGE VALVE CIRCUIT FOR A SHORT TO VOLTAGE IN THE HARNESS</b></p> <ul style="list-style-type: none"> <li>Key ON, engine OFF.</li> <li>Measure the voltage between:</li> </ul> <table border="1" style="margin-left: 20px;"> <tr> <td style="padding: 2px;">( + ) EVAPCP Valve Connector, Harness Side</td> <td style="padding: 2px;">( - )</td> </tr> <tr> <td style="padding: 2px;">EVAPCP - Pin 2</td> <td style="padding: 2px;">Ground</td> </tr> </table> <ul style="list-style-type: none"> <li>Is the voltage less than 1 V?</li> </ul>	( + ) EVAPCP Valve Connector, Harness Side	( - )	EVAPCP - Pin 2	Ground	<p><b>Yes</b> GO to <b>HX54</b>.</p> <p><b>No</b> REPAIR the short circuit. CLEAR the DTCs. REPEAT the self-test.</p>
( + ) EVAPCP Valve Connector, Harness Side	( - )					
EVAPCP - Pin 2	Ground					
<b>HX8</b>	<p><b>DTC P1450: CHECK FOR VISUAL CAUSES OF EXCESSIVE FUEL TANK VACUUM</b></p> <p><b>Note:</b> If the CV solenoid and the fuel tank assemblies are not accessible during this step, refer to Evaporative Emissions System, Evaporative Emissions and Fuel Delivery and Air Induction, Fuel Tank and Lines for removal instructions.</p> <ul style="list-style-type: none"> <li>Check for kinks or bends in the fuel vapor hoses/tubes (EVAPCP outlet tube and EVAP canister tube).</li> <li>Visually inspect the EVAP canister inlet port, CV solenoid filter, and canister vent hose assembly for contamination or debris.</li> <li>Check the CV solenoid filter for blockage or contamination.</li> <li>Is a concern present?</li> </ul>	<p><b>Yes</b> REMOVE any contamination or debris around the fuel vapor hose/tubes and CV solenoid assembly. REMOVE kinks or bends in the EVAPCP outlet tube, EVAP canister tube, and canister vent hose assembly. CLEAR the DTCs. For repair verification, CARRY OUT the evaporative emission leak check monitor repair verification drive cycle. REFER to Diagnostic Methods, On Board Diagnostic (OBD) Drive Cycle.</p> <p><b>No</b> GO to <b>HX9</b>.</p>				
<b>HX9</b>	<p><b>CHECK THE FTP SENSOR VOLTAGE WITH THE FUEL FILLER CAP REMOVED OR THE CAPLESS FUEL TANK FILLER PIPE OPENED</b></p> <p><b>Note:</b> For vehicles with a capless fuel filler pipe, instead of removing the fuel filler cap, install the supplemental refueling adaptor provided with the vehicle to open the capless fuel tank filler pipe.</p> <ul style="list-style-type: none"> <li>Remove the fuel filler cap.</li> <li>Key ON, engine OFF.</li> <li>Access the PCM and monitor the FTP PID.</li> <li>Is the voltage between 2.4 - 2.8 V?</li> </ul>	<p><b>Yes</b> GO to <b>HX13</b>.</p> <p><b>No</b> GO to <b>HX10</b>.</p>				

# Evaporative Emission (EVAP) System and Monitor

**HX**

Test Step		Results / Action to Take								
<b>HX10</b>	<b>CHECK FOR ANY OTHER DTCS</b> <ul style="list-style-type: none"> <li>Check for other 3-wire sensor DTCs (KOEO, KOER, or continuous memory) present with the DTC P1450.</li> <li>Are any other DTCs present?</li> </ul>	<b>Yes</b> DISREGARD the current diagnostic trouble code (DTC) at this time. DIAGNOSE the next DTC. GO to DTC Index, Diagnostic Trouble Code (DTC) Charts and Descriptions.  <b>No</b> GO to HX11.								
<b>HX11</b>	<b>CHECK THE VOLTAGE TO THE FTP SENSOR</b> <ul style="list-style-type: none"> <li>Key in OFF position.</li> <li>FTP Sensor connector disconnected.</li> <li>Key ON, engine OFF.</li> <li>Measure the voltage between:</li> </ul> <table border="1" style="margin-left: 20px;"> <thead> <tr> <th>( + ) FTP Sensor Connector, Harness Side</th> <th>( - ) FTP Sensor Connector, Harness Side</th> </tr> </thead> <tbody> <tr> <td>VREF</td> <td>SIGRTN</td> </tr> <tr> <td>FTPREF</td> <td>SIGRTN</td> </tr> </tbody> </table> <ul style="list-style-type: none"> <li>Are the voltages between 4 - 6 V?</li> </ul>	( + ) FTP Sensor Connector, Harness Side	( - ) FTP Sensor Connector, Harness Side	VREF	SIGRTN	FTPREF	SIGRTN	<b>Yes</b> INSTALL a new FTP sensor. For some vehicles, the FTP sensor is integral to the fuel vapor tube assembly.  CLEAR the DTCs. For repair verification, CARRY OUT the evaporative emission leak check monitor repair verification drive cycle. REFER to Diagnostic Methods, On Board Diagnostic (OBD) Drive Cycle.  <b>No</b> GO to HX12.		
( + ) FTP Sensor Connector, Harness Side	( - ) FTP Sensor Connector, Harness Side									
VREF	SIGRTN									
FTPREF	SIGRTN									
<b>HX12</b>	<b>CHECK THE FTPREF OR VREF AND SIGRTN CIRCUIT FOR AN OPEN IN THE HARNESS</b> <ul style="list-style-type: none"> <li>Key in OFF position.</li> <li>PCM connector disconnected.</li> <li>Measure the resistance between:</li> </ul> <table border="1" style="margin-left: 20px;"> <thead> <tr> <th>( + ) PCM Connector, Harness Side</th> <th>( - ) FTP Sensor Connector, Harness Side</th> </tr> </thead> <tbody> <tr> <td>VREF</td> <td>VREF</td> </tr> <tr> <td>SIGRTN</td> <td>SIGRTN</td> </tr> <tr> <td>FTPREF</td> <td>FTPREF</td> </tr> </tbody> </table> <ul style="list-style-type: none"> <li>Are the resistances less than 5 ohms?</li> </ul>	( + ) PCM Connector, Harness Side	( - ) FTP Sensor Connector, Harness Side	VREF	VREF	SIGRTN	SIGRTN	FTPREF	FTPREF	<b>Yes</b> GO to HX54.  <b>No</b> REPAIR the open circuit. CLEAR the DTCs. REPEAT the self-test.
( + ) PCM Connector, Harness Side	( - ) FTP Sensor Connector, Harness Side									
VREF	VREF									
SIGRTN	SIGRTN									
FTPREF	FTPREF									
<b>HX13</b>	<b>CHECK IF THE ENGINE IDLES</b> <ul style="list-style-type: none"> <li>Key ON, engine running.</li> <li>Does the engine stall or is it unable to maintain idle?</li> </ul>	<b>Yes</b> GO to HX14.  <b>No</b> GO to HX15.								



# Evaporative Emission (EVAP) System and Monitor

**HX**

Test Step		Results / Action to Take
<b>HX14</b>	<b>CHECK THE EVAP SYSTEM FOR A STUCK OPEN VALVE</b>	
	<ul style="list-style-type: none"> <li>• Key in OFF position.</li> <li>• Disconnect the fuel vapor to intake manifold line at the EVAPCP valve and cap the line at the EVAPCP valve.</li> <li>• Key ON, engine running.</li> <li>• <b>Does the engine stall or is it unable to maintain idle?</b></li> </ul>	<p><b>Yes</b> The EVAP system is not the cause of the symptom. RETURN to Symptom Charts for further direction.</p> <p><b>No</b> INSTALL a new EVAPCP valve.</p> <p>CLEAR the DTCs. REPEAT the self-test.</p>
<b>HX15</b>	<b>CHECK FOR BLOCKAGE IN THE FUEL TANK VENT SYSTEM</b>	
	<p><b>Note:</b> The CV is normally open and venting to the atmosphere.</p> <ul style="list-style-type: none"> <li>• Access the PCM and monitor the EVAPPDC, EVMV, FTP and EVAPCV PIDs.</li> <li>• While monitoring the FTP PID, ramp open the EVAPCP valve by incrementally commanding the EVAPPDC PID to a 100% duty cycle (or EVMV PID to a 1,000 mA).</li> <li>• <b>Does the FTP sensor voltage drop below 2 volts when the EVAPCP valve is commanded fully open?</b></li> </ul>	<p><b>Yes</b> CHECK for blockage in the vapor line to the CV solenoid. CHECK the CV solenoid filter for blockage or contamination. CHECK the carbon canister for blockage. If OK, INSTALL a new CV solenoid.</p> <p>CLEAR the DTCs. REPEAT the self-test.</p> <p><b>No</b> GO to HX16.</p>
<b>HX16</b>	<b>CHECK THE EVAP SYSTEM FOR A STUCK OPEN VALVE</b>	
	<ul style="list-style-type: none"> <li>• Key ON, engine running.</li> <li>• Access the PCM and control the EVAPPDC PID.</li> <li>• Close the EVAPCP by commanding the EVAPPDC PID to 0% duty cycle or the EVMV PID to 0 mA.</li> <li>• Access the PCM and control the EVAPCV PID.</li> <li>• Close the CV solenoid by commanding the EVAPCV PID to ON (100% duty cycle).</li> <li>• <b>Does the FTPV PID decrease, the engine RPM change, or the engine stall, as an indication that the EVAPCP valve is stuck open?</b></li> </ul>	<p><b>Yes</b> INSTALL a new EVAPCP valve.</p> <p>CLEAR the DTCs. REPEAT the self-test.</p> <p><b>No</b> GO to HX17.</p>

# Evaporative Emission (EVAP) System and Monitor

**HX**

Test Step		Results / Action to Take
<b>HX17</b>	<b>EVAP CANISTER PURGE VALVE TEST</b>	
	<ul style="list-style-type: none"> <li>• Key ON, engine running.</li> <li>• Access the PCM and control the EVAPCV PID.</li> <li>• Close the CV solenoid by commanding the EVAPCV PID to ON (100% duty cycle).</li> <li>• Access the PCM and control the EVAPPDC PID.</li> <li>• While monitoring the FTP PID, open the EVAPCP valve by commanding the EVAPPDC PID to a 100% duty cycle (or EVMV PID to a 1,000 mA).</li> <li>• <b>Does the FTP PID decrease, the engine RPM change, or the engine stall as an indication that the EVAPCP valve is opening?</b></li> </ul>	<p><b>Yes</b> For DTC P1450, unable to duplicate or identify the concern at this time. GO to Pinpoint Test Z. For all others, CHECK the EVAP system for leaks.</p> <p><b>No</b> CHECK for blockages between the fuel tank, the EVAPCP valve, and the engine intake manifold. CHECK for obstructions in the EVAPCP valve diaphragm and ports. If OK, INSTALL a new EVAPCP valve.</p> <p>CLEAR the DTCs. REPEAT the self-test.</p>
<b>HX18</b>	<b>DTC P0452: CHECK FOR FUEL TANK PRESSURE SENSOR CONNECTOR CONTAMINATION</b>	
	<ul style="list-style-type: none"> <li>• Key in OFF position.</li> <li>• Visually check for liquid fuel contamination of the FTP sensor electrical connector.</li> <li>• Check for a completely submerged FTP sensor (tank-mounted type only) in the liquid fuel. This can affect the correct FTP voltage reading.</li> <li>• <b>Does the FTP sensor and its connector show any signs of fuel contamination?</b></li> </ul>	<p><b>Yes</b> REPAIR as necessary. ADJUST the fuel tank overfill. CLEAR the DTCs. REPEAT the self-test.</p> <p><b>No</b> GO to HX19.</p>
<b>HX19</b>	<b>CHECK FOR LOW FTP SENSOR VOLTAGE</b>	
	<p><b>Note:</b> The FTP sensor voltage with no pressure/vacuum on the fuel tank is between 2.4 and 2.8 volts.</p> <ul style="list-style-type: none"> <li>• Key ON, engine OFF.</li> <li>• Access the PCM and monitor the FTP PID.</li> <li>• <b>Is the voltage less than 0.22 V?</b></li> </ul>	<p><b>Yes</b> GO to HX20.</p> <p><b>No</b> The concern that produced the DTC P0452 is intermittent. GO to Pinpoint Test Z.</p>

# Evaporative Emission (EVAP) System and Monitor

**HX**

Test Step		Results / Action to Take								
<b>HX20</b>	<p><b>CHECK THE OPPOSITE INDUCED HIGH FTP SENSOR SIGNAL</b></p> <ul style="list-style-type: none"> <li>Key in OFF position.</li> <li>FTP Sensor connector disconnected.</li> <li>Connect a 5 amp fused jumper wire between the following:</li> </ul> <table border="1" style="width: 100%;"> <tr> <td style="text-align: center;">Point A FTP Sensor Connector, Harness Side</td> <td style="text-align: center;">Point B FTP Sensor Connector, Harness Side</td> </tr> <tr> <td style="text-align: center;">VREF</td> <td style="text-align: center;">FTP</td> </tr> </table> <ul style="list-style-type: none"> <li>Key ON, engine OFF.</li> <li>Access the PCM and monitor the FTP PID.</li> <li><b>Is the voltage between 4 - 6 V?</b></li> </ul>	Point A FTP Sensor Connector, Harness Side	Point B FTP Sensor Connector, Harness Side	VREF	FTP	<p><b>Yes</b> INSTALL a new FTP sensor. For some vehicles, the FTP sensor is integral to the fuel vapor tube assembly.</p> <p>CLEAR the DTCs. REPEAT the self-test.</p> <p><b>No</b> GO to HX21.</p>				
Point A FTP Sensor Connector, Harness Side	Point B FTP Sensor Connector, Harness Side									
VREF	FTP									
<b>HX21</b>	<p><b>CHECK THE VREF VOLTAGE TO THE FTP SENSOR</b></p> <ul style="list-style-type: none"> <li>Remove the jumper wire(s).</li> <li>Key ON, engine OFF.</li> <li>Measure the voltage between:</li> </ul> <table border="1" style="width: 100%;"> <tr> <td style="text-align: center;">( + ) FTP Sensor Connector, Harness Side</td> <td style="text-align: center;">( - ) FTP Sensor Connector, Harness Side</td> </tr> <tr> <td style="text-align: center;">VREF</td> <td style="text-align: center;">SIGRTN</td> </tr> </table> <ul style="list-style-type: none"> <li><b>Is the voltage between 4 - 6 V?</b></li> </ul>	( + ) FTP Sensor Connector, Harness Side	( - ) FTP Sensor Connector, Harness Side	VREF	SIGRTN	<p><b>Yes</b> GO to HX22.</p> <p><b>No</b> GO to Pinpoint Test C.</p>				
( + ) FTP Sensor Connector, Harness Side	( - ) FTP Sensor Connector, Harness Side									
VREF	SIGRTN									
<b>HX22</b>	<p><b>CHECK THE FTP CIRCUIT(S) FOR A SHORT TO SIGRTN OR GND IN THE HARNESS</b></p> <ul style="list-style-type: none"> <li>Key in OFF position.</li> <li>PCM connector disconnected.</li> <li>Measure the resistance between:</li> </ul> <table border="1" style="width: 100%;"> <tr> <td style="text-align: center;">( + ) PCM Connector, Harness Side</td> <td style="text-align: center;">( - ) PCM Connector, Harness Side</td> </tr> <tr> <td style="text-align: center;">FTP</td> <td style="text-align: center;">SIGRTN</td> </tr> </table> <ul style="list-style-type: none"> <li>Measure the resistance between:</li> </ul> <table border="1" style="width: 100%;"> <tr> <td style="text-align: center;">( + ) PCM Connector, Harness Side</td> <td style="text-align: center;">( - ) Vehicle Battery</td> </tr> <tr> <td style="text-align: center;">FTP</td> <td style="text-align: center;">Negative terminal</td> </tr> </table> <ul style="list-style-type: none"> <li><b>Is the resistance greater than 10K ohms?</b></li> </ul>	( + ) PCM Connector, Harness Side	( - ) PCM Connector, Harness Side	FTP	SIGRTN	( + ) PCM Connector, Harness Side	( - ) Vehicle Battery	FTP	Negative terminal	<p><b>Yes</b> GO to HX54.</p> <p><b>No</b> REPAIR the short circuit. CLEAR the DTCs. REPEAT the self-test.</p>
( + ) PCM Connector, Harness Side	( - ) PCM Connector, Harness Side									
FTP	SIGRTN									
( + ) PCM Connector, Harness Side	( - ) Vehicle Battery									
FTP	Negative terminal									
<b>HX23</b>	<p><b>DTC P0453: CHECK FOR HIGH FTP SENSOR VOLTAGE</b></p> <p><b>Note:</b> The FTP sensor voltage with no pressure/vacuum on the fuel tank is between 2.4 and 2.8 volts.</p> <ul style="list-style-type: none"> <li>Key ON, engine OFF.</li> <li>Access the PCM and monitor the FTP PID.</li> <li><b>Is the voltage greater than 4.5 V?</b></li> </ul>	<p><b>Yes</b> GO to HX24.</p> <p><b>No</b> The concern that produced the DTC P0453 is intermittent. GO to Pinpoint Test Z.</p>								

# Evaporative Emission (EVAP) System and Monitor

**HX**

Test Step		Results / Action to Take				
<b>HX24</b>	<p><b>CHECK THE VOLTAGE BETWEEN THE VREF AND SIGRTN CIRCUITS AT THE FTP SENSOR VEHICLE HARNESS CONNECTOR</b></p> <ul style="list-style-type: none"> <li>Key in OFF position.</li> <li>FTP Sensor connector disconnected.</li> <li>Key ON, engine OFF.</li> <li>Measure the voltage between:</li> </ul> <table border="1"> <tr> <td>( + ) FTP Sensor Connector, Harness Side</td> <td>( - ) FTP Sensor Connector, Harness Side</td> </tr> <tr> <td>VREF</td> <td>SIGRTN</td> </tr> </table> <ul style="list-style-type: none"> <li>Is the voltage between 4 - 6 V?</li> </ul>	( + ) FTP Sensor Connector, Harness Side	( - ) FTP Sensor Connector, Harness Side	VREF	SIGRTN	<p><b>Yes</b> GO to HX25.</p> <p><b>No</b> GO to Pinpoint Test C.</p>
( + ) FTP Sensor Connector, Harness Side	( - ) FTP Sensor Connector, Harness Side					
VREF	SIGRTN					
<b>HX25</b>	<p><b>CHECK THE FTP CIRCUIT FOR A SHORT TO VOLTAGE</b></p> <ul style="list-style-type: none"> <li>Measure the voltage between:</li> </ul> <table border="1"> <tr> <td>( + ) FTP Sensor Connector, Harness Side</td> <td>( - ) Vehicle Battery</td> </tr> <tr> <td>FTP</td> <td>Negative terminal</td> </tr> </table> <ul style="list-style-type: none"> <li>Is the voltage less than 10 V?</li> </ul>	( + ) FTP Sensor Connector, Harness Side	( - ) Vehicle Battery	FTP	Negative terminal	<p><b>Yes</b> GO to HX27.</p> <p><b>No</b> GO to HX26.</p>
( + ) FTP Sensor Connector, Harness Side	( - ) Vehicle Battery					
FTP	Negative terminal					
<b>HX26</b>	<p><b>CHECK THE FTP CIRCUIT FOR A SHORT TO VPWR IN THE HARNESS</b></p> <ul style="list-style-type: none"> <li>Key in OFF position.</li> <li>PCM connector disconnected.</li> <li>Key ON, engine OFF.</li> <li>Measure the voltage between:</li> </ul> <table border="1"> <tr> <td>( + ) PCM Connector, Harness Side</td> <td>( - ) Vehicle Battery</td> </tr> <tr> <td>FTP</td> <td>Negative terminal</td> </tr> </table> <ul style="list-style-type: none"> <li>Is the voltage greater than 10 V?</li> </ul>	( + ) PCM Connector, Harness Side	( - ) Vehicle Battery	FTP	Negative terminal	<p><b>Yes</b> REPAIR the short circuit. CLEAR the DTCs. REPEAT the self-test.</p> <p><b>No</b> GO to HX54.</p>
( + ) PCM Connector, Harness Side	( - ) Vehicle Battery					
FTP	Negative terminal					
<b>HX27</b>	<p><b>CHECK THE FTP CIRCUIT FOR AN OPEN IN THE HARNESS</b></p> <ul style="list-style-type: none"> <li>Key in OFF position.</li> <li>PCM connector disconnected.</li> <li>Measure the resistance between:</li> </ul> <table border="1"> <tr> <td>( + ) PCM Connector, Harness Side</td> <td>( - ) FTP Sensor Connector, Harness Side</td> </tr> <tr> <td>FTP</td> <td>FTP</td> </tr> </table> <ul style="list-style-type: none"> <li>Is the resistance less than 5 ohms?</li> </ul>	( + ) PCM Connector, Harness Side	( - ) FTP Sensor Connector, Harness Side	FTP	FTP	<p><b>Yes</b> GO to HX28.</p> <p><b>No</b> REPAIR the open circuit. CLEAR the DTCs. REPEAT the self-test.</p>
( + ) PCM Connector, Harness Side	( - ) FTP Sensor Connector, Harness Side					
FTP	FTP					

# Evaporative Emission (EVAP) System and Monitor

**HX**

Test Step		Results / Action to Take						
<b>HX28</b>	<b>CHECK THE FTP CIRCUIT FOR A SHORT TO VREF</b> <ul style="list-style-type: none"> <li>Measure the resistance between:                             <table border="1"> <tr> <td>( + ) PCM Connector, Harness Side</td> <td>( - ) PCM Connector, Harness Side</td> </tr> <tr> <td>VREF</td> <td>FTP</td> </tr> </table> </li> <li>Is the resistance greater than 10K ohms?</li> </ul>	( + ) PCM Connector, Harness Side	( - ) PCM Connector, Harness Side	VREF	FTP	<b>Yes</b> GO to HX29. <b>No</b> REPAIR the short circuit. CLEAR the DTCs. REPEAT the self-test.		
( + ) PCM Connector, Harness Side	( - ) PCM Connector, Harness Side							
VREF	FTP							
<b>HX29</b>	<b>CHECK THE OPPOSITE INDUCED LOW FTP SIGNAL</b> <ul style="list-style-type: none"> <li>PCM connector connected.</li> <li>Connect a 5 amp fused jumper wire between the following:                             <table border="1"> <tr> <td>Point A FTP Sensor Connector, Harness Side</td> <td>Point B FTP Sensor Connector, Harness Side</td> </tr> <tr> <td>FTP</td> <td>SIGRTN</td> </tr> </table> </li> <li>Key ON, engine OFF.</li> <li>Access the PCM and monitor the FTP PID.</li> <li>Is the voltage less than 0.1 V?</li> </ul>	Point A FTP Sensor Connector, Harness Side	Point B FTP Sensor Connector, Harness Side	FTP	SIGRTN	<b>Yes</b> INSTALL a new FTP sensor. For some vehicles, the FTP sensor is integral to the fuel vapor tube assembly.  CLEAR the DTCs. REPEAT the self-test. <b>No</b> GO to HX54.		
Point A FTP Sensor Connector, Harness Side	Point B FTP Sensor Connector, Harness Side							
FTP	SIGRTN							
<b>HX30</b>	<b>DTCs P0446 OR P1451: CHECK THE PCM OUTPUT TO THE CV SOLENOID</b> <p><b>Note:</b> For applications that use the engine off natural vacuum (EONV) EVAP leak check monitor, KAPWR provides voltage to the CV solenoid instead of VPWR.</p> <ul style="list-style-type: none"> <li>Key in OFF position.</li> <li>CV Solenoid connector disconnected.</li> <li>Connect a non-powered test lamp between:                             <table border="1"> <tr> <td>( + ) CV Solenoid Connector, Harness Side</td> <td>( - ) CV Solenoid Connector, Harness Side</td> </tr> <tr> <td>VPWR</td> <td>CANV</td> </tr> <tr> <td>KAPWR</td> <td>CANV</td> </tr> </table> </li> <li>Key ON, engine OFF.</li> <li>Enter output test mode. Refer to Diagnostic Methods, Output Test Mode (OTM).</li> <li>Command the outputs ON.</li> <li>Command the outputs OFF.</li> <li>Exit output test mode.</li> <li>Does the test lamp turn on and off when the output(s) is commanded on and off?</li> </ul>	( + ) CV Solenoid Connector, Harness Side	( - ) CV Solenoid Connector, Harness Side	VPWR	CANV	KAPWR	CANV	<b>Yes</b> GO to HX31. <b>No</b> GO to HX32.
( + ) CV Solenoid Connector, Harness Side	( - ) CV Solenoid Connector, Harness Side							
VPWR	CANV							
KAPWR	CANV							

# Evaporative Emission (EVAP) System and Monitor

## HX

Test Step		Results / Action to Take						
<b>HX31</b>	<b>CHECK THE CV SOLENOID RESISTANCE</b>  <b>Note:</b> For applications that use the engine off natural vacuum (EONV) EVAP leak check monitor, KAPWR provides voltage to the CV solenoid instead of VPWR. <ul style="list-style-type: none"> <li>• Key in OFF position.</li> <li>• Measure the resistance between:</li> </ul> <table border="1"> <tr> <td>( + ) CV Solenoid Connector, Component Side</td> <td>( - ) CV Solenoid Connector, Component Side</td> </tr> <tr> <td>KAPWR</td> <td>CANV</td> </tr> <tr> <td>VPWR</td> <td>CANV</td> </tr> </table> <ul style="list-style-type: none"> <li>• Are the resistances between 48 - 65 ohms?</li> </ul>	( + ) CV Solenoid Connector, Component Side	( - ) CV Solenoid Connector, Component Side	KAPWR	CANV	VPWR	CANV	<b>Yes</b> Unable to duplicate or identify the concern at this time. GO to Pinpoint Test Z.  <b>No</b> INSTALL a new CV solenoid.  CLEAR the DTCs. REPEAT the self-test.
( + ) CV Solenoid Connector, Component Side	( - ) CV Solenoid Connector, Component Side							
KAPWR	CANV							
VPWR	CANV							
<b>HX32</b>	<b>CHECK THE VPWR VOLTAGE TO THE CV SOLENOID</b>  <b>Note:</b> For applications that use the engine off natural vacuum (EONV) EVAP leak check monitor, KAPWR provides voltage to the CV solenoid instead of VPWR. <ul style="list-style-type: none"> <li>• Measure the voltage between:</li> </ul> <table border="1"> <tr> <td>( + ) CV Solenoid Connector, Harness Side</td> <td>( - )</td> </tr> <tr> <td>KAPWR</td> <td>Ground</td> </tr> <tr> <td>VPWR</td> <td>Ground</td> </tr> </table> <ul style="list-style-type: none"> <li>• Are the voltages greater than 10 V?</li> </ul>	( + ) CV Solenoid Connector, Harness Side	( - )	KAPWR	Ground	VPWR	Ground	<b>Yes</b> GO to HX33.  <b>No</b> REPAIR the open circuit. CLEAR the DTCs. REPEAT the self-test.
( + ) CV Solenoid Connector, Harness Side	( - )							
KAPWR	Ground							
VPWR	Ground							
<b>HX33</b>	<b>CHECK THE CANV CIRCUIT FOR AN OPEN IN THE HARNESS</b>  <ul style="list-style-type: none"> <li>• Key in OFF position.</li> <li>• PCM connector disconnected.</li> <li>• Measure the resistance between:</li> </ul> <table border="1"> <tr> <td>( + ) PCM Connector, Harness Side</td> <td>( - ) CV Solenoid Connector, Harness Side</td> </tr> <tr> <td>CANV</td> <td>CANV</td> </tr> </table> <ul style="list-style-type: none"> <li>• Is the resistance less than 5 ohms?</li> </ul>	( + ) PCM Connector, Harness Side	( - ) CV Solenoid Connector, Harness Side	CANV	CANV	<b>Yes</b> GO to HX34.  <b>No</b> REPAIR the open circuit. CLEAR the DTCs. REPEAT the self-test.		
( + ) PCM Connector, Harness Side	( - ) CV Solenoid Connector, Harness Side							
CANV	CANV							
<b>HX34</b>	<b>CHECK THE CANV CIRCUIT FOR A SHORT TO PWRGND IN THE HARNESS</b>  <ul style="list-style-type: none"> <li>• Measure the resistance between:</li> </ul> <table border="1"> <tr> <td>( + ) CV Solenoid Connector, Harness Side</td> <td>( - ) Vehicle Battery</td> </tr> <tr> <td>CANV</td> <td>Negative terminal</td> </tr> </table> <ul style="list-style-type: none"> <li>• Is the resistance greater than 10K ohms?</li> </ul>	( + ) CV Solenoid Connector, Harness Side	( - ) Vehicle Battery	CANV	Negative terminal	<b>Yes</b> GO to HX35.  <b>No</b> REPAIR the short circuit. CLEAR the DTCs. REPEAT the self-test.		
( + ) CV Solenoid Connector, Harness Side	( - ) Vehicle Battery							
CANV	Negative terminal							

# Evaporative Emission (EVAP) System and Monitor

HX

Test Step		Results / Action to Take				
<b>HX35</b>	<b>CHECK THE CANV CIRCUIT FOR A SHORT TO VOLTAGE IN THE HARNESS</b> <ul style="list-style-type: none"> <li>Key ON, engine OFF.</li> <li>Measure the voltage between:                             <table border="1"> <tr> <td>( + ) CV Solenoid Connector, Harness Side</td> <td>( - )</td> </tr> <tr> <td>CANV</td> <td>Ground</td> </tr> </table> </li> <li>Is the voltage less than 1 V?</li> </ul>	( + ) CV Solenoid Connector, Harness Side	( - )	CANV	Ground	<b>Yes</b> GO to HX54. <b>No</b> REPAIR the short circuit. CLEAR the DTCs. REPEAT the self-test.
( + ) CV Solenoid Connector, Harness Side	( - )					
CANV	Ground					
<b>HX36</b>	<b>DTCS P0461, P0462 AND P0463: CHECK THE INSTRUMENT CLUSTER (IC) MODULE FOR DTCS</b> <ul style="list-style-type: none"> <li>Key ON, engine OFF.</li> <li>Carry out the IC self-test.</li> <li>Are any DTCs present?</li> </ul>	<b>Yes</b> REFER to Instrument Panel, Gauges and Warning Indicators, Instrument Cluster to continue diagnosis. <b>No</b> GO to HX37.				
<b>HX37</b>	<b>CHECK THE FLI PID</b> <ul style="list-style-type: none"> <li>Key ON, engine running.</li> <li>Access the PCM and monitor the FLI PID.</li> <li>Does the FLI PID match the fuel gauge?</li> </ul>	<b>Yes</b> GO to HX38. <b>No</b> GO to HX54.				
<b>HX38</b>	<b>DTC P0460: CHECK FOR FUEL TANK FLOAT LEVEL RESPONSE</b> <p><b>Note:</b> A dual-container (saddle type) fuel tank has 2 fuel level sensors. The FLI PID in the PCM is the average value of both fuel level sensors. Some dual-container tanks may require the fuel level to be greater 3/4 full before the fuel level equalizes.</p> <ul style="list-style-type: none"> <li>Key ON, engine running.</li> <li>Access the PCM and monitor the FLI PID.</li> <li>Key in OFF position.</li> <li>If the fuel level is less than 1/4 (25% on FLI), add approximately 1/4 tank of fuel.</li> <li>If the fuel level is greater than 3/4 (75% on FLI), drain approximately 1/4 tank of fuel.</li> <li>Key ON, engine running.</li> <li>Access the PCM and monitor the FLI PID.</li> <li>Does the FLI PID indicate a movement upward or downward as fuel is either added or drained?</li> </ul>	<b>Yes</b> Unable to duplicate or identify the concern at this time. GO to Pinpoint Test Z. <b>No</b> REFER to Instrument Panel, Gauges and Warning Indicators, Instrument Cluster to diagnose the incorrect fuel gauge indication symptom.				

# Evaporative Emission (EVAP) System and Monitor

**HX**

Test Step		Results / Action to Take
<b>HX39</b>	<p><b>DTC P0451: CHECK THE FTP SENSOR FOR CORRECT OPERATION</b></p> <p><b>Note:</b> For vehicles with a capless fuel filler pipe, instead of removing the fuel filler cap, install the supplemental refueling adaptor provided with the vehicle to open the capless fuel tank filler pipe.</p> <ul style="list-style-type: none"> <li>• Key in OFF position.</li> <li>• Remove the fuel filler cap.</li> <li>• Key ON, engine OFF.</li> <li>• Access the PCM and monitor the FTP PID.</li> <li>• <b>Is the pressure between -0.42 and 0.42 kPa (-1.7 and 1.7 in-H<sub>2</sub>O)?</b></li> </ul>	<p><b>Yes</b> CHECK for kinks or bends in the fuel vapor hoses/tubes between the fuel tank and dust separator. CHECK the EVAP canister ports and canister vent hose assembly for contamination or debris. CHECK the dust separator for blockage. REPAIR as necessary. CLEAR the DTCs. REPEAT the self-test.</p> <p><b>No</b> INSTALL a new FTP sensor. For some vehicles, the FTP sensor is integral to the fuel vapor tube assembly.</p> <p>CLEAR the DTCs. REPEAT the self-test.</p>
<b>HX40</b>	<p><b>DTCS P0455 OR P0457: CHECK THE FUEL FILLER CAP OF CAPLESS FUEL TANK FILLER PIPE</b></p> <p><b>Note:</b> If the fuel filler cap or capless fuel tank filler pipe is suspected as an EVAP leak source during visual inspection, do not disturb the fuel filler cap or capless fuel tank filler pipe until the repair verification method is complete. If the repair verification method fails, reposition or install a new fuel filler cap and repeat the test. For vehicles with a capless fuel tank filler pipe, install and remove the supplemental refueling adaptor provided with the vehicle to reseal the capless fuel tank filler pipe and repeat the test. This action isolates the fuel filler cap or capless fuel tank filler pipe from the rest of the EVAP system as a potential concern.</p> <ul style="list-style-type: none"> <li>• For vehicles with a fuel filler cap, visually inspect the fuel filler cap without initially disturbing it.                             <ul style="list-style-type: none"> <li>— Verify the fuel filler cap tether is visible and free to move.</li> <li>— Check for missing or loose fuel filler cap.</li> <li>— Check the fuel filler cap for damage.</li> </ul> </li> <li>• For vehicles with a capless fuel tank filler pipe, visually inspect the capless fuel tank filler pipe inlet without initially disturbing it.                             <ul style="list-style-type: none"> <li>— Check the capless fuel tank filler pipe inlet for an obstruction that prevents it from sealing.</li> <li>— Check the capless fuel tank filler pipe for damage.</li> </ul> </li> <li>• <b>Is a concern present?</b></li> </ul>	<p><b>Yes</b> For repair verification, CARRY OUT the Smoke Machine PHASE 1 - Leak Verification Pressure Test. REPAIR as necessary. GO to HX46.</p> <p><b>No</b> GO to HX41.</p>




# Evaporative Emission (EVAP) System and Monitor

## HX

Test Step		Results / Action to Take
<b>HX41</b>	<b>CHECK FOR FLI DTCS</b>  <ul style="list-style-type: none"> <li>• Key ON, engine OFF.</li> <li>• Check for self-test DTCS.</li> <li>• <b>Are DTCS P0460, P0461, P0462 or P0463 present?</b></li> </ul>	<p><b>Yes</b> DISREGARD the current diagnostic trouble code (DTC) at this time. DIAGNOSE the next DTC. GO to DTC Index, Diagnostic Trouble Code (DTC) Charts and Descriptions.</p> <p><b>No</b> GO to <b>HX42</b>.</p>
<b>HX42</b>	<b>CHECK THE OPERATION OF THE FUEL GAUGE</b>  <p><b>Note:</b> A fuel gauge that always indicates a fuel level less than a 1/2 tank or always a full tank, may be caused by a fuel level input (FLI) concern.</p> <ul style="list-style-type: none"> <li>• Check operation of the fuel gauge.</li> <li>• <b>Is the fuel gauge functioning properly?</b></li> </ul>	<p><b>Yes</b> GO to <b>HX43</b>.</p> <p><b>No</b> CHECK the functionality of the FLI circuit. RETURN to Symptom Charts for further direction.</p>
<b>HX43</b>	<b>DTC P1443: EVAPORATIVE EMISSION SYSTEM VISUAL INSPECTION</b>  <ul style="list-style-type: none"> <li>• Key in OFF position.</li> <li>• Visually inspect for:                             <ul style="list-style-type: none"> <li>— EVAP system lines/hoses (check for proper connections, damage or blockage)</li> <li>— loose fuel vapor hose/tube connections to the EVAP system components</li> <li>— blocked vacuum hose between the EVAPCP valve and the engine intake manifold</li> <li>— damaged fuel tank or fuel filler pipe</li> </ul> </li> <li>• <b>Are there any concerns found during the visual inspection?</b></li> </ul>	<p><b>Yes</b> REPAIR as necessary. For repair verification, CARRY OUT the Smoke Machine PHASE 1 - Leak Verification Pressure Test. GO to <b>HX46</b>.</p> <p><b>No</b> GO to <b>HX44</b>.</p>
<b>HX44</b>	<b>CHECK THE FTP SENSOR VOLTAGE WITH THE FUEL FILLER CAP REMOVED OR THE CAPLESS FUEL TANK FILLER PIPE OPENED</b>  <p><b>Note:</b> For vehicles with a capless fuel filler pipe, instead of removing the fuel filler cap, install the supplemental refueling adaptor provided with the vehicle to open the capless fuel tank filler pipe.</p> <ul style="list-style-type: none"> <li>• Remove the fuel filler cap.</li> <li>• Key ON, engine OFF.</li> <li>• Access the PCM and monitor the FTP PID.</li> <li>• <b>Is the voltage between 2.4 - 2.8 V?</b></li> </ul>	<p><b>Yes</b> GO to <b>HX45</b>.</p> <p><b>No</b> INSTALL a new FTP sensor. For some vehicles, the FTP sensor is integral to the fuel vapor tube assembly. REPEAT the test and VERIFY the results.</p> <p>For repair verification, CARRY OUT the Smoke Machine PHASE 1 - Leak Verification Pressure Test. GO to <b>HX46</b>.</p>

# Evaporative Emission (EVAP) System and Monitor

**HX**

Test Step		Results / Action to Take
<b>HX45</b>	<b>EVAP CANISTER PURGE VALVE TEST</b>	
	<p><b>Note:</b> The EVAPCP valve PID name may vary by the vehicle. Use the EVAPPDC or EVMV PID to control the EVAPCP valve.</p> <ul style="list-style-type: none"> <li>• Key in OFF position.</li> <li>• Install the fuel filler cap or remove the supplemental refueling adaptor.</li> <li>• Key ON, engine running.</li> <li>• Access the PCM and monitor the EVAPCV, EVAPPDC, EVMV and FTP PIDs.</li> <li>• Close the CV solenoid by commanding the EVAPCV PID to ON (100% duty cycle).</li> <li>• While monitoring the FTP PID, open the EVAPCP by commanding the EVAPPDC PID to a 100% duty cycle (or EVMV PID to a 1,000 mA).</li> <li>• <b>Does the FTP PID decrease, the engine RPM change, or the engine stall as an indication that the EVAPCP valve is opening?</b></li> </ul>	<p><b>Yes</b> GO to <b>HX46</b>.</p> <p><b>No</b> INSTALL a new EVAPCP valve. REPEAT the test and VERIFY the results.</p> <p>For repair verification, CARRY OUT the Smoke Machine PHASE 1 - Leak Verification Pressure Test. GO to <b>HX46</b>.</p>
<b>HX46</b>	<b>DTCS P0442 OR P0456: HOOK UP THE SMOKE MACHINE (ROTUNDA VACUTEC)</b>	
	<p> <b>CAUTION:</b> Removing the Schrader valve from the test port permanently damages the valve.</p> <p><b>Note:</b> The smoke and air flow from the smoke machine will not pass through liquid fuel. Liquid fuel may be present in the fuel tank filler pipe.</p> <p><b>Note:</b> Some vehicles are not equipped with an evaporative emission test port. Use a suitable hose adapter in the following diagnostic procedures.</p> <ul style="list-style-type: none"> <li>• Key in OFF position.</li> <li>• Connect the smoke machine power cables to the vehicle battery. Check to see that the smoke machine power indicator lamp is on, indicating a good battery contact.</li> <li>• For vehicles not equipped with an evaporative emission test port: <ul style="list-style-type: none"> <li>— Disconnect the fuel vapor to intake manifold line at the EVAPCP valve and cap the line.</li> <li>— Connect a suitable hose adapter to the fuel vapor to intake manifold connection at the EVAPCP valve.</li> </ul> </li> <li>• For vehicles equipped with an evaporative emission test port: <ul style="list-style-type: none"> <li>— Locate the evaporative emission test port and remove the green cap. The cap is located on or close to the EVAPCP valve.</li> <li>— Install the EVAP test port adapter (provided with the Vacutec Smoke Machine) to the test port.</li> </ul> </li> <li>• <b>Is the smoke machine hook up complete?</b></li> </ul>	<p><b>Yes</b> For leak detection, GO to <b>HX47</b>. For leak repair verification, GO to <b>HX48</b>.</p> <p><b>No</b> REFER to the smoke machine operator manual for additional instructions and for helpful tips.</p>

# Evaporative Emission (EVAP) System and Monitor

**HX**

	Test Step	Results / Action to Take
<b>HX47</b>	<p><b>CARRY OUT SMOKE MACHINE PHASE 2 - LEAK DETECTION SMOKE TEST</b></p>	
	<p><b>Note:</b> If the leak is not detected from the top, check the EVAP system for leaks from under the vehicle.</p> <ul style="list-style-type: none"> <li>— Check the EVAP hoses, EVAPCP valve, CV solenoid, EVAP canister, fuel tank, fuel filler pipe, around the fuel tank area, and at the fuel filler cap or capless fuel tank filler pipe inlet.</li> <li>— Wiggle the components and connections to simulate road bumps while looking for signs of leaking smoke.</li> </ul> <p>If the leak is in the fuel tank filler pipe between the check valve and the fuel filler cap or capless fuel tank filler pipe inlet, smoke under pressure may not reach the leak. If leaking smoke is not found, a thorough visual inspection of the fuel tank filler pipe and fuel filler cap or capless fuel tank filler pipe inlet should be done.</p> <ul style="list-style-type: none"> <li>• Set the smoke machine to SMOKE.</li> <li>• Remove the fuel filler cap or install the supplemental refueling adaptor.</li> <li>• Connect the smoke supply hose nozzle tip into the EVAP service port or suitable hose adapter.</li> <li>• Key ON, engine OFF.</li> <li>• Access the PCM and control the EVAPCV PID.</li> <li>• Close the CV solenoid by commanding the EVAPCV PID to ON (100% duty cycle). The CV solenoid reopens after 9 minutes of continuous operation.</li> <li>• For vehicles not equipped with an evaporative emission test port:             <ul style="list-style-type: none"> <li>— Start the smoke machine and verify the connection at the EVAPCP valve is correct and not leaking</li> <li>— Open the EVAPCP valve by commanding the EVAPPDC PID to 100% duty cycle or EVMV PID to 1,000 mA</li> </ul> </li> <li>• Start the smoke machine. If smoke does not exit the fuel tank filler pipe after the system is pressurized, command the EVAPCV PID open to allow air to purge the CV solenoid. Once smoke is seen at the CV solenoid, command the EVAPCV PID close.             <ul style="list-style-type: none"> <li>— Install the fuel filler cap or remove the supplemental refueling adaptor once smoke is observed exiting the fuel tank neck area.</li> <li>— Continue to smoke the system for 60 seconds to obtain pressure.</li> <li>— Press and release the remote starter button in intervals of approximately 15 seconds on and 15 seconds off while checking for exiting smoke.</li> <li>— Use the halogen spotlight provided with the smoke machine to follow the EVAP system path and look for smoke exiting at the source of the leak(s).</li> </ul> </li> <li>• <b>Is the source of the EVAP leak located?</b></li> </ul>	<p><b>Yes</b> REPAIR as necessary. CONNECT all the disconnected components. For repair verification, CARRY OUT the Smoke Machine PHASE 1 - Leak Verification Pressure Test. GO to <b>HX48</b>.</p> <p><b>No</b> The test passed. CONNECT all the disconnected components. CARRY OUT the Smoke Machine PHASE 1 - Leak Verification Pressure Test. GO to <b>HX48</b>.</p>

# Evaporative Emission (EVAP) System and Monitor

**HX**

Test Step		Results / Action to Take
<b>HX48</b>	<p><b>CARRY OUT THE SMOKE MACHINE PHASE 1 - LEAK VERIFICATION PRESSURE TEST</b></p> <ul style="list-style-type: none"> <li>• Position the control lever located on the smoke machine to <b>METER</b>.</li> <li>• Calibrate the smoke machine flowmeter using the 0.020 (DTC P0456) or 0.040 (DTC P0442) standard as follows:                             <ul style="list-style-type: none"> <li>— Insert the air supply hose (transparent hose) nozzle tip into the appropriate EVAP system standard located on the front of the smoke machine.</li> <li>— Press the remote starter button on the smoke machine. Observe the position of the flowmeter indicator ball.</li> <li>— Position the flowmeter red pointer flag so that it aligns with the measurement of the indicator ball.</li> <li>— Release the button and remove the air supply hose nozzle tip from the EVAP system standard.</li> </ul> </li> <li>• Connect the air supply hose (transparent hose) nozzle tip into the EVAP test port or suitable hose adapter.</li> <li>• Key ON, engine OFF.</li> <li>• Access the PCM and control the EVAPCV PID.</li> <li>• Close the CV solenoid by commanding the EVAPCV PID to ON (100% duty cycle).</li> <li>• For vehicles not equipped with an evaporative emission test port, open the EVAPCP valve by commanding the EVAPPDC PID to 100% duty cycle or EVMV PID to 1,000 mA.</li> <li>• Press the remote starter button on the smoke machine. Notice that the ball in the flowmeter is all the way at the top. This indicates the system is being pressurized.</li> <li>• Continue to press the remote starter button until the ball stops descending. Once the ball stops descending, observe if it is above or below the red pointer flag. If the measurement is below the indicator flag, the system has passed the pressure test. If the measurement is above the indicator flag, the EVAP system has an unacceptable leak.</li> <li>• <b>Does the EVAP system pass the smoke machine leak verification pressure test?</b></li> </ul>	<p><b>Yes</b> The test passed and no concerns are present. CLEAR the DTCs. REPEAT the self-test.</p> <p><b>No</b> GO to <b>HX47</b>.</p>

# Evaporative Emission (EVAP) System and Monitor

**HX**

Test Step		Results / Action to Take
<b>HX49</b>	<b>DTC P144A: CHECK FOR A BLOCKED FUEL VAPOR TUBE BETWEEN THE FTP SENSOR AND THE FUEL TANK</b>	
	<ul style="list-style-type: none"> <li>• Key in OFF position.</li> <li>• Remove the fuel vapor tube assembly.</li> <li>• Visually inspect the fuel vapor tube for a blockage between the FTP sensor and the connection to the fuel tank or fuel pump module.</li> <li>• Visually inspect the connection at the fuel tank or fuel pump module for a blockage.</li> <li>• Attempt to manually remove the blockage.</li> <li>• <b>Is the blockage visible and can be removed?</b></li> </ul>	<p><b>Yes</b> REMOVE the blockage. INSTALL the Fuel Vapor Tube assembly.</p> <p>CLEAR the DTCs. REPEAT the self-test.</p> <p><b>No</b> INSTALL a new Fuel Vapor Tube assembly.</p> <p>CLEAR the DTCs. REPEAT the self-test.</p>
<b>HX50</b>	<b>DTC P260F: CHECK FOR THE PRESENCE OF ANY MODULE COMMUNICATION CONCERNS</b>	
	<ul style="list-style-type: none"> <li>• Key ON, engine OFF.</li> <li>• Check for self-test DTCs in all of the vehicle modules.</li> <li>• <b>Are any communication concerns or communication DTCs present?</b></li> </ul>	<p><b>Yes</b> For communication concerns in the PCM, DISREGARD the current diagnostic trouble code (DTC) at this time. DIAGNOSE the next DTC. GO to DTC Index, Diagnostic Trouble Code (DTC) Charts and Descriptions.</p> <p>For communication concerns in other modules, REFER to Testing for that System or Component to diagnose the communication DTC.</p> <p><b>No</b> GO to HX51.</p>
<b>HX51</b>	<b>CHECK THE PERFORMANCE OF THE PROCESSOR</b>	
	<ul style="list-style-type: none"> <li>• Key in OFF position.</li> <li>• Disconnect the battery and wait for 1 minute. Refer to Battery, Mounting and Cables.</li> <li>• Connect the battery.</li> <li>• Key ON, engine running.</li> <li>• Allow the engine idle to stabilize.</li> <li>• Access the PCM and monitor the FTP PID.</li> <li>• <b>Is the pressure equal to 0 kPa (0 psi)?</b></li> </ul>	<p><b>Yes</b> GO to HX53.</p> <p><b>No</b> GO to HX52.</p>

# Evaporative Emission (EVAP) System and Monitor

**HX**

Test Step		Results / Action to Take
<b>HX52</b>	<b>CHECK FOR SELF-TEST DTC P260F</b>	<p><b>Yes</b> GO to <b>HX53</b>.</p> <p><b>No</b> RETURN the vehicle to the customer.</p>
	<ul style="list-style-type: none"> <li>• Idle the engine for 2 minutes.</li> <li>• Carry out the self-test.</li> <li>• <b>Is DTC P260F present?</b></li> </ul>	
<b>HX53</b>	<b>CHECK THE PCM FOR THE LATEST CALIBRATION</b>	<p><b>Yes</b> GO to <b>HX54</b>.</p> <p><b>No</b> RETURN the vehicle to the customer.</p>
	<ul style="list-style-type: none"> <li>• Program the PCM to the latest calibration.</li> <li>• Key ON, engine running.</li> <li>• Idle the engine for 2 minutes.</li> <li>• Carry out the self-test.</li> <li>• <b>Is DTC P260F present?</b></li> </ul>	
<b>HX54</b>	<b>CHECK FOR CORRECT PCM OPERATION</b>	<p><b>Yes</b> INSTALL a new PCM. REFER to Diagnostic Methods, Flash Electrically Erasable Programmable Read Only Memory (EEPROM), Programming the VID Block for a Replacement PCM.</p> <p><b>No</b> The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector.</p>
	<ul style="list-style-type: none"> <li>• Disconnect all the PCM connectors.</li> <li>• Visually inspect for:                             <ul style="list-style-type: none"> <li>— pushed out pins</li> <li>— corrosion</li> </ul> </li> <li>• Connect all the PCM connectors and make sure they seat correctly.</li> <li>• Carry out the PCM self-test and verify the concern is still present.</li> <li>• <b>Is the concern still present?</b></li> </ul>	