for Preparation **Click here**

IMPORTANT POINTS CONCERNING TROUBLESHOOTING

CAUTION:

Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to disable the SRS system.

NOTICE:

- **Refer to the troubleshooting procedures of each system if DTCs regarding the CAN communication system are not output.**
- **Before measuring the resistance, leave the vehicle for at least 1 minute and do not operate the engine switch, any switches or any doors. If doors need to be opened in order to check connectors, open the doors and leave them open.**
- **w/ Navigation System (for HDD):**
  After the engine switch is turned off, the display and navigation module display (HDD navigation system) records various types of memory and settings. As a result, after turning the engine switch off, be sure to wait for the time specified in the following table before disconnecting the cable from the negative (-) battery terminal.

  Waiting Time before Disconnecting Cable from Negative (-) Battery Terminal:

Condition	Waiting Time
Vehicle enrolled in G-BOOK system	6 minutes
Vehicle not enrolled in G-BOOK system	1 minute

- **When disconnecting the cable, some systems need to be initialized after the cable is reconnected (Click here).**

HINT:

- **Operating the engine switch, any switches or any doors triggers related ECU and sensor communication with the CAN, which causes resistance variation.**
- ***: Use the intelligent tester.**

a. DTCs indicating a CAN communication malfunction are also stored due to internal or power source-related problems in ECUs or sensors of systems using CAN communication. Therefore, check whether codes indicating internal or power source-related problems in those systems are output together with the CAN communication DTCs.

b. It is possible to inspect the circuit of the DLC3 branch line or V1 bus main line for malfunctions by inspecting the terminals of the DLC3 using SST.

   NOTICE:

   It is only possible to inspect branch lines to ECUs (sensors) or the V1 bus from the DLC3.

c. It is possible to check which ECUs (sensors) are not able to communicate via CAN communication by checking the "Bus Check" function of the intelligent tester (when the DLC3 branch wire and V1 bus main wire are normal).

   HINT:

- **When checking "Bus Check", ECUs (sensors) whose branch line is open or that cannot communicate via CAN communication do not respond to the intelligent tester (they are not displayed on the screen).**
- **When checking "Bus Check", if a DTC indicating a CAN communication malfunction is output even though all ECUs (sensors) respond (they are displayed on the screen), use the DTC combination table to determine the suspected trouble area and perform symptom simulation.**

d. For past malfunctions of the V1 bus, the ECUs (sensors) which cannot communicate via CAN communication can be determined from the combination of CAN communication DTCs that are output.

e. The power management control ECU (Power Management1) detects malfunctions in the V2 bus circuit and outputs DTCs depending on the malfunctioning areas. The ECUs (sensors) which cannot communicate via CAN communication can be determined from the combination of CAN communication DTCs that are output.

f. The main body ECU (multiplex network body ECU) detects malfunctions in the MS bus circuit and outputs DTCs depending on the malfunctioning areas. The ECUs (sensors) which cannot communicate via CAN communication can be determined from the combination of CAN communication DTCs that are output.

g. The power management control ECU (Power Management) detects malfunctions in the power management bus circuit and outputs DTCs depending on the malfunctioning areas. The ECUs (sensors) which cannot communicate via CAN communication can be determined from the combination of CAN communication DTCs that are output.

h. The driving support ECU assembly detects malfunctions in the sensor bus circuit and stores DTCs depending on the malfunctioning areas. The ECUs (sensors) which cannot communicate via CAN communication can be determined from the combination of CAN communication DTCs that are output.

i. When an open circuit malfunction is confirmed, before disconnecting the connectors for inspection, check whether the connectors are loose by pushing in the connector case.

j. When a connector is disconnected, check if the connector terminals or case is damaged, deformed, deteriorated, etc.

1.VEHICLE BROUGHT TO WORKSHOP

NEXT

2.INSPECT BATTERY VOLTAGE

Standard voltage:
11 to 14 V

If the voltage is below 11 V, recharge or replace the battery before proceeding.

NEXT

3.CHECK AND CLEAR DTC*

a. Using the intelligent tester, perform the all DTCs check.

NOTICE:

- **If codes indicating internal or power source-related malfunctions of ECUs or sensors are output together with codes indicating that those ECUs or sensors cannot communicate via CAN communication, it is likely that the problem is not in the CAN communication line. Therefore, perform troubleshooting for the DTCs related to the malfunctioning parts first.**
- **If a connector of a system which includes a CAN communication line is disconnected when the engine switch is on (IG) or on (ACC), CAN communication DTCs will be stored by that system and any related systems.**

NEXT

4.CHECK INSTALLED SYSTEMS (ECU AND SENSOR) THAT USE CAN COMMUNICATION

a. Based on the vehicle equipment and specifications, confirm the systems that use CAN communication (Click here).
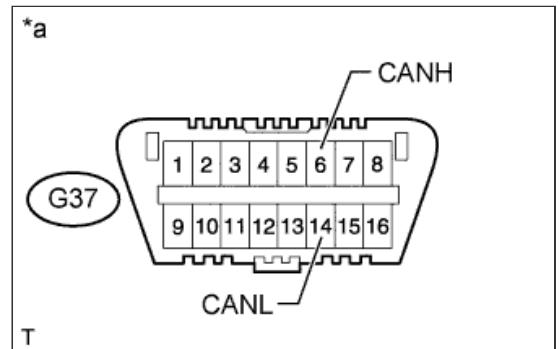
NEXT

5.CHECK FOR OPEN CIRCUIT IN DLC3 BRANCH WIRE AND V1 BUS CIRCUIT MAIN WIRE AND SHORT CIRCUIT (CANH - CANL)

a. Disconnect the cable from the negative (-) battery terminal before measuring the resistances of the main wire and the branch wire.

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

Standard Resistance:

Tester Connection	Switch Condition	Specified Condition	Proceed to
G37-6 (CANH) - G37-14 (CANL)	Engine switch off	OK (54 to 69 Ω)	A
G37-6 (CANH) - G37-14 (CANL)	Engine switch off	NG (Higher than 69 Ω)	B
G37-6 (CANH) - G37-14 (CANL)	Engine switch off	NG (Below 54 Ω)	C

Text in Illustration
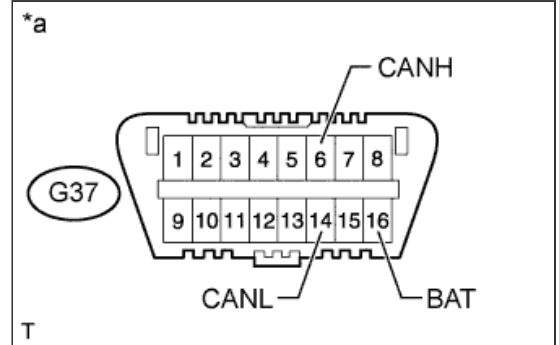
*a	Front view of DLC3

A

6.CHECK FOR SHORT TO +B IN CAN V1 BUS (CANH, CANL - BAT)

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

Standard Resistance:

Tester Connection	Switch Condition	Specified Condition
G37-6 (CANH) - G37-16 (BAT)	Engine switch off	6 kΩ or higher
G37-14 (CANL) - G37-16 (BAT)	Engine switch off	6 kΩ or higher

Text in Illustration
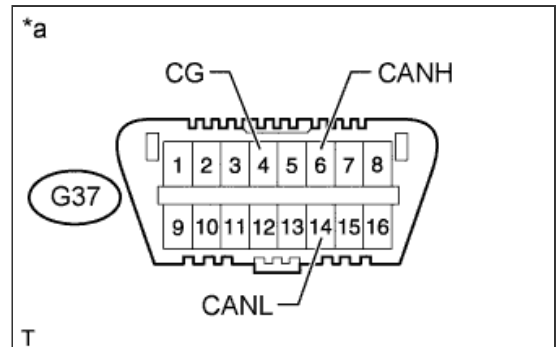
*a	Front view of DLC3

OK

7.CHECK FOR SHORT TO GND IN CAN V1 BUS (CANH, CANL - CG)

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

Standard Resistance:

Tester Connection	Switch Condition	Specified Condition
G37-6 (CANH) - G37-4 (CG)	Engine switch off	200 Ω or higher
G37-14 (CANL) - G37-4 (CG)	Engine switch off	200 Ω or higher

NG. → Go to "Short to GND in CAN Bus Lines" (**Click here**)

OK

8.CHECK ECUS CONNECTED TO CAN BUS*

a. Connect the cable to the negative (-) battery terminal.

NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected (Click here).

b. Select "Bus Check" from "System Select".

c. Check the display of the connected ECUs and sensors for a minute.

Result

Inspection Result	Proceed to
All ECUs and sensors connected to CAN communication system displayed on screen (CAN bus circuit currently normal)	A
Except for power management control ECU (Power Management1), no ECUs connected to V2 bus are displayed (V2 bus main wire open or short malfunction)	B
No ECUs connected to V2 bus are displayed (branch wire between power management control ECU and V2 bus circuit is open)	C
Except for power management control ECU (Power Management), no ECUs connected to power management bus are displayed (power management bus main wire open or short malfunction)	D
No ECUs connected to power management bus are displayed (power management bus circuit is open)	E
Except for main body ECU (multiplex network body ECU), no ECUs connected to MS bus are displayed (MS bus main wire open or short malfunction)	F
No ECUs connected to MS bus are displayed (branch wire between main body ECU (multiplex network body ECU) and MS bus circuit is open)	G
Except for driving support ECU assembly, no ECUs connected to sensor bus are displayed (sensor bus main wire open or short malfunction)	H

No ECUs connected to sensor bus are displayed (branch wire between driving support ECU assembly and sensor bus circuit is open)	I
Single ECU or sensor that should be connected to CAN communication is not displayed (ECU or sensor branch wire open or communication stop)	J
ECU or sensor that should be connected to CAN communication is not displayed or display is intermittent during check (ECU or sensor branch wire open on one side)	K

NOTICE:

ECUs and sensors that are not present will not be displayed. Be careful not to mistake them for communication stop malfunctions.

HINT:

- If the display of an ECU is intermittent during the check, one side of an ECU or sensor branch wire is open (the signal of the ECU is treated as noise, which affects the response and display of the intelligent tester).
- The power management control ECU checks for proper ECU communication for ECUs that are connected to the V2 bus and the results are displayed on the intelligent tester. ECUs that stop communicating with the power management control ECU for 3 seconds or more will stop being displayed on the intelligent tester.
- The power management control ECU may be malfunctioning if both of the following occur: 1) all ECUs connected to the V2 bus are not displayed on the intelligent tester; and 2) DTC U1002 Lost Communication with Gateway Module (Power Management1) is not output.
- The power management control ECU checks for proper ECU communication for ECUs that are connected to the power management bus and the results are displayed on the intelligent tester. ECUs that stop communicating with the power management control ECU for 3 seconds or more will stop being displayed on the intelligent tester.
- The power management control ECU may be malfunctioning if both of the following occur: 1) all ECUs connected to the power management bus are not displayed on the intelligent tester; and 2) DTC U1002 Lost Communication with Gateway Module (Power Management) is not output.
- The main body ECU (multiplex network body ECU) checks for proper ECU communication for ECUs that are connected to the MS bus and the results are displayed on the intelligent tester. ECUs that stop communicating with the main body ECU (multiplex network body ECU) for 10 seconds or more will stop being displayed on the intelligent tester.
- The main body ECU (multiplex network body ECU) may be malfunctioning if both of the following occur: 1) all ECUs connected to the MS bus are not displayed on the intelligent tester; and 2) DTC U1002 Lost Communication with Gateway Module (MS Bus) is not output.
- The driving support ECU assembly checks for proper ECU communication for ECUs that are connected to the sensor bus and the results are displayed on the intelligent tester. ECUs that stop communicating with the driving support ECU assembly for 10 seconds or more will stop being displayed on the intelligent tester.
- The driving support ECU assembly may be malfunctioning if both of the following occur: 1) all ECUs connected to the sensor bus are not displayed on the intelligent tester; and 2) DTC U1002 Lost Communication with Gateway Module (Sensor Bus) is not output.

B.	Go to "DTC U1002" (**Click here**)
C.	Go to "Power Management Control ECU Communication Stop Mode" (**Click here**)
D.	Go to "DTC U1002" (**Click here**)
E.	Go to "Power Management Control ECU Communication Stop Mode" (**Click here**)
F.	Go to "DTC U1002" (**Click here**)
G.	Go to "Main Body ECU Communication Stop Mode" (**Click here**)
H.	Go to "DTC U1002" (**Click here**)
I.	Go to "DIAGNOSIS SYSTEM" (**Click here**)
J.	Go to "PROBLEM SYMPTOMS TABLE" (**Click here**)
K.	Go to "Open in One Side of CAN Branch Line" (**Click here**)

A

9.CHECK COMMUNICATION MALFUNCTION DTC (PAST DTC CHECK)*

a. Select "Bus Check" from the screen on the intelligent tester.

b. Write down all of the DTCs stored in each ECU.

HINT:

- If there are communication malfunction DTCs stored but the intelligent tester "Bus Check" screen displays all of the ECUs and sensors connected to the CAN system, the communication malfunction DTCs may be past malfunctions that are no longer present.
- For V1 bus main wire malfunctions, DTCs for related ECUs are also output. Therefore, determine the malfunctioning area based on all of the DTCs that are output.
- For V2 bus malfunctions, DTCs are stored based on the detection of communication stop malfunctions and network malfunctions of ECUs that are connected by the power management control ECU.
- For power management bus malfunctions, DTCs are stored based on the detection of communication stop malfunctions and network malfunctions of ECUs that are connected by the power management control ECU.
- For MS bus malfunctions, DTCs are stored based on the detection of communication stop malfunctions and network malfunctions of ECUs that are connected by the main body ECU (multiplex network body ECU).
- For sensor bus malfunctions, DTCs are stored based on the detection of communication stop malfunctions and network malfunctions of ECUs that are connected by the driving support ECU assembly.

Result

Inspection Result	Proceed to
ECU connected to the V1 bus outputs communication trouble code	A
Power management control ECU (Power Management1) outputs network malfunction trouble code (U1002) (V2 bus main wire past malfunction)	B
Power management control ECU (Power Management) outputs network malfunction trouble code (U1002) (power management bus main wire past malfunction)	C
Main body ECU (multiplex network body ECU) outputs network malfunction trouble code (U1002) (MS bus main wire past malfunction)	D
Driving support ECU assembly outputs network malfunction trouble code (U1002) (Sensor bus main wire past malfunction)	E
Power management control ECU (Power Management1) outputs trouble code other than network malfunction trouble code (U1002) (past malfunction of ECU or branch wire connected to V2 bus)	F
Power management control ECU (Power Management) outputs trouble code other than network malfunction trouble code (U1002) (past malfunction of ECU or branch wire connected to power management bus)	F
Main body ECU (multiplex network body ECU) outputs trouble code other than network malfunction trouble code (U1002) (past malfunction of ECU or branch wire connected to MS bus)	F
Driving support ECU assembly outputs trouble code other than network malfunction trouble code (U1002) (past malfunction of ECU or branch wire connected to sensor bus)	F

B.	Go to "DTC U1002" (**Click here**)
C.	Go to "DTC U1002" (**Click here**)
D.	Go to "DTC U1002" (**Click here**)
E.	Go to "DTC U1002" (**Click here**)
F.	Go to "DIAGNOSTIC TROUBLE CODE CHART" (**Click here**)

A

10.CHECK DTC COMBINATION TABLE (V1 BUS BRANCH WIRE OPEN, PAST COMMUNICATION STOP MALFUNCTION)

a. Based on the combination of output CAN communication system DTCs, determine which ECUs and sensors have a communication stop malfunction (Click here).

NEXT

11.PERFORM MALFUNCTION SIMULATION TEST (V1 BUS CIRCUIT MAIN WIRE PAST MALFUNCTION)*

a. Using the intelligent tester, clear all DTCs.

b. Perform a malfunction simulation test on all harnesses and connectors related to the V1 bus main wire.

c. Check the DTCs that were output as a result of the malfunction simulation test. Then determine the malfunctioning area.

NEXT

12.ADJUST, REPAIR AND REPLACE

NEXT

13.CLEAR DTC*

a. Using the intelligent tester, clear all DTCs.

NEXT

14.CONFIRMATION TEST

NEXT

END