

2005 Mazda MX-5 Miata

2005 ENGINE PERFORMANCE Emission System - MX-5 Miata

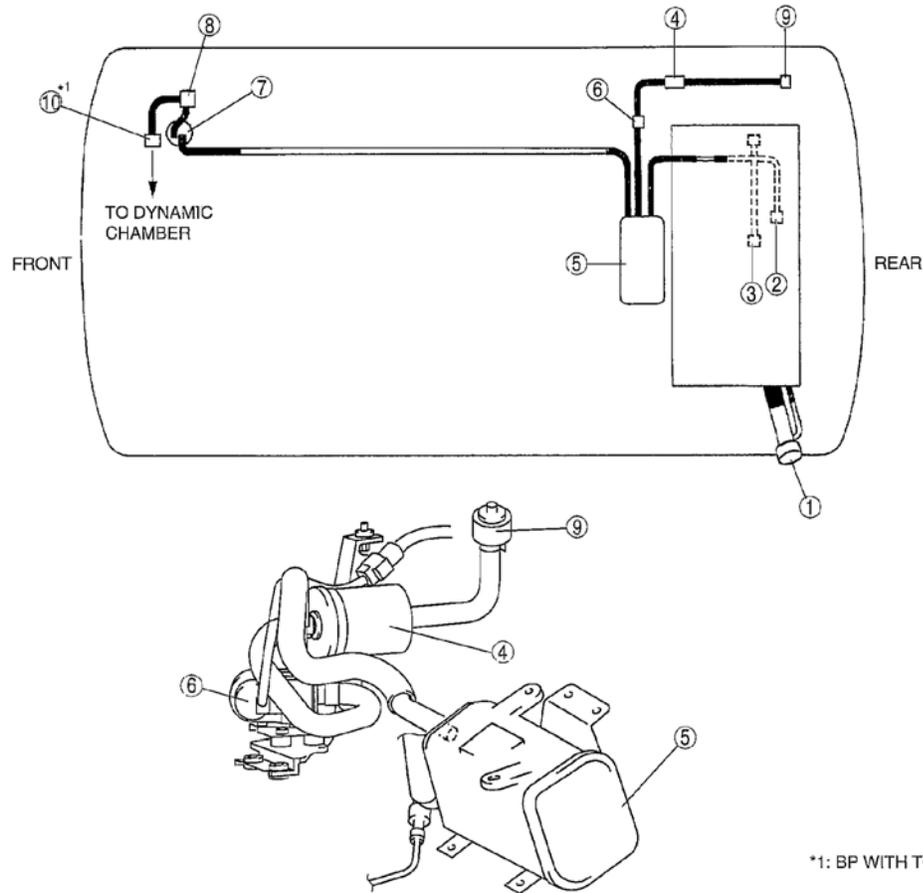
2005 ENGINE PERFORMANCE

Emission System - MX-5 Miata

**EVAPORATIVE EMISSION (EVAP) CONTROL SYSTEM LOCATION INDEX
(BP, BP WITH TC)**

2005 Mazda MX-5 Miata

2005 ENGINE PERFORMANCE Emission System - MX-5 Miata



*1: BP WITH TC

1	Fuel-filler cap (See FUEL-FILLER CAP INSPECTION [BP, BP WITH TC])	6	EVAP system leak detection pump (See EVAPORATIVE EMISSION (EVAP) SYSTEM LEAK DETECTION PUMP REMOVAL/INSTALLATION [BP, BP WITH TC]) (See EVAPORATIVE EMISSION (EVAP) SYSTEM LEAK DETECTION PUMP INSPECTION [BP, BP WITH TC])
2	Fuel shut-off valve (See FUEL SHUT-OFF VALVE/ROLLOVER VALVE INSPECTION [BP, BP WITH TC])	7	Catch tank (See CATCH TANK INSPECTION [BP, BP WITH TC])
3	Rollover valve (See FUEL SHUT-OFF VALVE/ROLLOVER VALVE INSPECTION [BP, BP WITH TC])	8	Purge solenoid valve (See PURGE SOLENOID VALVE REMOVAL/INSTALLATION [BP, BP WITH TC]) (See PURGE SOLENOID VALVE INSPECTION [BP, BP WITH TC])
4	Air filter (See AIR FILTER INSPECTION [BP, BP WITH TC])	9	Evaporative chamber (See EVAPORATIVE CHAMBER INSPECTION [BP, BP WITH TC])
5	Charcoal canister (See CHARCOAL CANISTER INSPECTION [BP, BP WITH TC])	10	EVAP control system check valve (one-way) (See EVAPORATIVE EMISSION (EVAP) CONTROL SYSTEM CHECK VALVE (ONE-WAY) INSPECTION [BP WITH TC])

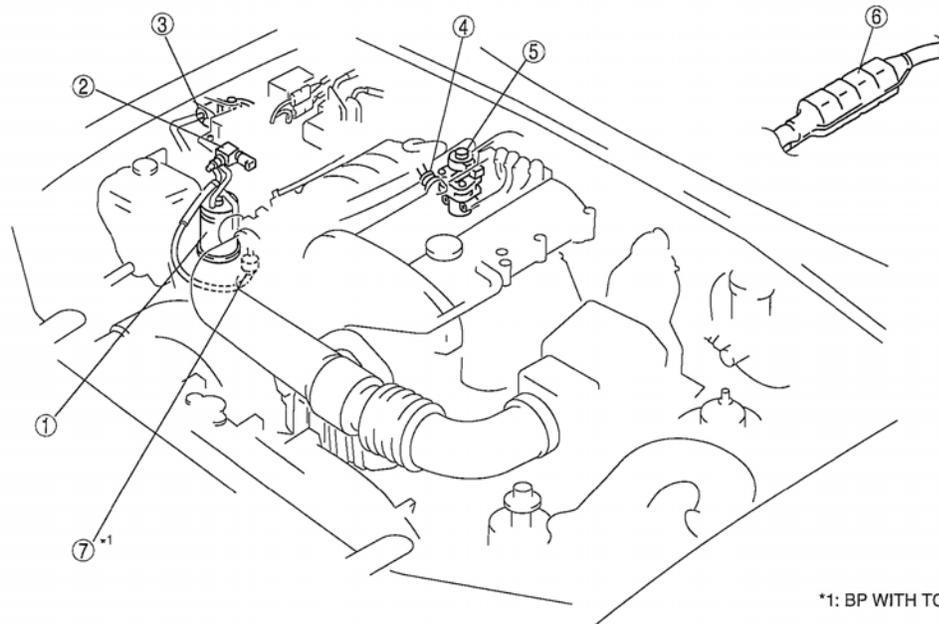
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Fig. 1: Locating Emission System Components
Courtesy of MAZDA MOTORS CORP.

EMISSION SYSTEM LOCATION INDEX (BP, BP WITH TC)

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1	Catch tank (See CATCH TANK INSPECTION [BP, BP WITH TC])	5	EGR valve (See EGR VALVE REMOVAL/INSTALLATION [BP, BP WITH TC]) (See EGR VALVE INSPECTION [BP, BP WITH TC])
2	Purge solenoid valve (See PURGE SOLENOID VALVE REMOVAL/INSTALLATION [BP, BP WITH TC]) (See PURGE SOLENOID VALVE INSPECTION [BP, BP WITH TC])	6	TWC (See THREE-WAY CATALYTIC CONVERTER (TWC) INSPECTION [BP, BP WITH TC])
3	EGR boost sensor solenoid valve (See EGR BOOST SENSOR SOLENOID VALVE INSPECTION [BP, BP WITH TC])	7	EVAP control system check valve (one-way) (See EVAPORATIVE EMISSION (EVAP) CONTROL SYSTEM CHECK VALVE (ONE-WAY) INSPECTION [BP WITH TC])
4	PCV valve (See PCV VALVE INSPECTION [BP, BP WITH TC])		

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Fig. 2: Locating Emission System Components

Courtesy of MAZDA MOTORS CORP.

FUEL-FILLER CAP INSPECTION (BP, BP WITH TC)

LEAKAGE INSPECTION

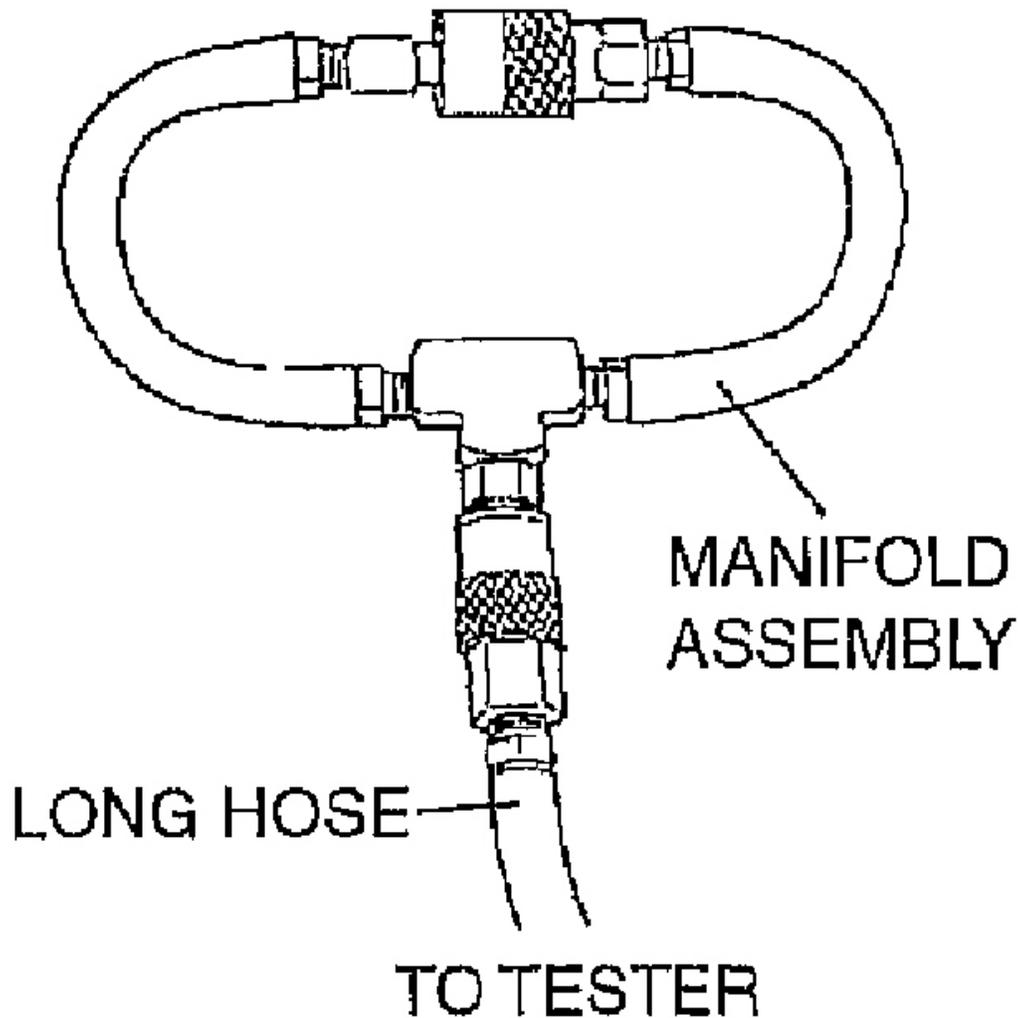
1. Perform the following **SST** (Evaporative Emission System Tester 134-01049) self-test:

NOTE:

- If the tester does not work correctly during the self-test, refer to the tester operators manual for more detailed procedures.

1. Verify that the gas cylinder valve is closed and the control valve located on the tester is in the TEST position.
2. All tester displays should be off at this time.
3. Connect the long hose (part of **SST**) to the tester.

4. Connect the manifold assembly (part of SST) to the long hose as shown in **Fig. 3**.

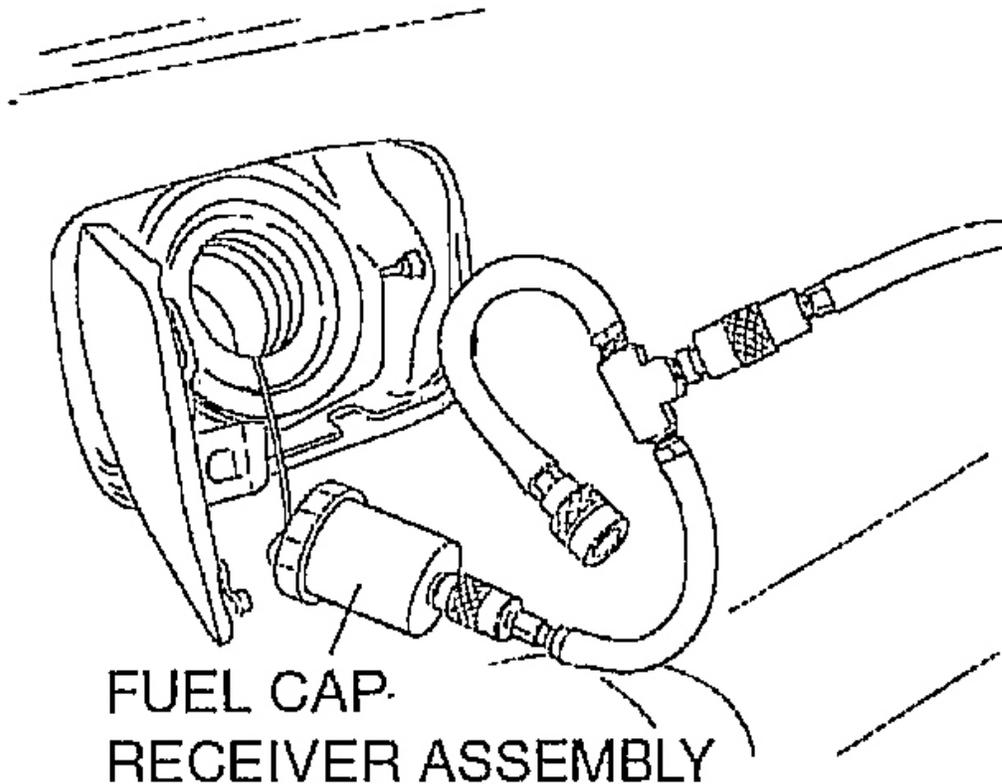


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Fig. 3: Connecting Manifold Assembly
Courtesy of MAZDA MOTORS CORP.

5. Open the gas cylinder valve and verify that the left gauge of the gas cylinder regulator reads **10 to 12 psi** (preset at factory).
 - If not, refer to the tester operators manual to contact the tester manufacturer.
6. Press the ON/OFF switch to turn on the **SST** and make sure the left display reads 0.0.

7. Turn the control valve on the tester to the FILL position.
 8. Verify that the display reading on the left is within **13.9 to 14.0 in** of water.
 - If not, adjust the pressure using the regulator knob located on the right side of the tester.
 9. Turn the control valve to the TEST position and press the START switch.
 10. After the **2-min** countdown (left display) is completed, the right display shows the total pressure loss for that period. **0.5 in** of water loss is acceptable on the self-test.
 - If the loss is more than **0.5 in** of water, perform one or more self-tests.
 - If the test position fails repeatedly, check for leakage using the ultrasonic leak detector (part of **SST**).
2. Press the RESET switch to set the left display reading to 0.0.
 3. Connect the fuel cap receiver assembly (part of **SST**) to the manifold assembly and the fuel-filler cap from the vehicle.



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Fig. 4: Connecting Fuel Cap Receiver Assembly

Courtesy of MAZDA MOTORS CORP.

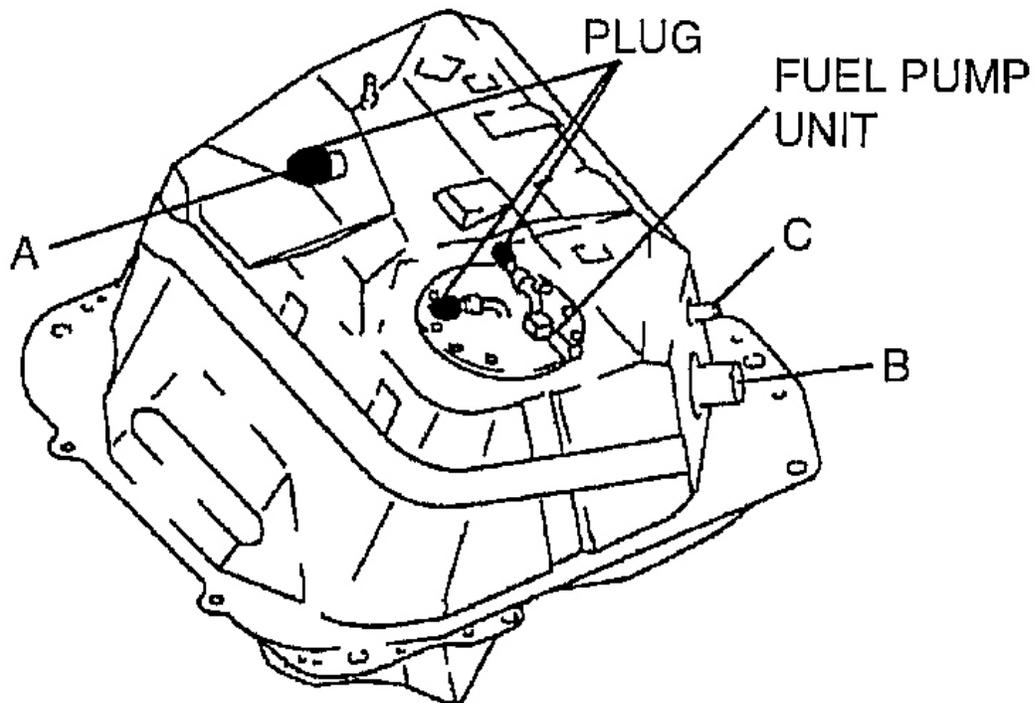
- If the fuel-filler cap is not a genuine part, replace it.
4. Turn the control valve to the FILL position.
 5. Wait (**max.20 s**) until the left display reads **13.9 to 14.0 in** of water.
 - If the reading is slightly below, adjust it using the regulator knob.
 - If the reading is far below, the fuel-filler cap has leakage. Replace it.
 6. Turn the control valve to the TEST position and press the START switch.
 7. After the **2-min** countdown (left display) is completed, check the test result (the failed/passed light on the tester).
 - If the green light illuminates, the fuel-filler cap is okay.
 - If the red light illuminates, the fuel-filler cap has leakage. Replace it.
 8. Close the gas cylinder valve.
 9. Turn the control valve to the FILL position.
 10. Press the ON/OFF switch to turn off the tester.

FUEL SHUT-OFF VALVE/ROLLOVER VALVE INSPECTION (BP, BP WITH TC)

CAUTION:

- **Disconnecting/connecting the quick release connector without cleaning it may possibly cause damage to the fuel pipe and quick release connector. Always clean the quick release connector joint area before disconnecting/connecting using a cloth or soft brush, and make sure that it is free of foreign material.**

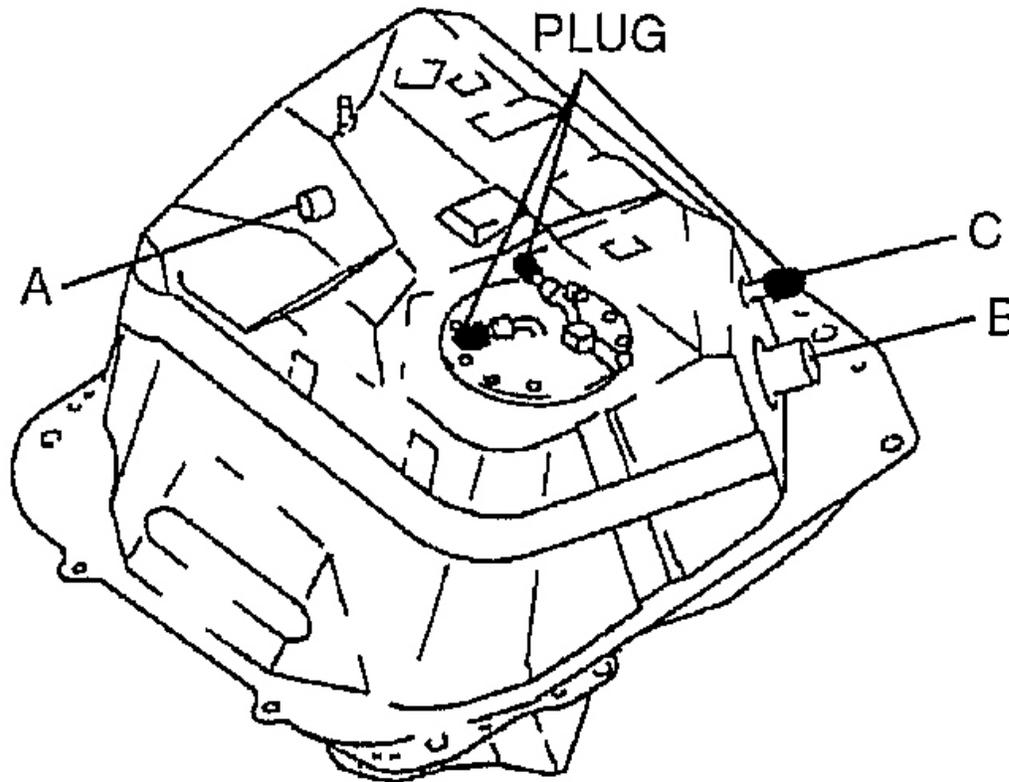
1. Disconnect the plastic fuel hose and the FP unit connector. (See **FUEL PUMP (FP) REMOVAL/INSTALLATION (BP, BP WITH TC)** .)
2. Remove the fuel tank with the FP unit. (See **FUEL TANK REMOVAL/INSTALLATION (BP, BP WITH TC)** .)
3. Plug the fuel main pipe and fuel return pipe of the FP unit.
4. Plug port A.



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Fig. 5: Plugging Fuel Main Pipe And Fuel Return Pipe Of The FP Unit
Courtesy of MAZDA MOTORS CORP.

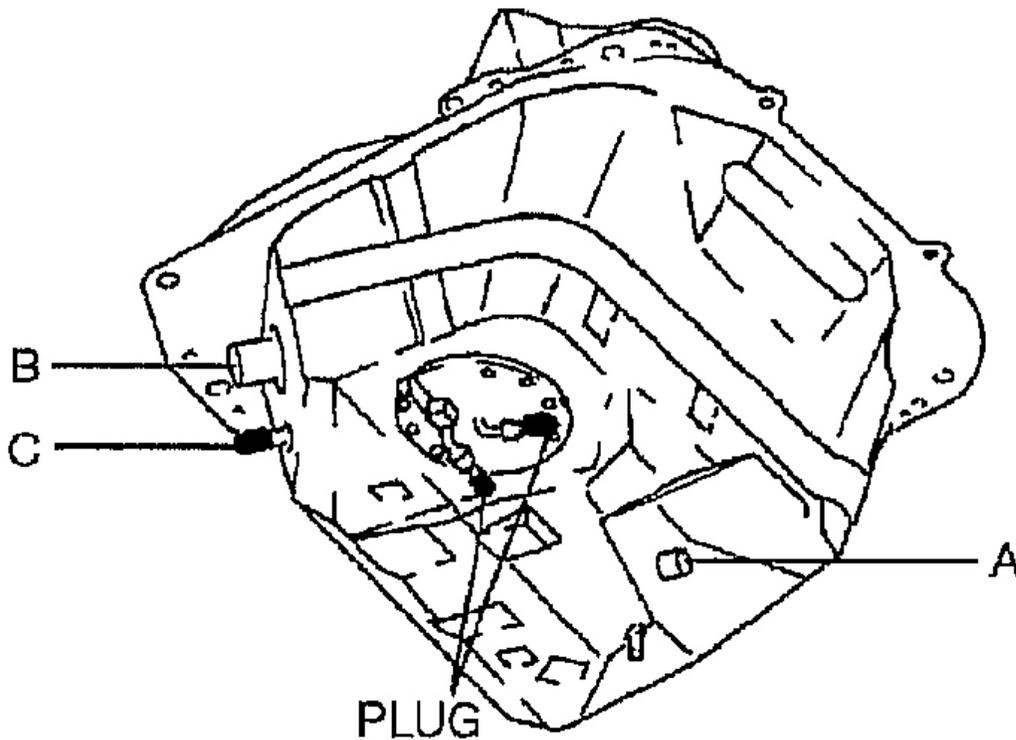
5. Level the fuel tank.
6. Blow through port B and verify that there is airflow from port C.
 - If there is no airflow, replace the fuel tank.
 - If there is airflow, plug port C and proceed to Step 7.
7. Blow through port B and verify that there is airflow from port A.



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Fig. 6: Blowing Through Port B And Verify That There Is Airflow From Port A
Courtesy of MAZDA MOTORS CORP.

- If there is no airflow, replace the fuel tank.
 - If there is airflow, turn the fuel tank upside-down, and proceed to Step 8.
8. Blow through port B and verify that there is no airflow from port A.



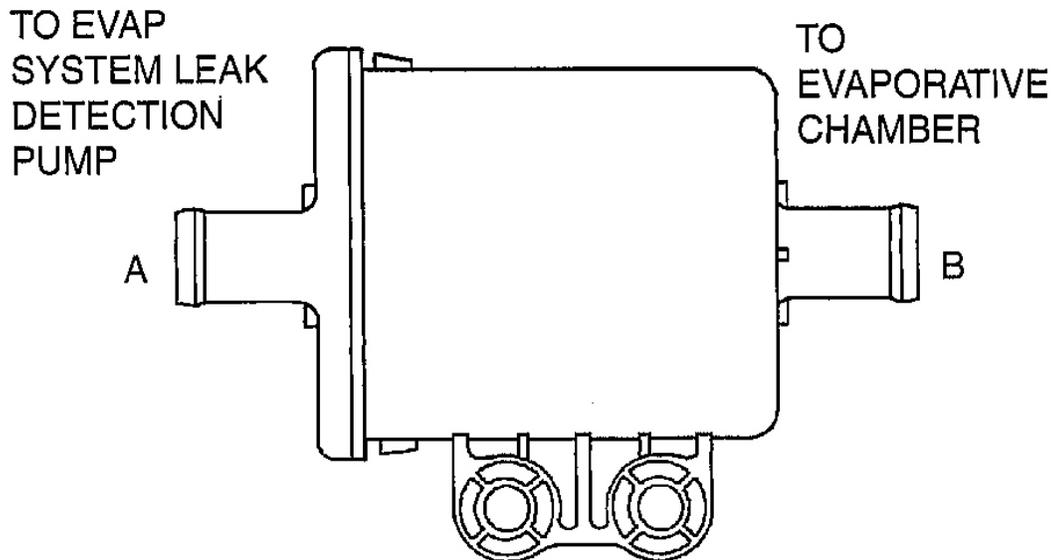
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Fig. 7: Blowing Through Port B And Verify That There Is No Airflow From Port A
Courtesy of MAZDA MOTORS CORP.

- If there is airflow, replace the fuel tank.

AIR FILTER INSPECTION (BP, BP WITH TC)

1. Remove the air filter.
2. Blow from port A and verify that there is airflow from port B.
 - If not as specified, replace the air filter.
3. Blow from port B and verify that there is airflow from port A.
 - If not as specified, replace the air filter.



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Fig. 8: Identifying Air Filter
Courtesy of MAZDA MOTORS CORP.

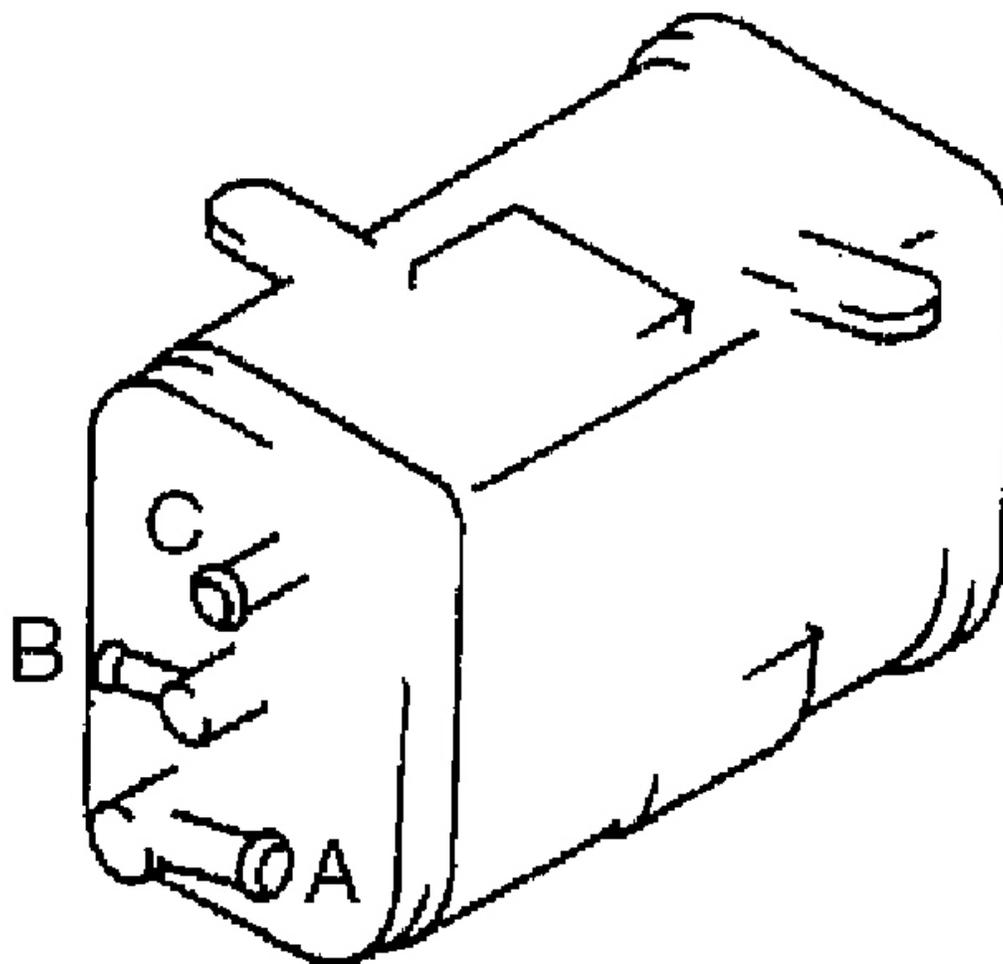
CHARCOAL CANISTER INSPECTION (BP, BP WITH TC)

1. Remove the charcoal canister. (See FUEL TANK REMOVAL/INSTALLATION (BP, BP WITH TC) .)
2. Plug ports A and B.

CAUTION:

- Do not apply more than 20 kPa {150 mmHg, 16 inHg} of pressure to the charcoal canister. Doing so may break the charcoal canister.

3. Verify that there is no air leakage when pressure of 20 kPa {150 mmHg, 16 inHg} is applied to port C.
 - If not as specified, replace the charcoal canister.



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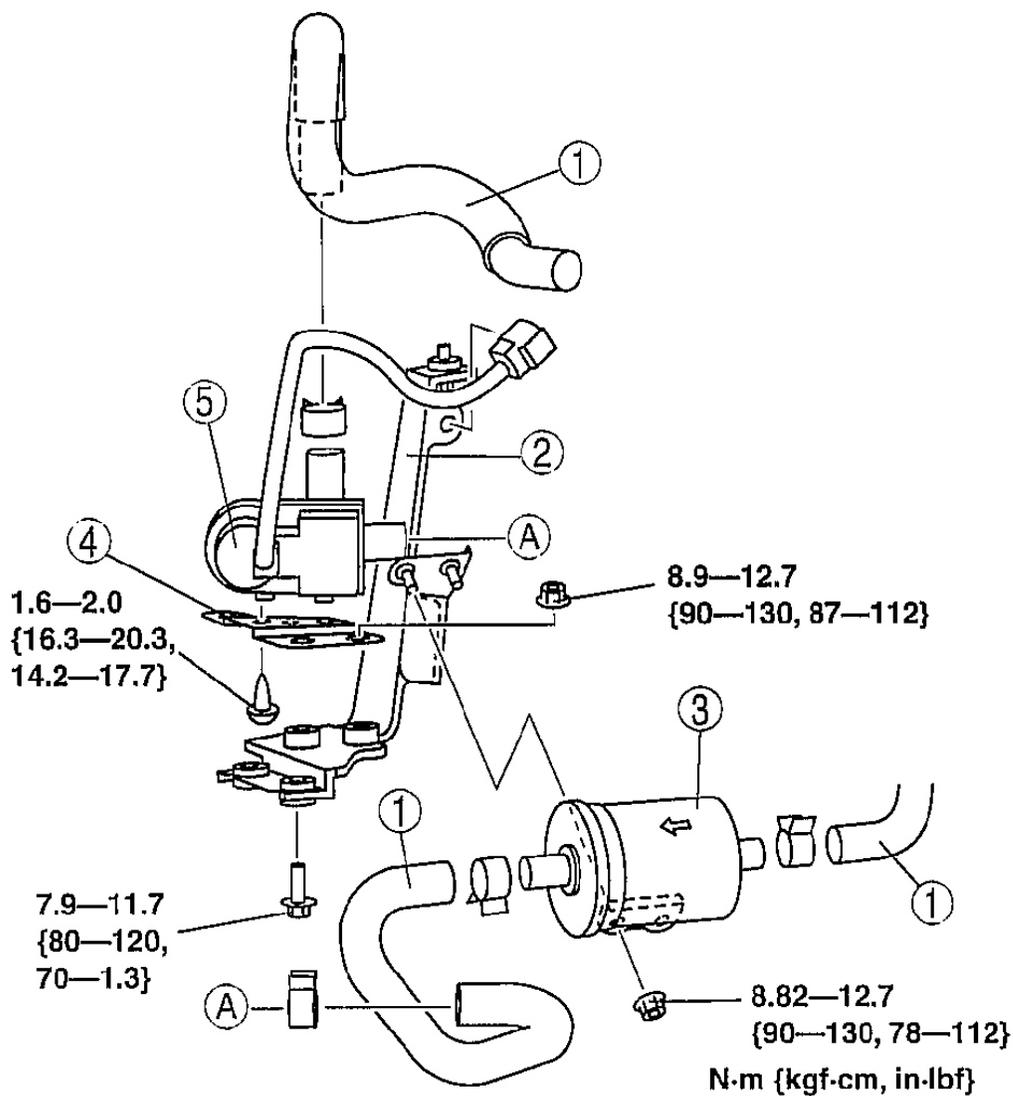
Fig. 9: Identifying Charcoal Canister
Courtesy of MAZDA MOTORS CORP.

EVAPORATIVE EMISSION (EVAP) SYSTEM LEAK DETECTION PUMP REMOVAL/INSTALLATION (BP, BP WITH TC)

1. Disconnect the negative battery cable.
2. Raise the rear of the vehicle and support it with safety stands.
3. Remove in the order indicated in the table.

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1	Evaporative hose (See Evaporative Hose Installation Note)
2	Bracket
3	Air filter
4	EVAP system leak detection pump bracket
5	EVAP system leak detection pump

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Fig. 10: Exploded View Of Evaporative Emission (EVAP) System Leak Detection Pump & Torque

Specifications

Courtesy of MAZDA MOTORS CORP.

4. Install in the reverse order of removal.

EVAPORATIVE HOSE INSTALLATION NOTE

1. Completely insert the evaporative hose into the EVAP system leak detection pump.

EVAPORATIVE EMISSION (EVAP) SYSTEM LEAK DETECTION PUMP INSPECTION (BP, BP WITH TC)

AIRFLOW INSPECTION

NOTE:

- Perform the following test only when directed.

1. Disconnect the negative battery cable.
2. Remove the EVAP system leak detection pump. (See **EVAPORATIVE EMISSION (EVAP) SYSTEM LEAK DETECTION PUMP REMOVAL/INSTALLATION (BP, BP WITH TC)**.)
3. Blow air into port A and verify that there is airflow from port B.
 - If not as specified, replace the EVAP system leak detection pump.
4. Blow air into port B and verify that there is airflow from port A.
 - If not as specified, replace the EVAP system leak detection pump.
 - If as specified, perform the following "**RESISTANCE INSPECTION**".

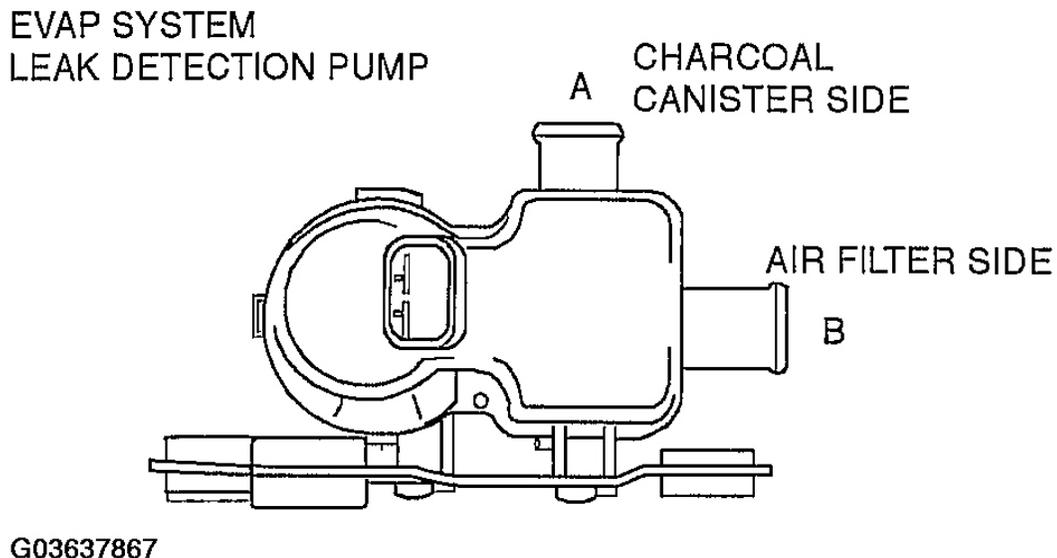


Fig. 11: Identifying EVAP System Leak Detection Pump
Courtesy of MAZDA MOTORS CORP.

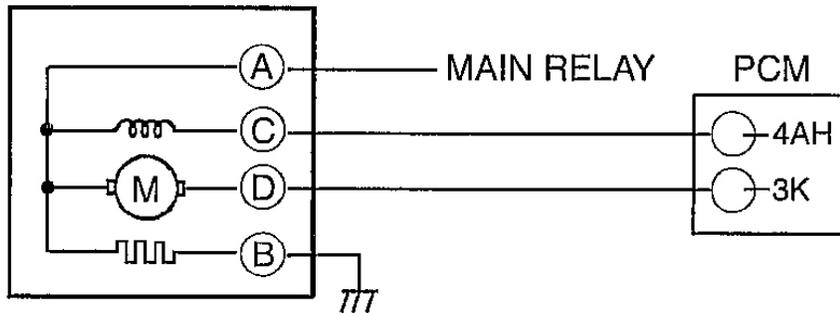
RESISTANCE INSPECTION

NOTE:

- Perform the following test only when directed.

1. Disconnect the negative battery cable.
2. Inspect resistance of the EVAP system leak detection pump.
 - If not as specified, replace the EVAP system leak detection pump.
 - If as specified, carry out the "Circuit Open/Short Inspection".

EVAP SYSTEM
LEAK DETECTION PUMP

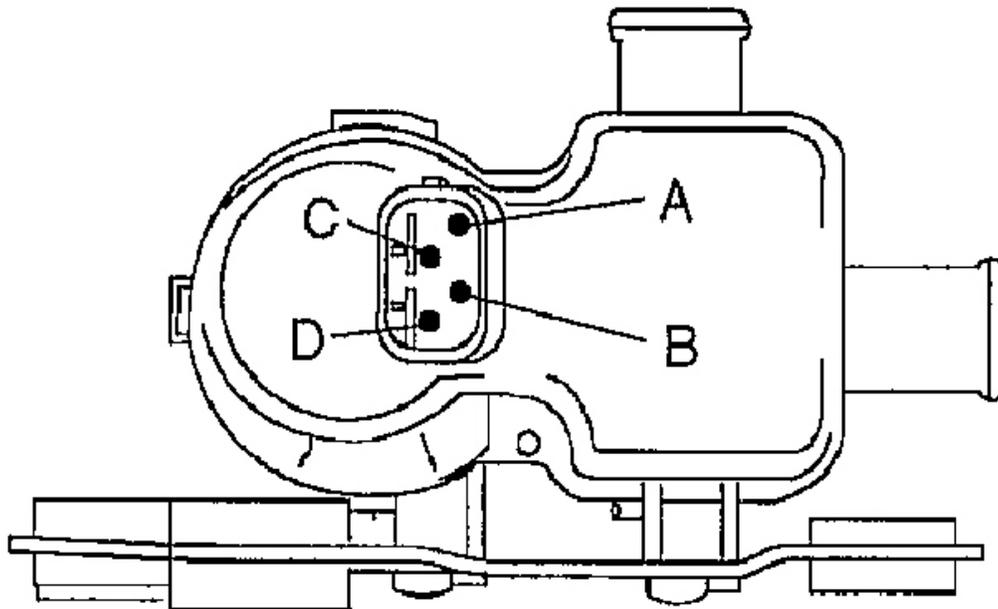


Terminals	Resistance (ohms)
A—B	20—50
A—C	26.6—32.4
A—D	Max. 118

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Fig. 12: Inspecting Resistance Of EVAP System Leak Detection Pump
Courtesy of MAZDA MOTORS CORP.

EVAP SYSTEM LEAK DETECTION PUMP



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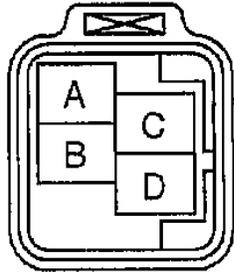
Fig. 13: Identifying Terminal
Courtesy of MAZDA MOTORS CORP.

CIRCUIT OPEN/SHORT INSPECTION

Open circuit

- If there is no continuity, the circuit is open. Repair or replace the harness.
 - EVAP system leak detection pump terminal C (harness-side) and PCM terminal 4AH
 - EVAP system leak detection pump terminal D (harness-side) and PCM terminal 3K
 - EVAP system leak detection pump terminal A (harness-side) and main relay terminal D (harness-side)
 - EVAP system leak detection pump terminal B (harness-side) and the body GND

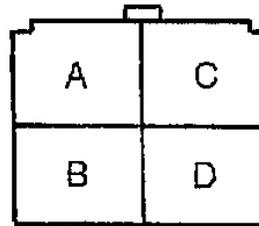
EVAP SYSTEM LEAK DETECTION PUMP



HARNESS SIDE CONNECTOR
(VIEW FROM TERMINAL SIDE)

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MAIN RELAY



HARNESS SIDE CONNECTOR
(VIEW FROM TERMINAL SIDE)

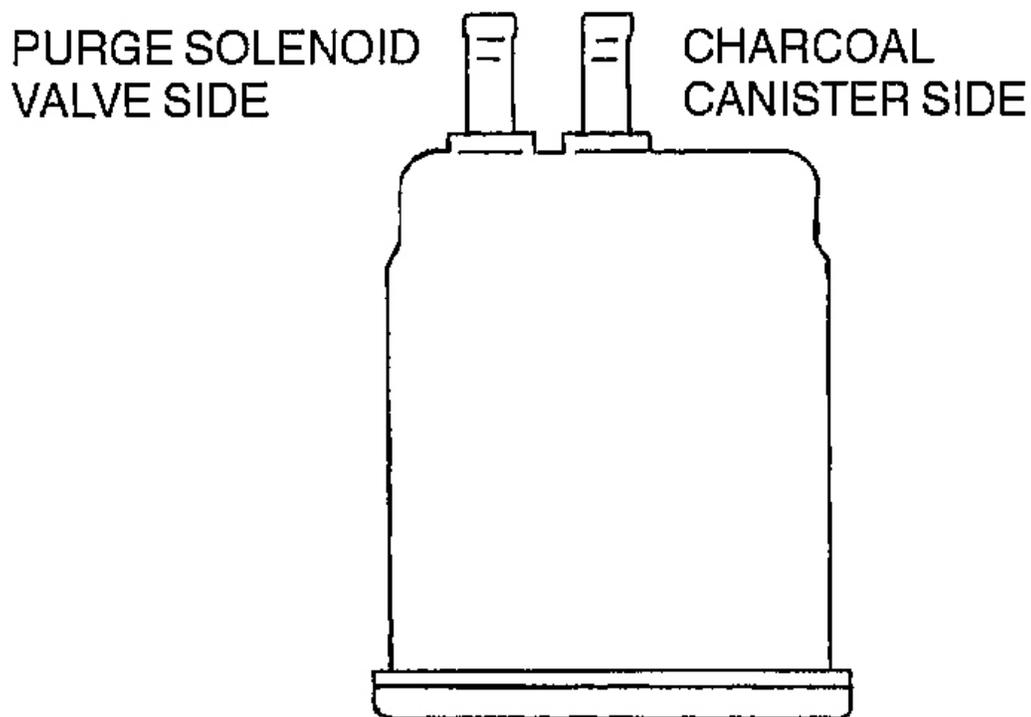
Fig. 14: Identifying Main Relay
Courtesy of MAZDA MOTORS CORP.

Short circuit

- If there is continuity, the circuit is shorted. Repair or replace the harness.
 - EVAP system leak detection pump terminal C (harness-side) and power supply
 - EVAP system leak detection pump terminal D (harness-side) and power supply
 - EVAP system leak detection pump terminal A (harness-side) and the body GND
 - EVAP system leak detection pump terminal B (harness-side) and power supply

CATCH TANK INSPECTION (BP, BP WITH TC)

1. Remove the catch tank.
2. Plug the purge solenoid valve side port of the catch tank.
3. Blow from the charcoal canister side port and verify that there is no air leakage.
 - If not as specified, replace the catch tank.

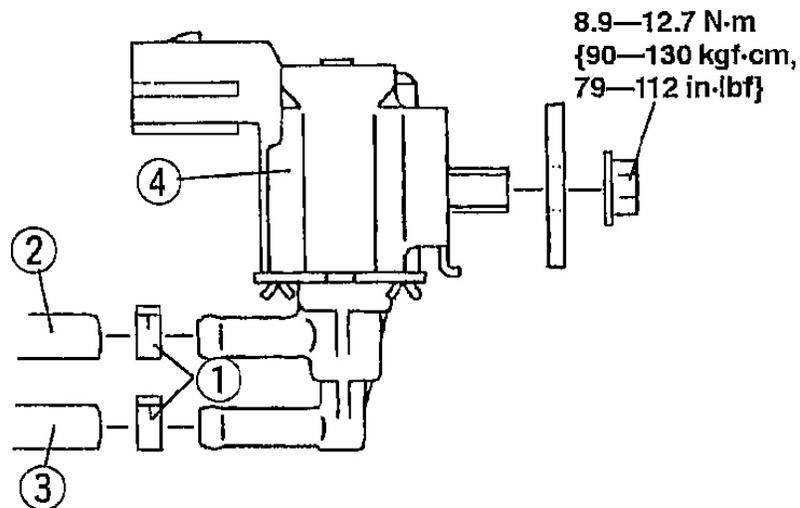


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Fig. 15: Identifying Catch Tank
Courtesy of MAZDA MOTORS CORP.

PURGE SOLENOID VALVE REMOVAL/INSTALLATION (BP, BP WITH TC)

1. Disconnect the negative battery cable.
2. Remove in the order indicated in the table.



1	Clamp
2	Evaporative hose (See Vacuum Hose, Evaporative Hose Installation Note)
3	Vacuum hose (See Vacuum Hose, Evaporative Hose Installation Note)
4	Purge solenoid valve

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Fig. 16: Identifying Purge Solenoid Valve Components & Torque Specifications
Courtesy of MAZDA MOTORS CORP.

3. Install in the reverse order of removal.

VACUUM HOSE, EVAPORATIVE HOSE INSTALLATION NOTE

1. Install the vacuum hose and evaporative hose until it contacts the stopper.

PURGE SOLENOID VALVE INSPECTION (BP, BP WITH TC)

AIRFLOW INSPECTION

NOTE:

- Perform the following test only when directed.

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1. Remove the purge solenoid valve. (See **PURGE SOLENOID VALVE REMOVAL/INSTALLATION (BP, BP WITH TC)**.)
2. Inspect airflow between the ports under the following conditions:
 - If as specified, inspect the vacuum hoses for improper routing, kinks or leakage, and carry out "Circuit Open/Short Inspection".
 - If not as specified, replace the purge solenoid valve.

○—○ : Continuity ○=○ : Airflow

Step	Terminal		Port	
	A	B	A	B
1	○—○	○—○		
2	B+	GND	○=○	○=○

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Fig. 17: Identifying Terminal Airflow
 Courtesy of MAZDA MOTORS CORP.

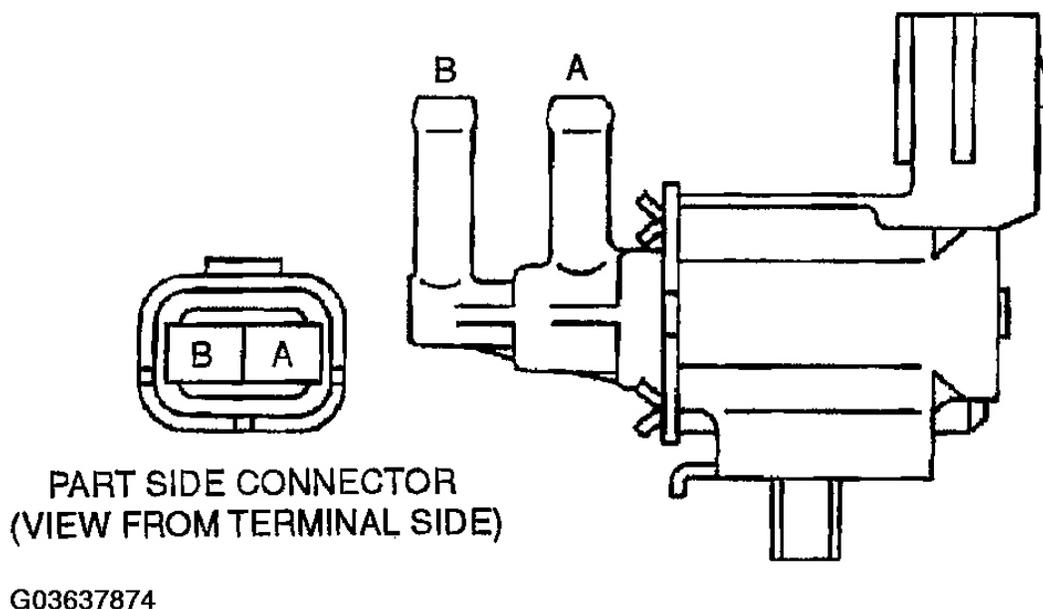


Fig. 18: Identifying Connector Terminal
Courtesy of MAZDA MOTORS CORP.

CIRCUIT OPEN/SHORT INSPECTION

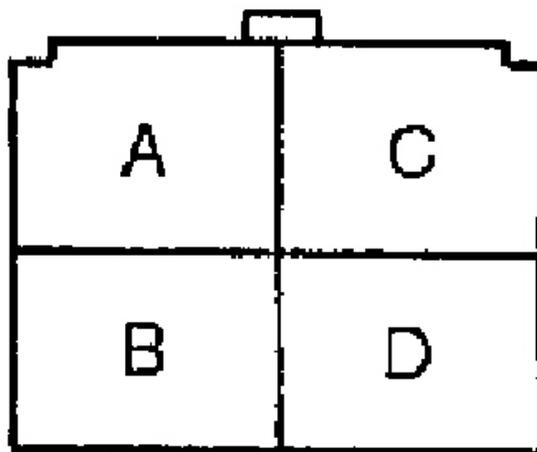
Open circuit

- GND circuit (Purge solenoid valve connector terminal B and PCM connector terminal 3C through common connector)
- Power circuit (Purge solenoid valve connector terminal A and main relay connector terminal D through common connector)

Short circuit

- Purge solenoid valve connector terminal B and PCM connector terminal 3C to GND

MAIN RELAY



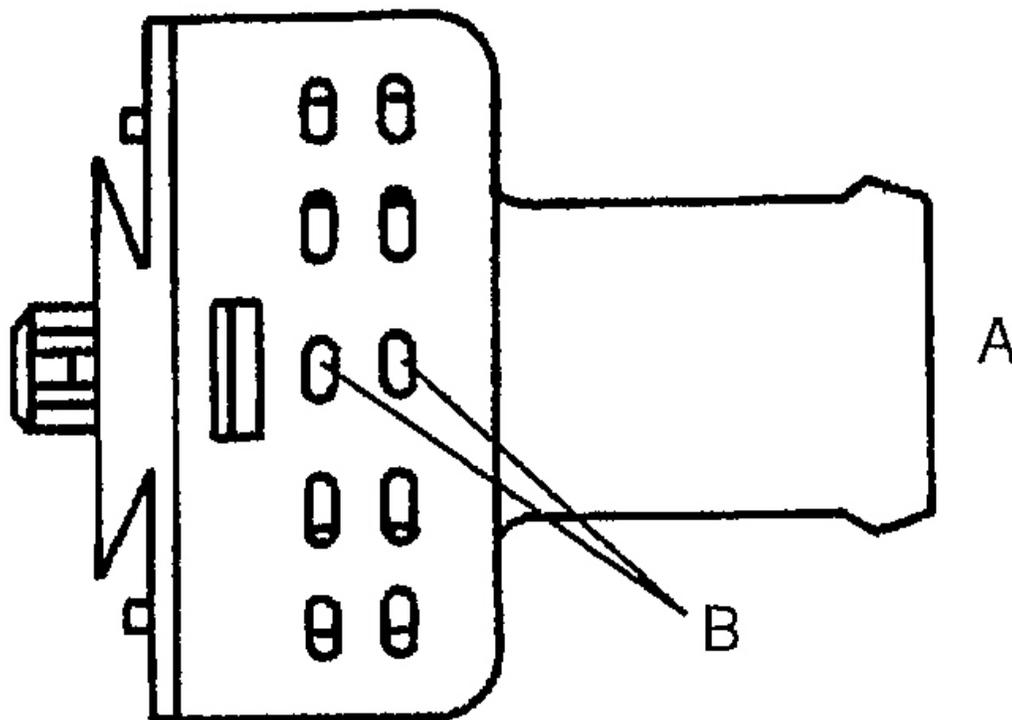
HARNESS SIDE CONNECTOR (VIEW FROM TERMINAL SIDE)

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Fig. 19: Identifying Main Relay
Courtesy of MAZDA MOTORS CORP.

EVAPORATIVE CHAMBER INSPECTION (BP, BP WITH TC)

1. Remove the evaporative chamber.
2. Blow from port A and verify that there is airflow from port B.
 - If not as specified, replace the evaporative chamber.

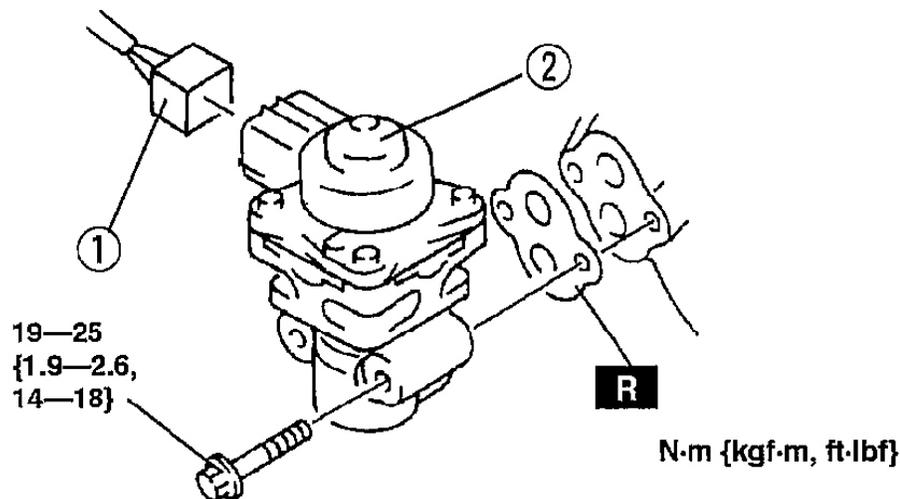


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Fig. 20: Identifying Evaporative Chamber
Courtesy of MAZDA MOTORS CORP.

EGR VALVE REMOVAL/INSTALLATION (BP, BP WITH TC)

1. Disconnect the negative battery cable.
2. Remove in the order indicated in the table.



1	EGR valve connector
2	EGR valve

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Fig. 21: Removing EGR Valve & Torque Specifications
Courtesy of MAZDA MOTORS CORP.

3. Install in the reverse order of removal.
4. Connect the negative battery cable.

EGR VALVE INSPECTION (BP, BP WITH TC)

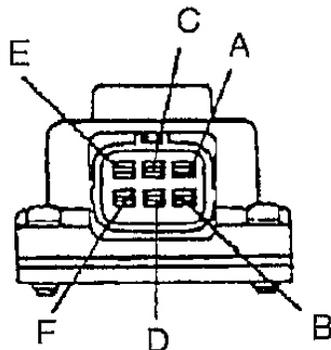
RESISTANCE INSPECTION

NOTE:

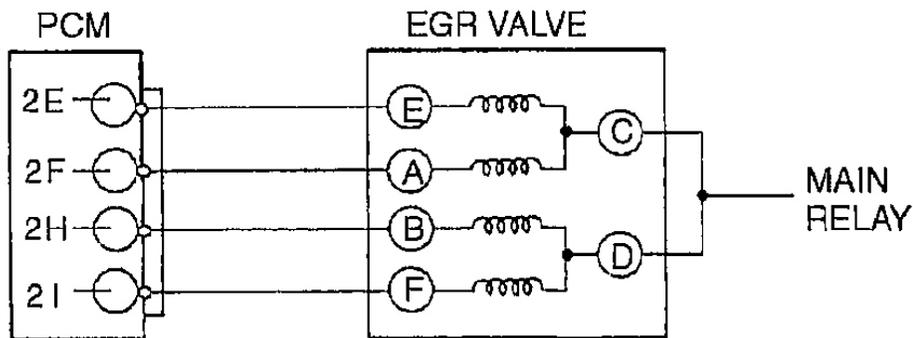
- Perform the following test only when directed.

1. Disconnect the negative battery cable.
2. Inspect resistance of the EGR valve coils.
 - If as specified, inspect the vacuum hoses for improper routing, kinks or leakage, and carry out "Circuit Open/Short Inspection".
 - If not as specified, replace the EGR valve.
3. Remove the EGR valve, and inspect for any damage or clogging. If not as specified, replace the EGR valve.
4. Connect the negative battery cable.

EGR VALVE



PART SIDE CONNECTOR
(VIEW FROM TERMINAL SIDE)



Terminals	Resistance (ohm)
C—E	Approx. 20—24
C—A	
D—B	
D—F	

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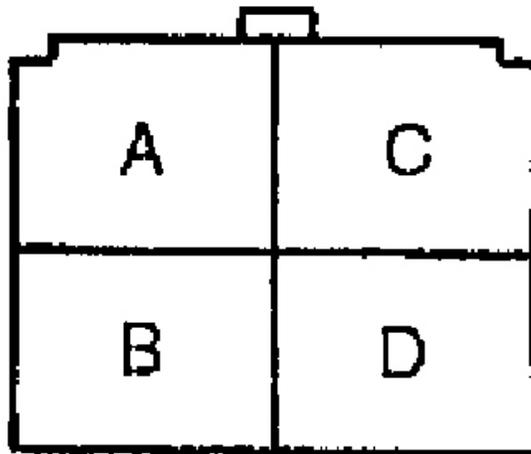
Fig. 22: Inspecting Resistance Of EGR Valve Coils
Courtesy of MAZDA MOTORS CORP.

CIRCUIT OPEN/SHORT INSPECTION

Open circuit

- GND circuit (EGR valve connector terminal E and PCM connector terminal 2E)
- GND circuit (EGR valve connector terminal A and PCM connector terminal 2F)
- GND circuit (EGR valve connector terminal B and PCM connector terminal 2H)
- GND circuit (EGR valve connector terminal F and PCM connector terminal 2I)
- Power circuit (EGR valve connector terminal C or D and main relay connector terminal D through common connector)

MAIN RELAY



HARNESS SIDE CONNECTOR (VIEW FROM TERMINAL SIDE)

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Fig. 23: Identifying Main Relay
Courtesy of MAZDA MOTORS CORP.

Short circuit

- EGR valve connector terminal E and PCM connector terminal 2E to GND

- EGR valve connector terminal A and PCM connector terminal 2F to GND
- EGR valve connector terminal B and PCM connector terminal 2H to GND
- EGR valve connector terminal F and PCM connector terminal 2I to GND

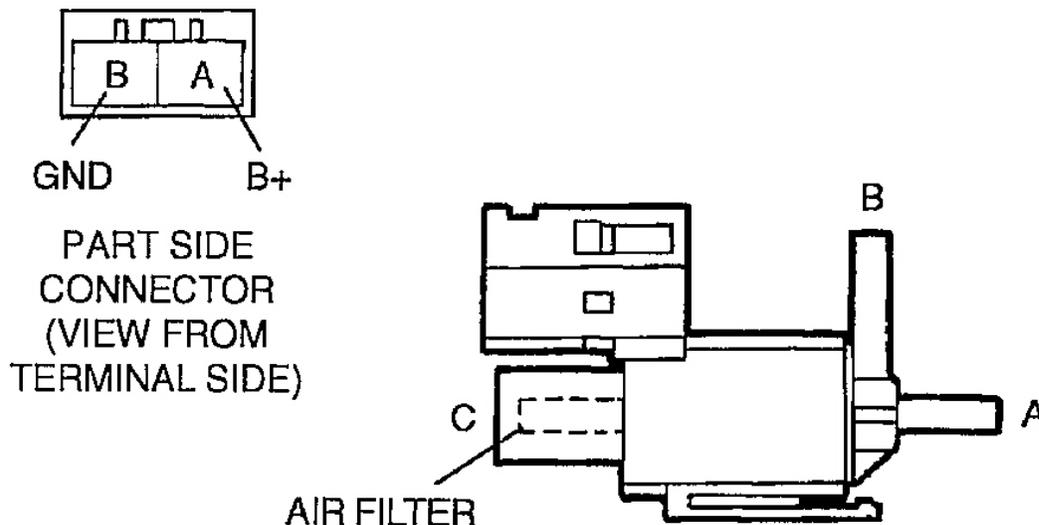
EGR BOOST SENSOR SOLENOID VALVE INSPECTION (BP, BP WITH TC)

AIRFLOW INSPECTION

NOTE:

- Perform the following test only when directed.

1. Disconnect the negative battery cable.
2. Remove the EGR boost sensor solenoid valve.
3. Inspect airflow between each port under the following conditions:



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Fig. 24: Identifying EGR Boost Sensor Solenoid Valve Connector Terminal
 Courtesy of MAZDA MOTORS CORP.

- If as specified, inspect the vacuum hoses for improper routing, kinks or leakage, and carry out "Circuit Open/Short Inspection".
 - If not as specified, replace the EGR boost sensor solenoid valve.
4. Connect the negative battery cable.

○—○ : Continuity ○=○ : Airflow

Step	Terminal		Port		
	A	B	A	B	C
1	○—○	○—○		○=○	○=○
2	B+	GND	○=○	○=○	

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Fig. 25: Identifying EGR Boost Sensor Solenoid Valve Terminal
 Courtesy of MAZDA MOTORS CORP.

CIRCUIT OPEN/SHORT INSPECTION

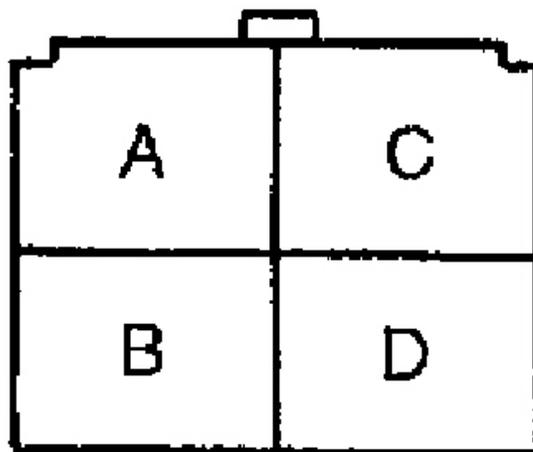
Open circuit

- GND circuit (EGR boost sensor solenoid valve connector terminal B and PCM connector terminal 3D)
- Power circuit (EGR boost sensor solenoid valve connector terminal A and main relay connector terminal D through common connector)

Short circuit

- EGR boost sensor solenoid valve connector terminal B and PCM connector terminal 3D to GND

MAIN RELAY



HARNES SIDE CONNECTOR (VIEW FROM TERMINAL SIDE)

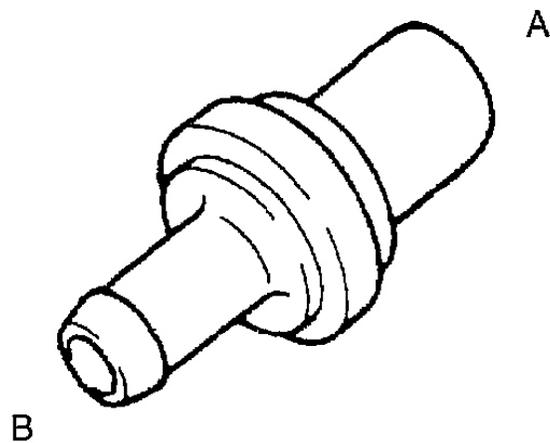
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Fig. 26: Identifying Main Relay

Courtesy of MAZDA MOTORS CORP.

PCV VALVE INSPECTION (BP, BP WITH TC)

1. Remove the PCV valve.
2. Blow through the valve and verify that air flows as specified.
 - If not as specified, replace the PCV valve.



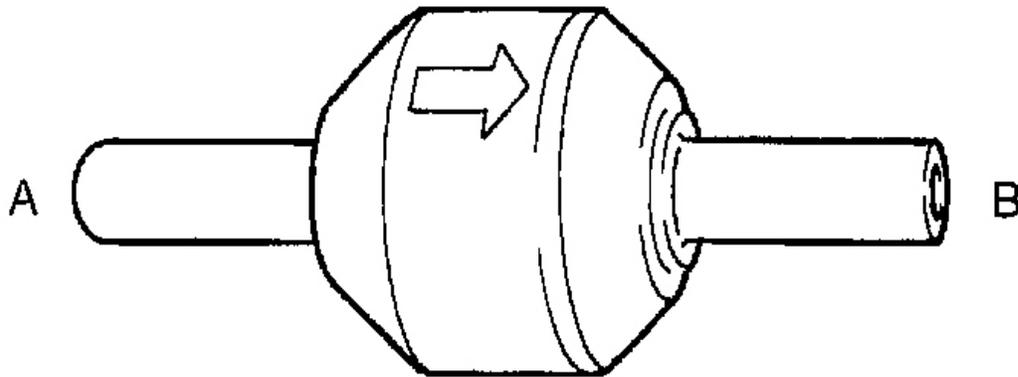
Condition	Airflow
Air applied from port A	Yes
Air applied from port B	No

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Fig. 27: Identifying PCV Valve Port
 Courtesy of MAZDA MOTORS CORP.

EVAPORATIVE EMISSION (EVAP) CONTROL SYSTEM CHECK VALVE (ONE-WAY) INSPECTION (BP WITH TC)

1. Remove the EVAP control system check valve (one-way). (See **INTAKE-AIR SYSTEM REMOVAL/INSTALLATION (BP WITH TC)** .)
2. Blow through A and verify that the air flows from B.



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Fig. 28: Identifying EVAP Control System Check Valve
 Courtesy of MAZDA MOTORS CORP.

- If not as specified, replace the EVAP control system check valve (one-way).
3. Blow through B and verify that the air does not flow from A.
 - If not as specified, replace the EVAP control system check valve (one-way).

THREE-WAY CATALYTIC CONVERTER (TWC) INSPECTION (BP, BP WITH TC)

NOTE:

- **Make sure that no HO2S DTC has been detected. If detected, this inspection cannot be used for TWC inspection.**

1. Connect the WDS or equivalent and monitor PIDs as follows:
 - Monitor TWC using O2S11 PID for upstream HO2S and O2S12 PID for downstream HO2S.
2. Begin monitoring the appropriate PIDs.
3. Drive the vehicle for **10 min** at **65-96 km/h {40-60 mph}** to ensure the front catalytic converter reaches operating temperature.
4. Stop the vehicle and leave in a safe place.
5. Idle the engine.
6. Record PIDs for **1 min**.
7. Select the appropriate PIDs and read the graph.
8. Count the number of times (inversions) that the upstream HO2S graph line actually crosses the **0.5 V** line.
9. Count the number of times (inversions) that the downstream HO2S graph line actually crosses the **0.5 V**

line.

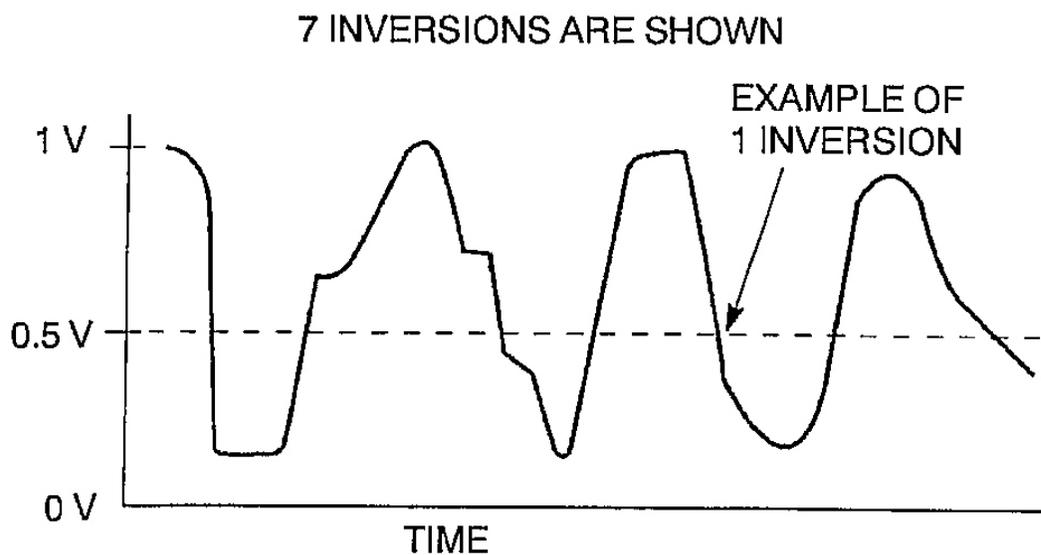
NOTE:

- Do not count the number of peaks. Refer to Fig. 29.

10. Using the following equation, calculate the value of ratio.

Equation

$$\text{RATIO} = \text{Upstream HO2S inversion} \text{ DIVISION } \text{downstream HO2S inversion}$$

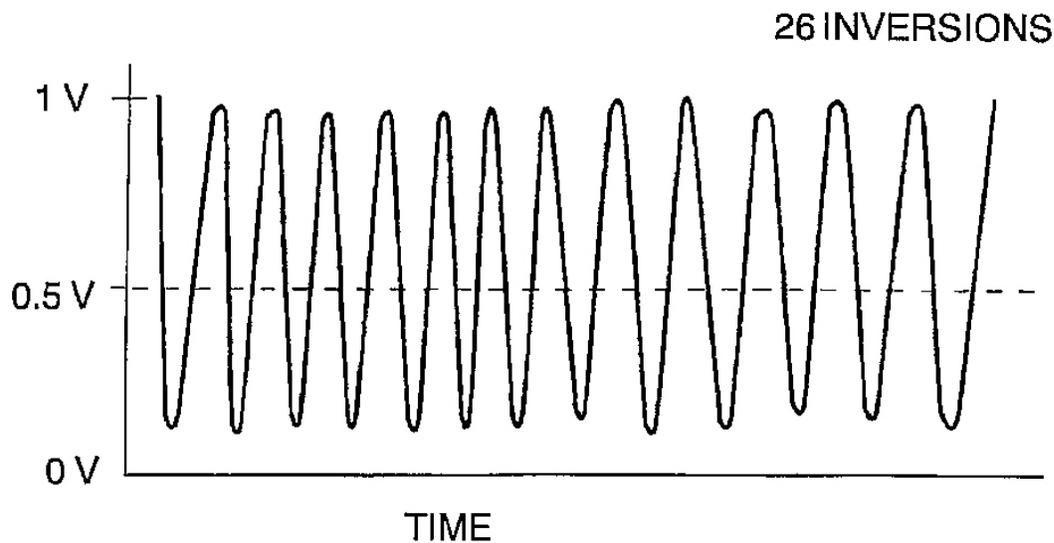


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Fig. 29: Identifying Upstream HO2S Graph Line
 Courtesy of MAZDA MOTORS CORP.

- If the ratio is **2 or more** or no downstream HO2S inversion, the TWC is functioning properly.
- If the ratio is **less than 2**, the TWC is not functioning properly. Replace the TWC.

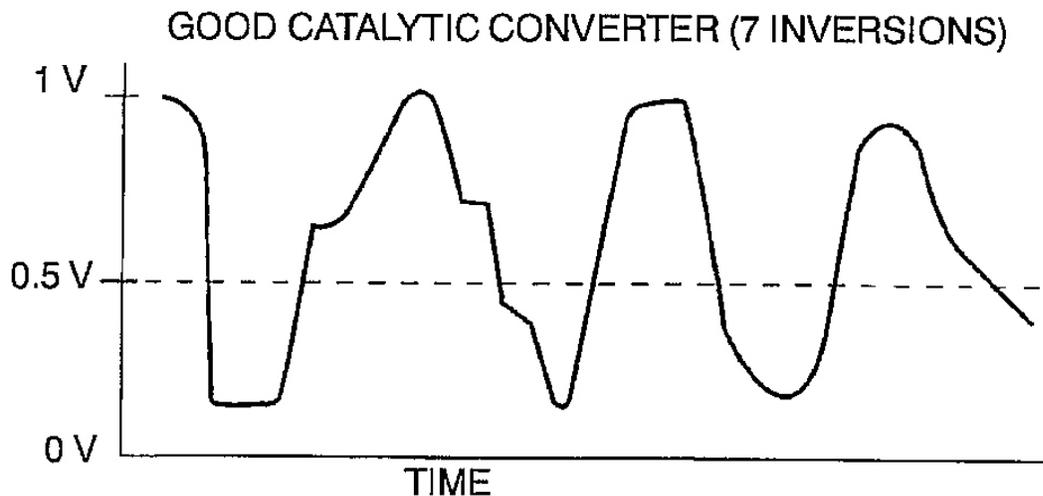
Upstream HO2S graph line example



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Fig. 30: Identifying Upstream HO2S Graph Line
Courtesy of MAZDA MOTORS CORP.

Downstream HO2S graph line example 1



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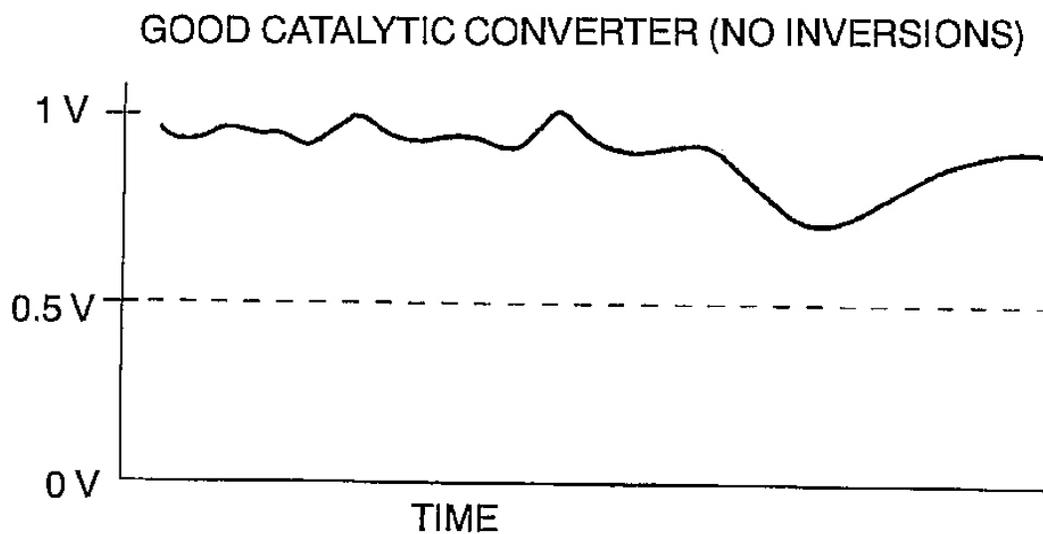
Fig. 31: Identifying Good Catalytic Converter (7 Inversions) Graph

Courtesy of MAZDA MOTORS CORP.

Equation

$\text{RATIO} = \frac{26 \text{ inversions (upstream HO2S inversions)}}{7 \text{ inversions (downstream HO2S inversions)}} = 3.7$ (good converter)

Downstream HO2S graph line example 2



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Fig. 32: Identifying Good Catalytic Converter (No Inversions) Graph
Courtesy of MAZDA MOTORS CORP.

Downstream HO2S graph line example 3

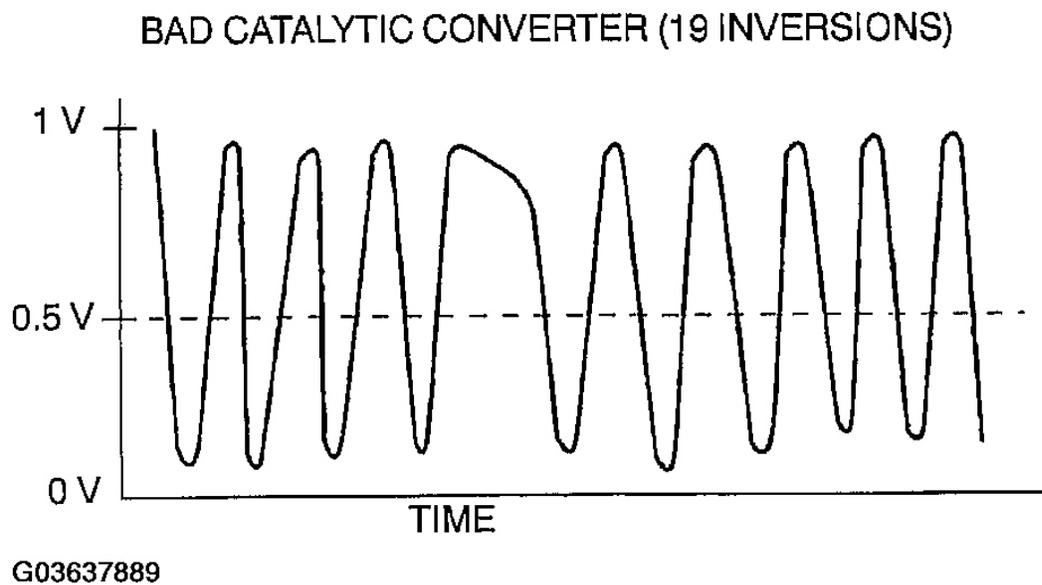


Fig. 33: Identifying Bad Catalytic Converter (19 Inversions) Graph
Courtesy of MAZDA MOTORS CORP.

Equation

RATIO = 26 inversions (upstream HO2S inversions) DIVISION 19 inversions (downstream HO2S inversions) = 1.4 (bad converter)