

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 Item	Malfunction Detection Condition	Trouble Area	Detection Timing	Detection Logic
P0455	EVAP gross leak	Leak detection pump creates negative pressure (vacuum) in EVAP system and EVAP system pressure measured. Reference pressure measured at start and at end of leak check. If stabilized pressure higher than [second reference pressure x 0.2], ECM determines that EVAP system has large leak.	<ul style="list-style-type: none"> Fuel tank cap (loose) Leakage from EVAP line (Canister - Fuel tank) Leakage from EVAP line (Purge VSV - Canister) Canister pump module Leakage from fuel tank Leakage from canister 	While ignition switch OFF	2 trip
P0456	EVAP small leak	Leak detection pump creates negative pressure (vacuum) in EVAP system and EVAP system pressure measured. Reference pressure measured at start and at end of leak check. If stabilized pressure higher than second reference pressure, ECM determines that EVAP system has small leak.	<ul style="list-style-type: none"> Fuel tank cap (loose) Leakage from EVAP line (Canister - Fuel tank) Leakage from EVAP line (Purge VSV - Canister) Canister pump module Leakage from fuel tank Leakage from canister 	While ignition switch OFF	2 trip

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DESCRIPTION

The description can be found in the EVAP (Evaporative Emission) System (see page [ES-371](#)).

INSPECTION PROCEDURE

Refer to the EVAP System (see page [ES-376](#)).

MONITOR DESCRIPTION

5 hours* after the ignition switch is turned OFF, the leak detection pump creates negative pressure (vacuum) in the EVAP system. The ECM monitors for leaks and actuator malfunctions based on the EVAP pressure.

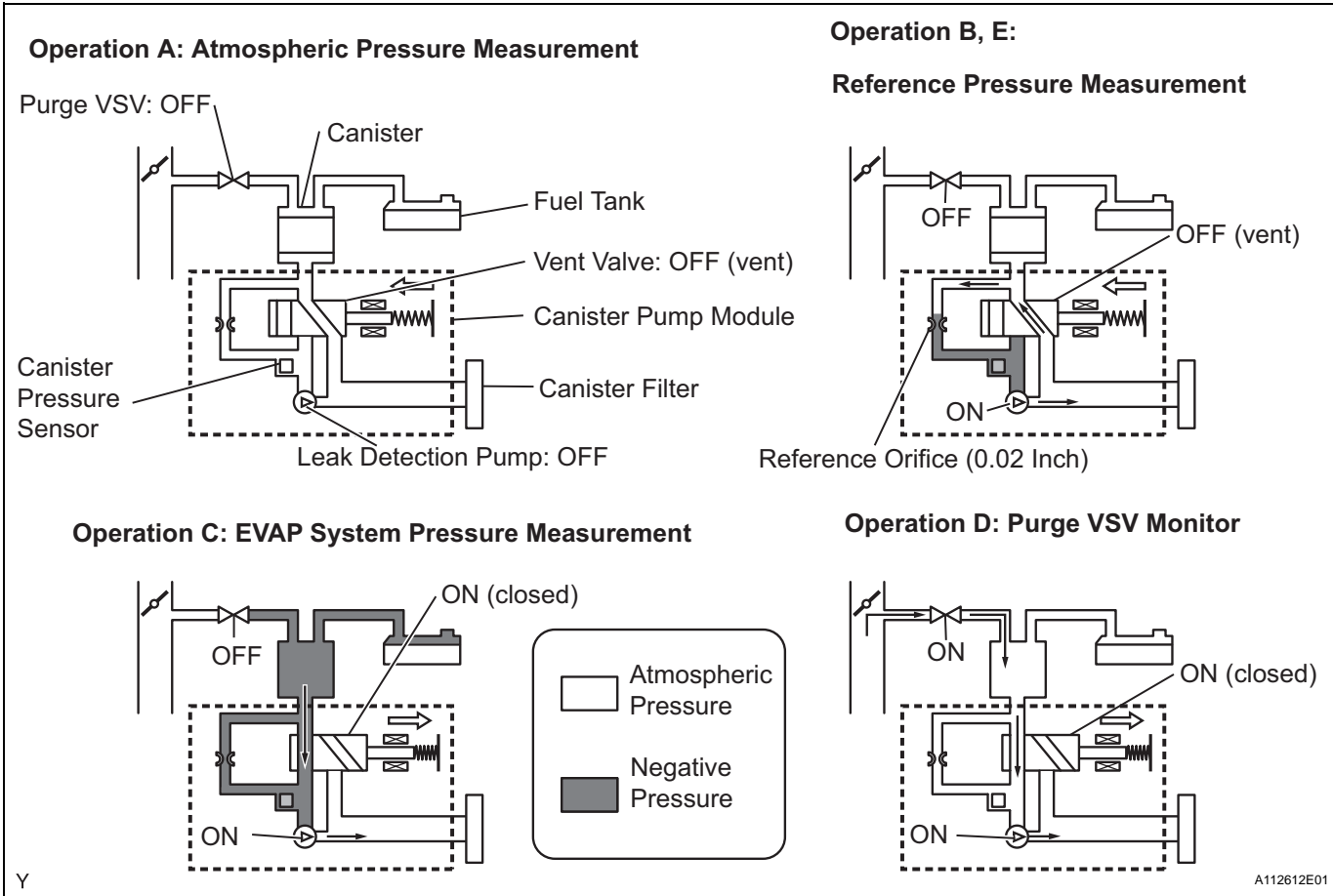
HINT:

*: If the engine coolant temperature is not below 35°C (95°F) 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	Operation	Description	Duration
-	ECM activation	Activated by soak timer 5, 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 not between 76 kPa-a and 110 kPa-a (570 mmHg-a and 825 mmHg-a), ECM cancels EVAP system monitor.	10 seconds
B	First reference pressure measurement	In order to determine reference pressure, leak detection pump creates negative pressure (vacuum) through reference orifice and then ECM checks if leak detection 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) 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*

Sequence	Operation	Description	Duration
D	Purge VSV monitor	Purge VSV opened and then EVAP system pressure measured by ECM. Large increase indicates normality.	10 seconds
E	Second reference pressure measurement	After second reference pressure measurement, leak check performed by comparing first and second reference pressure. If stabilized system pressure higher than second reference pressure, ECM determines that EVAP system leaking.	60 seconds
-	Final check	Atmospheric pressure measured and then monitoring result recorded by ECM.	-

*: If only a small amount of fuel is in the fuel tank, it takes longer for the EVAP pressure to stabilize.

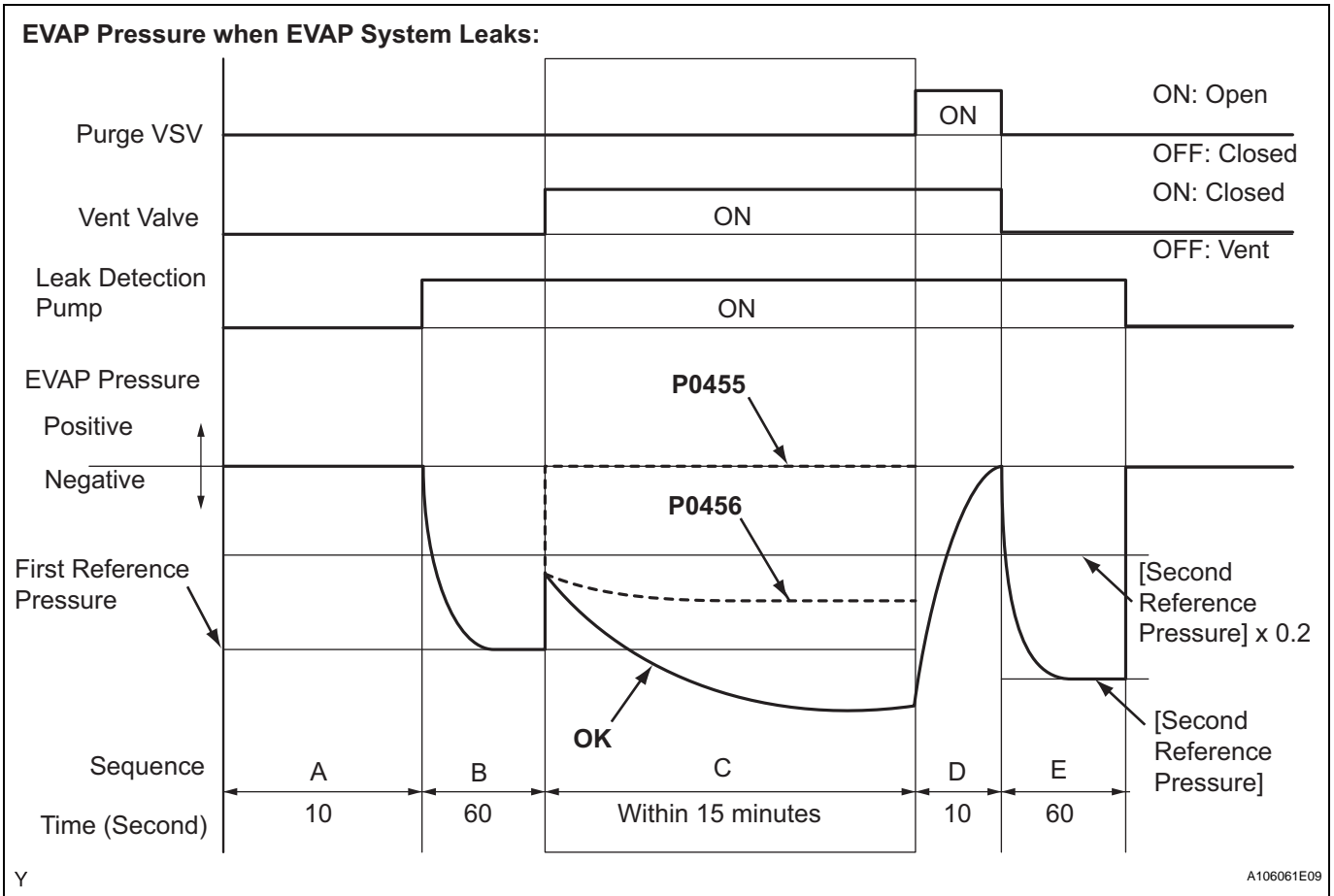


(a) P0455: EVAP gross leak

In operation C, the leak detection 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 reference pressure 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).

(b) P0456: EVAP very small leak

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



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MONITOR STRATEGY

Required Sensors/Components	Purge VSV and canister 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

Monitor runs whenever following DTCs not present	None
EVAP key-off monitor runs when all of following conditions met	-
Atmospheric pressure	70 to 110 kPa-a (525 to 825 mmHg-a)
Battery voltage	10.5 V or more
Vehicle speed	Below 4 km/h (2.5 mph)
Ignition switch	OFF
Time after key off	5 or 7 or 9.5 hours
Canister pressure sensor malfunction (P0450, P0451, P0452 and P0453)	Not detected
Purge VSV	Not operated by scan tool
Vent valve	Not operated by scan tool

Leak detection pump	Not operated by scan tool
Both of following conditions met before key off	Conditions 1 and 2
1. Duration that vehicle 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)

1. Key-off monitor sequence 1 to 8

1. Atmospheric pressure measurement

Next sequence run if following condition set	-
Atmospheric pressure change	Less than 0.3 kPa-g (2.25 mmHg-g) in 1 second

2. First reference pressure measurement

Next sequence run if all of following conditions set	Condition 1, 2 and 3
1. EVAP pressure just after reference pressure measurement started	-1 kPa-g (-7.5 mmHg-g) or less
2. Reference pressure	-4.85 to -1.057 kPa-g (-36.4 to -7.93 mmHg-g)
3. Reference pressure	Saturated within 60 seconds

3. Vent valve stuck closed check

Next sequence run if following condition set	-
EVAP pressure change after vent valve ON (closed)	0.3 kPa-g (2.25 mmHg-g) or more

4. Vacuum introduction

Next sequence run if following condition set	-
EVAP pressure	Saturated within 15 minutes

5. Purge VSV stuck closed check

Next sequence run if following condition set	-
EVAP pressure change after purge VSV ON (open)	0.3 kPa-g (2.25 mmHg-g) or more

6. Second reference pressure measurement

Next sequence run if all of following conditions set	Condition 1, 2, 3 and 4
1. EVAP pressure just after reference pressure	-1 kPa-g (-7.5 mmHg-g) or less
2. Reference pressure	-4.85 to -1.057 kPa-g (-36.4 to -7.93 mmHg-g)
3. Reference pressure	Saturated within 60 seconds
4. Reference pressure difference between first and second	Less than 0.7 kPa-g (5.25 mmHg-g)

7. Leak check

Next sequence run if following condition set	-
EVAP pressure when vacuum introduction complete	Second reference pressure or less

8. Atmospheric pressure measurement

EVAP monitor complete if following condition set	-
Atmospheric pressure difference between sequence 1 and 8	Within 0.3 kPa-g (2.25 mmHg-g)

TYPICAL MALFUNCTION THRESHOLDS

P0455: EVAP gross leak

EVAP pressure when vacuum introduction complete	Higher than reference pressure x 0.2
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P0456: EVAP small leak

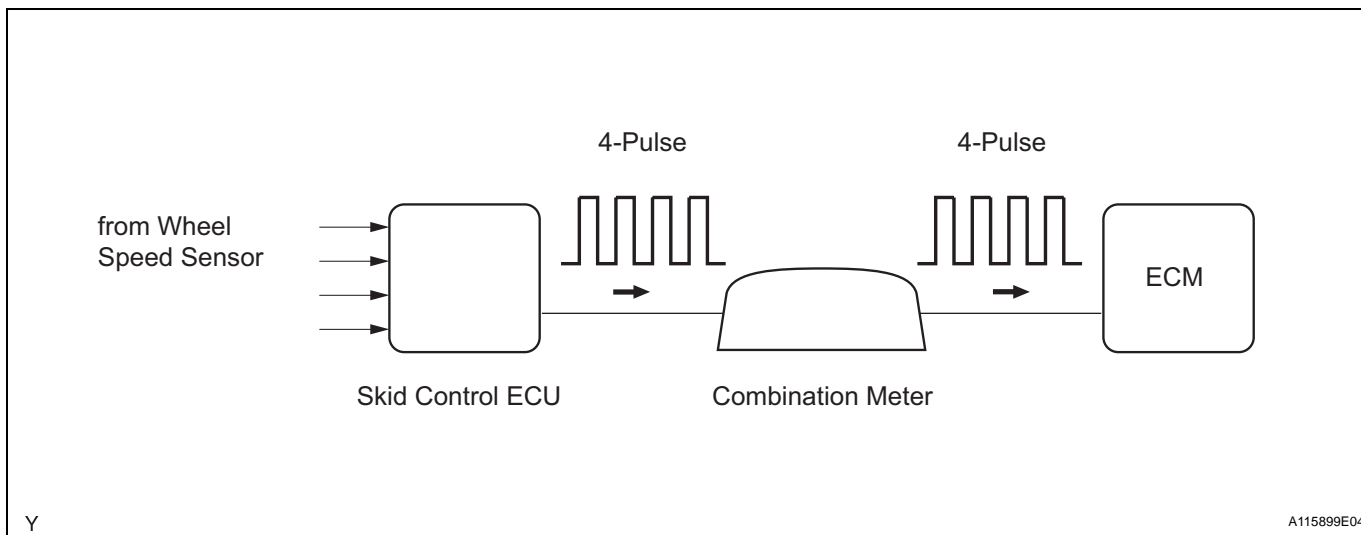
EVAP pressure when vacuum introduction complete	Between reference pressure and reference pressure x 0.2
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MONITOR RESULT

Refer to CHECKING MONITOR STATUS (see page [ES-19](#)).

DTC**P0500****Vehicle Speed Sensor "A"****DESCRIPTION**

The speed sensor detects the wheel speed and sends the appropriate signals to the skid control ECU. The skid control ECU converts these wheel speed signals into a 4-pulse signal and outputs it to the ECM via the combination meter. The ECM determines the vehicle speed based on the frequency of these pulse signals.

**ES**

DTC No.	DTC Detection Condition	Trouble Area
P0500	While vehicle being driven, no vehicle speed sensor signal transmitted to ECM (1 trip detection logic)	<ul style="list-style-type: none"> • Open or short in speed signal circuit • Vehicle speed sensor • Combination meter • ECM • Skid control ECU

MONITOR DESCRIPTION

The ECM assumes that the vehicle is being driven, when the indicated engine speed is more than 2,300 rpm and 30 seconds have elapsed since the Park/Neutral Position (PNP) switch was turned OFF. If there is no speed signal from the combination meter, despite these conditions being met, 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 (VSS), Combination meter and Skid control ECU
Required Sensors/Components (Related)	Park/Neutral Position (PNP) switch, Engine Coolant Temperature (ECT) sensor, Crankshaft Position (CKP) sensor, Throttle Position (TP) sensor and Mass Air Flow (MAF) meter
Frequency of Operation	Continuous
Duration	2 seconds
MIL Operation	Immediate
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

Monitor runs whenever following DTCs not present	P0120 - P0223, P2135 (TP sensor)
Either of following conditions (a) or (b) met:	-

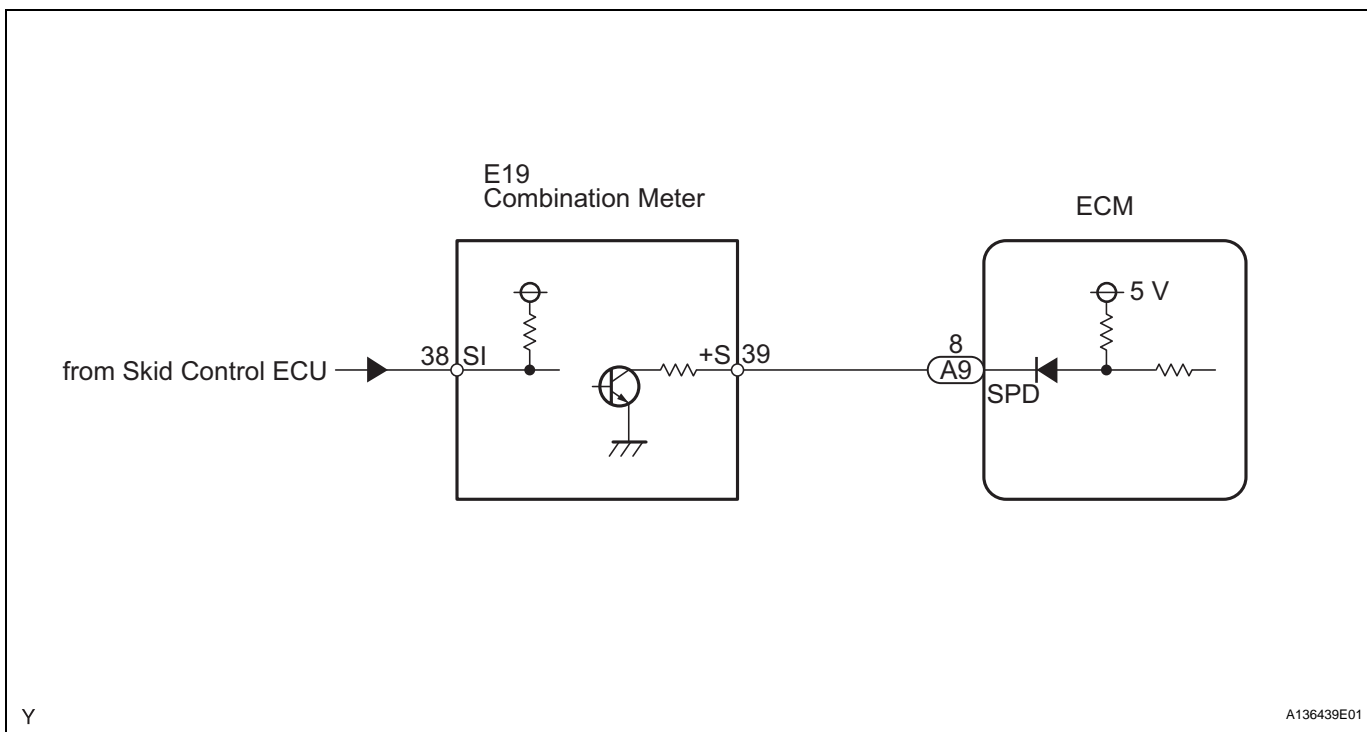
(a) Following conditions 1 and 2 met:	-
1. ECT and ECT sensor	20°C (68°F) or more, and sensor does not malfunction (P0115 or P0116)
2. Time after PNP switch turned OFF	10 seconds or more
(b) Following conditions 1 and 2 met:	-
1. ECT and ECT sensor	Less than 20°C (68°F), and sensor malfunction (P0115 or P0116)
2. Time after PNP switch turned OFF	30 seconds or more
Time after ignition switch turned ON	More than 0.5 seconds

TYPICAL MALFUNCTION THRESHOLDS

Vehicle speed sensor signal	No pulse input
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WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Read freeze frame data using the intelligent tester. Freeze frame data records the engine condition when malfunctions are detected. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1 CHECK OPERATION OF SPEEDOMETER

- (a) Drive the vehicle and check whether the operation of the speedometer in the combination meter is normal.
HINT:
 - The vehicle speed sensor is operating normally if the speedometer reading is normal.

- If the speedometer does not operate, check it by following the procedure described in Speedometer Malfunction (see page ME-41).

NG → **GO TO MALFUNCTION IN SPEEDOMETER**

OK

2 READ VALUE USING INTELLIGENT TESTER (VEHICLE SPD)

- Connect the intelligent tester to the DLC3.
- Turn the ignition switch ON.
- Turn the tester ON.
- Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DATA LIST / PRIMARY / VEHICLE SPD.
- Drive the vehicle.
- Read the value displayed on the tester.

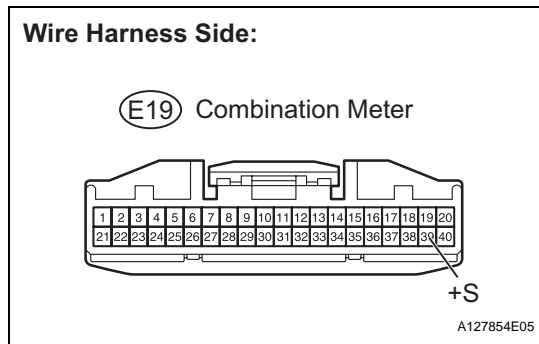
OK:

Vehicle speeds displayed on tester and speedometer display are equal.

OK → **CHECK FOR INTERMITTENT PROBLEMS**

NG

3 CHECK COMBINATION METER ASSEMBLY (+S VOLTAGE)



- Disconnect the E19 combination meter connector.
- Turn the ignition switch ON.
- Measure the voltage between the terminal of the combination meter and the body ground.

Standard voltage

Tester Connection	Specified Condition
E19-39 (+S) - Body ground	4.5 to 5.5 V

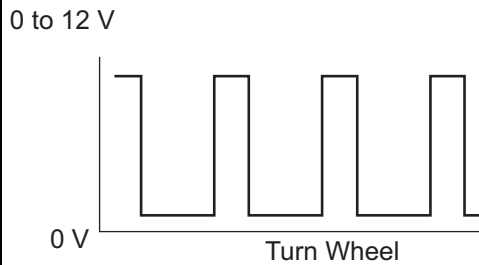
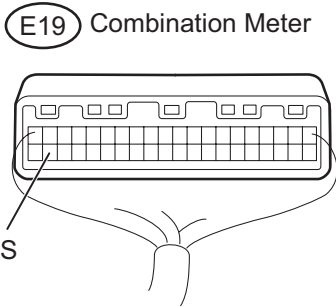
- Reconnect the combination meter connector.

NG → **Go to step 5**

OK

4 CHECK COMBINATION METER ASSEMBLY (SPD SIGNAL WAVEFORM)

Wire Harness Side:



A127943E04

- (a) Shift the transmission gear selector lever to the neutral position.
- (b) Jack up the vehicle.
- (c) Turn the ignition switch ON.
- (d) Check the voltage between the terminal of the combination meter and the body ground while the wheel is turned slowly.

Standard voltage

Tester Connection	Specified Condition
E19-39 (+S) - Body ground	Voltage generated intermittently

HINT:

The output voltage should fluctuate up and down, similarly to the diagram, when the wheel is turned slowly.

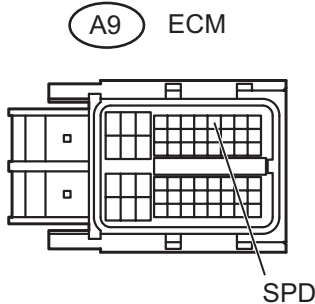
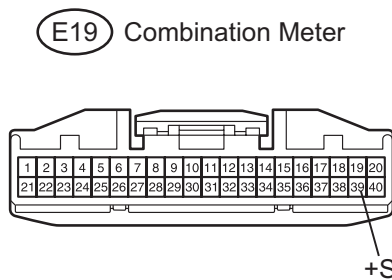
NG

REPLACE COMBINATION METER ASSEMBLY

OK

5 CHECK WIRE HARNESS (COMBINATION METER ASSEMBLY - ECM)

Wire Harness Side:



A127855E10

- (a) Disconnect the E19 combination meter connector.
- (b) Disconnect the A9 ECM connector.
- (c) Measure the resistance.

Standard resistance

Tester Connection	Specified Condition
E19-39 (+S) - A9-8 (SPD)	Below 1 Ω
E19-39 (+S) or A9-8 (SPD) - Body ground	10 k Ω or higher

- (d) Reconnect the combination meter connector.
- (e) Reconnect the ECM connector.

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REPAIR OR REPLACE HARNESS AND CONNECTOR

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OK

REPLACE ECM