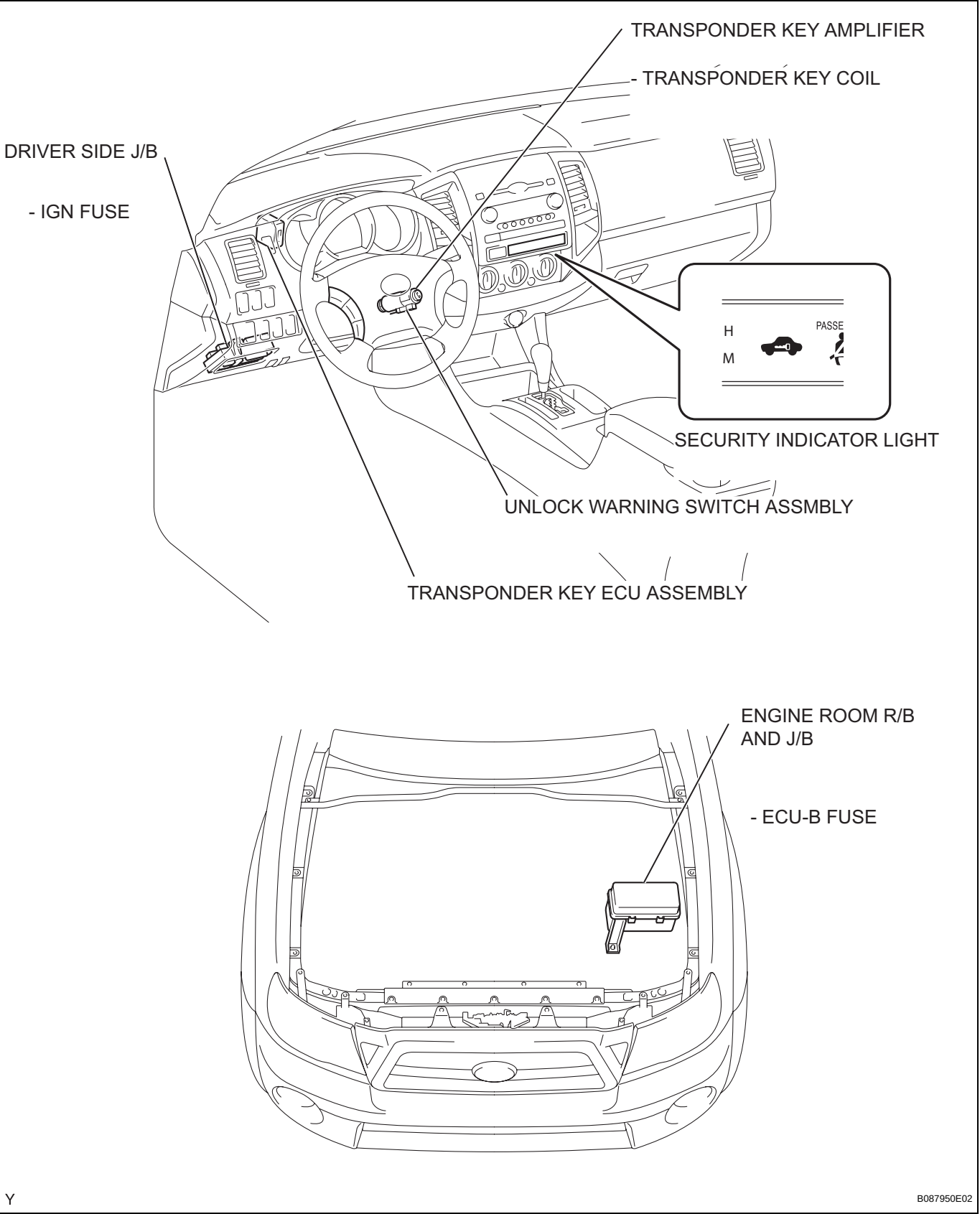
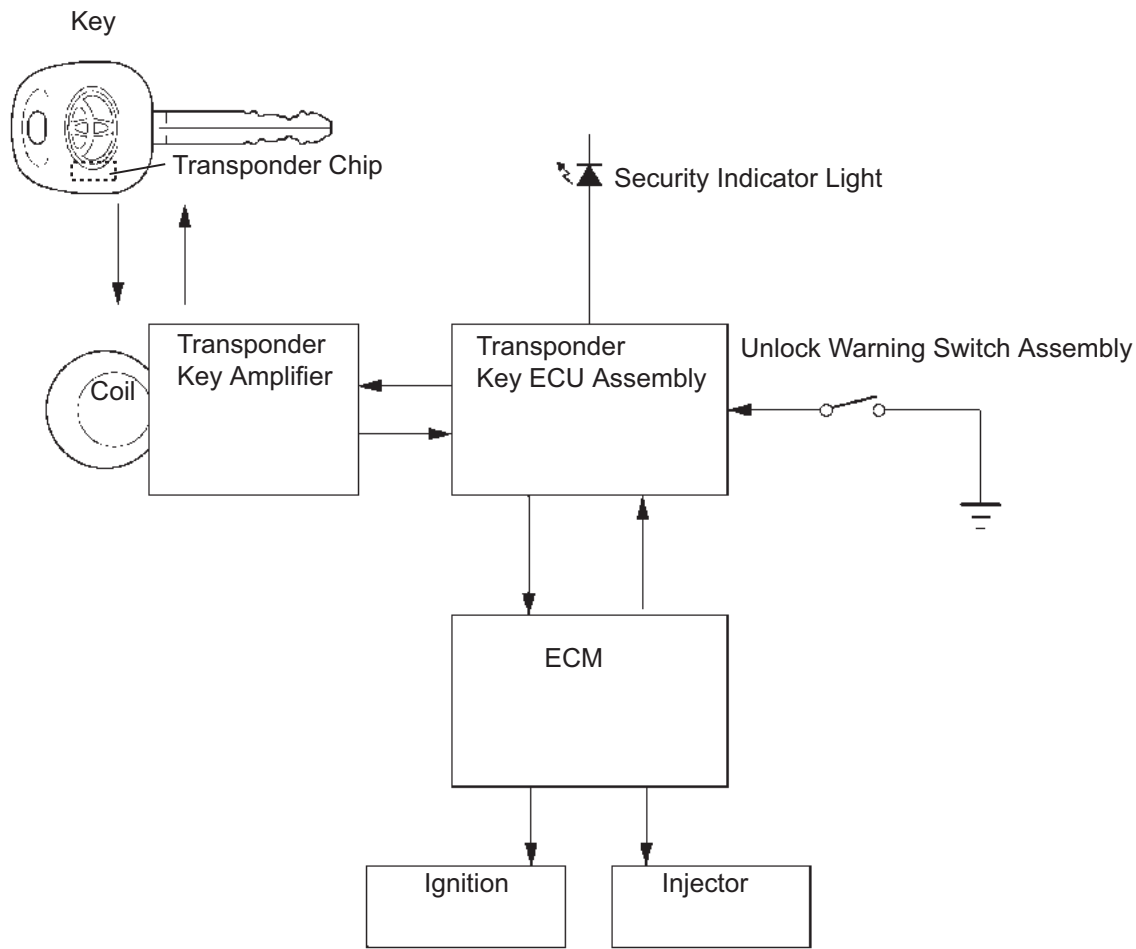


ENGINE IMMOBILISER SYSTEM

PARTS LOCATION



SYSTEM DIAGRAM



SYSTEM DESCRIPTION

1. ENGINE IMMOBILISER SYSTEM DESCRIPTION

The engine immobiliser system is designed to prevent the vehicle from being stolen. This system uses a transponder key ECU that stores the key codes of authorized ignition keys. If an attempt is made to start the engine using an unauthorized key, the transponder key 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's code. Then amplifier amplifies ID code and outputs it to transponder key ECU.
Unlock warning switch	Detects if key is in ignition key cylinder and outputs results to transponder key ECU
ECM	Through SFI communication*1, ECM receives ID verification results from transponder key ECU. ECM also verifies ECUs. Then judgment of whether or not to disable engine is made.
Security indicator light	Illuminates or starts flashing. Illumination is controlled by transponder key ECU

3. SYSTEM FUNCTION

When the transponder key ECU detects that the unlock warning switch is ON, the ECU provides current to the transponder key coil and produces a faint electric wave. A transponder chip in the key grip receives the wave. Upon receiving the wave, the transponder chip outputs a key ID code signal. The transponder key coil receives this signal, the transponder key amplifier amplifies it, and then the signal is transmitted to the transponder key ECU. The transponder key ECU matches the key's ID code with the vehicle's ID code, which was previously registered in the transponder key ECU. If the ID codes match, the transponder key ECU turns OFF the security indicator. Then when the ignition key cylinder is turned, the code match results are sent through the transponder key ECU to the ECM. After the identification results show that the key's ID code matches the vehicle's ID code and the transponder key ECU has confirmed their match, the immobiliser system is canceled and the engine starting controls (fuel injection control and ignition control) enter standby mode.

HOW TO PROCEED WITH TROUBLESHOOTING

HINT:

- Use these procedures to troubleshoot the engine immobiliser system.
- *: Use the intelligent tester.

1 VEHICLE BROUGHT TO WORKSHOP

NEXT

2 INSPECT BATTERY VOLTAGE

Standard voltage:

11 to 14 V

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

NEXT

3 CRANK ENGINE FOR MORE THAN 10 SECONDS

NEXT

4 CHECK FOR DTCs*

- Check for DTCs and note any codes that are output (see page [EI-19](#)).
- Delete the DTC.
- Recheck for DTCs. Based on the DTC output in (a), try to force output of the same SFI system DTC or engine immobiliser system DTC by simulating the original activity 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 STEP 8

A

5 READ VALUE OF INTELLIGENT TESTER*

- Connect the intelligent tester to the DLC3.

- (b) Turn the ignition switch ON and push the intelligent tester main switch ON.
- (c) On the intelligent tester, enter the following menus:
DIAGNOSIS / ENHANCED OBD II / DATA LIST /
IMMOBILISER / KEY SW. Read the values.

Transponder key ECU assembly:

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

OK:

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

NG**GO TO DTC B2780****OK****6****PROBLEM SYMPTOMS TABLE****Result:**

Result	Proceed to
Fault is not listed in problem symptoms table	A
Fault is listed in problem symptoms table	B

B**GO TO STEP 8****A****7****OVERALL ANALYSIS AND TROUBLESHOOTING***

- (a) DATA LIST/ACTIVE TEST (see page [EI-19](#))
 - (1) Inspection with intelligent tester (DATA LIST)
 - (2) Inspection with intelligent tester (ACTIVE TEST)
- (b) Terminals of ECU (see page [EI-13](#))

NEXT**8****ADJUST, REPAIR OR REPLACE****NEXT****9****CONFIRMATION TEST****NEXT****END**

REGISTRATION

1. DESCRIPTION OF CODE REGISTRATION

- (a) When adding master keys and sub-keys (additional registration).

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

Target ECU	See step
Transponder key ECU assembly	Procedure "A"

- (b) When replacing the transponder key ECU assembly (new registration):

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

Target ECU	See step
Transponder key ECU assembly	Procedure "B"

- (2) Register the ECU COMMUNICATION ID between the ECM and the transponder key ECU assembly.

Target ECU	See step
ECM	Procedure "C"

- (c) When replacing the ECM:

- (1) Register the ECU COMMUNICATION ID between the ECM and the transponder key ECU assembly.

Target ECU	See step
Transponder key ECU assembly	Procedure "C"

- (d) Erasure of key code:

- (1) Erasure the key code.

Target ECU	See step
Transponder key ECU assembly	Procedure "D"

2. KEY REGISTRATION IN AUTOMATIC REGISTRATION (PROCEDURE "B")

- (a) When an ignition key is inserted into the ignition cylinder, the key code (immobiliser code) registration is automatic. In this mode, a maximum of 4 key codes for 3 master keys and 1 sub-key can be registered. Any order of registration for the master keys and sub-keys is fine because the transponder key ECU assembly can distinguish the types of keys.

HINT:

- When a new transponder key ECU assembly is installed, key codes (immobiliser codes) must be registered with ignition keys.
- New transponder key ECU assemblies are automatically set to automatic key code registration mode.

Automatic Key Code Registration (New Registration)

Procedure	Security Indicator Condition
1. Start (Procedure "E")	Blinking occurs until the first key is inserted.

Procedure	Security Indicator Condition
2. Insert the key into the ignition key cylinder.	ON
3. Registration begins. HINT: The registration will be completed approx. 1 second after the key is inserted.	OFF HINT: Approx. 1 second
4. Remove the key.	ON HINT:
5. Register another key? Yes: Go to procedure "E". No: Go to procedure "F".	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.
6. End (Procedure "F")	

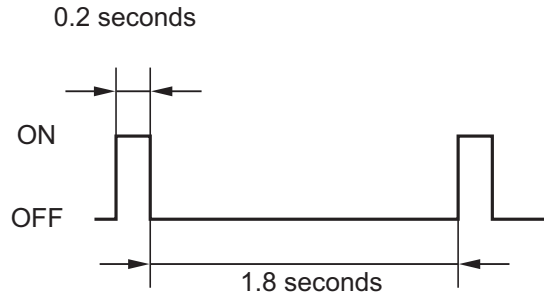
HINT:

- When no key is inserted in the ignition key cylinder 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.

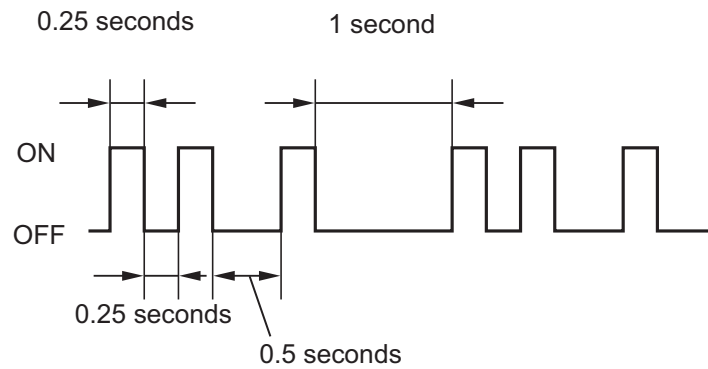
- If the key code registration has failed in automatic key code registration mode, code 2-1 will be output from the security indicator. Trying to re-register an already registered key will cause code 2-2 to be output when the key is inserted. If the number of registered key codes exceeds the limit, code 2-3 will be output from the security indicator. The output details are shown below.

Security Indicator:

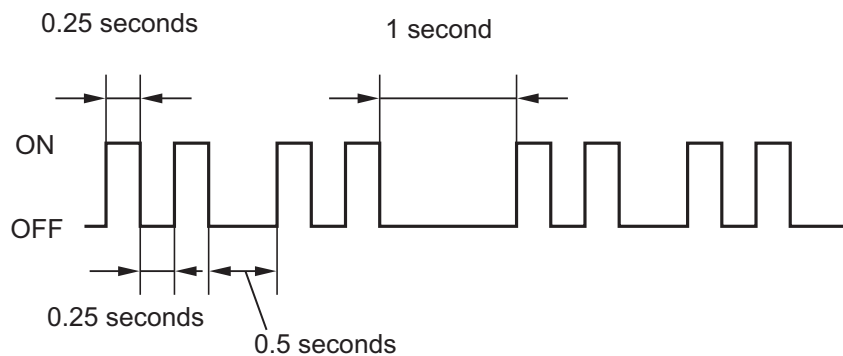
Normal (Immobiliser system is operating normally)



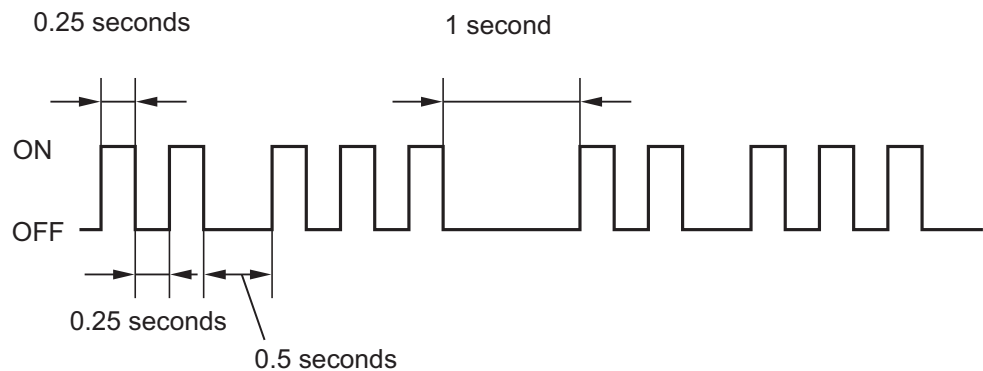
Code 2 - 1



Code 2 - 2



Code 2 - 3



N

B111593E03

HINT:

The automatic key code registration mode can be forced to end when 1 or more key codes (immobiliser code) for the master key has been registered.

EI

- (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 for the master key has been registered.
- (1) Turn the ignition switch ON and OFF 5 times within 10 seconds using the already registered master key.

3. PERFORM REGISTRATION OF ADDITIONAL KEY (PROCEDURE "A")

- (a) Register an additional key by using the intelligent tester.

HINT:

- A maximum of 5 master key codes and 3 sub-key codes can be registered.
- Registration mode will end if each 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 the new key as the master key. If necessary, use this master key to register other keys.

NOTICE:

When the ignition key cylinder has been replaced, locking and unlocking doors is possible with the new master key's transmitter module (taken from the original master key). However, the new master key will not be able to lock and unlock doors through the door key cylinder. Keep the original master key. If the new master key's transmitter module's battery fails, the original master key can be used to lock and unlock doors through the door key cylinder.

Additional Registration

Procedure	Time (Completion of operation)	Security indicator Condition
1. Start	-	The indicator will blink 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 TRANS CODE REG. HINT: After completing the above operation, proceed to the next step in accordance with the prompts on the tester screen.	Within 120 seconds	OFF
4. Remove the master key.	Within 20 seconds of the instruction on the tester.	ON
5. Insert the key to be registered in the ignition key cylinder.	Within 10 seconds	
6. After 60 sec. the key is registered. HINT: Security indicator goes off.	-	Blinking
7. Next		OFF
8. End		

HINT:

- A brief outline of the procedures for key code registration is shown on this page. For more detailed information, please refer to the intelligent tester screen's instructions.
- 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 automatic key code registration mode, code 2-1 will be output from the security indicator. Trying to re-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 step 2 (new registration).

4. ERASURE OF KEY CODE (PROCEDURE "D")

(a) Erase key codes using the intelligent tester.

HINT:

- All key codes are erased except for the master key, which is used for erasing the key codes. In order to use a key whose code has been erased, a new key code must be registered.
- Registration will be cancelled if each step is not completed within the specified time.
- Conduct this operation with the driver door closed.

Erasing Key Code

Procedure	Time (Completion of operation)	Security Indicator Condition
1. Start	-	The indicator will blink 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. Select TRANS CODE REG. HINT: After completing the above operation, proceed to the next step in accordance with the prompts on the tester screen.	Within 120 seconds	OFF
4. Remove the master key.	Within 10 seconds of the instruction on the tester.	ON for 1 sec. then OFF
5. Next	-	Blinking
6. End		

HINT:

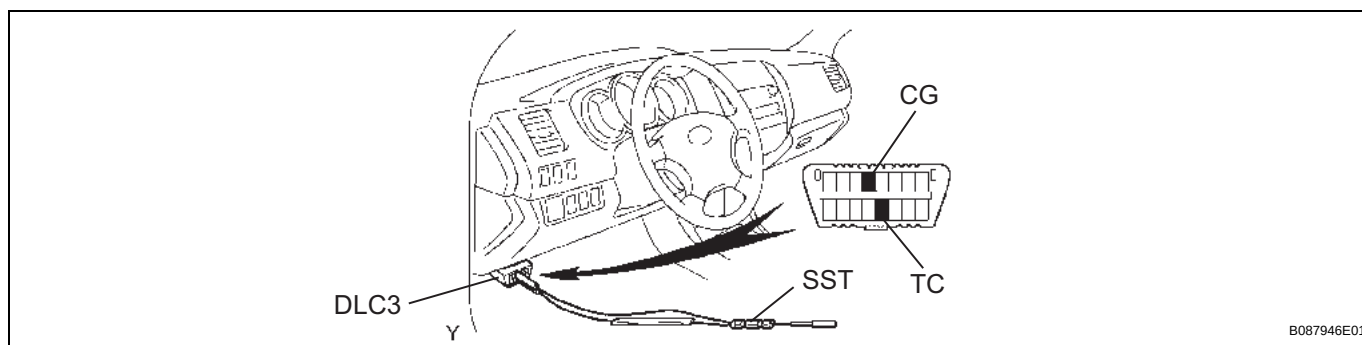
- A brief outline of procedures for key code erasure is shown on this page. For more detailed information, please refer to the intelligent tester screen's instructions.
- When the immobiliser system is operating normally and the key is pulled out, the security indicator blinks continuously.

5. REGISTRATION OF ECU COMMUNICATION ID (PROCEDURE "C")

NOTICE:

- The ECU COMMUNICATION ID should be registered when the transponder key ECU assembly 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.

(a) Register the ECU communication ID



- (1) Before operation, make sure that no key is in the ignition key cylinder.
- (2) Using SST, connect terminals TC and CG of the DLC3. SST 09843-18040
- (3) Insert a key, of which the key code has already been registered, into the ignition key cylinder.
- (4) Turn the ignition switch ON (do not start the engine) and leave it as is for 30 minutes.
- (5) Turn the ignition switch OFF and disconnect terminals TC and CG.
- (6) Check that the engine starts.

HINT:

After the engine has been started, delete DTC 2799 (indicating immobiliser communication failures in the ECM) by following either one of the operations below with the ignition switch OFF:

- Delete the DTC using intelligent tester.
- Disconnect the negative battery cable from the battery terminal for at least 30 seconds.

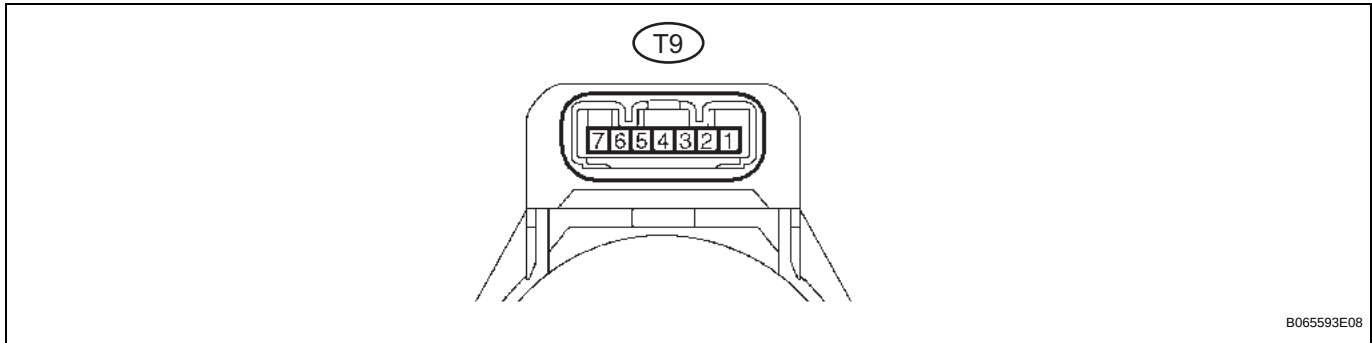
PROBLEM SYMPTOMS TABLE

Immobiliser function

Symptom	Suspected area	See page
Engine does not start	ECU power source circuit	EI-37
	Transponder key ECU assembly	EI-13
	SFI system (2TR-FE)	ES-29
	SFI system (1GR-FE)	ES-28

TERMINALS OF ECU

1. CHECK TRANSPONDER KEY AMPLIFIER



- (a) Disconnect the T9 amplifier connector.
- (b) Measure the resistance of the wire harness side connector.

Standard resistance:

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
AGND (T9-7) - Body ground	L - Body ground	Ground	Always	Below 1 Ω

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

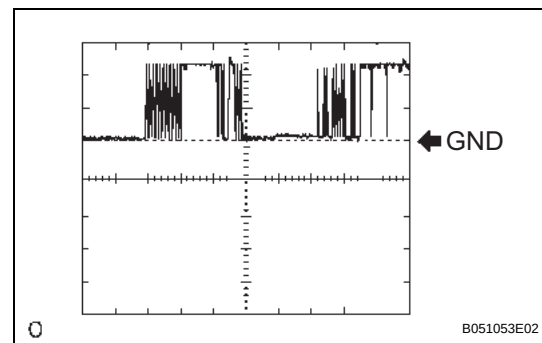
- (c) Reconnect the T9 amplifier connector.
- (d) Measure the resistance and voltage of the connector.

Standard:

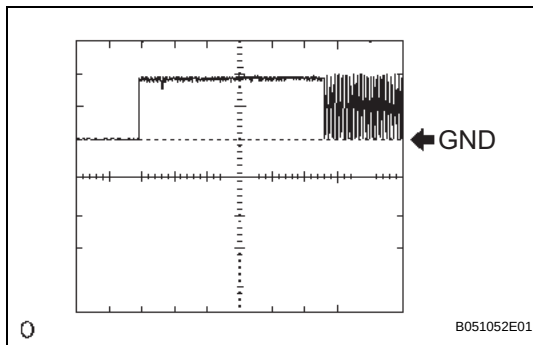
Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
VC5 (T9-1) - AGND(T9-7)	GR-B - L	Power source	No key in ignition key cylinder	0 V
VC5 (T9-1) - AGND(T9-7)	GR-B - L	Power source	Key inserted	4.6 to 5.4 V
CODE (T9-4) - AGND (T9-7)	P-G - L	Demodulated signal of key code data	No key in ignition key cylinder → Key inserted	Pulse generation (see waveform 1)
TXCT (T9-5) - AGND (T9-7)	LG-R - L	Key code output signal	No key in ignition key cylinder → Key inserted	Pulse generation (see waveform 2)
AGND (T9-7) - Body ground	L - Body ground	Ground	Always	Below 1 Ω

If the result is not as specified, there may be a malfunction on the amplifier.

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



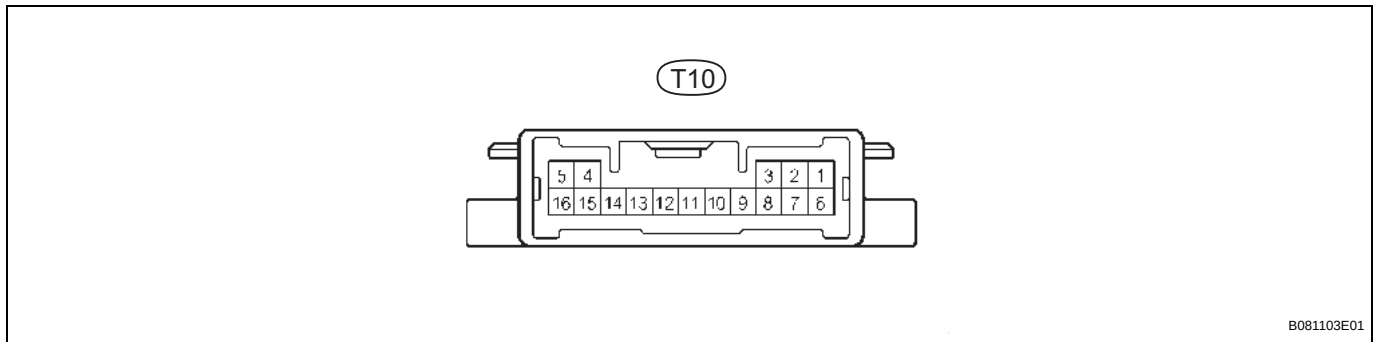
Terminal	CODE (T9-4) - AGND (T9-7)
Tool Setting	2 V/DIV., 20 msec/DIV.
Condition	No key in ignition key cylinder → Key inserted



(2) Waveform 2

Terminal	TXCT (T9-5) - AGND (T9-7)
Tool Setting	2 V/DIV., 20 msec/DIV.
Condition	No key in ignition key cylinder → Key inserted

2. CHECK TRANSPONDER KEY ECU ASSEMBLY



- Disconnect the T10 ECU connector.
- Measure the resistance and voltage of the wire harness side connector.

Standard:

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
GND (T10-16) - Body ground	W-B - Body ground	Ground	Always	Below 1 Ω
+B (T10-1) - GND (T10-16)	R - W-B	Battery	Always	10 to 14 V
IG (T10-2) - GND (T10-16)	O - W-B	Ignition switch	Ignition switch OFF	0 V
IG (T10-2) - GND (T10-16)	O - W-B	Ignition switch	Ignition switch ON	10 to 14 V
KSW (T10-3) - AGND (T10-5)	G-B - L	Unlock warning switch	No key in ignition key cylinder	10 k Ω or higher
KSW (T10-3) - AGND (T10-5)	G-B - L	Unlock warning switch	Key inserted	Below 1 Ω

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

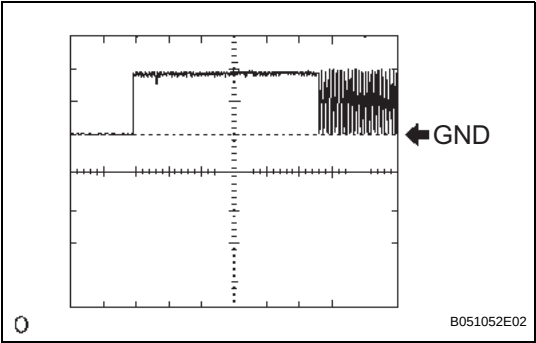
- Reconnect the T10 ECU connector.
- Measure the voltage of the connector.

Standard voltage:

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
VC5 (T10-14) - GND (T10-16)	GR-B - W-B	Power source	No key in ignition key cylinder	0 V
VC5 (T10-14) - GND (T10-16)	GR-B - W-B	Power source	Key inserted	4.6 to 5.4 V
TXCT (T10-4) - GND (T10-16)	LG-R - W-B	Transponder key amplifier communication signal	No key in ignition key cylinder → Key inserted	Pulse generation (see waveform 1)
CODE (T10-15) - GND (T10-16)	P-G - W-B	Transponder key amplifier communication signal	No key in ignition key cylinder → Key inserted	Pulse generation (see waveform 2)
EFIO (T10-13) - GND (T10-16)	L-W - W-B	ECM output signal	Ignition switch OFF → ON	Pulse generation (see waveform 3)
EFII (T10-12) - GND (T10-16)	LG-B - W-B	ECM input signal	Ignition switch OFF → ON	Pulse generation (see waveform 4)

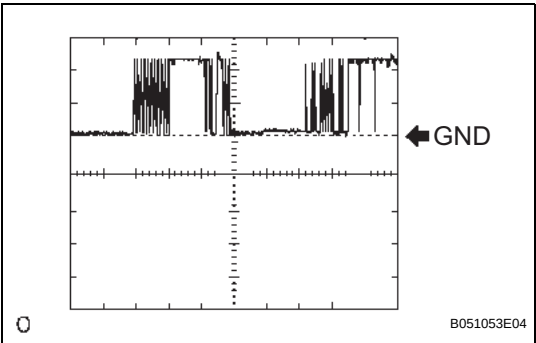
If the result is not as specified, there may be a malfunction on the ECU.

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



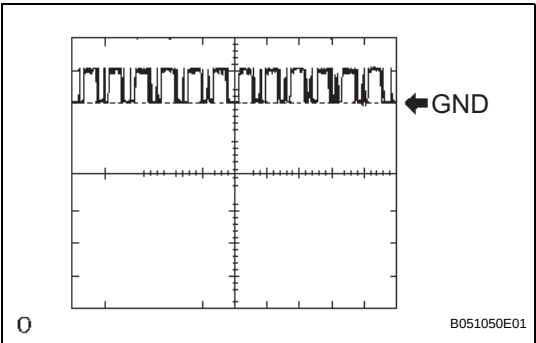
Terminal	TXCT (T10-4) - GND (T10-16)
Tool Setting	2.5 V/DIV., 20 msec/DIV.
Condition	No key in ignition key cylinder → Key inserted

- (2) Waveform 2 (Reference)



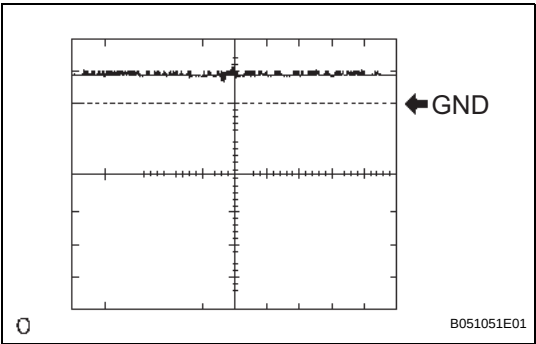
Terminal	CODE (T10-15) - GND (T10-16)
Tool Setting	2.5 V/DIV., 20 msec/DIV.
Condition	No key in ignition key cylinder → Key inserted

- (3) Waveform 3



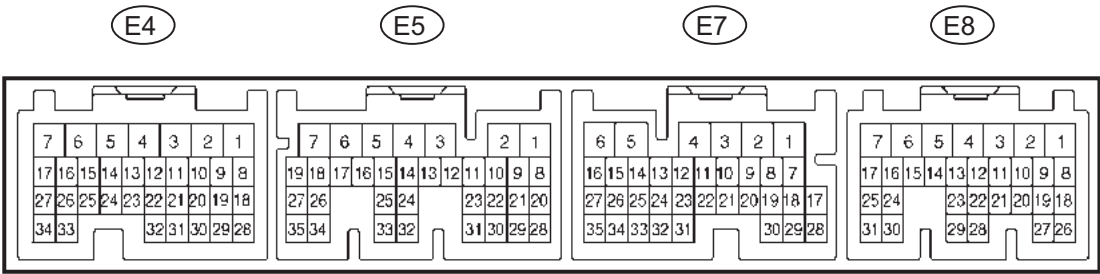
Terminal	EFIO (T10-13) - GND (T10-16)
Tool Setting	12 V/DIV., 100 msec/DIV.
Condition	Ignition switch OFF → ON

- (4) Waveform 4



Terminal	EFII (T10-12) - GND (T10-16)
Tool Setting	10 V/DIV., 100 msec/DIV.
Condition	Ignition switch OFF → ON

3. CHECK ECM (2TR-FE)



A066714E18

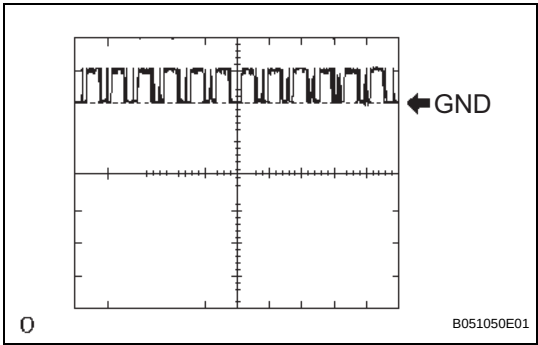
- (a) Disconnect the E7 and E8 ECM connectors.
- (b) Measure the resistance and voltage of the wire harness side connector.

Standard:

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
IMI (E7-16) - EOM (E8-29)	L-W - W-B	Transponder key ECU input signal	Ignition switch OFF → ON	Pulse generation (see waveform 1)
IMO (E7-15) - EOM (E8-29)	LG-B - W-B	Transponder key ECU output signal	Ignition switch OFF → ON	Pulse generation (see waveform 2)
EOM (E8-29) - Body ground	W-B - Body ground	Ground	Always	Below 1 Ω

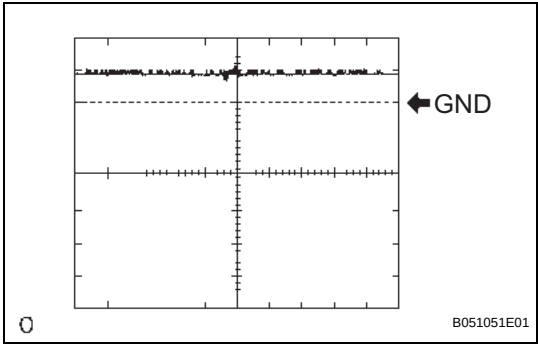
If the result is not as specified, the ECM may have a malfunction.

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



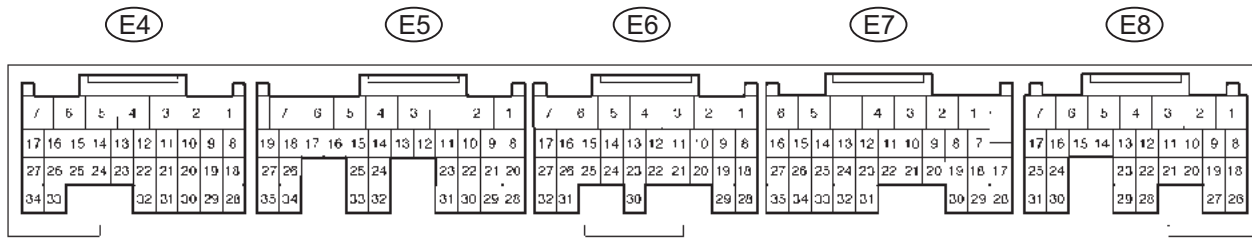
Terminal	IMI (E7-16) - EOM (E8-29)
Tool Setting	12 V/DIV., 100 msec/DIV.
Condition	Ignition switch OFF → ON

- (2) Waveform 2



Terminal	IMO (E7-15) - EOM (E8-29)
Tool Setting	10 V/DIV., 100 msec/DIV.
Condition	Ignition switch OFF → ON

4. CHECK ECM (1GR-FE)



G035613E13

- (a) Disconnect the E7 ECM connectors.
- (b) Measure the resistance and voltage of the wire harness side connector.

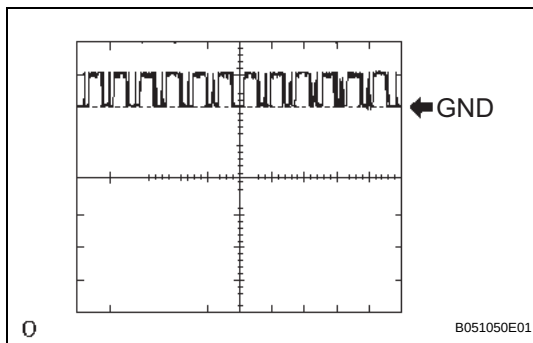
Standard:

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
IMI (E7-16) - EOM (E7-35)	L-W - W-B	Transponder key ECU input signal	Ignition switch OFF → ON	Pulse generation (see waveform 1)
IMO (E7-15) - EOM (E7-35)	LG-B - W-B	Transponder key ECU output signal	Ignition switch OFF → ON	Pulse generation (see waveform 2)
EOM (E7-35) - Body ground	W-B - Body ground	Ground	Always	Below 1 Ω

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

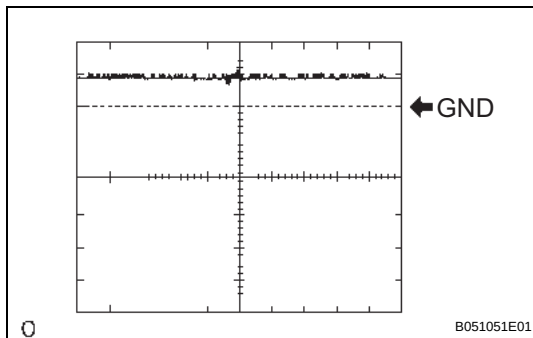
- (c) Inspect using an oscilloscope.

(1) Waveform 1



Terminal	IMI (E7-16) - EOM (E7-35)
Tool Setting	12 V/DIV., 100 msec/DIV.
Condition	Ignition switch OFF → ON

(2) Waveform 2



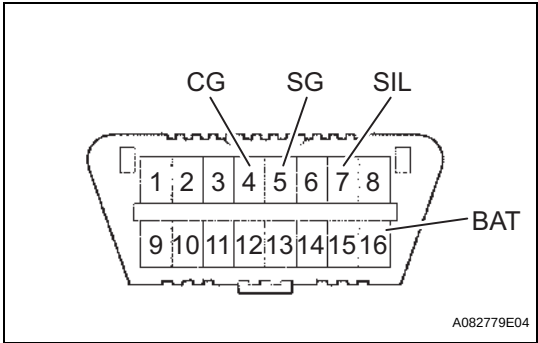
Terminal	IMO (E7-15) - EOM (E7-35)
Tool Setting	10 V/DIV., 100 msec/DIV.
Condition	Ignition switch OFF → ON

DIAGNOSIS SYSTEM

1. DESCRIPTION

- (a) The ECM controls the vehicle's immobiliser system functions. immobiliser system data and the DTCs can be read through the vehicle's DLC3. In some cases, a malfunction may be occurring in the immobiliser system even though the security indicator light is not illuminated. When the system seems to be malfunctioning, use the intelligent tester to check for a malfunctions and perform repairs.

2. CHECK DLC3



Symbols (Terminals 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	11 to 14 V

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

HINT:

Connect the cable of the intelligent tester with CAN VIM to the DLC3, turn the ignition switch ON and attempt to use the tester. If the screen displays the message UNABLE TO CONNECT TO VEHICLE, there is a problem either with the vehicle or with the tester.

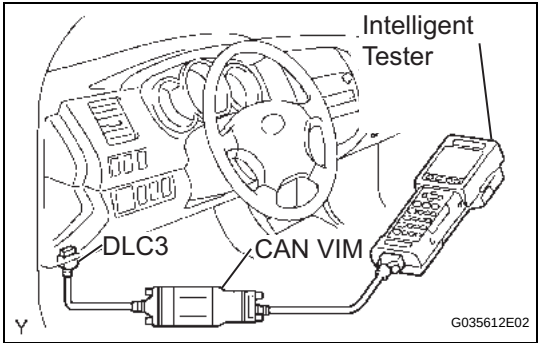
- If communication is normal when the tester is connected to another vehicle, inspect the DLC3 of the original vehicle.
- If communication is still not possible when the tester is connected to another vehicle, the problem is probably in the tester itself. Consult the Service Department listed in the tester's instruction manual.

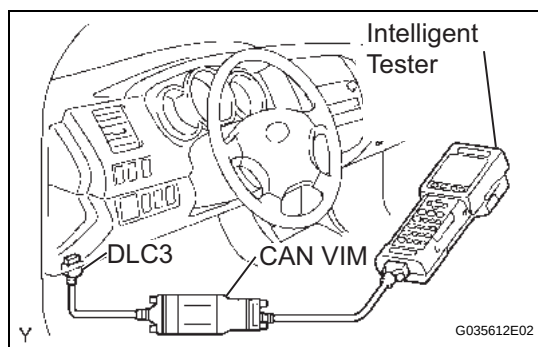
3. INSPECT BATTERY VOLTAGE

Standard voltage:

11 to 14 V

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





DTC CHECK / CLEAR

1. CHECK DTC

- Connect the intelligent tester with CAN VIM to the DLC3.
- Turn the ignition switch ON.
- Read the DTCs by following the directions on the tester's screen.

HINT:

Refer to the intelligent tester operator's manual for further details.

2. CLEAR DTC

- Connect the intelligent tester to the DLC3.
- Turn the ignition switch ON.
- 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's DATA LIST allows switch, sensor, actuator and other item values to be read without removing any parts. Reading the DATA LIST early in troubleshooting is one way to save time.

- Connect the intelligent tester to the DLC3.
- Turn the ignition switch ON.
- Read the DATA LIST.

Transponder key ECU assembly

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 OFF: Ignition switch OFF or ACC	-
IMMOBILISER	Immobiliser system status / SET or UNSET	SET: Without key UNSET: Ignition switch ON	-
PERMIT (START)	Start control system starting control / OK or NG	OK: Start control system starting is permitted NG: Start control system starting is not permitted	-
RESPONSE	Transponder chip data / OK or NG	OK: Data OK NG: Data error	-
FRAME	Transponder chip data / OK or NG	OK: Data OK NG: Data error	-
SERIAL NUMBER	Transponder chip signal / OK or NG	OK: Data OK NG: Data error	-
ENCRYPT CODE	Transponder chip signal / OK or NG	OK: Data OK NG: Data error	-
STATUS	Transponder chip signal / OK or NG	OK: Data OK NG: Data error	-
BCC	Transponder chip signal / OK or NG	OK: Correct data sending NG: Incorrect data sending	-
SUB KEY	Sub-key code signal / NO MATCH or MATCH	NO MATCH: Unmatched sub-key code is sent MATCH: Sub-key code is sent	-
MASTER KEY	Master key code signal / MATCH or NO MATCH	NO MATCH: Unmatched sub-key code is sent MATCH: Sub-key code is sent	-
REGIST SUB CODE	Number of registered sub- key / min. 0, max. 15	Number of registered sub-keys	-
REGIST MAS CODE	Number of registered master key / min. 0, max. 15	Number of registered master keys	-
REG CODE SPACE	Memory space for key codes registration / NOT FUL or FULL	NOT FUL: Possible to register more key codes Full: Cannot register any more key codes	-
+B	+B judgment / NORMAL or BREAK	NORMAL: Battery supply is normal BREAK: Battery supply is malfunctioning	-
ANTENNA COIL	Antenna coil condition / NORMAL or FAIL	NORMAL: Antenna coil is normal FAIL: Antenna coil is malfunctioning	-
G-CODE SUPPORT	G code judgment / NOT SUPPORT or SUPPORT	NOT SUPPORT: G-code is not supported SUPPORT: G-code is supported	-
G-CODE DECISION	G code judgment / YES or NO	-	-
WIRELS C-CODE	REGD or NOT REGD	-	-

2. PERFORM ACTIVE TEST

HINT:

Perform 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 to the DLC3.
- (b) Turn the ignition switch ON.
- (c) Perform the ACTIVE TEST according to the display on the tester.

Transponder key ECU

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

DIAGNOSTIC TROUBLE CODE CHART

TRANSPONDER KEY ECU DTC CHART

DTC No.	Detection Item	Trouble Areas	See page
B2780	Push Switch / Key Unlock Warning Switch Malfunction	Unlock warning switch assembly Wire harness and connector Transponder key ECU assembly	EI-22
B2784	Antenna Coil Open / Short	Wire harness and connector Transponder key amplifier Transponder key ECU assembly	EI-24
B2793	Transponder Chip Malfunction	Key	EI-26
B2794	Unmatched Encryption Code	Key	EI-27
B2795	Unmatched Key Code	Key	EI-28
B2796	No Communication in Immobiliser System	Key Transponder key amplifier Wire harness and connector Transponder key ECU assembly	EI-29
B2797	Communication Malfunction No. 1	Key Wire harness and connector Transponder key amplifier Transponder key ECU assembly	EI-32
B2798	Communication Malfunction No. 2	Key	EI-29

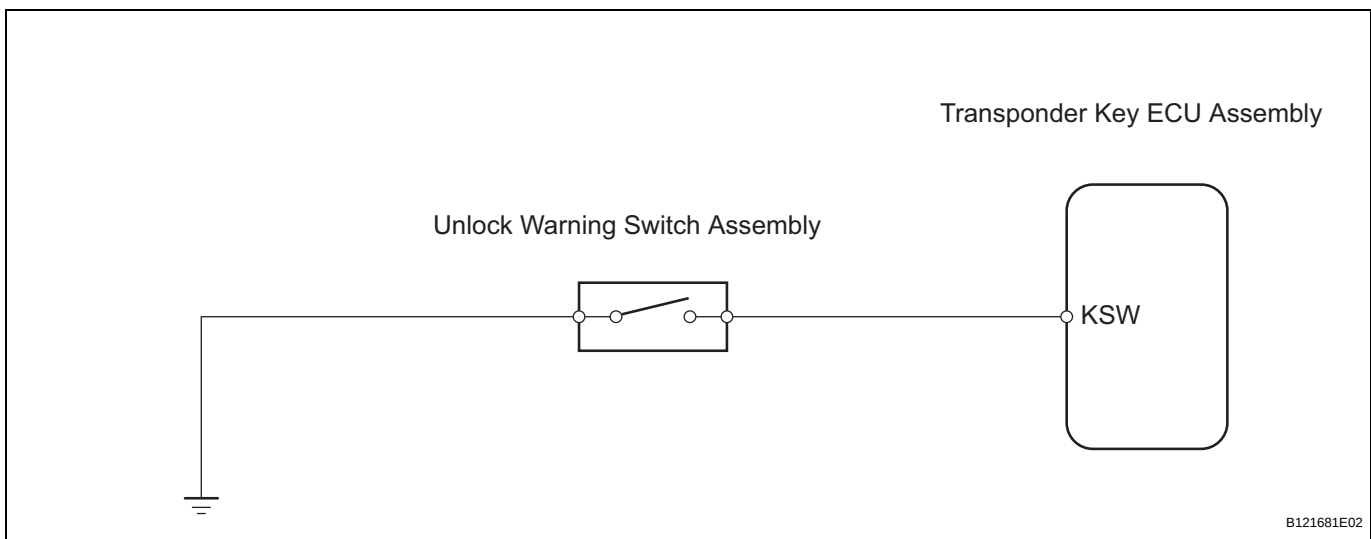
ECM DTC CHART

DTC No.	Detection Item	Trouble Areas	See page
B2799	Engine Immobiliser System	Wire harness and connector ECM	EI-35

DTC**B2780****Push Switch / Key Unlock Warning Switch Malfunction****DESCRIPTION**

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

DTC No.	DTC Detection Condition	Trouble Areas
B2780	Unlock warning switch ON is not detected when the key is inserted into the ignition key cylinder	• Unlock warning switch assembly • Wire harness and connector • Transponder key ECU assembly

WIRING DIAGRAM**1****READ VALUE OF INTELLIGENT TESTER (UNLOCK WARNING SWITCH)**

- (a) Connect the intelligent tester to the DLC3.
- (b) Turn the ignition switch ON with the key that cannot start the engine.
- (c) On the intelligent tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / IMMOBILISER / KEY SW. Read the values.

EI**Transponder key ECU assembly**

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

OK:

"ON" (key is in ignition key cylinder) appears on the screen.

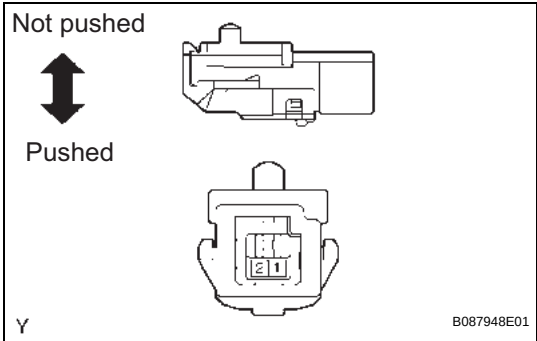
OK

REPLACE TRANSPONDER KEY ECU ASSEMBLY

NG

2

INSPECT UNLOCK WARNING SWITCH ASSEMBLY



- (a) Remove the unlock warning switch.
- (b) Measure the resistance of the switch.

Standard resistance

Tester Connection	Switch Condition	Specified Condition
1-2	Pushed	Below 1Ω
1-2	Not pushed	10 kΩ or higher

- (c) Reinstall the unlock warning switch.

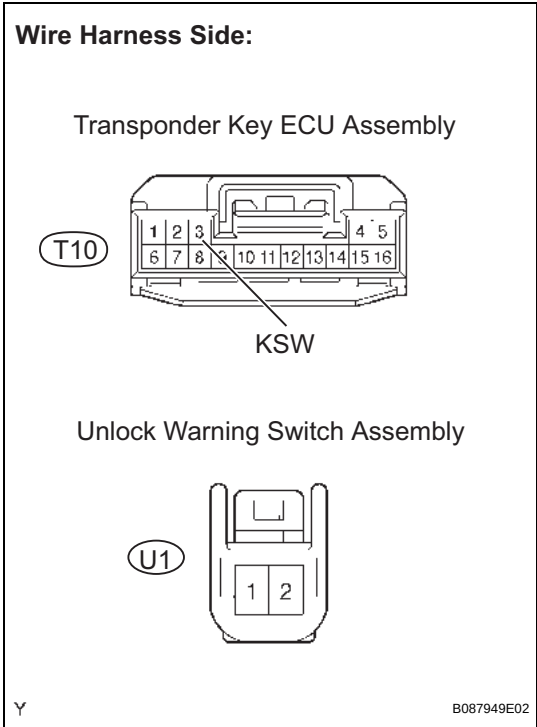
NG

REPLACE UNLOCK WARNING SWITCH ASSEMBLY

OK

3

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



- (a) Disconnect the T10 ECU connector.
- (b) Disconnect the U1 switch connector.
- (c) Measure the resistance of the wire harness side connectors.

Standard resistance

Tester Connection	Specified Condition
T10-3 (KSW) - U1-1	Below 1 Ω
U1-2 - Body ground	Below 1 Ω

- (d) Reconnect the unlock warning switch connector.
- (e) Reconnect the ECU connector.

NG

REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE TRANSPONDER KEY ECU ASSEMBLY

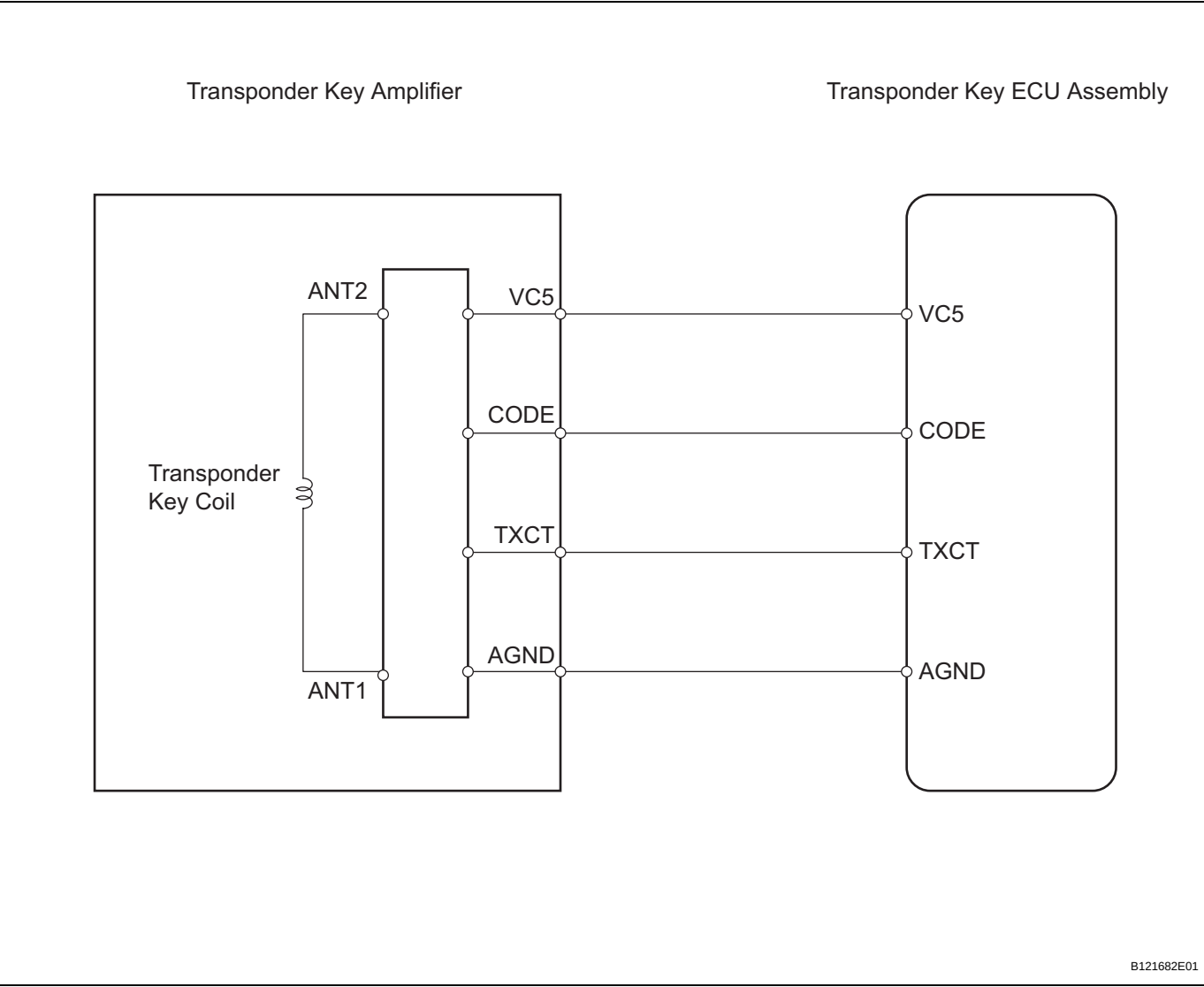
DTC	B2784	Antenna Coil Open / Short
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DESCRIPTION

The transponder key coil receives key code signals from key's transponder chip. The coil is built into the transponder key amplifier, which amplifies the key code signals and output the signals to the transponder key ECU.

DTC No.	DTC Detection Condition	Trouble Area
B2784	Open or short in antenna coil circuit	• Wire harness and connector • Transponder key amplifier • Transponder key ECU assembly

WIRING DIAGRAM



1	READ VALUE OF INTELLIGENT TESTER (TRANSPONDER KEY COIL)
---	---

- (a) Connect the intelligent tester to the DLC3.
- (b) Turn the ignition switch ON with the key that cannot start the engine.

- (c) On the intelligent tester, enter the following menus:
DIAGNOSIS/ENHANCED OBD II/DATA LIST/
IMMOBILISER/ ANTENNA COIL. Read the values.

Transponder key ECU assembly

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

OK:

"NORMAL" (Transponder key coil is normal) appears on the screen.

OK

REPLACE TRANSPONDER KEY ECU ASSEMBLY

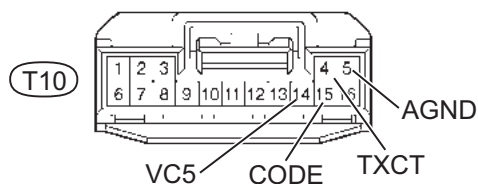
NG

2

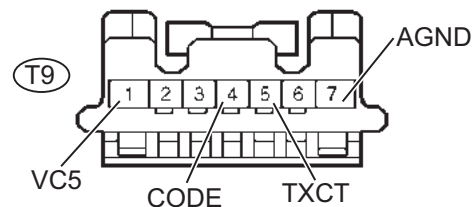
CHECK HARNESS AND CONNECTOR (TRANSPONDER KEY ECU ASSEMBLY - TRANSPONDER KEY AMPLIFIER)

Wire Harness Side:

Transponder Key ECU Assembly



Transponder Key Amplifier



B087953E03

- (a) Disconnect the T10 ECU connector.
(b) Disconnect the T9 amplifier connector.
(c) Measure the resistance of the wire harness side connectors.

Standard resistance

Tester Connection	Specified Condition
T10-14 (VC5) - T9-1 (VC5)	Below 1Ω
T10-15 (CODE) - T9-4 (CODE)	Below 1Ω
T10-4 (TXCT) - T9-5 (TXCT)	Below 1Ω
T10-5 (AGND) - T9-7 (AGND)	Below 1Ω
T10-14 (VC5) or T9-1 (VC5) - Body ground	10 kΩ or higher
T10-15 (CODE) or T9-4 (CODE) - Body ground	10 kΩ or higher
T10-4 (TXCT) or T9-5 (TXCT) - Body ground	10 kΩ or higher
T10-5 (AGND) or T9-7 (AGND) - Body ground	10 kΩ or higher

- (d) Reconnect the ECU connector.
(e) Reconnect the amplifier connector.

NG

REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE TRANSPONDER KEY AMPLIFIER

DTC**B2793****Transponder Chip Malfunction****DESCRIPTION**

This DTC is output when: 1) during key code registration, a key malfunction occurs; or 2) the key code was unable to be registered properly. Follow the inspection procedure below.

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

1**RE-REGISTER KEY**

- (a) Delete the DTC (see page [EI-19](#)).
- (b) Re-register the key (see page [EI-6](#)), and check that the engine starts with the key.

OK:**Engine starts.****NG****REPLACE KEY****OK****NORMAL (INSPECTION FINISHED)**

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

1**RE-REGISTER KEY**

- (a) Delete the DTC (see page [EI-19](#)).
- (b) RE-register the key (see page [EI-6](#)), and check that the engine starts with the key.

OK:**Engine starts.****NG****REPLACE KEY****OK****END**

DTC	B2795	Unmatched Key Code
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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

1	RE-REGISTER KEY
---	-----------------

- (a) Delete the DTC (see page EI-19).
- (b) Reregister the key, and check that the engine starts with the key (see page EI-6).

OK:
Engine starts.

NG	REPLACE KEY
----	-------------



NORMAL (INSPECTION FINISHED)

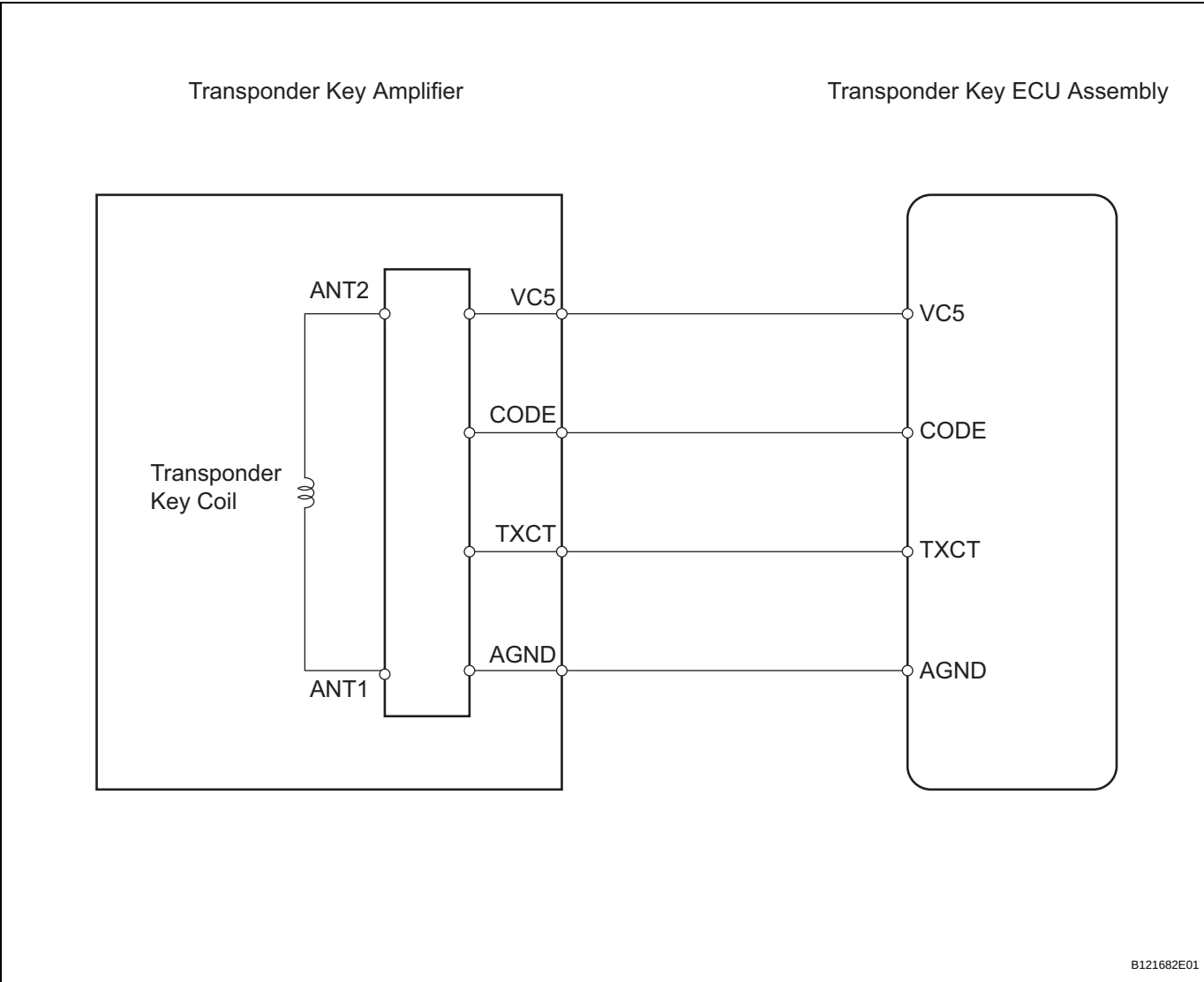
DTC	B2796	No Communication in Immobiliser System
DTC	B2798	Communication Malfunction No. 2

DESCRIPTION

When a key is inserted into the ignition key cylinder but no communication occurs between the key and transponder key ECU assembly, DTC B2796 is output. When a key is inserted into the ignition key cylinder but a communication error occurs between the key and transponder key ECU assembly, DTC B2798 is output.

DTC No.	DTC Detection Conditions	Trouble Areas
B2796	No communication	• Key • Wire harness and connector • Transponder key amplifier • Transponder key ECU assembly
B2798	Communication error	Key

WIRING DIAGRAM



1 READ VALUE OF INTELLIGENT TESTER (ENGINE IMMOBILISER SYSTEM)

- (a) Connect the intelligent tester to the DLC3.
- (b) Turn the ignition switch ON with the key that cannot start the engine.
- (c) On the intelligent tester enter the following menus:
DIAGNOSIS / ENHANCED OBD II / DATA LIST /
IMMOBILISER / IMMOBILISER. Read the values.

Transponder key ECU assembly

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 WHETHER ENGINE STARTS WITH OTHER KEYS**

- (a) Check whether the engine starts with the vehicle's other keys.

OK:**Engine starts.****OK****RE- REGISTER OR REPLACE KEY THAT CANNOT START ENGINE****NG****3 READ VALUE OF INTELLIGENT TESTER**

- (a) Connect the intelligent tester to the DLC3.
- (b) Turn the ignition switch ON with the key that will not start the engine.
- (c) On the intelligent tester, enter the following menus:
DIAGNOSIS / ENHANCED OBD II / DATA LIST /
IMMOBILISER / ANTENNA COIL. Read the values.

E**Transponder key ECU assembly**

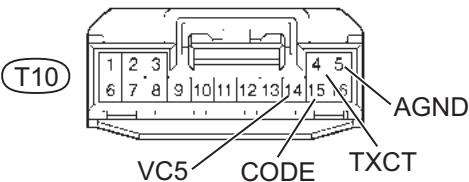
Item	Measurement Item / Display (Range)	Normal Condition	Diagnostic Note
ANTENNA COIL	Transponder key coil condition / NORMAL or FAIL	NORMAL: Transponder key coil is normal FAIL: Transponder key coil is malfunctioning	-

OK:**NORMAL (transponder key coil is normal) appears on screen.****OK****REPLACE TRANSPONDER KEY AMPLIFIER****NG**

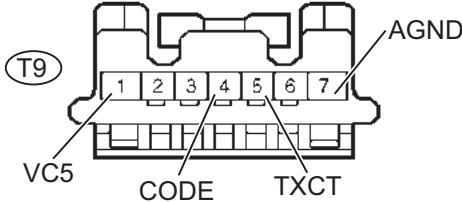
4 CHECK HARNESS AND CONNECTOR (TRANSPONDER KEY ECU ASSEMBLY - TRANSPONDER KEY AMPLIFIER)

Wire Harness Side:

Transponder Key ECU Assembly



Transponder Key Amplifier



B087953E03

- Disconnect the T10 ECU connector.
- Disconnect the T9 amplifier connector.
- Measure the resistance of the wire harness side connectors.

Standard resistance

Tester Connection	Specified Condition
T10-14 (VC5) - T9-1 (VC5)	Below 1Ω
T10-15 (CODE) - T9-4 (CODE)	Below 1Ω
T10-4 (TXCT) - T9-5 (TXCT)	Below 1Ω
T10-5 (AGND) - T9-7 (AGND)	Below 1Ω
T10-14 (VC5) or T9-1 (VC5) - Body ground	10 kΩ or higher
T10-15 (CODE) or T9-4 (CODE) - Body ground	10 kΩ or higher
T10-4 (TXCT) or T9-5 (TXCT) - Body ground	10 kΩ or higher
T10-5 (AGND) or T9-7 (AGND) - Body gorund	10 kΩ or higher

- Reconnect the ECU connector.
- Reconnect the amplifier connector.

NG

REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

5 REPLACE TRANSPONDER KEY AMPLIFIER (OPERATION)

- After replacing the transponder key amplifier with a normally functioning amplifier, check that the engine starts.

OK:

Engine starts.

NG

REPLACE TRANSPONDER KEY ECU ASSEMBLY

OK

NORMAL (TRANSPONDER KEY AMPLIFIER DEFECTIVE)

EI

DTC	B2797	Communication Malfunction No. 1
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DESCRIPTION

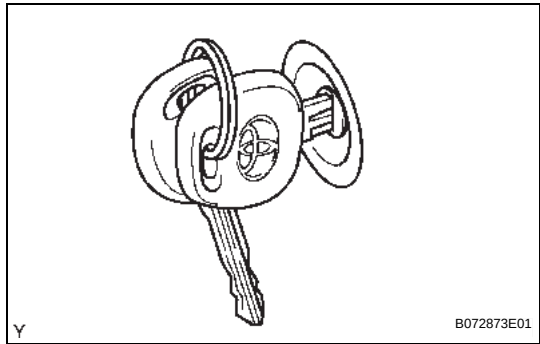
This DTC is output when a communication error occurs between the transponder key amplifier and transponder key ECU. Some possible reasons for the communication error are: 1) 2 or more ignition keys are positioned too close together, or 2) noise is occurring in the communication line.

DTC No.	DTC Detection Conditions	Trouble Areas
B2797	Keys are positioned too close each other, or noise occurred in communication line	• Key • Wire harness and connector • Transponder key amplifier • Transponder key ECU assembly

WIRING DIAGRAM



1	CHECK KEYS
---	------------



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

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

A

B

Go to step 3

2	CHECK FOR DTCS
---	----------------

- (a) Separate the keys from each other and/or remove the key ring.

- (b) Delete the DTC (see page EI-19).
- (c) Insert a key into the ignition cylinder. Remove it. Repeat for all the other keys.
- (d) Check that no code is output.

OK:

No code is output

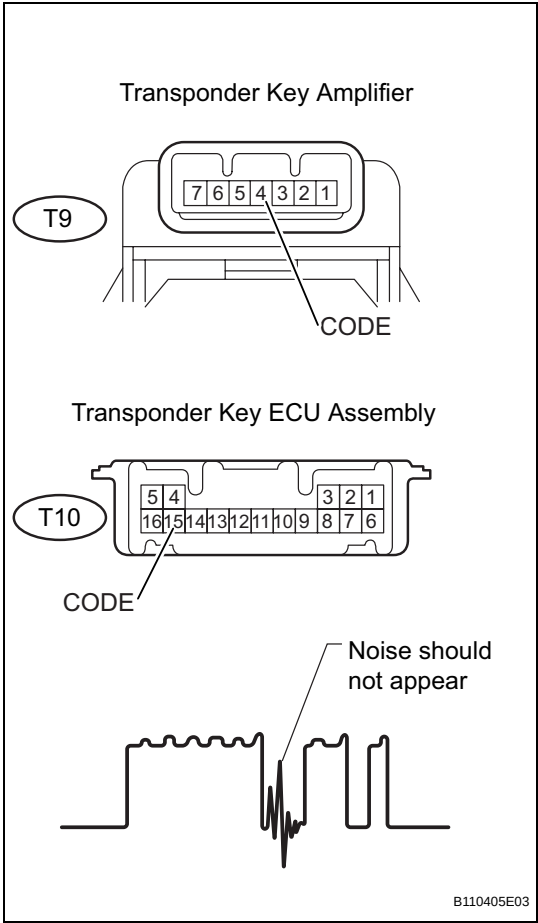
OK

NORMAL (INSPECTION FINISHED)

NG

3

CHECK TRANSPONDER KEY ECU ASSEMBLY



OK

- (a) Using an oscilloscope or the intelligent tester check for noise in the waveform between the terminals of the T9 amplifier connector and T10 ECU connector.

OK:

No noise is present (see illustration)

Tester Connection	Specified Condition
T10-15 (CODE) - T9-4 (CODE)	No noise is present
Tool Setting	5 V/div. 20 ms/DIV.
Condition	Ignition switch: OFF → ON

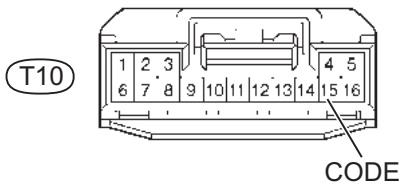
NG

FIND CAUSE OF NOISE AND REMOVE IT

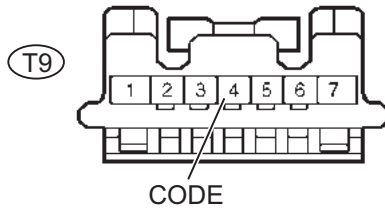
4 CHECK HARNESS AND CONNECTOR (TRANSPONDER KEY ECU ASSEMBLY - TRANSPONDER KEY AMPLIFIER)

Wire Harness Side:

Transponder Key ECU Assembly



Transponder Key Amplifier



B087953E04

- Disconnect the T10 ECU connector.
- Disconnect the T9 amplifier connector.
- Measure the resistance of the wire harness side connectors.

Standard resistance

Tester Connection	Specified Condition
T10-15 (CODE) - T9-4 (CODE)	Below 1Ω

- Reconnect the ECU connector.
- Reconnect the amplifier connector.

NG

REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

5 REPLACE TRANSPONDER KEY AMPLIFIER (OPERATION)

- After replacing the transponder key amplifier with a normally functioning amplifier, check that the engine starts.

OK:

Engine starts.

NG

REPLACE TRANSPONDER KEY ECU ASSEMBLY

OK

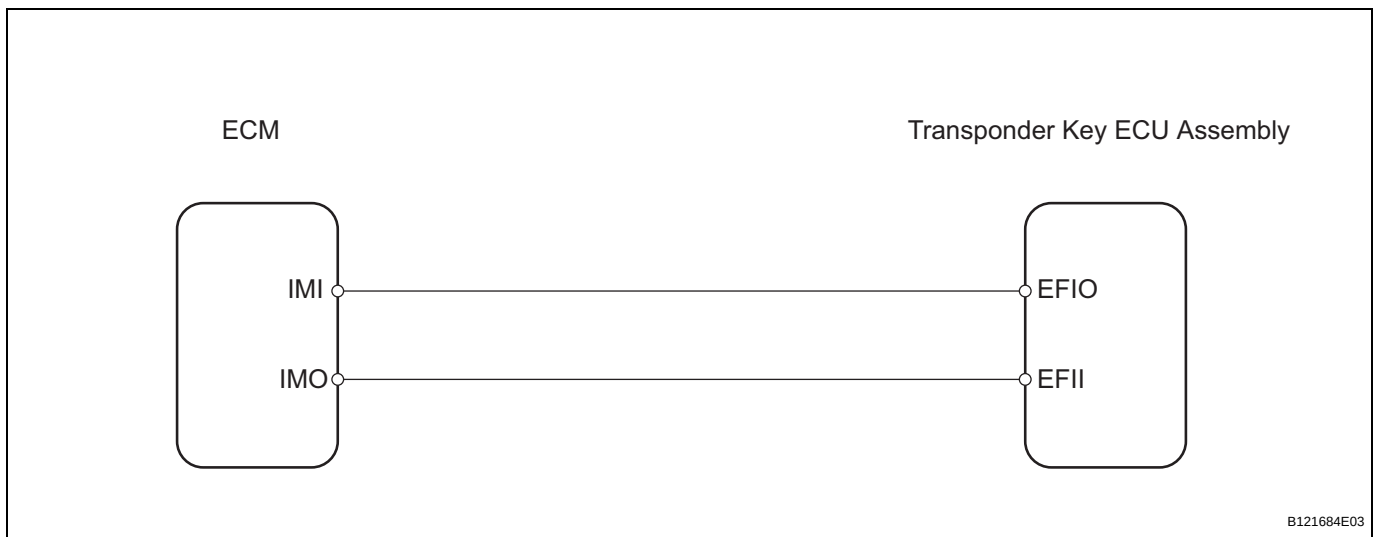
EI

END (TRANSPONDER KEY AMPLIFIER DEFECTIVE)

DTC**B2799****Engine Immobiliser System****DESCRIPTION**

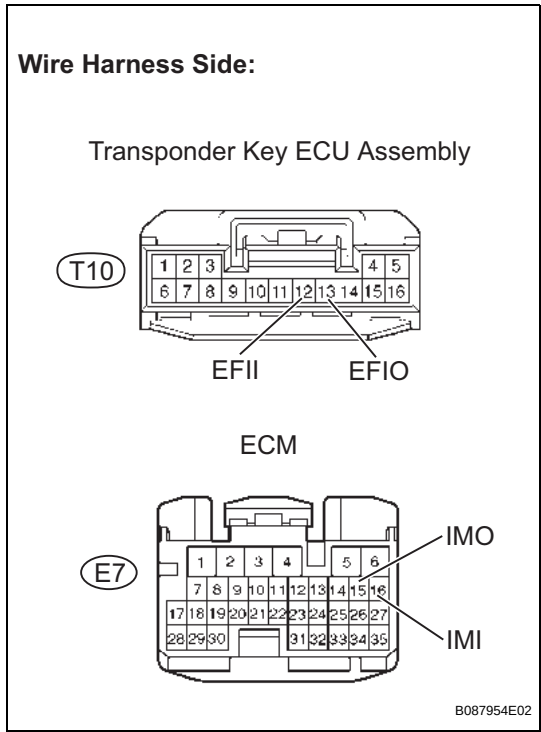
This DTC is output when one of the following occurs: 1) the ECM detected errors in its own communications with the immobiliser code ECU; 2) the ECM detects errors in the communication lines; or 3) the ECU communication ID between the immobiliser code ECU and ECM is different and an engine start is attempted. 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	- Error in communication between ECM and transponder key ECU, and in communication line - Communication ID is different during communication with transponder key ECU	- Wire harness and connector - ECM

WIRING DIAGRAM

1

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



- (a) Disconnect the T10 ECU connector.
- (b) Disconnect the E7 ECM connector.
- (c) Measure the resistance of the wire harness side connectors.

Standard resistance

Tester Connection	Specified Condition
T10-13 (EFIO) - E7-16 (IMI)	Below 1 Ω
T10-12 (EFII) - E7-15 (IMO)	Below 1 Ω
T10-13 (EFIO) or E7-16 (IMI) - Body ground	10 kΩ or higher
T10-12 (EFII) or E7-15 (IMO) - Body ground	10 kΩ or higher

- (d) Reconnect the ECU connector.
- (e) Reconnect the amplifier connector.

NG

REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

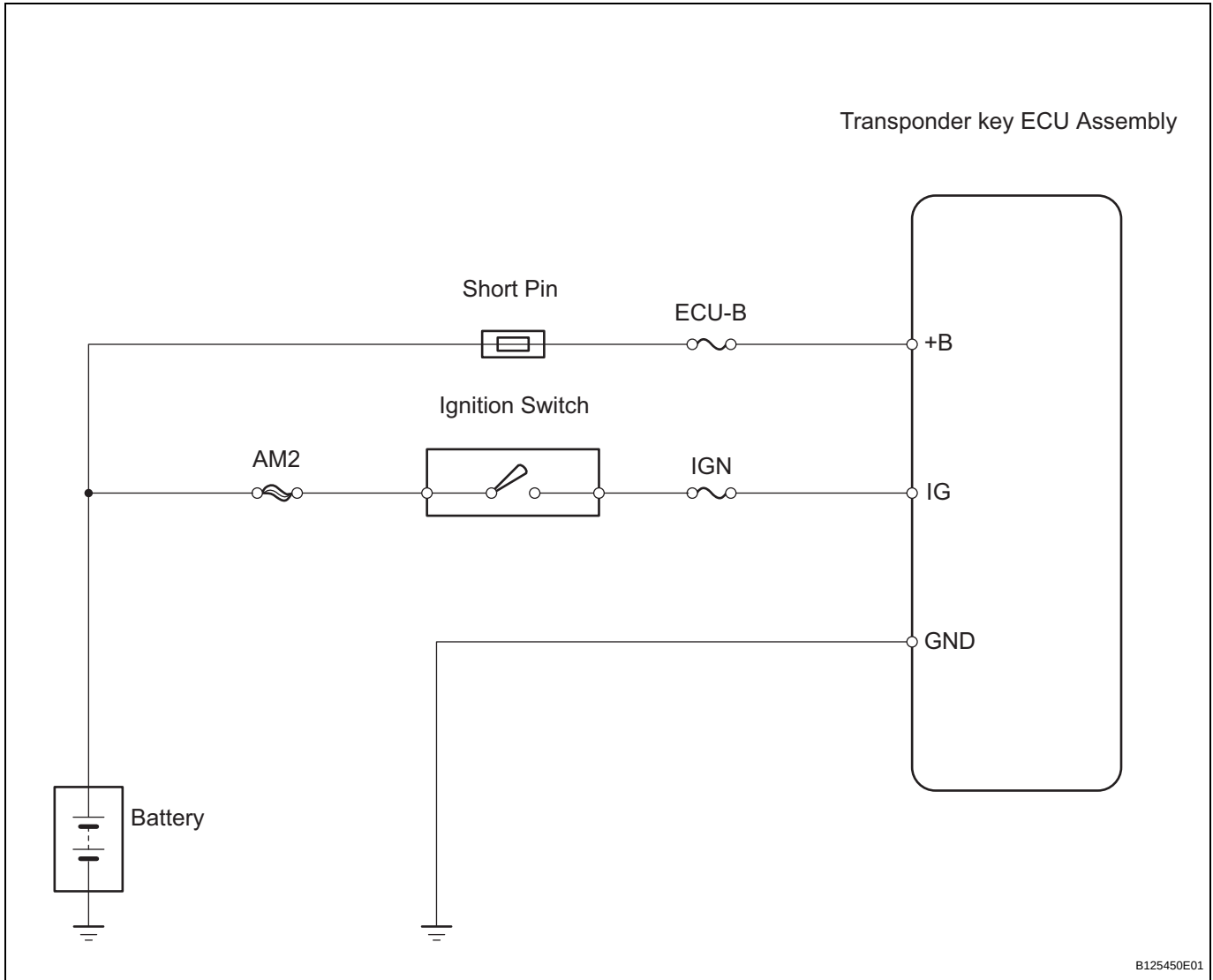
REPLACE ECM

ECU Power Source Circuit

DESCRIPTION

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

WIRING DIAGRAM


1

INSPECT FUSES (ECU-B AND IGN)

- (a) Remove the ECU-B fuse from the engine room R/B and J/B.
- (b) Remove the IGN fuse from the driver side J/B.
- (c) Measure the resistance of the fuse.

Standard resistance:

Below 1Ω

- (d) Reinstall fuses.

NG

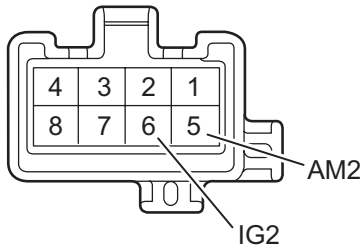
REPLACE FUSE

EI

OK

2 INSPECT IGNITION SWITCH ASSEMBLY**Component Side:**

Ignition Switch



B110407E04

- (a) Remove the ignition switch.
 (b) Measure the resistance of the switch.

Standard resistance

Tester Connection	Switch Condition	Specified Condition
5 (AM2) - 6 (IG2)	LOCK, ACC	10 k Ω or higher
	ON, START	Below 1 Ω

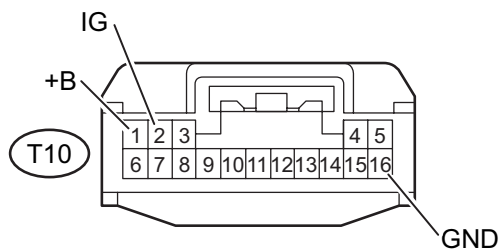
NG

REPLACE IGNITION SWITCH ASSEMBLY

OK

3 CHECK HARNESS AND CONNECTOR (TRANSPONDER KEY ECU ASSEMBLY - BATTERY AND BODY GROUND)**Wire Harness Side:**

Transponder Key ECU Assembly



B110782E08

- (a) Disconnect the T10 ECU connector.
 (b) Measure the resistance and voltage of the wire harness side connector.

Standard resistance

Tester Connection	Condition	Specified Condition
T10-16 (GND) - Body ground	Always	Below 1 Ω

Standard voltage

Tester Connection	Condition	Specified Condition
T10-1 (+B) - Body ground	Always	10 to 14 V
T10-2 (IG) - Body ground	Ignition switch OFF	Below 1 V
	Ignition switch ON	10 to 14 V

- (c) Reconnect the ECU connector.

NG

REPAIR OR REPLACE WIRE HARNESS AND CONNECTOR

OK

REPLACE TRANSPONDER KEY ECU ASSEMBLY