ENGINE IMMOBILISER SYSTEM (w/ Smart Key System)

PRECAUTION

1. PRECAUTIONS WHEN USING INTELLIGENT TESTER

(a) When using the intelligent tester to troubleshoot the smart access system: Connect the intelligent tester to the DLC3 while the engine switch off, and turn a door courtesy light switch on and off at 1.5-second intervals until communication between the tester and vehicle begins.

2. PRECAUTIONS FOR EACH FUNCTION

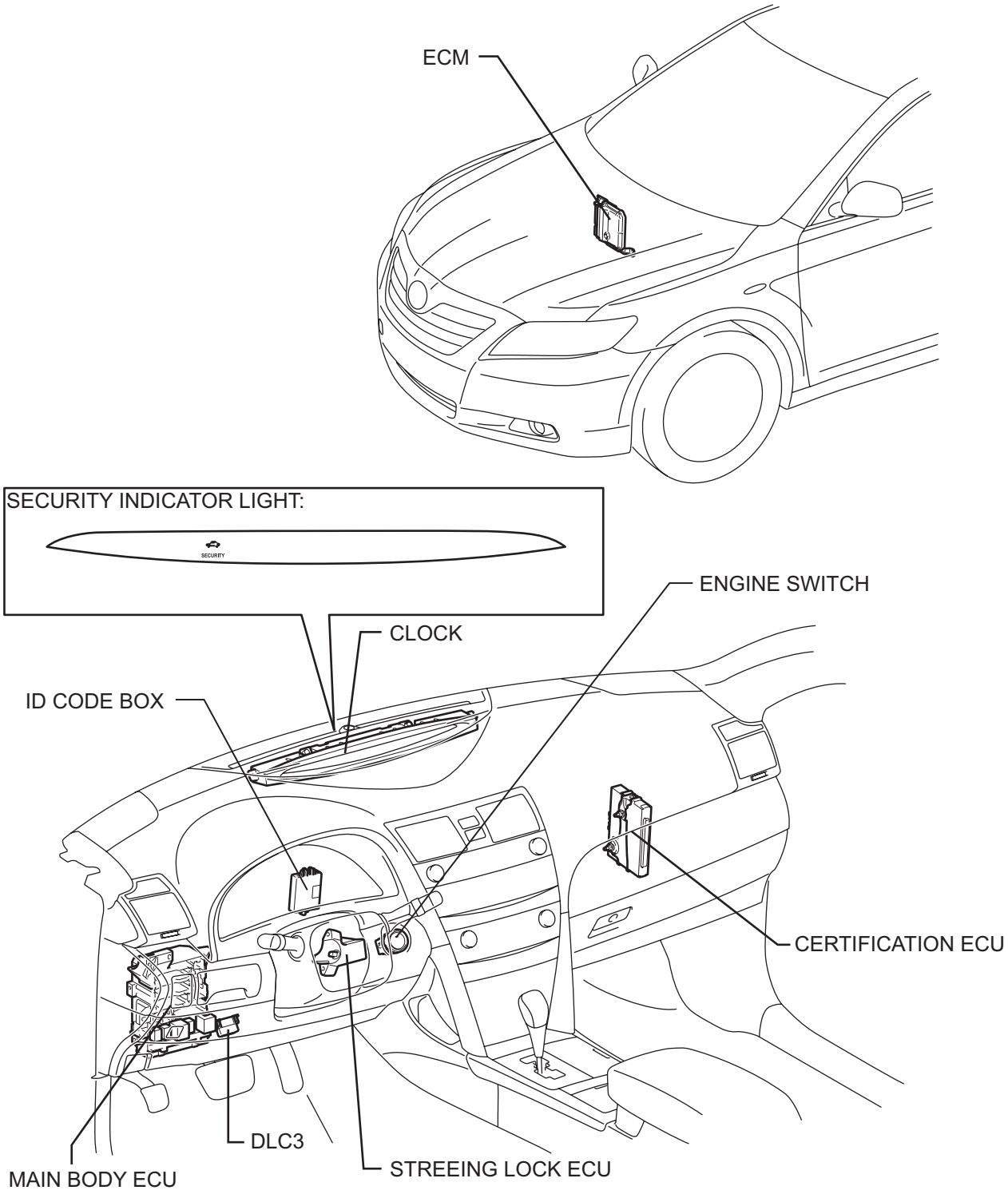
(a) Precautions for the electrical key:
The electrical key is a precision instrument. Be sure to observe the following:
(1) Do not drop or strike the electrical key.
(2) Do not allow the electrical key to be kept in a high temperature place for a long time.
(3) Do not use an ultrasonic washing machine to clean the electrical key.
(4) Keep the electrical key away from magnets or magnetized items during use.
(5) Do not attach any stickers to the electrical key.

(b) Precautions for the engine start function:
(1) Before starting the engine, firmly depress the brake pedal until the indicator of the engine switch illuminates in green.
(2) Be sure to turn the engine switch off before disconnecting the negative (-) battery terminal. When the battery terminal is disconnected, the power source mode (off, on (ACC), on (IG)) will remain in memory. When the vehicle's battery becomes discharged, be careful to remember the power source mode.
(3) After the battery is removed and reinstalled, be sure to wait 10 seconds or more before the next engine start. The engine may not start immediately after the battery is reinstalled.

(c) Precautions for the battery built into the electrical key and the vehicle battery:
(1) When the doors are locked (locked state), signals are emitted by the vehicle at a predetermined interval. If the vehicle were to remain parked for a long time, the vehicle battery could become discharged. To prevent this, periodically charge the vehicle battery, or disable the entry and start system.

(2) When the doors are locked (locked state), and the electrical key remains in the door oscillator detection area, the system will maintain periodic communication with the electrical key. If the vehicle remains parked in this state for a long time, the vehicle and key batteries could become discharged. If the vehicle is not being used, keep the electrical key at least 2 m (6.56 ft) from the vehicle.

PARTS LOCATION



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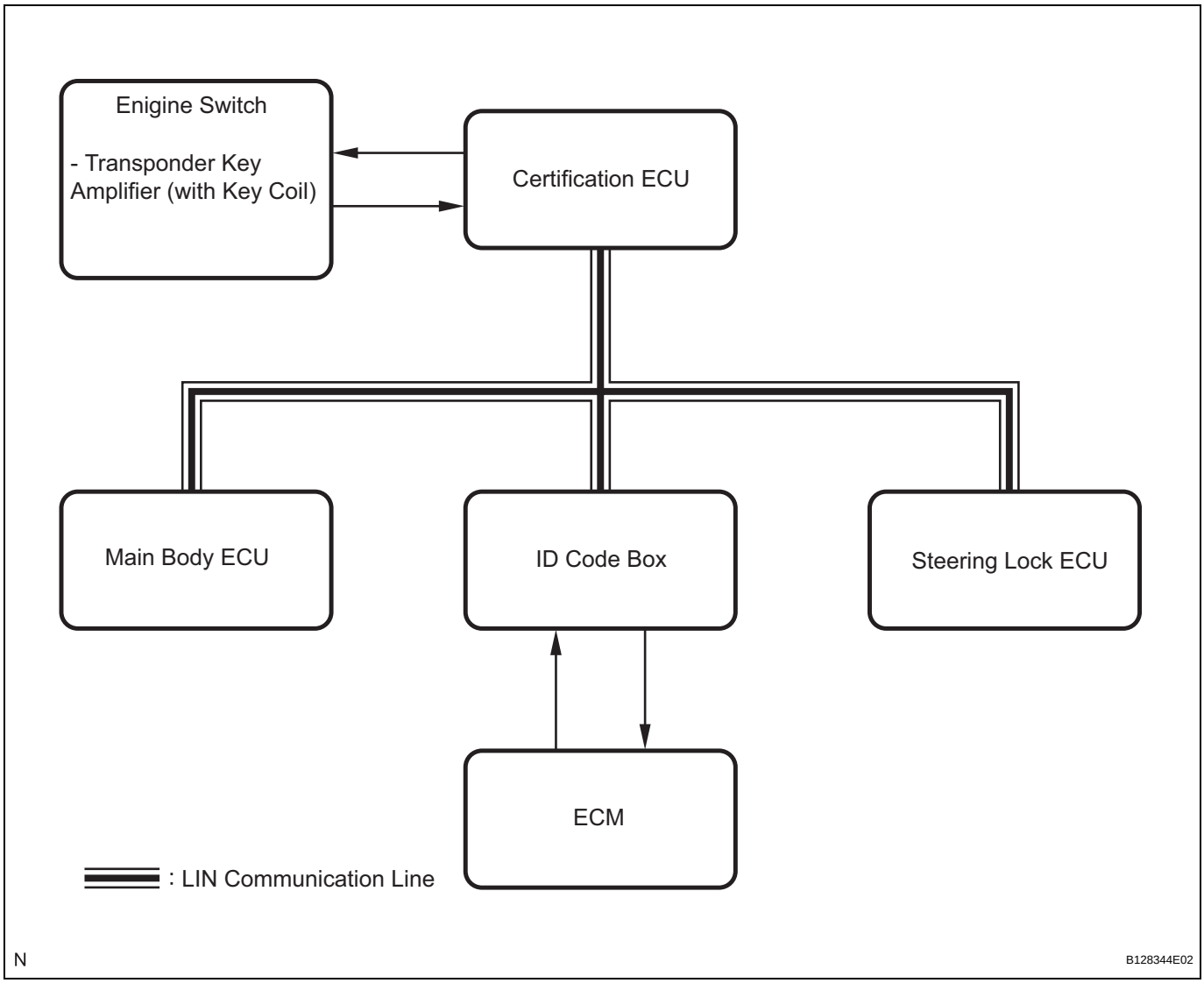
SYSTEM DIAGRAM



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Communication table:

Transmitting ECU (Transmitter)	Receiving ECU (Receiver)	Signals	Communication method
Main body ECU	Certification ECU	Key code recognition signal	LIN
ID code box	Certification ECU	DTC (B2791) signal	LIN
ID code box	Steering lock ECU	• Steering lock release signal • Matching request random number signal	LIN
ID code box	Certification ECU	Matching request random number signal	LIN

SYSTEM DESCRIPTION

1. ENGINE IMMOBILISER SYSTEM DESCRIPTION

(a) The immobiliser system is a theft deterrent system that determines whether to disable starting of the SFI system based on a comparison of the key's ID codes and the vehicle's pre-registered code. The immobiliser system compares the vehicle certification ECU's pre-registered ID code with the ID of the key-embedded transponder chip. If the ID codes do not match, the immobiliser system activates and the SFI system cannot be started. The certification ECU manages communication with the ECM, main body ECU, steering lock ECU and ID code box. When the ID codes of the transponder chip and certification ECU match, the certification ECU authorizes the SFI system to start.

2. FUNCTION OF MAIN COMPONENT

Component	Outline
Transponder key coil/amplifier (built into engine switch)	Receives key ID code, amplifies ID code and outputs the code to the certification ECU.
Indoor electrical key oscillator	Transmits key detection signals within the detection area in the vehicle interior upon receiving a transmission request signal from the certification ECU. Certification ECU request signal is activated when the key is brought into the vehicle interior and the engine switch is pushed.
Door control receiver	Receives an ID code from the key in the actuation area and transmits it to the certification ECU.
Security indicator	Illuminates or starts flashing. Illumination is controlled by the certification ECU.

3. SYSTEM FUNCTION

(a) Using entry function

(1) When the driver (or passenger) is sitting in the vehicle while carrying the key, and the engine switch is pressed while the brake pedal is depressed, the main body ECU recognizes that the engine start operation has occurred and sends a certification request signal to the certification ECU. Upon receipt of the certification request signal, the certification ECU sends a request signal to the indoor electrical key oscillator. Upon receipt of the request signal, the indoor electrical key oscillator sends a request signal to detect if the key is inside the vehicle. When the key receives this request signal, it answers by sending an ID code containing a response code through the glass antenna to the door control receiver. Upon receipt of the ID code, the certification ECU analyzes the code. If the interior certification passes, then the main body ECU sends a certification pass response signal. When the main body ECU receives this signal, the ACC relay is switched on and the IG1 and IG2 relays are switched on in sequence. At this time, the

engine switch indicator illuminates in green. Then the certification ECU checks that the power source mode has been changed and sends a steering lock command signal to the main body ECU. After receiving this signal, the main body ECU supplies power to the steering lock actuator. Then (via the ID code box) the steering lock ECU confirms that the certification ECU is certified and drives the steering actuator motor until the steering lock is unlocked. After unlocking the steering lock, an unlock completed signal is sent to the certification ECU. Upon receipt of this signal, the certification ECU sends an unset command signal to the ID code box. Once this signal is received, the ID code box confirms that the certification ECU is certified, sends an immobiliser unset command signal to the ECM and sends a security indicator light off signal to the certification ECU.

(b) Not using the entry function (when key battery is depleted)

(1) When the driver is sitting in the vehicle while carrying the key and the brake pedal is depressed, the main body ECU recognizes that the stop light switch is on and sends a key confirmation request signal to the certification ECU. Upon receipt of this signal, the certification ECU drives the immobiliser amplifier built in the engine switch. At this time, the engine switch sends an RF wave communication signal to the immobiliser. If the driver holds the key up to the engine switch at this time, the engine switch receives the immobiliser RF wave signal and responds by sending a radio wave signal. When the engine switch receives the radio wave signal from the key, it duplicates the signal and sends an ID code to the certification ECU. Upon receipt of the ID code, the code is analyzed. If the certification passes, a key certification pass response signal is sent to the main body ECU while simultaneously sending a sound buzzer request signal to the meter ECU. When the main body ECU receives this signal, the ACC relay is switched on and the IG1 and IG2 relays are switched on in sequence. At this time, the engine switch indicator illuminates in green. Then the certification ECU checks that the power source mode has been changed and sends a steering lock command signal to the main body ECU. After receiving this signal, the main body ECU supplies power to the steering lock actuator. Then (via the ID code box) the steering lock ECU confirms that the certification ECU is certified and drives the steering actuator

motor until the steering lock is unlocked. After unlocking the steering lock, an unlock completed signal is sent to the certification ECU. Upon receipt of this signal, the certification ECU sends an unset command signal to the ID code box. Once this signal is received, the ID code box confirms that the certification ECU is certified, sends an immobiliser unset command signal to the ECM and sends a security indicator light off signal to the certification ECU.

HOW TO PROCEED WITH TROUBLESHOOTING

HINT:

- Use the following procedures to troubleshoot the engine immobiliser system.
- The intelligent tester should be used in steps 3 and 5.

1 VEHICLE BROUGHT TO WORKSHOP

NEXT

2 CRANK ENGINE FOR MORE THAN 10 SECONDS

NEXT

3 CHECK FOR DTCS

(a) Check for DTCs and note any codes that are output (see page EI-24).
(b) Delete the DTCs.
(c) Recheck for DTCs. Based on the DTCs output above, try to duplicate the SFI system DTC or engine immobiliser system DTC by simulating the symptoms indicated by the DTC.

Result

Result	Proceed to
DTC output does not reoccur	A
SFI system DTC output reoccurs	B
Engine immobiliser system DTC output reoccurs	C

B → GO TO SFI SYSTEM

C → GO TO DTC CHART

A

4 PROBLEM SYMPTOMS TABLE

(a) If the fault is not listed on the problem symptoms table, proceed to A.
(b) If the fault is listed on the problem symptoms table, proceed to B.

B → GO TO STEP 6

A

EI

5	**OVERALL ANALYSIS AND TROUBLESHOOTING**

(a) DATA LIST/ACTIVE TEST (See page EI-24)
(b) TERMINALS OF ECU (See page EI-15)

NEXT

6	**ADJUST, REPAIR OR REPLACE**

NEXT

7	**CONFIRMATION TEST**

NEXT

END

REGISTRATION

1. DESCRIPTION OF CODE REGISTRATION

HINT:

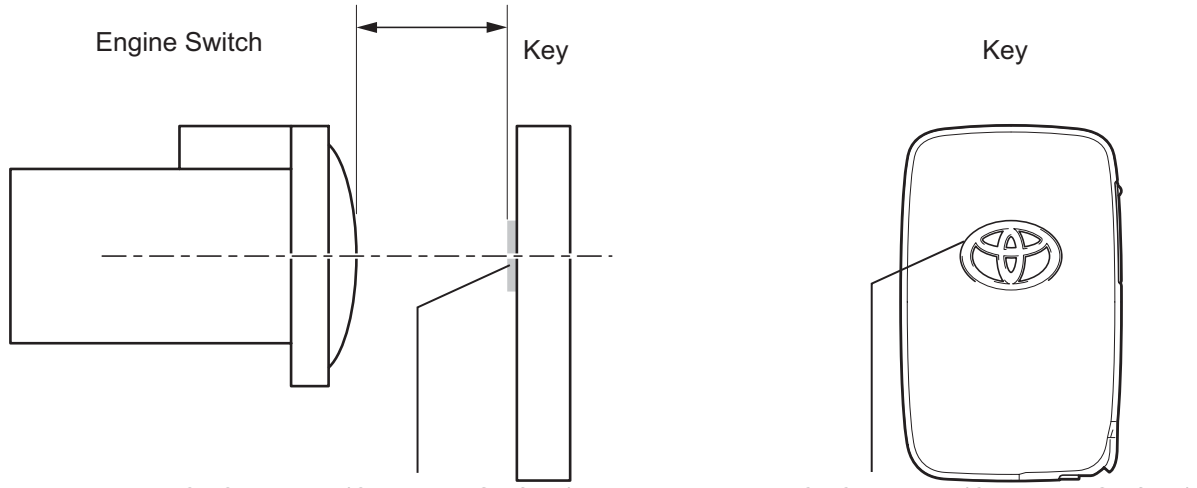
- ID codes are the same as recognition codes for the wireless transmitter and the engine immobiliser function. Registering an ID code enables the smart access system with push-button start, the wireless door lock control function and the engine immobiliser function to be operated.
- Code registration is needed when the certification ECU, ID code box, steering lock ECU or key is replaced with a new one.

(a) PROCEDURE "1"

The vehicle with the smart access system with push-button start system does not have a key slot. Therefore, hold the key close to the engine switch to register the key, as shown in the illustration below.

Hold the key with its ornament surface within a range of 10 mm (0.39 in.) or less from the engine switch.

Communication distance: 10 mm (0.39 in.) or less from the engine switch.



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2. PART REPLACEMENT KEY REGISTRATION

(a) The following table shows ECU replacement and key registration procedures in case the malfunctioning ECU has been identified after troubleshooting the smart access system with push-button start.

HINT:

- The following procedures indicated in the table below require the use of the intelligent tester:
  - New key ID registration
  - Additional key ID registration
  - Key ID erasure
  - ECU code registration
- If all of the registered keys are not available, replacement of the ID code box is also required.
- A maximum of 7 keys can be registered.

Part to be replaced	Condition		Procedure	Reference
Certification ECU	Customer has brought all keys		1. Replace certification ECU	-
			2. Reregister all keys (new key ID registration)	PROCEDURE "B"
	Some keys are lost	Key ID codes can be registered and erased	1. Erase key codes (key ID erasure)	PROCEDURE "D"
			2. Perform additional key registration procedure (additional key ID registration)	PROCEDURE "C"
			3. Replace certification ECU	-
			4. Reregister all keys (new key ID registration) HINT: If some keys are not registered during above steps, they will be disabled because they cannot be registered later	PROCEDURE "B"
		Key ID codes cannot be either registered or erased	1. Replace certification ECU	-
			2. Replace ID code box	-
			3. Reregister all keys (new key ID registration) HINT: If key codes cannot be erased or additional keys cannot be registered due to a malfunction in certification ECU, replace ID code box and certification ECU. If some keys are not registered during above steps, they will be disabled because they cannot be registered later	PROCEDURE "A"
			4. ECU communication ID registration	PROCEDURE "F"
ID code box	At least 1 key is available		1. Replace ID code box	-
			2. Register recognition codes in ECUs (ECU code registration)	PROCEDURE "E"
			3. ECU communication ID registration	PROCEDURE "F"
	All keys are lost		1. Replace ID code box	-
			2. Replace certification ECU	-
			3. Reregister all keys (new key ID registration) HINT: If some keys are not registered during above steps, they will be disabled because they cannot be registered later	PROCEDURE "A"
			4. ECU communication ID registration	PROCEDURE "F"

EI

Part to be replaced	Condition	Procedure	Reference
Steering lock ECU	Customer has brought at least 1 key	1. Replace steering lock ECU	-
		2. Register recognition codes in ECUs (ECU code registration)	PROCEDURE "E"
	All keys are lost	1. Replace steering lock ECU	-
		2. Replace certification ECU	-
		3. Replace ID code box	-
		4. Reregister all keys (new key ID registration) HINT: If some keys are not registered during above steps, they will be disabled because they cannot be registered later	PROCEDURE "A"
		5. ECU communication ID registration	PROCEDURE "F"
Main body ECU	No condition required	Replace main body ECU	-
ECM	No condition required	1. Replace ECM	-
		2. ECU communication ID registration	PROCEDURE "F"
Key	Customer has brought at least 1 key	1. Using remaining key, erase lost key code (key ID erasure)	PROCEDURE "D"
		2. Register additional keys as necessary (additional key ID registration)	PROCEDURE "E"
	All keys are lost	1. Replace certification ECU	-
		2. Replace ID code box	-
		3. Register all keys (new key ID registration) HINT: If customer brings lost keys at later date, they can be registered using additional key ID registration function	PROCEDURE "A"
		4. ECU communication ID registration	PROCEDURE "F"

3. KEY REGISTRATION

(a) PROCEDURE "A"

New key ID registration (when replacing certification ECU and ID code box, or certification ECU, ID code box and steering lock ECU)

EI

Process	Procedure
1. Start of registration	1. Connect intelligent tester (with CAN VIM) to DLC3 2. Turn engine switch on (IG) 3. Select "SMART ACCESS / ID UTILITY / SMART CODE REG" from tester menu HINT: The engine switch cannot be turned on (IG) more than 10 times. After connecting tester, turn tester on while turning driver's side door courtesy light switch on and off repeatedly at 1.5-second intervals or less to continue key registration procedure
2. Confirmation of ECU code	Perform operation according to prompts on tester screen HINT: The mode is automatically selected by tester, new registration mode or add mode
3. Verification of unregistered key *1	Hold unregistered key close to engine switch (For details, refer to PROCEDURE "1")
	Confirm that wireless door lock buzzer sounds. Place unregistered key on front passenger's side seat
	Confirm that wireless door lock buzzer sounds
4. Registration of ID code	Perform operation according to prompts on tester screen
5. End of registration	Finish new key ID code registration

*1: Repeat this process for each key which is to be registered for the vehicle. Finish the procedure for each key within 30 seconds. If the procedure for any of the keys has not been finished within the specified time, perform registration procedures from process 1 again. Make sure that only 1 key is in the cabin during registration procedures. If 2 or more keys are in the cabin simultaneously, electric waves will interfere with each other, preventing normal registration.

(b) PROCEDURE "B"
New key ID registration (when replacing certification ECU)

Process	Procedure
1. Start of registration	1. Connect intelligent tester (with CAN VIM) to DLC3 2. Turn engine switch on (IG) 3. Select "SMART ACCESS / ID UTILITY / SMART CODE REG" from tester menu HINT: The engine switch cannot be turned on (IG) more than 10 times. After connecting tester, turn tester on while turning driver's side door courtesy light switch on and off repeatedly at 1.5-second intervals or less to continue key registration procedure
2. Confirmation of ECU code	Perform operation according to prompts on tester screen HINT: The mode is automatically selected by tester, new registration mode or add mode
3. Confirmation of all registered keys *1	Hold unregistered key close to engine switch (For details, refer to PROCEDURE "1")
	Confirm that wireless door lock buzzer sounds
4. Confirmation of ECU code	Perform operation according to prompts on tester screen
5. Verification of unregistered key *2	Hold unregistered key close to engine switch (For details, refer to PROCEDURE "1")
	Confirm that wireless door lock buzzer sounds. Place unregistered key on front passenger side seat
	Confirm that wireless door lock buzzer sounds
5. Registration of ID code	Perform operation according to prompts on tester screen
6. End of registration	Finish new key ID code registration

*1: Repeat this process for each key registered for the vehicle. Finish the procedure for each key within 30 seconds. If the procedure for any of the keys has not been finished within the specified time, perform registration procedures from process 1 again. If performing the key confirmation procedure for a key, the security indicator comes on and remains on until all the keys are confirmed.
*2: Repeat this process for each key which is to be registered for the vehicle. Finish the procedure for each key within 30 seconds. If the procedure for any of the keys has not been finished within the specified time, perform registration procedures from 1 again. Make sure that only 1 key is in the cabin during registration procedures. If 2 or more keys are in the cabin simultaneously, electric waves will interfere with each other, preventing normal registration.

(c) PROCEDURE "C"
Additional key ID registration

Process	Procedure
1. Start of registration	1. Connect intelligent tester (with CAN VIM) to DLC3 2. Turn engine switch on (IG) 3. Select "SMART ACCESS / ID UTILITY / SMART CODE REG" from tester menu
2. Confirmation of registered key *1	Perform operation according to prompts on intelligent tester screen HINT: The mode is automatically selected by tester, new registration mode or add mode
	Hold unregistered key close to engine switch (For details, refer to PROCEDURE "1")
	Confirm that wireless door lock buzzer sounds once
3. Confirmation of ECU code	Perform operation according to prompts on tester screen
4. Verification of unregistered key *2	Hold unregistered key close to engine switch (For details, refer to PROCEDURE "1")
	Confirm that wireless door lock buzzer sounds. Place unregistered key on front passenger's side seat
	Confirm that wireless door lock buzzer sounds
5. Registration of ID code	Perform operation according to prompts on tester screen
6. End of registration	Finish key ID code registration

*1: Perform this process for one of the keys registered for the vehicle. Finish the procedure within 30 seconds. If the procedure has not been finished within the specified time, perform registration procedures from process 1 again.
*2: Repeat this process for each key which is to be registered for the vehicle. Finish the procedure for each key within 30 seconds. If the procedure for any of the keys has not been finished within the specified time, perform registration procedures from 1 again. Make sure that only 1 key is in the cabin during registration procedures. If 2 or more keys are in the cabin simultaneously, electric waves will interfere with each other, preventing normal registration.

(d) PROCEDURE "D"
Key ID erasure
HINT:
Erase all registered key codes except one.

Process	Procedure
1. Start of erasure	1. Connect intelligent tester (with CAN VIM) to DLC3 2. Turn engine switch on (IG) 3. Select "SMART ACCESS / ID UTILITY / SMART CODE ERS" from tester menu
2. Confirmation of registered key *1	Perform operation according to prompts on intelligent tester screen
	Hold unregistered key close to engine switch (For details, refer to PROCEDURE "1")
	Confirm that wireless door lock buzzer sounds once
3. Confirmation of ECU code	Perform operation according to prompts on tester screen
4. Erasure of ID code	Perform operation according to prompts on tester screen
5. End of erasure	Finish key ID code erasure

*1: Perform this process for one of the keys registered for the vehicle. Finish the procedure within 30 seconds. If the procedure has not been finished within the specified time, perform erasure procedures from process 1 again.

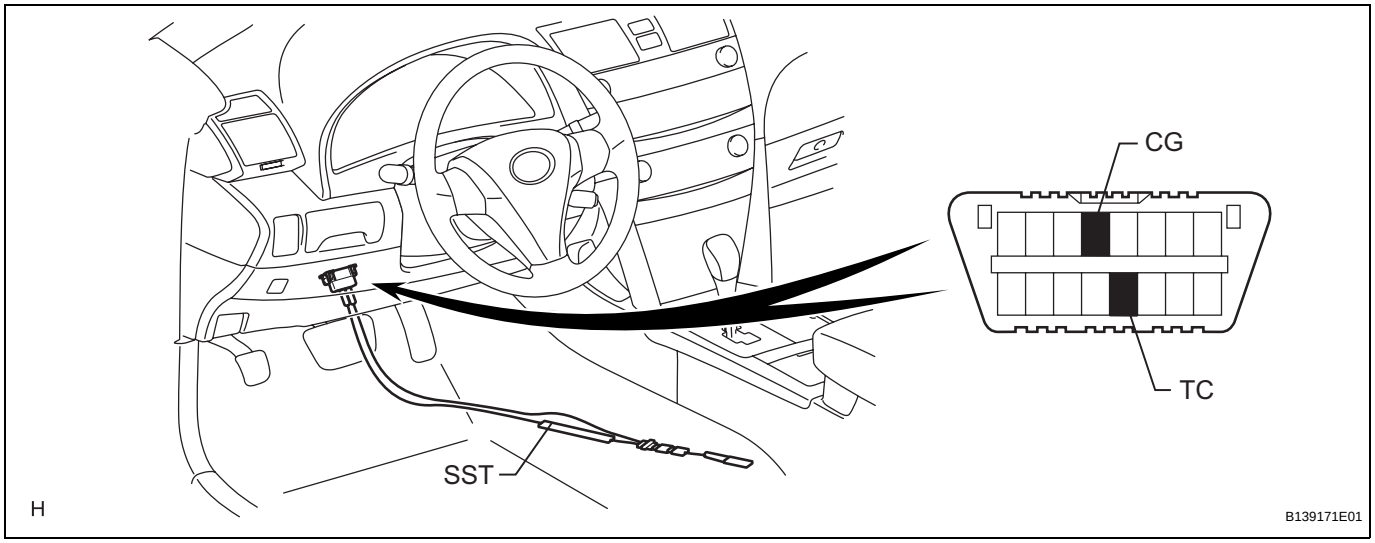
(e) PROCEDURE "E"
ECU code registration

Process	Procedure
1. Start of registration	1. Connect intelligent tester (with CAN VIM) to DLC3 2. Turn engine switch on (IG) 3. Select "SMART ACCESS / ID UTILITY / ECU COMM ID REG / ID Code Box and Steering Lock" from tester menu
2. Confirmation of registered key *1	Hold unregistered key close to engine switch (For details, refer to PROCEDURE "1")
	Confirm that wireless door lock buzzer sounds once
3. Registration of ECU code	Perform operation according to prompts on tester screen
4. End of registration	Finish ECU code registration

*1: Perform this process for one of the keys registered for the vehicle. Finish the procedure within 30 seconds. If the procedure has not been finished within the specified time, perform erasure procedures from process 1 again.

(f) PROCEDURE "F"
ECU communication ID registration
NOTICE:
- **The ECU communication ID should be registered when the ID code box and/or the ECM is replaced in order to match these ECM communication ID.**
- **The engine cannot be started unless the ECM communication ID matches.**

Register the ECU communication ID.



(1) Using SST, connect terminals TC and CG of the DLC3.
SST 09843-18040

(2) Turn the engine switch on (IG) and leave it for 30 minutes.
HINT:
Do not start the engine.
(3) Turn the engine switch off and disconnect terminals TC and CG.
(4) Check that the engine starts.

PROBLEM SYMPTOMS TABLE

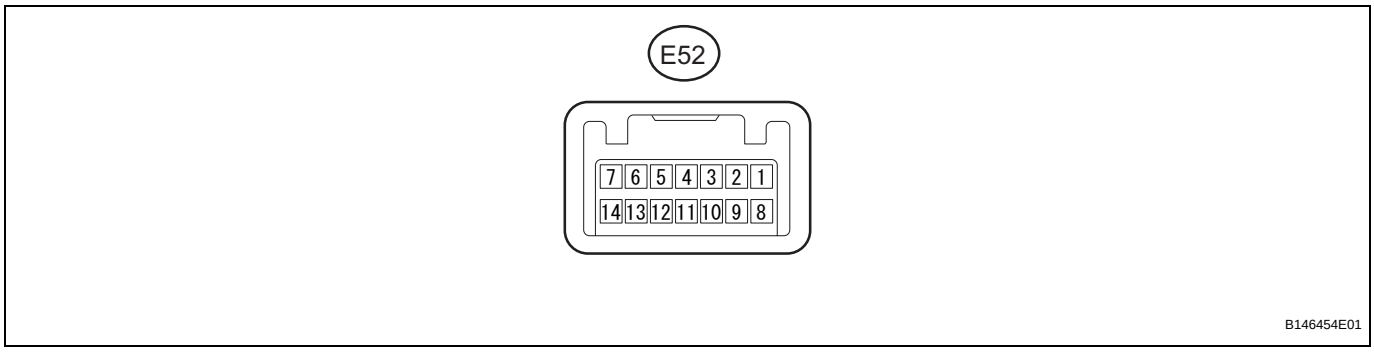
HINT:
Use the table below to help determine the cause of the problem symptom. The potential cases of the symptoms are listed in order of probability in the "Suspected Area" column of the table. Check each symptom by checking the suspected area in the order they are listed. Replace parts as necessary.

Engine Immobiliser System:

Symptom	Suspected area	See page
Engine does not start	1. Key	EI-24
	2. ID code box power source circuit	EI-45
	3. Certification ECU power source circuit	EI-48
	4. Steering lock ECU power source circuit	SR-30
	5. Smart access system	DL-142
	6. SFI system	ES-15

TERMINALS OF ECU

1. CHECK ENGINE SWITCH



(a) Disconnect the E52 switch connector.
(b) Measure the resistance according to the value(s) in the table below.

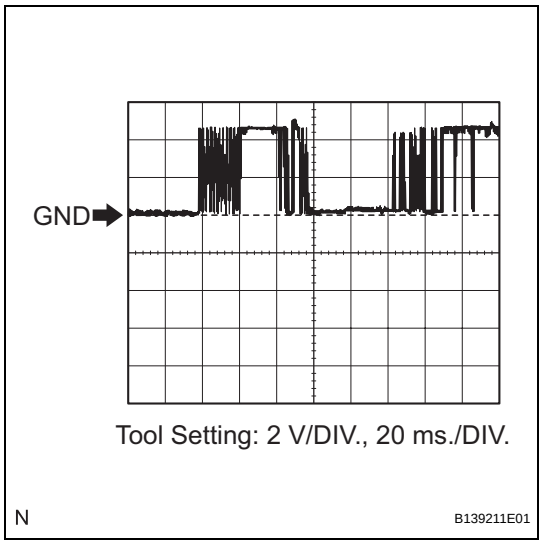
Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
AGND (E52-8) - Body ground	G - Body ground	Ground	Always	Below 1 Ω

If the result is not as specified, there may be a malfunction on the wire harness side.
(c) Reconnect the E52 switch connector.
(d) Measure the resistance and voltage according to the value(s) in the table below.

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
AGND (E52-8) - Body ground	G - Body ground	Ground	Always	Below 1 Ω
VC5 (E52-14) - AGND (E52-8)	R - G	Power supply	Key is not in cabin	Below 1 V
			Press engine switch	4.6 to 5.4 V
CODE (E52-10) - AGND (E52-8)	W - G	Demodulated signal of key code data	Key is not in cabin	Below 1 V
			Press engine switch and hold key close to engine switch*	Pulse generation (see waveform 1)
TXCT (E52-9) - AGND (E52-8)	GR - G	Key code output signal	Key is not in cabin	Below 1 V
			Press engine switch and hold key close to engine switch*	Pulse generation (see waveform 2)

HINT:
*: Remove the key battery before performing this inspection.
If the result is not as specified, the switch may have a malfunction.

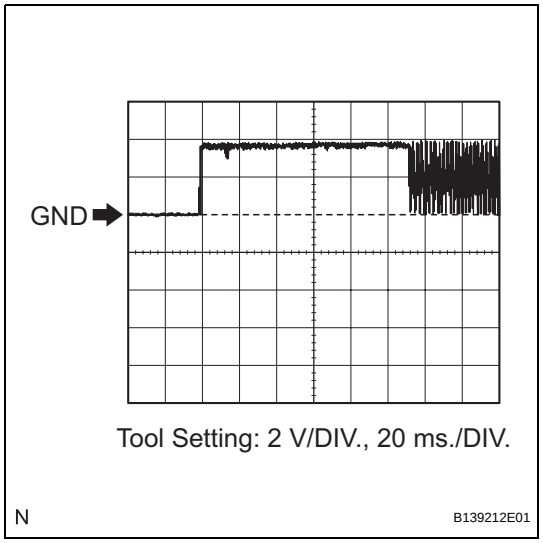
EI



(e) Inspect using an oscilloscope.
(1) Waveform 1 (Reference)

Item	Content
Symbols (Terminal No.)	CODE (E52-10) - AGND (E52-8)
Tool Setting	2 V/DIV., 20 ms./DIV.
Condition	Press engine switch and hold key close to engine switch*

HINT:
*: Remove the key battery before performing this inspection.

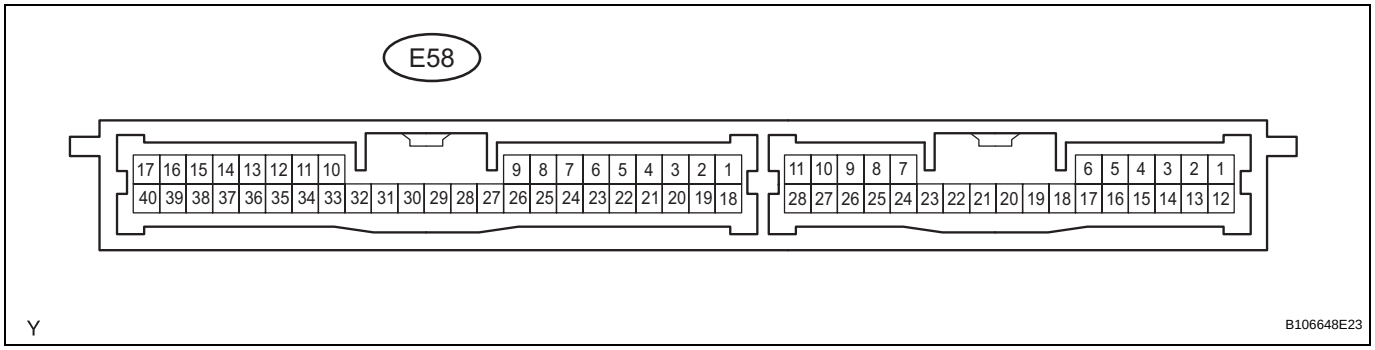


(2) Waveform 2 (Reference)

Item	Content
Symbols (Terminal No.)	TXCT (E52-9) - AGND (E52-8)
Tool Setting	2 V/DIV., 20 ms./DIV.
Condition	Press engine switch and hold key close to engine switch*

HINT:
*: Remove the key battery before performing this inspection.

2. CHECK CERTIFICATION ECU



(a) Disconnect the E58 ECU connector.
(b) Measure the resistance and voltage according to the value(s) in the table below.

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
E (E58-17) - Body ground	W-B - Body ground	Ground	Always	Below 1 Ω
+B (E58-1) - E (E58-17)	W - W-B	+B power supply	Always	10 to 14 V
IG (E58-18) - E (E58-17)	LG - W-B	Ignition power supply	Engine switch off	Below 1 V

If the result is not as specified, there may be a malfunction on the wire harness side.
(c) Reconnect the E58 ECU connector.

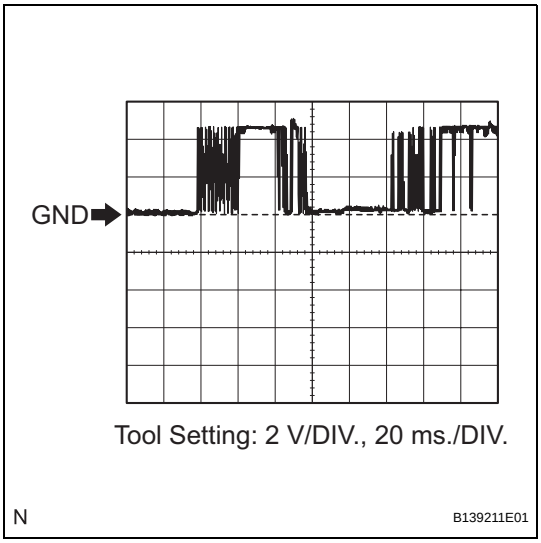
EI

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

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
AGND (E58-40) - Body ground	G - Body ground	Engine switch ground	Always	Below 1 Ω
VC5 (E58-30) - AGND (E58-40)	R - G	Engine switch power supply	Key is not in cabin	Below 1 V
			Press engine switch*	4.6 to 5.4 V
CODE (E58-9) - AGND (E58-40)	W - G	Engine switch CODE input	Key is not in cabin	Below 1 V
			Press engine switch and hold key close to engine switch*	Pulse generation (see waveform 1)
TXCT (E58-8) - AGND (E58-40)	GR - G	Engine switch TXCT output	Key is not in cabin	Below 1 V
			Press engine switch and hold key close to engine switch*	Pulse generation (see waveform 2)

HINT:
*: Remove the key battery before performing this inspection.
If the result is not as specified, the ECU may have a malfunction.

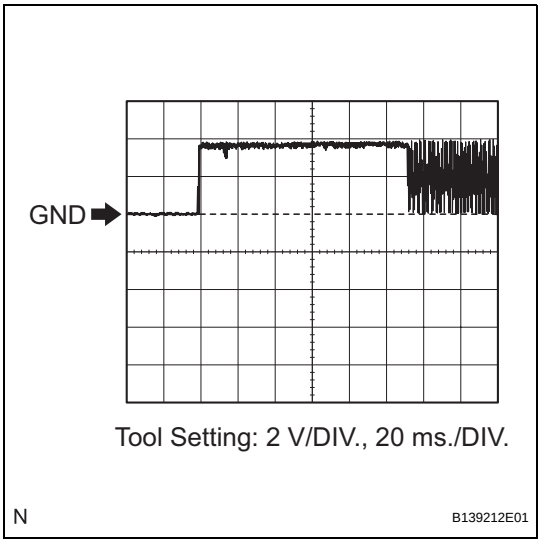
(e) Inspect using an oscilloscope.
(1) Waveform 1 (Reference)



Item	Content
Symbols (Terminal No.)	CODE (E58-9) - AGND (E58-40)
Tool Setting	2 V/DIV., 20 ms./DIV.
Condition	Press engine switch and hold key close to engine switch*

HINT:
*: Remove the key battery before performing this inspection.

(2) Waveform 2 (Reference)

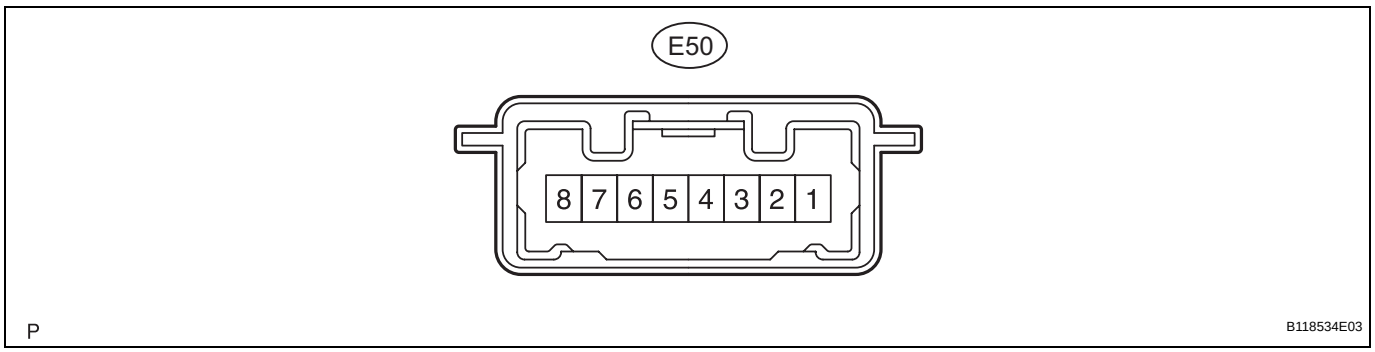


Item	Content
Symbols (Terminal No.)	TXCT (E58-8) - AGND (E58-40)
Tool Setting	2 V/DIV., 20 ms./DIV.
Condition	Press engine switch and hold key close to engine switch*

HINT:
*: Remove the key battery before performing this inspection.

EI

3. CHECK ID CODE BOX



(a) Disconnect the E50 ECU connector.
(b) Measure the resistance and voltage according to the value(s) in the table below.

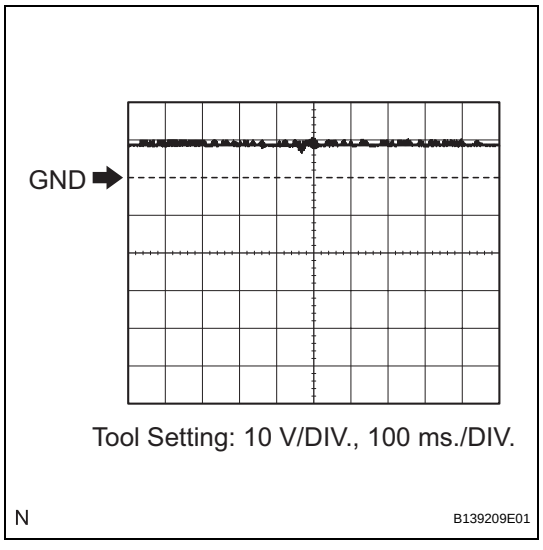
Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
GND (E50-8) - Body ground	W-B - Body ground	Ground	Always	Below 1 Ω
+B (E50-1) - GND (E50-8)	W - W-B	+B power supply	Always	10 to 14 V

If the result is not as specified, there may be a malfunction on the wire harness side.
(c) Reconnect the E50 ECU connector.
(d) Measure the voltage according to the value(s) in the table below.

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
EFII (E50-5) - GND (E50-8)	G - W-B	ECM input signal	Engine switch off	Below 1 V
			Engine switch on (IG)	Pulse generation (see waveform 1)
EFIO (E50-6) - GND (E50-8)	L - W-B	ECM output signal	Engine switch off	Below 1 V
			Engine switch on (IG)	Pulse generation (see waveform 2)

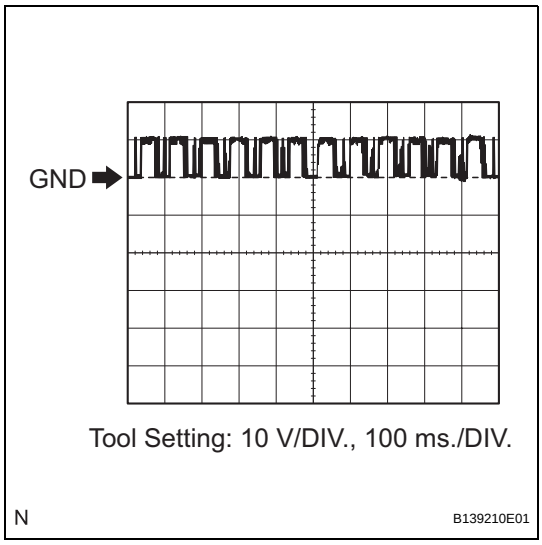
If the result is not as specified, the ECU may have a malfunction.

(e) Inspect using an oscilloscope.
(1) Waveform 1 (Reference)



Item	Content
Symbols (Terminal No.)	EFII (E50-5) - GND (E50-8)
Tool Setting	10 V/DIV., 100 ms./DIV.
Condition	Engine switch on (IG)

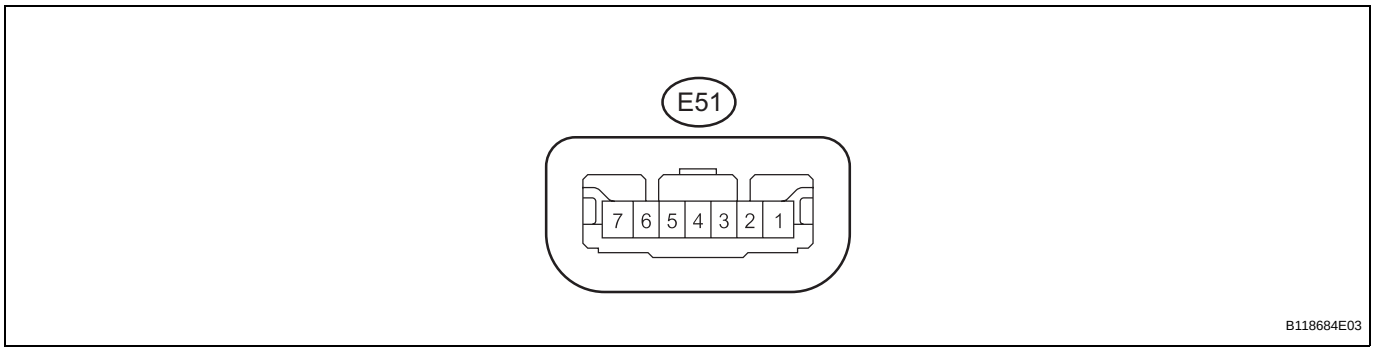
EI



(2) Waveform 2 (Reference)

Item	Content
Symbols (Terminal No.)	EFIO (E50-6) - GND (E50-8)
Tool Setting	10 V/DIV., 100 ms./DIV.
Condition	Engine switch on (IG)

4. CHECK STEERING CONTROL ECU

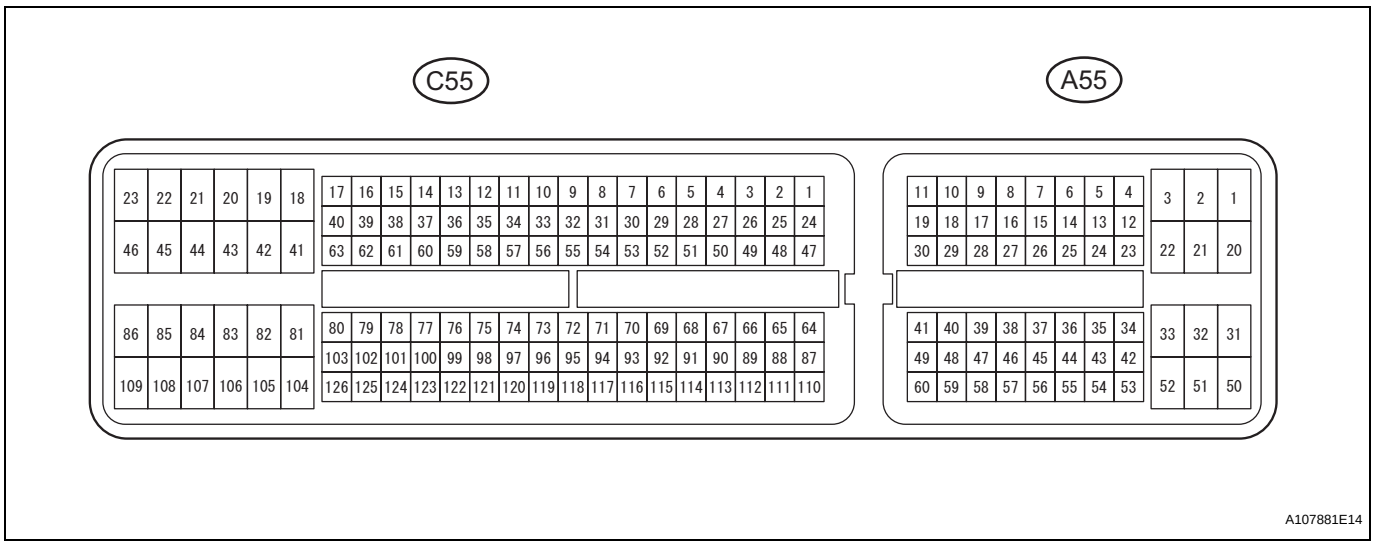


(a) Disconnect the E51 ECU connector.
(b) Measure the resistance and voltage according to the value(s) in the table below.

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
SGND (E51-2) - Body ground	W-B - Body ground	Ground	Always	Below 1 Ω
GND (E51-1) - Body ground	W-B - Body ground	Ground	Always	Below 1 Ω
B (E51-7) - Body ground	P - Body ground	+B power supply	Always	10 to 14 V
IG2 (E51-6) - Body ground	B - Body ground	Ignition power supply	Engine switch off	0 V
			Engine switch on (IG)	10 to 14 V

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

5. CHECK ECM

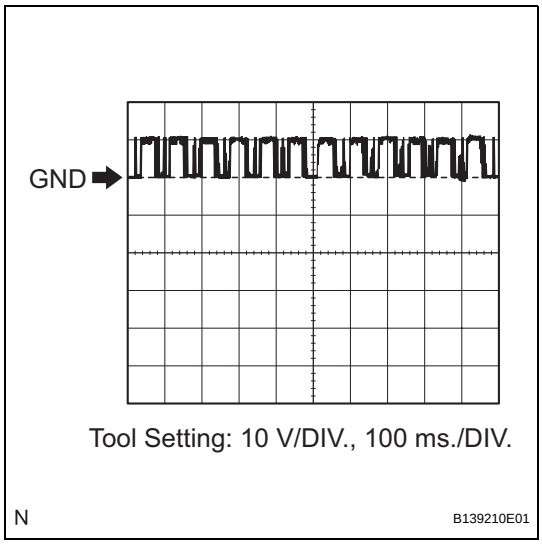


(a) Measure the resistance and voltage according to the value(s) in the table below.

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
E1 (C55-81) - Body ground	W-B - Body ground	Ground	Always	Below 1 Ω
E01 (C55-22) - Body ground	W-B - Body ground	Ground	Always	Below 1 Ω
E02 (C55-21) - Body ground	B-W - Body ground	Ground	Always	Below 1 Ω
E03 (C55-104) - Body ground	B - Body ground	Ground	Always	Below 1 Ω
E04 (C55-23) - Body ground	W - Body ground	Ground	Always	Below 1 Ω
E05 (C55-46) - Body ground	W - Body ground	Ground	Always	Below 1 Ω
ME01 (C55-20) - Body ground	B - Body ground	Ground	Always	Below 1 Ω
BATT (A55-20) - E1 (C55-81)	Y - W-B	Battery (for measuring battery voltage and for ECM memory)	Always	10 to 14 V
+B (A55-2) - E1 (C55-81)	R - W-B	Power source of ECM	Engine switch off	Below 1 V
			Engine switch on (IG)	10 to 14 V
IMI (A55-11) - E1 (C55-81)	Y - W-B	Immobiliser code ECU input signal	Engine switch off	Below 1 V
			Engine switch on (IG)	Pulse generation (see waveform 1)
IMO (A55-10) - E1 (C55-81)	G - W-B	Immobiliser code ECU output signal	Engine switch off	Below 1 V
			Engine switch on (IG)	Pulse generation (see waveform 2)

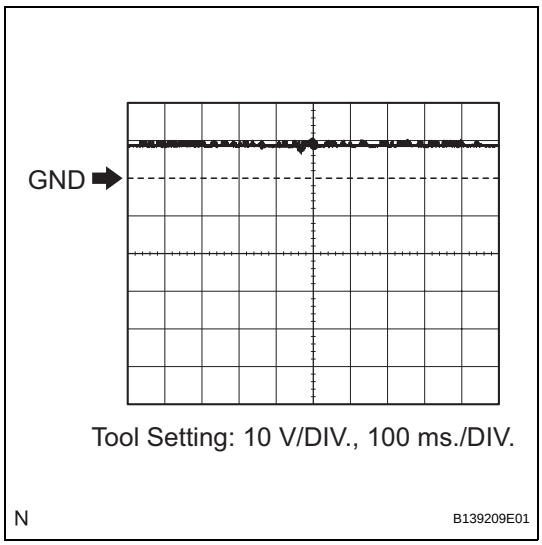
If the result is not as specified, the ECM may have a malfunction.

EI



(b) Inspect using an oscilloscope.
(1) Waveform 1 (Reference)

Item	Content
Symbols (Terminal No.)	IMI (A55-11) - E1 (C55-81)
Tool Setting	10 V/DIV., 100 ms./DIV.
Condition	Engine switch on (IG)



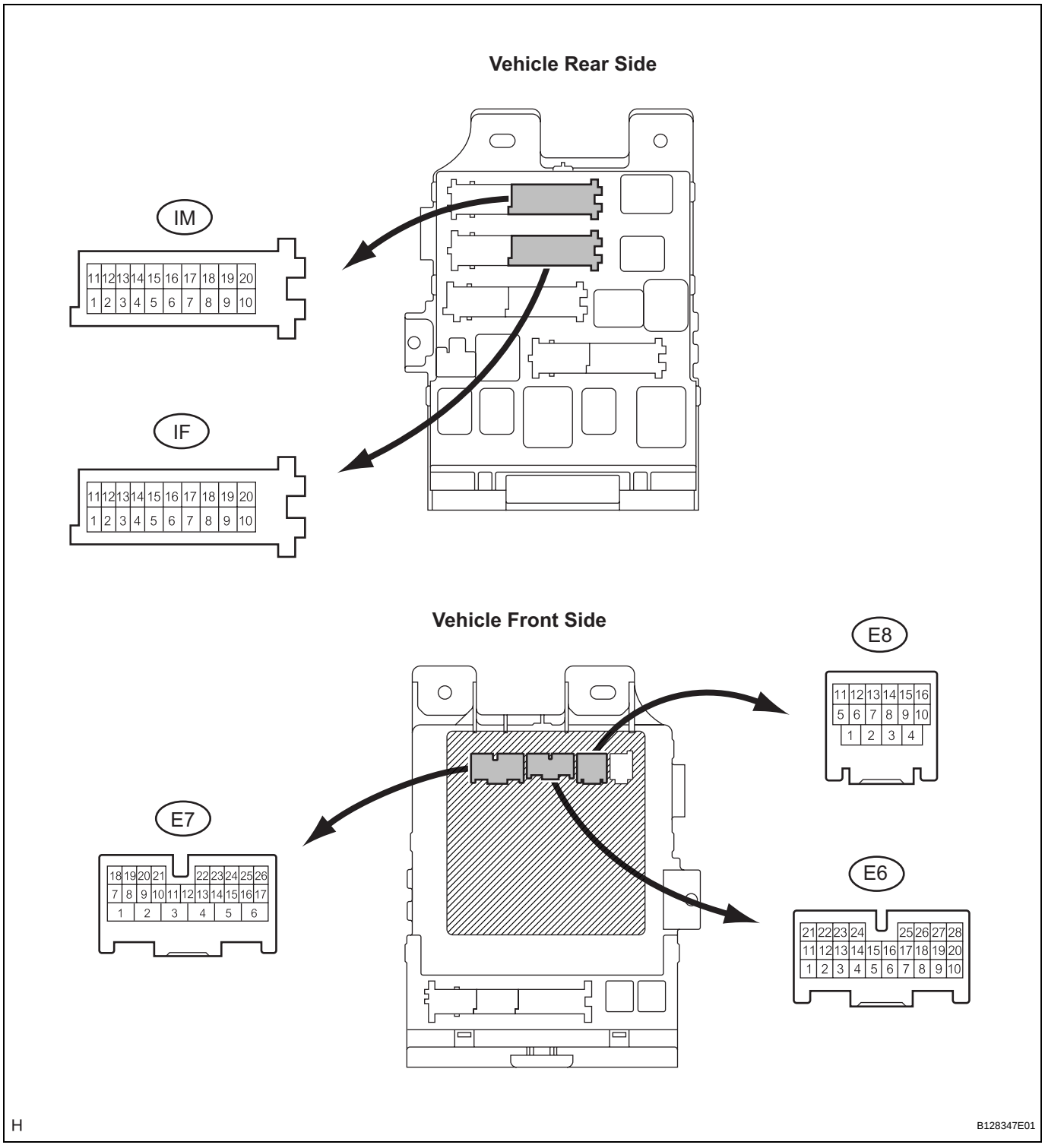
(2) Waveform 2 (Reference)

Item	Content
Symbols (Terminal No.)	IMO (A55-10) - E1 (C55-10)
Tool Setting	10 V/DIV., 100 ms./DIV.
Condition	Engine switch on (IG)

6. CHECK MAIN BODY ECU (INSTRUMENT PANEL J/B)

(a) Disconnect the IF and IM junction block connectors.

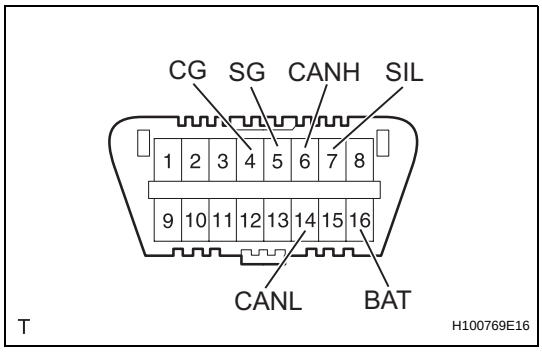
(b) Disconnect the E8, E7 and E6 main body ECU connectors.



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

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
GND1 (IF-10) - Body ground	W-B - Body ground	Ground	Always	Below 1 Ω
GND2 (IM-9) - Body ground	W-B - Body ground	Ground	Always	Below 1 Ω
GND3 (E8-1) - Body ground	W-B - Body ground	Ground	Always	Below 1 Ω
AM1 (E7-6) - Body ground	L - Body ground	+B power supply	Always	10 to 14 V
AM2 (E6-1) - Body ground	L - Body ground	+B power supply	Always	10 to 14 V

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



DIAGNOSIS SYSTEM

1. CHECK DLC3

(a) The vehicle's ECU uses ISO 15765-4 for communication protocol. The terminal arrangement of the DLC3 complies with SAE J1962 and matches the ISO 15765-4 format.

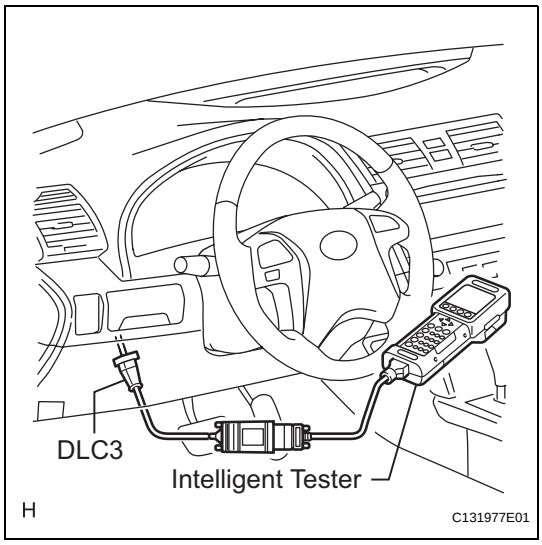
Symbols (Terminal No.)	Terminal Description	Condition	Specified Condition
SIL (7) - SG (5)	Bus "+" line	During transmission	Pulse generation
CG (4) - Body ground	Chassis ground	Always	Below 1 Ω
SG (5) - Body ground	Signal ground	Always	Below 1 Ω
BAT (16) - Body ground	Battery positive	Always	10 to 14 V
CANH (6) - CANL (14)	CAN bus line	Engine switch off*	54 to 69 Ω
CANH (6) - CG (4)	HIGH-level CAN bus line	Engine switch off*	200 Ω or higher
CANL (14) - CG (4)	LOW-level CAN bus line	Engine switch off*	200 Ω or higher
CANH (6) - BAT (16)	HIGH-level CAN bus line	Engine switch off*	6 kΩ or higher
CANL (14) - BAT (16)	LOW-level CAN bus line	Engine switch off*	6 kΩ or higher

NOTICE:

***: Before measuring the resistance, leave the vehicle as is for at least 1 minute and do not operate the engine switch, any other switches or the doors.**

If the result is not as specified, the DLC3 may have a malfunction. Repair or replace the harness and connector.

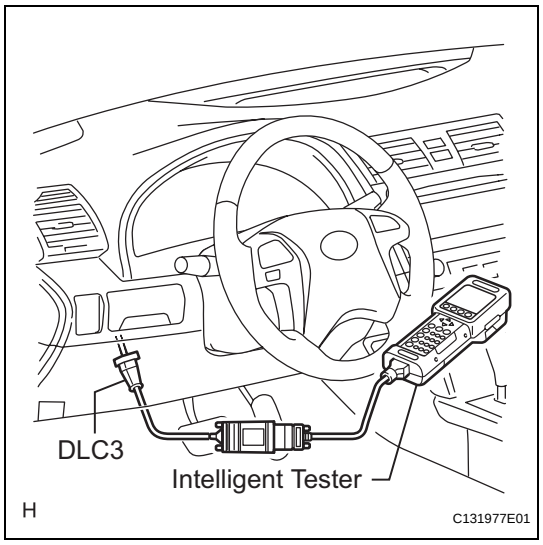
EI



(b) Connect the cable of the intelligent tester (with CAN VIM) to the DLC3, turn the engine switch on (IG) and attempt to use the intelligent tester. If the screen displays a communication error message, a problem exists in the vehicle side or tester side.

HINT:

- If communication is normal when the tool is connected to another vehicle, inspect the DLC3 on the original vehicle.
- If communication is still impossible when the tool is connected to another vehicle, the problem is probably in the tool itself. Consult the Service Department listed in the tool's instruction manual.



DTC CHECK / CLEAR

1. CHECK DTC

(a) Connect the intelligent tester to the Controller Area Network Vehicle Interface Module (CAN VIM). Then connect the CAN VIM to the DLC3.

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

(c) Read the DTCs by following the directions on the tester screen.
HINT:
Refer to the intelligent tester operator's manual for further details.

2. CLEAR DTC

(a) Connect the intelligent tester (with CAN VIM) to the DLC3.

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

(c) Erase the DTCs by following the directions on the tester's screen.
HINT:
Refer to the intelligent tester operator's manual for further details.

DATA LIST / ACTIVE TEST

1. READ DATA LIST

HINT:

Using the intelligent tester to read the DATA LIST allows the values or states of switches, sensors, actuators and other items to be read without removing any parts. This non-intrusive inspection can be very useful as 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.

(a) Connect the intelligent tester (with CAN VIM) to the DLC3.
(b) Turn the engine switch on (IG).
(c) Read the DATA LIST.

SMART:

Item	Measurement Item / Display (Range)	Normal Condition	Diagnostic Note
IG SW	Engine switch on (IG) signal / ON or OFF	ON: Engine switch on (ACC, IG) or start OFF: Engine switch off	-
ACC SW	Engine switch on (ACC) signal / ON or OFF	ON: Engine switch on (ACC, IG) or start OFF: Engine switch off	-
IMMOBILISER	Immobiliser system status / SET or UNSET	SET: Key is not in cabin UNSET: Key is in cabin	-
MASTER KEY	Master key code signal / MATCH or NO MATCH	MATCH: Master key code is sent NO MATCH: Unmatched master key code is sent	-
SUB KEY	Sub-key (Master key) code signal / MATCH or NO MATCH	MATCH: Sub-key (master key) code is sent NO MATCH: Unmatched sub-key (master key) code is sent	-
BCC	Transponder chip signal / OK or NG	OK: Correct data sent NG: Incorrect data sent	-
STATUS	Transponder chip data / OK or NG	OK: Data OK NG: Data error	-
ENCRYPT CODE	Transponder chip signal / OK or NG	OK: Correct data sent NG: Incorrect data sent	-
SERIAL NUMBER	Transponder chip signal / OK or NG	OK: Correct data sent NG: Incorrect data sent	-
FRAME	Transponder chip signal / OK or NG	OK: Correct data sent NG: Incorrect data sent	-

EI

2. PERFORM ACTIVE TEST

HINT:

Performing the intelligent tester's ACTIVE TEST allows relay, VSV, actuator and other items to be operated without removing any parts. Performing the ACTIVE TEST early in troubleshooting is one way to save time. The DATA LIST can be displayed during the ACTIVE TEST.

(a) Connect the intelligent tester (with CAN VIM) to the DLC3.
(b) Turn the engine switch on (IG).
(c) Perform the ACTIVE TEST by following the directions on the tester screen.

SMART:

Item	Test Details	Diagnostic Note
SECURITY INDIC	Turn security indicator ON/OFF	-

DIAGNOSTIC TROUBLE CODE CHART

Certification ECU Diagnostic Trouble Code Chart:

DTC No.	Detection Item	Trouble Area	See page
B2784	Antenna Coil Open / Short	1. Wire harness 2. Engine switch 3. Certification ECU	EI-27
B2785	Communication Malfunction between ECUs Connected by LIN	1. Wire harness 2. Certification ECU 3. Main body ECU 4. Steering lock ECU 5. ID code box	EI-29
B2786	No Response from Steering Lock ECU	1. Wire harness 2. Certification ECU 3. Steering lock ECU	EI-32
B2789	No Response from ID BOX	1. Wire harness 2. Certification ECU 3. ID code box	EI-34
B278A	Short to GND in Immobiliser System Power Source Circuit	1. Wire harness 2. Engine switch 3. Certification ECU	EI-36
B2790	ID BOX EEPROM Malfunction	ID code box	EI-39
B2791	Communication Condition Failure between ECM	1. Wire harness 2. ID code box 3. ECM	EI-40

ECM Diagnostic Trouble Code Chart:

DTC No.	Detection Item	Trouble Area	See page
B2799	Engine Immobiliser System	1. Wire harness 2. ECM 3. ID code box	EI-42

HINT:
The DTCs for the engine immobiliser system are specified above. If other codes are output, check the DTC chart for the SFI system.

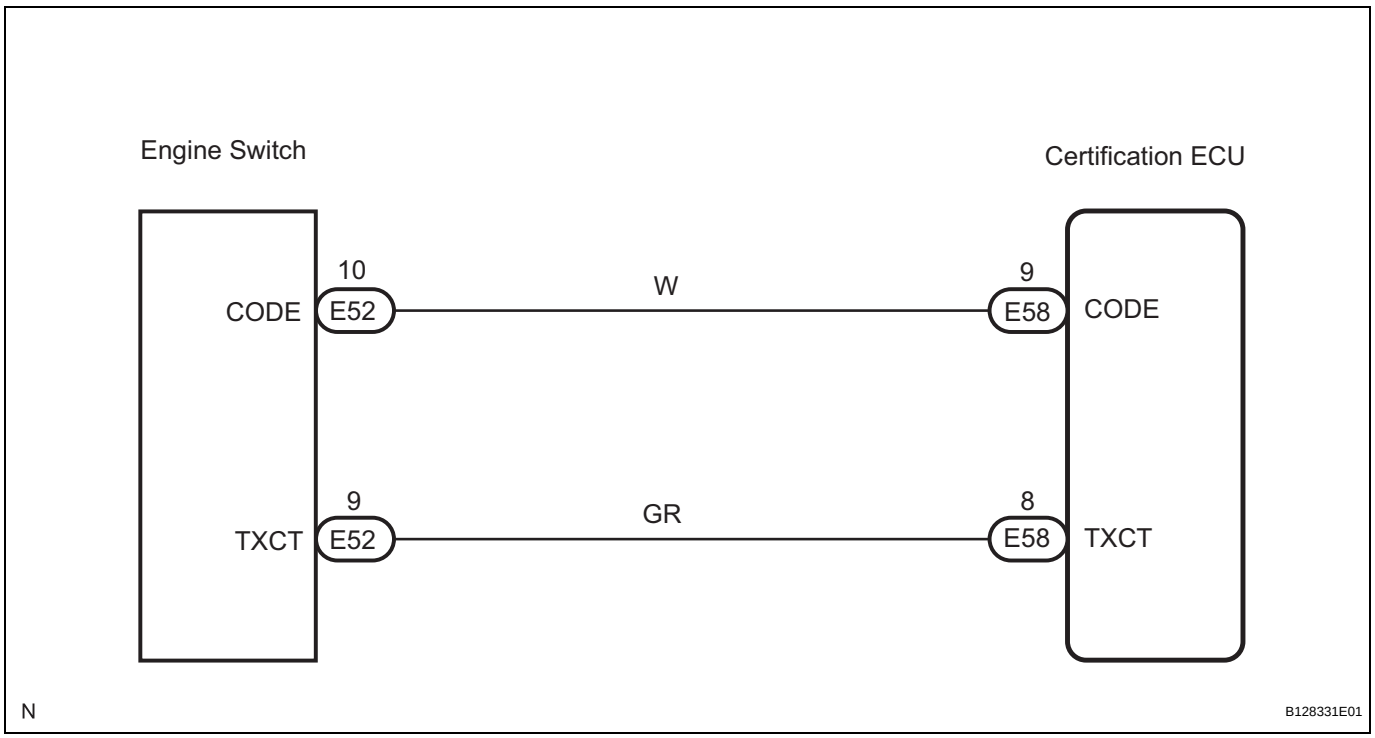
DTC	B2784	Antenna Coil Open / Short

DESCRIPTION

This DTC is output when there is an open or short malfunction in the key coil (built into engine switch).

DTC No.	DTC Detection Condition	Trouble Area
B2784	Antenna coil is open/short	• Wire harness • Engine switch • Certification ECU

WIRING DIAGRAM



EI

INSPECTION PROCEDURE

NOTICE:

If the certification ECU is replaced, register the key and ECU communication ID (See page EI-8).

1	CHECK DTC OUTPUT

(a) Delete the DTCs (See page EI-24).

(b) Recheck for DTCs (See page EI-24).

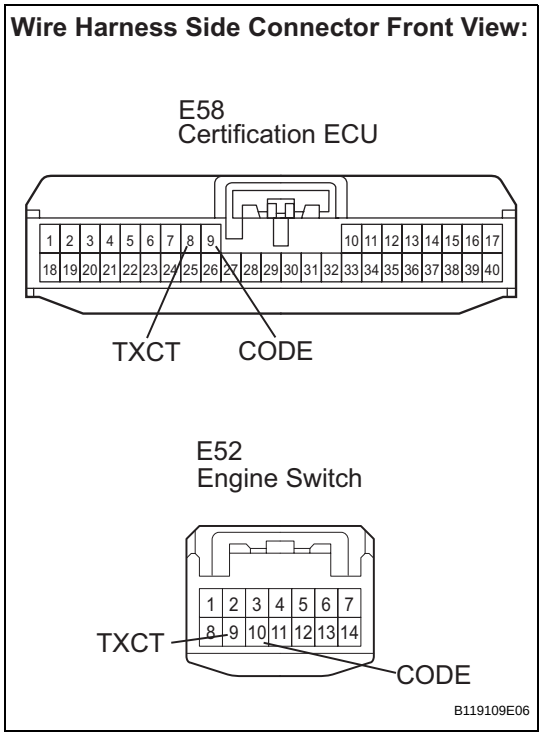
Result

Result	Proceed to
B2784 output reoccurs	A
B2784 output does not reoccur	B

B → END

A

2 CHECK HARNESS AND CONNECTOR (CERTIFICATION ECU - ENGINE SWITCH)



(a) Disconnect the E58 ECU and E52 switch connectors.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition
E58-9 (CODE) - E52-10 (CODE)	Below 1 Ω
E58-8 (TXCT) - E52-9 (TXCT)	
E58-9 (CODE) - Body ground	10 kΩ or higher
E58-8 (TXCT) - Body ground	

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

3 CHECK ENGINE SWITCH

(a) After replacing the engine switch (See page ST-152) with a normal one, check that the engine starts.

OK:

The engine starts.

NG → REPLACE CERTIFICATION ECU

OK

END

EI

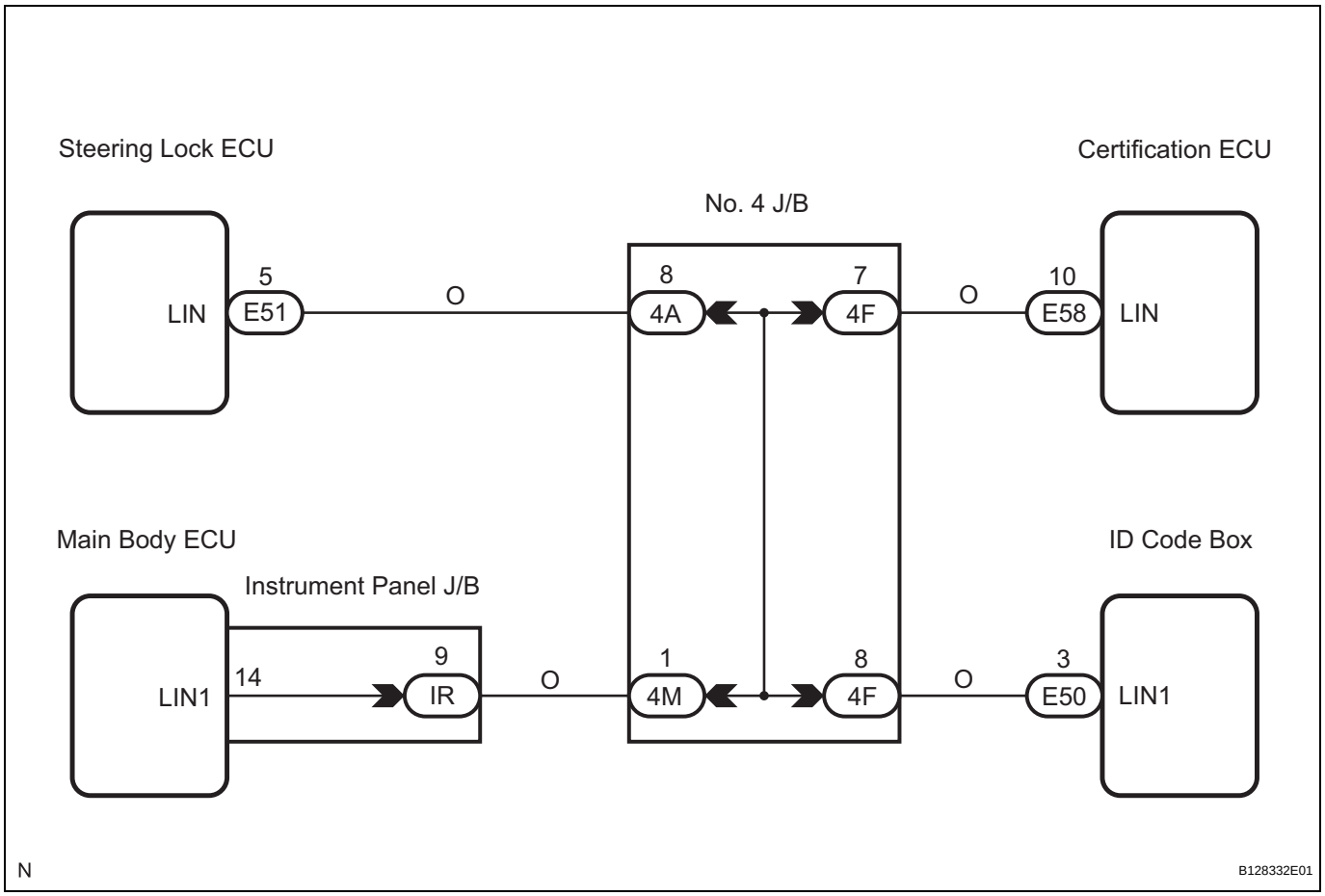
DTC	B2785	Communication Malfunction between ECUs Connected by LIN

DESCRIPTION

This DTC is output when LIN communication from the certification ECU stops for a certain amount of time.

DTC No.	DTC Detection Condition	Trouble Area
B2785	LIN communication from certification ECU stops for a certain amount of time • Open or short in wire harness between ECUs	• Wire harness • Certification ECU • Main body ECU • Steering lock ECU • ID code box

WIRING DIAGRAM



INSPECTION PROCEDURE

NOTICE:

- **If the certification ECU or ID code box is replaced, register the key and ECU communication ID (See page EI-8).**
- **If the steering lock ECU or main body ECU is replaced, register the ECU code and ECU communication ID (See page EI-8).**

1	CHECK DTC OUTPUT

(a) Delete the DTCs (See page EI-24).
(b) Recheck for DTCs (See page EI-24).

EI

Result

Result	Proceed to
B2785 output reoccurs	A
B2785 output does not reoccur	B

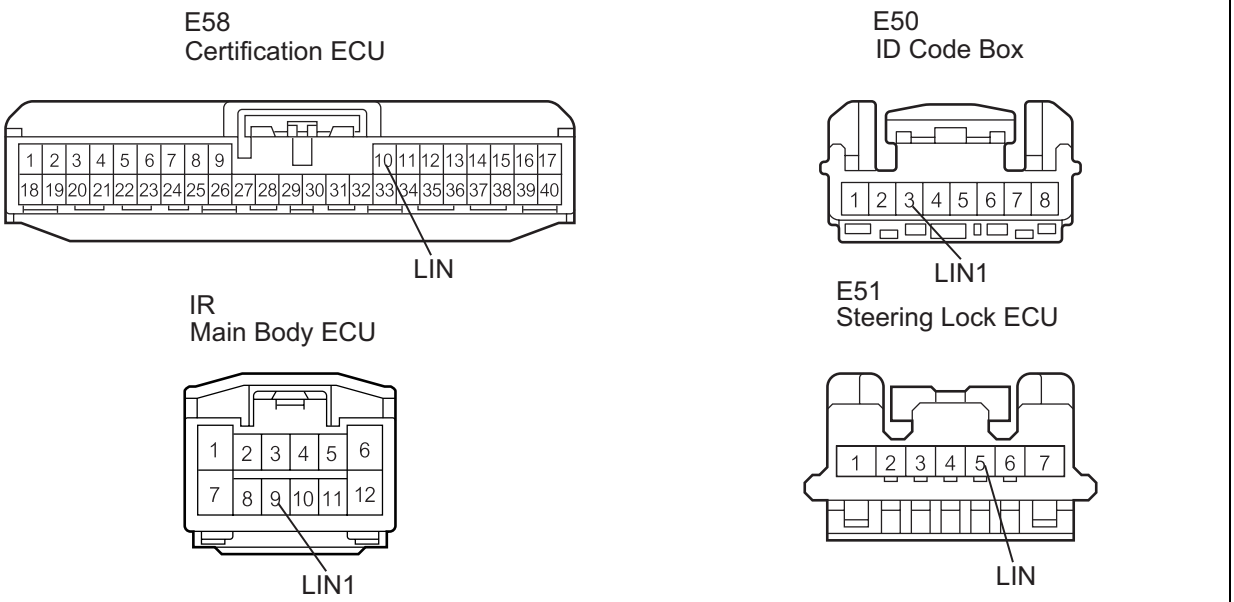
B → END

A

2 CHECK HARNESS AND CONNECTOR (LIN COMMUNICATION LINE)

(a) Disconnect the E58, E51, IR and E50 ECU connectors.

Wire Harness Side Connector Front View:



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

Standard resistance

Tester Connection	Specified Condition
E58-10 (LIN) - E50-3 (LIN1)	Below 1 Ω
E58-10 (LIN) - IR-9 (LIN1)	
E58-10 (LIN) - E51-5 (LIN)	
E58-10 (LIN) - Body ground	10 kΩ or higher

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

3 CHECK CERTIFICATION ECU

(a) After replacing the certification ECU with a normal one, check for DTCs (See page EI-24).

Result

Result	Proceed to
B2785 output reoccurs	A
B2785 output does not reoccur	B

B → END

A

4 CHECK MAIN BODY ECU

(a) After replacing the main body ECU with a normal one, check for DTCs (See page EI-24).

Result

Result	Proceed to
B2785 output reoccurs	A
B2785 output does not reoccur	B

B → END

A

5 CHECK STEERING LOCK ECU

(a) After replacing the steering lock ECU with a normal one, check for DTCs (See page EI-24).

Result

Result	Proceed to
B2785 output reoccurs	A
B2785 output does not reoccur	B

B → END

A

REPLACE ID CODE BOX

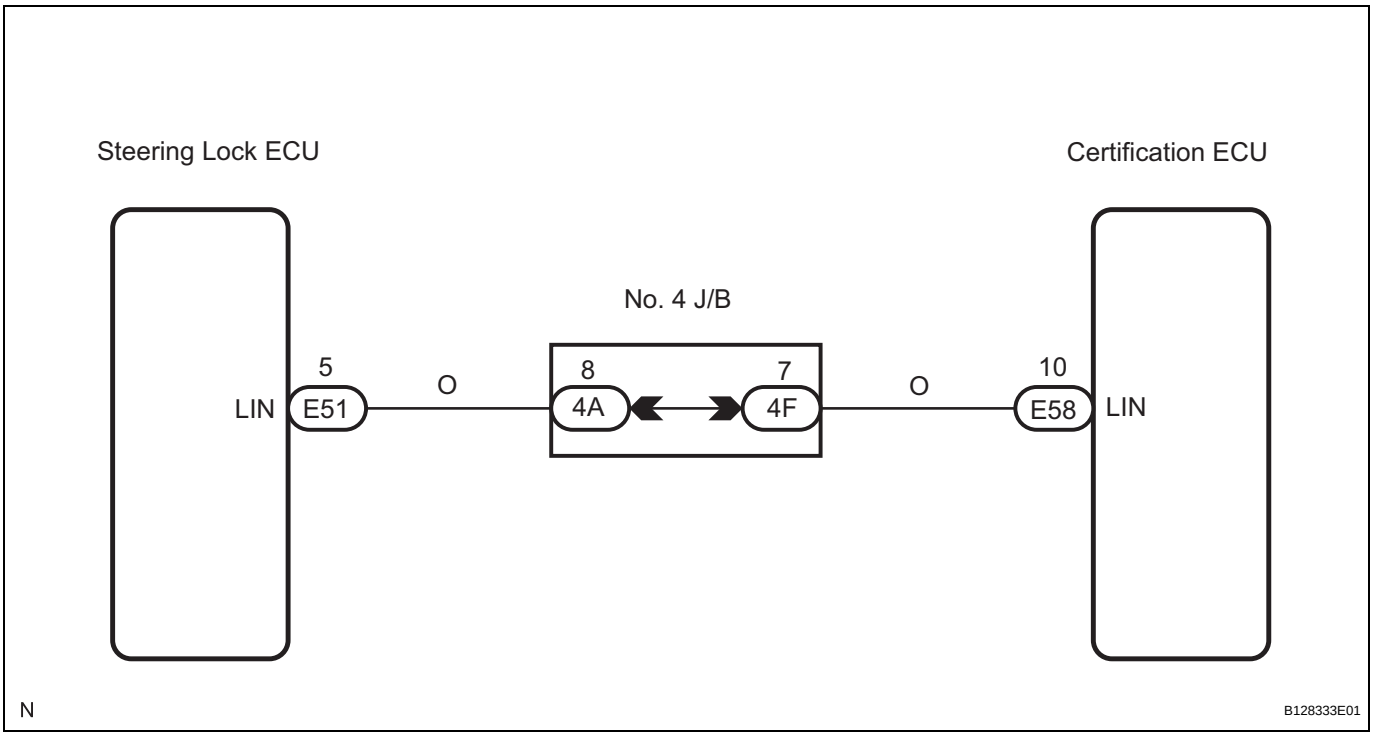
DTC	B2786	No Response from Steering Lock ECU

DESCRIPTION

This DTC is output when the certification ECU does not receive LIN communication from the steering lock ECU for 10 seconds.

DTC No.	DTC Detection Condition	Trouble Area
B2786	Certification ECU does not receive LIN communication from steering lock ECU for 10 seconds	• Wire harness • Certification ECU • Steering lock ECU

WIRING DIAGRAM



EI

INSPECTION PROCEDURE

NOTICE:

- **If the certification ECU is replaced, register the key and ECU communication ID (See page EI-8).**
- **If the steering lock ECU is replaced, register the ECU code and ECU communication ID (See page EI-8).**

1	CHECK DTC OUTPUT

(a) Delete the DTCs (See page EI-24).
(b) Recheck for DTCs (See page EI-24).

Result

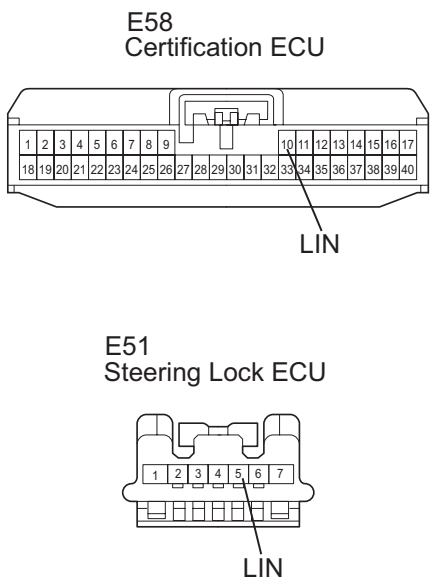
Result	Proceed to
B2786 output reoccurs	A
B2786 output does not reoccur	B

B	END

A

2 CHECK HARNESS AND CONNECTOR (CERTIFICATION ECU - STEERING LOCK ECU)

Wire Harness Side Connectro Front View:



(a) Disconnect the E58 and E51 ECU connectors.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition
E58-10 (LIN) - E51-5 (LIN)	Below 1 Ω
E58-10 (LIN) - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

3 CHECK CERTIFICATION ECU

(a) After replacing the certification ECU with a normal one, check for DTCs (See page EI-24).

Result

Result	Proceed to
B2786 output reoccurs	A
B2786 output does not reoccur	B

B → **END**

A

REPLACE STEERING LOCK ECU

EI

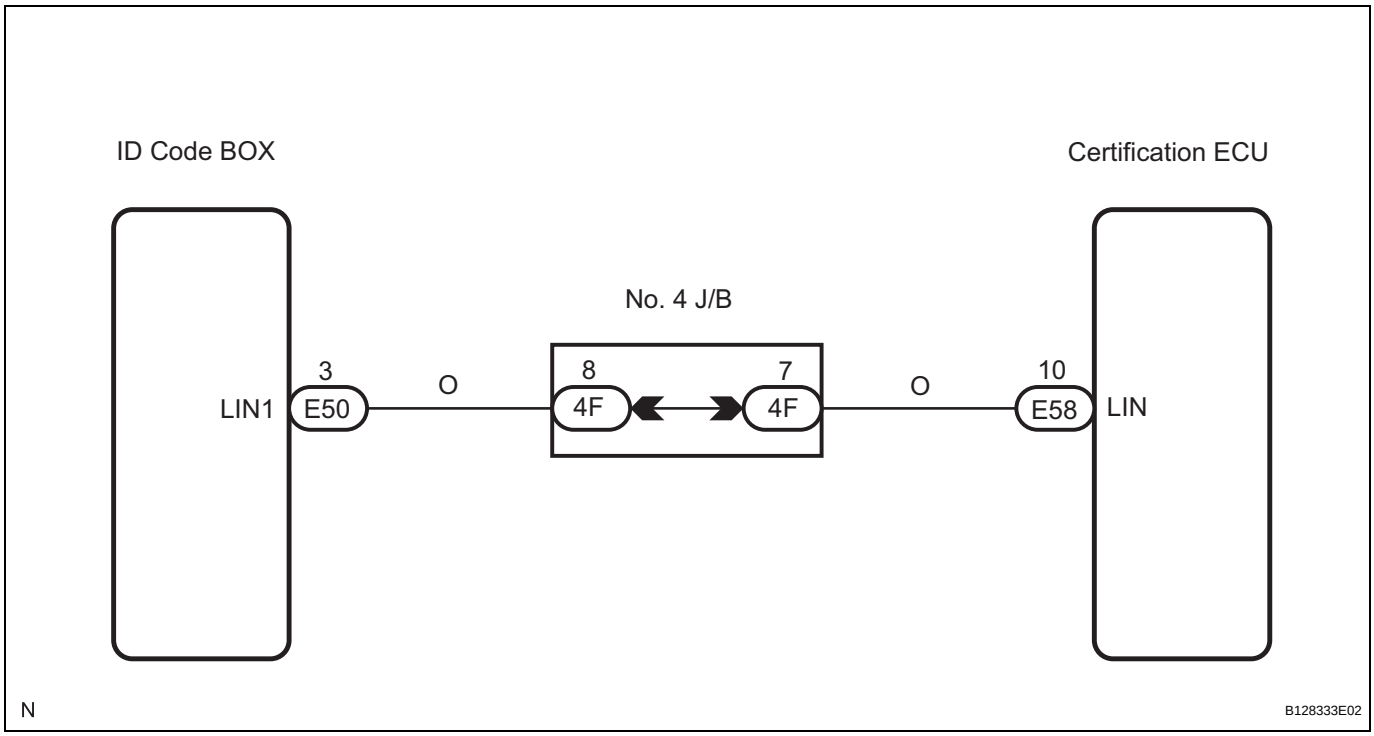
DTC	B2789	No Response from ID BOX

DESCRIPTION

This DTC is output when the certification ECU does not receive LIN communication from the ID code box for 10 seconds.

DTC No.	DTC Detection Condition	Trouble Area
B2789	Certification ECU does not receive LIN communication from ID code box • Open or short in wire harness between ECUs	• Wire harness • Certification ECU • ID code box

WIRING DIAGRAM



EI

INSPECTION PROCEDURE

NOTICE:

If the certification ECU or ID code box is replaced, register the key and ECU communication ID (See page EI-8).

1	CHECK DTC OUTPUT

(a) Delete the DTCs (See page EI-24).

(b) Recheck for DTCs (See page EI-24).

Result

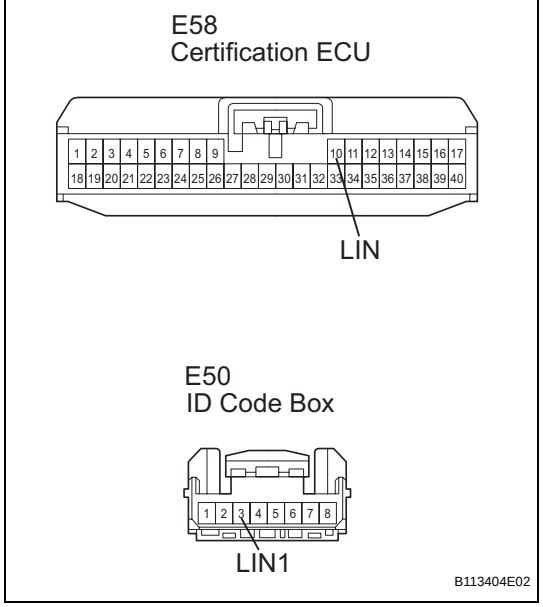
Result	Proceed to
B2789 output reoccurs	A
B2789 output does not reoccur	B

B	END

A

2 CHECK HARNESS AND CONNECTOR (CERTIFICATION ECU - ID CODE BOX)

Wire Harness Side Connector Front View:



(a) Disconnect the E58 ECU and E50 ID code box connectors.

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

Standard resistance

Tester Connection	Specified Condition
E58-10 (LIN) - E50-3 (LIN1)	Below 1 Ω
E58-10 (LIN) - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

3 CHECK CERTIFICATION ECU

(a) After replacing the certification ECU with a normal one, check for DTCs (See page EI-24).

Result

Result	Proceed to
B2789 output reoccurs	A
B2789 output does not reoccur	B

B → **END**

A

REPLACE ID CODE BOX

EI

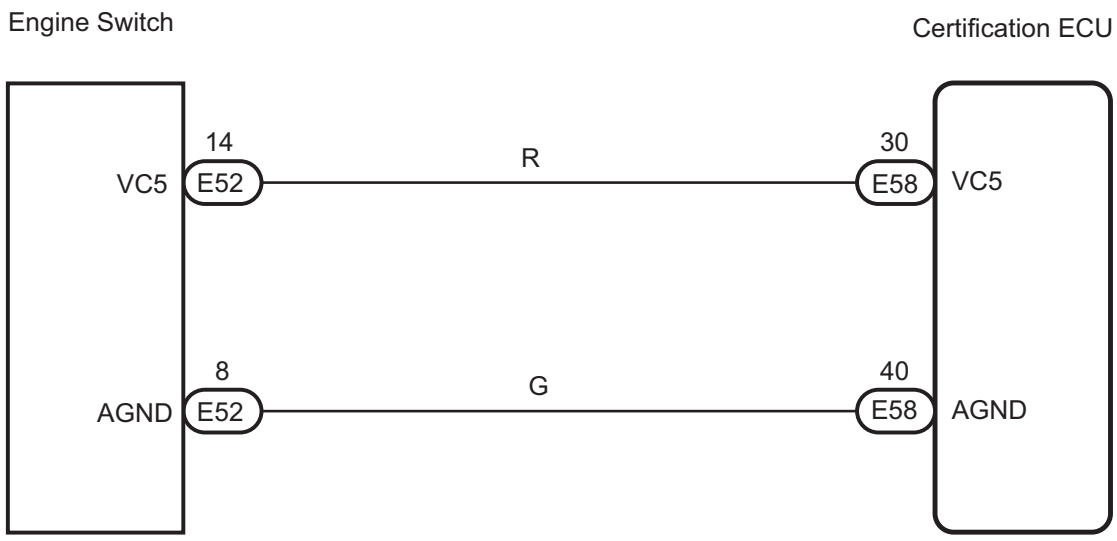
DTC	B278A	Short to GND in Immobiliser System Power Source Circuit

DESCRIPTION

This DTC is output when the engine switch power source supply line is open or shorted.

DTC No.	DTC Detection Condition	Trouble Area
B278A	Engine switch power source supply line is open or shorted	• Wire harness • Engine switch • Certification ECU

WIRING DIAGRAM



EI

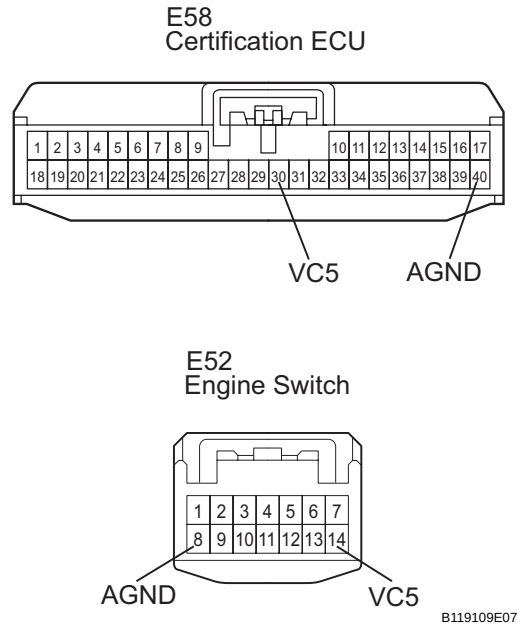
INSPECTION PROCEDURE

NOTICE:

If the certification ECU is replaced, register the key and ECU communication ID (See page EI-8).

1 CHECK WIRE HARNESS (CERTIFICATION ECU - ENGINE SWITCH)

Wire Harness Side Connector Front View:



(a) Disconnect the E58 ECU and E52 switch connectors.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

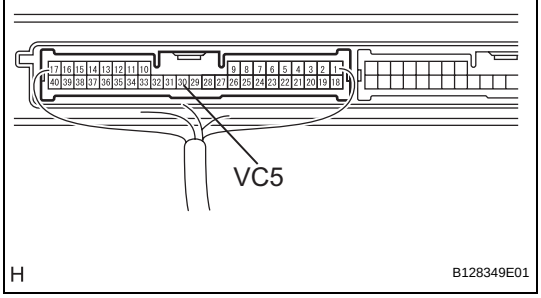
Tester Connection	Specified Condition
E58-30 (VC5) - E52-14 (VC5)	Below 1 Ω
E58-40 (AGND) - E52-8 (AGND)	
E58-30 (VC5) - Body ground	10 kΩ or higher
E58-40 (AGND) - Body ground	

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

2 CHECK HARNESS AND CONNECTOR (ENGINE SWITCH POWER SOURCE)

Wire Harness Side Connector Rear View:



(a) Reconnect the E58 ECU and E52 switch connectors.
(b) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Condition	Specified Condition
E58-30 (VC5) - Body ground	Key is not in cabin	Below 1 V
	Press engine switch	4.6 to 5.4 V

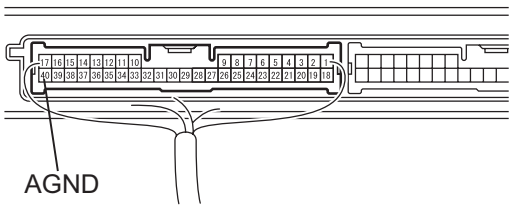
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

EI

3	CHECK HARNESS AND CONNECTOR (ENGINE SWITCH BODY GROUND)

Wire Harness Side Connector Rear View:



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

Tester Connection	Specified Condition
E58-40 (AGND) - Body ground	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

4	CHECK ENGINE SWITCH

(a) After replacing the engine switch (See page ST-152) with a normal one, check that the engine starts.
OK:
The engine starts.

NG → **REPLACE CERTIFICATION ECU**

OK

EI

END

DTC	B2790	ID BOX EEPROM Malfunction

DESCRIPTION

This DTC is output when the ID code box detects an internal malfunction.

DTC No.	DTC Detection Condition	Trouble Area
B2790	ID code box detects internal malfunction	ID code box

INSPECTION PROCEDURE

NOTICE:

If the ID code box is replaced, register the key and ECU communication ID (See page EI-8).

1	REPLACE ID CODE BOX

NEXT

END

DTC	B2791	Communication Condition Failure between ECM

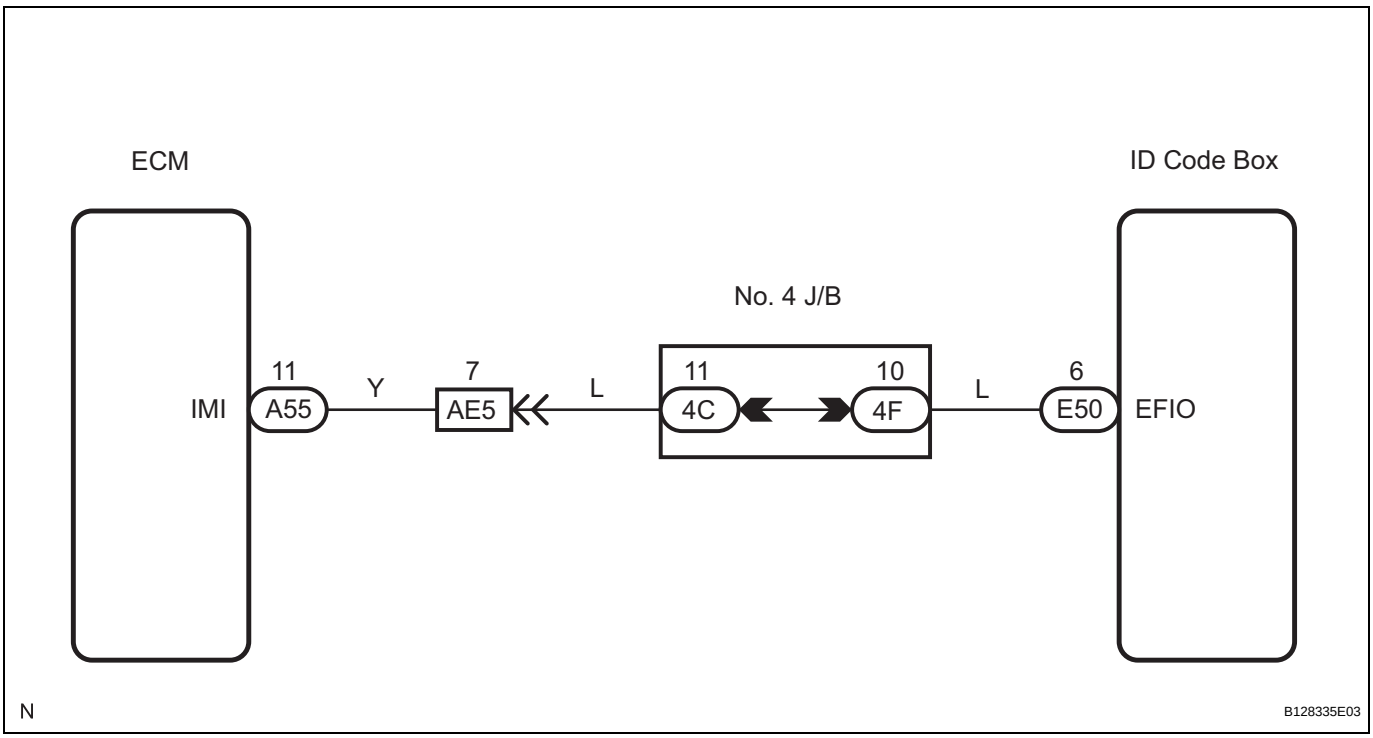
DESCRIPTION

This DTC is output when the ID code box does not respond to a verification request signal from the ECM.
HINT:

- If the engine switch is turned off immediately after an engine start, this DTC is also detected.
- If this DTC is detected simultaneously with DTC B2799, troubleshoot DTC B2799 first.

DTC No.	DTC Detection Condition	Trouble Area
B2791	ID code box does not respond to a verification request signal from ECM	• Wire harness • ID code box • ECM

WIRING DIAGRAM



INSPECTION PROCEDURE

NOTICE:

- **If the ID code box is replaced, register the key and ECU communication ID (See page EI-8).**
- **If the ECM is replaced, register the ECU communication ID (See page EI-8).**
- **If the engine can be started even when DTC B2791 is output, the ID code box can be considered normal. Be sure to recheck for DTCs after clearing the DTCs (See page EI-24).**

1	CHECK DTC OUTPUT

(a) Delete the DTCs (See page EI-24).
(b) Recheck for DTCs (See page EI-24).
Result

Result	Proceed to
B2791 and other DTC output	A

Result	Proceed to
No DTC output	B

B → **END**

A

REPAIR CIRCUITS INDICATED BY OUTPUT DTCS

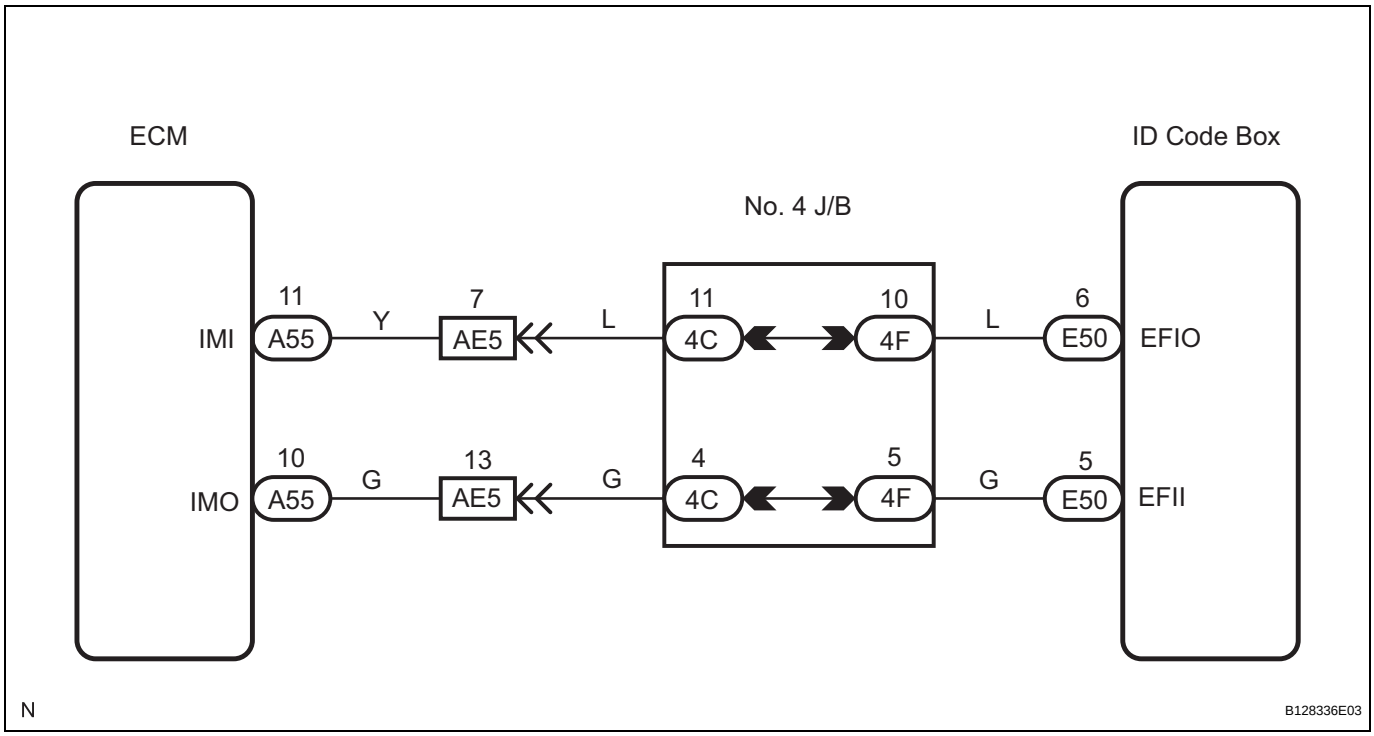
DTC	B2799	Engine Immobiliser System

DESCRIPTION

This DTC is output when one of the following occurs: 1) the ECM detects errors in its own communications with the ID code box; 2) the ECM detects errors in the communication lines; or 3) the ECU communication ID between the ID code box and ECM is different and an engine start is attempted. Before troubleshooting for this DTC, make sure no certification ECU DTCs are present. If present, troubleshoot the certification ECU DTCs first.

DTC No.	DTC Detection Condition	Trouble Area
B2799	One of following conditions is met: • Error in communication between ECM and ID code box • Error in communication lines • Communication ID is different with ID code box during communication	• Wire harness • ECM • ID code box

WIRING DIAGRAM



INSPECTION PROCEDURE

NOTICE:

- **If the ID code box is replaced, register the key and ECU communication ID (See page EI-8).**
- **If the ECM is replaced, register the ECU communication ID (See page EI-8).**

1	CHECK DTC OUTPUT

(a) Delete the DTCs (See page EI-24).
(b) Recheck for DTCs (See page EI-24).

Result

Result	Proceed to
B2799 output reoccurs	A

Result	Proceed to
B2799 output does not reoccur	B

B → END

A

2 RE-REGISTER ECU COMMUNICATION ID

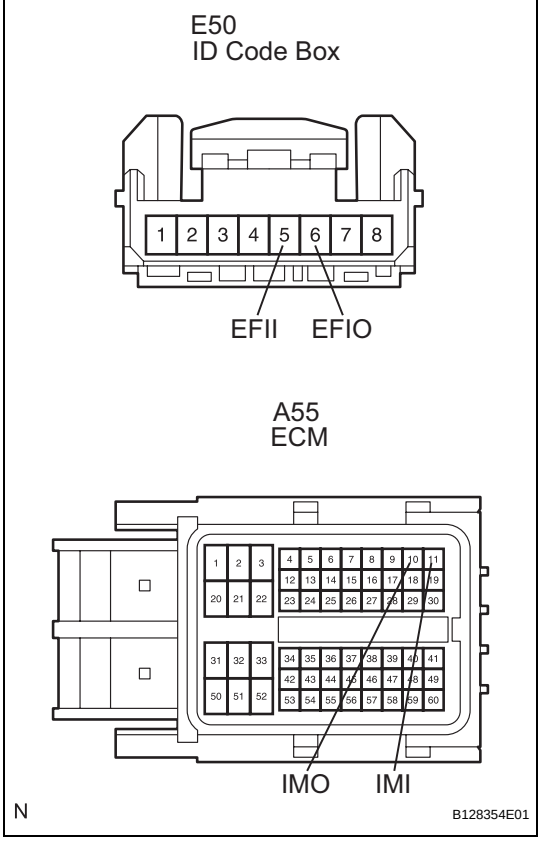
(a) Re-register the ECU communication ID (See page EI-8) between the ID code box and ECM.
(b) Check that the engine starts.
OK:
Engine starts.

OK → END

NG

3 CHECK HARNESS AND CONNECTOR (ID CODE BOX - ECM)

Wire Harness Side Connecter Front View:



(a) Disconnect the E50 ID code box and A55 ECM connectors.
(b) Measure the resistance according to the value(s) in the table below.
Standard resistance

Tester Connection	Specified Condition
E50-5 (EFII) - A55-10 (IMO)	Below 1 Ω
E50-6 (EFIO) - A55-11 (IMI)	
E50-5 (EFII) - Body ground	10 kΩ or higher
E50-6 (EFIO) - Body ground	

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

EI

4	CHECK ECM

(a) After replacing the ECM (See page ES-518) with a normal one, check for DTCs (See page EI-8).

Result

Result	Proceed to
B2799 output reoccurs	A
B2799 output does not reoccur	B

A → REPLACE ID CODE BOX

B

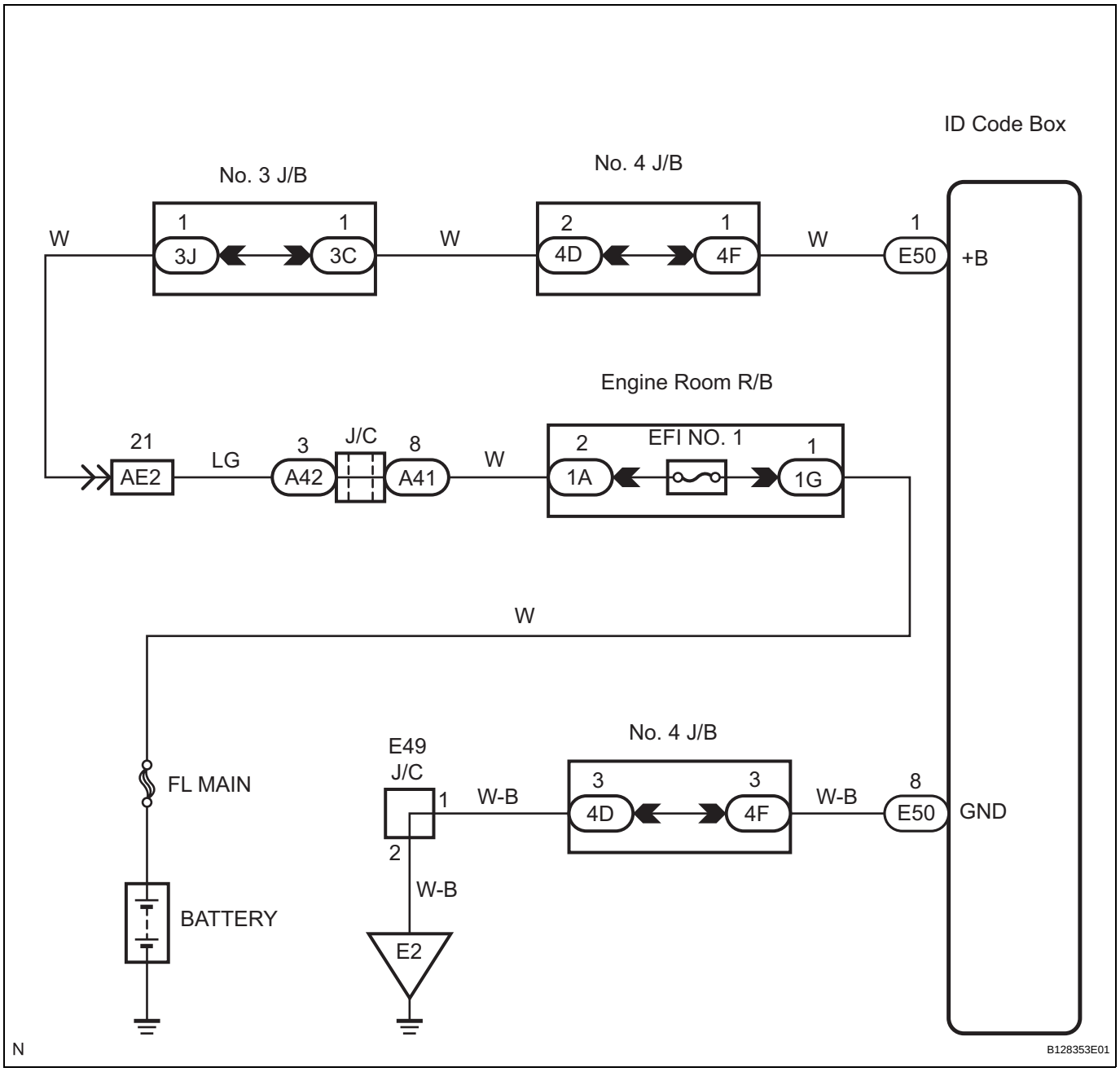
END

ID Code Box Power Source Circuit

DESCRIPTION

This circuit provides power to operate the ID code box.

WIRING DIAGRAM



INSPECTION PROCEDURE

NOTICE:

If the ID code box is replaced, register the key and ECU communication ID (See page EI-8).

EI

1	INSPECT FUSE (EFI NO. 1)

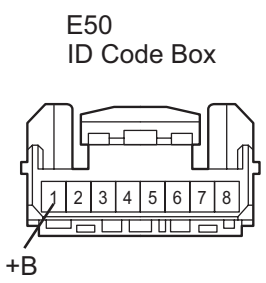
(a) Remove the EFI No. 1 fuse from the No. 1 engine room R/B.
(b) Measure the resistance of the fuse.
Standard resistance:
Below 1 Ω

NG → **REPLACE FUSE**

OK

2	CHECK HARNESS AND CONNECTOR (ID CODE BOX - BATTERY)

Wire Harness Side Connector Front View:



(a) Disconnect the E50 ID code box connector.
(b) Measure the voltage according to the value(s) in the table below.
Standard voltage

Tester Connection	Specified Condition
E50-1 (+B) - Body ground	10 to 14 V

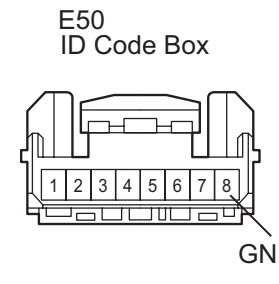
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

EI

3	CHECK HARNESS AND CONNECTOR (ID CODE BOX - BODY GROUND)

Wire Harness Side Connector Front View:



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

Tester Connection	Specified Condition
E50-8 (GND) - Body ground	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

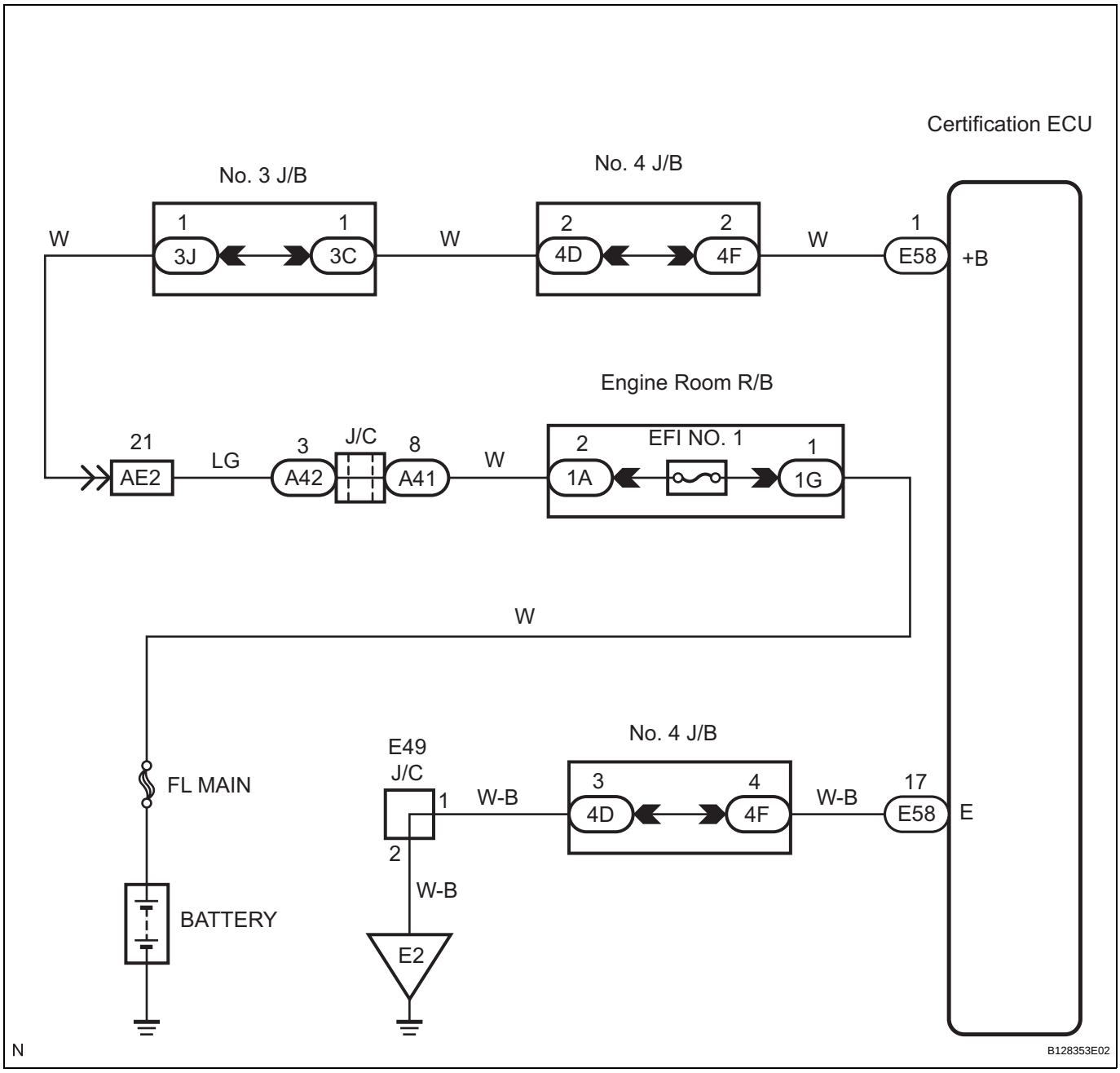
PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

Certification ECU Power Source Circuit

DESCRIPTION

This circuit provides power to operate the certification ECU.

WIRING DIAGRAM



INSPECTION PROCEDURE

NOTICE:

If the certification ECU is replaced, register the key and ECU communication ID (See page EI-8).

1	INSPECT FUSE (EFI NO. 1)

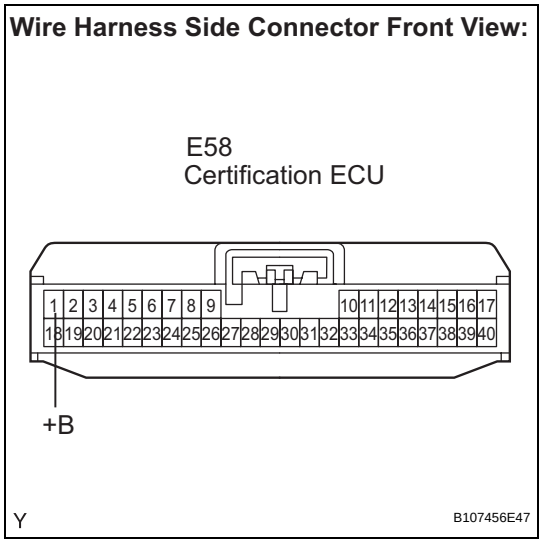
(a) Remove the EFI No. 1 fuse from the No. 1 engine room R/B.
(b) Measure the resistance of the fuse.
Standard resistance:
Below 1 Ω

NG → **REPLACE FUSE**

OK

2	CHECK WIRE HARNESS (CERTIFICATION ECU - BATTERY)

Wire Harness Side Connector Front View:



(a) Disconnect the E58 ECU connector.
(b) Measure the voltage according to the value(s) in the table below.
Standard voltage

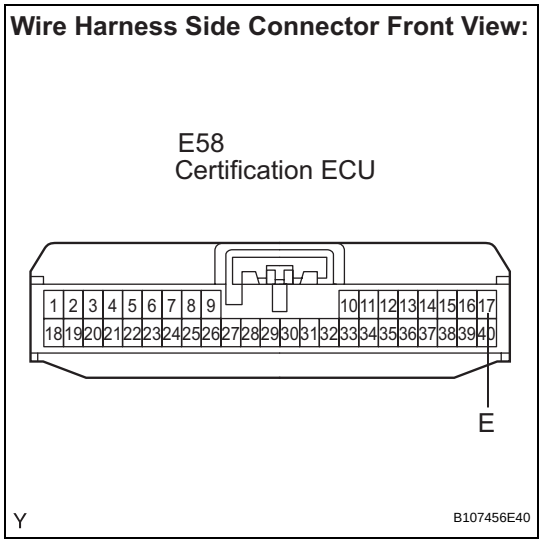
Tester Connection	Specified Condition
E58-1 (+B) - Body ground	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

3	CHECK HARNESS AND CONNECTOR (CERTIFICATION ECU - BODY GROUND)

Wire Harness Side Connector Front View:



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

Tester Connection	Specified Condition
E58-17 (E) - Body ground	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

EI

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

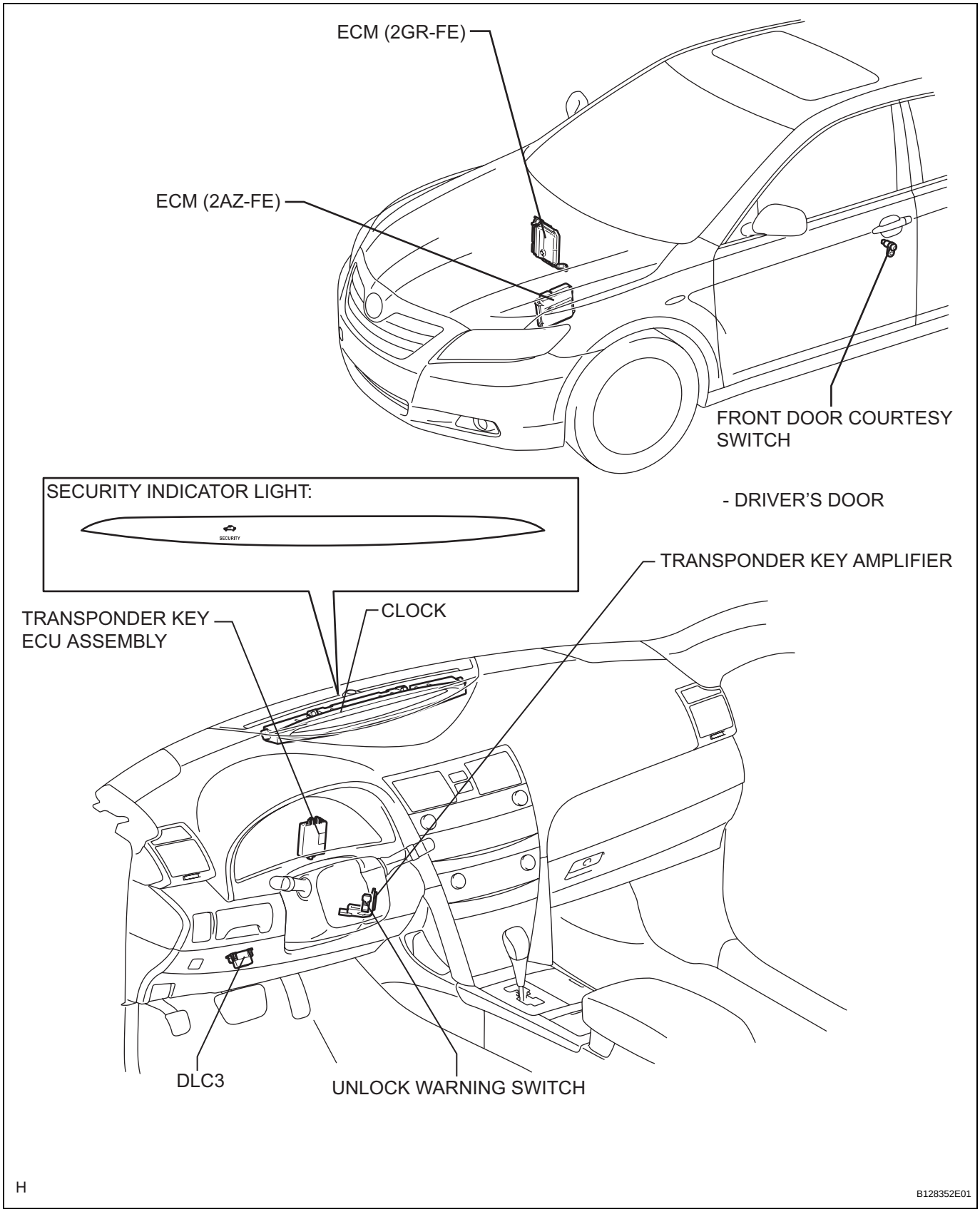
ENGINE IMMOBILISER SYSTEM (w/o Smart Key System)

PRECAUTION

1. PRECAUTIONS FOR THE KEY

(a) The key is a precision instrument. Be sure to observe the following:
  (1) Do not drop or strike the key.
  (2) Do not allow the key to be kept in a high temperature place for a long time.
  (3) Do not use an ultrasonic washing machine to clean the key.
  (4) Keep the key away from magnets or magnetized items during use.
  (5) Do not attach any stickers to the key.

PARTS LOCATION



EI

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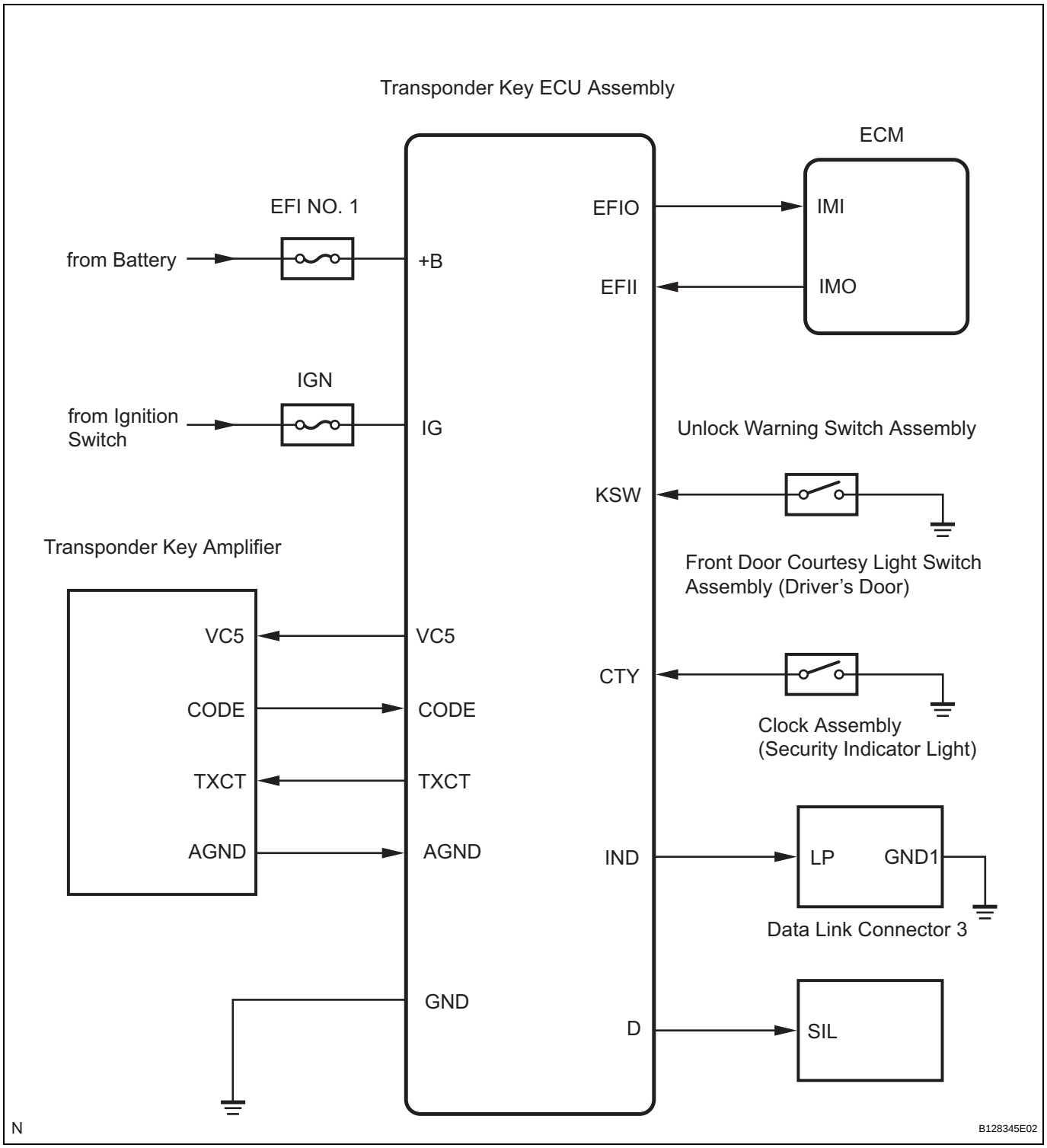
SYSTEM DIAGRAM



EI

SYSTEM DESCRIPTION

1. ENGINE IMMOBILISER SYSTEM DESCRIPTION

The engine immobiliser system is designed to prevent the vehicle from being stolen. This system uses the transponder key ECU assembly that stores the key codes of authorized ignition keys. If an attempt is made to start the engine using an unauthorized key, the ECU sends a signal to the ECM to prohibit fuel delivery and ignition, effectively disabling the engine.

2. FUNCTION OF MAIN COMPONENT

Component	Outline
Transponder key coil/amplifier	When key is inserted in ignition key cylinder, key coil receives key code. Then amplifier amplifies ID code and outputs it to transponder key ECU assembly.
Unlock warning switch assembly	Detects if key is in ignition key cylinder and outputs results to transponder key ECU assembly.
ECM	ECM receives ID verification results from transponder key ECU assembly. ECM also verifies ECUs. Then judgement of whether to immobilise engine is made.
Security indicator	Depending on operation of transponder key ECU assembly, interior security indicator light comes on or starts blinking.

Security Indicator Light:

P B128350E02

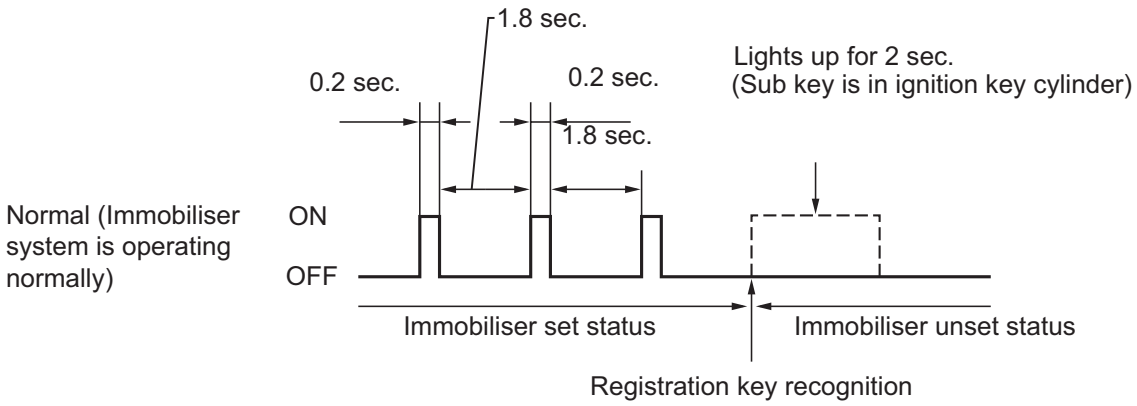
3. SYSTEM FUNCTION

(a) When the transponder key ECU assembly detects that the key unlock warning switch is ON, the ECU provides current to the transponder key coil and produces an electric wave. A transponder chip in the key grip receives the electric wave. Upon receiving the electric wave, the transponder chip outputs a key ID code signal. The transponder key coil receives this signal, the signal is amplified by the transponder key amplifier, and the signal is transmitted to the ECU.
The ECU matches the key's ID code with the vehicle's ID code, which was previously registered in the ECU, and communicates the results to the ECM.
After the identification results show that the key's ID code matches the vehicle's ID code and the ECU has confirmed their match: 1) the immobiliser system does not immobilise the engine and the engine starting controls (fuel injection control and ignition control) enter standby mode; and 2) the ECU transmits a security indicator signal that communicates "indicator off" to the clock. Then, the clock turns off the security indicator light.

(b) The security indicator pattern is as shown below (when changing from the immobiliser set status to the unset status):

EI

Security Indicator:



N

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EI

HOW TO PROCEED WITH TROUBLESHOOTING

HINT:
Use this procedure to troubleshoot the engine immobiliser system.
The intelligent tester should be used in steps 3, 4, and 6.

1	VEHICLE BROUGHT TO WORKSHOP

NEXT

2	CRANK ENGINE FOR MORE THAN 10 SECONDS

NEXT

3	CHECK FOR DTCS

(a) Check for DTCs and note any codes that are output.
(b) Delete the DTCs.
(c) Recheck for DTCs. Try to duplicate the DTC (SFI system and engine immobiliser system) by simulating the symptoms indicated by the DTC.
  (1) If the DTC does not reoccur, proceed to A.
  (2) If the DTC (SFI system) reoccurs, proceed to B.
  (3) If the DTC (engine immobiliser system) reoccurs, proceed to C.

B	GO TO SFI SYSTEM
C	GO TO DTC CHART

EI

A

4	READ VALUE ON INTELLIGENT TESTER

(a) Connect the intelligent tester (with CAN VIM) to the DLC3.
(b) Turn the ignition switch to the ON position and turn the intelligent tester on.
(c) Read the DATA LIST according to the display on the tester.

IMMOBILISER:

Item	Measurement Item/Display (Range)	Normal Condition	Diagnostic Note
KEY SW	Unlock warning switch signal/ON or OFF	ON: Key is in ignition key cylinder OFF: No key is in ignition key cylinder	-

OK:
ON (Key is in ignition key cylinder) appears on the screen.

NG → **GO TO DTC B2780**

OK

5	PROBLEM SYMPTOMS TABLE

(a) If the fault is not listed on the problem symptoms table, proceed to A.
(b) If the fault is listed on the problem symptoms table, proceed to B.

B → **GO TO STEP 7**

A

6	OVERALL ANALYSIS AND TROUBLESHOOTING

(a) Inspection with the intelligent tester (DATA LIST).
(b) Inspection with the intelligent tester (ACTIVE TEST).
(c) TERMINALS OF ECU (See page EI-63).

NEXT

7	ADJUST, REPAIR OR REPLACE

NEXT

8	CONFIRMATION TEST

NEXT

END

REGISTRATION

1. DESCRIPTION OF CODE REGISTRATION

HINT:

The key has 2 codes: The key code (immobiliser code) and the wireless code. Both of these codes need to be registered. Refer to page for the wireless code registration procedures.

(a) When adding master keys or sub keys (Additional registration):

(1) Register key code (immobiliser code) in the transponder key ECU.

Target ECU	See Procedure
Transponder key ECU	Procedure "A"

(b) When replacing the transponder key ECU (New registration):

(1) Register the key code (immobiliser code) in the transponder key ECU.

Target ECU	See Procedure
Transponder key ECU	Procedure "B"

(2) Register the ECU communication ID between the ECM and the transponder key ECU.

Target ECU	See Procedure
Transponder key ECU	Procedure "C"

(c) When replacing the ECM:

(1) Register the ECU communication ID between the ECM and the transponder key ECU.

Target ECU	See Procedure
Transponder key ECU	Procedure "C"

2. KEY REGISTRATION

(a) Automatic registration (Procedure "B"):

The new registration of the key codes (immobiliser codes) is made automatically.

HINT:

- When installing a new transponder key ECU, the key codes (immobiliser codes) must be registered.
- A new transponder key ECU starts in the automatic key code registration mode. In this mode, a maximum of 4 key codes for 3 master keys and 1 sub key can be registered. Since the transponder key ECU can distinguish types of keys, any registration order is acceptable.

Automatic Key Code Registration (New Registration):

Procedure	Security Indicator Condition
1. Start (Procedure "D")	Blinking occurs until the first key is inserted.
2. Insert the key into the ignition key cylinder.	ON
3. Registration begins. HINT: The registration will be completed approx. 1 sec. after the key is inserted.	OFF HINT: Approx. 1 sec.

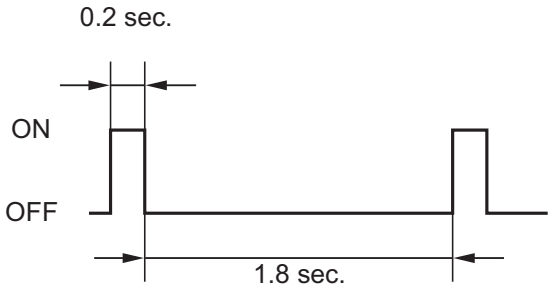
Procedure	Security Indicator Condition
4. Remove the key.	ON HINT: When the maximum number of the key codes is registered, the security indicator remains off until the last key registered is removed. After it is removed, the security indicator starts blinking.
5. Register another key ? Yes: Go to procedure "D" No: Go to procedure "E"	
6. End (Procedure "E")	

HINT:

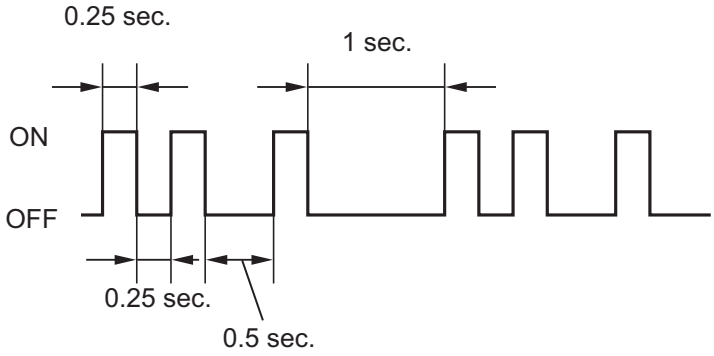
- When no key is inserted in the key cylinder while the system is in automatic key code registration mode, the security indicator remains on.
- When the immobiliser system is operating normally and the key is pulled out, the security indicator blinks continuously.
- If the key code registration has failed in the automatic key code registration mode, code 2-1 will be output from the security indicator. Trying to register an already registered key will cause code 2-2 to be output when the key is inserted. If the number of registered key codes exceeds the limit, code 2-3 will be output from the security indicator. The output details are shown below.

Security Indicator:

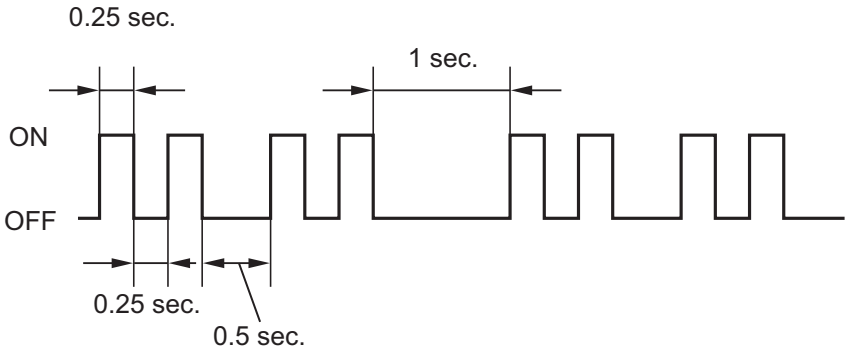
Normal (Immobiliser system is operating normally)



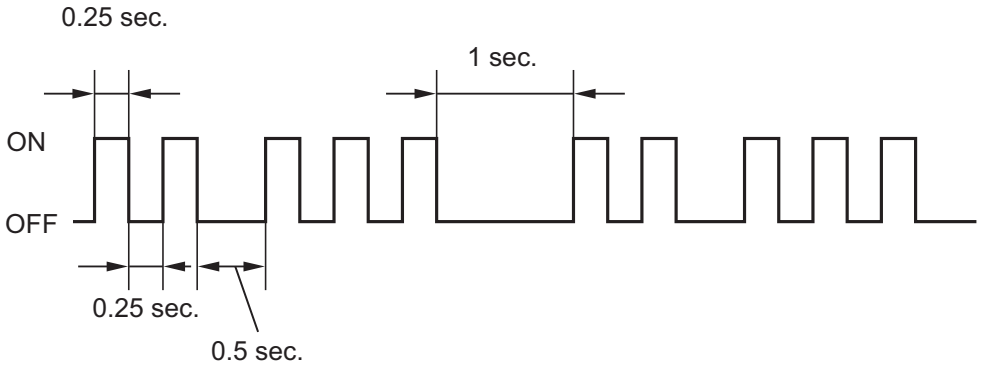
Code 2 - 1



Code 2 - 2



Code 2 - 3



EI

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(b) Finish the automatic key code registration mode. The automatic key code registration mode can be forced to end, when at least 1 key code (immobiliser code) for the master key has been registered.
(1) Turn the ignition switch on and off 5 times within 10 seconds using the master key that has already been registered.

3. REGISTRATION OF ADDITIONAL KEY

(a) Additional registration (Procedure "A"):
Register an additional key by using the intelligent tester.
HINT:
- A maximum of 5 key codes and 3 sub key codes can be registered.
- Registration mode will end if any step is not completed within the specified time.
- When the ignition cylinder or the key cylinder set is replaced, remove the transmitter module from the original master key. Then install this transmitter module to a new key and use it as the master key. If necessary, use this master key to register other keys.

NOTICE:
When only the ignition key cylinder has been replaced, you can lock or unlock doors by wireless operation using the new key with built in transmitter but not by inserting it in the door key cylinder. Therefore, keep the original key for the door lock or unlock operation in order to avoid malfunctions caused by a dead transmitter battery in the new key.

Additional Registration:

Procedure	Time (Completion of operation)	Security Indicator Condition
1. Start	-	Indicator blinks until the first key is inserted.
2. Insert the already registered master key in the ignition key cylinder and turn the ignition switch on.		
3. Intelligent tester operation (1) Select IMMOBILISER (2) Select ID UTILITY (3) Select IMMOB CODE REG HINT: After completing the above operation, proceed to the next step in accordance with the prompts on the tester screen.	Within 120 sec.	OFF
4. Remove the master key.	Within 20 sec. of the instruction on the tester	ON
5. Insert the key to be registered in the ignition key cylinder.	Within 10 sec.	
6. After 60 sec. the key is registered. HINT: The security indicator goes off.	-	Blinking
7. Next		OFF
8. End		

EI

NOTICE:
If the key code registration has failed in automatic key code registration mode, code 2-1 will be output from the security indicator. Trying to register an already registered key will cause code 2-2 to be output when the key is inserted. If the number of registered key codes exceeds the limit, code 2-3 will be output from the security indicator. The output details are shown in procedure "B".
HINT:
- A brief outline of procedures for key code registration is shown above. For detailed information, refer to the screen of the intelligent tester.
- When the immobiliser system is operating normally and the key is pulled out, the security indicator will blink.

4. ERASURE OF KEY CODE

(a) Erase the key codes by using the intelligent tester.
HINT:
- All key codes will be erased except for the master key which is used for erasing the key codes. In order to use a key for which the code has been erased, it is necessary to register the key code again.
- The registration operation will be cancelled if any step is not completed within the specified time.

Erasing Key Code:

Procedure	Time (Operation Completion Time)	Security Indicator Condition
1. Start	-	Indicator blinks until the first key is inserted.
2. Insert the already registered master key in the ignition key cylinder and turn the ignition switch on.		
3. Intelligent tester operation (1) Select IMMOBILISER (2) Select ID UTILITY (3) Select IMMOB CODE ERA HINT: After completing the above operation, proceed to the next step in accordance with the prompts on the tester screen.	Within 120 sec.	OFF
4. Remove the master key.	Within 10 sec. of the instruction on the tester	ON for 1 sec. then OFF
5. Next	-	Blinking
6. End		

HINT:
- A brief outline of procedures for key code registration is shown above. For detailed information, refer to the screen of the intelligent tester.
- When the immobiliser system is operating normally and the key is pulled out, the security indicator will blink.

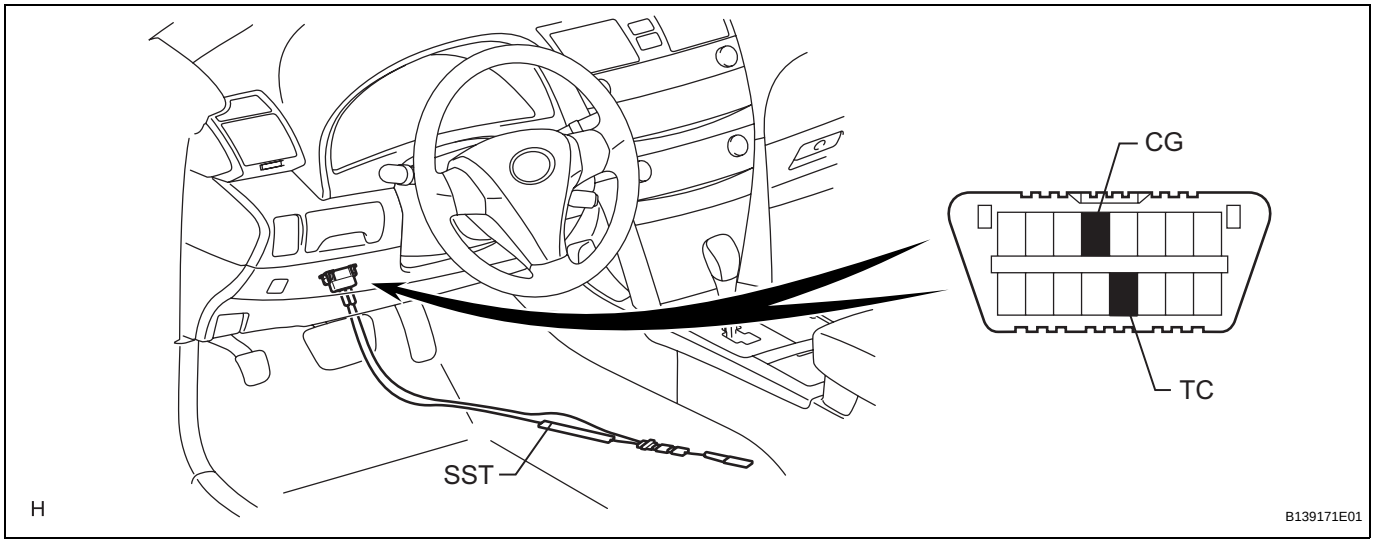
5. ECU COMMUNICATION ID REGISTRATION

NOTICE:

- **The ECU communication ID should be registered when the transponder key ECU and/or the ECM is replaced in order to match it to the ECM communication ID.**
- **The SFI system cannot be started unless the ECM communication ID matches.**

(a) ECU communication ID registration (Procedure "C"):

Register the ECU communication ID, after the transponder key ECU and/or the ECM is replaced.



(1) Using SST, connect terminals TC and CG of the DLC3.

SST 09843-18040

(2) Turn the ignition switch to the ON position and leave the vehicle as is for 30 minutes.

(3) Check that the engine starts.

PROBLEM SYMPTOMS TABLE

HINT:
Use the table below to help determine the cause of the problem symptom. The potential cases of the symptoms are listed in order of probability in the "Suspected Area" column of the table. Check each symptom by checking the suspected areas in the order they are listed. Replace parts as necessary.

ENGINE IMMOBILISER SYSTEM:

Symptom	Suspected area	See page
Unable to register the key.	1. Door courtesy switch circuit	EI-92
	2. ECU power source circuit	EI-94
	3. Transponder key ECU assembly	-
Engine does not start.	1. Key	EI-70
	2. ECU power source circuit	EI-94
	3. Transponder key ECU assembly	-
	4. SFI system (2AZ-FE)	ES-11
	5. SFI system (2GR-FE)	ES-15
Security indicator is always ON.	1. Security indicator light circuit	EI-89
	2. ECU power source circuit	EI-94
	3. Transponder key ECU assembly	-
Security indicator is OFF.	1. Security indicator light circuit	EI-89
	2. ECU power source circuit	EI-94
	3. Transponder key ECU assembly	-
Security indicator is blinking abnormally.	Transponder key ECU assembly	-
No code is output.	1. Diagnosis circuit	EI-98
	2. ECU power source circuit	EI-94
	3. Transponder key ECU assembly	-

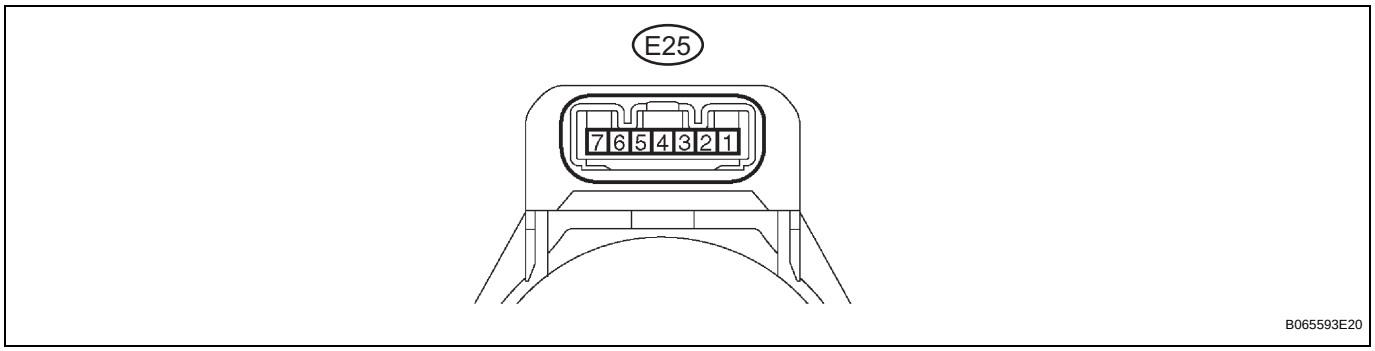
HINT:

- If the engine does not start, check that the key which did not start the engine control system has been registered, and that it is possible to start with another registered key.
- If the security indicator is always ON, finish the automatic registration mode in case the mode still operates.

TERMINALS OF ECU

1. CHECK TRANSPONDER KEY AMPLIFIER

(a) Disconnect the E25 amplifier connector and measure the resistance between the terminal of the wire harness side connector and body ground.



Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
AGND (E25-7) - Body ground	V - Body ground	Ground	Always	Below 1 Ω

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

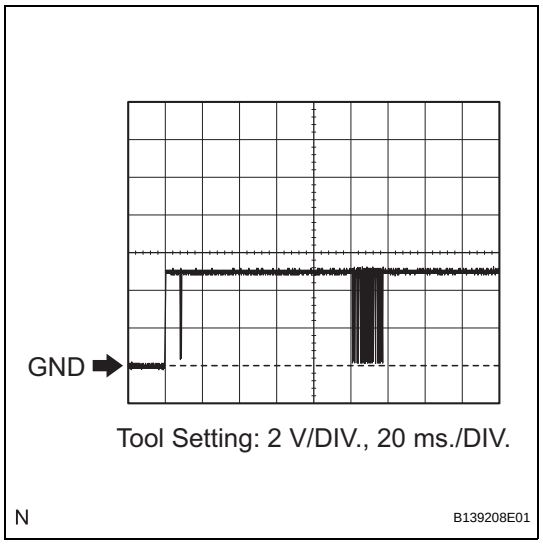
(b) Reconnect the E25 amplifier connector and measure the resistance and voltage of each terminal of the connector.

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
VC5 (E25-1) - AGND (E25-7)	O - V	Power source	No key is in ignition key cylinder	Below 1 V
			Key is in ignition key cylinder	4.6 to 5.4 V
CODE (E25-4) - AGND (E25-7)	BR - V	Demodulated signal of key code data	No key is in ignition key cylinder	Below 1 V
			Key is in ignition key cylinder	Waveform 1
TXCT (E25-5) - AGND (E25-7)	R - V	Key code output signal	No key is in ignition key cylinder	Below 1 V
			Key is in ignition key cylinder	Waveform 2
AGND (E25-7) - Body ground	V - Body ground	Ground	Always	Below 1 Ω

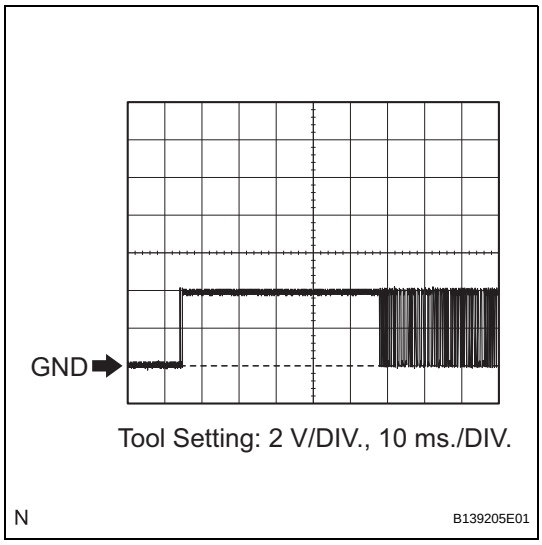
If the result is not as specified, the amplifier may have a malfunction.

(c) Inspect using an oscilloscope.
(1) Waveform 1 (Reference)

Terminal	CODE (E25-4) - AGND (E25-7)
Tool Setting	2 V/DIV., 20 ms./DIV.
Condition	Key is in ignition key cylinder



EI

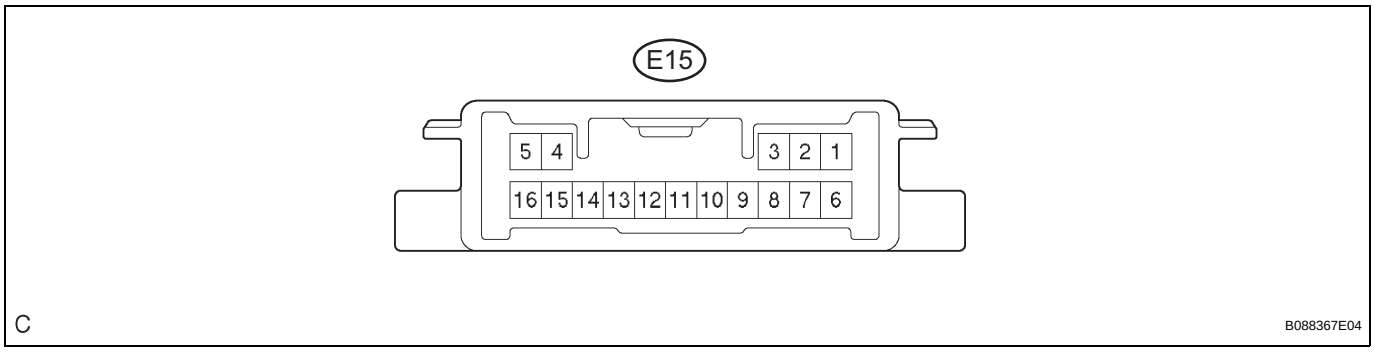


(2) Waveform 2 (Reference)

Terminal	TXCT (E25-5) - AGND (E25-7)
Tool Setting	2 V/DIV., 10 ms./DIV.
Condition	Key is in ignition key cylinder

2. CHECK TRANSPONDER KEY ECU ASSEMBLY

(a) Disconnect the E15 ECU connector and measure the resistance and voltage between each terminal of the wire harness side connector.



Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
GND (E15-16) - Body ground	W-B - Body ground	Ground	Always	Below 1 Ω
+B (E15-1) - GND (E15-16)	W - W-B	Battery	Always	10 to 14 V
IG (E15-2) - GND (E15-16)	LG - W-B	Ignition switch signal	Ignition switch OFF	Below 1 V
			Ignition switch ON	10 to 14 V
KSW (E15-3) - GND (E15-16)	B - W-B	Unlock warning switch signal	No key is in ignition key cylinder	10 kΩ or higher
			Key is in ignition key cylinder	Below 1 Ω

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

(b) Reconnect the E15 ECU connector and measure the voltage of each terminal of the connector.

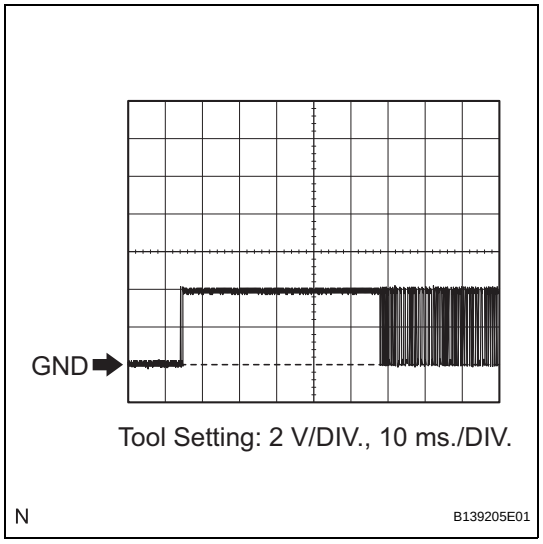
Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
AGND (E15-5) - Body ground	V - Body ground	Ground	Always	Below 1 Ω
KSW (E15-3) - GND (E15-16)	B - W-B	Unlock warning switch signal	No key is in ignition key cylinder	10 to 14 V
			Key is in ignition key cylinder	Below 1 V
VC5 (E15-14) - AGND (E15-5)	O - V	Power source	No key is in ignition key cylinder	Below 1 V
			Key is in ignition key cylinder	4.6 to 5.4 V
TXCT (E15-4) - AGND (E15-5)	R - V	Transponder key amplifier communication signal	No key is in ignition key cylinder	Below 1 V
			Key is in ignition key cylinder	Waveform 1
CODE (E15-15) - AGND (E15-5)	BR - V	Transponder key amplifier communication signal	No key is in ignition key cylinder	Below 1 V
			Key is in ignition key cylinder	Waveform 2

EI

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
EFIO (E15-13) - GND (E15-16)	L - W-B	ECM output signal	Ignition switch OFF	Below 1 V
			Ignition switch ON	Waveform 3
EFII (E15-12) - GND (E15-16)	G - W-B	ECM input signal	Ignition switch OFF	Below 1 V
			Ignition switch ON	Waveform 4
D (E15-9) - GND (E15-16)	GR - W-B	Diagnostic tester communication	Without communication	Below 1 V
			During communication	Pules generation
CTY (E15-7) - GND (E15-16)	Y - W-B	Door courtesy signal	Switch pushed	10 to 14 V
			Switch free	Below 1 V
IND (E15-8) - GND (E15-16)	P - W-B	Security indicator signal	Security indicator light is on	10 to 14 V
			Security indicator light is off	Below 1 V

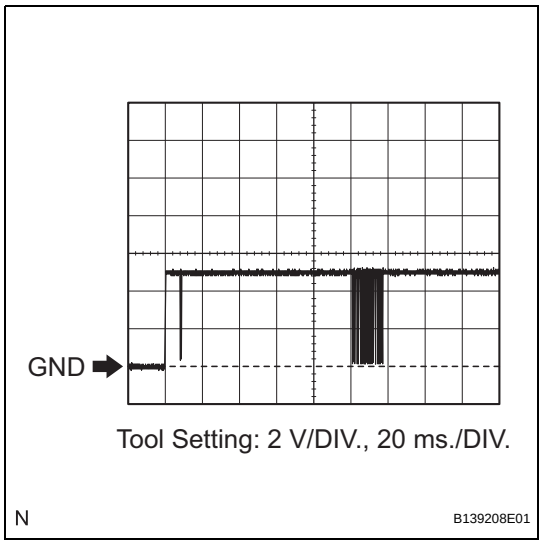
If the result is not as specified, the ECU may have a malfunction.

(c) Inspect using an oscilloscope.
(1) Waveform 1 (Reference)



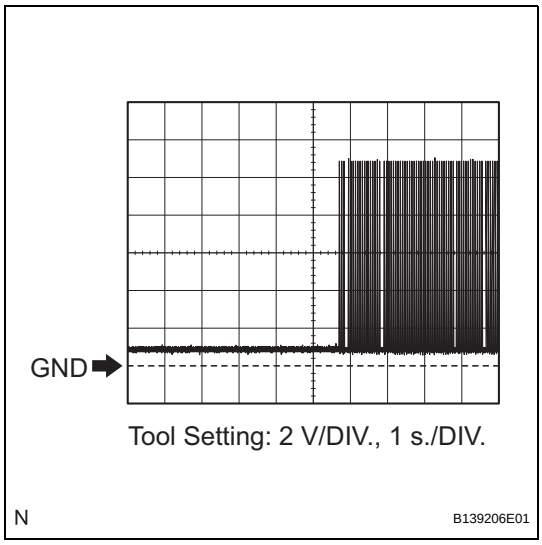
Terminal	TXCT (E15-4) - AGND (E15-5)
Tool Setting	2 V/DIV., 10 ms./DIV.
Condition	Key is in ignition key cylinder

(2) Waveform 2 (Reference)



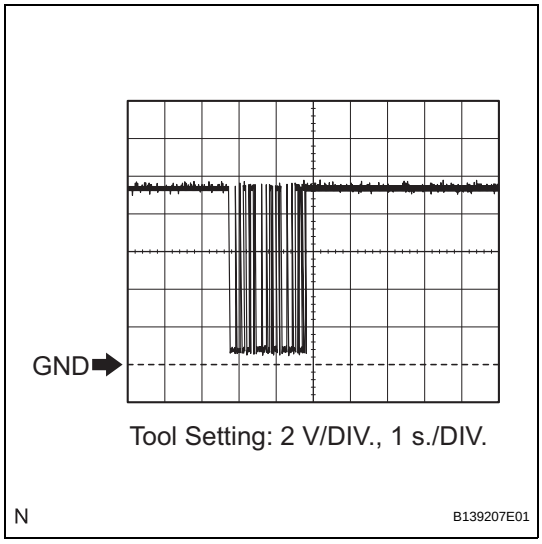
Terminal	CODE (E15-15) - AGND (E15-5)
Tool Setting	2 V/DIV., 20 ms./DIV.
Condition	Key is in ignition key cylinder

EI



(3) Waveform 3 (Reference)

Terminal	EFIO (E15-13) - GND (E15-16)
Tool Setting	2 V/DIV., 1 s./DIV.
Condition	Ignition switch ON



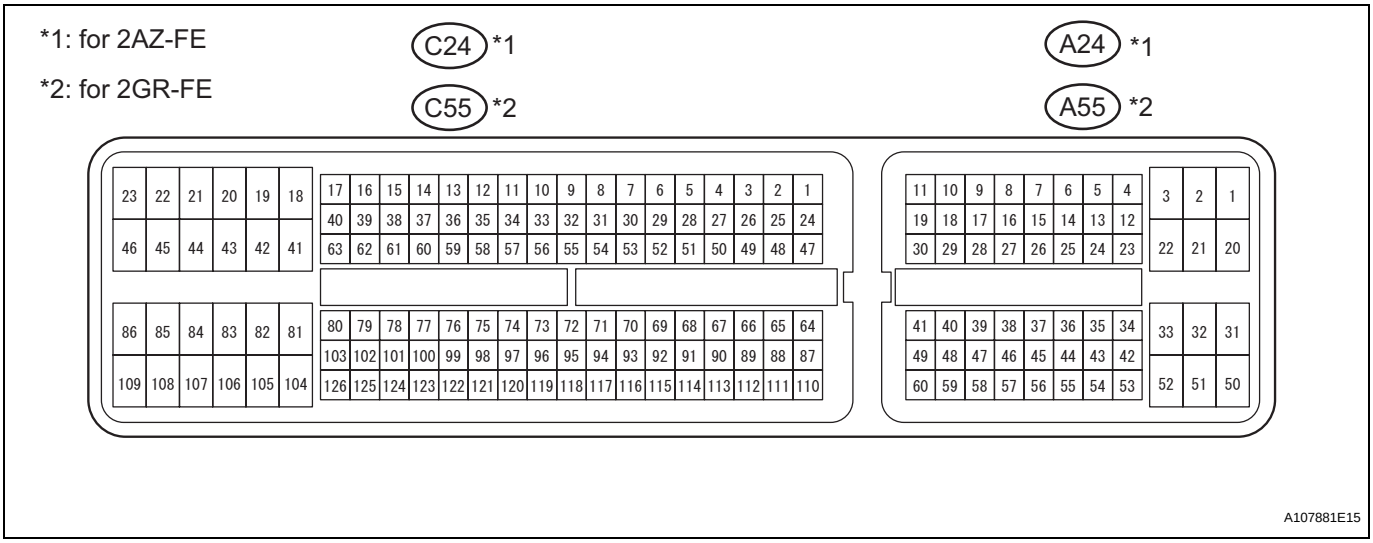
(4) Waveform 4 (Reference)

Terminal	EFII (E15-12) - GND (E15-16)
Tool Setting	2 V/DIV., 1 s./DIV.
Condition	Ignition switch ON

3. CHECK ECM

(a) Disconnect the C24*1 or C55*2 ECM connector and measure the resistance between the terminal of the wire harness side connector and body ground.

EI



Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
E1 (C24-104)*1 - Body ground	W-B - Body ground	Ground	Always	Below 1 Ω
E1 (C55-81)*2 - Body ground				

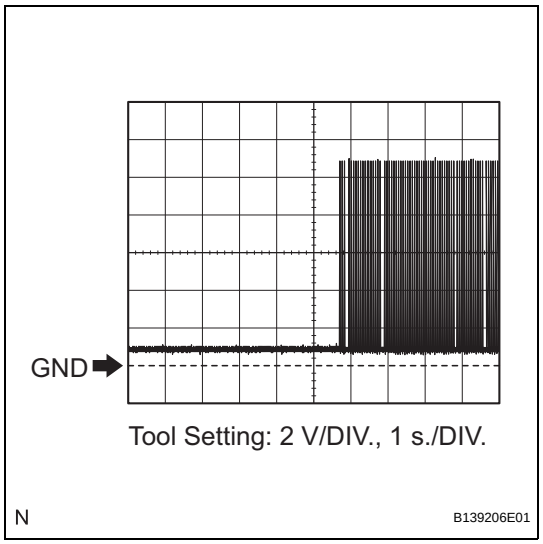
*1: for 2AZ-FE
*2: for 2GR-FE
If the result is not as specified, there may be a malfunction on the wire harness side.

(b) Reconnect the C24*1 or C55*2 ECM connector. Measure the voltage between each terminal of the connector according to the value(s) in the table below.

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
IMI (A24-11)*1 - E1 (C24-104)*1	Y - W-B	Transponder key ECU input signal	Ignition switch OFF	Below 1 V
IMI (A55-11)*2 - E1 (C55-81)*2			Ignition switch ON	Waveform 1
IMO (A24-10)*1 - E1 (C24-104)*1	G - W-B	Transponder key ECU output signal	Ignition switch OFF	Below 1 V
IMO (A55-10)*2 - E1 (C55-81)*2			Ignition switch ON	Waveform 2

*1: for 2AZ-FE
*2: for 2GR-FE
If the result is not as specified, the ECM may have a malfunction.

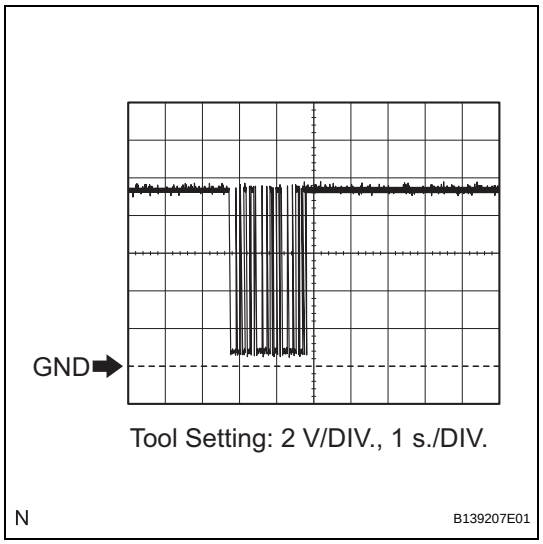
(c) Inspect using an oscilloscope.
(1) Waveform 1 (Reference)



Terminal	IMI (A24-11)*1 - E1 (C24-104)*1
	IMI (A55-11)*2 - E1 (C55-81)*2
Tool Setting	2 V/DIV., 1 s./DIV.
Condition	Ignition switch ON

*1: for 2AZ-FE
*2: for 2GR-FE

(2) Waveform 2 (Reference)



Terminal	IMO (A24-10)*1 - E1 (C24-104)*1
	IMO (A55-10)*2 - E1 (C55-81)*2
Tool Setting	2 V/DIV., 1 s./DIV.
Condition	Ignition switch ON

*1: for 2AZ-FE
*2: for 2GR-FE

EI

DATA LIST / ACTIVE TEST

1. READ DATA LIST

HINT:

Using the DATA LIST displayed on the intelligent tester, the values of the switches, sensors, actuators, etc. can be checked without part removal. Reading the DATA LIST as the first step in troubleshooting is one way to shorten labor time.

(a) Connect the intelligent tester (with CAN VIM) to the DLC3.

(b) Turn the ignition switch to the ON position.

(c) Read the DATA LIST according to the display on the tester.

IMMOBILISER:

Item	Measurement Item/Display (Range)	Normal Condition	Diagnostic Note
KEY SW	Unlock warning switch signal/ON or OFF	ON: Key is in ignition key cylinder OFF: No key is in ignition key cylinder	-
IG SW	Ignition switch signal/ON or OFF	ON: Ignition switch ON or START OFF: Ignition switch ACC or OFF	-
IMMOBILISER	Immobiliser system status/SET or UNSET	UNSET: Ignition switch ON SET: Without key	-
PERMIT (START)	Permit (Start) signal/OK or NG	NG: No permission for engine start OK: Engine start permission	-
RESPONSE	Transponder chip data/NG or OK	NG: Data error OK: Data OK	-
FRAME	Transponder chip data/NG or OK	NG: Data error OK: Data OK	-
SERIAL NUMBER	Transponder chip data/NG or OK	NG: Data error OK: Data OK	-
ENCRYPT CODE	Transponder chip data/NG or OK	NG: Data error OK: Data OK	-
STATUS	Transponder chip data/NG or OK	NG: Data error OK: Data OK	-
BCC	Transponder chip data/NG or OK	NG: Incorrect data being sent OK: Correct data being sent	-
SUB KEY	Sub key code signal/NOMATCH or MATCH	NOMATCH: Non-matching sub key code is sent MATCH: Sub key code is sent	-
MASTER KEY	Master key code signal/ NOMATCH or MATCH	NOMATCH: Non-matching master key code is sent MATCH: Master key code is sent	-
REGIST SUB CODE	Number of registered sub key/ min. 0, max. 15	Number of registered sub key	-
REGIST MAS CODE	Number of registered master key/ min. 0, max. 15	Number of registered master key	-
REG CODE SPACE	Memory space for key codes registration/NOT FULL or FULL	NOT FULL: More key code registration possible FULL: No more key code registration possible	-
+B	Power source/BRAKE or NORMAL	BRAKE: Power source open NORMAL: Power source normal	-
ANTENNA COIL	Antenna coil condition/NORMAL or FAIL	NORMAL: Antenna coil is normal FAIL: Antenna coil is malfunctioning	-

2. PERFORM ACTIVE TEST

HINT:

Performing the intelligent tester ACTIVE TEST allows a relay, VSV, actuator and other items to be operated without removing any parts. Performing the ACTIVE TEST early in troubleshooting is one way to shorten labor time. The DATA LIST can be displayed during the ACTIVE TEST.

(a) Connect the intelligent tester (with CAN VIM) to the DLC3.

(b) Turn the ignition switch to the ON position.

(c) Perform the ACTIVE TEST according to the display on the tester.

IMMOBILISER:

Item	Test Details	Diagnostic Note
SECURITY INDIC	Turn security indicator ON/OFF	-

DIAGNOSTIC TROUBLE CODE CHART

TRANSPONDER KEY ECU DIAGNOSTIC TROUBLE CODE CHART:

DTC No.	Detection Item	Trouble Area	See page
B2780	Push Switch / Key Unlock Warning Switch Malfunction	1. Wire harness 2. Unlock warning switch assembly 3. Transponder key ECU assembly	EI-72
B2784	Antenna Coil Open / Short	1. Wire harness 2. Transponder key amplifier 3. Transponder key ECU assembly	EI-76
B2793	Transponder Chip Malfunction	Key	EI-79
B2794	Unmatched Encryption Code	Key	EI-80
B2795	Unmatched Key Code	Key	EI-81
B2796	No Communication in Immobiliser System	1. Key 2. Transponder key amplifier 3. Transponder key ECU assembly	EI-82
B2797	Communication Malfunction No. 1	1. Key 2. Transponder key amplifier 3. Transponder key ECU assembly	EI-84
B2798	Communication Malfunction No. 2	1. Key 2. Transponder key amplifier 3. Transponder key ECU assembly	EI-82

ECM DIAGNOSTIC TROUBLE CODE CHART:

DTC No.	Detection Item	Trouble Area	See page
B2799	Engine Immobiliser System	1. Wire harness 2. Transponder key ECU assembly 3. ECM	EI-86

HINT:
The DTCs for the engine immobiliser system are specified above. If other codes are output, check the DTC chart for the SFI system.

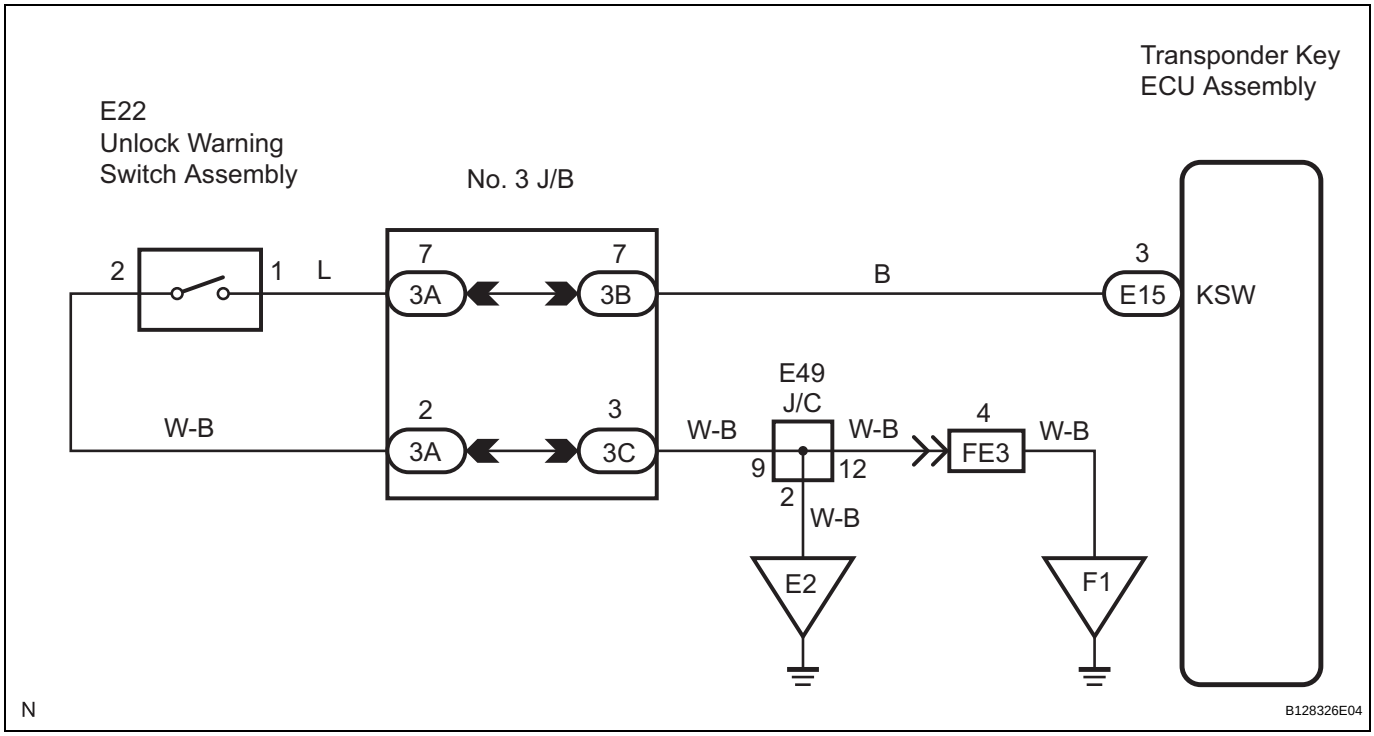
DTC	B2780	Push Switch / Key Unlock Warning Switch Malfunction

DESCRIPTION

This DTC will be output if the transponder key ECU assembly does not detect that the unlock warning switch is ON even when the ignition switch is ON. Under normal conditions, the unlock warning switch assembly is ON when the ignition switch is ON.

DTC No.	DTC Detection Condition	Trouble Area
B2780	"Unlock warning switch ON" is not detected when ignition switch is ON.	• Unlock warning switch assembly • Wire harness • Transponder key ECU assembly

WIRING DIAGRAM



INSPECTION PROCEDURE

NOTICE:

If the transponder key ECU assembly is replaced, register the key and ECU communication ID (See page EI-57).

1	READ VALUE OF INTELLIGENT TESTER

(a) Connect the intelligent tester (with CAN VIM) to the DLC3.

(b) Turn the ignition switch to the ON position and turn the intelligent tester main switch on.

(c) Select KEY SW in the DATA LIST and read the value displayed on the tester.

IMMOBILISER:

Item	Measurement Item/Display (Range)	Normal Condition	Diagnostic Note
KEY SW	Unlock warning switch signal/ON or OFF	OFF: Key is in ignition key cylinder ON: No key is in ignition key cylinder	-

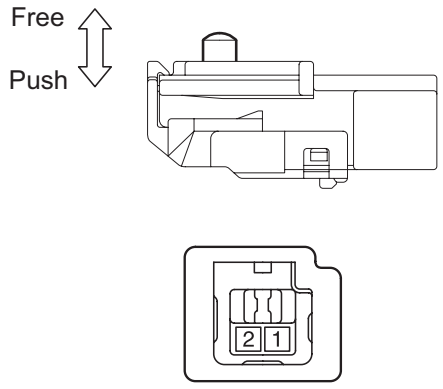
OK:
ON (Key is in ignition key cylinder) appears on the screen.

OK → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

NG

2 INSPECT UNLOCK WARNING SWITCH ASSEMBLY

Unlock Warning Switch Assembly:



(a) Remove the unlock warning switch assembly (See page DL-225).
(b) Measure the resistance according to the value(s) in the table below.
Standard resistance

Tester Connection	Switch Position	Specified Condition
1 - 2	Switch pushed (Key set)	Below 1 Ω
	Switch free (Key removed)	10 kΩ or higher

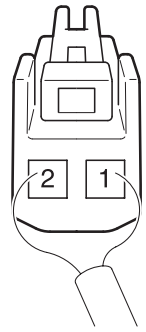
NG → **REPLACE UNLOCK WARNING SWITCH ASSEMBLY**

OK

EI

3 CHECK HARNESS AND CONNECTOR (UNLOCK WARNING SWITCH - BODY GROUND)

Wire Harness Side Connector Rear View:



E22
Unlock Warning Switch Assembly

P B124194E02

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

Standard resistance

Tester Connection	Condition	Specified Condition
E22-2 - Body ground	Always	Below 1 Ω

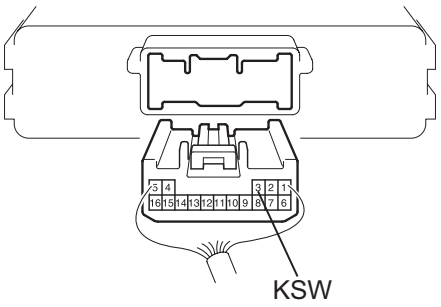
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

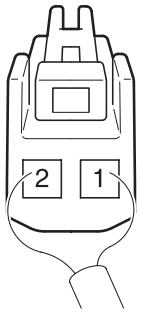
4 CHECK HARNESS AND CONNECTOR (TRANSPONDER KEY ECU - UNLOCK WARNING SWITCH)

Wire Harness Side Connector Rear View:

E15
Transponder Key ECU Assembly



E22
Unlock Warning Switch Assembly



P B128340E02

(a) Disconnect the E15 ECU connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

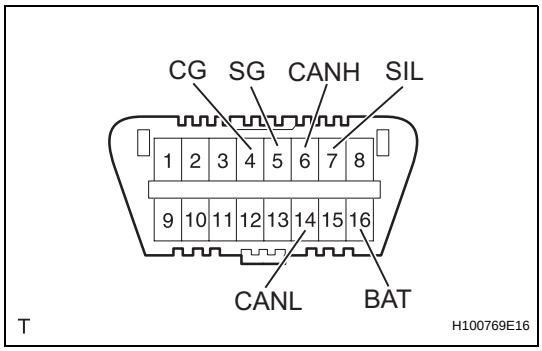
Tester Connection	Condition	Specified Condition
E15-3 (KSW) - E22-1	Always	Below 1 Ω
E22-1 - Body ground		10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

EI

OK

REPLACE TRANSPONDER KEY ECU ASSEMBLY



DIAGNOSIS SYSTEM

1. CHECK DLC3

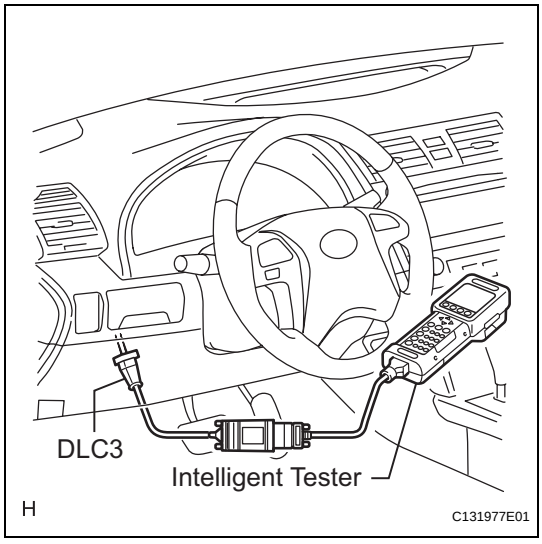
(a) The vehicle's ECU uses ISO 15765-4 for communication protocol. The terminal arrangement of the DLC3 complies with SAE J1962 and matches the ISO 15765-4 format.

Symbols (Terminal No.)	Terminal Description	Condition	Specified Condition
SIL (7) - SG (5)	Bus "+" line	During transmission	Pulse generation
CG (4) - Body ground	Chassis ground	Always	Below 1 Ω
SG (5) - Body ground	Signal ground	Always	Below 1 Ω
BAT (16) - Body ground	Battery positive	Always	10 to 14 V
CANH (6) - CANL (14)	CAN bus line	Ignition switch OFF*	54 to 69 Ω
CANH (6) - CG (4)	HIGH-level CAN bus line	Ignition switch OFF*	200 Ω or higher
CANL (14) - CG (4)	LOW-level CAN bus line	Ignition switch OFF*	200 Ω or higher
CANH (6) - BAT (16)	HIGH-level CAN bus line	Ignition switch OFF*	6 kΩ or higher
CANL (14) - BAT (16)	LOW-level CAN bus line	Ignition switch OFF*	6 kΩ or higher

NOTICE:

***: Before measuring the resistance, leave the vehicle as is for at least 1 minute and do not operate the ignition switch, any other switches or the doors.**

If the result is not as specified, the DLC3 may have a malfunction. Repair or replace the harness and connector.

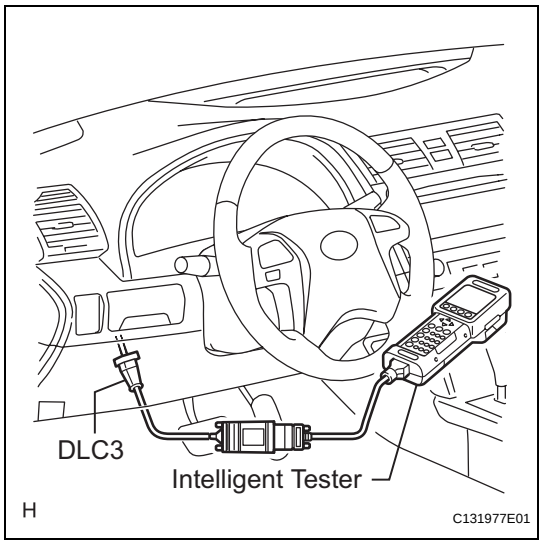


(b) Connect the cable of the intelligent tester (with CAN VIM) to the DLC3, turn the ignition switch to the ON position and attempt to use the intelligent tester. If the screen displays a communication error message, a problem exists in the vehicle side of the tester side.

HINT:

- If communication is normal when the tool is connected to another vehicle, inspect the DLC3 on the original vehicle.
- If communication is still impossible when the tool is connected to another vehicle, the problem is probably in the tool itself. Consult the Service Department listed in the tool's instruction manual.

EI



DTC CHECK / CLEAR

1. CHECK DTC

(a) Connect the intelligent tester to the Controller Area Network Vehicle Interface Module (CAN VIM). Then connect the CAN VIM to the DLC3.

(b) Turn the ignition switch to the ON position.

(c) Read the DTCs by following the directions on the tester screen.
HINT:
Refer to the intelligent tester operator's manual for further details.

2. CLEAR DTC

(a) Connect the intelligent tester (with CAN VIM) to the DLC3.

(b) Turn the ignition switch to the ON position.

(c) Erase the DTCs by following the directions on the tester screen.
HINT:
Refer to the intelligent tester operator's manual for further details.

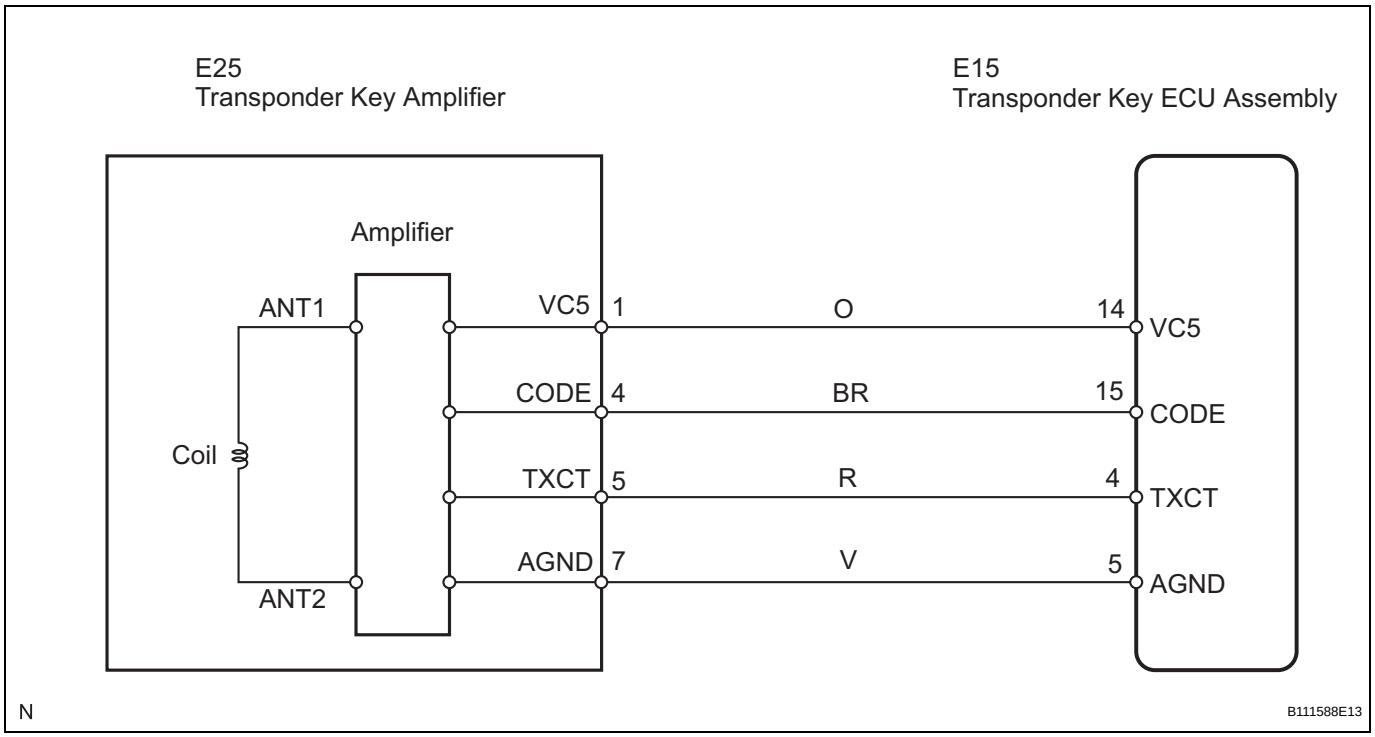
DTC	B2784	Antenna Coil Open / Short

DESCRIPTION

The transponder key coil is built into the transponder key amplifier and receives a key code signal from the transponder chip in the key. This signal is amplified by the amplifier, then it is output to the transponder key ECU assembly.

DTC No.	DTC Detection Condition	Trouble Area
B2784	Antenna coil is open/shorted	• Wire harness • Transponder key amplifier • Transponder key ECU assembly

WIRING DIAGRAM



EI

INSPECTION PROCEDURE

NOTICE:

If the transponder key ECU assembly is replaced, register the key and ECU communication ID (See page EI-57).

1	READ VALUE OF INTELLIGENT TESTER

(a) Connect the intelligent tester (with CAN VIM) to the DLC3.

(b) Turn the ignition switch to the ON position and turn the intelligent tester on.

(c) Select ANTENNA COIL in the DATA LIST and read the value displayed on the intelligent tester.

IMMOBILISER:

Item	Measurement Item/Display (Range)	Normal Condition	Diagnostic Note
ANTENNA COIL	Transponder key amplifier coil condition/NORMAL or FAIL	NORMAL: Antenna coil is normal FAIL: Antenna coil is malfunctioning	-

OK:

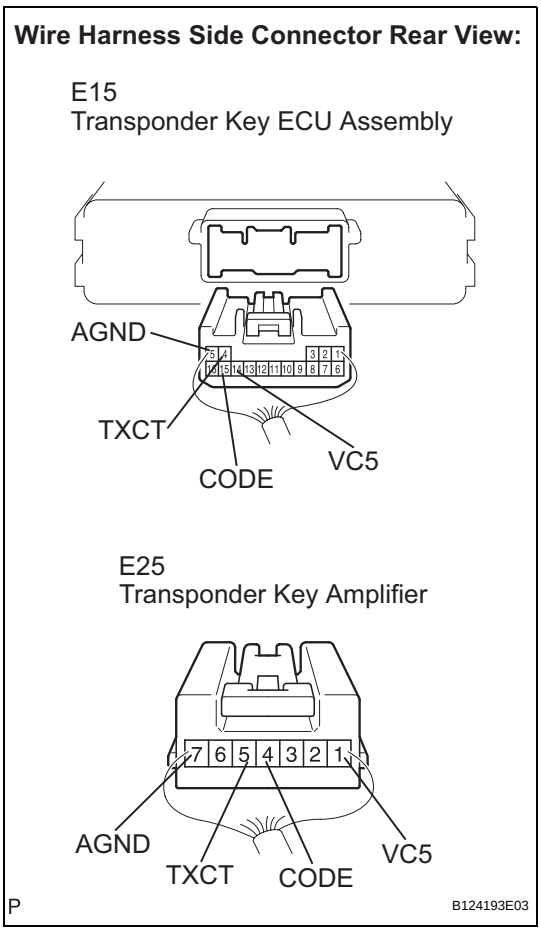
NORMAL (Antenna coil is normal) appears on the screen.

OK → **REPLACE TRANSPONDER KEY ECU ASSEMBLY**

NG

2 CHECK HARNESS AND CONNECTOR (TRANSPONDER KEY ECU - TRANSPONDER KEY AMPLIFIER)

Wire Harness Side Connector Rear View:



(a) Disconnect the E15 ECU and E25 amplifier connectors.

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

Standard resistance

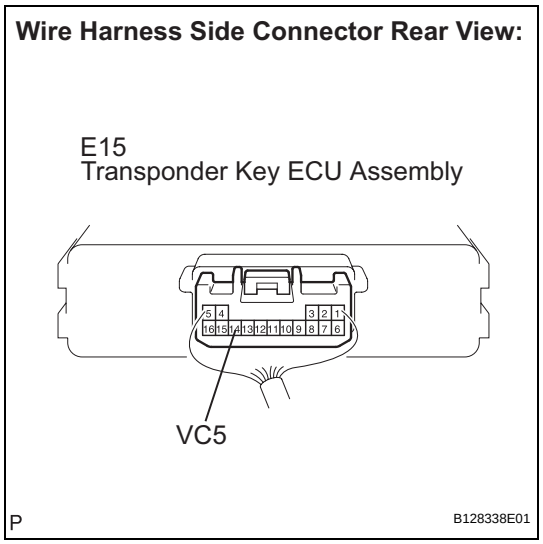
Tester Connection	Condition	Specified Condition
E15-4 (TXCT) - E25-5 (TXCT)	Always	Below 1 Ω
E15-5 (AGND) - E25-7 (AGND)		
E15-14 (VC5) - E25-1 (VC5)		
E15-15 (CODE) - E25-4 (CODE)		
E15-4 (TXCT) - Body ground		10 kΩ or higher
E15-5 (AGND) - Body ground		
E15-14 (VC5) - Body ground		
E15-15 (CODE) - Body ground		

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

EI

3	INSPECT TRANSPONDER KEY ECU ASSEMBLY (TRANSPONDER KEY AMPLIFIER POWER SOURCE)



(a) Reconnect the E15 ECU and E25 amplifier connectors.
(b) Measure the voltage according to the value(s) in the table below.

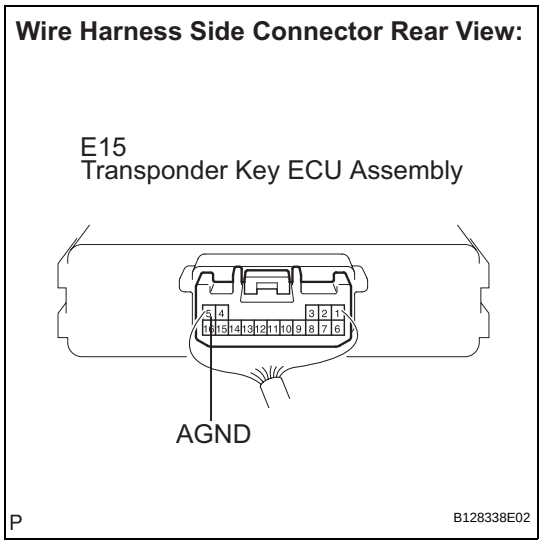
Standard voltage

Tester Connection	Condition	Specified Condition
E15-14 (VC5) - Body ground	No key is in ignition key cylinder	Below 1 V
	Key is in ignition key cylinder	4.6 to 5.4 V

NG → REPLACE TRANSPONDER KEY ECU ASSEMBLY

OK

4	INSPECT TRANSPONDER KEY ECU ASSEMBLY (TRANSPONDER KEY AMPLIFIER GROUND)



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

Standard resistance

Tester Connection	Condition	Specified Condition
E15-5 (AGND) - Body ground	Always	Below 1 Ω

NG → REPLACE TRANSPONDER KEY ECU ASSEMBLY

OK

REPLACE TRANSPONDER KEY AMPLIFIER

EI

DTC	B2793	Transponder Chip Malfunction

DESCRIPTION

This DTC is output when a malfunction is found in the key during key code registration or a key code is not registered normally. Replace the key if the key code registration is not performed normally and this DTC is detected.

DTC No.	DTC Detection Condition	Trouble Area
B2793	Transponder chip malfunction	Key

INSPECTION PROCEDURE

NOTICE:
If the key is replaced, register the key (See page EI-57).

1	RE-REGISTER KEY

(a) Delete the DTCs (See page EI-69).
(b) Re-register the key (See page EI-57) and insert this key into the ignition key cylinder. Check that the engine starts with this key.
OK:
The engine starts.

NG → **REPLACE KEY**

OK

END

DTC	B2794	Unmatched Encryption Code

DESCRIPTION

This DTC is output when a key with an incomplete key code is inserted into the ignition key cylinder.

DTC No.	DTC Detection Condition	Trouble Area
B2794	Key with incomplete key code is inserted	Key

INSPECTION PROCEDURE

NOTICE:

If the key is replaced, register the key (See page EI-57).

1	REPLACE KEY

NEXT

END

DTC	B2795	Unmatched Key Code

DESCRIPTION

This DTC is output when a key with a key code that has not been registered in the ECU is inserted into the ignition key cylinder.

DTC No.	DTC Detection Condition	Trouble Area
B2795	Key with unregistered key code is inserted	Key

INSPECTION PROCEDURE

NOTICE:

If the key is replaced, register the key (See page EI-57).

1	RE-REGISTER KEY

(a) Delete the DTCs (See page EI-69).

(b) Re-register the key (See page EI-57) and insert this key into the ignition key cylinder. Check that the engine starts with this key.

OK:

The engine starts.

NG → **REPLACE KEY**

OK ↓

END

DTC	B2796	No Communication in Immobiliser System

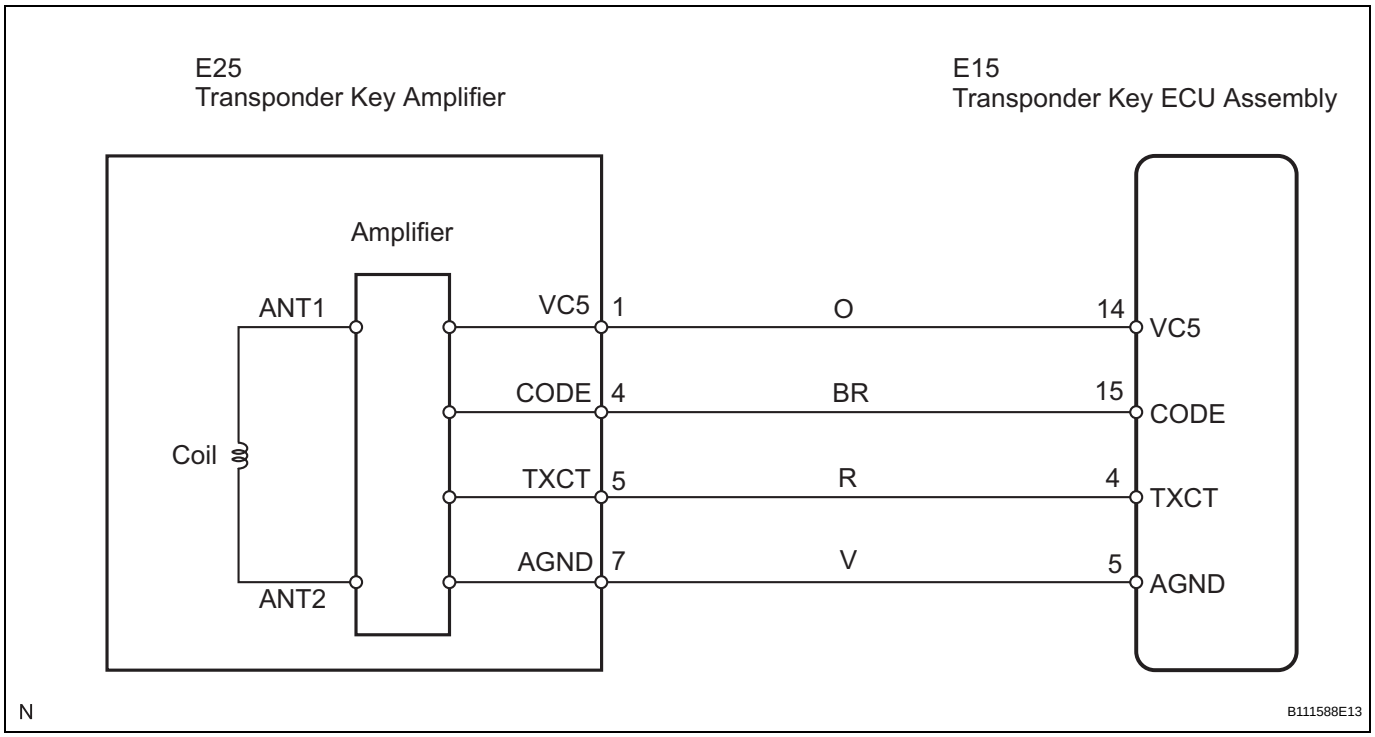
DTC	B2798	Communication Malfunction No. 2

DESCRIPTION

These DTCs are output if a key that does not have a transponder chip is inserted into the ignition key cylinder or if communication between the key and transponder key ECU assembly is impossible.

DTC No.	DTC Detection Condition	Trouble Area
B2796	The key code cannot be transmitted	• Key • Transponder key amplifier • Transponder key ECU assembly
B2798	Key code identification cannot be completed within the specified time	• Key • Transponder key amplifier • Transponder key ECU assembly

WIRING DIAGRAM



INSPECTION PROCEDURE

NOTICE:

- **If the transponder key ECU assembly is replaced, register the key and ECU communication ID (See page EI-57).**
- **If the key is replaced, register the key (See page EI-57).**

1	READ VALUE OF INTELLIGENT TESTER

(a) Connect the intelligent tester (with CAN VIM) to the DLC3.
(b) Turn the ignition switch to the ON position and turn the intelligent tester on.

EI

(c) Select IMMOBILISER in the DATA LIST and read the value displayed on the intelligent tester.

IMMOBILISER:

Item	Measurement Item/Display (Range)	Normal Condition	Diagnostic Note
IMMOBILISER	Immobiliser system status/SET or UNSET	UNSET: Ignition switch ON SET: Without key	-

OK:

UNSET (Ignition switch ON) appears on the screen.

OK → **REPLACE TRANSPONDER KEY ECU ASSEMBLY**

NG

2 CHECK KEYS

(a) Insert the vehicle's other key into the ignition key cylinder.

(b) Check that the engine starts with this key.

OK:

The engine starts.

OK → **RE-REGISTER OR REPLACE KEY THAT CANNOT START ENGINE**

NG

3 CHECK TRANSPONDER KEY AMPLIFIER

(a) After replacing the transponder key amplifier (See page LI-112) with a normally functioning amplifier, check that the engine starts.

OK:

The engine starts.

NG → **REPLACE TRANSPONDER KEY ECU ASSEMBLY**

OK

END

EI

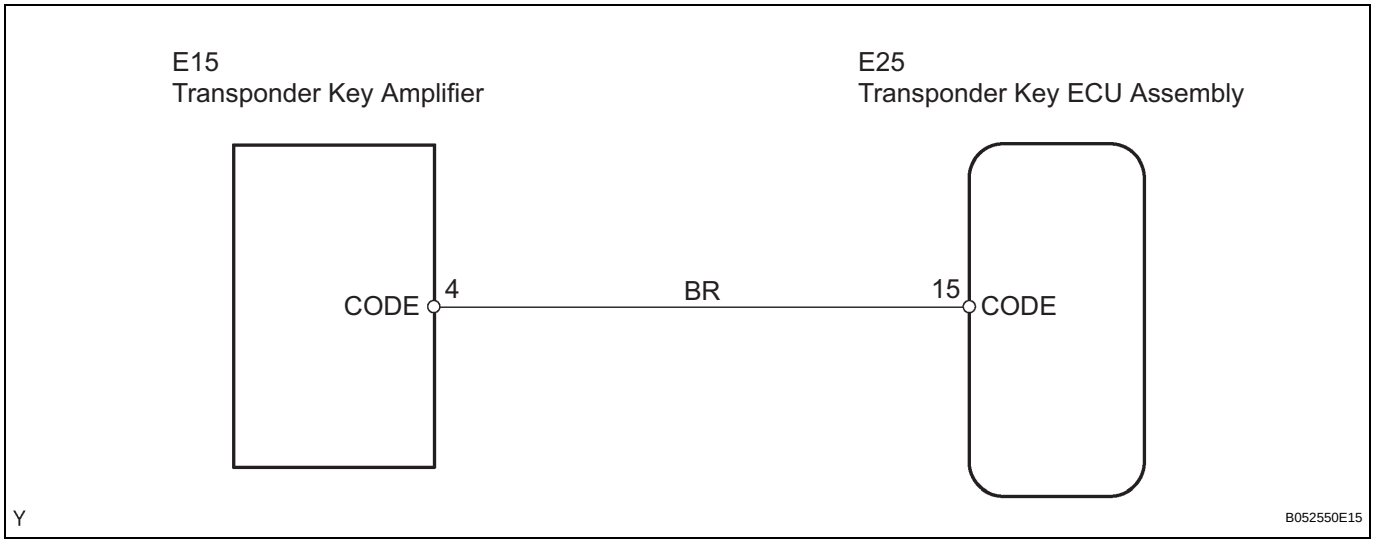
DTC	B2797	Communication Malfunction No. 1

DESCRIPTION

This DTC is output when an error occurs in communication between the transponder key amplifier and the transponder key ECU.
HINT:
Some noise is found in the communication line.

DTC No.	DTC Detection Condition	Trouble Area
B2797	Keys are positioned too close to each other, or noise occurred in communication line	• Key • Transponder key amplifier • Transponder key ECU assembly

WIRING DIAGRAM

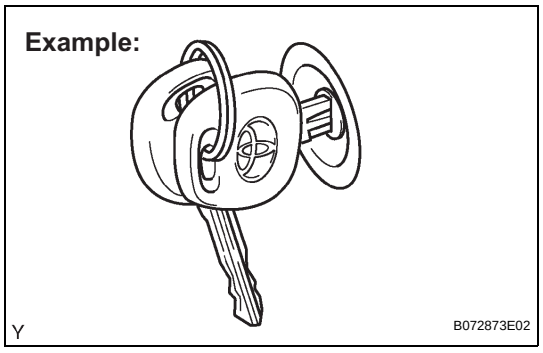


INSPECTION PROCEDURE

NOTICE:
If the transponder key ECU assembly is replaced, register the key and ECU communication ID (See page EI-57).

EI

1	CHECK KEYS



(a) Check whether the ignition key being used is near other ignition keys, as shown in the illustration. Also, check whether the key ring is in contact with the key grip.
Result

Result	Proceed to
Key is near other keys and/or key ring is in contact with key grip.	A
Key is not near other keys and/or key ring is not in contact with key grip.	B

B → **Go to step 3**

A

2	CHECK DTC OUTPUT

(a) Separate the keys from each other, or remove the key ring.
(b) Delete the DTCs (See page EI-69).
(c) Insert a key into the ignition key cylinder and remove the key. Repeat for all the other keys of the vehicle.
OK:
No code is output.

OK → **END**

NG

3	CHECK TRANSPONDER KEY AMPLIFIER

(a) After replacing the transponder key amplifier (See page LI-112) with a normally functioning amplifier, check that the engine starts.
OK:
The engine starts.

NG → **REPLACE TRANSPONDER KEY ECU ASSEMBLY**

OK

END

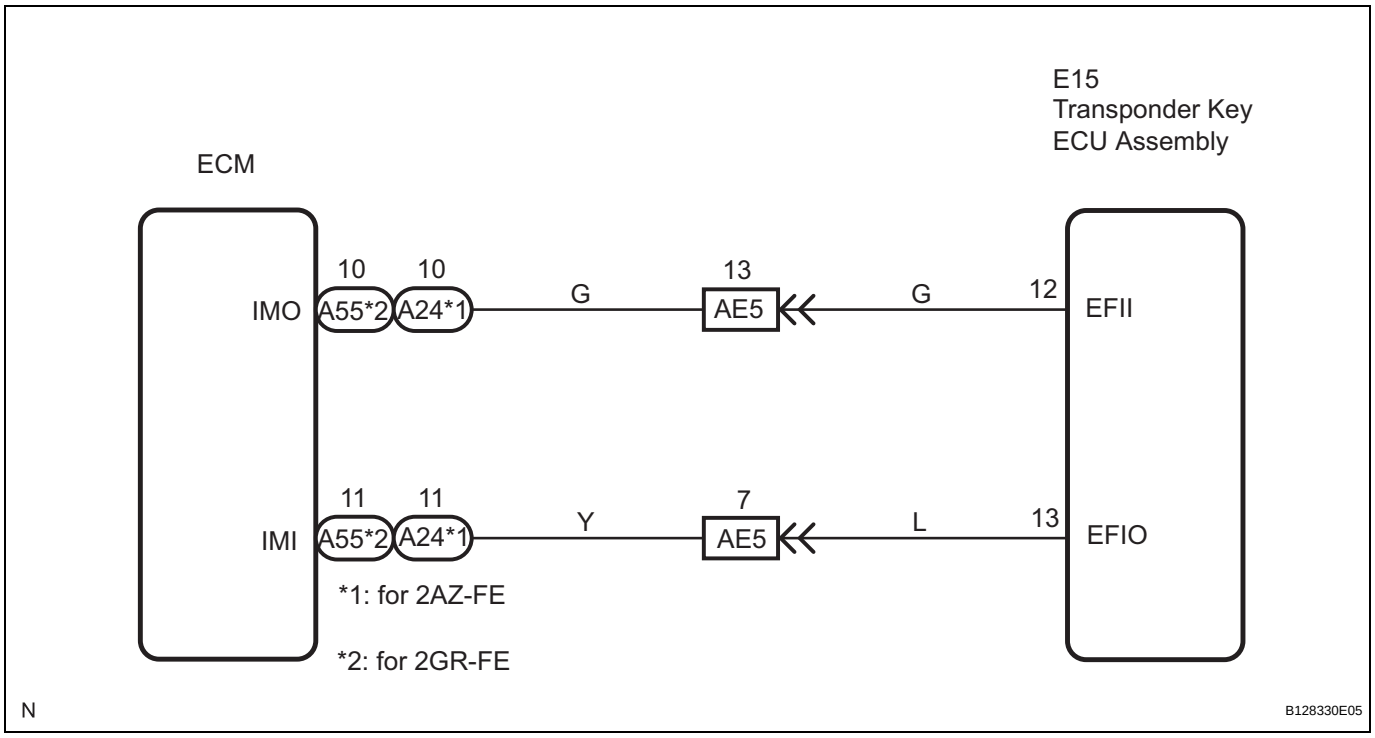
DTC	B2799	Engine Immobiliser System

DESCRIPTION

This DTC is output when the ECM detects errors in communication with the transponder key ECU, and in the communication lines.
This DTC is also output when an engine start is attempted while the ECU communication ID between the transponder key ECU and the ECM is different.
Before troubleshooting for this DTC, make sure that there is no DTC detected in the transponder key ECU. If there is any key code related DTC detected in the transponder key ECU, repair it first.

DTC No.	DTC Detection Condition	Trouble Area
B2799	Error in communication between ECM and transponder key ECU assembly, and in communication line Communication ID is different during communication with transponder key ECU	• Wire harness • Transponder key ECU assembly • ECM

WIRING DIAGRAM



INSPECTION PROCEDURE

NOTICE:

- **If the transponder key ECU assembly is replaced, register the key and ECU communication ID (See page EI-57).**
- **If the ECM is replaced, register the ECU communication ID (See page EI-57).**

1	RE-REGISTER ECU COMMUNICATION ID

(a) Re-register the ECU communication ID (See page EI-57) between the transponder key ECU assembly and ECM.
(b) Check that the engine starts.
OK:
The engine starts.

EI

OK → END

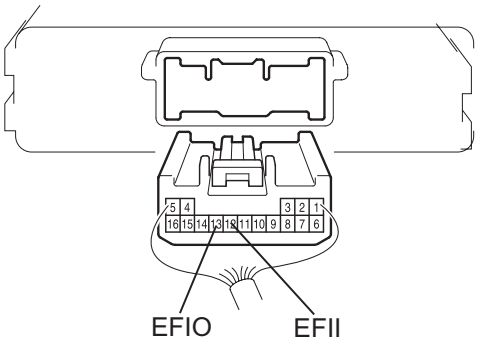
NG

2 CHECK HARNESS AND CONNECTOR (TRANSPONDER KEY ECU - ECM)

(a) Disconnect the E15 ECU and A24*1 or A55*2 ECM connectors.

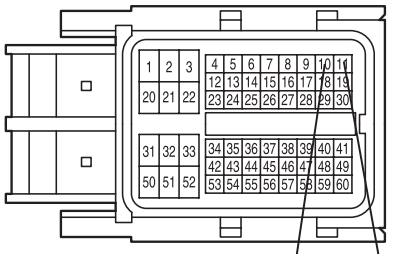
Wire Harness Side Connector Front View:

E15
Transponder Key ECU Assembly



Wire Harness Side Connector Rear View:

A24*1
A55*2
ECM



*1: for 2AZ-FE
*2: for 2GR-FE

B139202E01

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

Standard resistance

Tester Connection	Condition	Specified Condition
E15-12 (EFII) - A24*1, A55*2-10 (IMO)	Always	Below 1 Ω
E15-13 (EFIO) - A24*1, A55*2-11 (IMI)		
E15-12 (EFII) - Body ground		10 kΩ or higher
E15-13 (EFIO) - Body ground		

*1: for 2AZ-FE
*2: for 2GR-FE

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

3 REPLACE TRANSPONDER KEY ECU ASSEMBLY

(a) After replacing the transponder key ECU assembly with a normally functioning transponder key ECU assembly, check that the engine starts.

OK:

The engine starts.

EI

NG → **REPLACE ECM**

OK

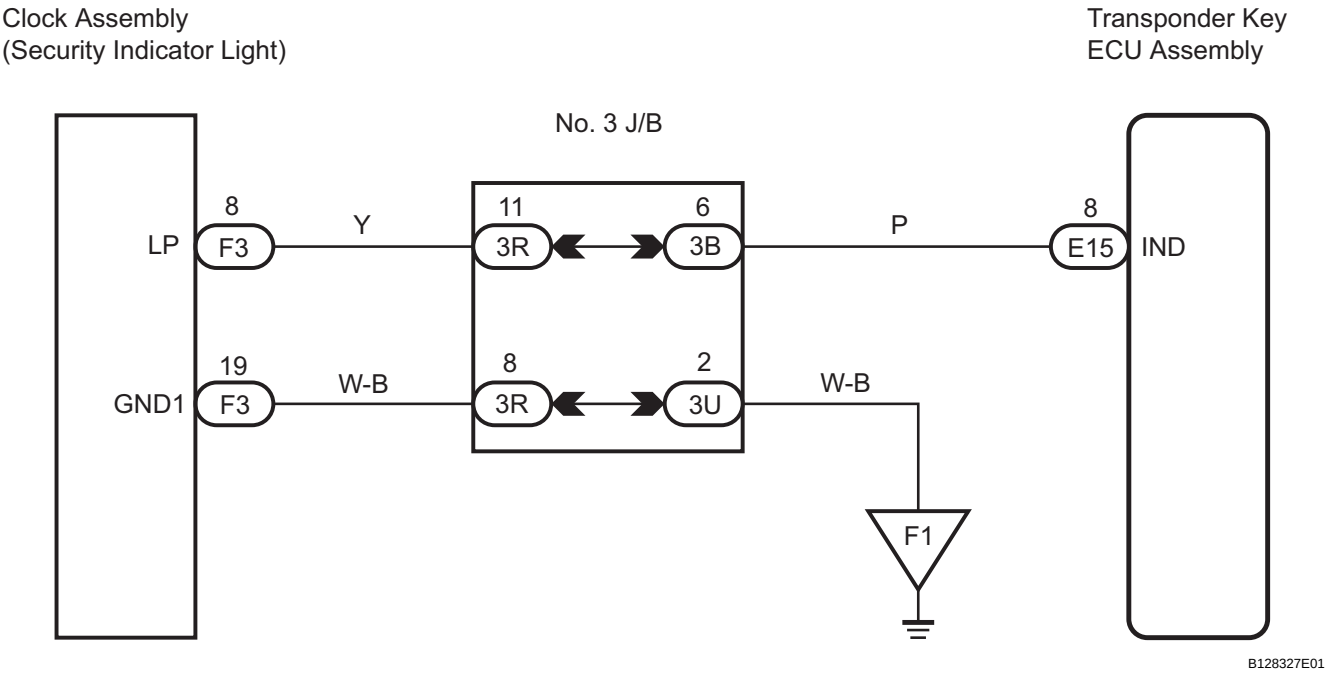
END

Security Indicator Light Circuit

DESCRIPTION

When the transponder key is registered, the transponder key ECU assembly outputs the key registration condition by lighting up, blinking or turning off the security indicator.

WIRING DIAGRAM



INSPECTION PROCEDURE

NOTICE:

If the transponder key ECU assembly is replaced, register the key and ECU communication ID (See page EI-57).

1	PERFORM ACTIVE TEST BY INTELLIGENT TESTER

(a) Connect the intelligent tester (with CAN VIM) to the DLC3.
(b) Turn the ignition switch to the ON position.
(c) Perform the ACTIVE TEST according to the display on the tester.

IMMOBILISER:

Item	Tester Details	Diagnostic Note
SECURITY INDIC	Turn security indicator ON/OFF	-

OK:

Security indicator turns on and off.

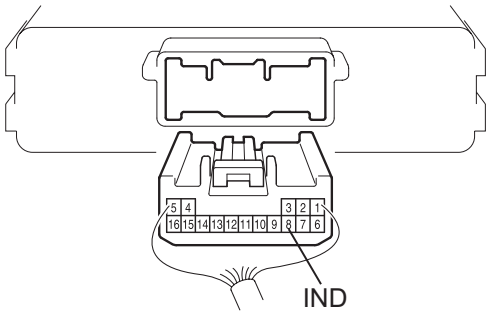
OK	**PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE**

NG

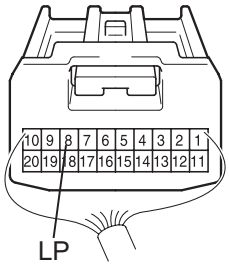
2 CHECK HARNESS AND CONNECTOR (TRANSPONDER KEY ECU - SECURITY INDICATOR LIGHT)

Wire Harness Side Connector Rear View:

E15
Transponder Key ECU Assembly



F3
Clock Assembly (Security Indicator Light)



P B128342E01

(a) Disconnect the E15 ECU and F3 combination meter connectors.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
E15-8 (IND) - F3-8 (LP)	Always	Below 1 Ω
E15-8 (IND) - Body ground		10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

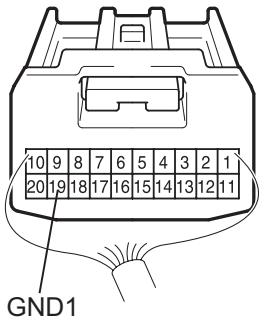
OK

EI

3 CHECK HARNESS AND CONNECTOR (SECURITY INDICATOR LIGHT - BODY GROUND)

Wire Harness Side Connector Rear View:

F3
Clock Assembly (Security Indicator Light)



P B128343E01

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

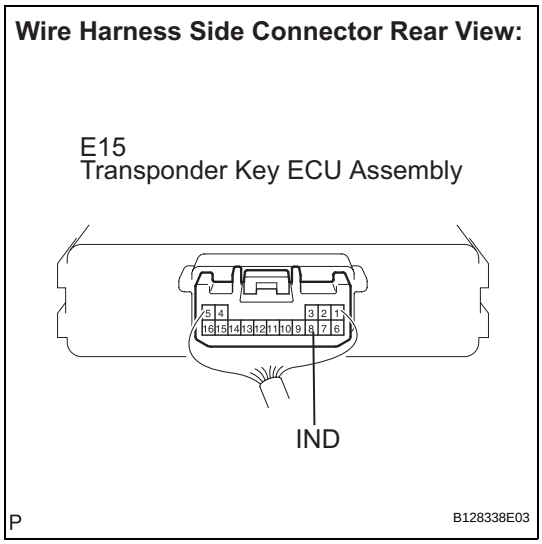
Standard resistance

Tester Connection	Condition	Specified Condition
F3-19 (GND1) - Body ground	Always	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

4	INSPECT TRANSPONDER KEY ECU ASSEMBLY



(a) Reconnect the E15 ECU and F3 combination meter connectors.

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

Standard voltage

Tester Connection	Condition	Specified Condition
E15-8 (IND) - Body ground	Immobiliser set state (No key is in ignition key cylinder)	Repeats 10 to 14 V and below 1 V

NG → **REPLACE TRANSPONDER KEY ECU ASSEMBLY**

OK

REPLACE CLOCK ASSEMBLY

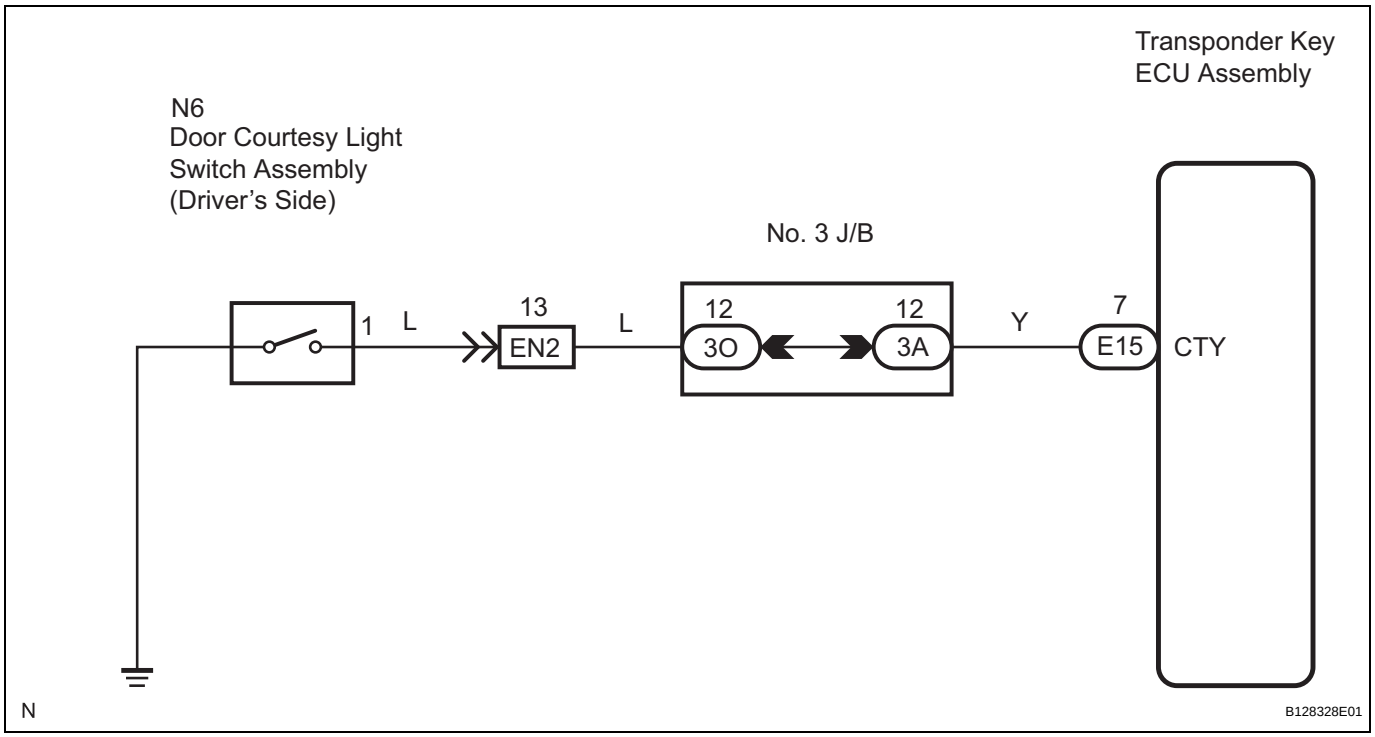
EI

Door Courtesy Switch Circuit

DESCRIPTION

When an additional transponder key is registered, the transponder key ECU assembly detects the front door courtesy light switch open/close condition, and enters the key registration mode.

WIRING DIAGRAM



INSPECTION PROCEDURE

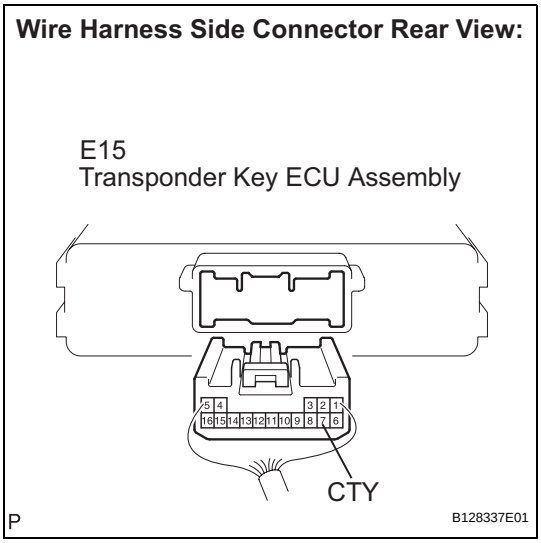
NOTICE:

If the transponder key ECU assembly is replaced, register the key and ECU communication ID (See page EI-57).

EI

1	CHECK HARNESS AND CONNECTOR (FRONT DOOR COURTESY LIGHT SWITCH CIRCUIT)

Wire Harness Side Connector Rear View:



(a) Disconnect the E15 ECU connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

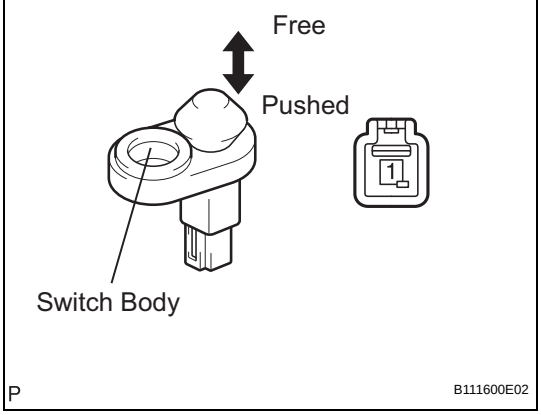
Tester Connection	Condition	Specified Condition
E15-7 (CTY) - Body ground	Courtesy switch pushed (Door closed)	10 kΩ or higher
	Courtesy switch free (Door open)	Below 1 Ω

OK → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE**

NG

2	INSPECT FRONT DOOR COURTESY LIGHT SWITCH ASSEMBLY

Front Door Courtesy Light Switch Side Connector Front View:



(a) Remove the driver side front door courtesy light switch (See page LI-128).
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
1 - Switch body	Courtesy switch pushed (Door closed)	10 kΩ or higher
	Courtesy switch free (Door open)	Below 1 Ω

NG → **REPLACE FRONT DOOR COURTESY LIGHT SWITCH ASSEMBLY**

OK

REPAIR OR REPLACE HARNESS OR CONNECTOR (TRANSPONDER KEY ECU - FRONT DOOR COURTESY LIGHT SWITCH)

EI

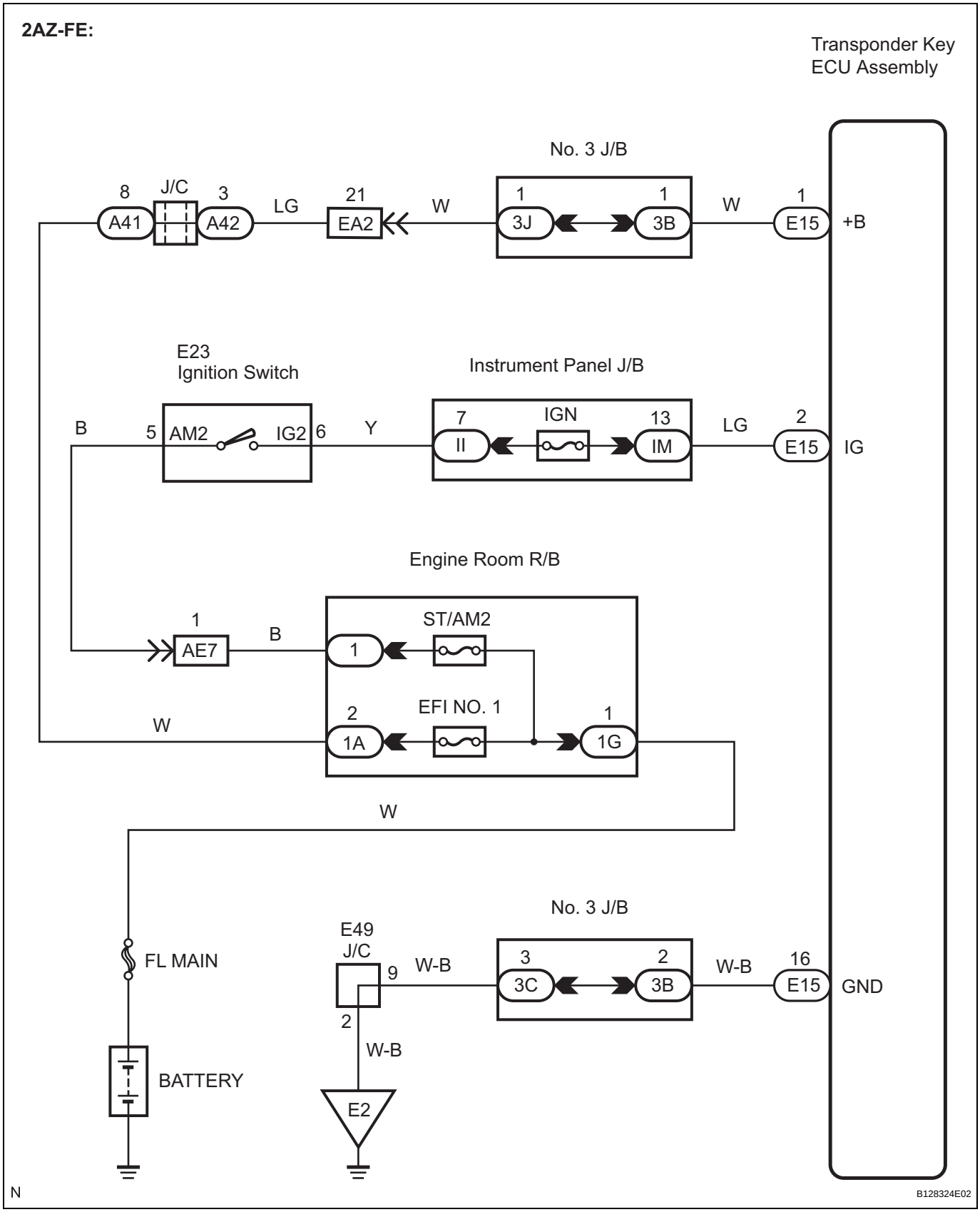
ECU Power Source Circuit

DESCRIPTION

This circuit provides power to operate the transponder key ECU assembly.

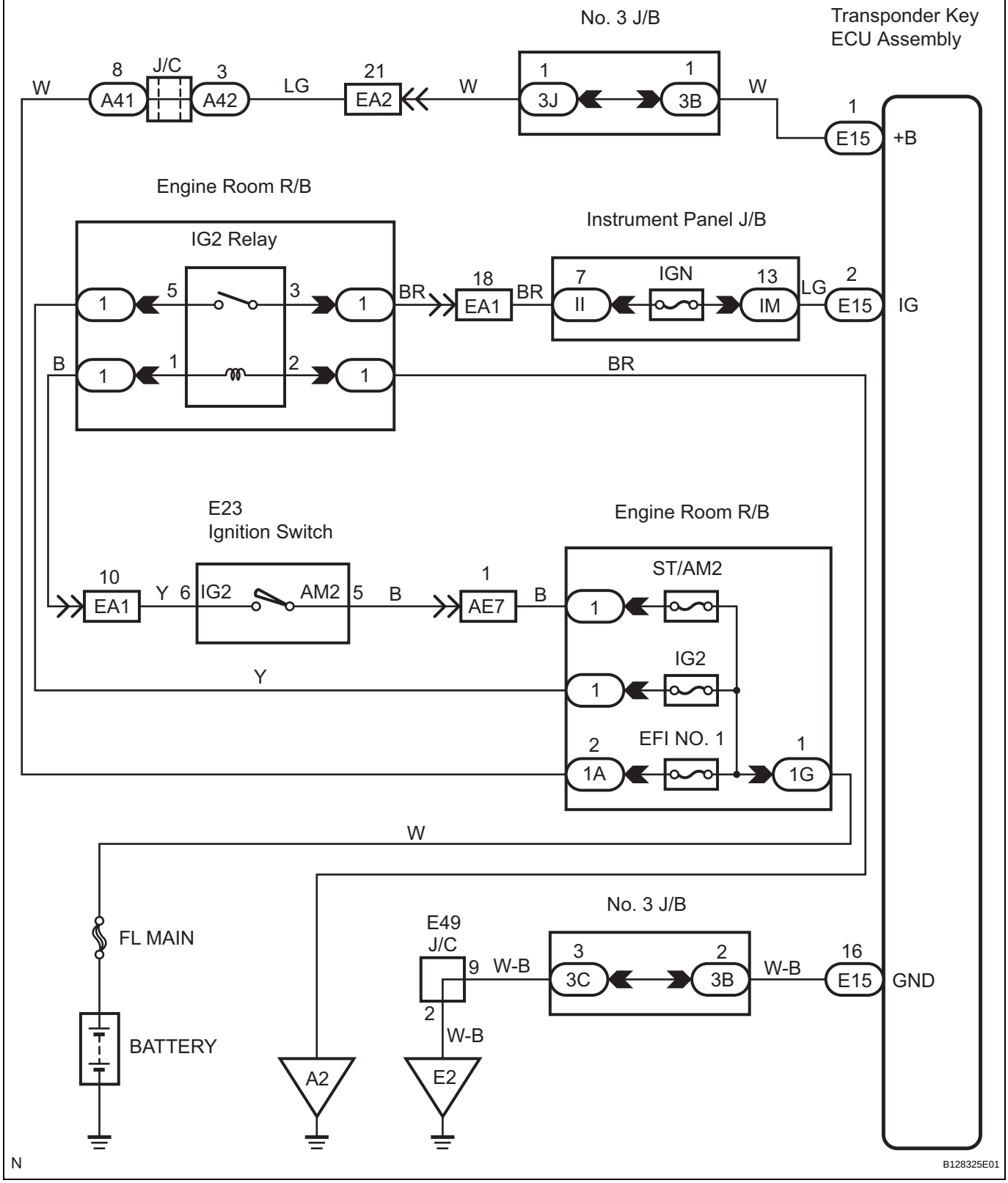
WIRING DIAGRAM

2AZ-FE:



EI

2GR-FE:

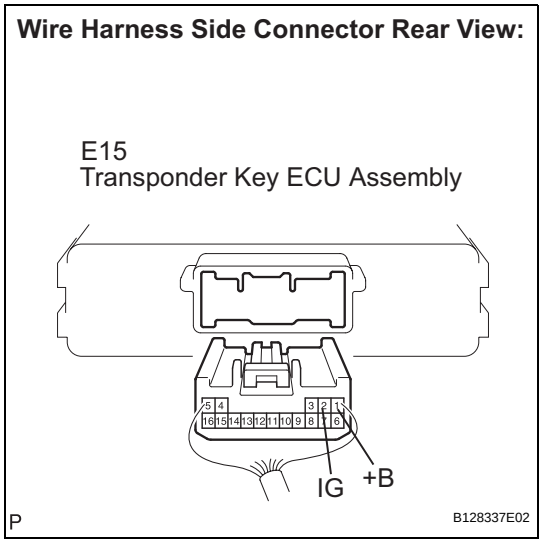


INSPECTION PROCEDURE

NOTICE:

If the transponder key ECU assembly is replaced, register the key and ECU communication ID (See page EI-57).

1 CHECK HARNESS AND CONNECTOR (TRANSPONDER KEY ECU - BATTERY)



(a) Disconnect the E15 ECU connector.
(b) Measure the voltage according to the value(s) in the table below.

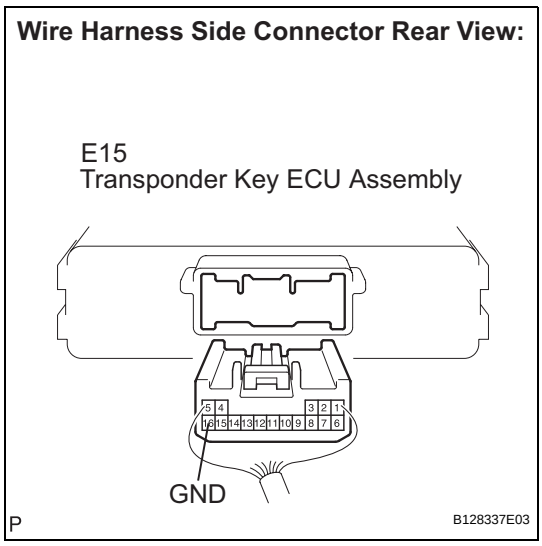
Standard voltage

Tester Connection	Condition	Specified Condition
E15-1 (+B) - Body ground	Always	10 to 14 V
E15-2 (IG) - Body ground	Ignition switch OFF	Below 1 V
	Ignition switch ON	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR, OR REPLACE FUSE**

OK

2 CHECK HARNESS AND CONNECTOR (TRANSPONDER KEY ECU - BODY GROUND)



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

Standard resistance

Tester Connection	Condition	Specified Condition
E15-16 (GND) - Body ground	Always	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

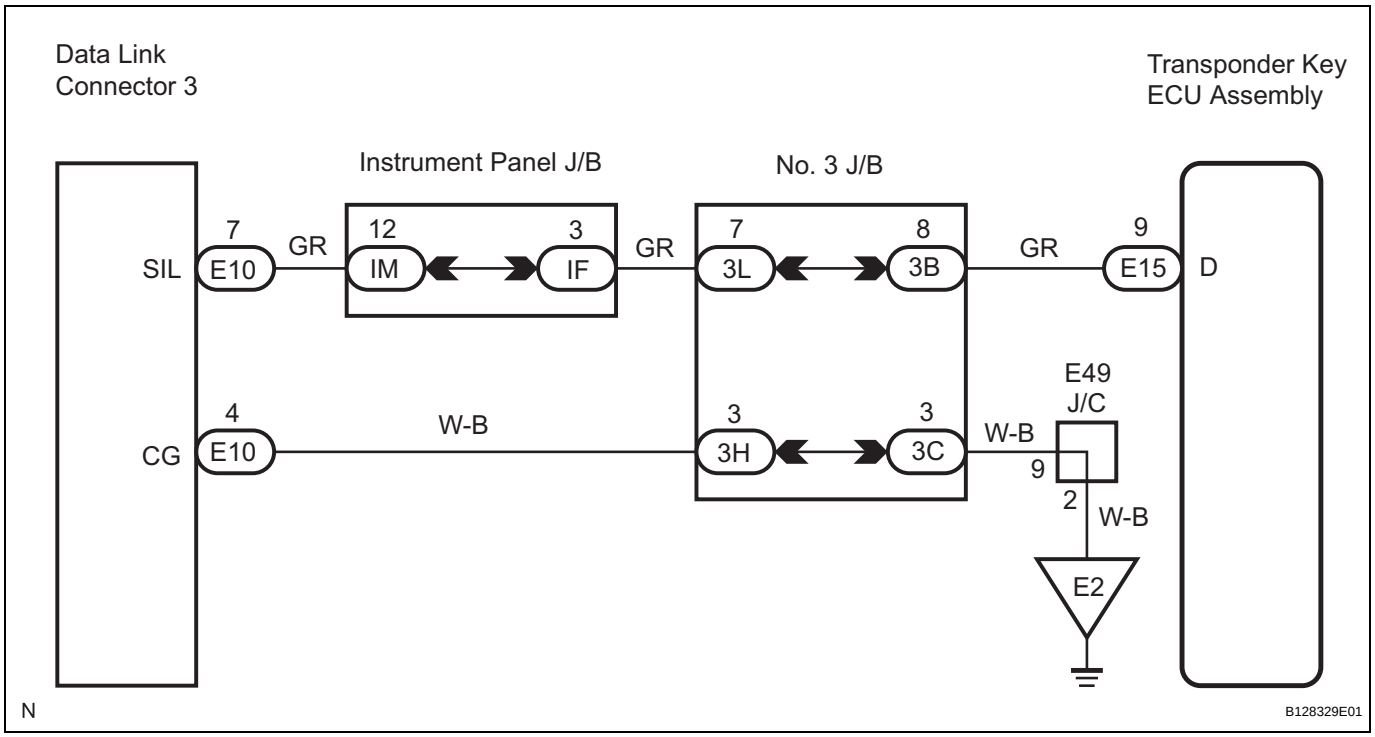
EI

Diagnosis Circuit

DESCRIPTION

This circuit is used to read the DTCs that are output from the transponder key ECU assembly with the intelligent tester.

WIRING DIAGRAM



INSPECTION PROCEDURE

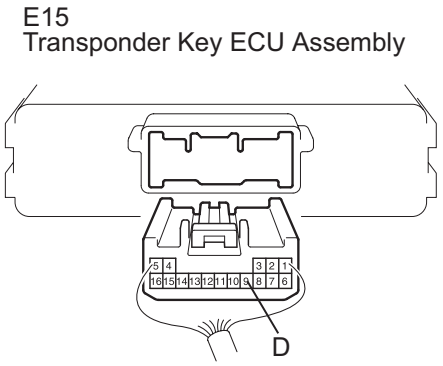
NOTICE:

If the transponder key ECU assembly is replaced, register the key and ECU communication ID (See page EI-57).

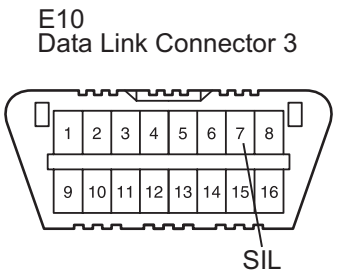
EI

1 CHECK HARNESS AND CONNECTOR (TRANSPONDER KEY ECU - DLC3)

Wire Harness Side Connector Rear View:



Wire Harness Side Connector Front View:



P B128341E01

(a) Disconnect the E15 ECU connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
E15-9 (D) - E10-7 (SIL)	Always	Below 1 Ω
E15-9 (D) - Body ground		10 kΩ or higher

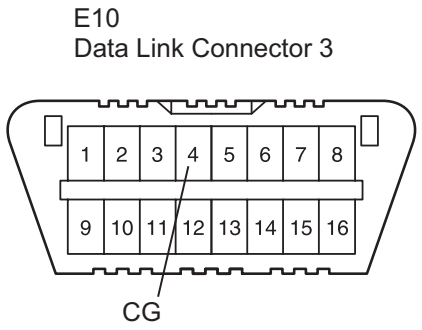
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

EI

2 CHECK HARNESS AND CONNECTOR (DLC3 - BODY GROUND)

Wire Harness Side Connector Front View:



P B124215E08

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

Standard resistance

Tester Connection	Condition	Specified Condition
E10-4 (CG) - Body ground	Always	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE