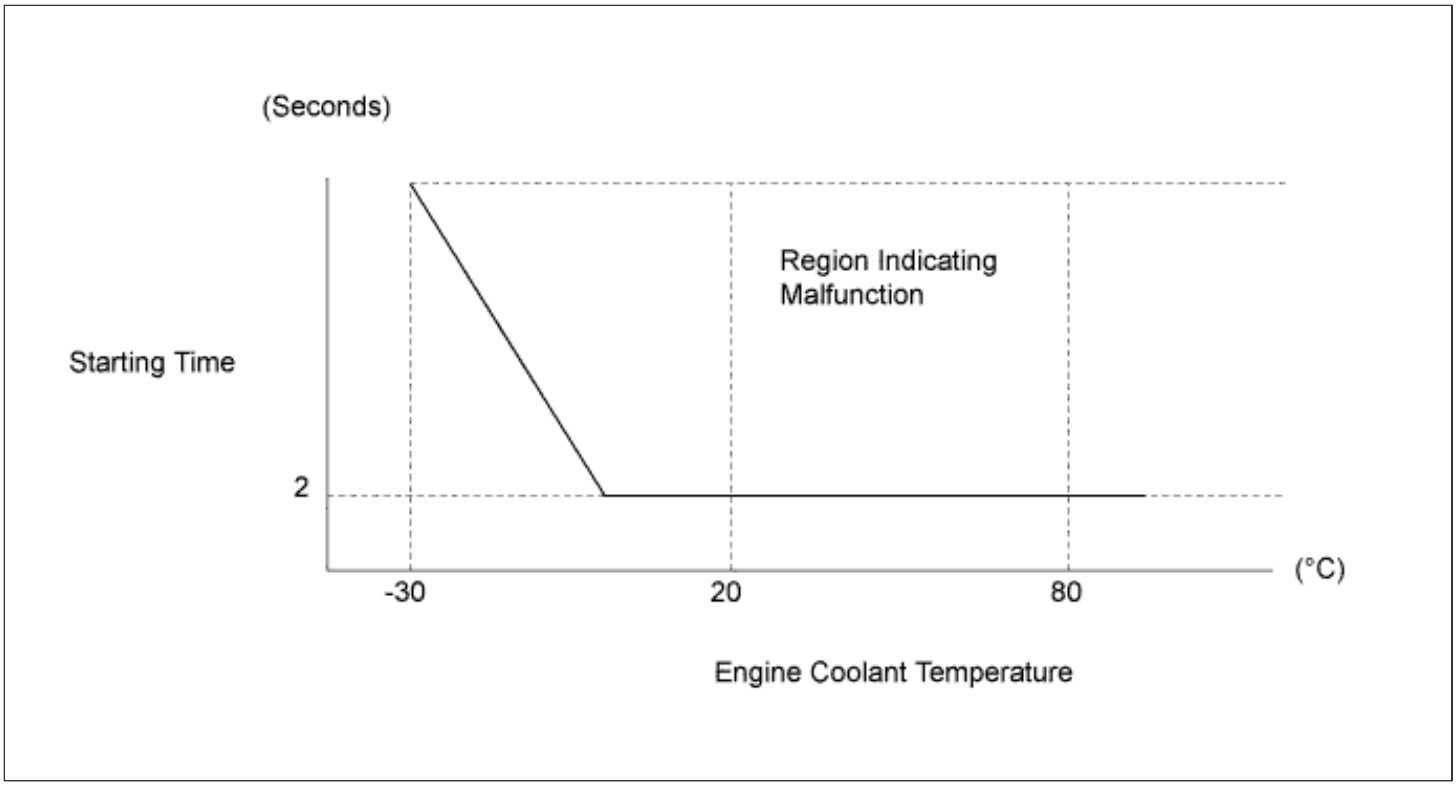
DTC P1604 Startability Malfunction

for Preparation Click here

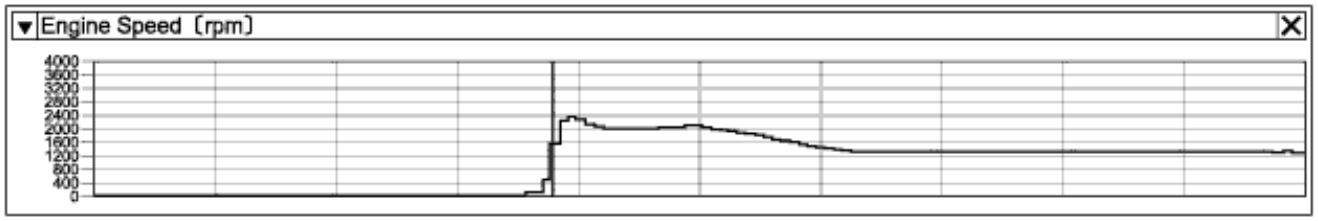
DESCRIPTION

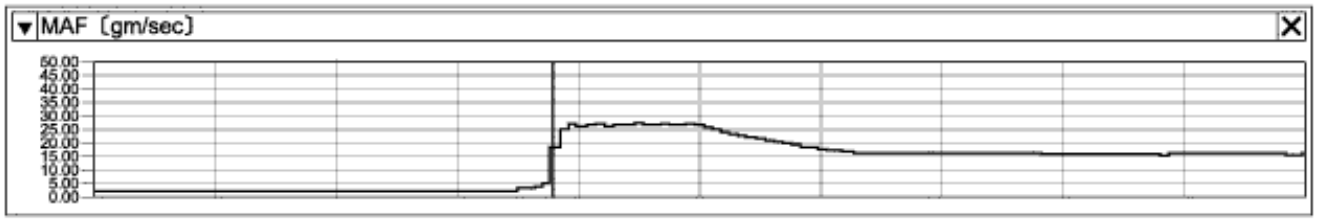
This DTC is stored when the engine does not start even though the STA signal is input or when the engine takes a long time to start, and when the engine speed is low or the engine stalls just after the engine starts.
Using the intelligent tester, the conditions present when the DTC was stored can be confirmed by referring to the freeze frame data. Freeze frame data records engine conditions when a malfunction occurs. This information can be useful when troubleshooting.
It is necessary to check if the vehicle ran out of fuel before performing troubleshooting, as this DTC is also stored when there is engine starting trouble due to running out of fuel.

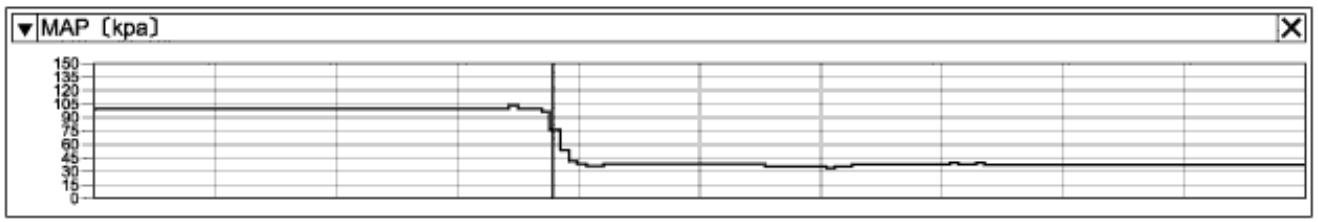
DTC No.	DTC Detection Condition	Trouble Area
P1604	Either condition is met: • The engine speed is less than 500 rpm with the STA signal on for a certain amount of time (refer to the illustration below) (1 trip detection logic). • After the engine starts (engine speed is 500 rpm or more), the engine speed drops to 200 rpm or less within approximately 2 seconds (1 trip detection logic).	• Immobiliser system • Engine assembly (excess friction, compression loss) • Starter assembly • Crankshaft position sensor • Engine coolant temperature sensor • Fuel pump • Fuel pump control system • Fuel pipes • Fuel injector assembly • Throttle body assembly • Fuel pressure regulator assembly • Battery • Drive plate • Spark plug • Ignition coil circuit • Intake system • Camshaft timing oil control valve assembly • Mass air flow meter assembly • Air fuel ratio sensor • Valve timing • Fuel • Purge VSV • EGR system • Intake valve • Exhaust valve • ECM

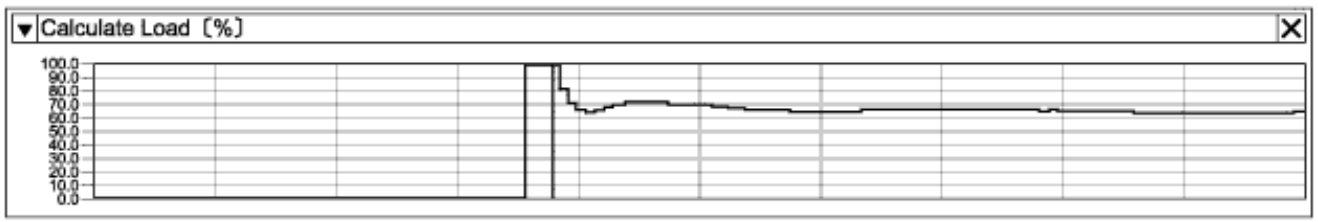


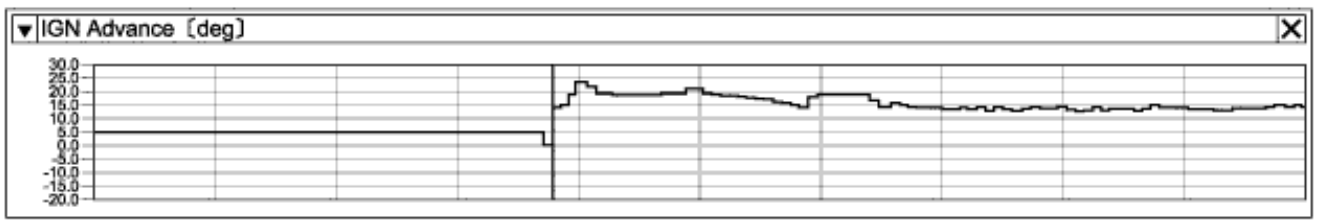
Reference waveforms showing a normal cold engine start

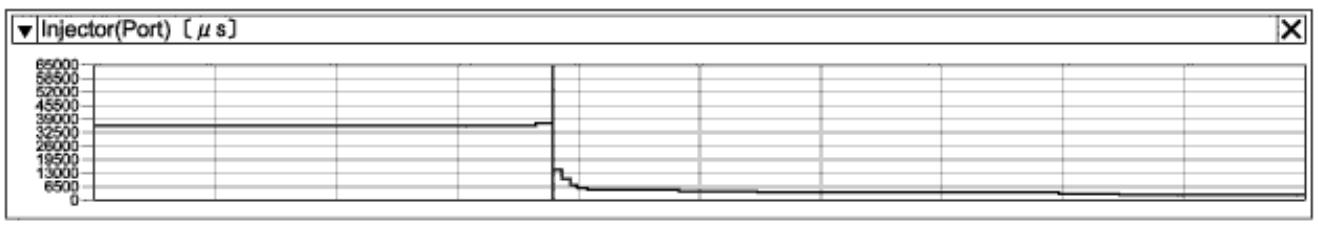

Engine Speed [rpm]
4000
3600
3200
2800
2400
2000
1600
1200
800
400
0


MAF [gm/sec]
50.00
45.00
40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00


MAP [kpa]
150
135
120
105
90
75
60
45
30
15
0

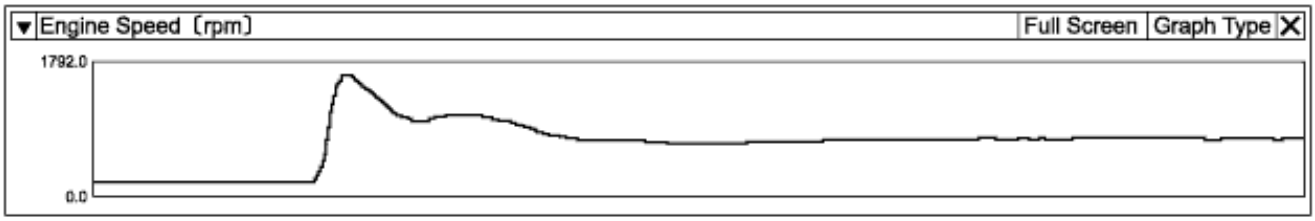

Calculate Load [%]
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0

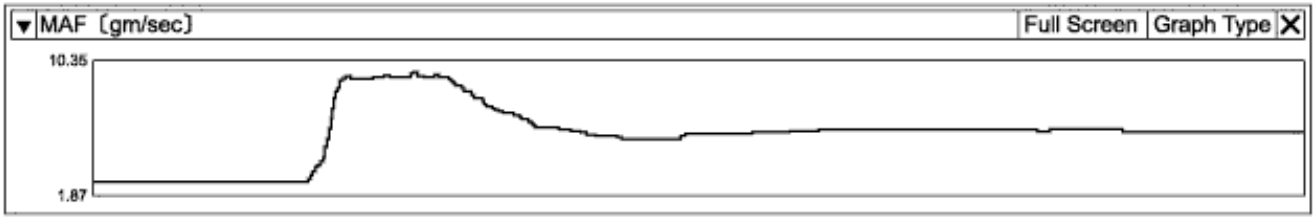

IGN Advance [deg]
30.0
25.0
20.0
15.0
10.0
5.0
0.0
-5.0
-10.0
-15.0
-20.0

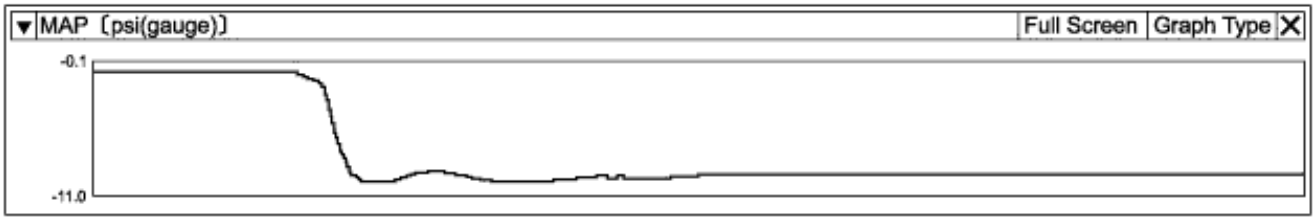

Injector(Port) [μs]
65000
58500
52000
45500
39000
32500
26000
19500
13000
6500
0

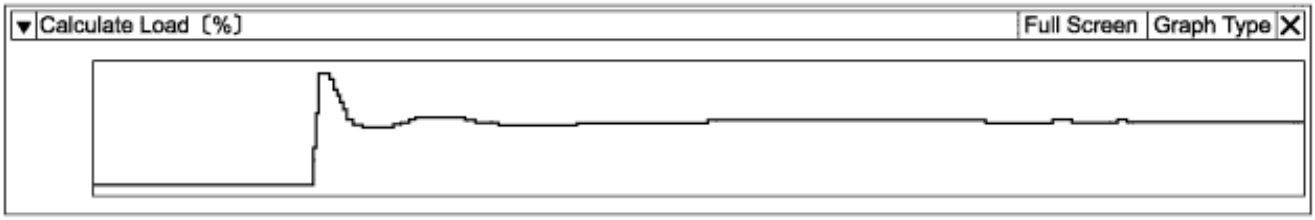
O

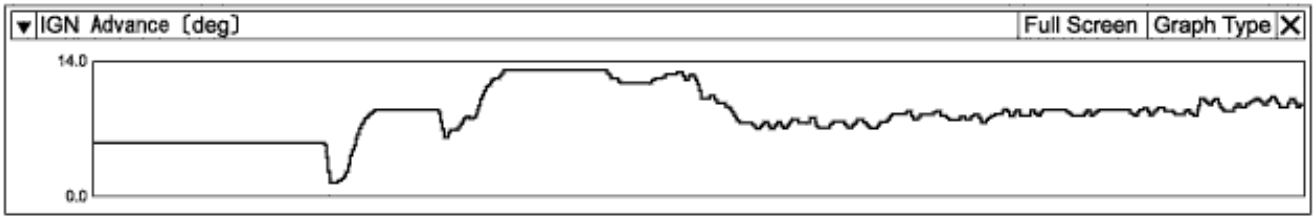
Reference waveforms showing a normal warm engine start

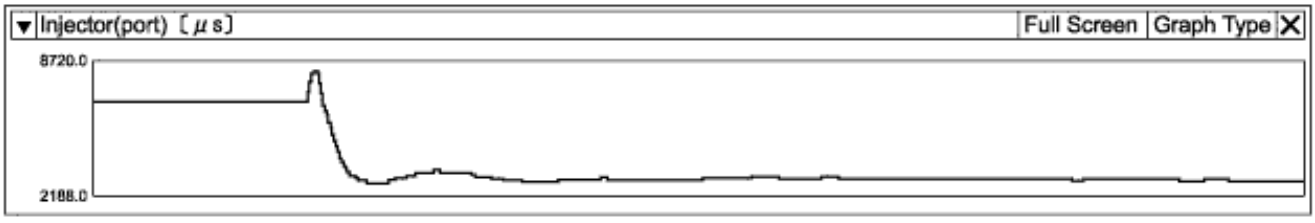












0

Reference values when there is an air leak in the intake system during starting difficulty

Freeze Frame Data
P1604 Startability Malfunction

	Parameter	-3	-2	-1	0	1	Unit
	Engine Speed	1532	1003	324	153	114	rpm
	Calculate Load	72.5	56.4	62.7	100.0	100.0	%
	Vehicle Load	10.1	18.4	43.1	49.0	36.0	%
	MAF	7.14	8.57	6.35	3.45	1.87	gm/sec
	Atmosphere Pressure	100	100	100	100	100	kPa(abs)
	MAP	65	64	88	97	101	kPa(abs)
	Coolant Temp	183	183	185	185	185	F
	Intake Air	97	97	95	95	95	F
	Ambient Temperature	55	55	55	55	55	F
	Battery Voltage	13.105	13.183	11.992	11.855	11.914	V
	Throttle Sensor Volt %	17.2	17.2	16.8	16.4	16.4	%
	Throttl Sensor #2 Volt %	49.4	49.4	49.0	48.6	48.6	%
	Throttle Sensor Position	0.0	0.0	0.0	0.0	0.0	%
	Throttle Motor DUTY	17.2	17.2	16.8	16.4	16.4	%
	Injector(Port)	3734	2582	2727	2727	6752	μS
	Injection Volum(Cylinder1)	0.135	0.230	0.230	0.230	0.230	ml
	Fuel Pump/Speed Status	ON	ON	ON	ON	ON	
	EVAP(Purge) VSV	0.0	0.0	0.0	0.0	0.0	%
	Evap Purge Flow	0.0	0.0	0.0	0.0	0.0	%
	Purge Density Learn Value	0.000	0.000	0.000	0.000	0.000	
	EVAP System Vent Valve	OFF	OFF	OFF	OFF	OFF	
	EVAP Purge VSV	OFF	OFF	OFF	OFF	OFF	
	Purge Cut VSV Duty	0.0	0.0	0.0	0.0	0.0	%
	Target Air-Fuel Ratio	0.985	0.987	0.987	0.987	0.984	
	AF Lambda B1S1	0.999	0.999	0.999	0.999	0.999	
	AF Lambda B2S1	0.998	0.998	0.998	0.999	0.999	
	AFS Voltage B1S1	3.298	3.298	3.298	3.298	3.298	V
	AFS Voltage B2S1	3.298	3.298	3.298	3.302	3.302	V
	O2S B1S2	0.000	0.000	0.000	0.000	0.000	V
	O2S B2S2	0.015	0.000	0.000	0.000	0.000	V
	Short FT #1	0.000	0.000	0.000	0.000	0.000	%
	Long FT #1	10.937	6.250	1.562	4.687	1.562	%
	Total FT #1	0.000	0.000	0.000	0.000	0.000	
	Short FT #2	0.000	0.000	0.000	0.000	0.000	%
	Long FT #2	8.593	4.687	-2.344	2.343	-2.344	%
	Total FT #2	0.000	0.000	0.000	0.000	0.000	
	Fuel System Status #1	OL	OL	OL	OL	OL	
	Fuel System Status #2	OL	OL	OL	OL	OL	
	IGN Advance	0.0	5.5	9.0	9.0	9.0	deg
	Knock Feedback Value	-3.0	-3.0	-3.0	-3.0	-3.0	CA
	Knock Correct Learn Value	24.5	24.5	24.5	24.5	24.5	CA
	EGR Step Position	0	0	0	0	0	step
	VVT Control Status #1	OFF	OFF	OFF	OFF	OFF	
	VVT Control Status #2	OFF	OFF	OFF	OFF	OFF	
	Starter Signal	Close	Close	Close	Close	Close	

o

HINT:

The engine started momentarily but stalled immediately after starting due to an air leak.

INSPECTION PROCEDURE

HINT:

- **In contrast to normal malfunction diagnosis for components, circuits and systems, DTC P1604 is used to determine the malfunctioning area from the problem symptoms and freeze frame data when the user mentions problems such as starting difficulty. As these DTCs can be stored as a result of certain user actions, even if these DTCs are output, if the customer makes no mention of problems, clear these DTCs without performing any troubleshooting and return the vehicle to the customer.**
- **If any other DTCs are output, perform troubleshooting for those DTCs first.**
- **When the Data List item "Immobiliser Fuel Cut" is ON, the engine cannot be started.**
- **Read freeze frame data using the intelligent tester. Freeze frame data records engine conditions when a malfunction occurs. This information can be useful when troubleshooting.**
- **When confirming the freeze frame data, be sure to check all 5 sets of freeze frame data (Click here).**
- **When confirming freeze frame data, if there are multiple items related to the cause of the malfunction, perform troubleshooting for all related items.**
- **Try to start the vehicle under the conditions recorded in the freeze frame data which were present when the malfunction occurred. Confirm the data at this time and compare it with the freeze frame data.**
- **If the malfunction does not reoccur, carefully check the vehicle conditions from when the malfunction occurred using freeze frame data.**
- **When performing inspections, jiggle the relevant wire harnesses and connectors in an attempt to reproduce malfunctions that do not always occur.**
- **If the same inspection or replacement procedure appears 2 times when performing an inspection procedure, it is not necessary to repeat the procedure the second time.**

Malfunction Recurrence and Inspection Areas

a. Freeze frame data exists, but the malfunction (starting difficulty) has not reoccurred and the malfunction conditions are unknown.

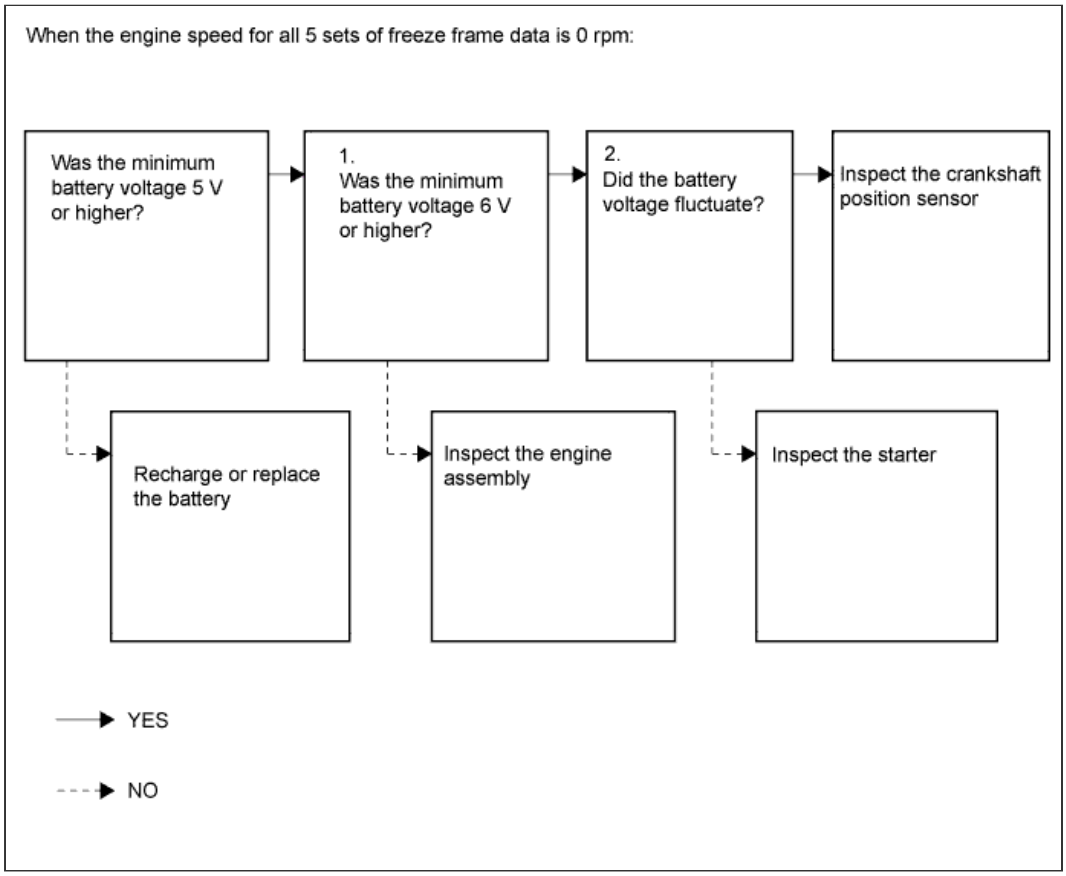
i. The engine speed recorded in the freeze frame data is 0 rpm (the engine does not crank).

HINT:

One of the following problems may be present: battery depletion, excess engine friction, a starter malfunction or a crankshaft position sensor malfunction.

- If the battery voltage is less than 6 V during cranking, there is a high probability that engine friction is abnormal.
- If the battery voltage drops to 5 V or less when starting the engine, the battery may be malfunctioning.

- If the battery voltage fluctuates while cranking the engine, it can be concluded that cranking is being performed. When the engine speed is 0 rpm, the crankshaft position sensor and/or ECM may be malfunctioning.

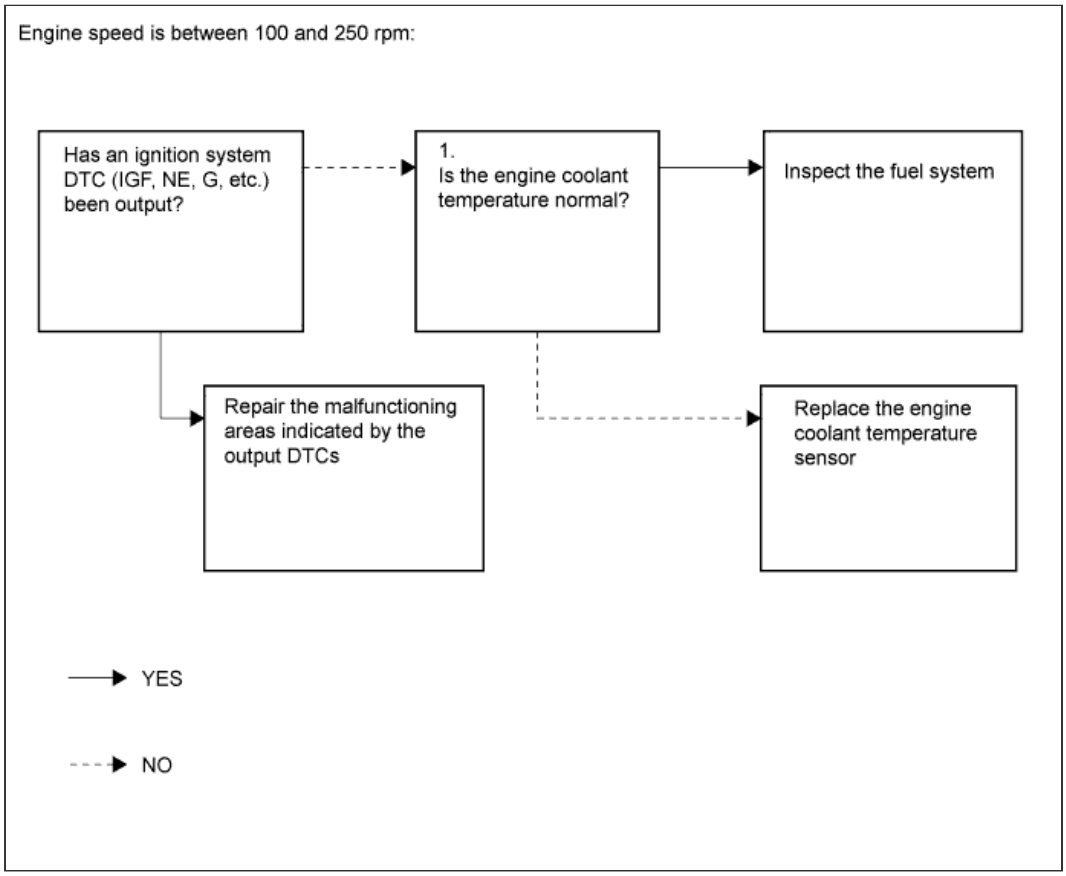


ii. All engine speeds recorded in the freeze frame data are between 100 and 250 rpm (the engine cranks but there is no combustion).

HINT:

If the engine speed is between 100 and 250 rpm (no initial combustion), there may be a wiring problem or a complete failure of an ignition or fuel system part.

- Due to an engine coolant temperature sensor malfunction, the fuel injection volume is extremely high or low and the engine may not be able to be started.



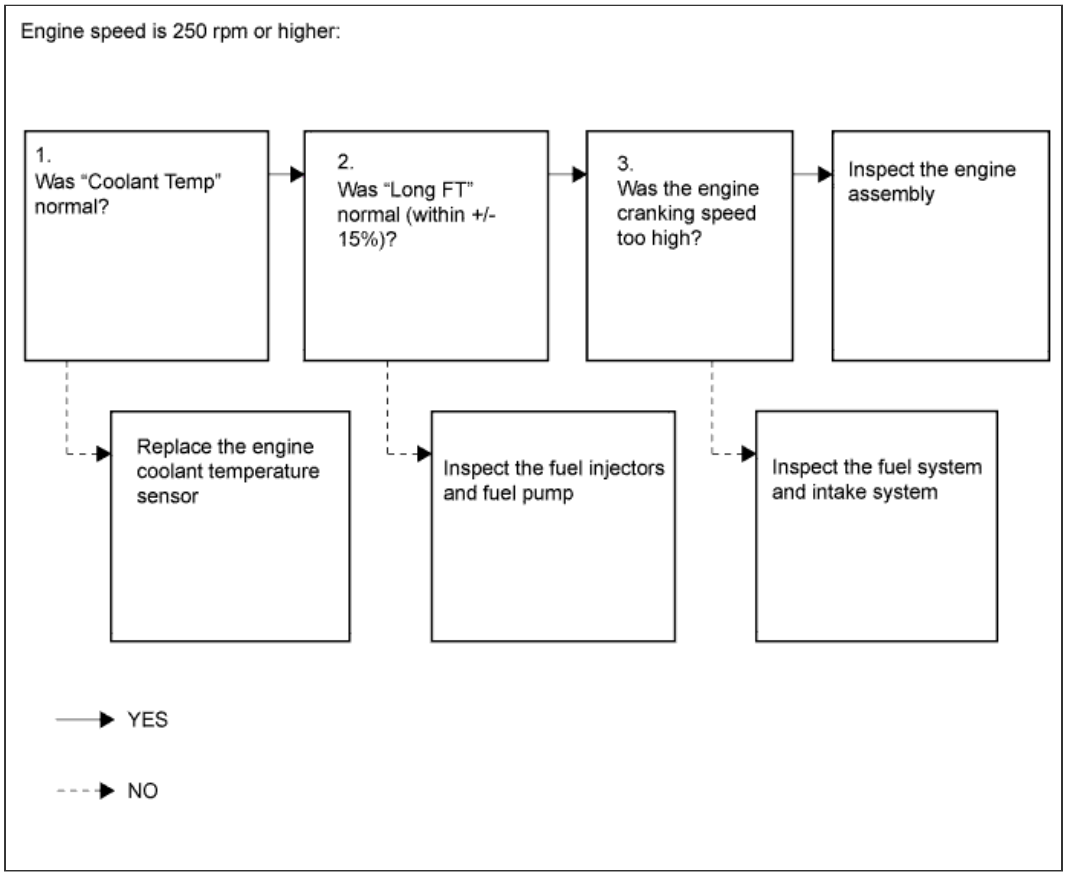
iii. The engine speed recorded in the freeze frame data is 250 rpm or higher (the initial combustion and starter turnoff timing is too late).

HINT:

If the engine speed is 250 rpm or higher (combustion occurs but the initial combustion and starter turnoff timing is too late), the fuel injection volume is often incorrect (too low or too high) and determining the cause of the malfunction is often difficult.

- Due to an engine coolant temperature sensor malfunction, the fuel injection volume is extremely high or low and engine starting trouble may occur.
- If Long FT is incorrect, there may be a fuel supply problem due to the injectors or fuel pump being clogged, etc.

- If the engine cranking speed is too high, compression loss may have occurred due to carbon interfering with the valve operation.



b. When the malfunction (starting difficulty) can be reproduced, or malfunction conditions are known, perform the following inspections ("Problem Symptoms" and "Systems to Inspect").

i. Problem Symptoms

1. The engine does not crank.

   HINT:

   The starter is normal if a noise that indicates the starter pinion gear is extending is heard. The battery may be fully depleted or there may be excess engine friction.

2. The engine cranking speed is abnormal.

   HINT:

   If the engine cranking speed is too high (for example, 300 rpm or higher with no combustion), compression loss may have occurred because carbon interfered with valve operation, etc.

3. There is no initial combustion.

   HINT:

   If there is no initial combustion, there is probably a wiring problem or an ignition or fuel system part malfunction.

4. The engine stalls after starter turnoff.

   HINT:

If the engine stalls after starter turnoff, the air-fuel ratio may be incorrect or the VVT may have a problem returning.

5. The initial combustion and starter turnoff occur late.

HINT:

If the initial combustion and starter turnoff occur late, the fuel injection volume is probably incorrect (too low or too high).

HINT:

Causes of fuel system malfunctions according to conditions present at the time of the malfunction.

- **When 2 to 3 minutes have elapsed after stopping the engine: Fuel pressure loss due to the pressure regulator failing to maintain the fuel pressure.**
- **When 15 to 120 minutes have elapsed after stopping the engine: Problem with fuel injector fuel seal.**
- **When a long time has elapsed after stopping the engine: Pressure regulator is stuck open.**

ii. Systems to Inspect

1. Intake system
2. Ignition system
3. Fuel system

INSPECTION FLOW

a. Freeze frame data exists, but the malfunction (starting difficulty) has not reoccurred and the malfunction conditions are unknown.

Freeze Frame Data Item	Result	Suspected Area	Procedure
Engine Speed	0 rpm (no engine cranking at all)	• Battery fully depleted • Engine assembly (excess friction) • Starter assembly • Immobiliser system • Crankshaft position sensor • ECM	4 to 9
	100 to 250 rpm (engine cranks but no initial combustion*1)	• Fuel pump control system • Ignition system • Engine coolant temperature sensor • Fuel injection system	10 to 14
	250 rpm or higher (combustion occurs but initial combustion and starter turnoff*2 occur late)	• Engine assembly (compression loss) • Fuel injection system • Fuel pump control system	15 to 23

HINT:

- ***1: First combustion after cranking begins.**
- ***2: Condition when engine speed increases and starter can be turned off.**

b. When the malfunction (starting difficulty) can be reproduced, or when malfunction conditions are known.

i. Problem Symptoms

Problem Symptom	Suspected Area	Suspected Component	Procedure
The engine does not crank	Battery malfunction	• Battery fully depleted	26 to 31
	Starting system	• Starter assembly (includes pinion gear wear or tooth damage) • Starting system	
	Immobiliser system	• Immobiliser system	
	Engine assembly	• Engine assembly (excess friction) • Drive plate wear or tooth damage	
Cranking speed too low	Battery malfunction	• Battery fully depleted	32 to 34
	Starting system	• Starter assembly	
	Engine assembly	• Engine assembly (excess friction)	
Cranking speed too high	Engine assembly	• Engine assembly (compression loss)	
There is no initial combustion	Fuel supply problem	• Cannot maintain pressure due to pressure regulator malfunction • Fuel injector leak • Fuel leak from fuel line • Fuel pump control system • Fuel pump	35 to 50
	Ignition system malfunction	• Spark plug • Crankshaft position sensor • Ignition coil assembly	
Engine stalls after starter turnoff	Air suction	• Intake system connections	51 to 59
	Deposits in throttle body	• Throttle body assembly	
	VVT valve does not return properly	• Camshaft timing oil control valve assembly	
	Mass air flow meter	• Mass air flow meter assembly	

	malfunction		
	EGR valve does not close properly	• EGR valve assembly	
The initial combustion and starter turnoff occur late	Engine coolant temperature sensor malfunction	• Engine coolant temperature sensor	60 to 73
	Mass air flow meter malfunction	• Mass air flow meter assembly	
	Abnormal A/F learned value	• Air fuel ratio sensor	
	Deviation from fuel injection characteristics	• Fuel injector assembly	
	Wet-fouled or dry-fouled spark plug	• Spark plug	
	Lack of fuel pressure	• Fuel pressure regulator assembly • Fuel pump • Fuel pump control system	

ii. Systems to Inspect

Troubleshooting by System	Suspected Area	Suspected Component	Procedure
Fuel system troubleshooting A	Abnormal A/F learned value	• Fuel injector assembly	89 to 96 97 to 104
	Rough idling	• Crankshaft position sensor	
	Abnormal fuel pressure	• Fuel • Fuel leak from fuel line • Fuel pump • Fuel pressure regulator assembly	
Fuel system troubleshooting B	Abnormal concentration of HC in surge tank	• Purge VSV system • Fuel injector assembly • Intake valve	105 to 107
Fuel system troubleshooting C	Injection signal system malfunction	• Fuel injector assembly • Crankshaft position sensor • Camshaft position sensor • ECM	75 to 79
Intake system troubleshooting	Difference between ISC target value and opening angle when idling	• Engine assembly (compression loss) • Valve timing • Engine coolant temperature sensor • ECM	86 to 88 108 to 110

Ignition system troubleshooting	Camshaft and/or crankshaft position sensor signal malfunction	• Crankshaft position sensor system (including sensor installation) • Camshaft position sensor system (including sensor installation) • ECM	80 to 85 111 to 116

1.CHECK FOR ANY OTHER DTCS OUTPUT AND RECORD FREEZE FRAME DATA

a. Connect the intelligent tester to the DLC3.

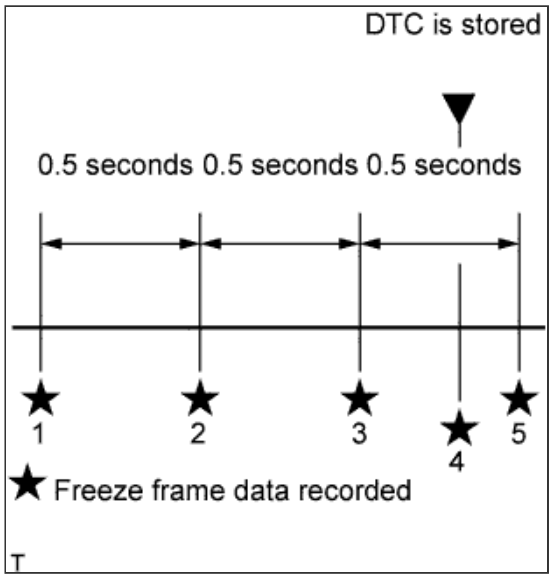
b. Turn the engine switch on (IG).

c. Enter the following menus: Powertrain / Engine and ECT / DTC.

d. Read the DTCs and record the freeze frame data.

HINT:

- **This freeze frame data shows the actual engine conditions when engine starting trouble occurred.**
- **When confirming the freeze frame data, be sure to check all 5 data sets of freeze frame data.**
- **The fourth set of freeze frame data is the data recorded when the DTC is stored.**



Result

Result	Proceed to
Only DTC P1604 is output	A
DTCs other than P1604 are output	B

B → **GO TO DTC CHART (Click here)**

A

2.CHECK ENGINE IMMOBILISER SYSTEM

a. Connect the intelligent tester to the DLC3.

b. Turn the engine switch on (IG).

c. Turn the tester on.

d. Enter the following menus: Powertrain / Engine and ECT / Data List / All Data / Immobiliser Fuel Cut.

e. Read the value displayed on the tester.

OK:
Immobiliser Fuel Cut is OFF.

HINT:

After reconnecting the battery cable, if the engine is started immediately (without waiting 1.8 seconds after turning the engine switch on (IG)), the engine will stop (due to the key verification process). The engine can be started after that.

NG → **REPAIR ENGINE IMMOBILISER SYSTEM (Click here)**

OK

3.CHECK MALFUNCTION CONDITION

a. Confirm the problem symptoms.

Result

Result	Proceed to
Freeze frame data exists, but the starting difficulty cannot be reproduced and it is unknown what kind of starting difficulty occurred	A
The problem symptoms can be reproduced, or the malfunction conditions are known	B

B → **Go to step 25**

A

4.CHECK FREEZE FRAME DATA

a. Connect the intelligent tester to the DLC3.

b. Turn the engine switch on (IG).

c. Using the intelligent tester, confirm the vehicle conditions recorded in the freeze frame data which were present when the DTC was stored (Click here).

Result

Freeze Frame Data Item		Suspected Area	Proceed to
Engine Speed	Battery Voltage		
All 5 sets of freeze frame data are 0 rpm (no engine cranking at all)	Minimum voltage is below 5 V	Battery fully depleted	A
	Minimum voltage is 5 V or higher	• Starter malfunction • Crankshaft position sensor system	B

		• Excess engine friction • Immobiliser system • ECM	
60 to 250 rpm (engine cranks but no initial combustion)	-	• Fuel pump control system • Ignition system • Engine coolant temperature sensor • Immobiliser system • Fuel injection system	C
250 rpm or higher (combustion occurs but initial combustion and starter turnoff occur late)	-	• Engine assembly • Fuel injection system • Fuel pump control system	D

HINT:

When DTC P1604 is stored, either "Engine Start Hesitation"*1 or "Low Rev for Eng Start"*2 in the freeze frame data will be ON. If "Low Rev for Eng Start" is ON, proceed to E.

*1: This value turns ON when the engine speed does not reach a certain value for a certain period of time when starting the engine.

*2: This value turns ON when the engine stalls immediately after starting the engine. If "Low Rev for Eng Start" is ON, as there is a possibility that the low engine speed or engine stall was caused by the user, confirm the following freeze frame data items.

- **Immobiliser Fuel Cut**
- **Engine Speed (starter off)**
- **Shift SW Status (R, D)**

B	Go to step 5
C	Go to step 10
D	Go to step 15
E	Go to step 51

A

CHARGE OR REPLACE BATTERY

5.CHECK FREEZE FRAME DATA

a. Connect the intelligent tester to the DLC3.

b. Turn the engine switch on (IG).

c. Using the intelligent tester, confirm the vehicle conditions recorded in the freeze frame data which were present when the DTC was stored (Click here).

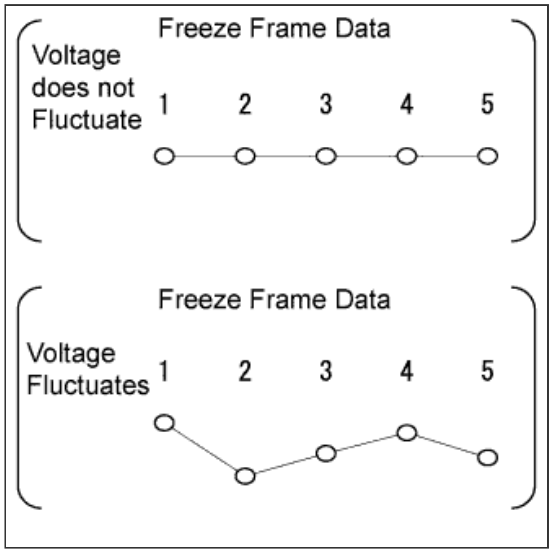
Result

Freeze Frame Data Item	Result	Suspected Area	Proceed to

Battery Voltage	Minimum voltage is 6 V or higher and voltage does not fluctuate*1	Starter system	A
	Minimum voltage is 6 V or higher and voltage fluctuates*2, *3	• Crankshaft position sensor system • ECM	B
	Minimum voltage is 5 to 6 V*4	• Excess engine friction • Battery fully depleted	C

HINT:

- ***1: The 5 sets of freeze frame data show approximately the same battery voltage.**
- ***2: The 5 sets of freeze frame data show different battery voltages.**
- ***3: If the voltage fluctuates, it can be determined that cranking is being performed. When the engine speed is 0 rpm, the crankshaft position sensor system and/or the ECM may be malfunctioning.**
- ***4: There may be excess engine friction. Make sure that the crankshaft rotates smoothly when turning it by hand. Excess engine friction may have occurred temporarily. Remove the cylinder head cover and oil pan, and check for foreign matter such as iron fragments. If there is a malfunction or signs of a malfunction present, perform a detailed inspection by disassembling all the parts.**



B → **Go to step 6**

C → **CHECK AND REPAIR ENGINE OR BATTERY**

A

CHECK STARTER SIGNAL CIRCUIT (Click here)

6.CHECK SENSOR INSTALLATION

a. Check the tightening and installation condition of the crankshaft position sensor bolt.

b. Check the connection of the crankshaft position sensor connector.

Result

Result	Proceed to
Normal	A
Abnormal	B

B → SECURELY REINSTALL SENSOR (Click here)

A

7.CHECK CRANKSHAFT POSITION SENSOR

a. Disconnect the crankshaft position sensor connector.

b. Check for oil on the connector terminals.

OK:
No oil on the terminals.

NG → REPLACE CRANKSHAFT POSITION SENSOR (Click here)

OK

8.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 kΩ or higher
C42-2 (NE-) or C28-5 (NE-) - Body ground	Always	10 kΩ or higher
C42-3 (VC) or C28-16 (VCV2) - 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

9.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 → **REPLACE ECM (Click here)**

OK

END (CRANKSHAFT POSITION SENSOR IS DEFECTIVE) (Click here)

10.CHECK FREEZE FRAME DATA

a. Connect the intelligent tester to the DLC3.

b. Turn the engine switch on (IG).

c. Using the intelligent tester, confirm the vehicle conditions recorded in the freeze frame data which were present when the DTC was stored (Click here).

Result

Freeze Frame Data Item			Suspected Area	Proceed to
Coolant Temp, Ambient Temperature, Intake Air	Coolant Temp, Ambient Temperature	Fuel Pump/Speed Status		
Difference between Coolant Temp, Ambient Temperature and Intake Air is 10°C or more*1	Coolant Temp is 125°C or higher, or below Ambient Temperature by 15°C or more	-	Engine coolant temperature sensor	A
	Other than above	All 5 sets of freeze frame data are ON	-	B
		At least 1 of the 5 sets of freeze frame data is OFF	Fuel pump control system	C
Difference between	-	At least 1 of the 5	Fuel pump control	C

Coolant Temp, Ambient Temperature and Intake Air is less than 10°C*2		sets of freeze frame data is OFF	system	
		All 5 sets of freeze frame data are ON	-	B

HINT:

- ***1: A long time had not elapsed after stopping the engine.**
- ***2: A long time had elapsed after stopping the engine.**

B	Go to step 11
C	CHECK FUEL PUMP CONTROL SYSTEM (Click here)

A

REPLACE ENGINE COOLANT TEMPERATURE SENSOR (Click here)

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

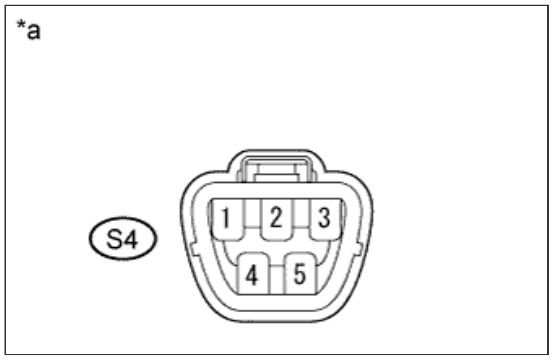
a. Connect the intelligent tester to the DLC3.

b. Disconnect the connector from the fuel suction tube.

c. Turn the engine switch on (IG).

d. Enter the following menus: Powertrain / Engine and ECT / Active Test / Control the Fuel Pump / Speed.

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



Standard Voltage:

Tester Connection	Condition	Specified Condition
S4-4 - Body ground	Active Test is being performed	11 to 14 V

Text in Illustration

*a	Front view of wire harness connector (to Fuel Pump)

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 FUEL PUMP CONTROL SYSTEM (Click here)**

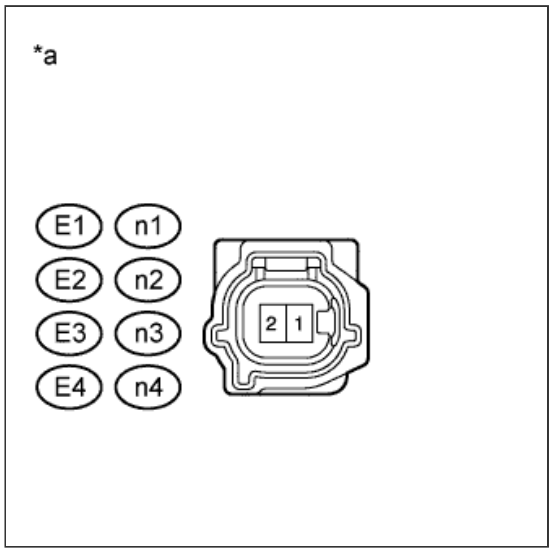
OK

12.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)

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 FUEL INJECTOR POWER SOURCE CIRCUIT**

OK

13.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 14**

A

REPAIR OR REPLACE FUEL LINE

14.CHECK FUEL SYSTEM

a. Check for foreign matter, such as iron particles, around the fuel pump, fuel pump filter and inside the fuel tank, and for signs that the fuel pump was stuck.

Result

Result	Proceed to
There is foreign matter or signs that fuel pump was stuck	A
There is no foreign matter and no signs that fuel pump was stuck	B

B → Go to step 24

A

REPAIR OR REPLACE FUEL SYSTEM

15.CHECK FREEZE FRAME DATA

a. Connect the intelligent tester to the DLC3.

b. Turn the engine switch on (IG).

c. Using the intelligent tester, confirm the vehicle conditions recorded in the freeze frame data which were present when the DTC was stored (Click here).

Result

Freeze Frame Data Item				Suspected Area	Proceed to
Coolant Temp, Ambient Temperature, Intake Air	Coolant Temp, Ambient Temperature	Long FT	Engine Speed		
Difference between Coolant Temp, Ambient Temperature and Intake Air is 10°C or more	Coolant Temp is 125°C or higher, or below Ambient Temperature by 15°C or more	-	-	Engine coolant temperature sensor	A
	Other than above	-15% or less, or +15% or more	-	• Fuel pump control system • Fuel injector assembly	B
		-15 to +15%	Minimum speed is 300 rpm or more*1	Engine assembly	C
			Minimum speed is less than 300 rpm	• Fuel system • Intake air system	D
Difference between Coolant Temp, Ambient Temperature and Intake Air is less than 10°C	-	-15% or less, or +15% or more	-	• Fuel pump control system • Fuel injector assembly	B
		-15 to +15%	Minimum speed is 300	Engine assembly	C

			rpm or more*1		
			Minimum speed is less than 300 rpm	• Fuel system • Intake air system	D

HINT:

*1: Compression loss may have occurred in the engine assembly.

B	Go to step 16
C	CHECK AND REPAIR ENGINE
D	Go to step 18

A

REPLACE ENGINE COOLANT TEMPERATURE SENSOR (Click here)

16.INSPECT FUEL INJECTOR ASSEMBLY

a. Check that no carbon is stuck to the fuel injector.

OK:
No carbon present.

NG	REPLACE FUEL INJECTOR ASSEMBLY (Click here)

OK

17.CHECK FUEL SYSTEM

a. Check for foreign matter, such as iron particles, around the fuel pump, fuel pump filter and inside the fuel tank, and for signs that the fuel pump was stuck.

Result

Result	Proceed to
There is foreign matter or signs that fuel pump was stuck	A
There is no foreign matter and no signs that fuel pump was stuck	B

B	Go to step 24

A

REPAIR OR REPLACE FUEL SYSTEM

18.CHECK FREEZE FRAME DATA

a. Connect the intelligent tester to the DLC3.

b. Turn the engine switch on (IG).

c. Using the intelligent tester, confirm the vehicle conditions recorded in the freeze frame data which were present when the DTC was stored (Click here).

Result

Freeze Frame Data Item	Result	Suspected Area	Proceed to
Coolant Temp	Engine coolant temperature is 40°C or less*1	Fuel pressure regulator assembly	A
	Engine coolant temperature is 40 to 90°C*2	Fuel injector assembly	B
	Engine coolant temperature is 90°C or higher*3	Fuel pressure regulator assembly	A

HINT:

*1: If the engine coolant temperature is 40°C or less (after stopping the engine and the vehicle has not been driven for a long period of time), 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: If the engine coolant temperature is 40 to 90°C (15 to 120 minutes have passed after stopping the engine), there may be fuel leaking from a fuel injector.

*3: If the engine coolant temperature is 90°C or more (2 to 5 minutes have passed after stopping the engine), there may be a problem with the fuel pressure regulator failing 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.

B → **Go to step 20**

A

19.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.

Standard:
147 kPa (1.5 kgf/cm^2) or higher (5 minutes after stopping the engine)

HINT:

If the engine cannot be started, read the values after cranking the engine.

Result

Result	Proceed to
Normal	A
Abnormal	B

A → Go to step 24

B → REPLACE FUEL PRESSURE REGULATOR ASSEMBLY (Click here)

20.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 22

A

21.CHECK FUEL INJECTOR ASSEMBLY

a. Inspect the fuel injector assembles (Click here).

Result

Result	Proceed to
Abnormal	A
Normal	B

B → Go to step 22

A

REPLACE FUEL INJECTOR ASSEMBLY (Click here)

22.CHECK THROTTLE BODY ASSEMBLY

a. Check if carbon is in the airflow passage.

Result

Result	Proceed to
Carbon in passage	A
No carbon present	B

B → Go to step 23

A

CLEAN OR REPLACE THROTTLE BODY ASSEMBLY (Click here)

23.CHECK INTAKE SYSTEM

a. Check the intake system for vacuum leaks (Click here).

OK:
No leaks in intake system.

NG → **REPAIR OR REPLACE INTAKE SYSTEM**

OK

24.PERFORM SIMULATION TEST

a. 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 25

A

END

25.CONFIRM PROBLEM SYMPTOM

a. Confirm the problem symptoms.

HINT:

The problem symptoms below can be determined by reading the freeze frame data.

Result

Problem Symptom	Suspected Area	Proceed to
The engine does not crank	• Battery fully depleted • Starter assembly (includes pinion gear wear or tooth damage) • Starter system • Engine assembly (excess friction) • Drive plate wear or tooth damage	A
Abnormal cranking speed	• Battery fully depleted • Starter assembly • Engine assembly (excess friction, compression loss)	B
There is no initial combustion (combustion does not occur even once)*1	• Fuel pressure regulator fuel pressure maintenance • Fuel injector leak • Fuel leak from fuel line • Fuel pump control system • Fuel pump • Spark plug • Crankshaft position sensor system • Ignition coil system • EGR valve assembly	C
The engine stalls after starter turnoff (engine stalls immediately after the first time the engine speed increases)*2	• Intake system connections • Throttle body assembly • Camshaft timing oil control valve assembly • Mass air flow meter system • EGR valve assembly	D
The initial combustion and starter turnoff occur late*3	• Engine coolant temperature sensor • Mass air flow meter assembly • Air fuel ratio sensor • Heated oxygen sensor • Fuel injector assembly • Spark plug • Fuel pressure regulator assembly • Fuel pump • Fuel pump control system	E

HINT:

- **If there is hesitation (cranking speed is slow and combustion occurs before passing TDC) during the initial cranking period, the battery charge may be insufficient or the starter may be malfunctioning.**
- ***1: If there is no initial combustion, a wire harness may be malfunctioning, or the ignition or fuel system may be malfunctioning.**
- ***2: If the engine stalls after starter turnoff, the air-fuel ratio may be incorrect or the camshaft timing oil control valve may have a problem returning.**
- ***3: If the initial combustion and starter turnoff occur late, the fuel injection volume may be incorrect (too low or too high).**

B	Go to step 32
C	Go to step 35
D	Go to step 51

E → Go to step 60

A

26.PERFORM SIMULATION TEST

a. When cranking the engine, check for a noise indicating that the starter pinion gear is extending, and check that the starter pinion gear is not spinning freely.

Result

Problem Symptom	Suspected Area	Proceed to
A noise indicating that the starter pinion gear is extending is heard and the starter pinion gear is not spinning freely*1	• Battery • Excess engine friction • Starter assembly	A
A noise indicating that the starter pinion gear is extending is heard but the starter pinion gear is spinning freely	• Drive plate • Starter assembly	B
A noise indicating that the starter pinion gear is extending is not heard	• Battery • Starter assembly • Starter system	C

HINT:

*1: The battery may be fully depleted or there may be excess engine friction.

B → Go to step 29

C → Go to step 30

A

27.INSPECT BATTERY

a. Check the electrolyte quantity.

Standard:
Electrolyte quantity is within the specified range.

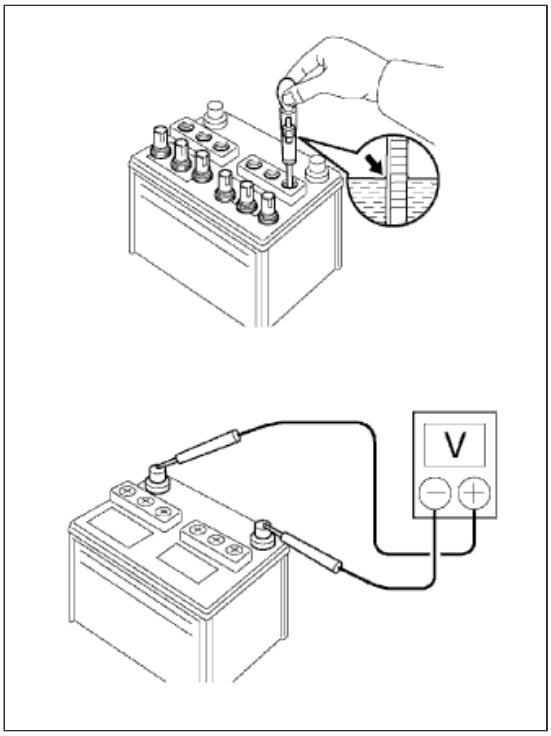
b. Inspect the specific gravity.

i. Inspect the specific gravity of each cell.

Standard specific gravity:
1.25 to 1.29 (electrolyte is at 20°C (68°F))

HINT:

- **If the result is not as specified, recharge or replace the battery.**
- **It is not necessary to inspect a maintenance-free battery.**



c. Inspect the battery voltage.

i. Turn the engine switch off and turn on the headlights for 20 to 30 seconds. This will remove the surface charge from the battery.

ii. Measure the battery voltage.

Standard voltage:
12.5 to 12.9 V (electrolyte is at 20°C (68°F))

HINT:

If the result is not as specified, recharge or replace the battery.

iii. Measure the battery voltage when cranking the engine.

Standard:
Approximately 6 V or higher (0°C (32°F) or higher)

HINT:

When the battery is depleted, the horn becomes quieter.

NG → **CHARGE OR REPLACE BATTERY**

OK

28.CHECK ENGINE ASSEMBLY

a. Check that the crankshaft rotates smoothly when rotating it by hand.

OK:
Crankshaft rotates smoothly.

HINT:

Excess engine friction may have occurred temporarily. Remove the cylinder head cover and oil pan, and check for foreign matter such as iron fragments. If there is a malfunction or signs of a malfunction present, perform a detailed inspection by disassembling all the parts.

NG → **REPAIR OR REPLACE ENGINE ASSEMBLY**

OK

INSPECT STARTER ASSEMBLY (Click here)

29.CHECK STARTER ASSEMBLY

a. Remove the starter assembly (Click here).

b. Check for starter pinion gear wear and damage.

OK:
There is no wear or damage.

NG → REPLACE STARTER ASSEMBLY (Click here)

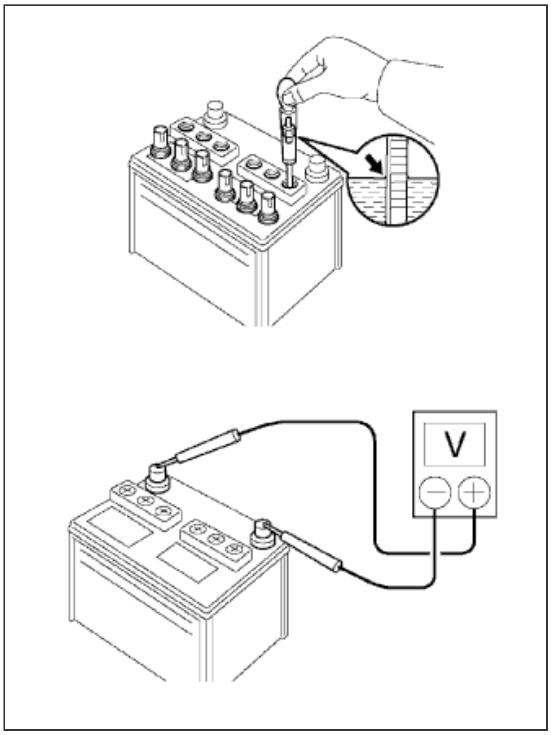
OK ↓

REPLACE DRIVE PLATE AND RING GEAR SUB-ASSEMBLY (Click here)

30.INSPECT BATTERY

a. Check the electrolyte quantity.

Standard:
Electrolyte quantity is within the specified range.



b. Inspect the specific gravity.

i. Inspect the specific gravity of each cell.

Standard specific gravity:
1.25 to 1.29 (electrolyte is at 20°C (68°F))

HINT:

- **If the result is not as specified, recharge or replace the battery.**
- **It is not necessary to inspect a maintenance-free battery.**

c. Inspect the battery voltage.

i. Turn the engine switch off and turn on the headlights for 20 to 30 seconds. This will remove the surface charge from the battery.

ii. Measure the battery voltage.

Standard voltage:
12.5 to 12.9 V (electrolyte is at 20°C (68°F))

HINT:

If the result is not as specified, recharge or replace the battery.

iii. Measure the battery voltage when cranking the engine.

Standard:
Approximately 6 V or higher (0°C (32°F) or higher)

HINT:

When the battery is depleted, the horn becomes quieter.

NG → CHARGE OR REPLACE BATTERY

OK

31.INSPECT STARTER ASSEMBLY

a. Inspect the starter assembly (Click here).

NG → REPLACE STARTER ASSEMBLY (**Click here**)

OK

CHECK STARTER SIGNAL CIRCUIT (Click here)

32.PERFORM SIMULATION TEST

a. Check the cranking speed.

Result

Problem Symptom	Suspected Area	Proceed to
Cranking speed is slow (100 rpm or less)	• Battery • Starter assembly • Excess engine friction	A
Cranking speed is fast (300 rpm or more)*1	Engine compression loss	B

HINT:

*1: If the cranking speed is fast, there may be compression loss.

B → CHECK AND REPAIR ENGINE

A

33.INSPECT BATTERY

a. Check the electrolyte quantity.

Standard:
Electrolyte quantity is within the specified range.

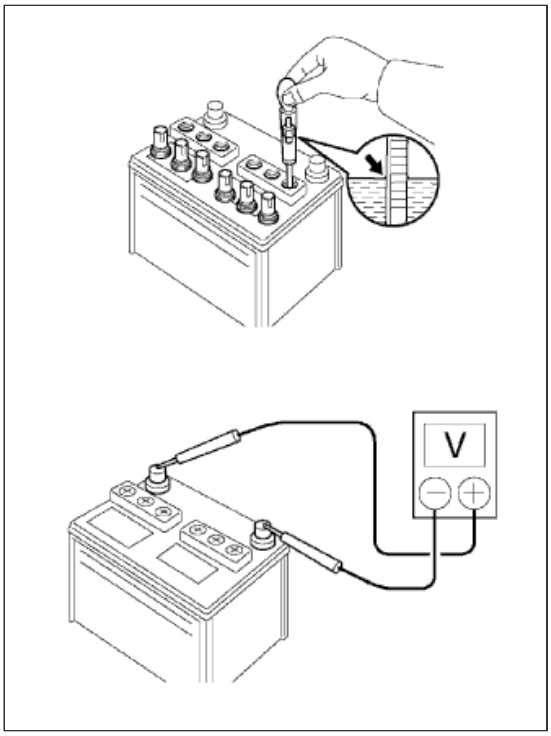
b. Inspect the specific gravity.

i. Inspect the specific gravity of each cell.

Standard specific gravity:
1.25 to 1.29 (electrolyte is at 20°C (68°F))

HINT:

- **If the result is not as specified, recharge or replace the battery.**
- **It is not necessary to inspect a maintenance-free battery.**



c. Inspect the battery voltage.

i. Turn the engine switch off and turn on the headlights for 20 to 30 seconds. This will remove the surface charge from the battery.

ii. Measure the battery voltage.

Standard voltage:
12.5 to 12.9 V (electrolyte is at 20°C (68°F))

HINT:

If the result is not as specified, recharge or replace the battery.

iii. Measure the battery voltage when cranking the engine.

Standard:
Approximately 6 V or higher (0°C (32°F) or higher)

HINT:

When the battery is depleted, the horn becomes quieter.

NG → CHARGE OR REPLACE BATTERY

OK

34.CHECK ENGINE

a. Check that the crankshaft rotates smoothly when rotating it by hand.

OK:
Crankshaft rotates smoothly.

HINT:

Excess engine friction may have occurred temporarily. Remove the cylinder head cover and oil pan, and check for foreign matter such as iron fragments. If there is a malfunction or signs of a malfunction present, perform a detailed inspection by disassembling all the parts.

NG → REPAIR OR REPLACE ENGINE

OK

INSPECT STARTER ASSEMBLY (Click here)

35.CHECK FUEL INJECTOR ASSEMBLY

a. Using a sound scope or screwdriver, check for a fuel injector operating noise while cranking the engine.

OK:
Fuel injector operating noise is heard.

NG → **Go to step 48**

OK ↓

36.CHECK FUEL PRESSURE

a. Inspect the fuel pressure (Click here).

NG → **Go to step 46**

OK ↓

37.CHECK SPARK PLUG AND SPARK

a. Check for sparks (Click here).

NG → **Go to step 41**

OK ↓

38.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	Failure to maintain fuel pressure by fuel pressure regulator	A

passed, engine starting trouble occurs*3		
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 C (steps 75 to 79).

B	Go to step 40
C	Go to step 74

A

39.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 C (steps 75 to 79).**

A	Go to step 74
B	REPLACE FUEL PRESSURE REGULATOR ASSEMBLY (Click here)

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)

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 / Engine Speed.

d. Start the engine.

e. 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)

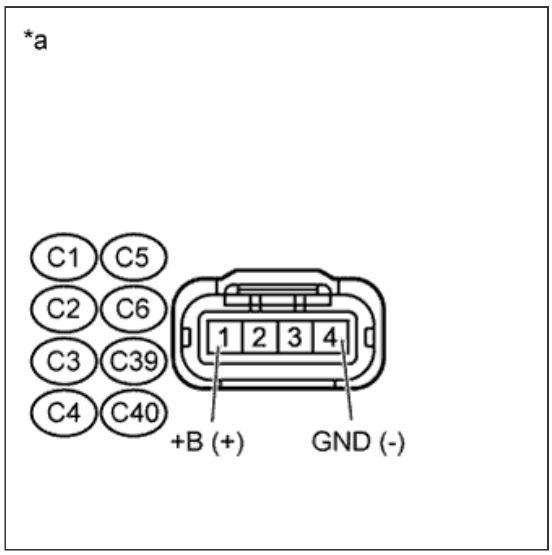
OK

43.CHECK TERMINAL VOLTAGE (IGNITION COIL POWER SOURCE)

a. Disconnect the ignition coil connector.

b. Turn the engine switch on (IG).

c. 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

Text in Illustration

*a	Front view of wire harness connector (to Ignition Coil 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 → CHECK POWER SOURCE CIRCUIT (Click here)

OK

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

a. Disconnect the ignition coil 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
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 kΩ or higher
C2-2 (IGF2) or C31-5 (IGF2) - Body ground	Always	10 kΩ or higher
C3-2 (IGF2)	Always	10 kΩ 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)

a. Disconnect the ignition coil 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
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 kΩ or higher
C2-3 (IGT2) or C29-27 (IGT2) - Body ground	Always	10 kΩ or higher
C3-3 (IGT3) or C30-27 (IGT3) - Body ground	Always	10 kΩ or higher
C4-3 (IGT4) or C29-26 (IGT4) - Body ground	Always	10 kΩ or higher
C5-3 (IGT5) or C29-25 (IGT5) - Body ground	Always	10 kΩ or higher
C6-3 (IGT6) or C30-28 (IGT6) - Body ground	Always	10 kΩ or higher
C39-3 (IGT7) or C30-26 (IGT7) - Body ground	Always	10 kΩ or higher
C40-3 (IGT8) or C30-25 (IGT8) - 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 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)

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 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)

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 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)

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 / Engine Speed.

d. Start the engine.

e. 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)

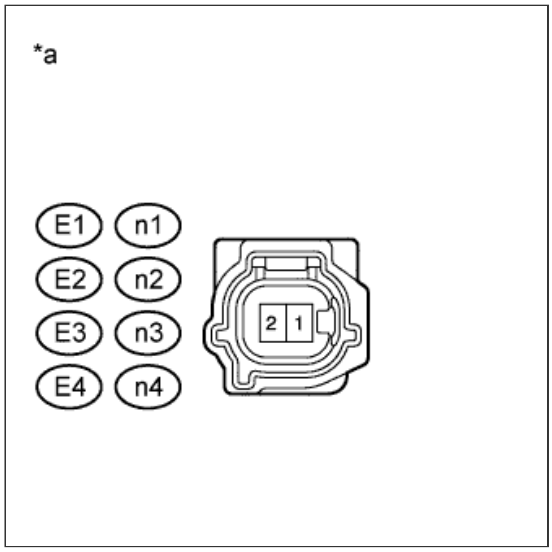
OK

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)

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.

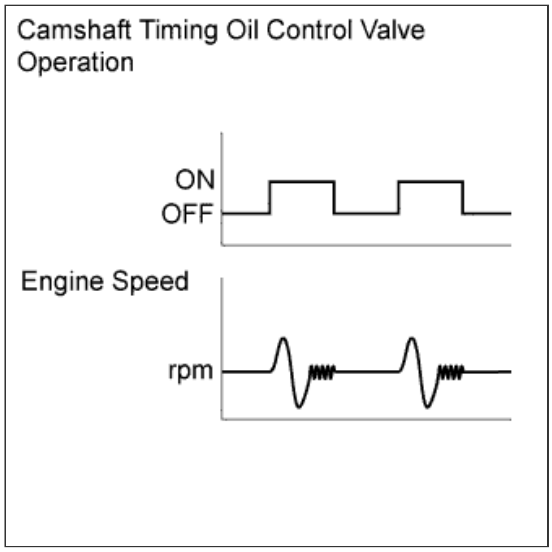
b. Turn the tester on.

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

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)

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 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)

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:

- **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.**

c. Turn the tester on.

d. Enter the following menus: Powertrain / Engine and ECT / Active Test / Control the EGR Step Position.

e. 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:

-	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

a. Remove the EGR valve assembly (Click here).

b. 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)

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 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 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 kΩ 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

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.

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 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

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

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

a. Remove the EFI and ETCS fuses from the engine room relay block.

b. After 60 seconds or more elapse, install the EFI and ETCS fuses.

c. 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

a. Connect the intelligent tester to the DLC3.

b. Start the engine.

c. Turn the tester on.

d. Enter the following menus: Powertrain / Engine and ECT / Data List / Fuel System Status #1 and Fuel System Status #2.

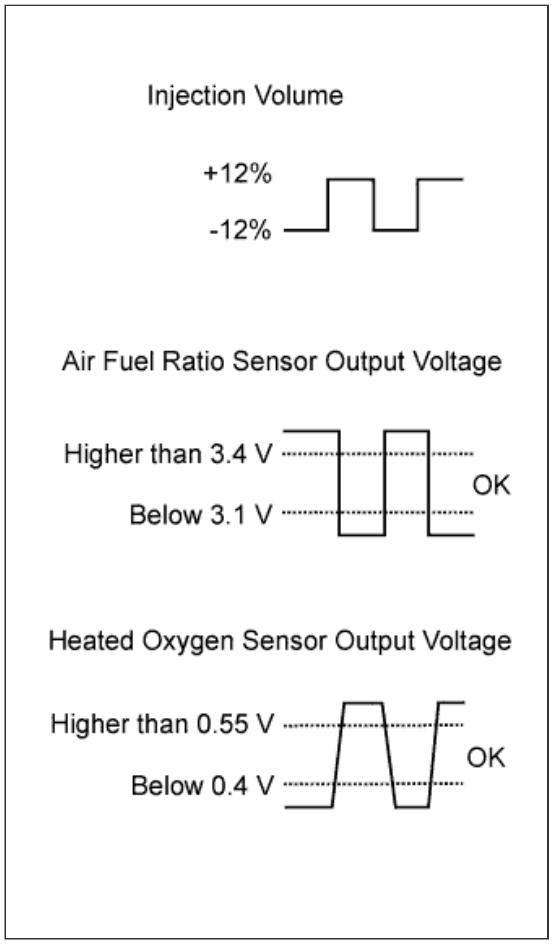
e. Confirm that Fuel System Status #1 and Fuel System Status #2 are both CL.

f. 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.**

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.**

A	**Go to step 74**
B	**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.**

B	**Go to step 74**

A

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 assembles (Click here).

NG → **REPLACE FUEL INJECTOR ASSEMBLY (Click here)**

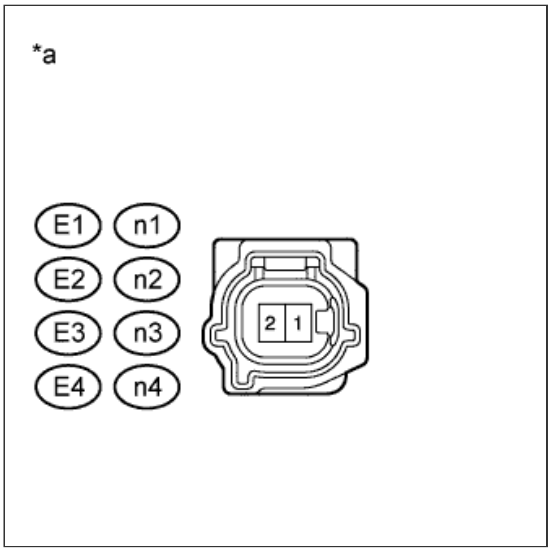
OK

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

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)

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

78.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 79

OK

END (CRANKSHAFT POSITION SENSOR IS DEFECTIVE)

79.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)

80.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

81.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 ↓

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 kΩ or higher
C42-2 (NE-) or C28-5 (NE-) - Body ground	Always	10 kΩ or higher
C42-3 (VC) or C28-16 (VCV2) - 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 ↓

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 kΩ or higher
C41-2 (G-) or C28-10 (G2-) - Body ground	Always	10 kΩ or higher
C41-3 (VC) or C28-16 (VCV2) - 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

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

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)

86.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 and warm it up until the engine coolant temperature stabilizes with the A/C switch and all the accessory switches off.

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 88

A

87.CHECK CYLINDER COMPRESSION PRESSURE

a. 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 kΩ or higher
C42-2 (NE-) or C28-5 (NE-) - Body ground	Always	10 kΩ or higher
C42-3 (VC) or C28-16 (VCV2) - 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

94.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 → **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 kΩ or higher
C42-2 (NE-) or C28-5 (NE-) - Body ground	Always	10 kΩ or higher
C42-3 (VC) or C28-16	Always	10 kΩ 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

a. Replace the crankshaft position sensor (Click here).

b. 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)

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 104

A

REPAIR OR REPLACE FUEL LINE

104.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

105.CHECK PURGE VSV

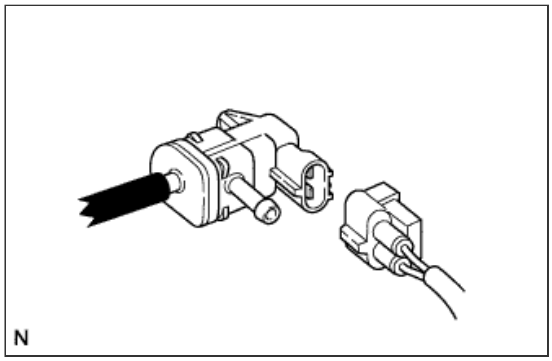
a. Disconnect the vacuum hose (on the canister side) of the purge VSV.

b. Start the engine.

c. Idle the engine.

d. Disconnect the connector of the purge VSV.

e. Check if air flows through the purge VSV.



Standard:
Air does not flow

f. Connect the connector of the purge VSV.

g. 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 kΩ or higher
C42-2 (NE-) or C28-5 (NE-) - Body ground	Always	10 kΩ or higher
C42-3 (VC) or C28-16 (VCV2) - 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

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 kΩ or higher
C41-2 (G-) or C28-10 (G2-) - Body ground	Always	10 kΩ or higher
C41-3 (VC) or C28-16 (VCV2) - 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

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)