Last Modified: 1-31-2018	6.8:8.0.48	**Doc ID:** RM00000211403JX
Model Year Start: 2010	**Model:** GX460	**Prod Date Range:** [11/2009 -]
Title: 1UR-FE ENGINE CONTROL: SFI SYSTEM: P1603,P1605; Engine Stall History; 2010 MY GX460 [11/2009 -]		

DTC	**P1603**	**Engine Stall History**

DTC	**P1605**	**Rough Idling**

DESCRIPTION

P1603

After starting the engine, this DTC is stored when the engine stops without the engine switch being operated.

Using the Techstream, 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 has ran out of fuel before performing troubleshooting, as this DTC is also stored when the engine stalls due to running out of fuel.

DTC NO.	DTC DETECTION CONDITION	TROUBLE AREA

DTC NO.	DTC DETECTION CONDITION	TROUBLE AREA
P1603	After monitoring for startability problems (P1604) finishes and 5 seconds or more elapse after starting the engine, with the engine running, the engine stops (the engine speed drops to 200 rpm or less) without the engine switch being operated for 0.5 seconds or more (1 trip detection logic).	• Air leak in intake system • Purge VSV • Mass air flow meter assembly • Engine coolant temperature sensor • Wire harness or connector • Air fuel ratio sensor • Power supply circuit (purge VSV, fuel injector assembly, ignition coil assembly) • Fuel pump • Fuel pump control system • Fuel line • Throttle body assembly • Camshaft timing oil control valve assembly • Air conditioning system • Power steering system • Electrical load signal system • A/T system • Park/neutral position switch assembly • EGR valve assembly • ECM

P1605

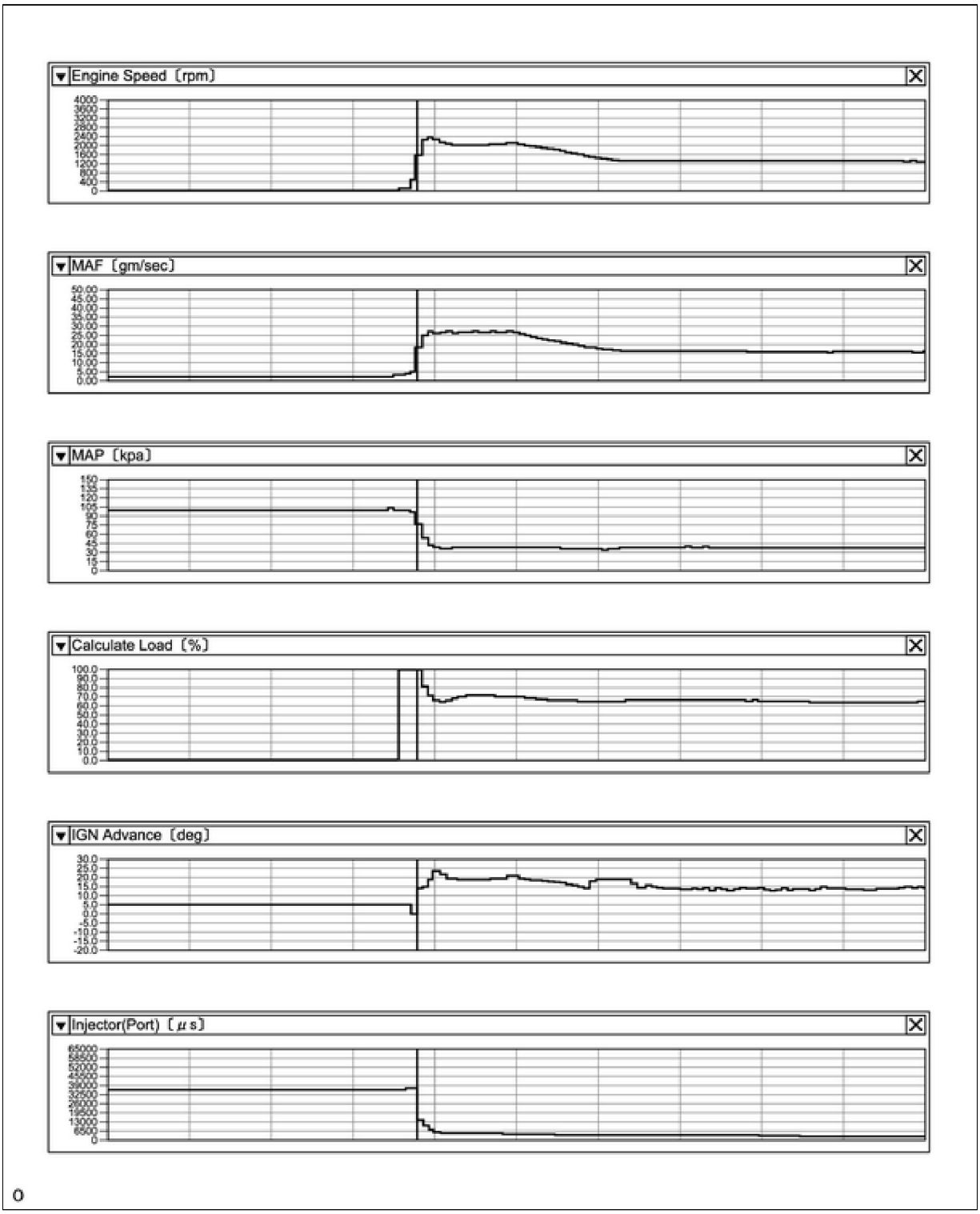
This DTC is stored if the engine speed drops below the set speed.

Using the Techstream, 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 idling is unstable due to running out of fuel.

DTC NO.	DTC DETECTION CONDITION	TROUBLE AREA
P1605	After 5 seconds or more elapse after starting the engine, with the engine running, the engine speed drops to 400 rpm or less (1 trip detection logic).	• Air leak in intake system • Purge VSV • Mass air flow meter assembly • Engine coolant temperature sensor • Wire harness or connector • Air fuel ratio sensor • Power supply circuit (purge VSV, fuel injector assembly, ignition coil assembly) • Fuel pump • Fuel pump control system • Fuel line • Throttle body assembly • Camshaft timing oil control valve assembly • Knock sensor • Ignition coil assembly • Fuel injector assembly • Spark plug(s) • Air conditioning system • Power steering system • Electrical load signal system • A/T system • Park/neutral position switch assembly • EGR valve assembly • ECM

1. Reference waveforms showing a normal cold engine start



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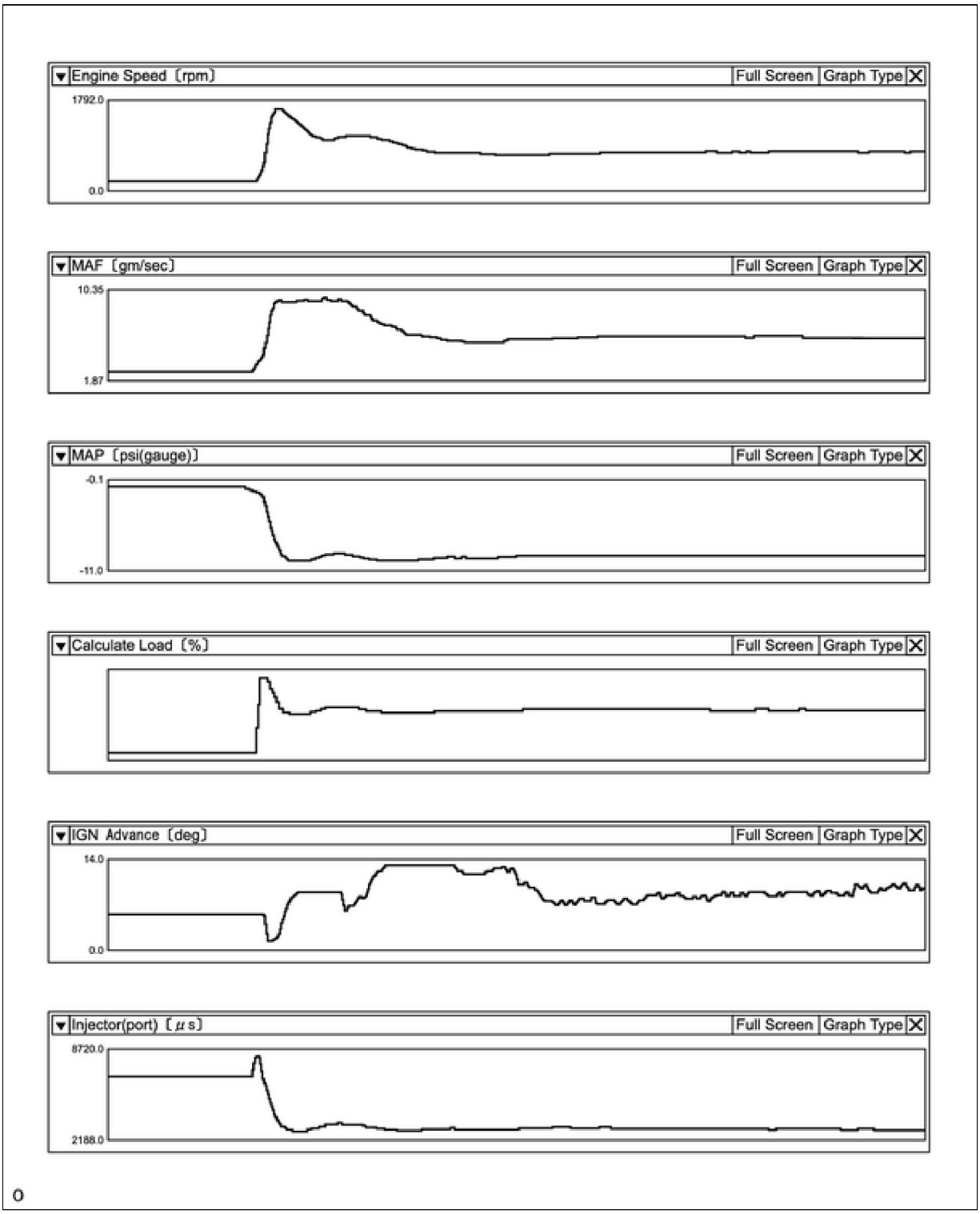
2. Reference waveforms showing a normal warm engine start



3. Reference values when there is an air leak in the intake system (disconnect PCV hose) and P1605 is stored

Freeze Frame Data
P1605 Rough Idling

Parameter	-3	-2	-1	0	1	Unit
Engine Speed	713	712	702	385	284	rpm
Calculate Load	52.9	52.9	52.9	57.6	60.3	%
Vehicle Load	15.2	15.2	15.6	52.5	65.4	%
Ambient Temperature	54	54	54	54	54	F
Intake Air	77	77	77	77	77	F
Coolant Temp	187	187	187	187	187	F
MAP	29	29	37	65	76	kPa(abs)
Atmosphere Pressure	100	100	100	100	100	kPa(abs)
MAF	5.06	5.06	5.06	9.26	8.48	gm/sec
Battery Voltage	13.398	13.398	13.398	12.890	12.812	V
Throttle Sensor Volt %	15.2	15.2	15.2	17.2	18.0	%
Fuel Pump/Speed Status	ON	ON	ON	ON	ON	
Injection Volum(Cylinder1)	0.099	0.099	0.099	0.100	0.100	ml
Injector(Port)	2122	2111	2123	2218	2218	µS
Throttle Motor DUTY	15.2	15.2	15.2	17.6	17.6	%
Throttle Sensor Position	0.0	0.0	0.0	0.0	0.0	%
Throttl Sensor #2 Volt %	47.0	47.0	47.0	49.4	50.5	%
EVAP(Purge) VSV	0.0	0.0	0.0	10.9	10.9	%
Evap Purge Flow	0.0	0.0	0.0	1.8	2.2	%
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	5.9	5.9	%
Target Air-Fuel Ratio	0.992	0.992	0.992	0.992	0.992	
AF Lambda B1S1	0.991	0.989	0.992	1.032	1.109	
AF Lambda B2S1	0.993	0.994	0.998	1.034	1.081	
AFS Voltage B1S1	3.298	3.283	3.307	3.561	3.751	V
AFS Voltage B2S1	3.298	3.312	3.332	3.517	3.678	V
O2S B1S2	0.760	0.760	0.760	0.760	0.760	V
O2S B2S2	0.780	0.780	0.780	0.780	0.780	V
Short FT #1	-0.782	-1.563	-0.782	1.562	1.562	%
Long FT #1	1.562	1.562	1.562	1.562	1.562	%
Total FT #1	0.007	0.007	0.007	0.007	0.011	
Short FT #2	-0.782	-0.782	0.000	1.562	3.906	%
Long FT #2	-2.344	-2.344	-2.344	-2.344	-2.344	%
Fuel System Status #1	CL	CL	CL	CL	CL	
Total FT #2	-0.024	-0.024	-0.024	-0.024	-0.024	
Fuel System Status #2	CL	CL	CL	CL	CL	
IGN Advance	10.0	10.0	11.5	12.5	12.5	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	ON	ON	ON	ON	ON	
VVT Control Status #2	ON	ON	ON	ON	ON	
Starter Signal	Close	Close	Close	Close	Close	

0

INSPECTION PROCEDURE

HINT:

- In contrast to normal malfunction diagnosis for components, circuits and systems, DTCs P1603 and P1605 are used to determine the malfunctioning area from the problem symptoms and freeze frame data when the user mentions problems such as engine stall.

  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.
- Use any information from the customer problem analysis about the condition of the vehicle at the time when the problem occurred (how the engine stopped, conditions when the engine was restarted, etc.) as a reference.

SYMPTOM	SUSPECTED AREA

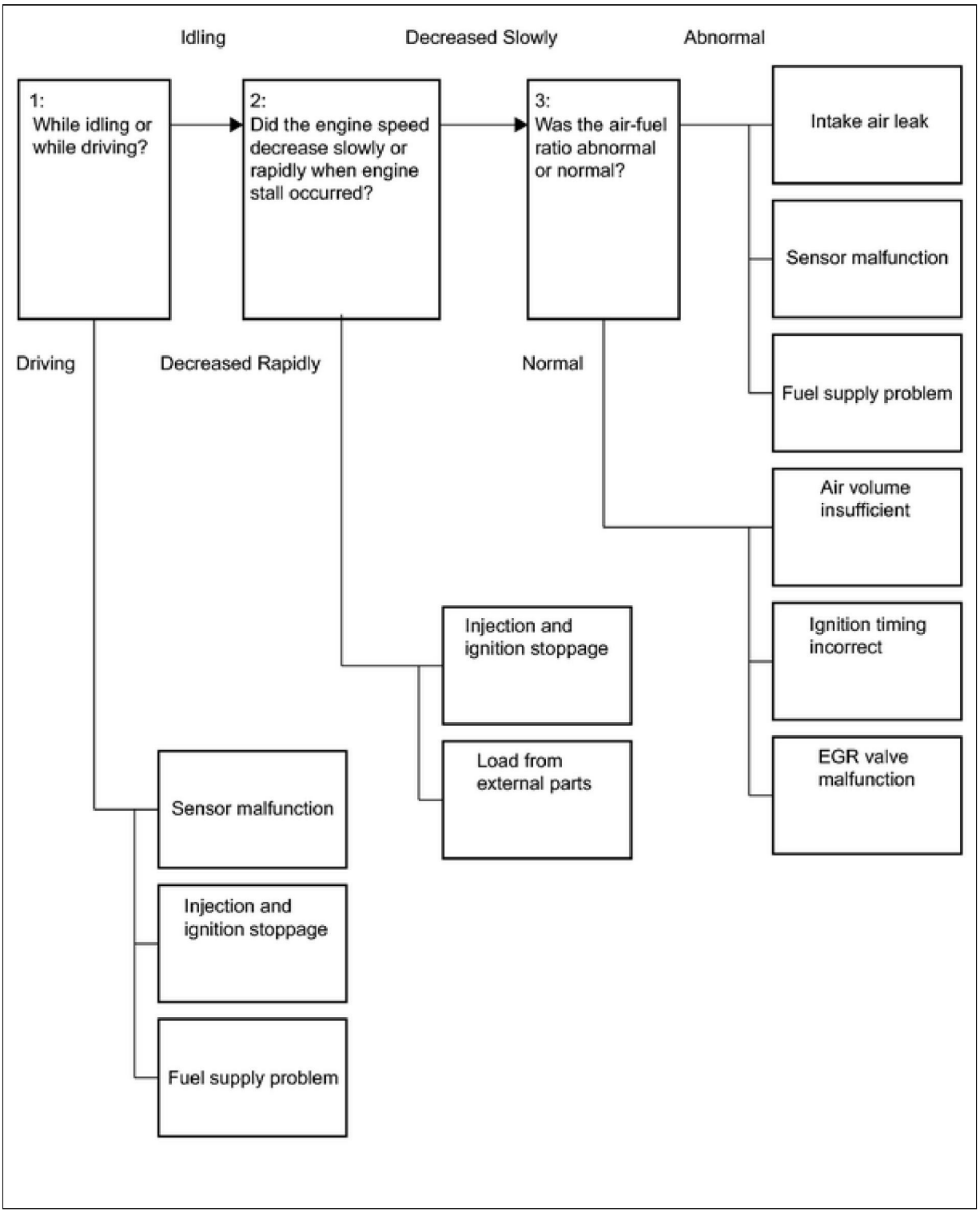
SYMPTOM	SUSPECTED AREA
Engine vibration occurs and engine stops	Air-fuel ratio abnormal
Engine stops with no engine vibration	Ignition system, injection stoppage, high load from external parts
Engine can be started with accelerator pedal depressed	Insufficient air volume
Rough idling after engine started	Air-fuel ratio abnormal, abnormal combustion

- Read freeze frame data using the Techstream. 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 INFO .
- When DTC P1603 (Engine Stall History) is stored, DTC P1605 (Rough Idling) is also stored. When confirming freeze frame data, check DTC P1605. The ECM stores DTC P1605 first. Therefore, 5 sets of freeze frame data can be confirmed through DTC P1605, enabling the technician to obtain more information.
- 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 operate 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 the data when the engine is idling (engine warmed up, no load, and shift lever in D or N) and compare these data with the freeze frame data.
- Inspections take into account the fact that the malfunction may not have reoccurred and place emphasis on checking the vehicle conditions present at the time when the malfunction occurred.
- When performing inspections, jiggle the relevant wire harnesses and connectors in an attempt to reproduce malfunctions that do not always occur.

Inspection flow:

Using freeze frame data, narrow down the parts to be inspected according to the vehicle conditions at the time when the malfunction occurred.

P1603:



1:

- If the engine stalled when the intake air volume was low (during idling or deceleration), there may be a decrease in torque due to an incorrect air-fuel ratio, etc.
- If the engine stalled when the intake air volume was high (during driving or acceleration), there may be a major malfunction such as continuous misfire due to ignition stoppage, fuel injection stoppage, etc. and the torque drops to zero.

2:

- If the engine speed decreased slowly, there may have been a decrease in torque due to an air-fuel ratio that was incorrect (by approximately 20 to 30%), etc.
- If the engine speed decreased rapidly, there may have been a malfunction such as when the engine misfires almost continuously due to ignition stoppage, fuel injection stoppage, etc., or when the external load increases due to an external part malfunctioning.

3:

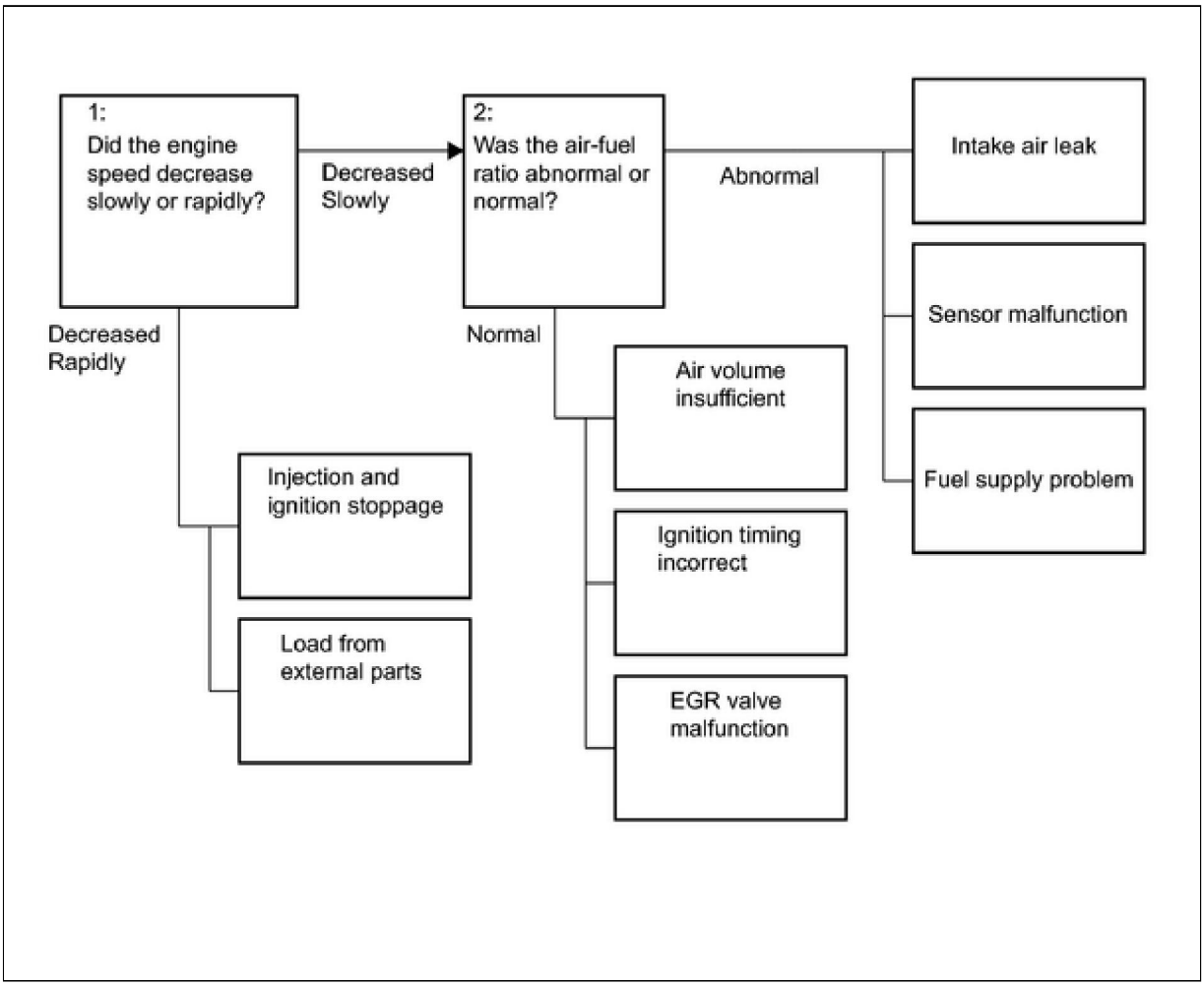
- If the air-fuel ratio is abnormal, there may have been an intake air leak, sensor malfunction, or fuel supply problem.
- If the vehicle was normal, the air volume may have been insufficient, the ignition timing may have been incorrect or the EGR valve may have been stuck open.

P1603 inspection flow: Narrow down the parts to be inspected according to the vehicle conditions at the time when the malfunction occurred (freeze frame data).

<table>
<tr><th>VEHICLE STATE</th><th>ENGINE SPEED</th><th colspan="2">SUSPECTED AREA</th><th>PRIMARY PARTS TO INSPECT</th><th>PROCEDURE</th></tr>
<tr><td rowspan="8">Idling or decelerating</td><td rowspan="6">Slowly decreases and engine stalls</td><td rowspan="4">Air-fuel ratio abnormal</td><td>Air suction</td><td>• Intake system connections
• Purge VSV system</td><td>3 to 4</td></tr>
<tr><td>Sensor malfunction (value from sensor too lean)</td><td rowspan="2">• Mass air flow meter assembly
• Engine coolant temperature sensor
• Air fuel ratio sensor system</td><td>5 to 14</td></tr>
<tr><td>Sensor malfunction (value from sensor too rich)</td><td>23 to 32</td></tr>
<tr><td>Fuel supply problem</td><td>• Fuel pump control system
• Purge VSV system
• Fuel line
• ECM</td><td>15 to 22</td></tr>
<tr><td rowspan="3">Intake air volume insufficient</td><td>ISC flow rate</td><td>• Throttle body assembly (ISC valve)</td><td>33 to 35</td></tr>
<tr><td>Excessive valve overlap</td><td>• Camshaft timing oil control valve assembly</td><td>36, 37</td></tr>
<tr><td>Abnormal combustion</td><td>• EGR valve assembly</td><td>38, 39</td></tr>
<tr><td>Ignition timing incorrect</td><td>Does not operate as expected</td><td>• Engine coolant temperature sensor
• Mass air flow meter assembly</td><td>40 to 42</td></tr>
<tr><td>Rapidly decreases and engine stalls</td><td>Ignition and injection stops (electrical system malfunction)</td><td>Power temporarily cut</td><td>• Power supply circuit (fuel injector assembly, ignition coil assembly)</td><td>43, 44</td></tr>
</table>

VEHICLE STATE	ENGINE SPEED	SUSPECTED AREA		PRIMARY PARTS TO INSPECT	PROCEDURE
		External part malfunctioning	Increase in load	• Air conditioning system • Electrical load signal system • Power steering system • A/T system • Park/neutral position switch assembly	47 to 49
Accelerating	-	Crankshaft position sensor or camshaft position sensor malfunction	Power temporarily cut	• Check DTCs	1
		Mass air flow meter	Foreign matter adhesion	• Mass air flow meter assembly	50, 51
		Fuel supply problem	Fuel leak, clog	• Fuel pump control system • Fuel line	54 to 56
		Ignition and injection stops (electrical system malfunction)	Power temporarily cut	• Power supply circuit (fuel injector assembly, ignition coil assembly)	52, 53

P1605:



1:

- If the engine speed decreased slowly, there may have been a decrease in torque due an air-fuel ratio that was incorrect (by approximately 20 to 30%), etc.
- If the engine speed decreased rapidly, there may have been a malfunction such as when the engine misfires almost continuously due to ignition stoppage, fuel injection stoppage, etc., or when the external load increases due to an external part malfunctioning.

2:

- If the air-fuel ratio is abnormal, there may have been an intake air leak, sensor malfunction, or fuel supply problem.
- If the vehicle was normal, the air volume may have been insufficient, the ignition timing may have been incorrect or the EGR valve may have been stuck open.

P1605 inspection flow: Narrow down the parts to be inspected according to the vehicle conditions at the time when the malfunction occurred (freeze frame data).

ENGINE SPEED	SUSPECTED AREA		PRIMARY PARTS TO INSPECT	PROCEDURE
Slowly decreases and engine stalls	Air-fuel ratio abnormal	Air suction	• Intake system connections • Purge VSV system	3 to 4
		Sensor malfunction (value from sensor too lean)	• Mass air flow meter assembly • Engine coolant temperature sensor	5 to 14

ENGINE SPEED	SUSPECTED AREA		PRIMARY PARTS TO INSPECT	PROCEDURE
		Sensor malfunction (value from sensor too rich)	• Air fuel ratio sensor system	23 to 32
		Fuel supply problem	• Fuel pump control system • Purge VSV system • Fuel line • ECM	15 to 22
	Intake air volume insufficient	ISC flow rate	• Throttle body assembly (ISC valve)	33 to 35
		Abnormal combustion	• EGR valve assembly	38, 39
	Ignition timing incorrect	Does not operate as expected	• Knock sensor • Engine coolant temperature sensor • Mass air flow meter assembly	40 to 42
Rapidly decreases and engine stalls	Ignition and injection stops (electrical system malfunction)	Power temporarily cut	• Power supply circuit (fuel injector assembly, ignition coil assembly)	43, 44
	External part malfunctioning	Increase in load	• Air conditioning system • Electrical load signal system • Power steering system • A/T system • Park/neutral position switch assembly	47 to 49

NOTICE:

Inspect the fuses for circuits related to this system before performing the following inspection procedure.

PROCEDURE

1.	**CHECK FOR ANY OTHER DTCS OUTPUT**

(a) Connect the Techstream to the DLC3.

(b) Turn the engine switch on (IG).

(c) Read the DTCs INFO .

Result

RESULT	PROCEED TO

RESULT	PROCEED TO
Only DTC P1603 and P1605 are output	A
DTCs other than P1603 and P1605 are output	B

B GO TO DTC CHART

A

2.	READ FREEZE FRAME DATA

(a) Connect the Techstream to the DLC3.

(b) Turn the engine switch on (IG).

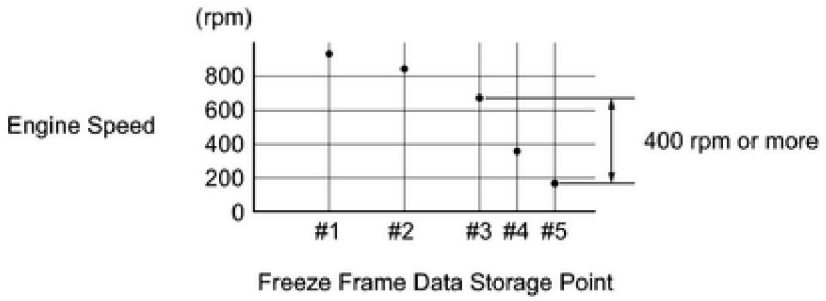
(c) Using the Techstream, confirm the vehicle conditions recorded in the freeze frame data which were present when the DTC was stored INFO .

Result

PROBLEM SYMPTOM	FREEZE FRAME DATA ITEM FOR DTC P1605			SUSPECTED AREA	PROCEED TO
	CLOSED THROTTLE POSITION SW	ENGINE SPEED	TOTAL OF SHORT FT AND LONG FT		
When idling or decelerating, engine speed slowly decreases and engine stalls	All 5 sets of freeze frame data are ON	Decreases slowly*1	All 5 sets of freeze frame data are +15% or more*2	• Air suction • Sensor malfunction (value from sensor too lean) • Fuel supply problem	A
			At least 1 of the 5 sets of freeze frame data is -15% or less*3	Sensor malfunction (value from sensor too rich)	B
			All 5 sets of freeze frame data are from -15% to +15%	• Intake air volume insufficient • Ignition timing incorrect	C

PROBLEM SYMPTOM	FREEZE FRAME DATA ITEM FOR DTC P1605			SUSPECTED AREA	PROCEED TO
	CLOSED THROTTLE POSITION SW	ENGINE SPEED	TOTAL OF SHORT FT AND LONG FT		
When idling or decelerating, engine speed rapidly decreases and engine stalls		Decreases rapidly*1	-	• Injection stoppage, ignition stoppage • Load from external parts	D
When accelerating or driving at constant speed, engine stalls*4	At least one is OFF	-	-	• Sensor malfunction • Injection stoppage, ignition stoppage • Fuel supply problem	E

Rapid Decrease in Engine Speed



HINT:

- *1: A rapid decrease in engine speed may be caused by an electrical fault in the shared wiring of all or a number of cylinders, an increase in load from external parts, etc. The engine speed is considered to have decreased rapidly if either of the following conditions applies.

  Otherwise, the engine speed is considered to have decreased slowly.

  a. In the freeze frame data, the decrease in engine speed from #3 to #5 is 400 rpm or more.
  b. In the freeze frame data, the engine speed at #5 is 120 rpm or less.

- If the vehicle speed is 30 km/h (19 mph) or less and the difference between Engine Speed and SPD (NT) is 100 rpm or less, inspect the automatic transmission. Depending on the rate of vehicle deceleration, the engine speed may have decreased due to the A/T lock-up release being late.
- *2: When a DTC is stored, feedback compensation increases because the air-fuel ratio is determined to be lean.
- *3: When a DTC is stored, feedback compensation decreases because the air-fuel ratio is determined to be rich.
- *4: This item should be checked when DTC P1603 is output and is not necessary to check when only P1605 is output.

B

GO TO STEP 23

C GO TO STEP 33

D GO TO STEP 43

E GO TO STEP 50

A

3.	CHECK INTAKE SYSTEM

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

HINT:

- If the accelerator pedal is released after racing the engine, the inspection is easier to perform because the vacuum inside the intake pipes increases and the air suction noise becomes louder.
- If Short FT and Long FT are largely different from the normal values when idling (the intake air volume is small) and almost the same as the normal values when racing the engine (the intake air volume is high), air leakage may be present.

OK:

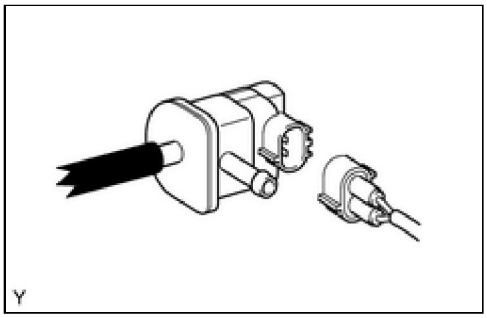
There is no air leakage.

NG REPAIR OR REPLACE INTAKE SYSTEM

OK

4.	CHECK PURGE VSV

(a) Disconnect the purge 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.

OK:

Air does not flow.

(f) Connect the connector of the purge VSV.

(g) Connect the purge hose of the purge VSV.

HINT:

When this inspection is performed, the MIL may illuminate. After finishing the inspection, check and clear DTCs INFO .

NG ▶ **INSPECT PURGE VSV**

OK ▼

5.	READ FREEZE FRAME DATA

(a) Connect the Techstream to the DLC3.

(b) Turn the engine switch on (IG).

(c) Using the Techstream, confirm the vehicle conditions recorded in the freeze frame data which were present when the DTC was stored INFO .

Result

FREEZE FRAME DATA ITEM FOR DTC P1605	RESULT	SUSPECTED AREA	PROCEED TO
Calculate Load	Below 90% of the current value of the vehicle*1	Mass air flow meter assembly	A
AFS Voltage B1S1	3.3 V or higher*2	• Air fuel ratio sensor • Wire harness or connector • Actual air-fuel ratio abnormal	B
Both freeze frame data items listed above	Values are other than above	-	C

HINT:

- Try to operate 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 the data when the engine is idling (engine warmed up, no load, and shift lever in D or N) and compare these data with the freeze frame data.
- *1: If the mass air flow meter is malfunctioning and incorrectly measures the pressure to be less than the actual intake manifold pressure, the freeze frame data will show a low engine load value.
- *2: If the air fuel ratio sensor is malfunctioning and constantly outputs a value indicating the air-fuel ratio is lean, the actual air-fuel ratio will become rich and the engine may stall.

B ▶ **GO TO STEP 7**

C ▶ **GO TO STEP 10**

A

6.	CHECK MASS AIR FLOW METER ASSEMBLY

(a) Remove the mass air flow meter assembly.

(b) Check for foreign matter in the airflow passage of the mass air flow meter.

Result

RESULT	PROCEED TO
Visible foreign matter is present	A
Visible foreign matter is not present	B

(c) Install the mass air flow meter assembly.

HINT:

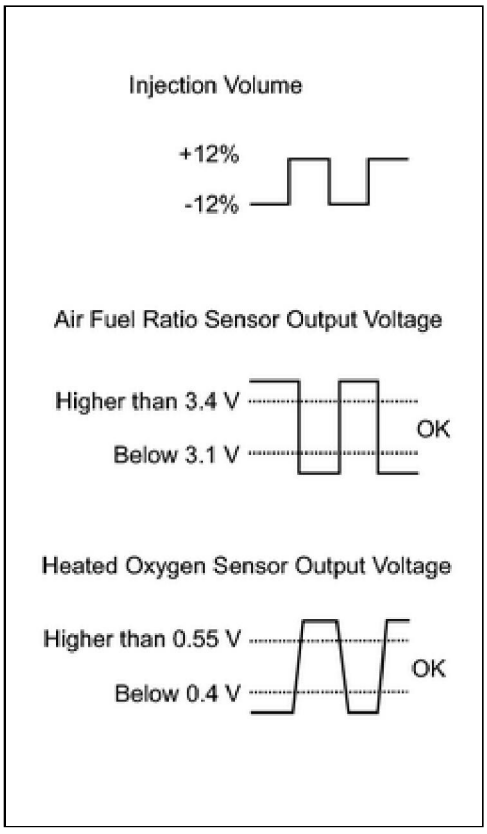
Even if the results are normal, the mass air flow meter may have been malfunctioning. Continue this inspection procedure until step 22, and if there are no problems with other parts, replace the mass air flow meter assembly (refer to step 57).

B ▶ **GO TO STEP 10**

A ▶ **REPLACE MASS AIR FLOW METER ASSEMBLY**

7.	PERFORM ACTIVE TEST USING TECHSTREAM (CONTROL THE INJECTION VOLUME)

(a) Connect the Techstream 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) Idle the engine.

(e) Enter the following menus: Powertrain / Engine and ECT / Active Test / Control the Injection Volume.

(f) Read the output voltage from the air fuel ratio sensor when increasing and decreasing the fuel injection volume.

Standard:

TECHSTREAM DISPLAY	SPECIFIED CONDITION
Control the Injection Volume (12%)	Air fuel ratio sensor output voltage is below 3.1 V
Control the Injection Volume (-12%)	Air fuel ratio sensor output voltage is higher than 3.4 V

Result

RESULT	PROCEED TO
Abnormal	A
Normal	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.
- Even if the results are normal, the air fuel ratio sensor may have been malfunctioning. Continue this inspection procedure until step 22, and if there are no problems with other parts, replace the air fuel ratio sensor (refer to step 57).

B ▶ **GO TO STEP 10**

A ▼

8.	CHECK TERMINAL VOLTAGE (AIR FUEL RATIO SENSOR POWER SOURCE)

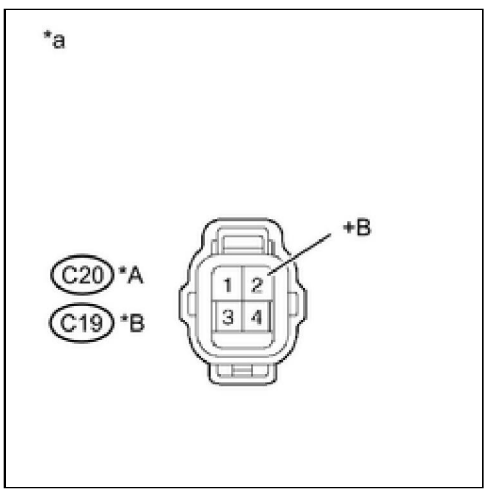
(a) Disconnect the air fuel ratio sensor connector.

(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
C20-2 (+B) - Body ground	Engine switch on (IG)	11 to 14 V



TESTER CONNECTION	SWITCH CONDITION	SPECIFIED CONDITION
C19-2 (+B) - Body ground	Engine switch on (IG)	11 to 14 V

Text in Illustration

*A	Bank 1
*B	Bank 2
*a	Front view of wire harness connector (to Air Fuel Ratio Sensor)

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**

OK ▼

9.	CHECK HARNESS AND CONNECTOR (AIR FUEL RATIO SENSOR - ECM)

(a) Disconnect the air fuel ratio 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
C20-1 (HA1A) - C31-17 (HA1A)	Always	Below 1 Ω
C20-3 (A1A+) - C30-1 (A1A+)	Always	Below 1 Ω
C20-4 (A1A-) - C30-2 (A1A-)	Always	Below 1 Ω
C19-1 (HA2A) - C31-19 (HA2A)	Always	Below 1 Ω
C19-3 (A2A+) - C30-7 (A2A+)	Always	Below 1 Ω
C19-4 (A2A-) - C30-8 (A2A-)	Always	Below 1 Ω
C20-1 (HA1A) or C31-17 (HA1A) - Body ground	Always	10 kΩ or higher
C20-3 (A1A+) or C30-1 (A1A+) - Body ground	Always	10 kΩ or higher
C20-4 (A1A-) or C30-2 (A1A-) - Body ground	Always	10 kΩ or higher
C19-1 (HA2A) or C31-19 (HA2A) - Body ground	Always	10 kΩ or higher
C19-3 (A2A+) or C30-7 (A2A+) - Body ground	Always	10 kΩ or higher

TESTER CONNECTION	CONDITION	SPECIFIED CONDITION
C19-4 (A2A-) or C30-8 (A2A-) - Body ground	Always	10 kΩ or higher

Result

RESULT	PROCEED TO
Abnormal	A
Normal	B

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.

B ▶ **REPLACE AIR FUEL RATIO SENSOR**

A ▶ **REPAIR OR REPLACE HARNESS OR CONNECTOR**

10.	READ FREEZE FRAME DATA

(a) Connect the Techstream to the DLC3.

(b) Turn the engine switch on (IG).

(c) Using the Techstream, confirm the vehicle conditions recorded in the freeze frame data which were present when the DTC was stored INFO .

Result

FREEZE FRAME DATA ITEM FOR DTC P1605	RESULT	PROCEED TO
Initial Engine Coolant Temp, Ambient Temperature, Initial Intake Air Temp	Difference in temperature between each item is less than 10°C*1	A
	Difference in temperature between each item is 10°C or more*2	B

HINT:

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

B ▶ **GO TO STEP 13**

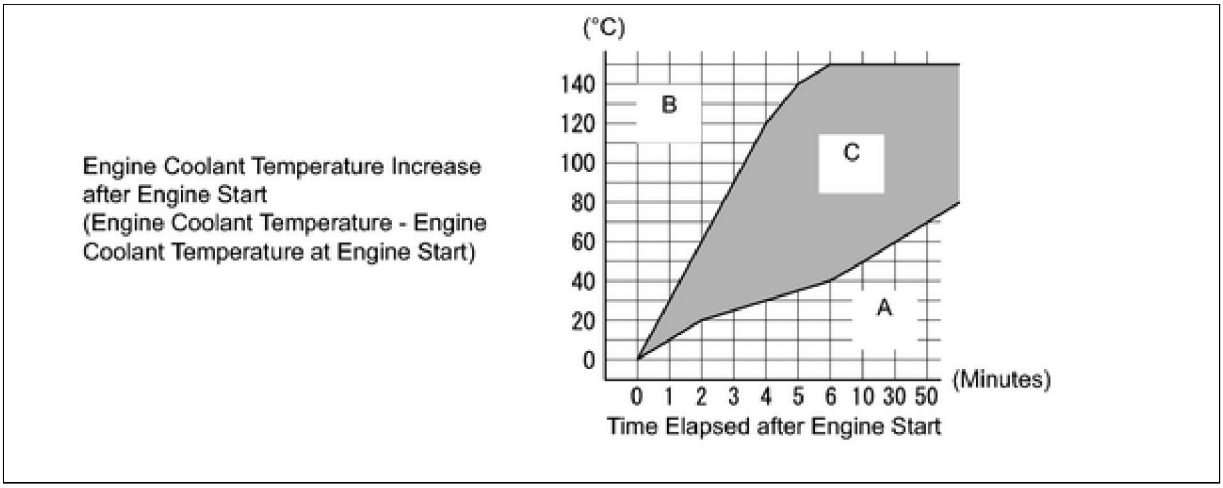
A ▼

11.	READ FREEZE FRAME DATA

(a) Connect the Techstream to the DLC3.

(b) Turn the engine switch on (IG).

(c) Using the Techstream, confirm the vehicle conditions recorded in the freeze frame data which were present when the DTC was stored INFO .



Result

FREEZE FRAME DATA ITEM FOR DTC P1605	RESULT	SUSPECTED AREA	PROCEED TO
Initial Engine Coolant Temp, Coolant Temp, Engine Run Time	Range A	• Engine coolant temperature sensor • Thermostat	A
	Range B	Engine coolant temperature sensor	B
	Range C	-	C

HINT:

This step is not directly related to engine stall.

B ▶ **GO TO STEP 14**

C ▶ **GO TO STEP 15**

A ▼

12.	INSPECT THERMOSTAT

HINT:

For the thermostat inspection, refer to the following procedures INFO .

Result

RESULT	PROCEED TO
Abnormal	A

RESULT	PROCEED TO
Normal	B

HINT:

This step is not directly related to engine stall.

B ▶ **GO TO STEP 14**

A ▶ **REPLACE THERMOSTAT**

13.	READ FREEZE FRAME DATA

(a) Connect the Techstream to the DLC3.

(b) Turn the engine switch on (IG).

(c) Using the Techstream, confirm the vehicle conditions recorded in the freeze frame data which were present when the DTC was stored INFO .

Result

FREEZE FRAME DATA ITEM FOR DTC P1605	RESULT	SUSPECTED AREA	PROCEED TO
Coolant Temp	120°C or higher	Engine coolant temperature sensor	A
Coolant Temp, Ambient Temperature	Engine coolant temperature is lower than outside temperature by 15°C or more	Engine coolant temperature sensor	
Both freeze frame data items listed above	Values are other than above	-	B

B ▶ **GO TO STEP 15**

A ▼

14.	INSPECT ENGINE COOLANT TEMPERATURE SENSOR

HINT:

For the engine coolant temperature sensor inspection, refer to the following procedures INFO .

Result

RESULT	PROCEED TO
Abnormal	A
Normal	B

HINT:

Even if the results are normal, the engine coolant temperature sensor may have been malfunctioning. Continue this inspection procedure until step 22, and if there are no problems with other parts, replace the engine coolant temperature sensor (refer to step 57).

B ▶ **GO TO STEP 15**

A ▶ **REPLACE ENGINE COOLANT TEMPERATURE SENSOR**

15.	**READ FREEZE FRAME DATA**

(a) Connect the Techstream to the DLC3.

(b) Turn the engine switch on (IG).

(c) Using the Techstream, confirm the vehicle conditions recorded in the freeze frame data which were present when the DTC was stored INFO .

Result

FREEZE FRAME DATA ITEM FOR DTC P1605	RESULT	SUSPECTED AREA	PROCEED TO
EVAP (Purge) VSV	At least 1 of the 5 sets of freeze frame data is not 0%	Purge VSV	A
	All 5 sets of freeze frame data are 0%	-	B

HINT:

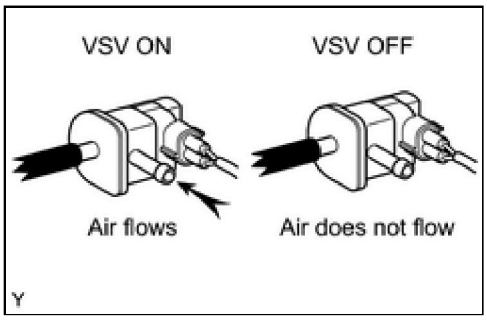
If the purge VSV is stuck closed, air-fuel ratio compensation by the purge VSV is incorrectly adjusted, and then the air-fuel ratio becomes lean and the engine may stall.

B ▶ **GO TO STEP 20**

A ▼

16.	**PERFORM ACTIVE TEST USING TECHSTREAM (ACTIVATE THE VSV FOR EVAP CONTROL)**

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



(b) Connect the Techstream to the DLC3.

(c) Turn the engine switch on (IG).

(d) Start the engine.

(e) Enter the following menus: Powertrain / Engine and ECT / Active Test / Activate the VSV for Evap Control.

(f) Operate the purge VSV and check the airflow.

Standard:

ACTIVATE THE VSV FOR EVAP CONTROL	SPECIFIED CONDITION
ON	Air flows
OFF	Air does not flow

Result

RESULT	PROCEED TO
Abnormal	A
Normal	B

HINT:

- Jiggle the wire harness and connector to increase the likelihood of detecting malfunctions that do not always occur.
- Even if the results are normal, the purge VSV may have been malfunctioning. Continue this inspection procedure until step 22.

B ▶ **GO TO STEP 20**

A ▼

17.	**INSPECT PURGE VSV**

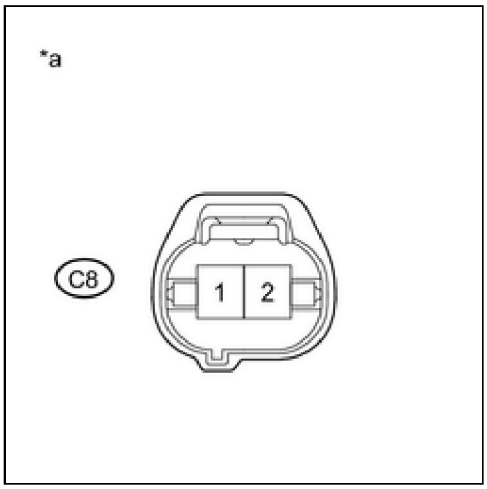
(a) Inspect the purge VSV INFO .

NG ▶ **REPLACE PURGE VSV**

OK ▼

18.	**CHECK TERMINAL VOLTAGE (PURGE VSV POWER SOURCE)**

(a) Disconnect the purge VSV 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
C8-1 - Body ground	Engine switch on (IG)	11 to 14 V

Text in Illustration

*a	Front view of wire harness connector (to Purge VSV)

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**

OK ▼

19.	**CHECK HARNESS AND CONNECTOR (PURGE VSV - ECM)**

(a) Disconnect the purge VSV 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
C8-2 - C30-18 (PRG)	Always	Below 1 Ω
C8-2 or C30-18 (PRG) - 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 ▶ **REPLACE ECM**

20.	PERFORM ACTIVE TEST USING TECHSTREAM (CONTROL THE FUEL PUMP / SPEED)

(a) Connect the Techstream 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

Result

RESULT	PROCEED TO
Abnormal	A
Normal	B

HINT:

- Jiggle the wire harness and connector to increase the likelihood of detecting malfunctions that do not always occur.
- While performing the Active Test, make sure that there is no fuel leakage from the pipes, no signs that fuel has leaked, and no fuel smell.
- If the fuel pump operating noise is abnormal, proceed to step 21.

B ▶ **GO TO STEP 22**

A ▼

21.	INSPECT FUEL PUMP

(a) Inspect the fuel pump INFO .

NG ▶ **REPLACE FUEL PUMP**

OK ▶ CHECK FUEL PUMP CONTROL SYSTEM

22.	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

HINT:

If there is foreign matter such as iron particles on the fuel pump, fuel filter or fuel tank, remove the foreign matter.

B ▶ GO TO STEP 57

A ▶ REPAIR OR REPLACE FUEL SYSTEM

23.	READ FREEZE FRAME DATA

(a) Connect the Techstream to the DLC3.

(b) Turn the engine switch on (IG).

(c) Using the Techstream, confirm the vehicle conditions recorded in the freeze frame data which were present when the DTC was stored INFO .

Result

FREEZE FRAME DATA ITEM FOR DTC P1605	RESULT	SUSPECTED AREA	PROCEED TO
Calculate Load	110% or more of the current value of the vehicle*1	Mass air flow meter assembly	A
AFS Voltage B1S1	Below 3.3 V*2	• Air fuel ratio sensor • Harness and connector • Actual air-fuel ratio abnormal	B
Both freeze frame data items listed above	Values are other than above	-	C

HINT:

- Try to operate 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 the data when the engine is idling (engine warmed up, no load, and shift lever in D or N) and compare these data with the freeze frame data.
- *1: If the mass air flow meter is malfunctioning and incorrectly measures the intake air volume to be higher than the actual volume of air flowing through the intake manifold, the freeze frame data will show a

high engine load value.

- *2: As the air fuel ratio sensor output is low before the sensor warms up, the value at that time cannot be used for diagnosis. If the air fuel ratio sensor is malfunctioning and constantly outputs a value indicating the air-fuel ratio is rich, the actual air-fuel ratio will become lean and the engine may stall.

B ▶ GO TO STEP 25

C ▶ GO TO STEP 28

A ▼

24.	CHECK MASS AIR FLOW METER ASSEMBLY

(a) Remove the mass air flow meter assembly.

(b) Check for foreign matter in the airflow passage of the mass air flow meter.

Result

RESULT	PROCEED TO
Visible foreign matter is present	A
Visible foreign matter is not present	B

HINT:

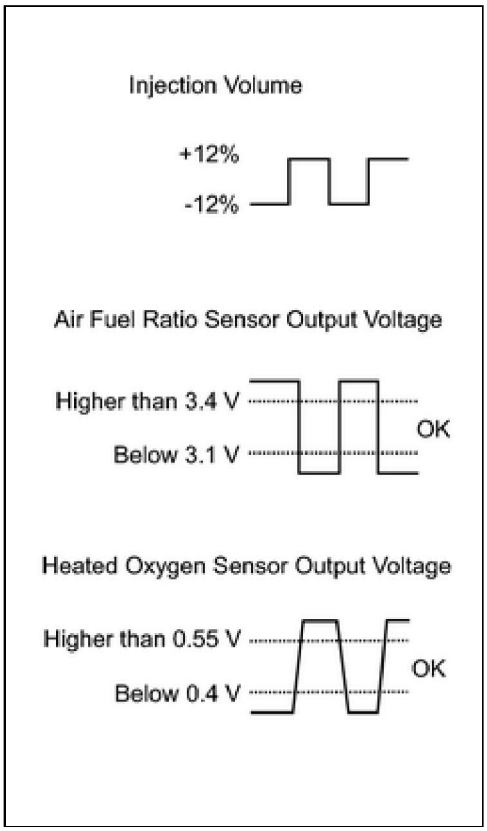
Even if the results are normal, the mass air flow meter may have been malfunctioning. Continue this inspection procedure until step 32, and if there are no problems with other parts, replace the mass air flow meter assembly (refer to step 57).

B ▶ GO TO STEP 28

A ▶ REPLACE MASS AIR FLOW METER ASSEMBLY

25.	PERFORM ACTIVE TEST USING TECHSTREAM (CONTROL THE INJECTION VOLUME)

(a) Connect the Techstream 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) Idle the engine.

(e) Enter the following menus: Powertrain / Engine and ECT / Active Test / Control the Injection Volume.

(f) Read the output voltage from the air fuel ratio sensor when increasing and decreasing the fuel injection volume.

Standard:

TECHSTREAM DISPLAY	SPECIFIED CONDITION
Control the Injection Volume (12%)	Air fuel ratio sensor output voltage is below 3.1 V
Control the Injection Volume (-12%)	Air fuel ratio sensor output voltage is higher than 3.4 V

Result

RESULT	PROCEED TO
Abnormal	A
Normal	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.
- Even if the results are normal, the air fuel ratio sensor may have been malfunctioning. Continue this inspection procedure until step 32, and if there are no problems with other parts, replace the air fuel ratio sensor (refer to step 57).

B ▶ GO TO STEP 28

A

26.	CHECK TERMINAL VOLTAGE (AIR FUEL RATIO SENSOR POWER SOURCE)

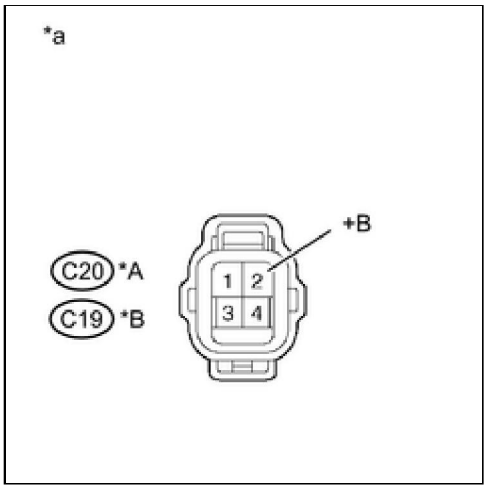
(a) Disconnect the air fuel ratio sensor connector.

(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
C20-2 (+B) - Body ground	Engine switch on (IG)	11 to 14 V
C19-2 (+B) - Body ground	Engine switch on (IG)	11 to 14 V



Text in Illustration

*A	Bank 1
*B	Bank 2
*a	Front view of wire harness connector (to Air Fuel Ratio Sensor)

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**

OK

27.	CHECK HARNESS AND CONNECTOR (AIR FUEL RATIO SENSOR - ECM)

(a) Disconnect the air fuel ratio 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
C20-1 (HA1A) - C31-17 (HA1A)	Always	Below 1 Ω
C20-3 (A1A+) - C30-1 (A1A+)	Always	Below 1 Ω
C20-4 (A1A-) - C30-2 (A1A-)	Always	Below 1 Ω
C19-1 (HA2A) - C31-19 (HA2A)	Always	Below 1 Ω
C19-3 (A2A+) - C30-7 (A2A+)	Always	Below 1 Ω
C19-4 (A2A-) - C30-8 (A2A-)	Always	Below 1 Ω
C20-1 (HA1A) or C31-17 (HA1A) - Body ground	Always	10 kΩ or higher
C20-3 (A1A+) or C30-1 (A1A+) - Body ground	Always	10 kΩ or higher
C20-4 (A1A-) or C30-2 (A1A-) - Body ground	Always	10 kΩ or higher
C19-1 (HA2A) or C31-19 (HA2A) - Body ground	Always	10 kΩ or higher
C19-3 (A2A+) or C30-7 (A2A+) - Body ground	Always	10 kΩ or higher
C19-4 (A2A-) or C30-8 (A2A-) - 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 AND CONNECTOR**

OK ▶ **REPLACE AIR FUEL RATIO SENSOR**

28.	READ FREEZE FRAME DATA

(a) Connect the Techstream to the DLC3.

(b) Turn the engine switch on (IG).

(c) Using the Techstream, confirm the vehicle conditions recorded in the freeze frame data which were present when the DTC was stored INFO .

Result

FREEZE FRAME DATA ITEM FOR DTC P1605	RESULT	PROCEED TO
Initial Engine Coolant Temp, Ambient Temperature, Initial Intake Air Temp	Difference in temperature between each item is less than 10°C*1	A
	Difference in temperature between each item is 10°C or more*2	B

HINT:

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

B ▶ **GO TO STEP 31**

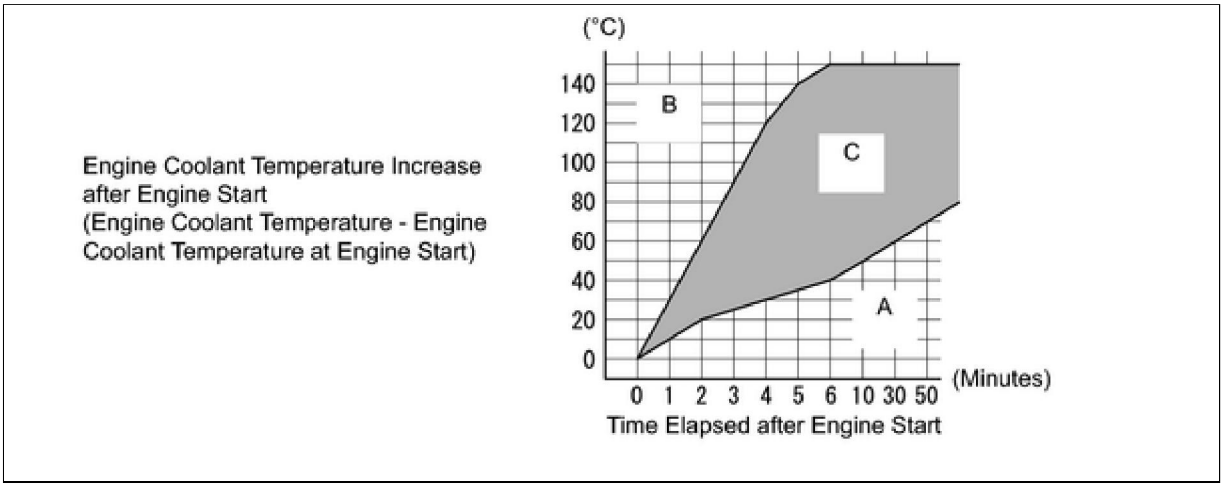
A

29.	READ FREEZE FRAME DATA

(a) Connect the Techstream to the DLC3.

(b) Turn the engine switch on (IG).

(c) Using the Techstream, confirm the vehicle conditions present when the DTC was stored which are recorded in the freeze frame data.



Result

FREEZE FRAME DATA ITEM FOR DTC P1605	RESULT	SUSPECTED AREA	PROCEED TO
Initial Engine Coolant Temp, Coolant Temp, Engine Run Time	Range A	• Engine coolant temperature sensor • Thermostat	A
	Range B	Engine coolant temperature sensor	B
	Range C	-	C

HINT:

This step is not directly related to engine stall.

B ▶ **GO TO STEP 32**

C ▶ **GO TO STEP 58**

A

30.	INSPECT THERMOSTAT

HINT:

For the thermostat inspection, refer to the following procedures INFO .

Result

RESULT	PROCEED TO
Abnormal	A
Normal	B

HINT:

This step is not directly related to engine stall.

B ▶ **GO TO STEP 32**

A ▶ **REPLACE THERMOSTAT**

31.	READ FREEZE FRAME DATA

(a) Connect the Techstream to the DLC3.

(b) Turn the engine switch on (IG).

(c) Using the Techstream, confirm the vehicle conditions recorded in the freeze frame data which were present when the DTC was stored INFO .

Result

FREEZE FRAME DATA ITEM FOR DTC P1605	RESULT	SUSPECTED AREA	PROCEED TO
Coolant Temp	120°C or higher	Engine coolant temperature sensor	A
Coolant Temp, Ambient Temperature	Engine coolant temperature is lower than outside temperature by 15°C or more	Engine coolant temperature sensor	
Both freeze frame data items listed above	Values are other than above	-	B

B ▶ **GO TO STEP 58**

A ▼

32.	INSPECT ENGINE COOLANT TEMPERATURE SENSOR

HINT:

For the engine coolant temperature sensor inspection, refer to the following procedures INFO .

Result

RESULT	PROCEED TO
Abnormal	A
Normal	B

HINT:

Even if the results are normal, the engine coolant temperature sensor may have been malfunctioning. If there are no problems with other parts, replace the engine coolant temperature sensor (refer to step 57).

B ▶ **GO TO STEP 57**

A ▶ **REPLACE ENGINE COOLANT TEMPERATURE SENSOR**

33.	READ FREEZE FRAME DATA

(a) Connect the Techstream to the DLC3.

(b) Turn the engine switch on (IG).

(c) Using the Techstream, confirm the vehicle conditions recorded in the freeze frame data which were present when the DTC was stored INFO .

Result

FREEZE FRAME DATA ITEM FOR DTC P1605	RESULT	SUSPECTED AREA	PROCEED TO
Total of ISC Learning Value and ISC Feedback Value	Below 80% of the current value of the vehicle*1	Throttle body assembly	A
	120% or more of the current value of the vehicle*2		B
	From 80 to 120% of the current value of the vehicle	-	C

HINT:

- Try to operate 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 the data when the engine is idling (engine warmed up, no load, and shift lever in D or N) and compare these data with the freeze frame data.
- *1: If the throttle body assembly has a temporary problem in which it cannot fully close, the intake air volume and engine speed increase. As a result, the ISC compensation amount becomes less than the standard. At this time, if the throttle body assembly returns to normal and fully closes, the intake air volume will be insufficient and the engine may stall.
- *2: If carbon accumulates on the throttle body assembly and the intake air volume decreases, the ISC compensation amount is increased to maintain the idling speed. If this situation continues, the ISC compensation amount reaches the upper limit, the idling speed cannot be maintained causing idling to become unstable, and the engine may stall.

B ▶ **GO TO STEP 35**

C ▶ **GO TO STEP 36**

A ▼

34.	CHECK THROTTLE BODY ASSEMBLY

(a) Check for foreign matter and signs that the throttle body was stuck, and also check that the valve and shaft move smoothly during operation.

Result

RESULT	PROCEED TO
Abnormal	A
Normal	B

HINT:

Even if the results are normal, the throttle body may have been malfunctioning. Continue this inspection procedure until step 42, and if there are no problems with other parts, replace the throttle body assembly (refer to step 57).

B ▶ **GO TO STEP 36**

A ▶ **REPLACE THROTTLE BODY ASSEMBLY**

35.	CHECK THROTTLE BODY ASSEMBLY

(a) Check if carbon is in the airflow passage of the throttle body.

Result

RESULT	PROCEED TO
Carbon in passage	A
No carbon in passage	B

HINT:

Even if the results are normal, the throttle body may have been malfunctioning. Continue this inspection procedure until step 42, and if there are no problems with other parts, replace the throttle body assembly (refer to step 57).

B ▶ **GO TO STEP 36**

A ▶ **REPLACE THROTTLE BODY ASSEMBLY**

36.	PERFORM ACTIVE TEST USING TECHSTREAM (CONTROL THE VVT SYSTEM)

(a) Connect the Techstream to the DLC3.

(b) Turn the Techstream 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

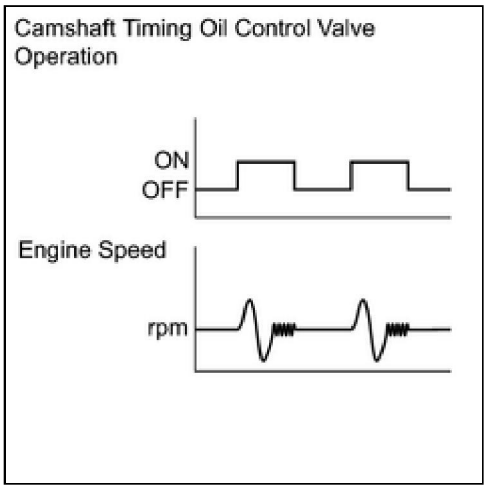
VVT System (Bank 2).

HINT:

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

(e) Check the engine speed while operating the camshaft timing oil control valve using the Techstream.

OK:



TECHSTREAM 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 rough idle or cause the engine to stall.

NG ▶ **REPLACE CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY**

OK ▼

37.	**PERFORM ACTIVE TEST USING TECHSTREAM (CONTROL THE VVT EXHAUST LINEAR)**

(a) Connect the Techstream to the DLC3.

(b) Turn the Techstream 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 or P.

(e) Check the engine speed while operating the camshaft timing oil control valve using the Techstream.

OK:

TECHSTREAM OPERATION	SPECIFIED CONDITION
0%	Normal engine speed
100%	Engine idles roughly or stalls

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 rough idle or cause the engine to stall.

NG ▶ **REPLACE CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY**

OK ▼

38.	**PERFORM ACTIVE TEST USING TECHSTREAM (CONTROL THE EGR STEP POSITION)**

(a) Connect the Techstream 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 Techstream 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 40

NG ▶ GO TO STEP 39

39.	INSPECT EGR VALVE ASSEMBLY

(a) Remove the EGR valve assembly INFO .

(b) Check if the EGR valve is stuck open.

OK:
EGR valve is tightly closed.

NG ▶ REPLACE EGR VALVE ASSEMBLY

OK ▼

40.	CHECK FREEZE FRAME DATA

(a) Connect the Techstream to the DLC3.

(b) Turn the engine switch on (IG).

(c) Using the Techstream, confirm the vehicle conditions recorded in the freeze frame data which were present when the DTC was stored INFO .

Result

<table>
<tr><th colspan="2">FREEZE FRAME DATA ITEM FOR DTC P1605</th><th rowspan="2">SUSPECTED AREA</th><th rowspan="2">PROCEED TO</th></tr>
<tr><th>IGN ADVANCE</th><th>KNOCK CORRECT LEARN VALUE</th></tr>
<tr><td rowspan="2">Differs from the current value of the vehicle by 10° or more</td><td>Less than 3°</td><td>• Engine coolant temperature sensor
• Mass air flow meter assembly
• Knock sensor</td><td>A</td></tr>
<tr><td>3° or more</td><td>-</td><td rowspan="2">B</td></tr>
<tr><td>Differs from the current value of the vehicle by less than 10°</td><td>-</td><td>-</td></tr>
</table>

HINT:

- Try to operate 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 the data when the engine is idling (engine warmed up, no load, and shift lever in D or N) and compare these data with the freeze frame data.
- Even if the results are normal, the knock sensors may have been malfunctioning. If there are no problems with other parts, replace the knock sensors (refer to step 57).

B ▶ GO TO STEP 57

A

41.	INSPECT ENGINE COOLANT TEMPERATURE SENSOR

(a) Inspect the engine coolant temperature sensor INFO .

NG ▶ REPLACE ENGINE COOLANT TEMPERATURE SENSOR

OK

42.	INSPECT MASS AIR FLOW METER ASSEMBLY

(a) Inspect the mass air flow meter assembly INFO .

NG ▶ REPLACE MASS AIR FLOW METER ASSEMBLY

OK ▶ REPLACE KNOCK SENSOR

43.	CHECK TERMINAL VOLTAGE (FUEL INJECTOR POWER SOURCE)

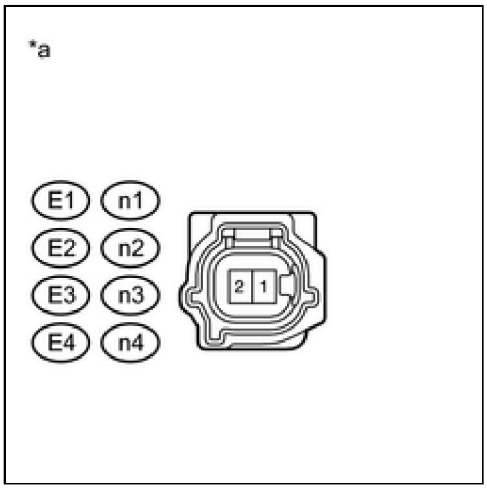
(a) Disconnect the fuel injector connector.

(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



CYLINDER	TESTER CONNECTION	SWITCH CONDITION	SPECIFIED CONDITION
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.
- A rapid decrease in engine speed may have been caused by a malfunction in all or multiple cylinders. There may be an electrical malfunction in the wiring shared by all the cylinders.

NG ▶ **REPAIR FUEL INJECTOR CIRCUIT**

OK ▼

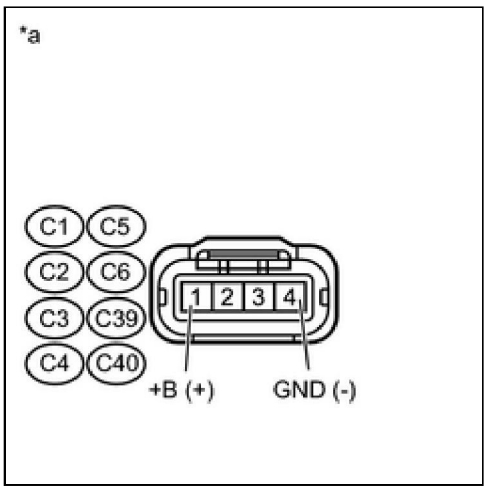
44.	CHECK TERMINAL VOLTAGE (IGNITION COIL POWER SOURCE)

(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

TESTER CONNECTION	SWITCH CONDITION	SPECIFIED CONDITION
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.
- A rapid decrease in engine speed may have been caused by a malfunction in all or multiple cylinders. There may be an electrical malfunction in the wiring shared by all the cylinders.

NG ▶ **REPAIR POWER SOURCE CIRCUIT**

OK ▼

45.	**CHECK FREEZE FRAME DATA**

(a) Connect the Techstream to the DLC3.

(b) Turn the engine switch on (IG).

(c) Using the Techstream, confirm the vehicle conditions recorded in the freeze frame data which were present when the DTC was stored INFO .

Result

FREEZE FRAME DATA ITEM	RESULT	SUSPECTED AREA	PROCEED TO
Idle Spark Advn Ctrl (#1 to #8)	At least one cylinder shows a value of 4° or more	• Fuel injector system • Ignition coil system	A
	All cylinders show a value of less than 4°	-	B

B ▶ GO TO STEP 47

A ▼

46.	CHECK FREEZE FRAME DATA

(a) Change the location of the ignition coil for the cylinder whose Idle Spark Advn Ctrl (#1 to #8) was 4° or more in step 45.

(b) Connect the Techstream to the DLC3.

(c) Turn the engine switch on (IG).

(d) Enter the following menus: Powertrain / Engine and ECT / Data List / Idle Spark Advn Ctrl (#1 to #8).

Result

RESULT	PROCEED TO
Same as result in step 45	A
Different from result in step 45	B

HINT:

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

A ▶ REPLACE IGNITION COIL ASSEMBLY

B ▼

47.	CHECK FREEZE FRAME DATA

(a) Connect the Techstream to the DLC3.

(b) Turn the engine switch on (IG).

(c) Using the Techstream, confirm the vehicle conditions recorded in the freeze frame data which were present when the DTC was stored INFO .

Result

FREEZE FRAME DATA ITEM FOR DTC P1605			SUSPECTED AREA	PROCEED TO
A/C SIGNAL	AIR CONDITIONER FB VAL	POWER STEERING SIGNAL		

FREEZE FRAME DATA ITEM FOR DTC P1605			SUSPECTED AREA	PROCEED TO
A/C SIGNAL	AIR CONDITIONER FB VAL	POWER STEERING SIGNAL		
A/C Signal display changes from OFF to ON*1	Value displayed for Air Conditioner FB Val increases	Does not change from OFF	A/C system	A
		Changes from OFF to ON	Power steering system	B
A/C Signal display does not change from OFF*1	Value displayed for Air Conditioner FB Val does not increase	Changes from OFF to ON		
		Does not change from OFF	-	

HINT:

- Try to operate 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 the data when the engine is idling (engine warmed up, no load, and shift lever in D or N) and compare these data with the freeze frame data.
- *1: Check not only the on/off state of the air conditioner, but also the change in air conditioner load.
- The normal value for the ISC learned value is engine displacement (liters) x 0.9.
- Even if the results are normal, the power steering system may have been malfunctioning. Continue this inspection procedure until step 49, and if there are no problems with other parts, inspect the power steering system (refer to step 57).

A ▶ **CHECK AIR CONDITIONING SYSTEM**

B ▼

48.	CHECK FREEZE FRAME DATA

(a) Connect the Techstream to the DLC3.

(b) Turn the engine switch on (IG).

(c) Using the Techstream, confirm the vehicle conditions recorded in the freeze frame data which were present when the DTC was stored INFO .

Result

FREEZE FRAME DATA ITEM FOR DTC P1605				SUSPECTED AREA	PROCEED TO
ELECTRICAL LOAD SIGNAL	ELECTRIC LOAD FEEDBACK VAL	DIFFERENCE BETWEEN ENGINE SPEED AND TURBINE SPEED	VEHICLE SPEED		
Electrical Load Signal display changes from OFF to ON*1, or value displayed for Electric Load Feedback Val increases*1	Value displayed for Electric Load Val changes	-	-	Electrical load signal circuit	A

FREEZE FRAME DATA ITEM FOR DTC P1605				SUSPECTED AREA	PROCEED TO
ELECTRICAL LOAD SIGNAL	ELECTRIC LOAD FEEDBACK VAL	DIFFERENCE BETWEEN ENGINE SPEED AND TURBINE SPEED	VEHICLE SPEED		
	Value displayed for Electric Load Val does not change	At least 1 of the 5 sets of freeze frame data is less than 100 rpm	Less than 30 km/h (19 mph)	A/T system	B
			30 km/h (19 mph) or more	-	C
		All 5 sets of freeze frame data are 100 rpm or more	-	-	C
Electrical Load Signal display does not change from OFF, or value displayed for Electric Load Feedback Val does not increase	-	At least 1 of the 5 sets of freeze frame data is less than 100 rpm	Less than 30 km/h (19 mph)	A/T system	B
			30 km/h (19 mph) or more	-	C
		All 5 sets of freeze frame data are 100 rpm or more	-	-	C

HINT:

- *1: If the Electrical Load Signal display changes from OFF to ON, or the "Electric Load Feedback Val" increases, it probably is a malfunction due to a change in electrical load. Check the generator and the continuity and connections between the generator and ECM.
- The normal value for the ISC learned value is engine displacement (liters) x 0.9.
- Even if the results are normal, the electrical load signal system and/or A/T system may have been malfunctioning. Continue this inspection procedure until step 49, and if there are no problems with other parts, inspect the electrical load system and/or A/T system (refer to step 57).

B ▶ **CHECK AUTOMATIC TRANSMISSION SYSTEM**

C ▶ **GO TO STEP 49**

A ▶ **CHECK GENERATOR CIRCUIT**

49.	CHECK FREEZE FRAME DATA

(a) Connect the Techstream to the DLC3.

(b) Turn the engine switch on (IG).

(c) Using the Techstream, confirm the vehicle conditions recorded in the freeze frame data which were present when the DTC was stored INFO .

Result

FREEZE FRAME DATA ITEM FOR DTC P1605		SUSPECTED AREA	PROCEED TO
P POSITION OR N POSITION	PARK/NEUTRAL POSITION SWITCH		
P and N position are both OFF in at least one data set	In D or R, NSW is ON	Park/neutral position switch assembly	A
	In D or R, NSW is OFF	A/T system	B
All 5 sets of freeze frame data are ON	-	-	C

HINT:

Even if the results are normal, the park/neutral position switch and/or A/T system may have been malfunctioning. If there are no problems with other parts, inspect the park/neutral position switch and/or A/T system (refer to step 57).

B ▶ **CHECK AUTOMATIC TRANSMISSION SYSTEM**

C ▶ **GO TO STEP 57**

A ▶ **CHECK PARK/NEUTRAL POSITION SWITCH ASSEMBLY**

50.	CHECK FREEZE FRAME DATA

(a) Connect the Techstream to the DLC3.

(b) Turn the engine switch on (IG).

(c) Using the Techstream, confirm the vehicle conditions recorded in the freeze frame data which were present when the DTC was stored INFO .

Result

FREEZE FRAME DATA ITEM	RESULT	SUSPECTED AREA	PROCEED TO
Throttle Sensor Position, Calculate Load	Calculate Load decreases while Throttle Sensor Position increases	Mass air flow meter assembly	A
	Calculate Load does not decrease while Throttle Sensor Position increases	-	B

B ▶ **GO TO STEP 52**

A ▼

51.	CHECK MASS AIR FLOW METER ASSEMBLY

(a) Remove the mass air flow meter assembly.

(b) Check for foreign matter in the airflow passage of the mass air flow meter.

Result

RESULT	PROCEED TO
Visible foreign matter is present	A
Visible foreign matter is not present	B

(c) Install the mass air flow meter.

HINT:

Even if the results are normal, the mass air flow meter may have been malfunctioning. Continue this inspection procedure until step 56, and if there are no problems with other parts, replace the mass air flow meter assembly (refer to step 57).

B ▶ **GO TO STEP 52**

A ▶ **REPLACE MASS AIR FLOW METER ASSEMBLY**

52.	CHECK TERMINAL VOLTAGE (FUEL INJECTOR POWER SOURCE)

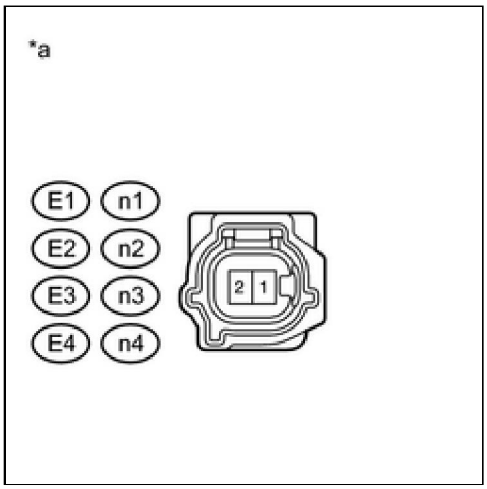
(a) Disconnect the fuel injector connector.

(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.
- A rapid decrease in engine speed may have been caused by a malfunction in all or multiple cylinders. There may be an electrical malfunction in the wiring shared by all the cylinders.

NG ▶ **REPAIR POWER SOURCE CIRCUIT**

OK

▼

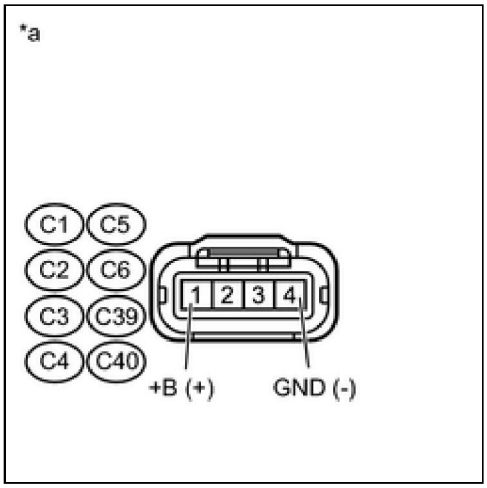
53.	**CHECK TERMINAL VOLTAGE (IGNITION COIL POWER SOURCE)**

(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.
- A rapid decrease in engine speed may have been caused by a malfunction in all or multiple cylinders. There may be an electrical malfunction in the wiring shared by all the cylinders.

NG ▶ **REPAIR POWER SOURCE CIRCUIT**

OK ▼

54.	**PERFORM ACTIVE TEST USING TECHSTREAM (CONTROL THE FUEL PUMP / SPEED)**

(a) Connect the Techstream 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.

Specified Condition:

CONTROL THE FUEL PUMP / SPEED	SPECIFIED CONDITION
ON	Operating sound heard
OFF	Operating sound not heard

Result

RESULT	PROCEED TO
Abnormal	A
Normal	B

HINT:

- Jiggle the wire harness and connector to increase the likelihood of detecting malfunctions that do not always occur.
- While performing the Active Test, make sure that there is no fuel leakage from the pipes, no signs that fuel has leaked, and no fuel smell.
- If the fuel pump operating noise is abnormal, proceed to step 55.

B ▶ **GO TO STEP 56**

A ▼

55.	INSPECT FUEL PUMP

(a) Inspect the fuel pump INFO .

NG ▶ REPLACE FUEL PUMP

OK ▶ CHECK FUEL PUMP CONTROL SYSTEM

56.	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	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 57

A ▶ REPAIR OR REPLACE FUEL SYSTEM

57.	REPLACE MALFUNCTIONING PARTS

(a) If the malfunction could not be identified in steps 3 to 22, replace the part which is suspected to be malfunctioning according to the step where an inspection was performed.

PERFORMED STEP	PART TO REPLACE
Step 6	Mass air flow meter assembly
Step 7	Air fuel ratio sensor
Step 14	Engine coolant temperature sensor
Step 16	Purge VSV
Step 22	Fuel pump

(b) If the malfunction could not be identified in steps 23 to 32, replace the part which is suspected to be malfunctioning according to the step where an inspection was performed.

PERFORMED STEP	PART TO REPLACE
Step 24	Mass air flow meter assembly
Step 25	Air fuel ratio sensor
Step 32	Engine coolant temperature sensor

(c) If the malfunction could not be identified in steps 33 to 42, replace the part which is suspected to be malfunctioning according to the step where an inspection was performed.

PERFORMED STEP	PART TO REPLACE
Step 34, 35	Throttle body assembly
Step 38, 39	EGR valve assembly
Step 40	Knock sensor

(d) If the malfunction could not be identified in steps 43 to 49, inspect and repair the part which is suspected to be malfunctioning according to the step where an inspection was performed.

PERFORMED STEP	INSPECTION
Step 47	A/C system inspection and repair Power steering system inspection and repair
Step 48	A/T system inspection and repair Electrical load system inspection and repair
Step 49	Park/neutral position switch assembly inspection and repair A/T system inspection and repair

(e) If the malfunction could not be identified in steps 50 to 56, replace the part which is suspected to be malfunctioning according to the step where an inspection was performed.

PERFORMED STEP	PART TO REPLACE
Step 51	Mass air flow meter assembly

HINT:

Referring to the chart, inspect and repair or replace the part from the step where an inspection was performed.

NEXT

58.	**CLEAR DTC**

(a) Connect the Techstream to the DLC3.

(b) Turn the engine switch on (IG).

(c) Clear the DTCs INFO .

NEXT

59.	**PERFORM CONFIRMATION DRIVING PATTERN**

(a) Check if engine stall symptoms are present.

HINT:

If any engine stall symptoms are present, recheck for DTCs and freeze frame data and perform an inspection.

NG ▶ **REPAIR OR REPLACE MALFUNCTIONING PARTS**

OK ▶ **END**