

2009 Toyota Highlander Limited

2009 ACCESSORIES & EQUIPMENT Multiplex Communication - Highlander

2009 ACCESSORIES & EQUIPMENT

Multiplex Communication - Highlander

LIN COMMUNICATION SYSTEM

PRECAUTION

1. PRECAUTION FOR DISCONNECTING THE BATTERY CABLE

NOTE: When disconnecting the battery negative (-) terminal, initialize the following systems after the terminal is reconnected:

SYSTEM PROCEDURE CHART

System Name	See Procedure
Power Back Door System	INITIALIZATION

2. PRECAUTIONS WHEN USING TECHSTREAM

- a. When using Techstream with the ignition switch off to troubleshoot: Connect Techstream to the vehicle, and turn the courtesy light switch on and off at 1.5-second intervals until communication between the tester and vehicle begins.
- b. After all DTCs are cleared, check if the trouble occurs again 6 seconds after the ignition switch on (IG).

3. IGNITION SWITCH EXPRESSIONS

HINT:

The type of ignition switch used on this model differs according to the specifications of the vehicle. The expressions listed in the table below are used in this article.

SWITCH REFERENCE CHART

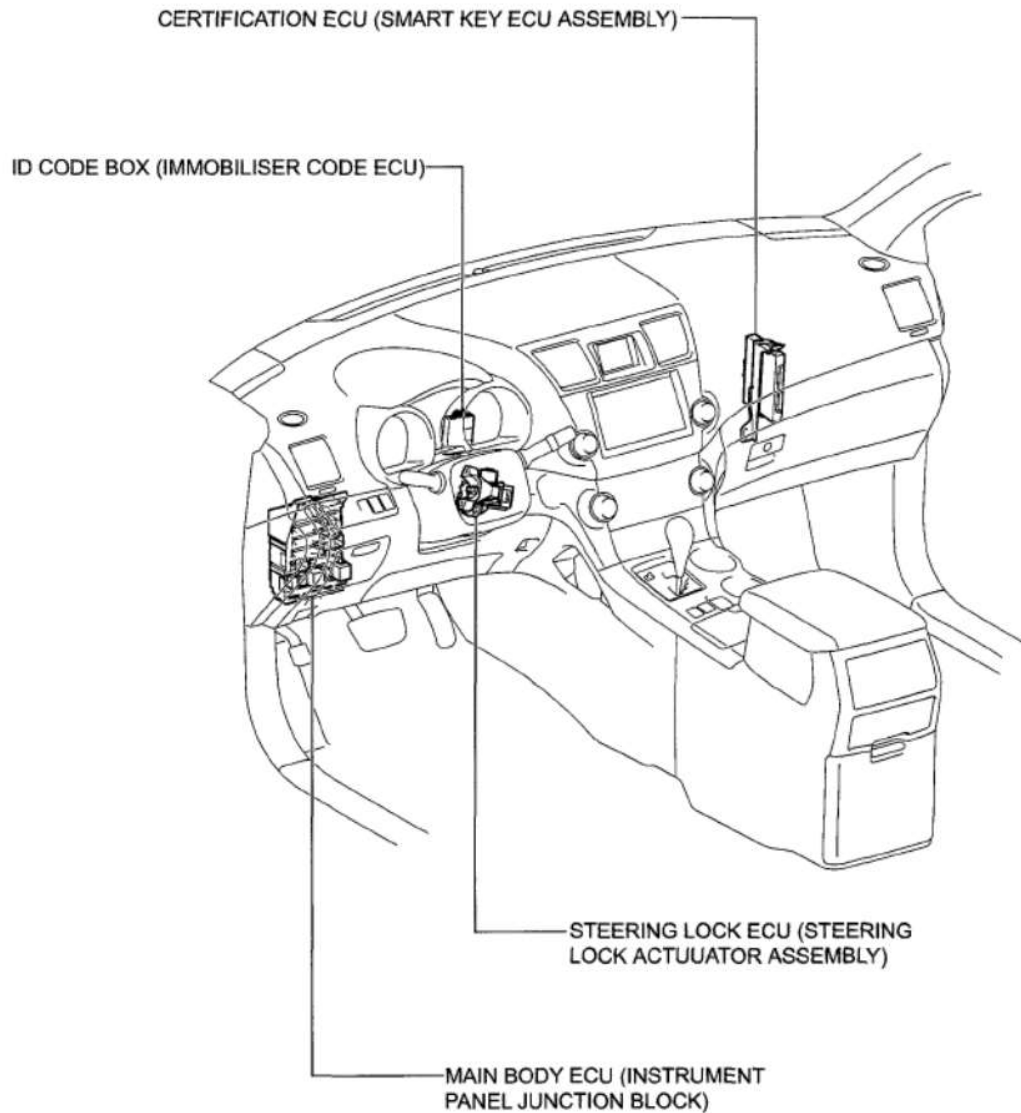
Expression	Ignition Switch (position)	Engine Switch (condition)
Ignition Switch off	LOCK	Off
Ignition Switch on (IG)	ON	On (IG)
Ignition Switch on (ACC)	ACC	On (ACC)
Engine Start	START	Start

PARTS LOCATION

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Certification Bus:



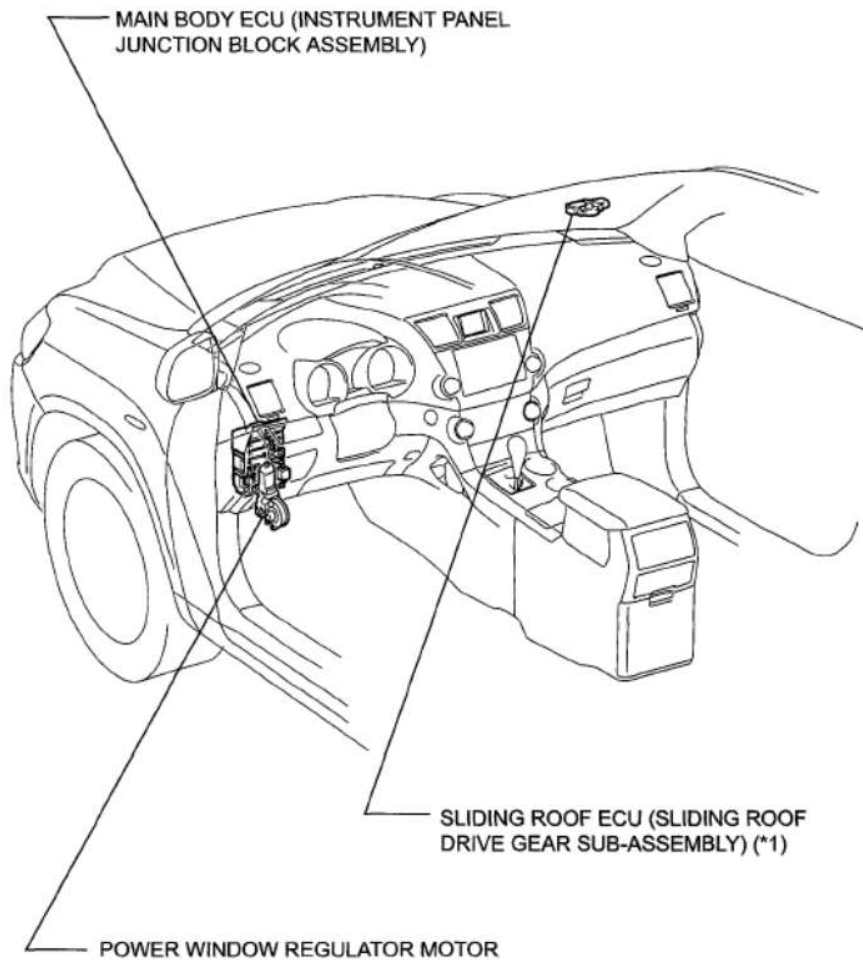
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Fig. 1: Identifying LIN Communication System Parts Location (1 Of 3)
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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Door Bus:



*1: w/ Sliding Roof

H

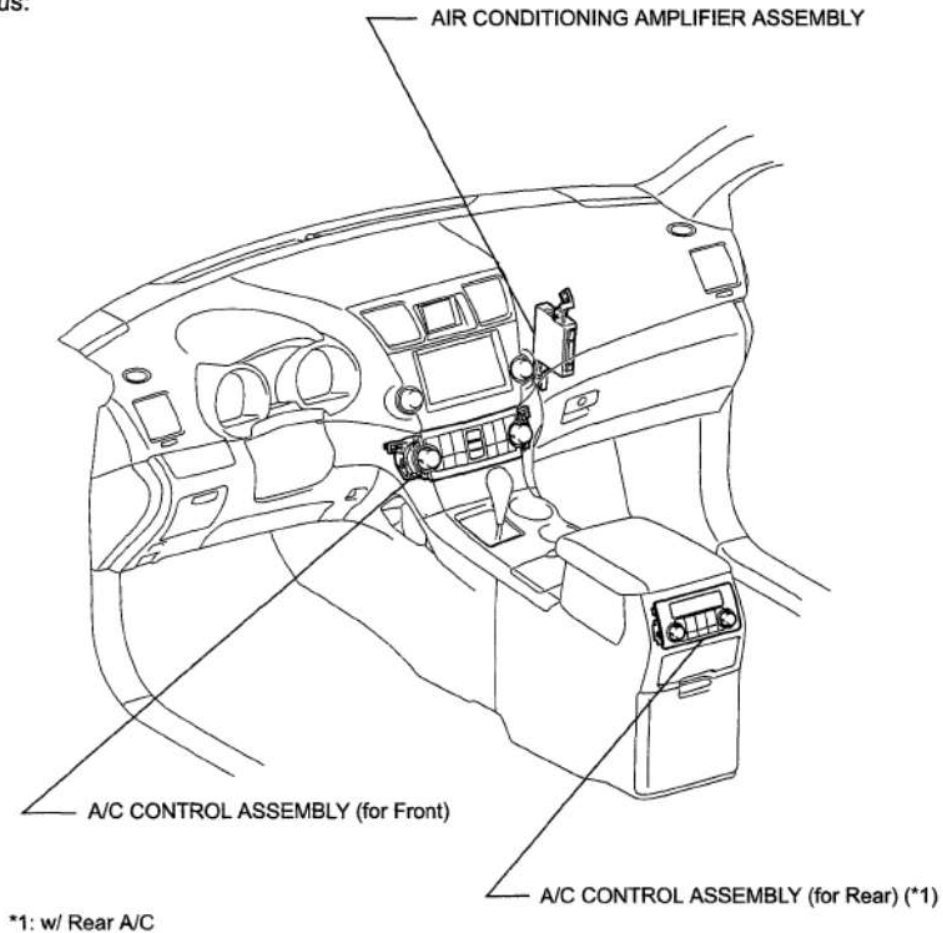
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Fig. 2: Identifying LIN Communication System Parts Location (2 Of 3)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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A/C Bus:



H

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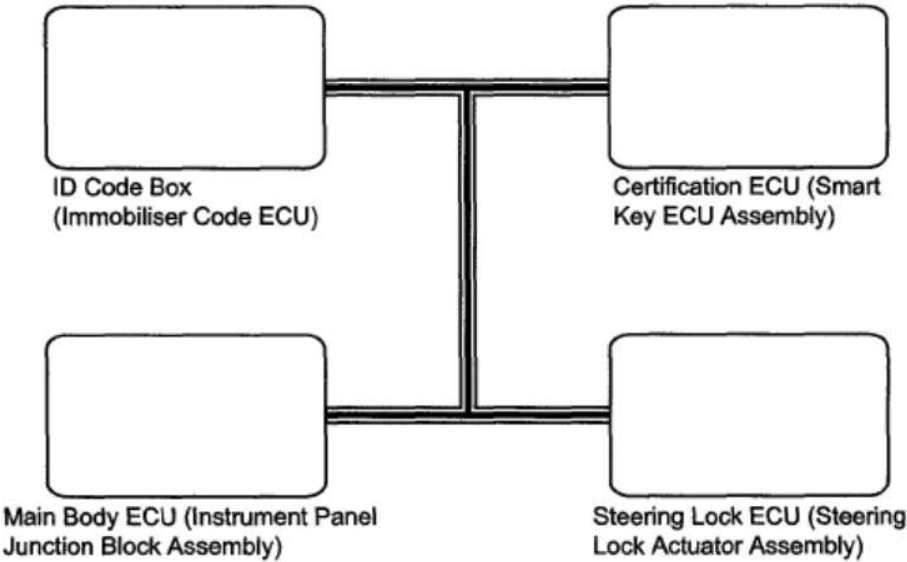
Fig. 3: Identifying LIN Communication System Parts Location (3 Of 3)
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

SYSTEM DIAGRAM

1. CERTIFICATION BUS LINES

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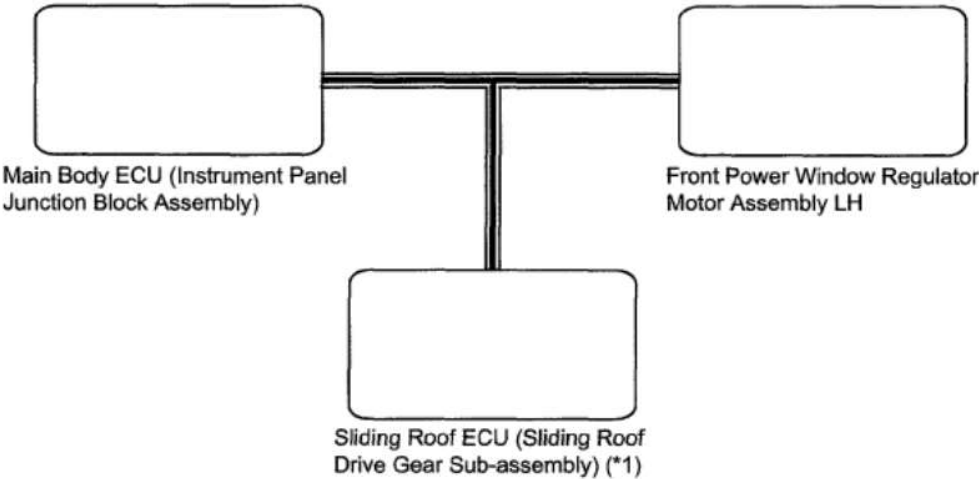
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B162902E12

Fig. 4: LIN Communication System Diagram - Certification Bus Lines
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

2. DOOR BUS LINES



*1: w/ Sliding Roof

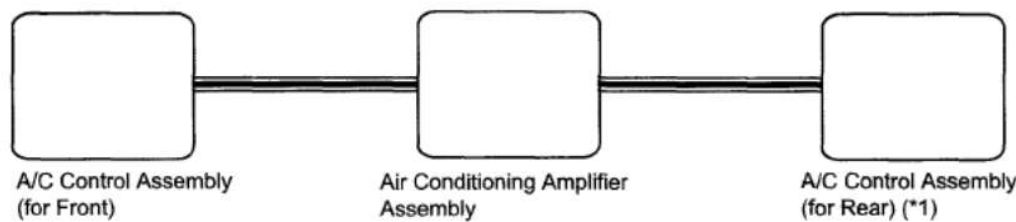
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Fig. 5: LIN Communication System Diagram - Door Bus Lines
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

3. AIR CONDITIONING BUS LINE



*1: w/ Rear A/C

B172362801

Fig. 6: LIN Communication System Diagram - Air Conditioning Bus Line
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

SYSTEM DESCRIPTION

1. LIN COMMUNICATION SYSTEM DESCRIPTION

Multiplex communication system (LIN) is used to control communication between the ECUs of the body system. If communication cannot be performed through LIN because of an open in the communication lines or other reason, the master control ECU of the relevant system will output a DTC. For the communication system and the connected ECUs, refer to the table below.

HINT:

Each ECU has a fail safe function which activates to maintain the minimum performance of the system and protect the system.

a. Door System LIN Communication System

DOOR SYSTEM LIN COMMUNICATION SYSTEM CHART

ECU	Master Control (LIN Communication DTC Output Function)
Main Body ECU	O (with output function)
Front Power Window ECU	x (without output function)
Sliding Roof ECU *1	x (without output function)
HINT: *1: Models with Sliding Roof	

b. Certification System LIN Communication System

CERTIFICATION SYSTEM LIN COMMUNICATION SYSTEM CHART

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ECU	Master Control (LIN Communication DTC Output Function)
Certification ECU	O (with output function)
Main Body ECU	x (without output function)
Steering Lock ECU	x (without output function)
ID Code Box	x (without output function)

c. Air Conditioning LIN Communication System

AIR CONDITIONING LIN COMMUNICATION SYSTEM CHART

Component	Master Control (LIN Communication DTC Output Function)
Air Conditioning Amplifier Assembly	O (with output function)
A/C Control Assembly (for Front)	x (without output function)
A/C Control Assembly (for Rear)	x (without output function)

HOW TO PROCEED WITH TROUBLESHOOTING

HINT:

*: Use Techstream.

1. **VEHICLE BROUGHT TO WORKSHOP**
2. **INSPECT BATTERY VOLTAGE**

Standard voltage:

11 to 14 V

HINT:

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

3. **INSPECT COMMUNICATION FUNCTION OF CAN COMMUNICATION SYSTEM***

- a. Using Techstream, inspect the CAN communication function to ensure there are no malfunctions in the communication system.

Result

RESULT CHART

Result	Proceed to
No DTCs output	A
DTCs output	B

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B: GO TO CAN COMMUNICATION SYSTEM (See DIAGNOSIS SYSTEM)

A: Go to next step

4. INSPECT COMMUNICATION FUNCTION OF LIN COMMUNICATION SYSTEM*

- a. Using Techstream, inspect the LIN communication function to ensure there are no malfunctions in the communication system (See TERMINALS OF ECU).

Result

RESULT CHART

Result	Proceed to
No DTCs output (LIN communication error does not occur.)	A
No DTCs output (LIN communication error occurs.)	B
DTCs output	C

B: PROBLEM SYMPTOMS TABLE (See PROBLEM SYMPTOMS TABLE)

C: DIAGNOSTIC TROUBLE CODE CHART (See DIAGNOSTIC TROUBLE CODE CHART)

A: Go to next step

5. OVERALL ANALYSIS AND TROUBLESHOOTING*

- a. DATA LIST/ACTIVE TEST (See DATA LIST/ACTIVE TEST)
- b. Terminals of ECU (See TERMINALS OF ECU)

6. ADJUST, REPAIR OR REPLACE

NEXT: END

PROBLEM SYMPTOMS TABLE

LIN communication system

LIN COMMUNICATION SYSTEM SYMPTOM CHART

Symptom	Suspected Area	Refer to
A/C LIN Line Communication Malfunction	LIN Communication Line (for Automatic Air Conditioning System)	<u>LIN COMMUNICATION CIRCUIT</u>
	LIN Communication Line (for Manual Air Conditioning System)	<u>LIN COMMUNICATION CIRCUIT</u>
	A/C Control Assembly [Front] (for Automatic Air Conditioning System)	<u>LIN COMMUNICATION CIRCUIT</u>
	A/C Control Assembly [Front] (for Manual Air Conditioning System)	<u>LIN COMMUNICATION CIRCUIT</u>

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A/C Control Assembly [Rear] *1 (for Automatic Air Conditioning System)	<u>LIN COMMUNICATION CIRCUIT</u>
A/C Control Assembly [Rear] *1 (for Manual Air Conditioning System)	<u>LIN COMMUNICATION CIRCUIT</u>
A/C Amplifier Assembly (for Automatic Air Conditioning System)	<u>LIN COMMUNICATION CIRCUIT</u>
A/C Amplifier Assembly (for Manual Air Conditioning System)	<u>LIN COMMUNICATION CIRCUIT</u>

TERMINALS OF ECU

- 1. **CHECK MAIN BODY ECU (INSTRUMENT PANEL JUNCTION BLOCK ASSEMBLY)**
 - a. Disconnect the D7, D8, 1D and 1F instrument panel junction block assembly connectors.

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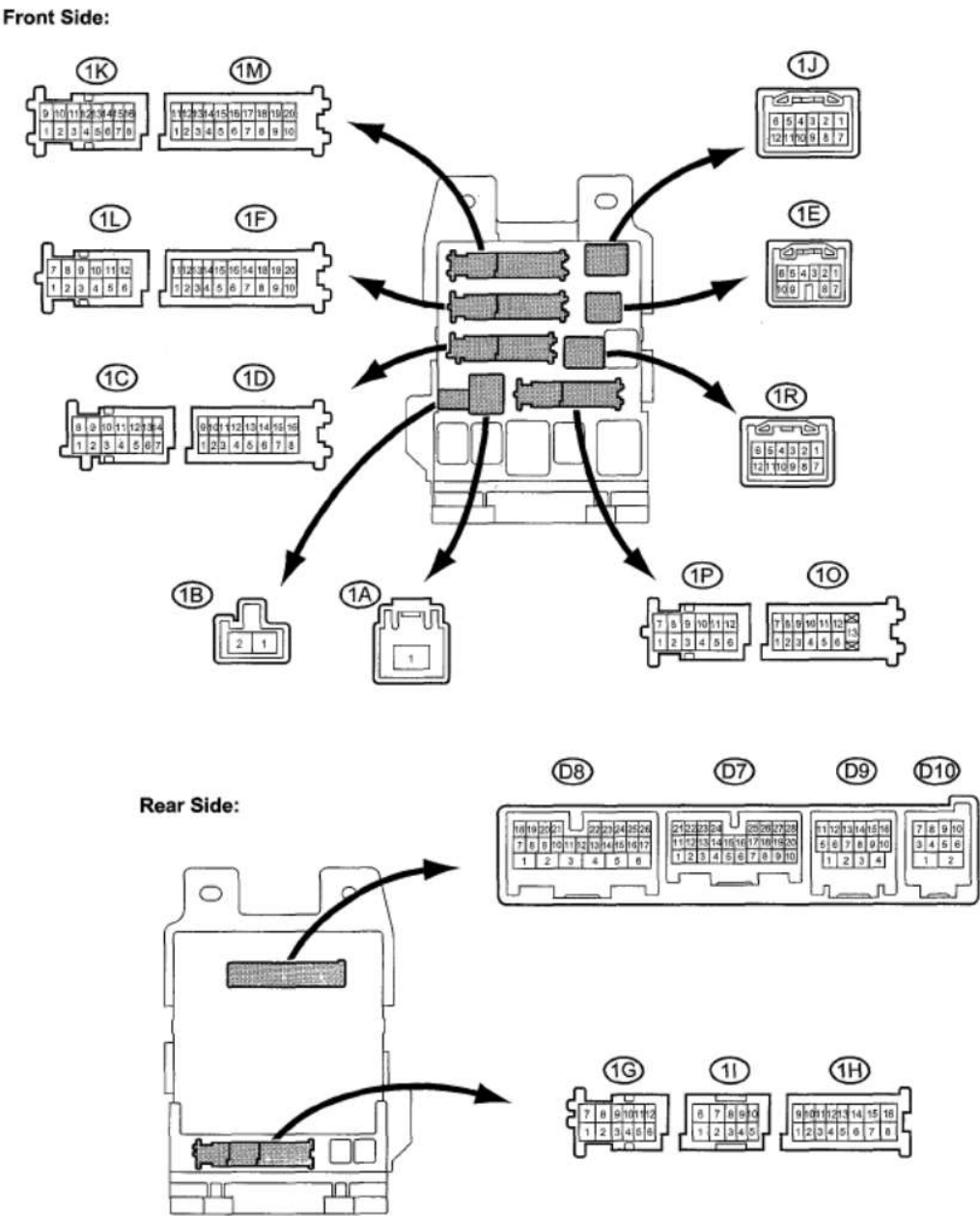


Fig. 7: Disconnecting D7, D8, 1D And 1F Instrument Panel Junction Block Assembly Connector Terminals
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. Measure the voltage and resistance between the wire harness side connectors and body ground.

TERMINALS DESCRIPTION SPECIFIED CONDITION CHART

Terminal No. (Symbols)	Wiring Color	Terminal Description	Condition	Specified Condition
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1D-10 (BECU)*1 - Body ground	W - Body ground	Battery power supply	Always	11 to 14 V
D8-6 (AM1)*2-Body ground	GR - Body ground	Battery power supply	Always	11 to 14 V
D7-1 (AM2)*2 - Body ground	G - Body ground	Battery power supply	Always	11 to 14 V
1F-10 (GND1) - Body ground	W-B - Body ground	Ground	Always	Below 1 ohms

HINT:

- If the result is not as specified, there may be a malfunction on the wire harness side.
- *1: w/o Smart Key System
- *2: w/ Smart Key System

- c. Reconnect the D7, D8, 1D and 1F instrument panel junction block assembly connectors.
- d. Measure the pulse according to the value (s) in the table below.

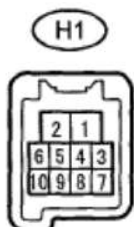
TERMINALS DESCRIPTION SPECIFIED CONDITION CHART

Terminal No. (Symbols)	Wiring Color	Terminal Description	Condition	Specified Condition
1E-7 (LIN1)*2 - 1F-10 (GND1)	R - W-B	LIN Communication line	Ignition switch on (IG)	Pulse generation
D9-10 (LIN2) - 1F-10 (GND1)	P - W-B	LIN Communication line	Ignition switch on (IG)	Pulse generation

HINT:

- If the result is not as specified, the main body ECU (Instrument panel junction block assembly) may have a malfunction.
- *2: w/ Smart Key System

2. CHECK POWER WINDOW REGULATOR MOTOR ASSEMBLY (for Driver Side)



B158006E16

Fig. 8: Identifying Power Window Regulator Motor Assembly Connector Terminals (For Driver Side)

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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- a. Disconnect the H1 motor connector.
- b. Measure the voltage and resistance according to the value (s) in the table below.

TERMINALS DESCRIPTION SPECIFIED CONDITION CHART

Terminal No. (Symbols)	Wiring Color	Terminal Description	Condition	Specified Condition
H1-2 (B) - H1-1 (E)	SB - W-B	Battery power supply	Always	11 to 14 V
H1-1 (E) - Body ground	W-B - Body ground	Ground	Always	Below 1 ohms

HINT:

If the result is not as specified, there may be a malfunction on the wire harness side.

- c. Reconnect the H1 motor connector.
- d. Measure the pulse according to the value (s) in the table below.

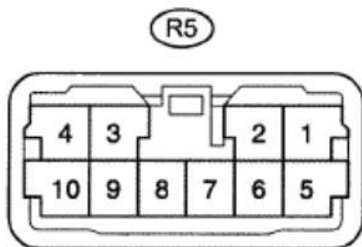
TERMINALS DESCRIPTION SPECIFIED CONDITION CHART

Terminal No. (Symbols)	Wiring Color	Terminal Description	Condition	Specified Condition
H1-9 (LIN) - H1-1 (E)	P - W-B	LIN Communication line	Ignition switch on (IG)	Pulse generation

HINT:

If the result is not as specified, the motor may be malfunctioning.

3. CHECK SLIDING ROOF ECU (SLIDING ROOF DRIVE GEAR SUB-ASSEMBLY) [w/ Sliding Roof]



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Fig. 9: Identifying Sliding Roof ECU Connector Terminals (Sliding Roof Drive Gear Sub-Assembly)

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- a. Disconnect the Q12 ECU connector.
- b. Measure the voltage and resistance according to the value (s) in the table below.

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TERMINALS DESCRIPTION SPECIFIED CONDITION CHART

Terminal No. (Symbols)	Wiring Color	Terminal Description	Condition	Specified Condition
Q12-1 (B) - Q12-2 (E)	B - W-B	Battery power supply	Always	11 to 14 V
Q12-2 (E) - Body ground	W-B - Body ground	Ground	Always	Below 1 ohms

HINT:

If the result is not as specified, there may be a malfunction on the wire harness side.

- c. Reconnect the Q12 ECU connector.
- d. Measure the pulse according to value (s) in the table below.

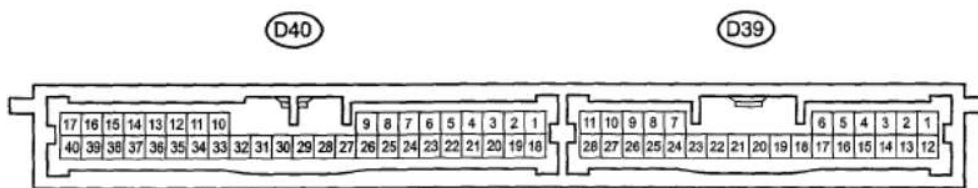
TERMINALS DESCRIPTION SPECIFIED CONDITION CHART

Terminal No. (Symbols)	Wiring Color	Terminal Description	Condition	Specified Condition
Q12-4 (MPX1) - Q12- 2 (E)	P - W-B	LIN Communication line	Ignition switch on (IG)	Pulse generation

HINT:

If the result is not as specified, the ECU may be malfunctioning.

4. CHECK CERTIFICATION ECU (SMART KEY ECU ASSEMBLY) [w/ Smart Key System]



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Fig. 10: Identifying Certification ECU Connector Terminals (Smart Key ECU Assembly)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- a. Disconnect the D40 ECU connector.
- b. Measure the voltage and resistance according to the value (s) in the table below.

TERMINALS DESCRIPTION SPECIFIED CONDITION CHART

Terminal No. (Symbols)	Wiring Color	Terminal Description	Condition	Specified Condition
D40-1 (+B) - D40-17 (E)	B - B	Battery power supply	Always	10 to 14 V
D40-17 (E) - Body	B - Body	Ground	Always	Below 1 ohms

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ground	ground		
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HINT:

If the result is not as specified, there may be a malfunction on the wire harness side.

- c. Reconnect the D40 ECU connector.
- d. Measure the pulse according to value (s) in the table below.

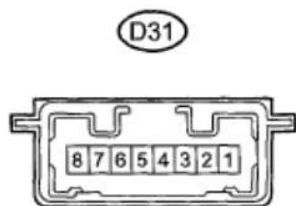
TERMINALS DESCRIPTION SPECIFIED CONDITION CHART

Terminal No. (Symbols)	Wiring Color	Terminal Description	Condition	Specified Condition
D40-10 (LIN) - D40-17 (E)	L - B	LIN Communication line	Ignition switch on (IG)	Pulse generation
D40-18 (IG) - D40-17 (E)	G - B	Power supply	Ignition switch on (IG)	10 to 14 V
D40-18 (IG) - D40-17 (E)	G-B	Power supply	Ignition switch off	0 V

HINT:

If the result is not as specified, the ECU may be malfunctioning.

5. CHECK ID CODE BOX (IMMOBILISER CODE ECU) [w/ Smart Key System]



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Fig. 11: Identifying ID Code Box Connector Terminals (Immobilizer Code ECU)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- a. Disconnect the D31 ECU connector.
- b. Measure the voltage and resistance according to the value (s) in the table below.

TERMINALS DESCRIPTION SPECIFIED CONDITION CHART

Terminal No. (Symbols)	Wiring Color	Terminal Description	Condition	Specified Condition
D31-1 (+B) - D31-8 (GND)	W-V	Battery power supply	Always	11 to 14 V
D31-8 (GND) - Body	V - Body			

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ground	ground	Ground	Always	Below 1 ohms
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HINT:

If the result is not as specified, there may be a malfunction on the wire harness side.

- c. Reconnect the D31 ECU connector.
- d. Measure the pulse according to value (s) in the table below.

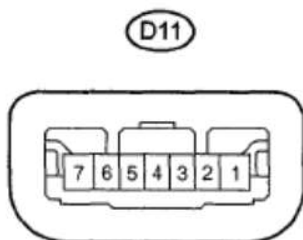
TERMINALS DESCRIPTION SPECIFIED CONDITION CHART

Terminal No. (Symbols)	Wiring Color	Terminal Description	Condition	Specified Condition
D31-3 (LIN1) - D31-8 (GND)	LG - V	LIN Communication line	Ignition switch on (IG)	Pulse generation

HINT:

If the result is not as specified, the ECU may be malfunctioning.

6. CHECK STEERING LOCK ECU (STEERING LOCK ACTUATOR ASSEMBLY) [w/ Smart Key System]



B110654E12

Fig. 12: Identifying Steering Lock ECU Connector Terminals (Steering Lock Actuator Assembly)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- a. Disconnect the D11 ECU connector.
- b. Measure the voltage and resistance according to the value (s) in the table below.

TERMINALS DESCRIPTION SPECIFIED CONDITION CHART

Terminal No. (Symbols)	Wiring Color	Terminal Description	Condition	Specified Condition
D11-1 (GND) - Body ground	W-B - Body ground	Ground	Always	Below 1 ohms
D11-6 (IG2) - D11-1 (GND)	V - W-B	Power supply	Ignition switch on (IG)	10 to 14V
D11-6 (IG2) - D11-1	V - W-B	Power supply	Ignition switch off	0 V

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(GND)				
D11-7 (B) - D11-1 (GND)	G - W-B	Battery power supply	Always	10 to 14 V

HINT:

If the result is not as specified, there may be a malfunction on the wire harness side.

- c. Reconnect the D11 ECU connector.
- d. Measure the pulse according to value (s) in the table below.

TERMINALS DESCRIPTION SPECIFIED CONDITION CHART

Terminal No. (Symbols)	Wiring Color	Terminal Description	Condition	Specified Condition
D11-5 (LIN) - D11-1 (GND)	GR - W-B	LIN Communication line	Ignition switch on (IG)	Pulse generation

HINT:

If the result is not as specified, the ECU may be malfunctioning.

DTC CHECK/CLEAR

HINT:

- When using Techstream with the ignition switch off to troubleshoot: Connect Techstream to the vehicle, and turn a courtesy light switch on and off at 1.5-second intervals until communication between the tester and vehicle begins.
- Refer to Techstream operator's manual for further details.

1. CHECK DTC

- a. Turn the ignition switch off.
- b. Connect Techstream to the DLC3.
- c. Turn the ignition switch on (IG) and turn the tester ON.
- d. Select the following menus: Body Electrical/Trouble Codes.
- e. Check for DTCs.

2. CLEAR DTC

- a. Turn the ignition switch off.
- b. Connect Techstream to the DLC3.
- c. Turn the ignition switch on (IG) and turn the tester ON.
- d. Select the following menus: Body Electrical/Trouble Codes.
- e. Erase the DTCs by pressing the YES button on the tester.

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DATA LIST/ACTIVE TEST

1. READ DATA LIST

NOTE:

- Using Techstream to read the DATA LIST allows values or status of switches, sensors, actuators and other items to be read without removing any parts. This non-intrusive inspection can be very useful because intermittent conditions or signals may be discovered before parts or wiring is disturbed. Reading the DATA LIST information early in troubleshooting is one way to save diagnostic time.
- In the table below, the values listed under "Normal Condition" are reference values. Do not depend solely on these reference values when deciding whether a part is faulty or not.

- a. Warm up the engine.
- b. Turn the ignition switch off.
- c. Connect Techstream to the DLC3.
- d. Turn the ignition switch on (IG).
- e. Turn the tester on.
- f. Enter the following menus.
 1. Techstream - Select: Body Electrical/Body/Main body/Data List /
- g. According to the display on the tester, read the "Data List".

Main Body ECU

TESTER DISPLAY NORMAL CONDITION CHART

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
Communication D-Door Motor	Connection status between power window regulator motor (for driver side) and main body ECU/OK or STOP	OK: Connection	DTC is output if an error occurs in LIN communication
Communication Slide Roof	Connection status between Sliding Roof ECU and main body ECU/OK or STOP	OK: Connection	DTC is output if an error occurs in LIN communication
Communication Smart/Wireless	Connection status between certification ECU and main body ECU/OK or STOP	OK: Connection	DTC is output if an error occurs in LIN communication

DIAGNOSTIC TROUBLE CODE CHART

DIAGNOSTIC TROUBLE CODE CHART

DTC Code	Detection Item	Trouble Area
<u>B1273</u>	Sliding Roof ECU	

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	Communication Stop	1. Sliding roof ECU (Sliding roof drive gear sub-assembly) ⁽¹⁾ 2. Main body ECU (Instrument panel junction block assembly) 3. Wire harness
<u>B2287</u>	LIN Communication Master Malfunction	1. Certification ECU (Smart key ECU assembly) 2. Main body ECU (Instrument panel junction block assembly) 3. Wire harness
<u>B2321</u>	Driver Side Door ECU Communication Stop	1. Front power window regulator motor assembly LH 2. Main body ECU (Instrument panel junction block assembly) 3. Wire harness
<u>B2325</u>	LIN Communication Bus Malfunction	1. Front power window regulator motor assembly LH 2. Sliding roof ECU (Sliding roof drive gear sub-assembly) ⁽¹⁾ 3. Main body ECU (Instrument panel junction block assembly) 4. Wire harness
<u>B2785</u>	Communication Malfunction between ECUs Connected by LIN	1. Certification ECU (Smart key ECU assembly) 2. Main body ECU (Instrument panel junction block assembly) 3. Steering lock ECU (Steering lock actuator assembly) 4. ID code box (Immobiliser code ECU) 5. Wire harness
<u>B2786</u>	No Response from Steering Lock ECU	1. Steering lock ECU (Steering

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		lock actuator assembly) 2. Certification ECU (Smart key ECU assembly) 3. Wire harness
B2789	No Response from ID BOX	1. ID code box (Immobiliser code ECU) 2. Certification ECU (Smart key ECU assembly) 3. Wire harness
(1) w/Sliding Roof		

DTC B1273 SLIDING ROOF ECU COMMUNICATION STOP

DESCRIPTION

This DTC is output when LIN communication between the sliding roof ECU (sliding roof drive gear) and main body ECU (instrument panel junction block assembly) stops for more than 10 seconds.

DTC DETECTION CONDITION CHART

DTC No.	DTC Detection Condition	Trouble Area
B1273	No communication between sliding roof drive gear and main body ECU (instrument panel junction block assembly) for more than 10 seconds	- Sliding roof ECU (Sliding roof drive gear sub-assembly) - Main body ECU (Instrument panel junction block assembly) - Wire harness

WIRING DIAGRAM

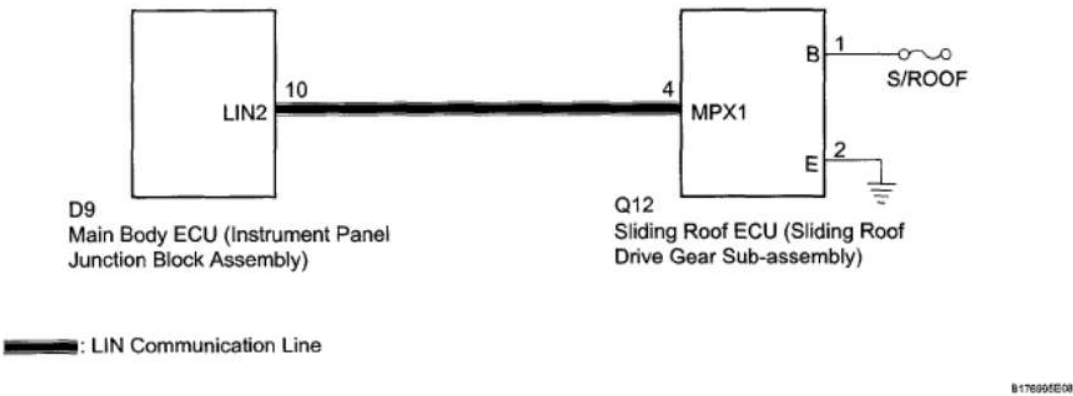


Fig. 13: Sliding Roof ECU Communication Stop - Wiring Diagram

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Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSPECTION PROCEDURE

NOTE: When using Techstream with the engine switch off to troubleshoot: Connect Techstream to the vehicle, and turn the courtesy switch on and off at 1.5-second intervals until communication between the tester and vehicle begins.

1. CHECK HARNESS AND CONNECTOR (MAIN BODY ECU - SLIDING ROOF ECU)

- a. Disconnect the D9 connector.
- b. Disconnect the Q12 connector.
- c. Measure the resistance according to the value (s) in the table below.

Standard resistance**TESTER CONNECTION SPECIFIED CONDITION CHART**

Tester Connection	Condition	Specified Condition
D9-10 (LIN2) - Q12-4 (MPX1)	Always	Below 1 ohms
Q12-4 (MPX1) - Body ground	Always	10 kohms or higher

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

Standard voltage**TESTER CONNECTION SPECIFIED CONDITION CHART**

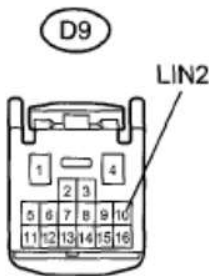
Tester Connection	Condition	Specified Condition
D9-10 (LIN2) - Body ground	Always	Below 1 V

NG: REPAIR OR REPLACE HARNESS OR CONNECTOR

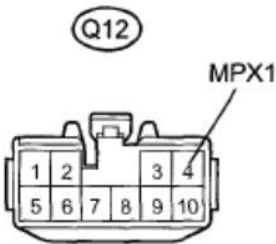
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Front view of wire harness connector:
(to Main Body ECU)



Front view of wire harness connector:
(to Sliding Roof ECU)



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Fig. 14: Identifying Sliding Roof ECU And Main Body ECU Connector Terminals
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

2. CHECK SLIDING ROOF ECU (SLIDING ROOF DRIVE GEAR SUB-ASSEMBLY)

- a. Disconnect the Q12 connector.
- b. Measure the resistance according to the value (s) in the table below.

Standard resistance

TESTER CONNECTION SPECIFIED CONDITION CHART

Tester Connection	Condition	Specified Condition
Q12-2 (E) - Body ground	Always	Below 1 ohms

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

Standard voltage

TESTER CONNECTION SPECIFIED CONDITION CHART

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Tester Connection	Condition	Specified Condition
Q12-1 (B) - Body ground	Always	11 to 14 V

NG: REPAIR OR REPLACE HARNESS OR CONNECTOR

Front view of wire harness connector:
(to Sliding Roof ECU)

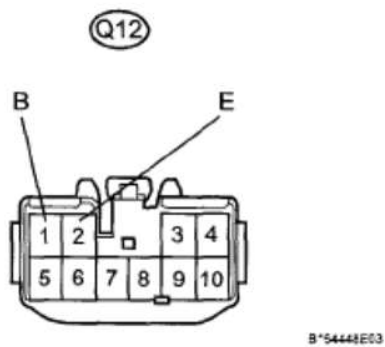


Fig. 15: Identifying Sliding Roof ECU Connector Terminals
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

3. REPLACE SLIDING ROOF ECU (SLIDING ROOF DRIVE GEAR SUB-ASSEMBLY)
- a. Replace the sliding roof ECU (sliding roof drive gear sub-assembly) with a normally-functioning or a new one (See **REMOVAL**).

b. Delete the DTC.
4. CHECK FOR DTC
- a. Recheck for DTC.

Result

RESULT CHART

Result	Proceed to
B1273 is not output	A
B1273 is output	B

B: REPLACE MAIN BODY ECU (INSTRUMENT PANEL JUNCTION BLOCK)

A: END

DTC B2287 LIN COMMUNICATION MASTER MALFUNCTION

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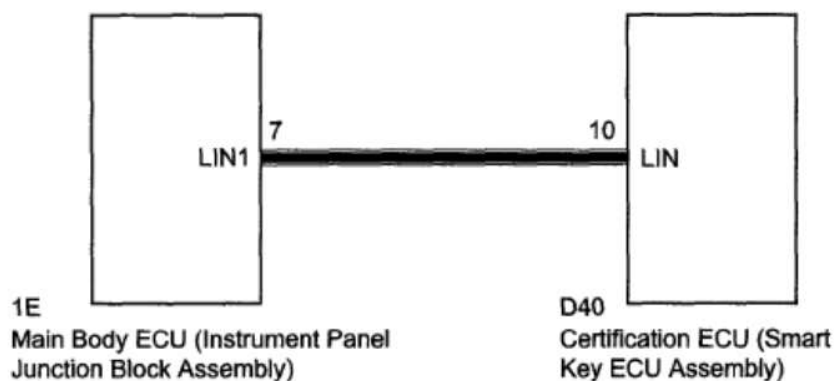
DESCRIPTION

This DTC is output when there is an open, short or ECU communication malfunction between the main body ECU (instrument panel junction block assembly) and certification ECU (smart key ECU assembly).

DTC DETECTION CONDITION CHART

DTC No.	DTC Detection Condition	Trouble Area
B2287	There is an open, short or ECU communication malfunction between main body ECU (instrument panel junction block assembly) and certification ECU (smart key ECU assembly).	• Certification ECU (Smart key ECU assembly) Main body ECU (Instrument panel junction block assembly) • Wire harness

WIRING DIAGRAM



8157653E08

Fig. 16: LIN Communication Master Malfunction - Wiring Diagram

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSPECTION PROCEDURE

NOTE: When using Techstream with the ignition switch off to troubleshoot: Connect Techstream to the vehicle, and turn the courtesy switch on and off at 1.5-second intervals until communication between the tester and vehicle begins.

1. CHECK HARNESS AND CONNECTOR (CERTIFICATION ECU - MAIN BODY ECU)

- Disconnect the D40 connector.
- Disconnect the 1E connector.
- Measure the resistance according to the value (s) in the table below.

Standard resistance

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TESTER CONNECTION SPECIFIED CONDITION CHART

Tester Connection	Condition	Specified Condition
D40-10 (LIN) - 1E-7 (LIN1)	Always	Below 1 ohms
D40-10 (LIN) or 1E-7 (LIN1) - Body ground	Always	10 kohms or higher

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

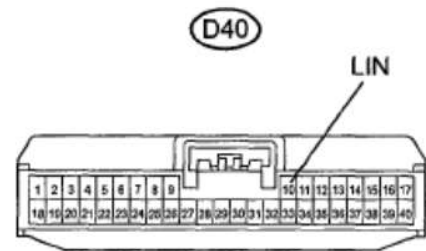
Standard voltage

TESTER CONNECTION SPECIFIED CONDITION CHART

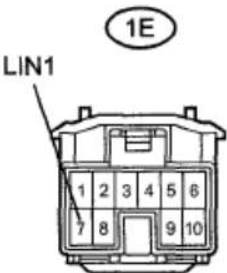
Tester Connection	Condition	Specified Condition
D40-10 (LIN) - Body ground	Always	Below 1 V

NG: REPAIR OR REPLACE HARNESS OR CONNECTOR

Front view of wire harness connector:
(to Certification ECU)



Front view of wire harness connector:
(to Main Body ECU)



8172356E03

Fig. 17: Identifying Certification ECU And Main Body ECU Connector Terminals
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

2. REPLACE MAIN BODY ECU (INSTRUMENT PANEL JUNCTION BLOCK)

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- a. Replace the main body ECU (instrument panel junction block assembly) with a normally-functioning or a new one.
- b. Delete the DTC.

3. CHECK FOR DTC

- a. Recheck for DTC.

Result

RESULT CHART

Result	Proceed to
B2287 is not output	A
B2287 is output	B

B: REPLACE CERTIFICATION ECU (SMART KEY ECU ASSEMBLY)

A: END

DTC B2321 DRIVER SIDE DOOR ECU COMMUNICATION STOP

DESCRIPTION

This DTC is output when LIN communication between the front power window regulator motor assembly LH and main body ECU (instrument panel junction block assembly) stops for more than 10 seconds.

DTC DETECTION CONDITION CHART

DTC No.	DTC Detection Condition	Trouble Area
B2321	No communication between front power window regulator motor assembly LH and main body ECU (instrument panel junction block assembly) for more than 10 seconds	• Front power window regulator motor assembly LH • Main body ECU (Instrument panel junction block assembly) • Wire harness

WIRING DIAGRAM

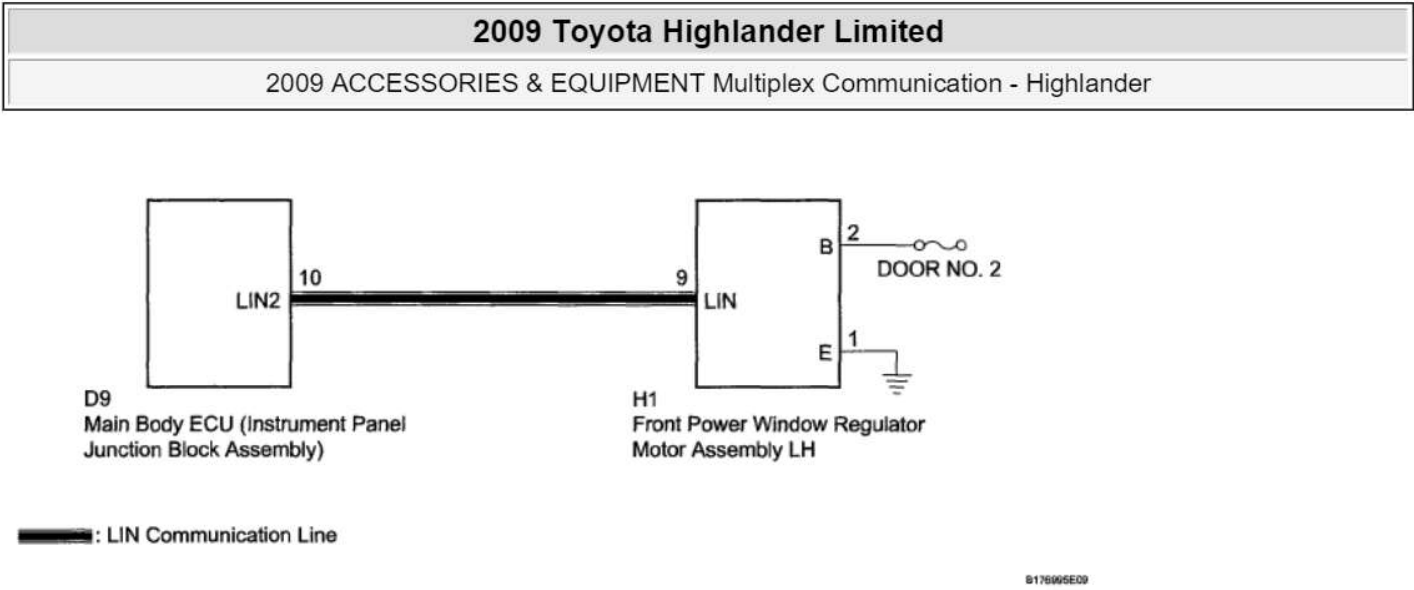


Fig. 18: Driver Side Door ECU Communication Stop - Wiring Diagram
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSPECTION PROCEDURE

NOTE: When using Techstream with the ignition switch off to troubleshoot: Connect Techstream to the vehicle, and turn the courtesy switch on and off at 1.5-second intervals until communication between the tester and vehicle begins.

1. **CHECK HARNESS AND CONNECTOR (MAIN BODY ECU - FRONT POWER WINDOW REGULATOR MOTOR LH)**
- a. Disconnect the D9 connector.
 - b. Disconnect the H1 connector.
 - c. Measure the resistance according to the value (s) in the table below.

Standard resistance

TESTER CONNECTION SPECIFIED CONDITION CHART

Tester Connection	Condition	Specified Condition
D9-10 (LIN2) - H1-9 (LIN)	Always	Below 1 ohms
D9-10 (LIN2) - Body ground	Always	10 kohms or higher

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

Standard voltage

TESTER CONNECTION SPECIFIED CONDITION CHART

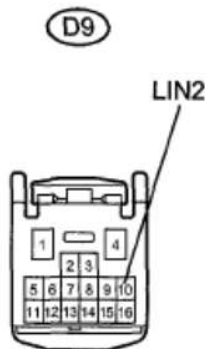
Tester Connection	Condition	Specified Condition
D9-10 (LIN2) - Body ground	Always	Below 1 V

NG: REPAIR OR REPLACE HARNESS OR CONNECTOR

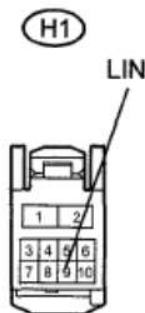
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Front view of wire harness connector:
(to Main Body ECU)



Front view of wire harness connector:
(to Front Power Window Regulator
Motor Assembly LH)



B177000E01

Fig. 19: Identifying Front Power Window Regulator Motor LH And Main Body ECU Connector Terminals

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

2. CHECK FRONT POWER WINDOW REGULATOR MOTOR ASSEMBLY LH

- a. Disconnect the H1 connector.
- b. Measure the resistance according to the value (s) in the table below.

Standard resistance

TESTER CONNECTION SPECIFIED CONDITION CHART

Tester Connection	Condition	Specified Condition
H1-1 (E) - Body ground	Always	Below 1 ohms

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

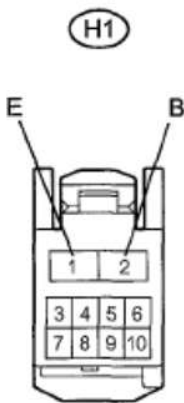
Standard voltage

TESTER CONNECTION SPECIFIED CONDITION CHART

Tester Connection	Condition	Specified Condition
H1-2 (B) - Body ground	Always	11 to 14 V

NG: REPAIR OR REPLACE HARNESS OR CONNECTOR

Front view of wire harness connector:
(to Front Power Window Regulator
Motor Assembly LH)



B176994E01

Fig. 20: Identifying Front Power Window Regulator Motor LH Connector Terminals
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

3. REPLACE FRONT POWER WINDOW REGULATOR MOTOR ASSEMBLY LH
- a. Replace the front power window regulator motor assembly LH with a normally-functioning or a new one (See **REMOVAL**).

b. Delete the DTC.
4. CHECK FOR DTC
- a. Recheck for DTC.

Result

RESULT CHART

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Result	Proceed to
B2321 is not output	A
B2321 is output	B

B: REPLACE MAIN BODY ECU (INSTRUMENT PANEL JUNCTION BLOCK)

A: END

DTC B2325 LIN COMMUNICATION BUS MALFUNCTION

DESCRIPTION

The main body ECU (instrument panel junction block assembly) monitors communication between all the ECUs connected to the door system LIN bus lines. When the main body ECU (instrument panel junction block assembly) detects errors in communication with all the ECUs connected to the door system LIN bus lines at 2.6-second intervals and 3 times in a row, DTC B2325 will be output.

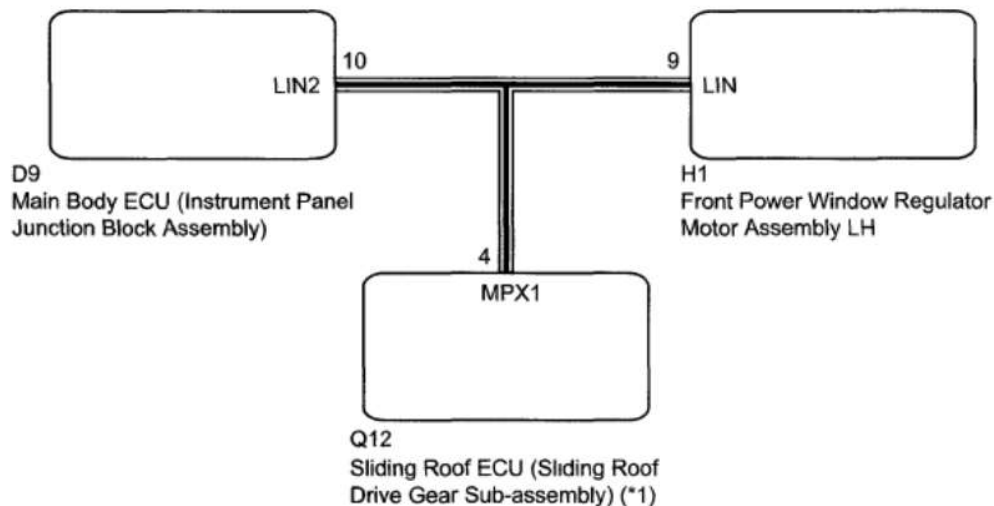
DTC DETECTION CONDITION CHART

DTC No.	DTC Detection Condition	Trouble Area
B2325	Main body ECU (instrument panel junction block assembly) detects errors in communication with the ECUs connected to the door system LIN bus lines 3 times in a row.	• Front power window regulator motor assembly LH • Sliding roof ECU (Sliding roof drive gear sub-assembly) *1 • Main body ECU (Instrument panel junction block assembly) • Wire harness
HINT: *1: w/ Sliding Roof		

WIRING DIAGRAM

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*1: w/ Sliding Roof

8162901ED8

Fig. 21: LIN Communication Bus Malfunction - Wiring Diagram
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSPECTION PROCEDURE

NOTE: When using Techstream with the ignition switch off to troubleshoot: Connect Techstream to the vehicle, and turn the courtesy switch on and off at 1.5-second intervals until communication between the tester and vehicle begins.

1. CHECK HARNESS AND CONNECTOR (MAIN BODY ECU - EACH ECU)

HINT:

*1: w/Sliding Roof

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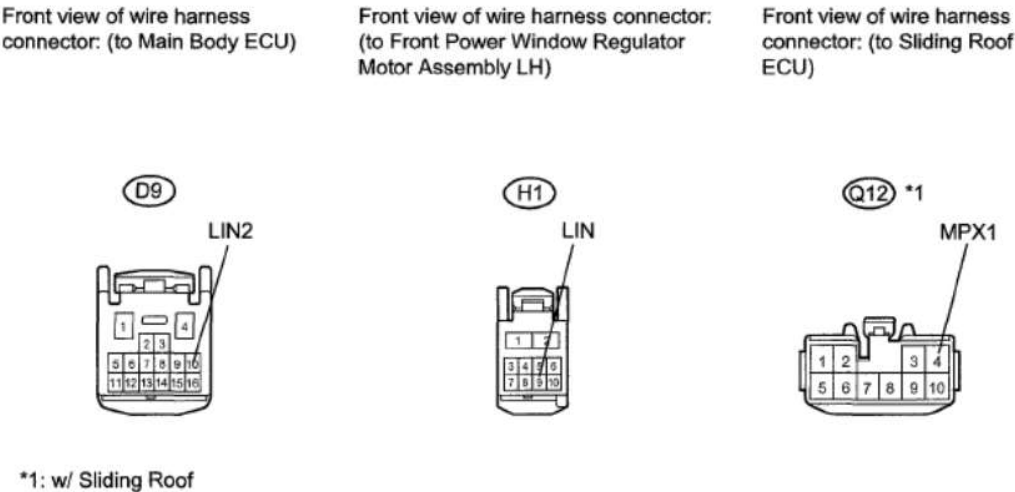


Fig. 22: Identifying D9, H1 And Q12 Connector Terminals
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- a. Disconnect the D9 connector.
- b. Disconnect the H1 connector.
- c. Disconnect the Q12^{*1} connector.
- d. Measure the resistance according to the value (s) in the table below.

Standard resistance

TESTER CONNECTION SPECIFIED CONDITION CHART		
Tester Connection	Condition	Specified Condition
D9-10 (LIN2) - H1-9 (LIN)	Always	Below 1 ohms
D9-10 (LIN2) - Q12 ^{*1} - 4 (MPX1)	Always	Below 1 ohms
D9-10 (LIN2) - Body ground	Always	10 kohms or higher

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

Standard voltage

TESTER CONNECTION SPECIFIED CONDITION CHART		
Tester Connection	Condition	Specified Condition
D9-10 (LIN2) - Body ground	Always	Below 1 V

NG: REPAIR OR REPLACE HARNESS OR CONNECTOR

OK: Go to next step

2. SYSTEM CHECK

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- a. Check the vehicle specifications.

Result

RESULT CHART

Result	Proceed to
Models with Sliding roof	A
Models without Sliding roof	B

B: Go to step 5

A: Go to next step

3. CHECK FOR DTC (SLIDING ROOF ECU)

- a. Connect the D9 connector.
- b. Connect the H1 connector.
- c. Check for DTC.

Result

RESULT CHART

Result	Proceed to
B2325 is output	A
B2325 is not output	B

B: REPLACE SLIDING ROOF DRIVE GEAR SUB-ASSEMBLY (See REMOVAL)

A: Go to next step

4. CHECK FOR DTC (POWER WINDOW ECU)

- a. Connect the Q12 connector.
- b. Disconnect the H1 connector.
- c. Recheck for DTC.

Result

RESULT CHART

Result	Proceed to
B2325 is output	A
B2325 is not output	B

B: REPLACE FRONT POWER WINDOW REGULATOR MOTOR ASSEMBLY LH (See REMOVAL)

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A: REPLACE MAIN BODY ECU (INSTRUMENT PANEL JUNCTION BLOCK)

5. REPLACE FRONT POWER WINDOW REGULATOR MOTOR ASSEMBLY LH

- a. Replace the front power window regulator motor assembly LH with a normally-functioning or a new one (See **REMOVAL**).

6. CHECK FOR DTC

- a. Recheck for DTC.

Result

RESULT CHART

Result	Proceed to
B2325 is not output	A
B2325 is output	B

B: REPLACE MAIN BODY ECU (INSTRUMENT PANEL JUNCTION BLOCK)

A: END

DTC B2785 COMMUNICATION MALFUNCTION BETWEEN ECUS CONNECTED BY LIN

DESCRIPTION

The certification ECU (smart key ECU assembly) monitors communication between all the ECUs connected to the certification ECU (smart key ECU assembly) system LIN bus lines. When the certification ECU (smart key ECU assembly) detects errors in communication with all the ECUs connected to the certification ECU (smart key ECU assembly) system LIN bus lines at a set interval and 3 times in a row, DTC B2785 will be output.

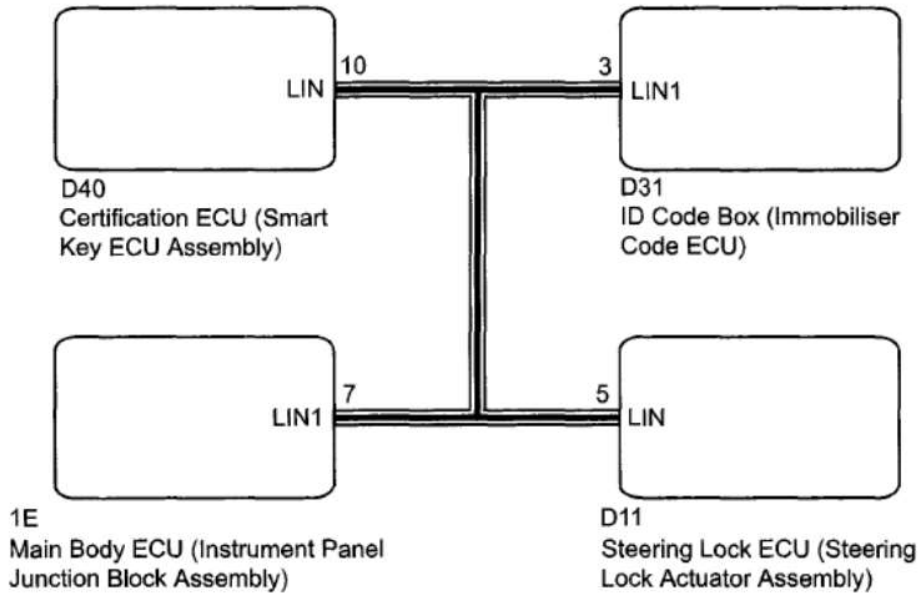
DTC DETECTION CONDITION CHART

DTC No.	DTC Detection Condition	Trouble Area
B2785	- Error in LIN communication between ECUs and an open or short in communication lines - LIN communication from certification ECU (smart key ECU assembly) stops for a set amount of time or more	- Certification ECU (Smart key ECU assembly) - Main body ECU (Instrument panel junction block assembly) - Steering lock ECU (Steering lock actuator assembly) - ID code box (Immobiliser code ECU) - Wire harness

WIRING DIAGRAM

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Fig. 23: Communication Malfunction Between ECU Connected By LIN - Wiring Diagram
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSPECTION PROCEDURE

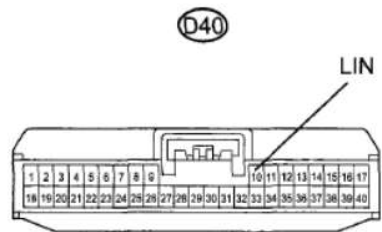
NOTE: When using Techstream with the ignition switch off to troubleshoot: Connect Techstream to the vehicle, and turn the courtesy switch on and off at 1.5-second intervals until communication between the tester and vehicle begins.

1. **CHECK HARNESS AND CONNECTOR (CERTIFICATION ECU - EACH ECU)**
 - a. Disconnect the D40 connector.
 - b. Disconnect the D31 connector.
 - c. Disconnect the 1E connector.
 - d. Disconnect the D11 connector.

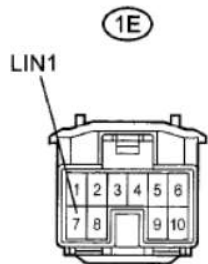
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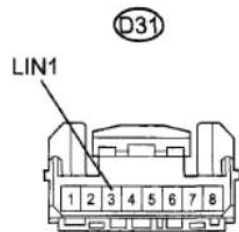
Front view of wire harness connector:
(to Certification ECU)



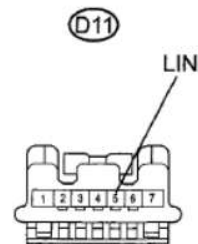
Front view of wire harness connector:
(to Main Body ECU)



Front view of wire harness connector:
(to ID Code Box)



Front view of wire harness connector:
(to Steering Lock ECU)



8176999E01

Fig. 24: Identifying D40, D31, 1E And D11 Connector Terminals
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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

Standard resistance

TESTER CONNECTION SPECIFIED CONDITION CHART

Tester Connection	Condition	Specified Condition
D40-10 (LIN) - D31-3 (LIN1)	Always	Below 1 ohms
D40-10 (LIN) - 1E-7 (MPX1)	Always	Below 1 ohms
D40-10 (LIN) - D11-5 (LIN)	Always	Below 1 ohms
D40-10 (LIN) - Body ground	Always	10 kohms or higher

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

Standard voltage

TESTER CONNECTION SPECIFIED CONDITION CHART

Tester Connection	Condition	Specified Condition
D40-10 (LIN) - Body ground	Always	Below 1 V

NG: REPAIR OR REPLACE HARNESS OR CONNECTOR

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OK: Go to next step

2. CHECK FOR DTC

- a. Connect the D40 connector.
- b. Connect the D31 connector.
- c. Connect the D11 connector.
- d. Check for DTC.

Result

RESULT CHART

Result	Proceed to
B2785 is output	A
B2785 is not output	B

B: Go to step 5

A: Go to next step

3. CHECK FOR DTC

- a. Connect the 1E connector.
- b. Disconnect the D11 connector.
- c. Check for DTC.

Result

RESULT CHART

Result	Proceed to
B2785 is output	A
B2785 is not output	B

B: Go to step 7

A: Go to next step

4. CHECK FOR DTC

- a. Connect the D11 connector.
- b. Disconnect the D31 connector.
- c. Check for DTC.

Result

RESULT CHART

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Result	Proceed to
B2785 is output	A
B2785 is not output	B

B: Go to step 9

A: REPLACE CERTIFICATION ECU (SMART KEY ECU ASSEMBLY)

5. REPLACE MAIN BODY ECU (INSTRUMENT PANEL JUNCTION BLOCK)

- a. Replace the main body ECU (instrument panel junction block assembly) with a normally-functioning or a new one.

6. CHECK FOR DTC

- a. Recheck for DTC.

Result

RESULT CHART

Result	Proceed to
B2785 is not output	A
B2785 is output	B

B: REPLACE CERTIFICATION ECU (SMART KEY ECU ASSEMBLY)

A: END

7. REPLACE STEERING LOCK ECU (STEERING LOCK ACTUATOR ASSEMBLY)

- a. Replace the steering lock ECU (steering lock actuator assembly) with a new one (See REMOVAL).

8. CHECK FOR DTC

- a. Recheck for DTC.

Result

RESULT CHART

Result	Proceed to
B2785 is not output	A
B2785 is output	B

B: REPLACE CERTIFICATION ECU (SMART KEY ECU ASSEMBLY)

A: END

9. REPLACE ID CODE BOX (IMMOBILISER CODE ECU)

- a. Replace the ID code box (immobiliser code ECU) with a new one.

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10. CHECK FOR DTC

- a. Recheck for DTC.

Result

RESULT CHART

Result	Proceed to
B2785 is not output	A
B2785 is output	B

B: REPLACE CERTIFICATION ECU (SMART KEY ECU ASSEMBLY)

A: END

DTC B2786 NO RESPONSE FROM STEERING LOCK ECU

DESCRIPTION

This DTC is output when LIN communication between the certification ECU (smart key ECU assembly) and steering lock ECU (steering lock actuator assembly) stops for more than 10 seconds.

DTC DETECTION CONDITION CHART

DTC No.	DTC Detection Condition	Trouble Area
B2786	No communication between steering lock ECU (steering lock actuator assembly) and certification ECU (smart key ECU assembly) for more than 10 seconds	- Steering lock ECU (Steering lock actuator assembly) - Certification ECU (Smart key ECU assembly) - Wire harness

WIRING DIAGRAM

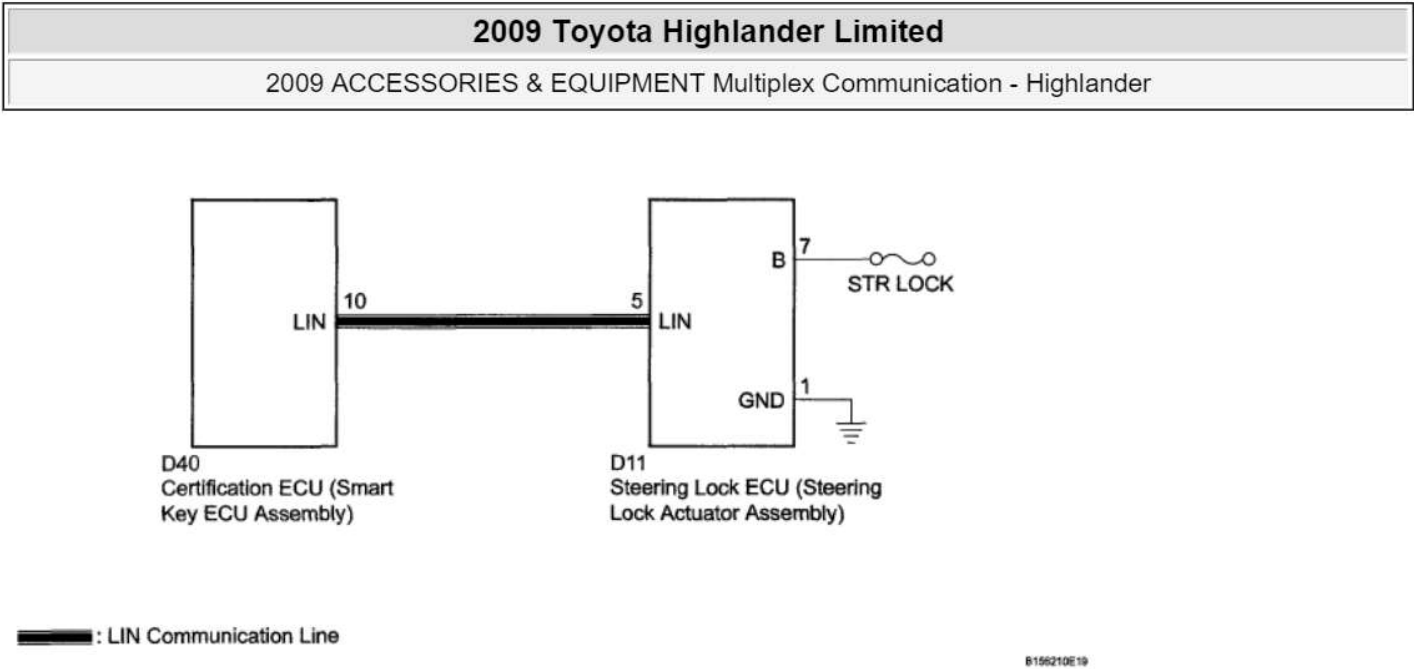


Fig. 25: No Response From Steering Lock ECU - Wiring Diagram
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSPECTION PROCEDURE

NOTE: When using Techstream with the ignition switch off to troubleshoot: Connect Techstream to the vehicle, and turn the courtesy switch on and off at 1.5-second intervals until communication between the tester and vehicle begins.

1. CHECK HARNESS AND CONNECTOR (CERTIFICATION ECU - STEERING LOCK ECU)
- a. Disconnect the D40 connector.

b. Disconnect the D11 connector.

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

Standard resistance

TESTER CONNECTION SPECIFIED CONDITION CHART

Tester Connection	Condition	Specified Condition
D40-10 (LIN) - D11-5 (LIN)	Always	Below 1 ohms
D40-10 (LIN) - Body ground	Always	10 kohms or higher

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

Standard voltage

TESTER CONNECTION SPECIFIED CONDITION CHART

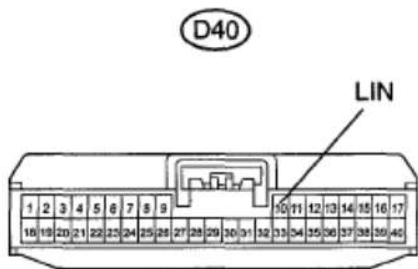
Tester Connection	Condition	Specified Condition
D40-10 (LIN) - Body ground	Always	Below 1 V

NG: REPAIR OR REPLACE HARNESS OR CONNECTOR

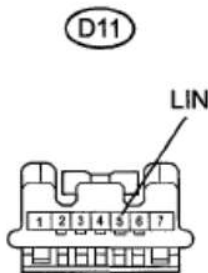
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Front view of wire harness connector:
(to Certification ECU)



Front view of wire harness connector:
(to Steering Lock ECU)



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Fig. 26: Identifying Certification ECU And Steering Lock ECU Connector Terminals
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

2. CHECK STEERING LOCK ECU (STEERING LOCK ACTUATOR ASSEMBLY)

- a. Disconnect the D11 connector.
- b. Measure the resistance according to the value (s) in the table below.

Standard resistance

TESTER CONNECTION SPECIFIED CONDITION CHART

Tester Connection	Condition	Specified Condition
D11-1 (GND) - Body ground	Always	Below 1 ohms

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

Standard voltage

TESTER CONNECTION SPECIFIED CONDITION CHART

Tester Connection	Condition	Specified Condition
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D11-7 (B) - Body ground	Always	11 to 14 V
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NG: REPAIR OR REPLACE HARNESS OR CONNECTOR

Front view of wire harness connector:
(to Certification ECU)

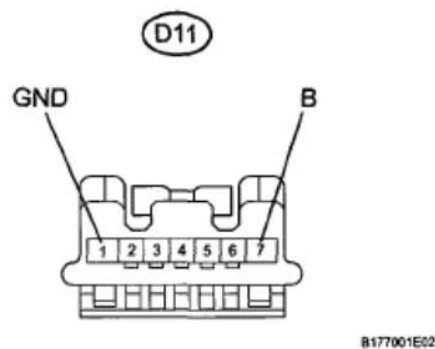


Fig. 27: Identifying Certification ECU Connector Terminals
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

3. REPLACE STEERING LOCK ECU (STEERING LOCK ACTUATOR ASSEMBLY)
- a. Replace the steering lock ECU (steering lock actuator assembly) with a normally-functioning or a new one (See **REMOVAL**).

b. Delete the DTC.
4. CHECK FOR DTC
- a. Recheck for DTC.

Result

RESULT CHART

Result	Proceed to
B2786 is not output	A
B2786 is output	B

B: REPLACE CERTIFICATION ECU (SMART KEY ECU ASSEMBLY)

A: END

DTC B2789 NO RESPONSE FROM ID BOX

DESCRIPTION

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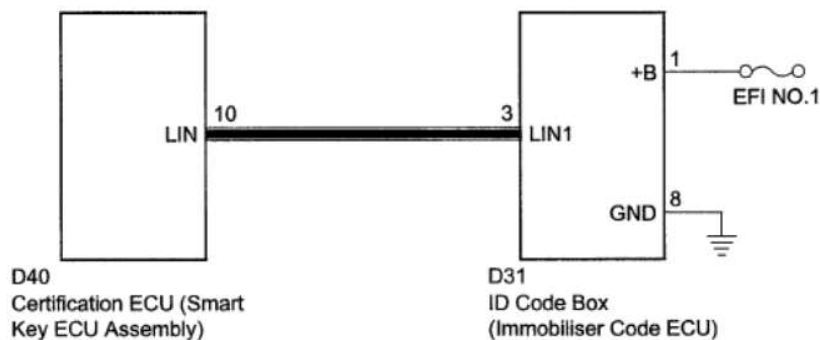
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This DTC is output when LIN communication between the certification ECU (smart key ECU assembly) and ID code box (immobiliser code ECU) stops for more than 10 seconds.

DTC DETECTION CONDITION CHART

DTC No.	DTC Detection Condition	Trouble Area
B2789	No communication between certification ECU (smart key ECU assembly) and ID code box (immobiliser code ECU) for more than 10 seconds	- ID code box (Immobiliser code ECU) - Certification ECU (Smart key ECU assembly) - Wire harness

WIRING DIAGRAM



— : LIN Communication Line

8156210E20

Fig. 28: No Response From ID Box - Wiring Diagram
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSPECTION PROCEDURE

NOTE: When using Techstream with the ignition switch off to troubleshoot: Connect Techstream to the vehicle, and turn the courtesy switch on and off at 1.5-second intervals until communication between the tester and vehicle begins.

- CHECK HARNESS AND CONNECTOR (CERTIFICATION ECU - ID CODE BOX)**
 - Disconnect the D40 and D31 connectors.
 - Measure the resistance according to the value (s) in the table below.

Standard resistance

TESTER CONNECTION SPECIFIED CONDITION CHART

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Tester Connection	Condition	Specified Condition
D40-10 (LIN) - D31-3 (LIN1)	Always	Below 1 ohms
D40-10 (LIN) - Body ground	Always	10 kohms or higher

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

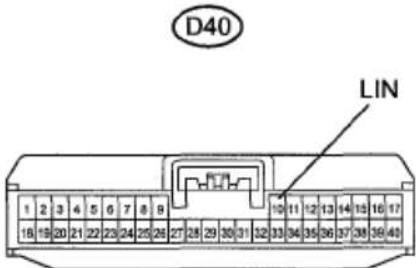
Standard voltage

TESTER CONNECTION SPECIFIED CONDITION CHART

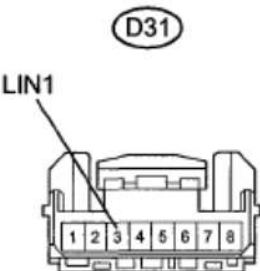
Tester Connection	Condition	Specified Condition
D40-10 (LIN) - Body ground	Always	Below 1 V

NG: REPAIR OR REPLACE HARNESS OR CONNECTOR

Front view of wire harness connector:
(to Certification ECU)



Front view of wire harness connector:
(to ID Code Box)



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Fig. 29: Identifying Certification ECU And ID Code Box Connector Terminals
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

2. CHECK ID CODE BOX (IMMOBILISER CODE ECU)

a. Disconnect the D31 connector.

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

Standard resistance

TESTER CONNECTION SPECIFIED CONDITION CHART

Tester Connection	Condition	Specified Condition
D31-8 (GND) - Body ground	Always	Below 1 ohms

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

Standard voltage

TESTER CONNECTION SPECIFIED CONDITION CHART

Tester Connection	Condition	Specified Condition
D31-1 (+B) - Body ground	Always	11 to 14 V

NG: REPAIR OR REPLACE HARNESS OR CONNECTOR

Front view of wire harness connector:
(to ID Code Box)

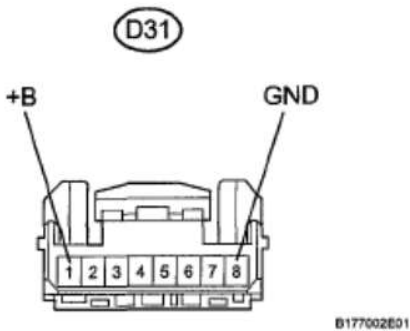


Fig. 30: Identifying ID Code Box Connector Terminals
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OK: Go to next step

3. REPLACE ID CODE BOX (IMMOBILISER CODE ECU)

- a. Replace the ID code box (immobiliser code ECU) with a new one.
- b. Delete the DTC.

4. CHECK FOR DTC

- a. Recheck for DTC.

Result

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RESULT CHART

Result	Proceed to
B2789 is not output	A
B2789 is output	B

B: REPLACE CERTIFICATION ECU (SMART KEY ECU ASSEMBLY)**A: END**