

DTC	P0455	Evaporative Emission Control System Leak Detected (Gross Leak)
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DTC	P0456	Evaporative Emission Control System Leak Detected (Very Small Leak)
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DTC SUMMARY

DTCs	Monitoring Items	Malfunction Detection Conditions	Trouble Areas	Detection Timings	Detection Logic
P0455	EVAP gross leak	Vacuum pump creates negative pressure (vacuum) in EVAP system and EVAP system pressure is measured. The 0.02 inch leak pressure standard is measured at the start and end of the leak check. If stabilized pressure is higher than [second 0.02 inch leak pressure standard x 0.2], ECM determines that EVAP system has large leakage.	- Fuel tank cap (loose) - Leakage from EVAP line (Canister - Fuel tank) - Leakage from EVAP line (Purge VSV - Canister) - Leakage from pump module - Leakage from fuel tank - Leakage from canister	While ignition switch OFF	2 trip
P0456	EVAP small leak	Vacuum pump creates negative pressure (vacuum) in EVAP system and EVAP system pressure measured. The 0.02 inch leak pressure standard measured at the start and end of the leak check. If stabilized pressure is higher than second 0.02 inch leak pressure standard, ECM determines that EVAP system has small leakage.	Same above	While ignition switch OFF	2 trip

DESCRIPTION

The circuit description can be found in the EVAP (Evaporative Emission) System (See page [ES-346](#)).

INSPECTION PROCEDURE

Refer to the EVAP System (See page [ES-349](#)).

MONITOR DESCRIPTION

5 hours^{*1} after the ignition switch is turned off, the electric vacuum pump creates negative pressure (vacuum) in the EVAP (Evaporative Emission) system. The ECM monitors for leaks and actuator malfunctions based on the EVAP pressure.

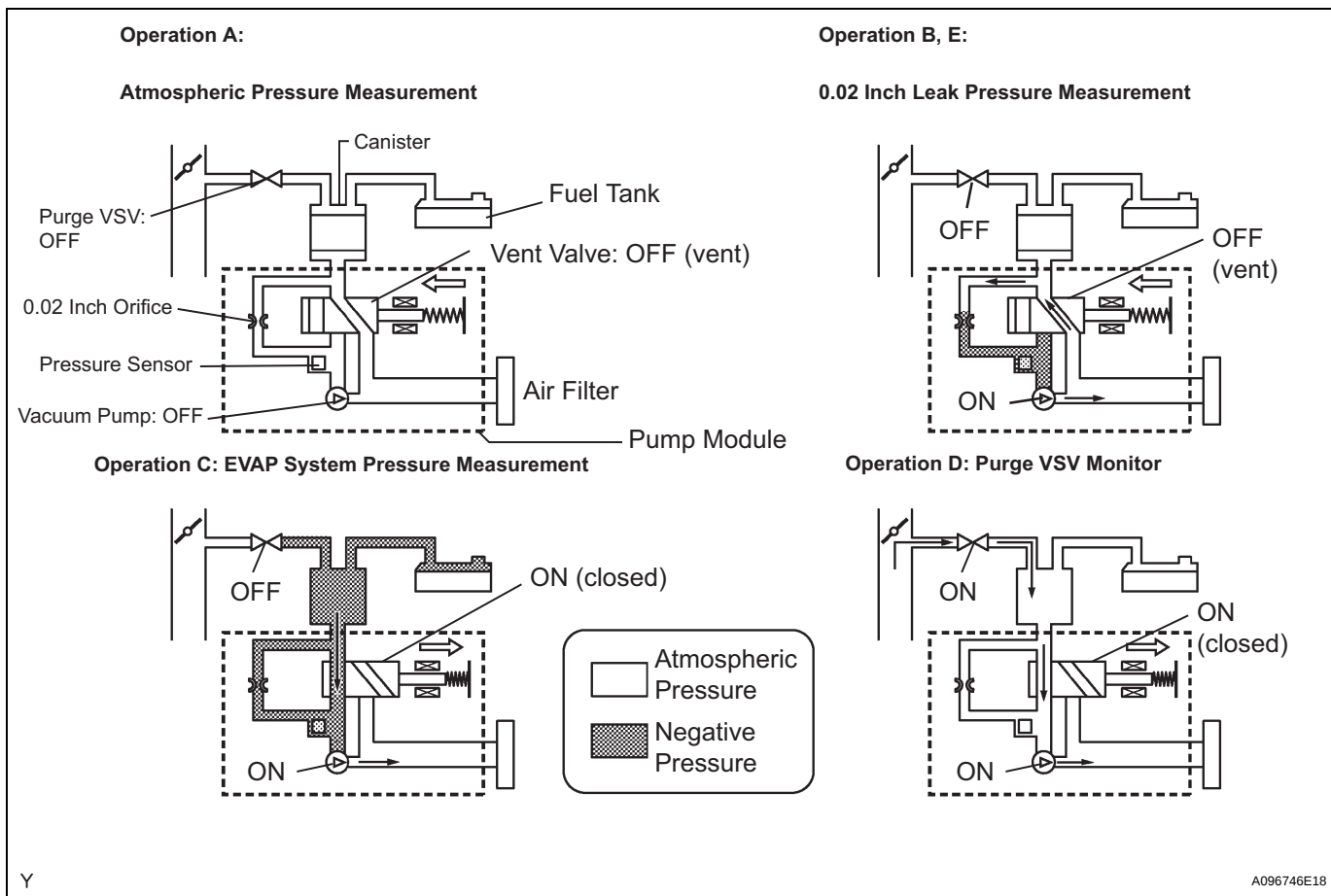
HINT:

^{*1}: If the engine coolant temperature is not below 35°C (95°F) after 5 hours after the ignition switch is turned off, the monitor check starts 2 hours later. If it is still not below 35°C (95°F) 7 hours after the ignition switch is turned off, the monitor check starts 2.5 hours later.

Sequence	Operations	Descriptions	Duration
-	ECM activation	Activated by soak timer, 5 hours (7 or 9.5 hours) after ignition switch turned off.	-
A	Atmospheric pressure measurement	Vent valve turned OFF (vent) and EVAP system pressure measured by ECM in order to register atmospheric pressure. If pressure in EVAP system is not between 70 kPa and 110 kPa (525 mmHg and 825 mmHg), ECM cancels EVAP system monitor.	10 seconds

Sequence	Operations	Descriptions	Duration
B	First 0.02 inch leak pressure measurement	In order to determine 0.02 inch leak pressure standard, vacuum pump creates negative pressure (vacuum) through 0.02 inch orifice and then ECM checks if vacuum pump and vent valve operate normally.	60 seconds
C	EVAP system pressure measurement	Vent valve turned ON (closed) to shut EVAP system. Negative pressure (vacuum) is created in EVAP system, and EVAP system pressure then measured. Write down measured value as it will be used in leak check. If EVAP pressure does not stabilize within 15 minutes, ECM cancels EVAP system monitor.	15 minutes ^{*2}
D	Purge VSV monitor	Purge VSV is opened and then EVAP system pressure is measured by ECM. Large increase indicates normal.	10 seconds
E	Second 0.02 inch leak pressure measurement	After second 0.02 inch leak pressure measurement, leak check is performed by comparing first and second 0.02 inch leak pressure standards. If stabilized system pressure is higher than second 0.02 inch leak pressure standard, ECM determines that EVAP system leaking.	60 seconds
F	Final check	Atmospheric pressure is measured and then monitoring result is recorded by ECM.	-

^{*2}: If only a small amount of fuel in the fuel tank, it take longer for the EVAP pressure to stabilize.

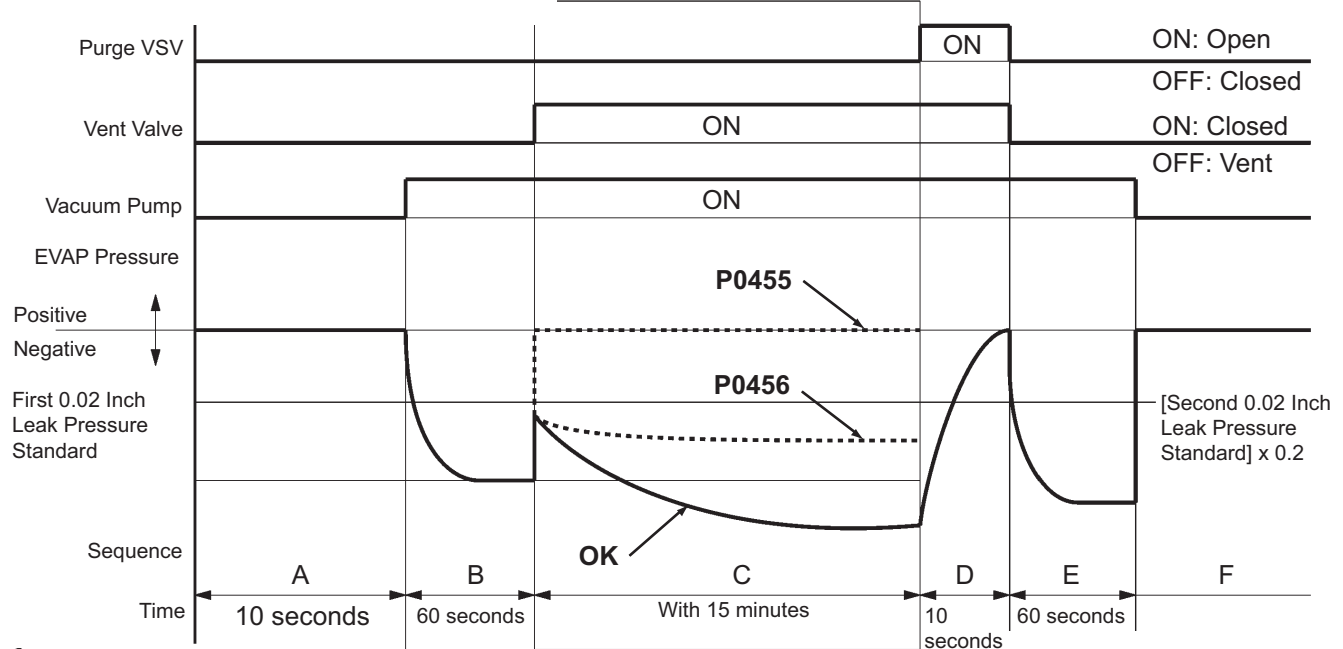


1. P0455: EVAP (Evaporative Emission) gross leak

In operation C, the vacuum pump creates negative pressure (vacuum) in the EVAP system and the EVAP system pressure is measured. If the stabilized system pressure is higher than [second 0.02 inch leak pressure standard x 0.2] (near atmospheric pressure), the ECM determines that the EVAP system has a large leakage, illuminates the MIL and sets the DTC (2 trip detection logic).

2. P0456: EVAP very small leak

In operation C, the vacuum pump creates negative pressure (vacuum) in the EVAP system and the EVAP system pressure is measured. If the stabilized system pressure is higher than second 0.02 inch leak pressure standard, the ECM determines that the EVAP system has a small leakage, illuminates the MIL and sets the DTC (2 trip detection logic).

EVAP Pressure when EVAP System Leaks:**MONITOR STRATEGY**

Related DTCs	P0455: Gross leak detected P0456: Very small leak (0.020 inch hole) detected
Required Sensors / Components	Purge VSV, pump module
Frequency of Operation	Once per driving cycle
Duration	Within 15 minutes (varies with amount of fuel in tank)
MIL Operation	2 driving cycles
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever these DTCs are not present	None
Atmospheric pressure	70 to 110 kPa (525 to 825 mmHg)
Battery voltage	10.5 V or more
Vehicle speed	Less than 2.5 mph (4 km/h)
Ignition switch	OFF
Time after key-off	5 or 7 or 9.5 hours
EVAP pressure sensor malfunction (P0450, P0452, P0453)	Not detected
EVAP canister purge valve	Not operated by scan tool
EVAP canister vent valve	Not operated by scan tool
EVAP leak detection pump	Not operated by scan tool
Both of the following conditions are met before key off	Condition 1 and 2
1. Duration that vehicle has been driven	5 minutes or more

2. EVAP purge operation	Performed
ECT	4.4 to 35°C (40 to 95°F)
IAT	4.4 to 35°C (40 to 95°F)

TYPICAL MALFUNCTION THRESHOLDS

Small leak (0.020 inch) malfunction detection:

EVAP pressure when vacuum introduction is complete	Between reference pressure and reference pressure x 0.2
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Gross leak detection:

EVAP pressure when vacuum introduction is complete	Higher than reference pressure x 0.2
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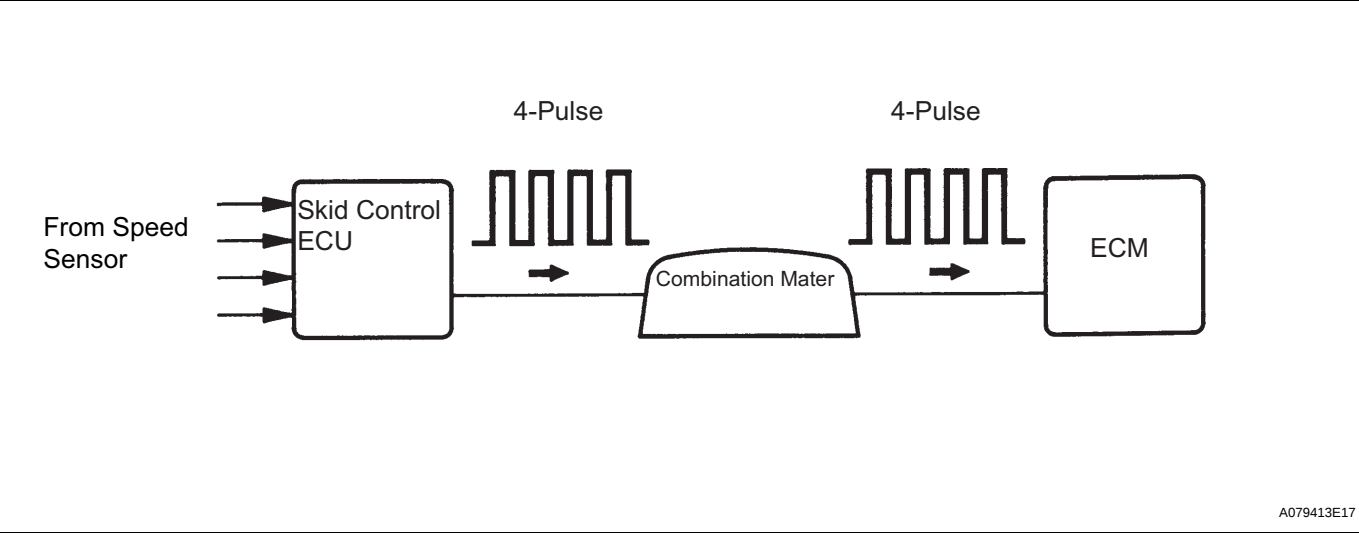
MONITOR RESULT

Refer to CHECKING MONITOR STATUS (See page [ES-14](#)).

DTC	P0500	Vehicle Speed Sensor "A"
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DESCRIPTION

Vehicles, which are equipped with ABS (Anti-lock Brake System), detect the vehicle speed using the skid control ECU and wheel speed sensor. The wheel speed sensor monitors the wheel rotation speed and sends a signal to the skid control ECU. The skid control ECU converts the wheel speed signal into a 4-pulse signal and transmits it to the ECM via the combination meter. The ECM determines the vehicle speed based on the frequency of the pulse signal.



DTC No.	DTC Detection Conditions	Trouble Areas
P0500	The ECM detects following conditions simultaneously 500 times (2 trip detection logic) - No SP1 (speed sensor) signal while ECM detects SP2 (No. 2 speed sensor) signal - Vehicle speed is 6 mph (9 km/h) or more for 4 seconds - Park/Neutral position switch is OFF (shift lever other than P and N positions) - Transfer lever is in other than N position (4WD)	- Open or short in speed signal circuit - Combination meter - ECM - Skid control ECU

MONITOR DESCRIPTION

The ECM assumes that the vehicle is being driven, the vehicle speed sensor signal is being transmitted by the combination meter. If there is no signal from combination meter, despite the ECM detects the speed signal from speed sensor No. 2, the ECM interprets this as a malfunction in the speed signal circuit. The ECM then illuminates the MIL and sets the DTC.

MONITOR STRATEGY

Related DTCs	P0500: Vehicle speed sensor "A" pulse input error
Required Sensors / Components (Main)	Vehicle Speed Sensor
Required Sensors / Components (Related)	Park/neutral Position switch, Engine Coolant Temperature sensor, Combination meter
Frequency of Operation	Continuous
Duration	0.5 seconds
MIL Operation	Immediate
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever these DTCs are not present	-
Vehicle speed is 5.59 mph (9 km/h) or more	4 seconds or more
Park/neutral position switch	OFF
Ignition switch	ON

TYPICAL MALFUNCTION THRESHOLDS

2WD:

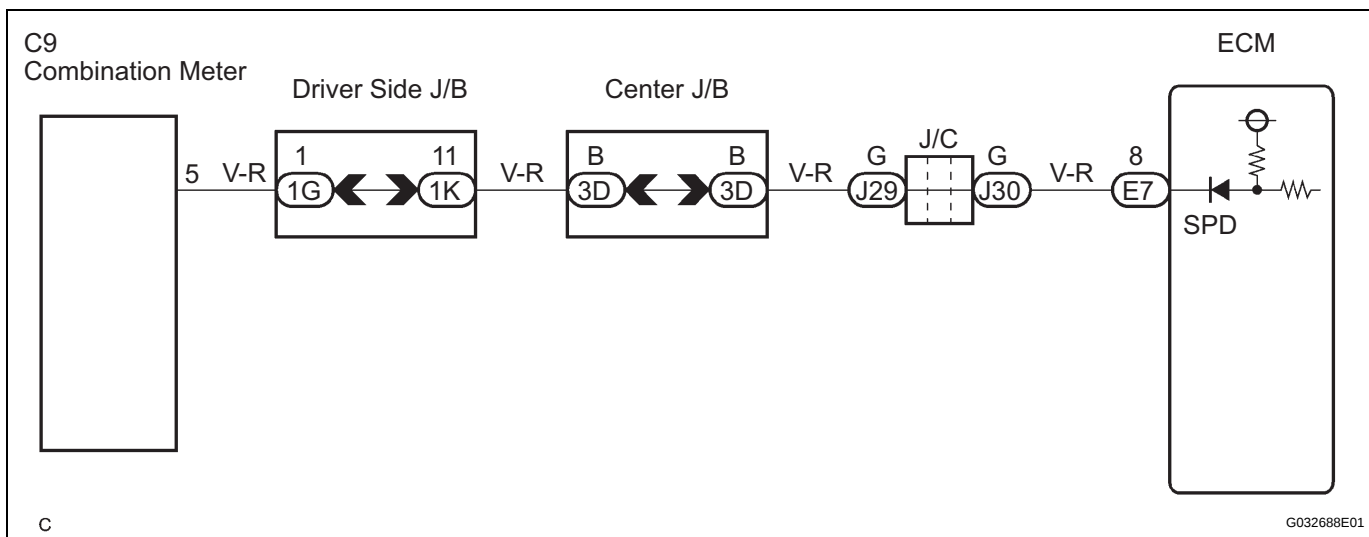
Sensor signal	No input
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4WD:

Either of following conditions is met	Condition 1 or 2
1. All of following conditions (a), (b) and (c) met	-
(a) Sensor signal	No input
(b) Output speed sensor input	16 pulse
(c) Transfer L4 Switch	OFF
2. All of following conditions (a), (b) and (c) met	-
(a) Sensor signal	No input
(b) Output speed sensor input	41 pulse
(c) Transfer L4 Switch	ON

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WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Read freeze frame data using the intelligent tester. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can be helpful in determining whether the vehicle was running or stopped, whether the engine was warmed up or not, whether the air/fuel ratio was lean or rich, as well as other data recorded at the time of a malfunction.

1

CHECK OPERATION OF SPEEDOMETER

- (a) Drive the vehicle and check if the operation of the speedometer in the combination meter is normal.
- OK:**
Actual vehicle speed and the speed indicated on the speedometer are the same.
- HINT:**
The vehicle speed sensor is operating normally if the speedometer reading is normal.

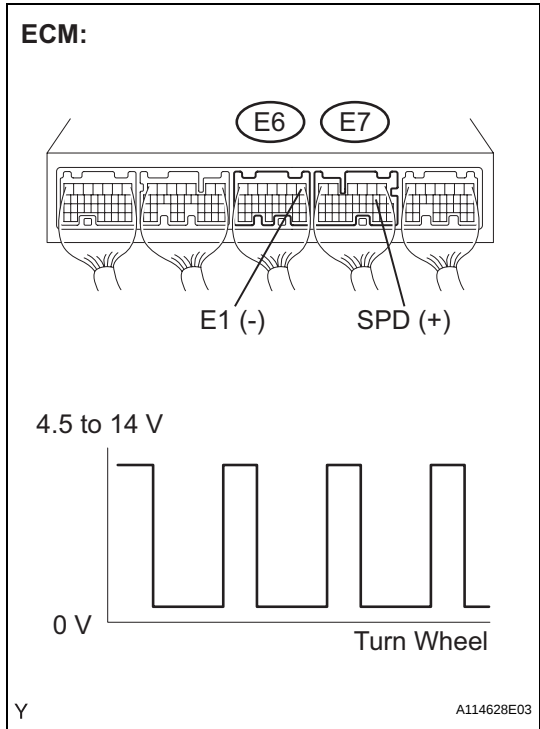
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CHECK SPEEDOMETER CIRCUIT

OK

2

INSPECT ECM (SPD VOLTAGE)



- (a) Shift the shift lever to the neutral position.
- (b) Jack up the vehicle.
- (c) Turn the ignition switch on.
- (d) Check the voltage between the terminals of the E6 and E7 ECM connectors as the wheel is turned slowly.
- OK**

Tester Connections	Specified Conditions
SPD (E7-8) - E1 (E6-1)	Voltage generated intermittently

HINT:
The output voltage should fluctuate up and down similarly to the diagram on the left when the wheel is turned slowly.

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REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE ECM