

# SECTION 11B

## Evaporative Emission (EVAP) Systems

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## Description and Operation

### Evaporative Emission (EVAP) Systems

The Evaporative Emissions (EVAP) system prevents the escape of fuel vapors to the atmosphere under hot soak and engine off conditions by storing these vapors in a carbon canister. The system also controls the purging of stored vapors from the carbon canister to the engine, where they are burned in the combustion chambers.

**EVAPORATIVE EMISSION SYSTEM COMPONENT APPLICATION CHART**

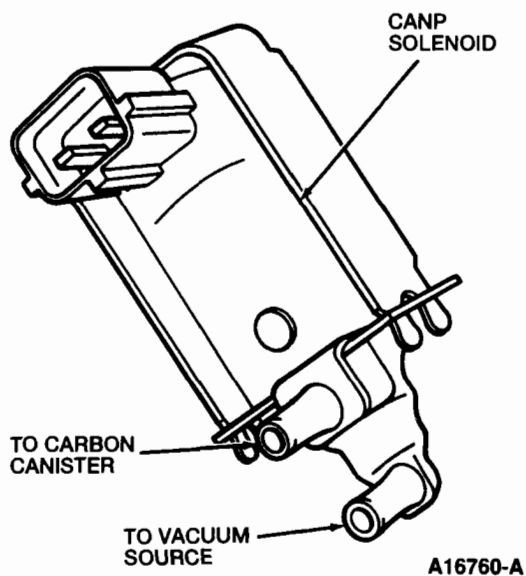
Component	1.3L (5-Door)	1.3L (3-Door)	1.6L Non-Turbo	1.6L Turbo	1.8L	2.0L	2.5L
Canister Purge Solenoid	X	X	X	X	X	X	X
Carbon Canister	X	X	X	X	X	X	X
Check Valve				X			
Restrictor	X	X	X	X			X
Rollover/Vent Valve	X	X	X	X	X	X	X
Two-Way Check Valve	X	X	X	X	X	X	X
Vapor Separator		X			X		

The following is a description of the EVAP system components.

## Description and Operation

### Canister Purge Solenoid

The Canister Purge (CANP) solenoid regulates the amount of evaporative fuel vapors transferred from the carbon canister into the intake manifold. The solenoid operates by an output signal from the Powertrain Control Module (PCM) to open the vacuum passage between the carbon canister and intake manifold when purging conditions are met. If more evaporative fuel vapors can be consumed by the engine, the solenoid is held open for a longer period of time.

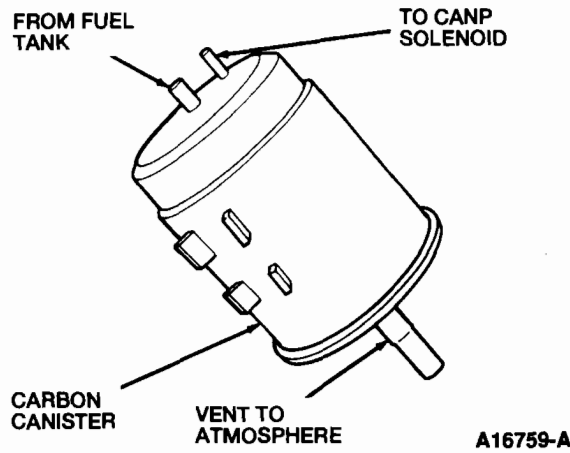


Engine	Location
1.3L, 1.6L, 1.8L	Mounted near center of cowl.
2.0L	RH side of intake manifold.
2.5L	Mounted to the back of the intake manifold.

## Description and Operation

### Carbon Canister

The fuel vapors from the fuel tank are stored in the carbon canister. When the vehicle is being operated, the carbon canister purges the fuel vapors into the engine for consumption by means of the Canister Purge (CANP) solenoid. During cool-down, air enters the carbon canister at the vent port.



Engine	Location
1.3L, 1.6L, 1.8L	RH corner near cowl.
2.0L, 2.5L	Behind the LH strut.

### Restrictor

The restrictor limits the amount of fuel vapors that enter the carbon canister.

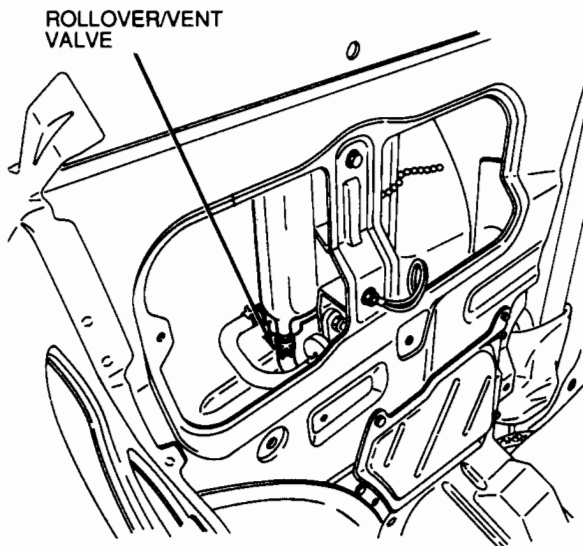
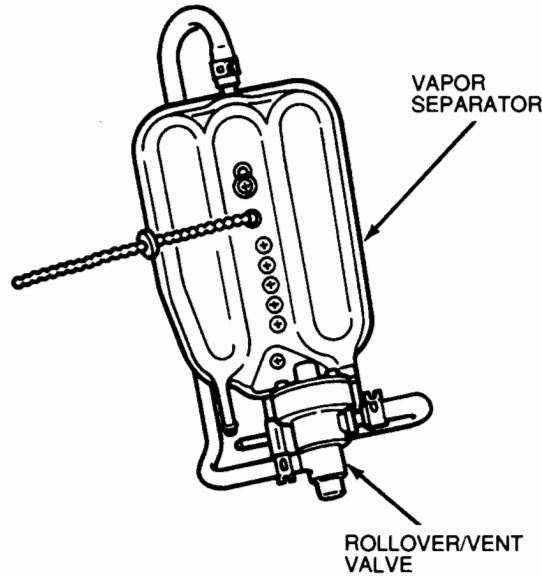
<b>Description and Operation</b>	<b>All Engines</b>	<b>Rollover/Vent Valve</b>
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**Rollover / Vent Valve**

The rollover / vent valve is located on the highest point of the fuel tank. The valve serves a dual purpose: when fuel is in the tank, pressure increases, and the rollover / vent valve releases the extra pressure into the atmosphere; if a rollover situation occurs, the rollover / vent valve closes and will not permit fuel or fuel vapors to escape from the fuel tank.

<b>Description and Operation</b>	<b>All Engines</b>	<b>Rollover/Vent Valve</b>
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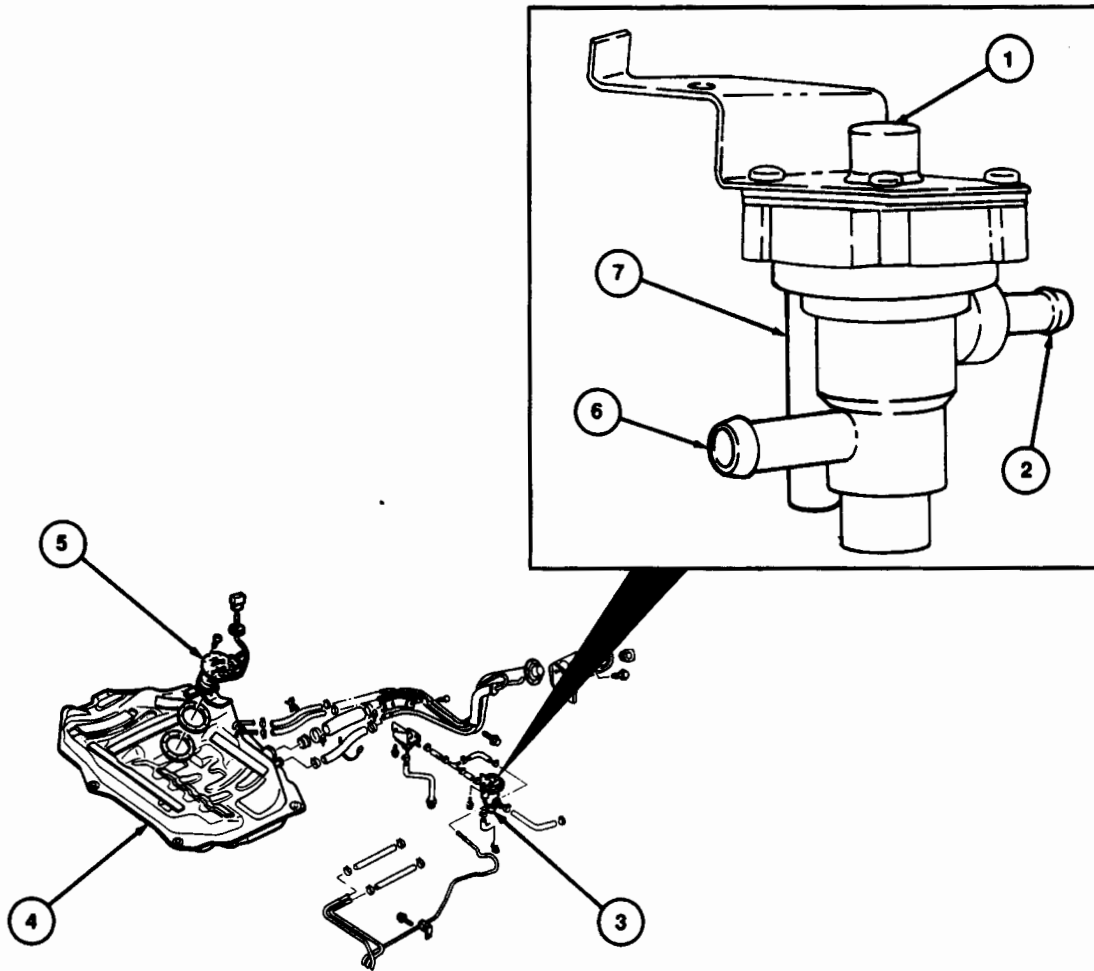
1.3L (3-Door Only)



A13866-B

<b>Description and Operation</b>	<b>All Engines</b>	<b>Rollover/Vent Valve</b>
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1.6L



A12415-D

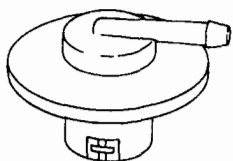
Figure 1.

Item	Description
1	Rollover/Vent Valve
2	To Two-Way Check Valve
3	Rollover/Vent Valve
4	Fuel Tank
5	Fuel Pump
6	From Fuel Tank
7	Vent to Atmosphere

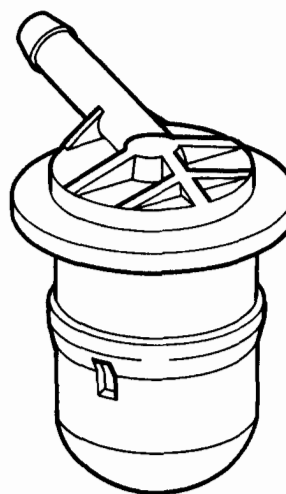
<b>Description and Operation</b>	<b>All Engines</b>	<b>Rollover/Vent Valve</b>
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1.3L (5-Door Only)

1.8L, 2.0L, 2.5L



A20507-A



A16764-A

Engine	Location
1.3L (3-Door)	Attached to the vapor separator.
1.3L (5-Door), 1.6L, 1.8L, 2.0L, 2.5L	Located on top of the fuel tank.



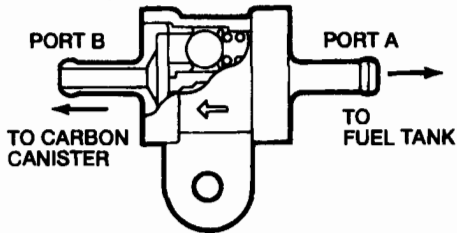
<b>Description and Operation</b>	<b>All Engines</b>	<b>Two-Way Check Valve</b>
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**Two-Way Check Valve**

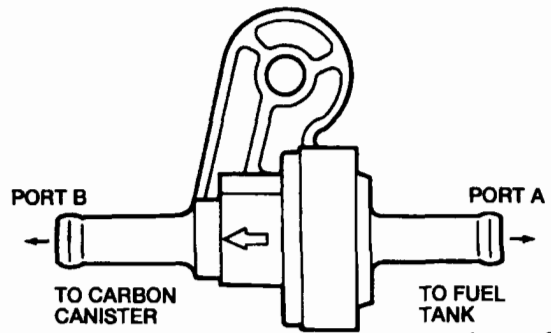
The two-way check valve controls pressure between the fuel tank and the carbon canister. The two-way check valve protects the fuel tank from heat build-up rupture and cool-down collapse by allowing air to pass in or out of the tank to equalize pressure.

**1.6L and 1.8L**

**1.3L, 2.0L, 2.5L**



A13965-C



A16475-B

Engine	Location
1.3L, 1.6L, 1.8L, 2.0L, 2.5L	Mounted to the body, above the fuel tank.

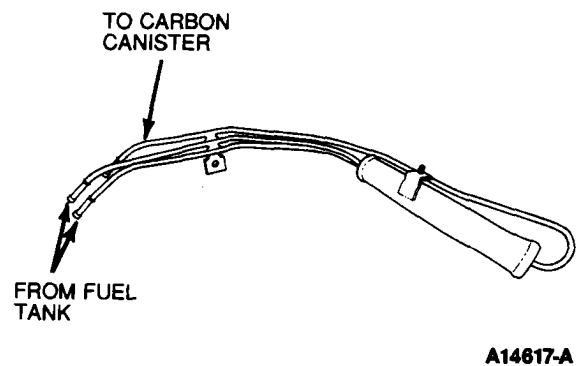
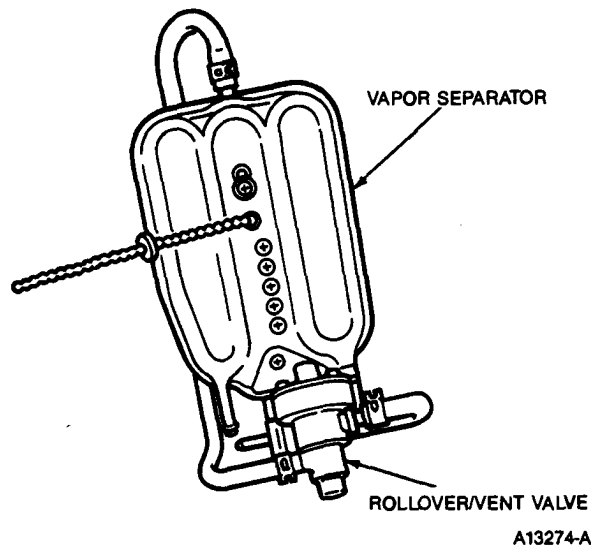
<p><b>Description and Operation</b></p>	<p><b>1.3L 1.8L</b></p>	<p><b>Vapor Separator</b></p>
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**Vapor Separator**

The vapor separator, installed between the fuel tank and evaporative lines to the carbon canister, prevents liquid fuel from entering the carbon canister. When fuel tank pressure increases, fuel vapors are allowed to vent to the carbon canister, but liquid fuel is directed back to the fuel tank.

**1.3L (3-Door Only)**

**1.8L**



Engine	Location
1.3L (3-Door Only), 1.8L	Near the fuel filler neck behind the left rear interior trim panel.

For further information regarding the makeup of the system and its relationship to other systems, refer to the appropriate engine / emission schematic diagram in Section 3B of this manual.

## Diagnosis and Testing

### System Inspection

**NOTE:** Excessive fuel tank pressure could be caused by the fuel cap and does not necessarily indicate a concern with the evaporative emission system components.

1. Visually inspect the components of the Evaporative Emission System.

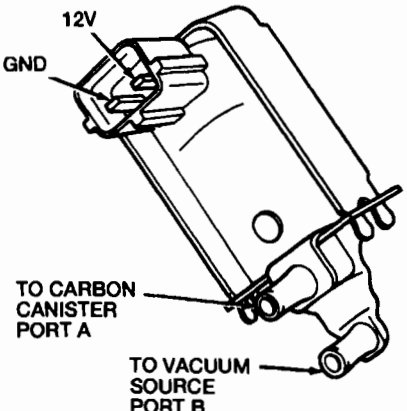
#### VISUAL INSPECTION CHART

Mechanical	Electrical
<ul style="list-style-type: none"> <li>● Fuel odor or leakage</li> <li>● Damaged vacuum or fuel vapor lines</li> <li>● Loose vapor line connections</li> </ul>	<ul style="list-style-type: none"> <li>● Discharged battery</li> <li>● Damaged connectors</li> <li>● Damaged air flow meter</li> <li>● Damaged solenoid</li> </ul>

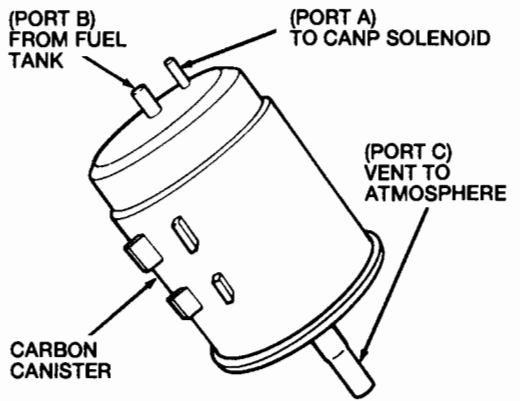
2. Exercise the wiring and connector for the Canister Purge (CANP) solenoid. Check the throttle body, air flow meter, and the Powertrain Control Module (PCM) for looseness, corrosion, damage, or other problems.
3. Check the fuel tank, the fuel vapor lines, the vacuum lines, and the connections for looseness, pinching, leakage, damage or other obvious causes for malfunction.
4. If all checks are OK, proceed to the Pinpoint Tests.

<b>Diagnosis and Testing</b>	<b>All Engines</b>	<b>EV</b>
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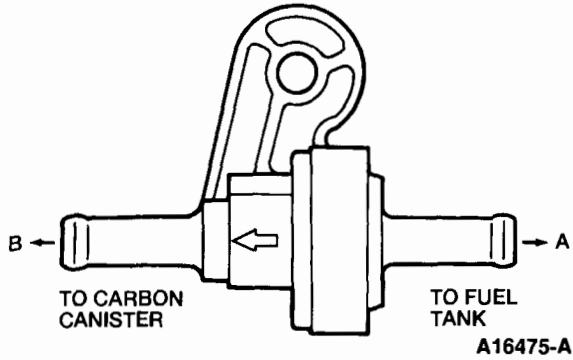
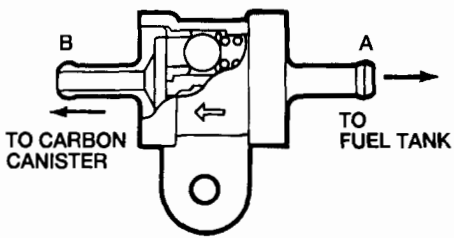
**Pinpoint Tests — EV**

TEST STEP		RESULT	ACTION TO TAKE
<b>EV1</b>	<p><b>CHECK CANISTER PURGE SOLENOID VALVE FUNCTION</b></p> <ul style="list-style-type: none"> <li>● Disconnect the vacuum hoses from ports A and B, and the electrical connector from the solenoid valve.</li> <li>● Blow air through port A and verify that no air exits from port B.</li> <li>● Apply 12 volts and ground as shown.</li> <li>● Blow air through port A and verify that air flows from port B.</li> </ul> <div style="text-align: center;">  <p>The diagram shows a solenoid valve with three main ports: a 12V electrical port, a GND (ground) electrical port, a port labeled 'TO CARBON CANISTER PORT A', and a port labeled 'TO VACUUM SOURCE PORT B'. The part number 'A16473-B' is indicated below the diagram.</p> </div> <ul style="list-style-type: none"> <li>● Does the valve function properly?</li> </ul>	<p>Yes</p> <p>No</p>	<ul style="list-style-type: none"> <li>▶ GO to <b>EV2</b>.</li> <li>▶ REPLACE the Canister Purge (CANP) solenoid.</li> </ul>

<b>Diagnosis and Testing</b>	<b>All Engines</b>	<b>EV</b>
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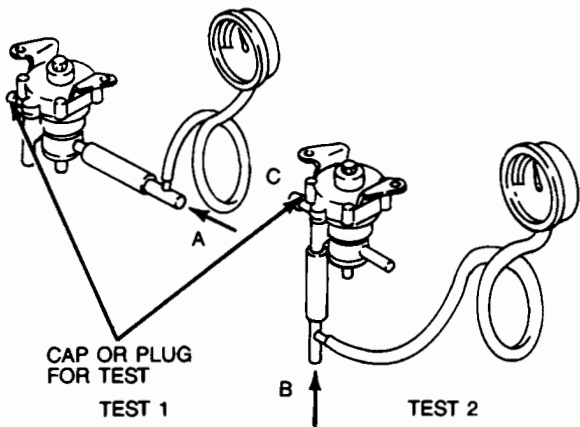
TEST STEP		RESULT	ACTION TO TAKE
<b>EV2</b>	<b>CHECK FOR LIQUID FUEL IN CARBON CANISTER</b> <ul style="list-style-type: none"> <li>● Run engine until warm to purge any fuel from the carbon canister.</li> <li>● Turn off the engine and remove the carbon canister.</li> <li>● Inspect the carbon canister for liquid fuel (strong odor or excessive weight).</li> <li>● Blow into the air vent (port C) and verify that air flows from the fuel vapor inlet (port B).</li> </ul> <div style="text-align: center;">  <p style="text-align: center;">A16508-B</p> </div> <ul style="list-style-type: none"> <li>● <b>Is the carbon canister free of liquid fuel, and does it function properly?</b></li> </ul>	Yes No	<ul style="list-style-type: none"> <li>▶ GO to <b>EV3</b>.</li> <li>▶ REPLACE the carbon canister.</li> </ul>
<b>EV3</b>	<b>CHECK PURGE LINES FOR BLOCKAGE</b> <ul style="list-style-type: none"> <li>● Remove the purge lines leading from the carbon canister to the engine air intake.</li> <li>● Check the lines for blockage by blowing through them.</li> <li>● <b>Does air flow freely through the lines?</b></li> </ul>	Yes No	<ul style="list-style-type: none"> <li>▶ GO to <b>EV4</b>.</li> <li>▶ REPLACE the purge line(s) any check valves, or restrictors that may be partially plugged.</li> </ul>

<b>Diagnosis and Testing</b>	<b>All Engines</b>	<b>EV</b>
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	TEST STEP	RESULT	ACTION TO TAKE
<b>EV4</b>	<p><b>CHECK TWO-WAY CHECK VALVE</b></p> <ul style="list-style-type: none"> <li>● Visually inspect the two-way check valve and its connections for pinching, blockage, looseness, or other damage and /or leakage.</li> <li>● Remove the two-way check valve. Refer to Service Manual Section 10-01.</li> <li>● Connect Rotunda Vacuum Tester 021-00037 or equivalent, to port A of the valve.</li> <li>● Apply 26 mm-Hg (1.01 in-Hg) of vacuum to port A for 1.3L, 2.0L and 2.5L or 37 mm-Hg (1.46 in-Hg) of vacuum to port A for 1.6L and 1.8L.</li> <li>● Verify that the valve opens (does not hold vacuum).</li> <li>● Connect the vacuum tester to port B of the valve.</li> <li>● Apply 44 mm-Hg (1.73 in-Hg) vacuum to port B, and verify that the valve opens. <b>1.3L, 2.0L and 2.5L</b></li> </ul>	<p>Yes</p> <p>No</p>	<ul style="list-style-type: none"> <li>▶ GO to <b>EV5</b>.</li> <li>▶ REPLACE / SERVICE the two-way check valve.</li> </ul>
	 <p><b>1.6L and 1.8L</b></p>		
	 <p><b>A13965-B</b></p>		
	<ul style="list-style-type: none"> <li>● Is the valve free of leakage, and does it function properly?</li> </ul>		

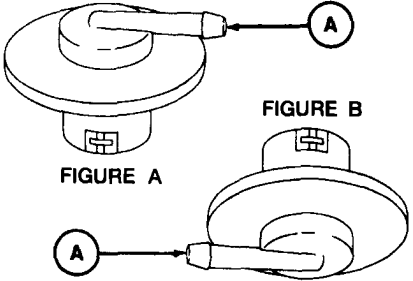
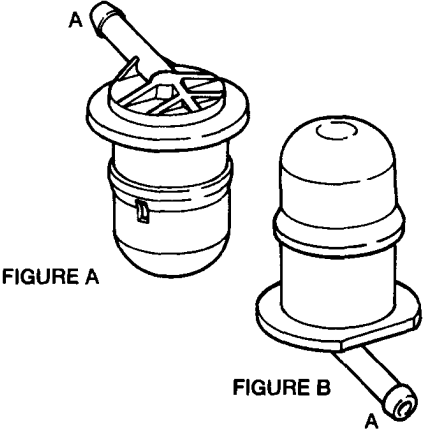
<b>Diagnosis and Testing</b>	<b>All Engines</b>	<b>EV</b>
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TEST STEP		RESULT	ACTION TO TAKE
<b>EV5</b>	<b>CHECK ROLLOVER/VENT VALVE</b> <ul style="list-style-type: none"> <li>● Visually inspect the rollover/vent valve and its connections for pinching, blockage, looseness, or other mechanical damage.</li> <li>● <b>Is the rollover/vent valve and its connections free of damage?</b></li> </ul>	Yes (1.3L [5-Door], 1.8L, 2.0L, 2.5L)  Yes (1.3L [3-Door], 1.6L)  No	<ul style="list-style-type: none"> <li>▶ GO to <b>EV7</b>.</li> <li>▶ GO to <b>EV6</b>.</li> <li>▶ REPLACE the rollover/vent valve or SERVICE the connecting hoses in question.</li> </ul>
<b>EV6</b>	<b>CHECK ROLLOVER/VENT VALVE FUNCTION (1.3L [3-DOOR], 1.6L ONLY)</b> <ul style="list-style-type: none"> <li>● Check the rollover/vent valve for evidence of leakage.</li> <li>● Remove the rollover/vent valve. Refer to Service Manual Section 10-01.</li> <li>● Connect Rotunda Vacuum/Pressure Tester 059-00008 or equivalent, to the rollover/vent valve as shown for Test 1.</li> <li>● Hold the valve vertically.</li> <li>● Blow into port A and verify the valve opens at 7.0 kPa (1.0 psi) maximum.</li> <li>● Connect the tester as shown for Test 2.</li> <li>● Blow into port B and verify the valve opens at 4.9 kPa (0.7 psi) maximum.</li> <li>● Hold the valve upside down.</li> <li>● Blow into port A and verify that pressure is held.</li> </ul>	Yes (1.3L [3-Door])  Yes (1.6L)  No	<ul style="list-style-type: none"> <li>▶ GO to <b>EV8</b>.</li> <li>▶ RETURN to the Diagnostic Routines, Section 2B.</li> <li>▶ REPLACE the rollover/vent valve.</li> </ul>



- Does the valve function properly?

<b>Diagnosis and Testing</b>	<b>All Engines</b>	<b>EV</b>
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TEST STEP	RESULT	ACTION TO TAKE
<p><b>EV7</b> CHECK ROLLOVER / VENT VALVE FUNCTION</p> <ul style="list-style-type: none"> <li>● Check the rollover / vent valve for evidence of leakage.</li> <li>● Remove the rollover / vent valve. Refer to Service Manual Section 10-01.</li> <li>● Hold the valve as shown in Figure A.</li> <li>● Blow into port A and verify that air flows through the rollover / vent valve.</li> <li>● Invert the valve as shown in Figure B.</li> <li>● Blow into port A and verify that air does not flow through the rollover / vent valve.</li> </ul> <p><b>1.3L (5-Door)</b></p>  <p style="text-align: center;">A20508-A</p> <p><b>1.8L, 2.0L, 2.5L</b></p>  <p style="text-align: center;">A16474-A</p> <ul style="list-style-type: none"> <li>● Does the valve function properly?</li> </ul>	<p>Yes (1.8L)</p> <p>Yes (1.3L [5-Door], 2.0L, 2.5L)</p> <p>No</p>	<ul style="list-style-type: none"> <li>▶ GO to <b>EV8</b>.</li> <li>▶ RETURN to the Diagnostic Routines, Section 2B.</li> <li>▶ REPLACE the rollover / vent valve.</li> </ul>



<b>Diagnosis and Testing</b>	<b>All Engines</b>	<b>EV</b>
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TEST STEP		RESULT	ACTION TO TAKE
<b>EV8</b>	<b>CHECK VAPOR SEPARATOR INTEGRITY</b>		
	<ul style="list-style-type: none"> <li>● Visually inspect the vapor separator and its connections with the fuel tank for hose pinching, blockage, looseness, or other mechanical damage.</li> <li>● <b>Is the vapor separator and its connections free of damage?</b></li> </ul>	<p>Yes</p> <p>No</p>	<p>▶ RETURN to the Diagnostic Routines, Section 2B.</p> <p>▶ REPLACE the vapor separator or REPAIR the connecting hoses as required.</p>

## Specifications / Special Service Tools

### Specifications

#### GENERAL SPECIFICATIONS

Description	Specifications
<b>Rollover / Vent Valve Operation</b>	
Fuel tank pressure to open (max.)	7.0 kPa (1.0 psi)
Air pressure to vent tank (max.)	4.9 kPa (0.7 psi)
Valve in upright position	Open
Valve in inverted position	Closed
<b>Two-Way Check Valve Operation</b> (Air must flow easily under low pressure in either direction)	
Vacuum to open valve, Port A (fuel tank pressure)	1.3L, 2.0L and 2.5L: 26 mm-Hg (1.01 in-Hg) 1.6L and 1.8L: 37 mm-Hg (1.46 in-Hg)
Vacuum to open valve, Port B (barometric pressure)	All engines: 44 mm-Hg (1.73 in-Hg)

### Special Service Tools / Equipment

#### ROTUNDA EQUIPMENT

Model	Description
021-00037	Vacuum Tester
059-00008	Vacuum / Pressure Tester