

40.CHECK FUEL INJECTOR ASSEMBLY

- a. After stopping the engine, measure the HC concentration inside the surge tank for 15 minutes.

Result

Result	Proceed to
400 ppm or more	A
Less than 400 ppm	B*1

HINT:

- If the concentration is 400 ppm or more, a fuel injector may have a sealing problem.
- *1: From step 74, perform fuel system troubleshooting C (steps 75 to 79).

B

[Go to step 74](#)

A

REPLACE FUEL INJECTOR ASSEMBLY ([Click here](#))

41.CHECK SPARK PLUG

- a. Inspect the spark plugs ([Click here](#)).

HINT:

Even if the spark plug of only one cylinder is malfunctioning, replace the spark plugs of all cylinders.

NG

REPLACE SPARK PLUG ([Click here](#))

OK

42.READ VALUE USING INTELLIGENT TESTER (ENGINE SPEED)

- Connect the intelligent tester to the DLC3.
- Turn the engine switch on (IG).
- Enter the following menus: Powertrain / Engine and ECT / Data List / Engine Speed.
- Start the engine.
- While running the engine, read the value of Engine Speed.

Standard:

A value that matches the actual engine speed is constantly output.

HINT:

- Check the engine speed using a line graph.
- If the engine cannot be started, check the engine speed while cranking the engine.

- If the engine speed is 0 rpm, the crankshaft position sensor may have an open or short circuit.

NG

CHECK CRANKSHAFT POSITION SENSOR CIRCUIT ([Click here](#))

OK

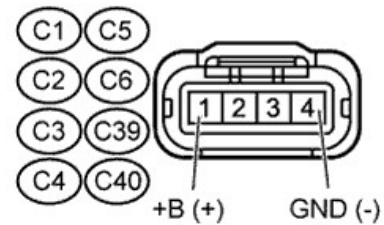
43.CHECK TERMINAL VOLTAGE (IGNITION COIL POWER SOURCE)

- Disconnect the ignition coil connector.
- Turn the engine switch on (IG).
- Measure the voltage according to the value(s) in the table below.

Standard Voltage:

Tester Connection	Switch Condition	Specified Condition
C1-1 (+B) - C1-4 (GND)	Engine switch on (IG)	11 to 14 V
C2-1 (+B) - C2-4 (GND)	Engine switch on (IG)	11 to 14 V
C3-1 (+B) - C3-4 (GND)	Engine switch on (IG)	11 to 14 V
C4-1 (+B) - C4-4 (GND)	Engine switch on (IG)	11 to 14 V
C5-1 (+B) - C5-4 (GND)	Engine switch on (IG)	11 to 14 V
C6-1 (+B) - C6-4 (GND)	Engine switch on (IG)	11 to 14 V
C39-1 (+B) - C39-4 (GND)	Engine switch on (IG)	11 to 14 V
C40-1 (+B) - C40-4 (GND)	Engine switch on (IG)	11 to 14 V

*a



Text in Illustration

*a	Front view of wire harness connector (to Ignition Coil Assembly)
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HINT:

- Jiggle the wire harness and connector to increase the likelihood of detecting malfunctions that do not always occur.

- Make sure there is not an excessive amount of force applied to the wire harness.

NG

CHECK POWER SOURCE CIRCUIT ([Click here](#))

OK

44.CHECK HARNESS AND CONNECTOR (IGNITION COIL - ECM)

- Disconnect the ignition coil connector.
- Disconnect the ECM connector.
- Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
C1-2 (IGF1) - C30-6 (IGF1)	Always	Below 1 Ω
C2-2 (IGF2) - C31-5 (IGF2)	Always	Below 1 Ω
C3-2 (IGF2) - C31-5 (IGF2)	Always	Below 1 Ω
C4-2 (IGF1) - C30-6 (IGF1)	Always	Below 1 Ω
C5-2 (IGF2) - C31-5 (IGF2)	Always	Below 1 Ω
C6-2 (IGF1) - C30-6 (IGF1)	Always	Below 1 Ω
C39-2 (IGF1) - C30-6 (IGF1)	Always	Below 1 Ω
C40-2 (IGF2) - C31-5 (IGF2)	Always	Below 1 Ω
C1-2 (IGF1) or C30-6 (IGF1) - Body ground	Always	10 k Ω or higher
C2-2 (IGF2) or C31-5 (IGF2) - Body ground	Always	10 k Ω or higher
C3-2 (IGF2)	Always	10 k Ω or

or C31-5 (IGF2) - Body ground		higher
C4-2 (IGF1) or C30-6 (IGF1) - Body ground	Always	10 kΩ or higher
C5-2 (IGF2) or C31-5 (IGF2) - Body ground	Always	10 kΩ or higher
C6-2 (IGF1) or C30-6 (IGF1) - Body ground	Always	10 kΩ or higher
C39-2 (IGF1) or C30-6 (IGF1) - Body ground	Always	10 kΩ or higher
C40-2 (IGF2) or C31-5 (IGF2) - Body ground	Always	10 kΩ or higher

HINT:

- **Jiggle the wire harness and connector to increase the likelihood of detecting malfunctions that do not always occur.**
- **Make sure there is not an excessive amount of force applied to the wire harness.**

NG

REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

45.CHECK HARNESS AND CONNECTOR (IGNITION COIL - ECM)

- Disconnect the ignition coil connector.
- Disconnect the ECM connector.
- Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
C1-3 (IGT1) - C30-24 (IGT1)	Always	Below 1 Ω
C2-3 (IGT2) - C29-27 (IGT2)	Always	Below 1 Ω

C3-3 (IGT3) - C30-27 (IGT3)	Always	Below 1 Ω
C4-3 (IGT4) - C29-26 (IGT4)	Always	Below 1 Ω
C5-3 (IGT5) - C29-25 (IGT5)	Always	Below 1 Ω
C6-3 (IGT6) - C30-28 (IGT6)	Always	Below 1 Ω
C39-3 (IGT7) - C30-26 (IGT7)	Always	Below 1 Ω
C40-3 (IGT8) - C30-25 (IGT8)	Always	Below 1 Ω
C1-3 (IGT1) or C30-24 (IGT1) - Body ground	Always	10 k Ω or higher
C2-3 (IGT2) or C29-27 (IGT2) - Body ground	Always	10 k Ω or higher
C3-3 (IGT3) or C30-27 (IGT3) - Body ground	Always	10 k Ω or higher
C4-3 (IGT4) or C29-26 (IGT4) - Body ground	Always	10 k Ω or higher
C5-3 (IGT5) or C29-25 (IGT5) - Body ground	Always	10 k Ω or higher
C6-3 (IGT6) or C30-28 (IGT6) - Body ground	Always	10 k Ω or higher
C39-3 (IGT7) or C30-26 (IGT7) - Body ground	Always	10 k Ω or higher
C40-3 (IGT8) or C30-25 (IGT8) - Body ground	Always	10 k Ω or higher

HINT:

- Jiggle the wire harness and connector to increase the likelihood of detecting malfunctions that do not always occur.
- Make sure there is not an excessive amount of force applied to the wire harness.
- If the wire harness is normal, after replacing the ignition coil assembly, check if engine starting trouble occurs again. If engine starting trouble occurs again, proceed to step 74 and perform troubleshooting for the ignition system (steps 80 to 85).

NG

REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE IGNITION COIL ASSEMBLY ([Click here](#))

46.PERFORM ACTIVE TEST USING INTELLIGENT TESTER (CONTROL THE FUEL PUMP / SPEED)

- Connect the intelligent tester to the DLC3.
- Turn the engine switch on (IG).
- Enter the following menus: Powertrain / Engine and ECT / Active Test / Control the Fuel Pump / Speed.
- When performing the Active Test, check for an operating sound from the fuel pump.

Standard:

Control the Fuel Pump / Speed	Specified Condition
ON	Operating sound heard
OFF	Operating sound not heard

HINT:

Jiggle the wire harness and connector to increase the likelihood of detecting malfunctions that do not always occur.

NG

CHECK FUEL PUMP CONTROL SYSTEM ([Click here](#))

OK

47.PERFORM ACTIVE TEST USING INTELLIGENT TESTER (CONTROL THE FUEL PUMP / SPEED)

- Connect the intelligent tester to the DLC3.
- Turn the engine switch on (IG).
- Enter the following menus: Powertrain / Engine and ECT / Active Test / Control the Fuel Pump / Speed.

d. When performing the Active Test, check for fuel leakage from the fuel pipes.

Result

Result	Proceed to
Fuel leakage or signs of fuel leakage are present	A
No fuel leakage or signs of fuel leakage	B

HINT:

- Jiggle the wire harness and connector to increase the likelihood of detecting malfunctions that do not always occur.
- Check if the vehicle ran out of fuel, as engine starting trouble due to running out of fuel is also detected.
- If there are no fuel leaks, after inspecting the fuel pump control system, check if engine starting trouble occurs again. If engine starting trouble occurs again, proceed to step 74 and perform fuel system troubleshooting C (steps 75 to 79).

B

CHECK FUEL PUMP CONTROL SYSTEM
([Click here](#))

A

REPAIR OR REPLACE FUEL LINE

48.READ VALUE USING INTELLIGENT TESTER (ENGINE SPEED)

- Connect the intelligent tester to the DLC3.
- Turn the engine switch on (IG).
- Enter the following menus: Powertrain / Engine and ECT / Data List / Engine Speed.
- Start the engine.
- While running the engine, read the value of Engine Speed.

Standard:

A value that matches the actual engine speed is constantly output.

HINT:

- Check the engine speed using a line graph.
- If the engine cannot be started, check the engine speed while cranking the engine.
- If the engine speed is 0 rpm, the crankshaft position sensor may have an open or short circuit.

NG

REPLACE CRANKSHAFT POSITION SENSOR
([Click here](#))

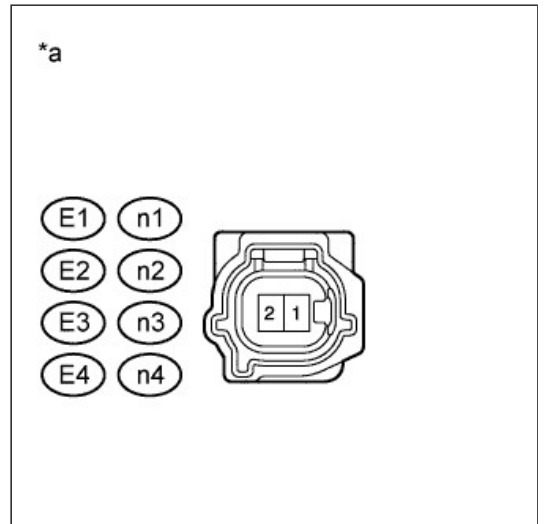
OK

49.CHECK TERMINAL VOLTAGE (FUEL INJECTOR POWER SOURCE)

- a. Disconnect the fuel injector connector.
- b. Turn the engine switch on (IG).
- c. Measure the voltage according to the value(s) in the table below.

Standard Voltage:

Cylinder	Tester Connection	Switch Condition	Specified Condition
No. 1	E1-2 - Ground	Engine switch on (IG)	11 to 14 V
No. 2	n1-2 - Ground	Engine switch on (IG)	11 to 14 V
No. 3	E2-2 - Ground	Engine switch on (IG)	11 to 14 V
No. 4	n2-2 - Ground	Engine switch on (IG)	11 to 14 V
No. 5	E3-2 - Ground	Engine switch on (IG)	11 to 14 V
No. 6	n3-2 - Ground	Engine switch on (IG)	11 to 14 V
No. 7	E4-2 - Ground	Engine switch on (IG)	11 to 14 V
No. 8	n4-2 - Ground	Engine switch on (IG)	11 to 14 V



Text in Illustration

*a	Front view of wire harness connector (to Fuel Injector Assembly)
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HINT:

- Jiggle the wire harness and connector to increase the likelihood of detecting malfunctions that do not always occur.
- Make sure there is not an excessive amount of force applied to the wire harness.

NG

REPAIR POWER SOURCE CIRCUIT ([Click here](#))

OK

50.CHECK HARNESS AND CONNECTOR (FUEL INJECTOR - ECM)

- a. Disconnect the fuel injector connector.

b. Disconnect the ECM connector.

c. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Cylinder	Tester Connection	Condition	Specified Condition
No. 1	E1-1 - Body ground	Always	10 kΩ or higher
	E1-1 - C31-6 (#10)	Always	Below 1 Ω
No. 2	n1-1 - Ground	Always	10 kΩ or higher
	n1-1 - C31-1 (#20)	Always	Below 1 Ω
No. 3	E2-1 - Ground	Always	10 kΩ or higher
	E2-1 - C31-7 (#30)	Always	Below 1 Ω
No. 4	n2-1 - Ground	Always	10 kΩ or higher
	n2-1 - C31-2 (#40)	Always	Below 1 Ω
No. 5	E3-1 - Ground	Always	10 kΩ or higher
	E3-1 - C31-8 (#50)	Always	Below 1 Ω
No. 6	n3-1 - Ground	Always	10 kΩ or higher
	n3-1 - C31-3 (#60)	Always	Below 1 Ω
No. 7	E4-1 - Ground	Always	10 kΩ or higher
	E4-1 - C31-9 (#70)	Always	Below 1 Ω
No. 8	n4-1 - Ground	Always	10 kΩ or higher
	n4-1 - C31-4 (#80)	Always	Below 1 Ω

HINT:

- Jiggle the wire harness and connector to increase the likelihood of detecting malfunctions that do not always occur.
- Make sure there is not an excessive amount of force applied to the wire harness.

NG

REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE ECM ([Click here](#))

51.CHECK MASS AIR FLOW METER ASSEMBLY

- a. Connect the intelligent tester to the DLC3.
- b. Start the engine and warm it up until the engine coolant temperature reaches 75°C (167°F) or higher.

HINT:

The A/C switch and all accessory switches should be off, and the shift lever should be in N or P.

- c. Turn the tester on.
- d. Enter the following menus: Powertrain / Engine and ECT / Data List / MAF.
- e. Check MAF in the Data List during idling.

Standard:

3.4 to 6.2 g/sec.

NG

[Go to step 59](#)

OK

52.CHECK INTAKE SYSTEM

- a. Check for air leakage in the intake system [due to vacuum hose disconnection, cracks, damaged gaskets, etc.] ([Click here](#)).

HINT:

- If the accelerator pedal is released after racing the engine, the inspection is easier to perform because the vacuum inside the intake manifold increases and the air suction noise becomes louder.
- If Short FT and Long FT are largely different from the normal values (differ by more than 15%) when idling (intake air volume is small) and almost the same as the normal values when racing the engine (for example, when maintaining a speed of 3000 rpm) (intake air volume is high), air leakage may be present.

OK:

There is no air leakage.

NG

REPAIR OR REPLACE INTAKE SYSTEM

OK

53.CHECK THROTTLE BODY ASSEMBLY

- a. Disconnect the throttle body connector.

HINT:

When the connector is disconnected, the vehicle enters fail-safe mode and the throttle valve opening angle is 4 to 7°.

- b. Crank the engine and check that it starts.

Result

Result	Proceed to
Engine starts	A
Engine does not start	B

- c. Connect the throttle body connector.

HINT:

When this inspection is performed, the MIL may illuminate. After finishing the inspection, check and clear DTCs ([Click here](#)).

B

[Go to step 55](#)

A

54.CHECK THROTTLE BODY ASSEMBLY

- a. Check if carbon is in the airflow passage.

OK:

No carbon present.

NG

REMOVE FOREIGN OBJECT AND CLEAN THROTTLE BODY

OK

55.PERFORM ACTIVE TEST USING INTELLIGENT TESTER (CONTROL THE VVT SYSTEM)

- a. Connect the intelligent tester to the DLC3.
- b. Turn the tester on.
- c. Warm up the engine.
- d. Enter the following menus: Powertrain / Engine and ECT / Active Test / Control the VVT System (Bank 1) or Control the VVT System (Bank 2).

HINT:

When performing the Active Test, make sure the A/C is on and the shift lever is in N.

- e. Check the engine speed while operating the camshaft timing oil control valve using the intelligent tester.

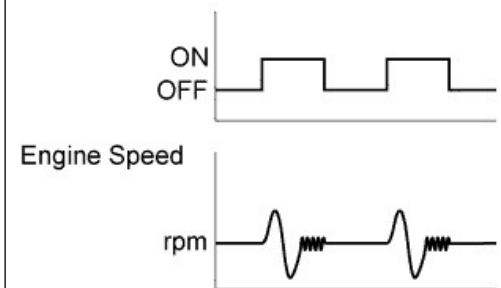
OK:

Tester Operation	Specified Condition
OFF	Normal engine speed
ON	Soon after camshaft timing oil control valve switched from OFF to ON, engine idles roughly or stalls

Result

Result	Proceed to
NG	A
OK	B

Camshaft Timing Oil Control Valve Operation



HINT:

- Jiggle the wire harness and connector to increase the likelihood of detecting malfunctions that do not always occur.
- When the results of the inspection using the Active Test are normal but the valve operating noise is abnormal, check the valve for any signs of problems.
- If the camshaft timing oil control valve is stuck ON, the valve overlap increases and combustion worsens due to the internal EGR which may cause the engine to stall.

B

[Go to step 56](#)

A

REPLACE CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY (FOR INTAKE SIDE) ([Click here](#))

56.PERFORM ACTIVE TEST USING INTELLIGENT TESTER (CONTROL THE VVT EXHAUST LINEAR)

- Connect the intelligent tester to the DLC3.
- Turn the tester on.
- Warm up the engine.
- Enter the following menus: Powertrain / Engine and ECT / Active Test / Control the VVT Exhaust Linear (Bank1) or Control the VVT Exhaust Linear (Bank2).

HINT:

When performing the Active Test, make sure the A/C is on and the shift lever is in N.

- e. Check the engine speed while operating the camshaft timing oil control valve using the intelligent tester.

OK*1:

Tester Operation	Specified Condition
0%	Normal engine speed
100%	Engine idles roughly or stalls

HINT:

- ***1: From step 74, perform intake system troubleshooting (steps 86 to 88). If engine starting trouble still occurs, perform fuel system troubleshooting A (steps 89 to 96).**
- **Jiggle the wire harness and connector to increase the likelihood of detecting malfunctions that do not always occur.**
- **When the results of the inspection using the Active Test are normal but the valve operating noise is abnormal, check the valve for any signs of problems.**
- **If the camshaft timing oil control valve is stuck ON, the valve overlap increases and combustion worsens due to the internal EGR which may cause the engine to stall.**

NG

REPLACE CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY (FOR EXHAUST SIDE) ([Click here](#))

OK

57.PERFORM ACTIVE TEST USING INTELLIGENT TESTER (CONTROL THE EGR STEP POSITION)

- Connect the intelligent tester to the DLC3.
- Start the engine and warm it up until the engine coolant temperature reaches 75°C (167°F) or higher.

HINT:

- **When performing the Active Test, make sure the shift lever is in P or N.**
- **The A/C switch and all accessory switches should be off.**

- Turn the tester on.
- Enter the following menus: Powertrain / Engine and ECT / Active Test / Control the EGR Step Position.
- Confirm that Throttle Idle Position is ON and check the engine idling condition and the value of MAP in the Data List while performing the Active Test.

HINT:

- **Do not leave the EGR valve open for 10 seconds or more during the Active Test.**
- **Be sure to return the EGR valve to step 0 when the Active Test is completed.**

OK:

MAP and idling condition change in response to EGR step position as follows.

Standard:

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	EGR Step Position (Active Test)	
	Step 0	Step 0 to 30
Idling condition	Steady idling	Idling changes from steady to rough idling or engine stalls
MAP (Data List)	20 to 40 kPa (150 to 300 mmHg)	MAP value is at least 10 kPa (75 mmHg) higher than when EGR valve is fully closed

OK

[Go to step 74](#)

NG

[Go to step 58](#)

58.INSPECT EGR VALVE ASSEMBLY

- Remove the EGR valve assembly ([Click here](#)).
- Check if the EGR valve is stuck open.

OK:

EGR valve is tightly closed.

OK

[Go to step 74](#)

NG

REPLACE EGR VALVE ASSEMBLY ([Click here](#))

59.CHECK HARNESS AND CONNECTOR (MASS AIR FLOW METER - ECM)

- Disconnect the mass air flow meter connector.
- Disconnect the ECM connector.
- Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
C27-3 (VG) - C29-14 (VG)	Always	Below 1 Ω
C27-2 (E2G) - C29-13 (E2G)	Always	Below 1 Ω
C27-3 (VG) or C29-14 (VG) - Body ground	Always	10 k Ω or higher

HINT:

- Jiggle the wire harness and connector to increase the likelihood of detecting malfunctions that do not always occur.
- Make sure there is not an excessive amount of force applied to the wire harness.
- If the wire harness is normal, after replacing the mass air flow meter, check if engine starting trouble occurs again. If engine starting trouble occurs again, proceed to step 74 and perform intake system troubleshooting (steps 86 to 88). If engine starting trouble still occurs, perform fuel system troubleshooting A (steps 89 to 96).

NG

REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE MASS AIR FLOW METER ASSEMBLY ([Click here](#))

60.INSPECT ENGINE COOLANT TEMPERATURE SENSOR

- a. Inspect the engine coolant temperature sensor ([Click here](#)).

HINT:

If the engine coolant temperature sensor is malfunctioning, after replacing it, check if engine starting trouble occurs again. If engine starting trouble occurs, replace the ECM. If engine starting trouble still occurs, proceed to step 74 and perform fuel system troubleshooting A (steps 97 to 104), fuel system troubleshooting B (steps 105 to 107), intake system troubleshooting (steps 108 to 110), and ignition system troubleshooting (steps 111 to 116), in that order.

NG

REPLACE ENGINE COOLANT TEMPERATURE SENSOR ([Click here](#))

OK

61.CHECK HARNESS AND CONNECTOR (ENGINE COOLANT TEMPERATURE SENSOR - ECM)

- a. Disconnect the engine coolant temperature sensor connector.
- b. Disconnect the ECM connector.
- c. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
C18-2 - C30-17 (THW)	Always	Below 1 Ω
C18-1 - C29-7 (E2)	Always	Below 1 Ω
C18-2 or C30-17	Always	10 k Ω or higher

(THW) - Body ground		
C18-1 or C29-7 (E2) - Body ground	Always	10 kΩ or higher

HINT:

- Jiggle the wire harness and connector to increase the likelihood of detecting malfunctions that do not always occur.
- Make sure there is not an excessive amount of force applied to the wire harness.
- If the wire harness or connector is malfunctioning, after replacing or repairing it, check if engine starting trouble occurs again. If engine starting trouble occurs, replace the ECM. If engine starting trouble still occurs, proceed to step 74 and perform fuel system troubleshooting A (steps 97 to 104), fuel system troubleshooting B (steps 105 to 107), intake system troubleshooting (steps 108 to 110), and ignition system troubleshooting (steps 111 to 116), in that order.

NG

REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

62.CHECK MASS AIR FLOW METER ASSEMBLY

- Connect the intelligent tester to the DLC3.
- Start the engine and warm it up until the engine coolant temperature reaches 75°C (167°F) or higher.

HINT:

The A/C switch and all accessory switches should be off, and the shift lever should be in N or P.

- Turn the tester on.
- Enter the following menus: Powertrain / Engine and ECT / Data List / MAF.
- Check MAF in the Data List during idling.

Standard:

3.4 to 6.2 g/sec.

HINT:

If the mass air flow meter is malfunctioning, after replacing it, check if engine starting trouble occurs again. If engine starting trouble occurs, replace the ECM. If engine starting trouble still occurs, proceed to step 74 and perform fuel system troubleshooting A (steps 97 to 104), fuel system troubleshooting B (steps 105 to 107), intake system troubleshooting (steps 108 to 110), and ignition system troubleshooting (steps 111 to 116), in that order.

NG

REPLACE MASS AIR FLOW METER ASSEMBLY ([Click here](#))

OK

63.CHECK HARNESS AND CONNECTOR (MASS AIR FLOW METER - ECM)

- a. Disconnect the mass air flow meter connector.
- b. Disconnect the ECM connector.
- c. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
C27-3 (VG) - C29-14 (VG)	Always	Below 1 Ω
C27-2 (E2G) - C29-13 (E2G)	Always	Below 1 Ω
C27-3 (VG) or C29-14 (VG) - Body ground	Always	10 k Ω or higher

HINT:

- Jiggle the wire harness and connector to increase the likelihood of detecting malfunctions that do not always occur.
- Make sure there is not an excessive amount of force applied to the wire harness.
- If the wire harness or connector is malfunctioning, after replacing or repairing it, check if engine starting trouble occurs again. If engine starting trouble occurs, replace the ECM. If engine starting trouble still occurs, proceed to step 74 and perform fuel system troubleshooting A (steps 97 to 104), fuel system troubleshooting B (steps 105 to 107), intake system troubleshooting (steps 108 to 110), and ignition system troubleshooting (steps 111 to 116), in that order.

NG

REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

64.READ VALUE USING INTELLIGENT TESTER

- a. Connect the intelligent tester to the DLC3.
- b. Turn the engine switch on (IG).
- c. Enter the following menus: Powertrain / Engine and ECT / Data List / Long FT and Atmosphere Pressure.

Result

Data List Item	Result	Suspected Area	Proceed to
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Long FT	+25% or more or less than -25%	• Air fuel ratio sensor • Heated oxygen sensor • Mass air flow meter assembly • Fuel injector assembly • ECM	A
Atmosphere Pressure	80 kPa or less (when elevation is 0 m)		
Both Data List items listed above	Values are other than above	-	B

B

[Go to step 68](#)

A

65.PERFORM SIMULATION TEST

- Remove the EFI and ETCS fuses from the engine room relay block.
- After 60 seconds or more elapse, install the EFI and ETCS fuses.
- Check if the engine can be started.

Result

Result	Proceed to
Engine can be started	A
Engine cannot be started	B

B

[Go to step 68](#)

A

66.INSPECT AIR FUEL RATIO SENSOR

- Connect the intelligent tester to the DLC3.
- Start the engine.
- Turn the tester on.
- Enter the following menus: Powertrain / Engine and ECT / Data List / Fuel System Status #1 and Fuel System Status #2.
- Confirm that Fuel System Status #1 and Fuel System Status #2 are both CL.
- Enter the following menus: Powertrain / Engine and ECT / Data List / AF Lambda B1S1 and AF Lambda B2S1.

- g. Confirm that AF Lambda B1S1 and AF Lambda B2S1 are both within the range of 0.95 to 1.05 when idling.
- h. Enter the following menus: Powertrain / Engine and ECT / Active Test / Control the Injection Volume for A/F sensor.
- i. Read the output voltage from the air fuel ratio sensor when increasing and decreasing the fuel injection volume.

Standard:

Tester Display	Injection Volume	Specified Condition
AFS Voltage B1S1 AFS Voltage B2S1	+12%	Air fuel ratio sensor output voltage is below 3.1 V
	-12%	Air fuel ratio sensor output voltage is higher than 3.4 V

Result

Result	Proceed to
Normal	A
Abnormal	B

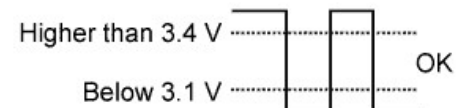
HINT:

- The air fuel ratio sensor has an output delay of a few seconds and the heated oxygen sensor has a maximum output delay of approximately 20 seconds.
- If the air fuel ratio sensor is malfunctioning, after replacing it, check if engine starting trouble occurs again. If engine starting trouble occurs, replace the ECM. If engine starting trouble still occurs, proceed to step 74 and perform fuel system troubleshooting A (steps 97 to 104), fuel system troubleshooting B (steps 105 to 107), intake system troubleshooting (steps 108 to 110), and ignition system troubleshooting (steps 111 to 116), in that order.

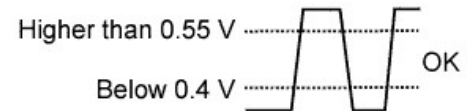
Injection Volume



Air Fuel Ratio Sensor Output Voltage



Heated Oxygen Sensor Output Voltage



B

REPLACE AIR FUEL RATIO SENSOR ([Click here](#))

A

67.PERFORM SIMULATION TEST

- a. Check if the idling speed is stable after starting the engine.

OK:

Speed is stable.

HINT:

After replacing the fuel injector or mass air flow meter, check if engine starting trouble occurs again. If engine starting trouble occurs, replace the ECM. If engine starting trouble still occurs, proceed to step 74 and perform fuel system troubleshooting A (steps 97 to 104), fuel system troubleshooting B (steps 105 to 107), intake system troubleshooting (steps 108 to 110), and ignition system troubleshooting (steps 111 to 116), in that order.

NG

REPLACE FUEL INJECTOR ASSEMBLY ([Click here](#))

OK

REPLACE MASS AIR FLOW METER ASSEMBLY ([Click here](#))

68.CHECK FUEL PRESSURE

- a. Inspect the fuel pressure ([Click here](#)).

NG

[Go to step 73](#)

OK

69.CHECK SPARK PLUG

- a. Inspect the spark plugs ([Click here](#)).

Result

Result	Proceed to
All cylinders are normal	A
One cylinder is abnormal*1	B
All cylinders are abnormal*2, *3	C

HINT:

- *1: If one cylinder is abnormal, replace the spark plug of that cylinder and inspect the ignition and fuel system for that cylinder. After performing repairs, check if engine starting trouble occurs again. If engine starting trouble still occurs, proceed to step 74 and perform fuel system troubleshooting A (steps 97 to 104), fuel system troubleshooting B (steps 105 to 107), intake system troubleshooting (steps 108 to 110), and ignition system troubleshooting (steps 111 to 116), in that order.
- *2: If all cylinders are abnormal, replace the spark plugs of all cylinders and check if engine starting trouble occurs again. If engine starting trouble still occurs, proceed to step 74 and perform fuel system troubleshooting A (steps 97 to 104), fuel system troubleshooting B (steps 105 to 107), intake system troubleshooting (steps 108 to 110), and ignition system troubleshooting (steps 111 to 116), in that order.
- *3: Engine starting trouble may occur if the vehicle is driven extremely short distances repeatedly.

B

REPLACE SPARK PLUG (ABNORMAL CYLINDER) ([Click here](#))

C

REPLACE SPARK PLUG (ALL) ([Click here](#))

A



70.CONFIRM VEHICLE CONDITION

- a. Confirm the conditions present when the malfunction occurred based on the customer problem analysis.

Result

Problem Symptom	Suspected Area	Proceed to
When the engine is stopped and a long time has passed, engine starting trouble occurs*1	Fuel pressure regulator is stuck open	A
When the engine is stopped and approximately 15 to 120 minutes have passed, engine starting trouble occurs*2	Fuel injector leak	B
When the engine is stopped and approximately 2 to 3 minutes have passed, engine starting trouble occurs*3	Failure to maintain fuel pressure by fuel pressure regulator	A
Condition other than above, or there is an inconsistency in the conditions present when engine starting trouble occurs	-	C*4

HINT:

*1: The fuel pressure regulator may be stuck open. Attach a fuel pressure gauge and check the ability of the system to maintain fuel pressure after stopping the engine.

*2: Fuel may be leaking from a fuel injector.

*3: The fuel pressure regulator may not be able to maintain the fuel pressure. Attach a fuel pressure gauge and check the ability of the fuel pressure regulator to maintain fuel pressure after stopping the engine.

*4: From step 74, perform fuel system troubleshooting A (steps 97 to 104), fuel system troubleshooting B (steps 105 to 107), intake system troubleshooting (steps 108 to 110), and ignition system troubleshooting (steps 111 to 116), in that order.

B

[Go to step 72](#)

C

[Go to step 74](#)

A

71.CHECK FUEL PRESSURE

HINT:

For the fuel pressure inspection, refer to the following procedures ([Click here](#)).

- a. Attach a fuel pressure gauge and check the fuel pressure after stopping the engine.

Result

Result	Proceed to
147 kPa (1.5 kgf/cm ²) or higher (5 minutes after stopping the engine)	A*1
Below 147 kPa (1.5 kgf/cm ²) (5 minutes after stopping the engine)	B

HINT:

- If the engine cannot be started, check the fuel pressure after cranking the engine.
- *1: From step 74, perform fuel system troubleshooting A (steps 97 to 104), fuel system troubleshooting B (steps 105 to 107), intake system troubleshooting (steps 108 to 110), and ignition system troubleshooting (steps 111 to 116), in that order.



[Go to step 74](#)



REPLACE FUEL PRESSURE REGULATOR ASSEMBLY ([Click here](#))

72.CHECK FUEL INJECTOR ASSEMBLY

- a. Clean the inside of the surge tank with compressed air.
- b. After stopping the engine, measure the HC concentration inside the surge tank for 15 minutes.

Result

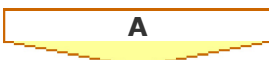
Result	Proceed to
400 ppm or more	A
Less than 400 ppm	B*1

HINT:

- If the concentration is 400 ppm or more, a fuel injector may have a sealing problem.
- *1: From step 74, perform fuel system troubleshooting A (steps 97 to 104), fuel system troubleshooting B (steps 105 to 107), intake system troubleshooting (steps 108 to 110), and ignition system troubleshooting (steps 111 to 116), in that order.



[Go to step 74](#)



REPLACE FUEL INJECTOR ASSEMBLY ([Click here](#))

73.PERFORM ACTIVE TEST USING INTELLIGENT TESTER (CONTROL THE FUEL PUMP / SPEED)

- a. Connect the intelligent tester to the DLC3.
- b. Turn the engine switch on (IG).
- c. Enter the following menus: Powertrain / Engine and ECT / Active Test / Control the Fuel Pump / Speed.
- d. When performing the Active Test, check for fuel leakage from the fuel pipes.

Result

Result	Proceed to
Fuel leakage or signs of fuel leakage are present	A
No fuel leakage or signs of fuel leakage	B

HINT:

- Jiggle the wire harness and connector to increase the likelihood of detecting malfunctions that do not always occur.
- Check if the vehicle ran out of fuel, as engine starting trouble due to running out of fuel is also detected.
- If there are no fuel leaks, after inspecting the fuel pump control system, check if engine starting trouble occurs again. If engine starting trouble still occurs, proceed to step 74 and perform fuel system troubleshooting A (steps 97 to 104), fuel system troubleshooting B (steps 105 to 107), intake system troubleshooting (steps 108 to 110), and ignition system troubleshooting (steps 111 to 116), in that order.

B

CHECK FUEL PUMP CONTROL SYSTEM
([Click here](#))

A

REPAIR OR REPLACE FUEL LINE

74.CHECK MALFUNCTION CONDITION

- a. If the malfunction could not be identified during the inspections in steps 38, 39, 40 and 47, perform fuel system troubleshooting C (steps 75 to 79).

Result

Performed Step	Troubleshooting by System	Procedure	Proceed to
Steps 38, 39, 40 and 47	Fuel system troubleshooting C	75 to 79	A

- b. If the malfunction could not be identified during the inspection in step 45, perform ignition system troubleshooting (steps 80 to 85).

Result

Performed Step	Troubleshooting by System	Procedure	Proceed to
Step 45	Ignition system troubleshooting	80 to 85	B

- c. If the malfunction could not be identified during the inspections in steps 55, 56, 57, 58 and 59, perform intake air system troubleshooting (steps 86 to 88). If engine starting trouble still occurs, perform fuel system troubleshooting A (steps 89 to 96).

Result

Performed Step	Troubleshooting by System	Procedure	Proceed to
Step 55, 56, 57, 58, 59	Intake air system troubleshooting	86 to 88	C
	Fuel system troubleshooting A	89 to 96	

- d. If the malfunction could not be identified during the inspections in steps 60, 61, 62, 63, 66, 67, 69, 70, 71, 72 and 73, perform fuel system troubleshooting A (steps 97 to 104), fuel system troubleshooting B (steps 105 to 107), intake air system troubleshooting (steps 108 to 110), and ignition system troubleshooting (steps 111 to 116), in that order.

Result

Performed Step	Troubleshooting by System	Procedure	Proceed to
Steps 60, 61, 62, 63, 66, 67, 69, 70, 71, 72 and 73	Fuel system troubleshooting A	97 to 104	D
	Fuel system troubleshooting B	105 to 107	
	Intake air system troubleshooting	108 to 110	
	Ignition system troubleshooting	111 to 116	

B

[Go to step 80](#)

C

[Go to step 86](#)

D

[Go to step 97](#)

A

75.INSPECT FUEL INJECTOR ASSEMBLY

- a. Inspect the fuel injector assemblies ([Click here](#)).

NG

REPLACE FUEL INJECTOR ASSEMBLY ([Click here](#))

OK

76.CHECK TERMINAL VOLTAGE (FUEL INJECTOR POWER SOURCE)

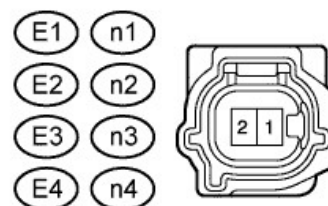
- a. Disconnect the fuel injector connector.
- b. Turn the engine switch on (IG).

- c. Measure the voltage according to the value(s) in the table below.

Standard Voltage:

Cylinder	Tester Connection	Switch Condition	Specified Condition
No. 1	E1-2 - Ground	Engine switch on (IG)	11 to 14 V
No. 2	n1-2 - Ground	Engine switch on (IG)	11 to 14 V
No. 3	E2-2 - Ground	Engine switch on (IG)	11 to 14 V
No. 4	n2-2 - Ground	Engine switch on (IG)	11 to 14 V
No. 5	E3-2 - Ground	Engine switch on (IG)	11 to 14 V
No. 6	n3-2 - Ground	Engine switch on (IG)	11 to 14 V
No. 7	E4-2 - Ground	Engine switch on (IG)	11 to 14 V
No. 8	n4-2 - Ground	Engine switch on (IG)	11 to 14 V

*a



Text in Illustration

*a	Front view of wire harness connector (to Fuel Injector Assembly)
----	--

HINT:

- Jiggle the wire harness and connector to increase the likelihood of detecting malfunctions that do not always occur.
- Make sure there is not an excessive amount of force applied to the wire harness.

NG

REPAIR POWER SOURCE CIRCUIT ([Click here](#))

OK

77.CHECK HARNESS AND CONNECTOR (FUEL INJECTOR - ECM)

- Disconnect the fuel injector connector.
- Disconnect the ECM connector.
- Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Cylinder	Tester Connection	Condition	Specified Condition
No. 1	E1-1 - Body ground	Always	10 kΩ or higher
	E1-1 - C31-6 (#10)	Always	Below 1 Ω
No. 2	n1-1 - Ground	Always	10 kΩ or higher
	n1-1 - C31-1 (#20)	Always	Below 1 Ω
No. 3	E2-1 - Ground	Always	10 kΩ or higher
	E2-1 - C31-7 (#30)	Always	Below 1 Ω
No. 4	n2-1 - Ground	Always	10 kΩ or higher
	n2-1 - C31-2 (#40)	Always	Below 1 Ω
No. 5	E3-1 - Ground	Always	10 kΩ or higher
	E3-1 - C31-8 (#50)	Always	Below 1 Ω
No. 6	n3-1 - Ground	Always	10 kΩ or higher
	n3-1 - C31-3 (#60)	Always	Below 1 Ω
No. 7	E4-1 - Ground	Always	10 kΩ or higher
	E4-1 - C31-9 (#70)	Always	Below 1 Ω
No. 8	n4-1 - Ground	Always	10 kΩ or higher
	n4-1 - C31-4 (#80)	Always	Below 1 Ω

HINT:

- Jiggle the wire harness and connector to increase the likelihood of detecting malfunctions that do not always occur.
- Make sure there is not an excessive amount of force applied to the wire harness.

NG**REPAIR OR REPLACE HARNESS OR**

CONNECTOR

OK

78.CHECK CRANKSHAFT POSITION SENSOR

- Replace the crankshaft position sensor ([Click here](#)).
- Check the engine start operation.

OK:
Malfunction has been repaired successfully.

NG

[Go to step 79](#)

OK

END (CRANKSHAFT POSITION SENSOR IS DEFECTIVE)

79.CHECK CAMSHAFT POSITION SENSOR

- Replace the camshaft position sensor ([Click here](#)).
- Check the engine start operation.

OK:
Malfunction has been repaired successfully.

NG

REPLACE ECM ([Click here](#))

OK

END (CAMSHAFT POSITION SENSOR IS DEFECTIVE)

80.CHECK CRANKSHAFT POSITION SENSOR

- Check the tightening and installation condition of the crankshaft position sensor bolt.
- Check the connection of the crankshaft position sensor connector.

OK:
Sensor is installed correctly.

NG

SECURELY REINSTALL SENSOR ([Click here](#))

OK

81.CHECK CAMSHAFT POSITION SENSOR

- Check the tightening and installation condition of the camshaft position sensor bolt.

- b. Check the connection of the camshaft position sensor connector.

OK:

Sensor is installed correctly.

NG

SECURELY REINSTALL SENSOR ([Click here](#))

OK

82.CHECK HARNESS AND CONNECTOR (CRANKSHAFT POSITION SENSOR - ECM)

- a. Disconnect the crankshaft position sensor connector.
- b. Disconnect the ECM connector.
- c. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
C42-1 (NE+) - C28-6 (NE+)	Always	Below 1 Ω
C42-2 (NE-) - C28-5 (NE-)	Always	Below 1 Ω
C42-3 (VC) - C28-16 (VCV2)	Always	Below 1 Ω
C42-1 (NE+) or C28-6 (NE+) - Body ground	Always	10 k Ω or higher
C42-2 (NE-) or C28-5 (NE-) - Body ground	Always	10 k Ω or higher
C42-3 (VC) or C28-16 (VCV2) - Body ground	Always	10 k Ω or higher

HINT:

- **Jiggle the wire harness and connector to increase the likelihood of detecting malfunctions that do not always occur.**
- **Make sure there is not an excessive amount of force applied to the wire harness.**

NG

REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

83.CHECK HARNESS AND CONNECTOR (CAMSHAFT POSITION SENSOR - ECM)

- a. Disconnect the camshaft position sensor connector.
- b. Disconnect the ECM connector.
- c. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
C41-1 (G2) - C28-9 (G2)	Always	Below 1 Ω
C41-2 (G-) - C28-10 (G2-)	Always	Below 1 Ω
C41-3 (VC) - C28-16 (VCV2)	Always	Below 1 Ω
C41-1 (G2) or C28-9 (G2) - Body ground	Always	10 k Ω or higher
C41-2 (G-) or C28-10 (G2-) - Body ground	Always	10 k Ω or higher
C41-3 (VC) or C28-16 (VCV2) - Body ground	Always	10 k Ω or higher

HINT:

- Jiggle the wire harness and connector to increase the likelihood of detecting malfunctions that do not always occur.
- Make sure there is not an excessive amount of force applied to the wire harness.

NG

REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

84.CHECK CRANKSHAFT POSITION SENSOR

- a. Replace the crankshaft position sensor ([Click here](#)).
- b. Check the engine start operation.

OK:

Malfunction has been repaired successfully.

NG

[Go to step 85](#)

OK

END (CRANKSHAFT POSITION SENSOR IS DEFECTIVE)

85.CHECK CAMSHAFT POSITION SENSOR

- Replace the camshaft position sensor ([Click here](#)).
- Check the engine start operation.

OK:
Malfunction has been repaired successfully.

NG

REPLACE ECM ([Click here](#))

OK

END (CAMSHAFT POSITION SENSOR IS DEFECTIVE)

86.READ VALUE USING INTELLIGENT TESTER (ISC LEARNING VALUE)

- Connect the intelligent tester to the DLC3.
- Turn the engine switch on (IG).
- Start the engine and warm it up until the engine coolant temperature stabilizes with the A/C switch and all the accessory switches off.
- Enter the following menus: Powertrain / Engine and ECT / Data List / ISC Learning Value.

Result

Data List Item	Result	Suspected Area	Proceed to
ISC Learning Value	(engine displacement (liters) x 0.9) or more	- Valve timing - Compression	A
	Less than (engine displacement (liters) x 0.9)	-	B

B

[Go to step 88](#)

A

87.CHECK CYLINDER COMPRESSION PRESSURE

- Inspect the compression ([Click here](#)).

NG

REPAIR OR REPLACE ENGINE ASSEMBLY

OK

CHECK VALVE TIMING

88.INSPECT ENGINE COOLANT TEMPERATURE SENSOR

- a.** Inspect the engine coolant temperature sensor ([Click here](#)).

NG

REPLACE ENGINE COOLANT TEMPERATURE SENSOR ([Click here](#))

OK

89.CHECK FUEL PRESSURE

HINT:

For the fuel pressure inspection, refer to the following procedures ([Click here](#)).

- a.** Attach a fuel pressure gauge and check the fuel pressure when cranking the engine and after stopping the engine.

Result

Vehicle State	Specified Condition
Cranking engine	304 to 343 kPa (3.1 to 3.5 kgf/cm ²)
5 minutes after stopping engine	147 kPa (1.5 kgf/cm ²) or higher

NG

[Go to step 95](#)

OK

90.READ VALUE USING INTELLIGENT TESTER (LONG FT)

- a.** Connect the intelligent tester to the DLC3.
- b.** Turn the engine switch on (IG).
- c.** Enter the following menus: Powertrain / Engine and ECT / Data List / Long FT.

Result

Data List Item	Result	Suspected Area	Proceed to
Long FT	-15 to +15%	• Wire harness or connector • Fuel	A
	+15% or more,	Fuel injector assembly	B

	or less than -15%		
--	----------------------	--	--

B

REPLACE FUEL INJECTOR ASSEMBLY ([Click here](#))

A

91.PERFORM SIMULATION TEST

- a.** Check if the idling speed is stable after starting the engine and if an unstable idling speed has ever occurred in the past.

Result

Problem Symptom	Suspected Area	Proceed to
Current unstable idling speed or history of unstable idling speed	Crankshaft position sensor system	A
All current and past idling speeds are stable	Fuel	B

HINT:

Through the customer problem analysis, confirm the fuel being used and the location at which the fuel was added to check if the malfunction is caused by the fuel in the vehicle.

B

REPLACE FUEL

A

92.CHECK CRANKSHAFT POSITION SENSOR

- a.** Check the tightening and installation condition of the crankshaft position sensor bolt.
b. Check the connection of the crankshaft position sensor connector.

OK:

Sensor is installed correctly.

NG

SECURELY REINSTALL SENSOR ([Click here](#))

OK

93.CHECK HARNESS AND CONNECTOR (CRANKSHAFT POSITION SENSOR - ECM)

- a.** Disconnect the crankshaft position sensor connector.
b. Disconnect the ECM connector.
c. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
C42-1 (NE+) - C28-6 (NE+)	Always	Below 1 Ω
C42-2 (NE-) - C28-5 (NE-)	Always	Below 1 Ω
C42-3 (VC) - C28-16 (VCV2)	Always	Below 1 Ω
C42-1 (NE+) or C28-6 (NE+) - Body ground	Always	10 k Ω or higher
C42-2 (NE-) or C28-5 (NE-) - Body ground	Always	10 k Ω or higher
C42-3 (VC) or C28-16 (VCV2) - Body ground	Always	10 k Ω or higher

HINT:

- **Jiggle the wire harness and connector to increase the likelihood of detecting malfunctions that do not always occur.**
- **Make sure there is not an excessive amount of force applied to the wire harness.**

NG**REPAIR OR REPLACE HARNESS OR CONNECTOR****OK****94.CHECK CRANKSHAFT POSITION SENSOR**

- Replace the crankshaft position sensor ([Click here](#)).
- Check the engine start operation.

OK:**Malfunction has been repaired successfully.****NG****REPLACE ECM ([Click here](#))****OK****END (CRANKSHAFT POSITION SENSOR IS DEFECTIVE)****95.PERFORM ACTIVE TEST USING INTELLIGENT TESTER (CONTROL THE FUEL PUMP / SPEED)**

-
- a. Connect the intelligent tester to the DLC3.
 - b. Turn the engine switch on (IG).
 - c. Enter the following menus: Powertrain / Engine and ECT / Active Test / Control the Fuel Pump / Speed.
 - d. When performing the Active Test, check for fuel leakage from the fuel pipes.

Result

Result	Proceed to
Fuel leakage or signs of fuel leakage are present	A
No fuel leakage or signs of fuel leakage	B

HINT:

- Jiggle the wire harness and connector to increase the likelihood of detecting malfunctions that do not always occur.
- When performing the Active Test, if there is no operating noise from the fuel pump, the fuel pump system may be malfunctioning.
- Check if the vehicle ran out of fuel, as engine starting trouble due to running out of fuel is also detected.

B[Go to step 96](#)**A****REPAIR OR REPLACE FUEL LINE****96.INSPECT FUEL PUMP**

- a. Inspect the fuel pump ([Click here](#)).

HINT:

- Make sure there is no foreign matter such as iron particles on the fuel pump and no signs that the fuel pump was stuck.
- Make sure the internal connector is securely connected.
- Make sure the fuel pump filter is not clogged.

NG**REPLACE FUEL PUMP ([Click here](#))****OK****REPLACE FUEL PRESSURE REGULATOR ASSEMBLY ([Click here](#))****97.CHECK FUEL PRESSURE****HINT:**

For the fuel pressure inspection, refer to the following procedures ([Click here](#)).

- a. Attach a fuel pressure gauge and check the fuel pressure after stopping the engine.

Result

Result	Proceed to
147 kPa (1.5 kgf/cm ²) or higher (5 minutes after stopping the engine)	A
Below 147 kPa (1.5 kgf/cm ²) (5 minutes after stopping the engine)	B

B

[Go to step 103](#)

A

98.READ VALUE USING INTELLIGENT TESTER (LONG FT)

- a. Connect the intelligent tester to the DLC3.
- b. Turn the engine switch on (IG).
- c. Enter the following menus: Powertrain / Engine and ECT / Data List / Long FT.

Result

Data List Item	Result	Suspected Area	Proceed to
Long FT	-15 to +15%	- Wire harness or connector - Fuel	A
	+15% or more, or less than -15%	Fuel injector assembly	B

B

REPLACE FUEL INJECTOR ASSEMBLY ([Click here](#))

A

99.PERFORM SIMULATION TEST

- a. Check if the idling speed is stable after starting the engine and if an unstable idling speed has ever occurred in the past.

Result

Problem Symptom	Suspected Area	Proceed to
Current unstable idling speed or history of unstable idling speed	Crankshaft position sensor system	A
All current and past idling speeds are stable	Fuel	B

HINT:

Through the customer problem analysis, confirm the fuel being used and the location at which the fuel was added to check if the malfunction is caused by the fuel in the vehicle.

B

REPLACE FUEL

A

100.CHECK CRANKSHAFT POSITION SENSOR

- a. Check the tightening and installation condition of the crankshaft position sensor bolt.
- b. Check the connection of the crankshaft position sensor connector.

OK:

Sensor is installed correctly.

NG

SECURELY REINSTALL SENSOR ([Click here](#))

OK

101.CHECK HARNESS AND CONNECTOR (CRANKSHAFT POSITION SENSOR - ECM)

- a. Disconnect the crankshaft position sensor connector.
- b. Disconnect the ECM connector.
- c. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
C42-1 (NE+) - C28-6 (NE+)	Always	Below 1 Ω
C42-2 (NE-) - C28-5 (NE-)	Always	Below 1 Ω
C42-3 (VC) - C28-16 (VCV2)	Always	Below 1 Ω
C42-1 (NE+) or C28-6 (NE+) - Body ground	Always	10 k Ω or higher
C42-2 (NE-) or C28-5 (NE-) - Body ground	Always	10 k Ω or higher
C42-3 (VC) or C28-16	Always	10 k Ω or higher

(VCV2) - Body ground		
-------------------------	--	--

HINT:

- Jiggle the wire harness and connector to increase the likelihood of detecting malfunctions that do not always occur.
- Make sure there is not an excessive amount of force applied to the wire harness.

NG

REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

102.CHECK CRANKSHAFT POSITION SENSOR

- Replace the crankshaft position sensor ([Click here](#)).
- Check the engine start operation.

OK:

Malfunction has been repaired successfully.

NG

REPLACE ECM ([Click here](#))

OK

END (CRANKSHAFT POSITION SENSOR IS DEFECTIVE)

103.PERFORM ACTIVE TEST USING INTELLIGENT TESTER (CONTROL THE FUEL PUMP / SPEED)

- Connect the intelligent tester to the DLC3.
- Turn the engine switch on (IG).
- Enter the following menus: Powertrain / Engine and ECT / Active Test / Control the Fuel Pump / Speed.
- When performing the Active Test, check for fuel leakage from the fuel pipes.

Result

Result	Proceed to
Fuel leakage or signs of fuel leakage are present	A
No fuel leakage or signs of fuel leakage	B

HINT:

- Jiggle the wire harness and connector to increase the likelihood of detecting malfunctions that do not always occur.
- When performing the Active Test, if there is no operating noise from the fuel pump, the fuel pump system may be malfunctioning.

- Check if the vehicle ran out of fuel, as engine starting trouble due to running out of fuel is also detected.

B

[Go to step 104](#)

A

REPAIR OR REPLACE FUEL LINE

104.INSPECT FUEL PUMP

- Inspect the fuel pump ([Click here](#)).

HINT:

- Make sure there is no foreign matter such as iron particles on the fuel pump and no signs that the fuel pump was stuck.
- Make sure the internal connector is securely connected.
- Make sure the fuel pump filter is not clogged.

NG

REPLACE FUEL PUMP ([Click here](#))

OK

105.CHECK PURGE VSV

- Disconnect the vacuum hose (on the canister side) of the purge VSV.
- Start the engine.
- Idle the engine.
- Disconnect the connector of the purge VSV.
- Check if air flows through the purge VSV.

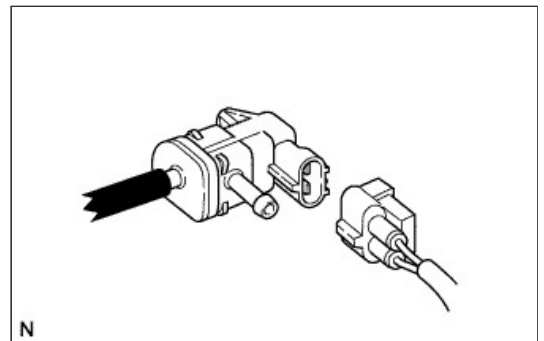
Standard:

Air does not flow

- Connect the connector of the purge VSV.
- Connect the vacuum hose of the purge VSV.

HINT:

When this inspection is performed, the MIL may illuminate. After finishing the inspection, check and clear DTCs ([Click here](#)).



NG

INSPECT PURGE VSV ([Click here](#))

OK

106.CHECK FUEL INJECTOR ASSEMBLY

- a. Clean the inside of the surge tank with compressed air.
- b. After stopping the engine, measure the HC concentration inside the surge tank for 15 minutes.

Result

Result	Proceed to
400 ppm or more	A
Less than 400 ppm	B

HINT:

If the concentration is 400 ppm or more, a fuel injector may have a sealing problem.

B

[Go to step 107](#)

A

REPLACE FUEL INJECTOR ASSEMBLY ([Click here](#))

107.CHECK INTAKE VALVE

- a. Check if carbon is on the intake valves.

Result

Result	Proceed to
Carbon present	A
No carbon present	B

B

[Go to step 108](#)

A

CLEAN INTAKE VALVE

108.READ VALUE USING INTELLIGENT TESTER (ISC LEARNING VALUE)

- a. Connect the intelligent tester to the DLC3.
- b. Turn the engine switch on (IG).
- c. Start the engine, turn off all accessory switches and warm up the engine until the engine coolant temperature stabilizes.
- d. Enter the following menus: Powertrain / Engine and ECT / Data List / ISC Learning Value.

Result

--	--	--	--

Data List Item	Result	Suspected Area	Proceed to
ISC Learning Value	(engine displacement (liters) x 0.9) or more	- Valve timing - Compression	A
	Less than (engine displacement (liters) x 0.9)	-	B

B

[Go to step 110](#)

A

109.CHECK CYLINDER COMPRESSION PRESSURE

- a. Inspect the compression ([Click here](#)).

NG

REPAIR OR REPLACE ENGINE ASSEMBLY

OK

ADJUST VALVE TIMING ([Click here](#))

110.INSPECT ENGINE COOLANT TEMPERATURE SENSOR

- a. Inspect the engine coolant temperature sensor ([Click here](#)).

NG

REPLACE ENGINE COOLANT TEMPERATURE SENSOR ([Click here](#))

OK

111.CHECK CRANKSHAFT POSITION SENSOR

- a. Check the tightening and installation condition of the crankshaft position sensor bolt.
b. Check the connection of the crankshaft position sensor connector.

OK:
Sensor is installed correctly.

NG

SECURELY REINSTALL SENSOR ([Click here](#))

OK

112.CHECK CAMSHAFT POSITION SENSOR

- a. Check the tightening and installation condition of the camshaft position sensor bolt.
- b. Check the connection of the camshaft position sensor connector.

OK:

Sensor is installed correctly.

NG

SECURELY REINSTALL SENSOR ([Click here](#))

OK

113.CHECK HARNESS AND CONNECTOR (CRANKSHAFT POSITION SENSOR - ECM)

- a. Disconnect the crankshaft position sensor connector.
- b. Disconnect the ECM connector.
- c. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
C42-1 (NE+) - C28-6 (NE+)	Always	Below 1 Ω
C42-2 (NE-) - C28-5 (NE-)	Always	Below 1 Ω
C42-3 (VC) - C28-16 (VCV2)	Always	Below 1 Ω
C42-1 (NE+) or C28-6 (NE+) - Body ground	Always	10 k Ω or higher
C42-2 (NE-) or C28-5 (NE-) - Body ground	Always	10 k Ω or higher
C42-3 (VC) or C28-16 (VCV2) - Body ground	Always	10 k Ω or higher

HINT:

- **Jiggle the wire harness and connector to increase the likelihood of detecting malfunctions that do not always occur.**
- **Make sure there is not an excessive amount of force applied to the wire harness.**

NG

REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

114.CHECK HARNESS AND CONNECTOR (CAMSHAFT POSITION SENSOR - ECM)

- a. Disconnect the camshaft position sensor connector.
- b. Disconnect the ECM connector.
- c. Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
C41-1 (G2) - C28-9 (G2)	Always	Below 1 Ω
C41-2 (G-) - C28-10 (G2-)	Always	Below 1 Ω
C41-3 (VC) - C28-16 (VCV2)	Always	Below 1 Ω
C41-1 (G2) or C28-9 (G2) - Body ground	Always	10 k Ω or higher
C41-2 (G-) or C28-10 (G2-) - Body ground	Always	10 k Ω or higher
C41-3 (VC) or C28-16 (VCV2) - Body ground	Always	10 k Ω or higher

HINT:

- Jiggle the wire harness and connector to increase the likelihood of detecting malfunctions that do not always occur.
- Make sure there is not an excessive amount of force applied to the wire harness.

NG

REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

115.CHECK CRANKSHAFT POSITION SENSOR

- a. Replace the crankshaft position sensor ([Click here](#)).

b. Check the engine start operation.

OK:

Malfunction has been repaired successfully.

NG

[Go to step 116](#)

OK

END (CRANKSHAFT POSITION SENSOR IS DEFECTIVE)

116.CHECK CAMSHAFT POSITION SENSOR

a. Replace the camshaft position sensor ([Click here](#)).

b. Check the engine start operation.

OK:

Malfunction has been repaired successfully.

NG

REPLACE ECM ([Click here](#))

OK

END (CAMSHAFT POSITION SENSOR IS DEFECTIVE)

