

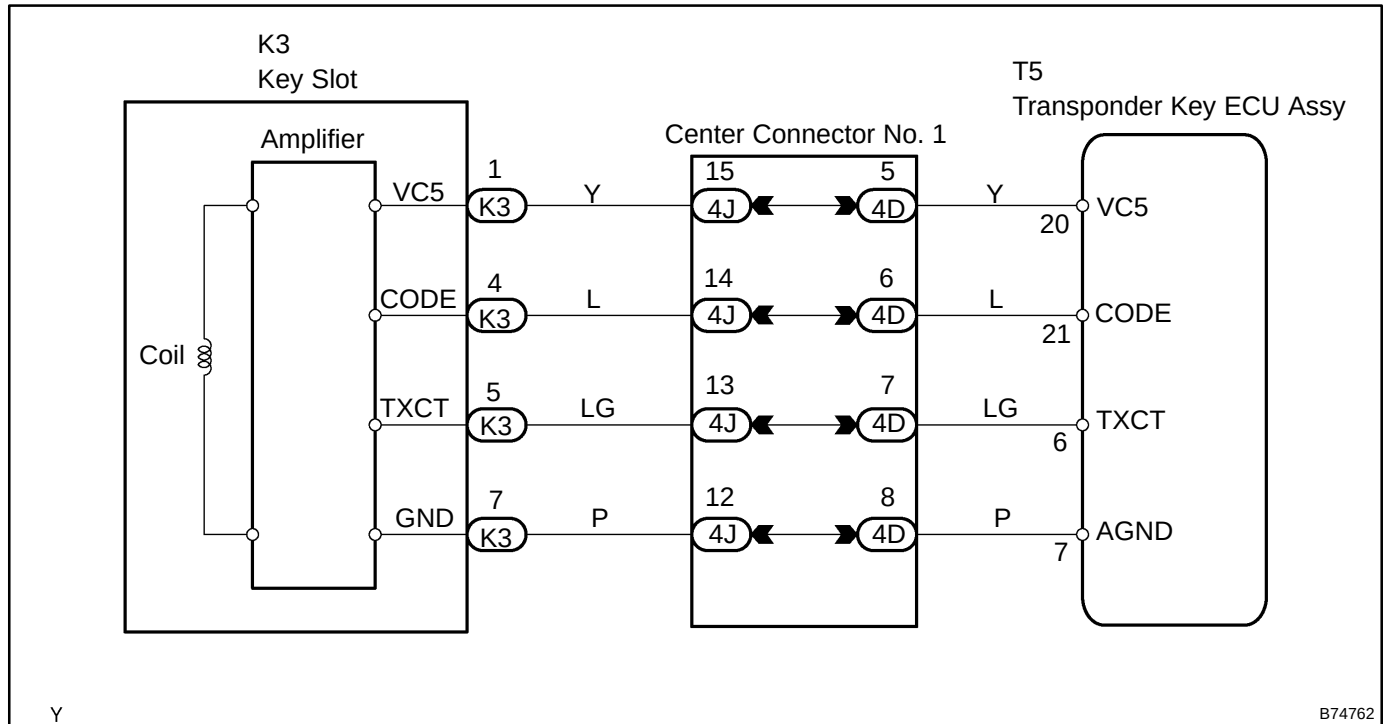
DTC	B2784	ANTENNA COIL OPEN/SHORT
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CIRCUIT DESCRIPTION

This DTC detected when an antenna coil is open/short.

DTC No.	DTC Detection Condition	Trouble Area
B2784	Antenna coil is open/short	• Wire harness • Key slot • Transponder key ECU Assy

WIRING DIAGRAM



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INSPECTION PROCEDURE

1 READ VALUE OF HAND-HELD TESTER

- Connect the hand-held tester (with CAN VIM) to the DLC3.
- Insert the key that cannot start the hybrid control system into the key slot, and change the power switch's power mode to ON (IG) by pushing the power switch.
- Read the DATA LIST according to the display on the tester.

OK: "NORMAL" (antenna coil is normal) appears on the screen.

Item	Measurement Item/ Display (Range)	Normal Condition	Diagnostic Note
ANTENNA COIL	Antenna coil condition /NORMAL or FAIL	NORMAL: Antenna coil is normal FAIL: Antenna coil is abnormal	–

NG

Go to step 2

OK

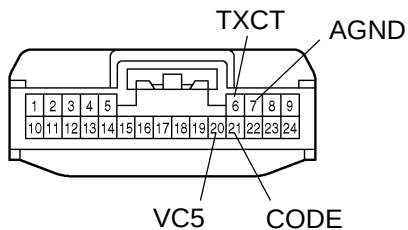
REPLACE TRANSPONDER KEY ECU ASSY

2 CHECK WIRE HARNESS (TRANSPONDER KEY ECU ASSY – KEY SLOT) (TRANSPONDER KEY ECU ASSY OR KEY SLOT – BODY GROUND)

Wire Harness Side

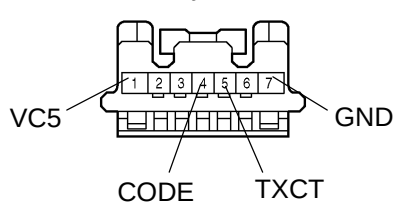
T5

Transponder Key ECU Assy



K3

Key Slot



Y

B74764

- Disconnect the T5 ECU connector.
- Disconnect the K3 key slot connector.
- Measure the resistance of the wire harness side connectors.

Standard:

Tester Connection	Specified Condition
T5-20 (VC5) – K3-1 (VC5)	Below 1 Ω
T5-21 (CODE) – K3-4 (CODE)	Below 1 Ω
T5-6 (TXCT) – K3-5 (TXCT)	Below 1 Ω
T5-7 (AGND) – K3-7 (GND)	Below 1 Ω
T5-20 (VC5) or K3-1 (VC5) – Body ground	10 k Ω or higher
T5-21 (CODE) or K3-4 (CODE) – Body ground	10 k Ω or higher
T5-6 (TXCT) or K3-5 (TXCT) – Body ground	10 k Ω or higher
T5-7 (AGND) or K3-7 (GND) – Body ground	10 k Ω or higher

NG

REPAIR OR REPLACE HARNESS AND CONNECTOR

OK

REPLACE TRANSPONDER KEY ECU ASSY

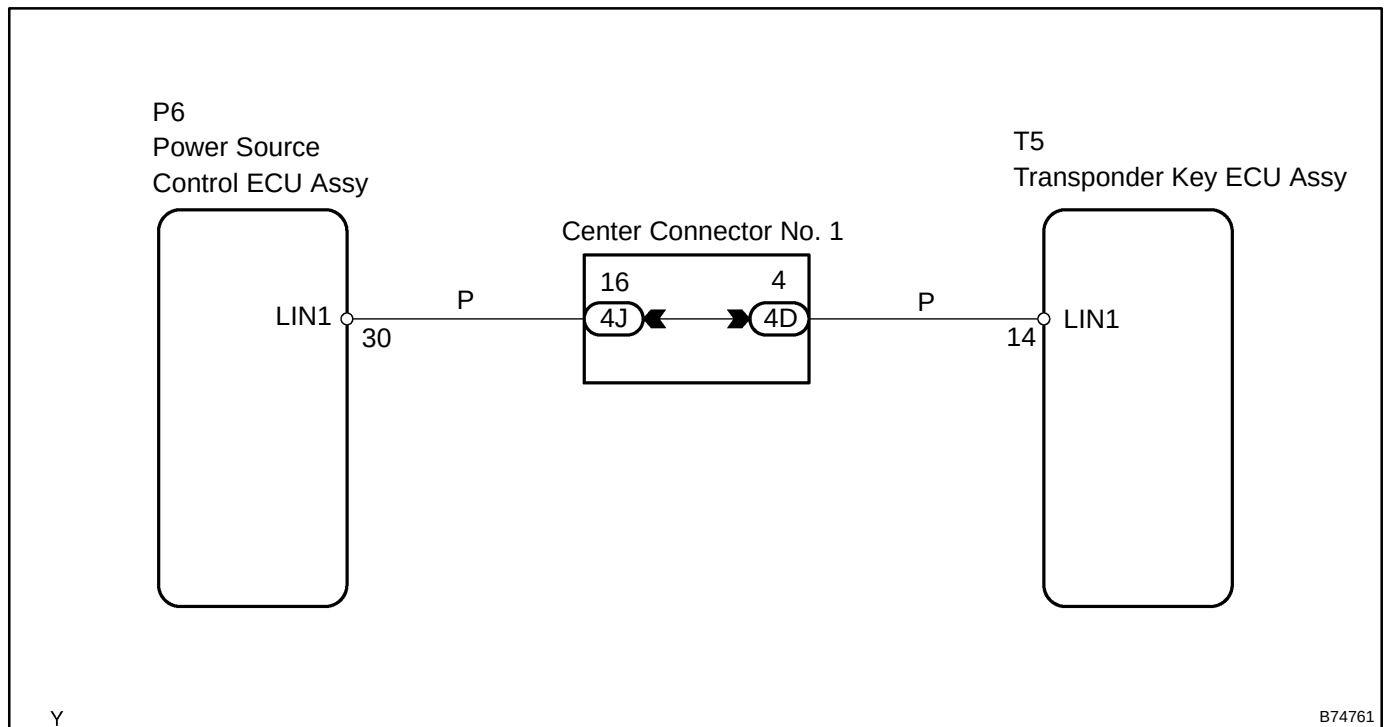
DTC	B2785	IGNITION SWITCH ON MALFUNCTION
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CIRCUIT DESCRIPTION

This DTC is output if communication between the transponder key ECU and power source control ECU is not possible.

DTC No.	DTC Detection Condition	Trouble Area
B2785	Communication between the transponder key ECU and power source control ECU is not possible	• Wire harness • Power source control ECU assy • Transponder key ECU assy

WIRING DIAGRAM



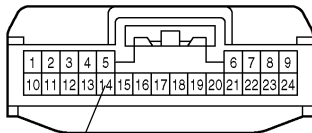
INSPECTION PROCEDURE

1 CHECK WIRE HARNESS (TRANSPONDER KEY ECU ASSY – POWER SOURCE CONTROL ECU ASSY)

Wire Harness Side

T5

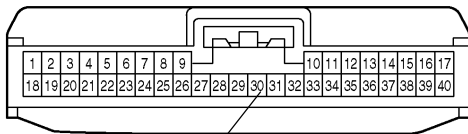
Transponder Key ECU Assy



LIN1

P6

Power Source Control ECU Assy



LIN1

Y

B74763

- (a) Reconnect the T5 and P6 ECU connector.
- (b) Measure the resistance of each terminal of the wire harness side connectors.

Standard:

Tester Connection	Specified Condition
T5-14 (LIN1) – P6-30 (LIN1)	Below 1 Ω
T5-14 (LIN1) or P6-30 (LIN1) – Body ground	10 k Ω or higher

NG

REPAIR OR REPLACE WIRE HARNESS AND CONNECTOR

OK

2 CHECK OPERATION OF TRANSPONDER KEY ECU

- (a) After replacing the transponder key ECU assy with a normally functioning ECU, check that the power switch's power mode can be changed to ON (ACC and IG) and the hybrid control system can be started.

OK:

Power switch's power mode can be changed to ON (ACC and IG) and the hybrid control system can be started.

NG

REPLACE POWER SOURCE CONTROL ECU ASSY

OK

END (REPLACE TRANSPONDER KEY ECU ASSY)

DTC	B2793	TRANSPONDER CHIP MALFUNCTION
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CIRCUIT 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	Smart key (Door control transmitter)

INSPECTION PROCEDURE

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

- (a) Delete the DTC (see page [05-2351](#)).
- (b) Re-register the key (see page [05-2333](#)) and insert this key into the key slot. Check that the power switch's power mode can be changed to ON (ACC and IG) and the hybrid control system can be started.

OK:

Power switch's power mode can be changed to ON (ACC and IG) and the hybrid control system can be started.

NG

REPLACE KEY

OK

END

DTC	B2794	UNMATCHED ENCRYPTION CODE
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CIRCUIT DESCRIPTION

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

DTC No.	DTC Detection Condition	Trouble Area
B2793	Key with incomplete key code is inserted	Smart key (Door control transmitter)

INSPECTION PROCEDURE

REPLACE KEY

DTC	B2795	UNMATCHED KEY CODE
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CIRCUIT DESCRIPTION

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

DTC No.	DTC Detection Condition	Trouble Area
B2795	Key with unregistered code is inserted	Smart key (Door control transmitter)

INSPECTION PROCEDURE

1	DELETE DTC AND INSERT ALL PRESENTLY AVAILABLE KEYS INTO KEY SLOT TO CHECK WHETHER HYBRID CONTROL SYSTEM STARTS OR NOT
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OK:

Power switch's power mode can be changed to ON (ACC and IG) and hybrid control system can be started.

NG

REPLACE KEY THAT CANNOT START HYBRID CONTROL SYSTEM

OK

END

DTC	B2796	NO COMMUNICATION IN IMMOBILISER SYSTEM
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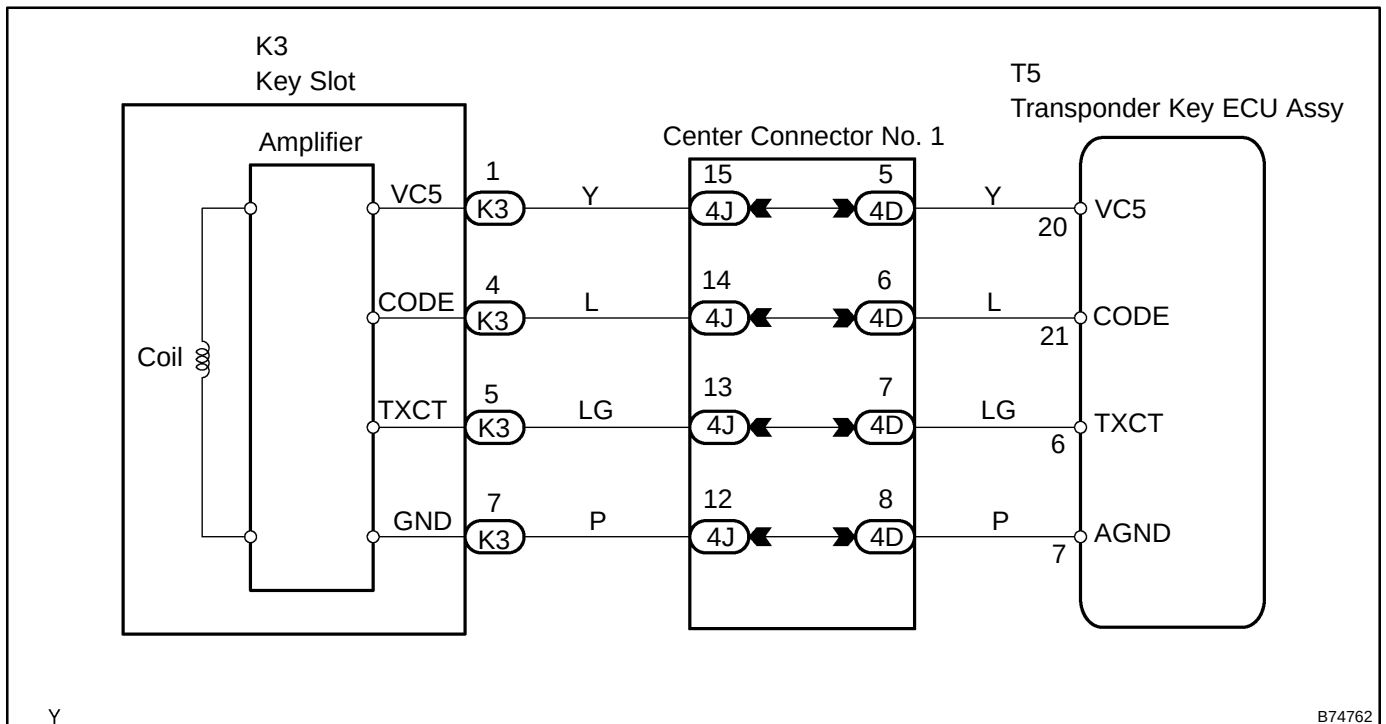
DTC	B2798	COMMUNICATION MALFUNCTION NO.2
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CIRCUIT DESCRIPTION

This DTC is output when a key that does not have a transponder chip is inserted into the key slot or if communication between the key and transponder key ECU is not possible.

DTC No.	DTC Detection Condition	Trouble Area
B2796	No communication	• Smart key (Door control transmitter) • Wire harness • Key slot • Transponder key ECU Assy
B2798	Communication error	Smart key (Door control transmitter)

WIRING DIAGRAM



INSPECTION PROCEDURE

1 READ VALUE OF HAND-HELD TESTER

- (a) Connect the hand-held tester (with CAN VIM) to the DLC3.
- (b) Insert the key that cannot start the hybrid control system into the key slot, and change the power switch's power mode to ON (IG) by pushing the power switch.
- (c) Read the DATA LIST according to the display on the tester.

OK: "SET" (power switch's power mode ON (IG)) appears on the screen.

Item	Measurement Item/ Display (Range)	Normal Condition	Diagnostic Note
IMMOBILISER	Immobilizer system status/ SET or UNSET	UNSET: Without key SET: Power switch's power mode ON (IG)	—

NG

Go to step NO TAG

OK

REPLACE TRANSPONDER KEY ECU ASSY**2 CHECK WHETHER HYBRID CONTROL SYSTEM STARTS WITH OTHER KEYS**

- (a) Insert the key that cannot the hybrid control system into the key slot, and change the power switch's power mode to ON (IG) by pushing the power switch.

OK:

Power switch's power mode can be changed to ON (ACC and IG) and hybrid control system can be started.

NG

Go to step NO TAG

OK

RE-REGISTER OR REPLACE KEY THAT CANNOT START HYBRID CONTROL SYSTEM**3 READ VALUE OF HAND-HELD TESTER**

- (a) Connect the hand-held tester (with CAN VIM) to the DLC3.
- (b) Insert the key that cannot start the hybrid control system into the key slot, and change the power switch's power mode to ON (IG) by pushing the power switch.
- (c) Read the DATA LIST according to the display on the tester.

OK: "NORMAL" (antenna coil is normal) appears on the screen.

Item	Measurement Item/ Display (Range)	Normal Condition	Diagnostic Note
ANTENNA COIL	Antenna coil condition /NORMAL or FAIL	NORMAL: Antenna coil is normal FAIL: Antenna coil is abnormal	—

NG

REPLACE KEY SLOT

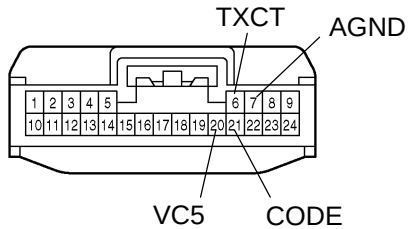
OK

4 CHECK WIRE HARNESS (TRANSPONDER KEY ECU ASSY – KEY SLOT) (TRANSPONDER KEY ECU ASSY OR KEY SLOT – BODY GROUND)

Wire Harness Side

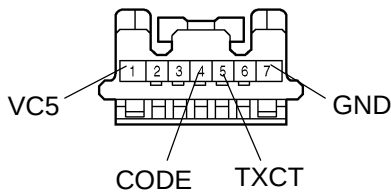
T5

Transponder Key ECU Assy



K3

Key Slot



Y

B74764

- Disconnect the T5 ECU connector.
- Disconnect the K3 key slot connector.
- Measure the resistance of the wire harness side connectors.

Standard:

Tester Connection	Specified Condition
T5-20 (VC5) – K3-1 (VC5)	Below 1 Ω
T5-21 (CODE) – K3-4 (CODE)	Below 1 Ω
T5-6 (TXCT) – K3-5 (TXCT)	Below 1 Ω
T5-7 (AGND) – K3-7 (GND)	Below 1 Ω
T5-20 (VC5) or K3-1 (VC5) – Body ground	10 k Ω or higher
T5-21 (CODE) or K3-4 (CODE) – Body ground	10 k Ω or higher
T5-6 (TXCT) or K3-5 (TXCT) – Body ground	10 k Ω or higher
T5-7 (AGND) or K3-7 (GND) – Body ground	10 k Ω or higher

NG

REPAIR OR REPLACE WIRE HARNESS AND CONNECTOR

OK

5 CHECK OPERATION OF KEY SLOT

- After replacing the key slot with normally functioning key slot, check that the power switch's power mode can be changed to ON (ACC and IG) and the hybrid control system can be started.

OK:

Power switch's power mode can be changed to ON (ACC and IG) and hybrid control system can be started.

NG

REPLACE TRANSPONDER KEY ECU ASSY

OK

END (REPLACE KEY SLOT)

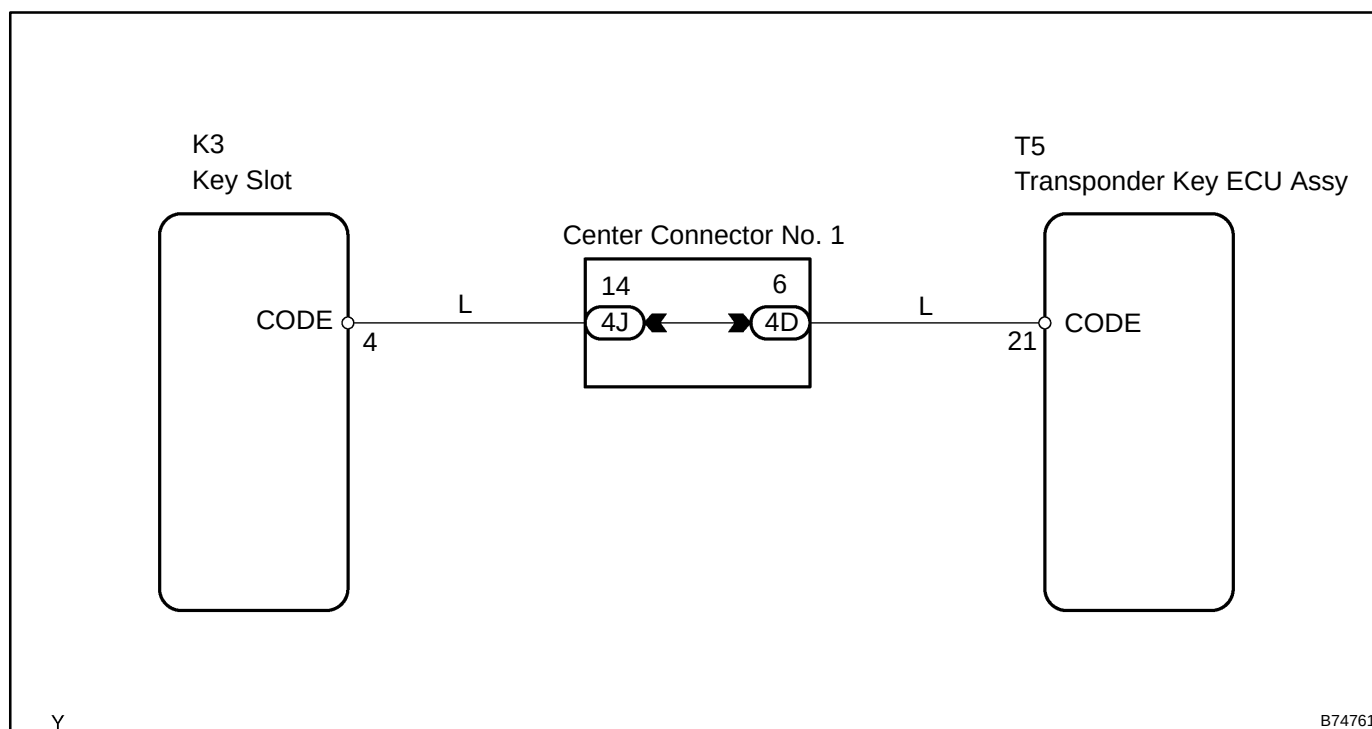
DTC	B2797	COMMUNICATION MALFUNCTION NO.1
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CIRCUIT DESCRIPTION

This DTC is output when a communication error occurs between the transponder key amplifier and transponder key ECU. A possible reason for the communication error is that noise is occurring on the communication line. Following the inspection procedure below.

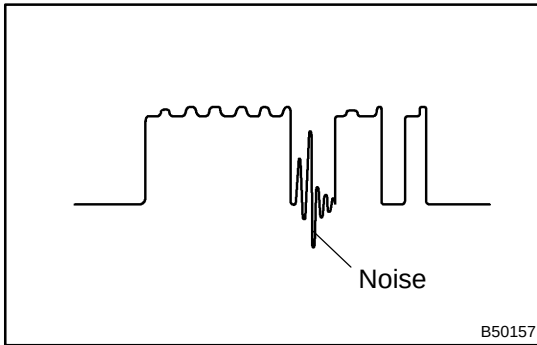
DTC No.	DTC Detection Condition	Trouble Area
B2797	Key has noise occurring on communication line	• Smart key (Door control transmitter) • Wire harness • Key slot • Transponder key ECU assy

WIRING DIAGRAM



INSPECTION PROCEDURE

1 CHECK TRANSPONDER KEY ECU ASSY



- (a) Using an oscilloscope or the hand-held tester, check that the waveform between the terminals of the K3 key slot and T5 ECU connector. The waveform should be similar to the illustration on the left.

Standard:

Tester Connection	Specified Condition
T5-21 (CODE) – K3-4 (CODE)	No noise is present

Tool Setting	2.5 V/DIV., 20 ms/DIV.
Condition	Power switch's power mode OFF ON (IG)

NG

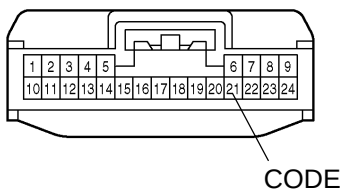
FIND CAUSE OF NOISE AND REMOVE IT

OK

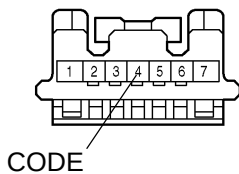
2 CHECK WIRE HARNESS (TRANSPONDER KEY ECU ASSY – KEY SLOT)

Wire Harness Side

T5
Transponder Key ECU Assy



K3
Key Slot



- (a) Disconnect the T5 ECU connector.
(b) Disconnect the K3 key slot connector.
(c) Measure the resistance of the wire harness side connectors.

Standard:

Tester Connection	Specified Condition
T5-21 (CODE) – K3-4 (CODE)	Below 1 Ω

NG

REPAIR OR REPLACE WIRE HARNESS AND CONNECTOR

OK

3 CHECK OPERATION OF KEY SLOT

- (a) After replacing the key slot with normally functioning key slot, check that the power switch's power mode can be changed to ON (ACC and IG) and the hybrid control system can be started.

OK:

Power switch's power mode can be changed to ON (ACC and IG) and hybrid control system can be started.

NG

REPLACE TRANSPONDER KEY ECU ASSY

OK

END (REPLACE KEY SLOT)

DTC	B2799-539	ENGINE IMMOBILISER SYSTEM MALFUNCTION
DTC	B2799-540	ENGINE IMMOBILISER SYSTEM MALFUNCTION
DTC	B2799-541	ENGINE IMMOBILISER SYSTEM MALFUNCTION
DTC	B2799-542	ENGINE IMMOBILISER SYSTEM MALFUNCTION
DTC	B2799-543	ENGINE IMMOBILISER SYSTEM MALFUNCTION
DTC	B2799-544	ENGINE IMMOBILISER SYSTEM MALFUNCTION

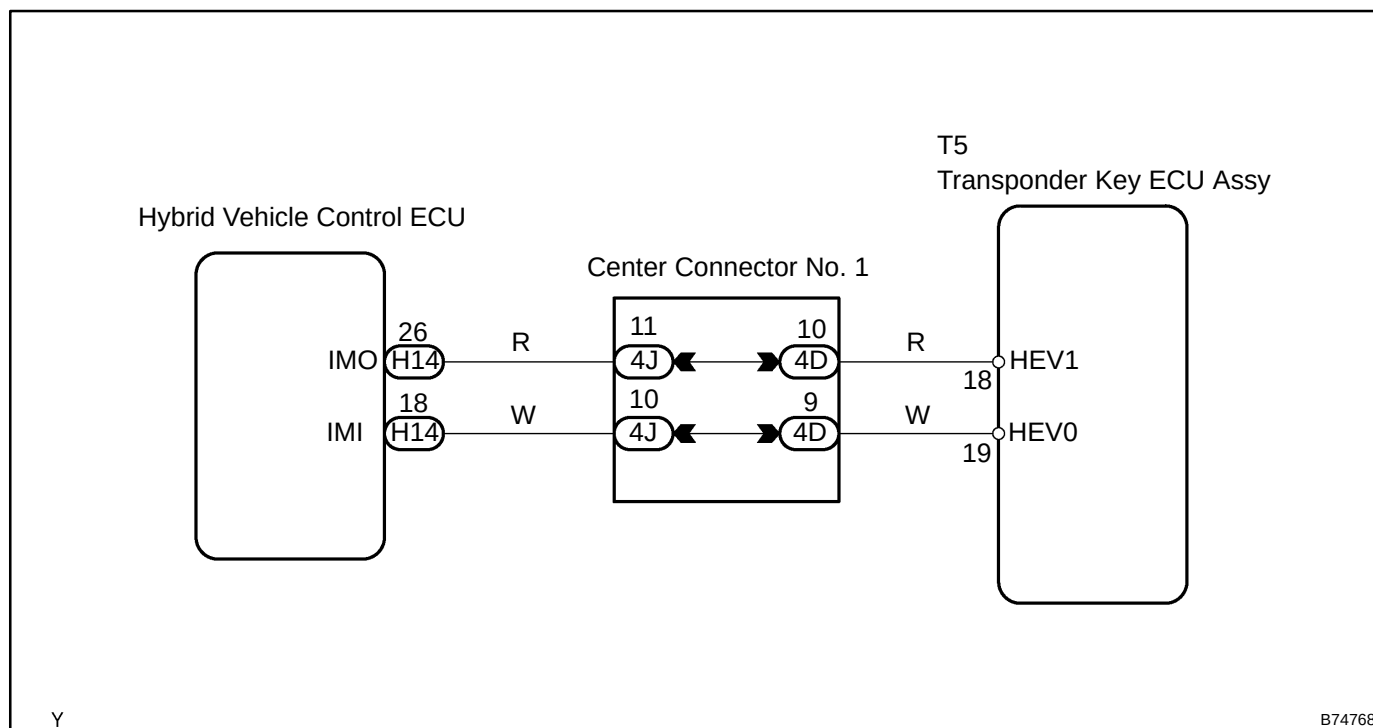
CIRCUIT DESCRIPTION

These DTCs are detected when: 1) the wire harness between the transponder key ECU and hybrid vehicle control ECU is open or short circuited, 2) the ECU communication IDs of the hybrid vehicle control ECU and transponder key ECU are different, 3) the start (ON (READY) signal delayed, or 4) the key codes are unmatched.

Before troubleshooting for the this DTC, make sure no transponder key ECU DTCs are present. If present, troubleshoot the transponder key ECU DTCs or hybrid vehicle control ECUs first.

DTC No.	DTC Detection Condition	Trouble Area
B2799-539 B2799-540 B2799-541 B2799-542 B2799-543 B2799-544	When any of the following conditions are met: • wire harness between transponder key ECU and hybrid vehicle control ECU is open or short • ECU communication IDs of hybrid vehicle control ECU and transponder key ECU are different • ON (READY) signal is delayed more than 10 seconds from when power switch is set to ON (READY) • Key codes are unmatched.	• Wire harness • Hybrid vehicle control ECU

WIRING DIAGRAM



INSPECTION PROCEDURE

1 CHECK FOR DTCS

- Delete the DTC (see page 05-2351).
- Check that no DTC is output.

OK: DTC is not output.

NG

Go to step 2

OK

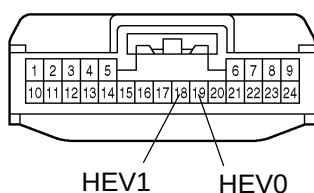
END

2 CHECK WIRE HARNESS (TRANSPONDER KEY ECU ASSY – HYBRID VEHICLE CONTROL ECU) (TRANSPONDER KEY ECU ASSY OR HYBRID VEHICLE CONTROL ECU – BODY GROUND)

Wire Harness Side

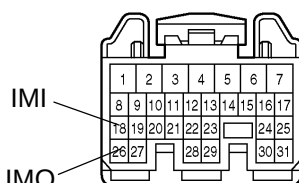
T5

Transponder Key ECU Assy



H14

Hybrid Vehicle Control ECU



Y

B74765

- Disconnect the T5 and H14 ECU connectors.
- Measure the resistance of the wire harness side connectors.

Standard:

Tester Connection	Specified Condition
T5-19 (HEV0) – H14-18 (IMI)	Below 1 Ω
T5-18 (HEV1) – H14-26 (IMO)	Below 1 Ω
T5-19 (HEV0) or H14-18 (IMI) – Body ground	10 k Ω or higher
T5-18 (HEV1) – H14-26 (IMO) – Body ground	10 k Ω or higher

NG

REPAIR OR REPLACE WIRE HARNESS AND CONNECTOR

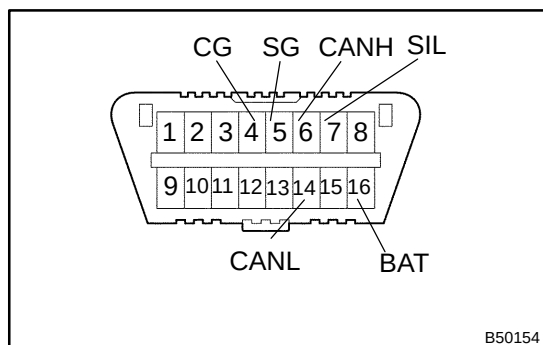
OK

REPLACE HYBRID VEHICLE CONTROL ECU

DIAGNOSIS SYSTEM

1. DESCRIPTION

- (a) The hybrid vehicle control ECU controls vehicle's immobilizer system function. Immobilizer system data and the Diagnostic Trouble Codes (DTCs) can be read through the vehicle's Data Link Connector 3 (DLC3). In some cases, a malfunction may be occurring in the immobilizer system even though the security indicator lamp is off. When the system seems to be malfunctioning, use the hand-held tester to check for malfunctions and perform repairs.

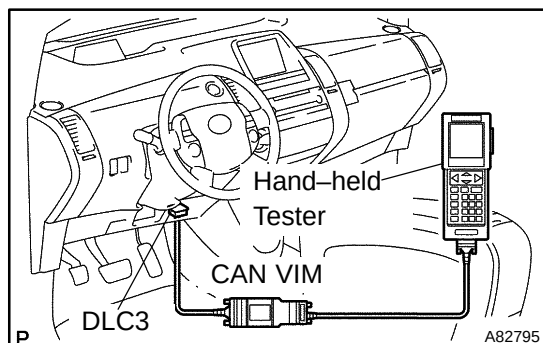


2. CHECK DLC3

The vehicle uses the ISO 15765-4 for communication protocol. The terminal arrangement of the DLC3 complies with SAE J1962 and matches the ISO 15765-4 format.

Symbol	Terminal No.	Name	Reference terminal	Result	Condition
SIL	7	Bus "+" line	5 – Signal ground	Pulse generation	During transmission
CG	4	Chassis ground	Body ground	Below 1 Ω	Constant
SG	5	Signal ground	Body ground	Below 1 Ω	Constant
BAT	16	Battery positive	Body ground	11 to 14 V	Constant
CANH	6	HIGH-level CAN bus line	CANL	54 to 69 Ω	Power switch's power mode OFF
CANH	6	HIGH-level CAN bus line	Battery positive	1 M Ω or higher	Power switch's power mode OFF
CANH	6	HIGH-level CAN bus line	CG	1 k Ω or higher	Power switch's power mode OFF
CANL	14	LOW-level CAN bus line	Battery positive	1 M Ω or higher	Power switch's power mode OFF
CANL	14	LOW-level CAN bus line	CG	1 k Ω or higher	Power switch's power mode OFF

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 hand-held tester (with CAN VIM) to the DLC3, change the power switch's power mode to ON (IG) and attempt to use the hand-held tester. If the screen displays UNABLE TO CONNECT TO VEHICLE, a problem exists in the vehicle side or tester side.

- If communication is normal when the tester is connected to another vehicle, inspect the DLC3 of the original vehicle.
- If communication is still impossible 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. CHECK BATTERY VOLTAGE**Standard: 11 to 14 V**

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

DATA LIST/ACTIVE TEST

1. DATA LIST

HINT:

Using the hand-held tester DATA LIST allows switch, actuator and other item values to be read without removing any parts. Reading the DATA LIST early in troubleshooting is one way to shorten labor time.

- Connect the hand-held tester (with CAN VIM) to the DLC3.
- Change the power switch's power mode to ON (IG) by pushing the power switch.
- Read the DATA LIST according to the display on the tester.

Transponder key ECU:

Item	Measurement Item/ Display (Range)	Normal Condition	Diagnostic Note
KEY SW	Unlock warning switch signal/ ON or OFF	OFF: Key is in key slot ON: No key is in key slot	–
SHIFT POS	Shift position P signal/ ON or OFF	ON: Shift position is P OFF: Shift position is not P	–
+B	–	NORMAL: Battery supply is normal BREAK: Battery supply is malfunctioning (break)	–
ANTENNA COIL	Antenna coil condition/ NORMAL or FAIL	NORMAL: Antenna coil is normal FAIL: Antenna coil is malfunctioning	–
IMMOBILISER	Immobilizer system status/ SET or UNSET	SET: Power switch's power mode ON (IG) UNSET: Without key	–
CHECK (SECURITY)	Verification with smart key ECU/ NORMAL or ABNORML	NORMAL: Verified with smart key ECU ABNORML: Not verified with smart key ECU	–
PERMIT (START)	Hybrid control system starting control/OK or NG	NG: Hybrid control system starting is not permitted OK: Hybrid control system starting is permitted	–
G-CODE SUPPORT	–	NOT SUP: G-code is not supported SUPPORT: G-code is supported	–
MASTER KEY	Master key code signal/ NOMATCH or MATCH	NOMATCH: Unmatched master key code is sent MATCH: Master key code is sent	–
REGIST MAS CODE	Number of registered master key/ min. 0, max. 5	Number of registered master key	–
REGIST SUB CODE	Number of registered sub-key/ min. 0, max. 5	Number of registered sub-key	–

2. ACTIVE TEST

HINT:

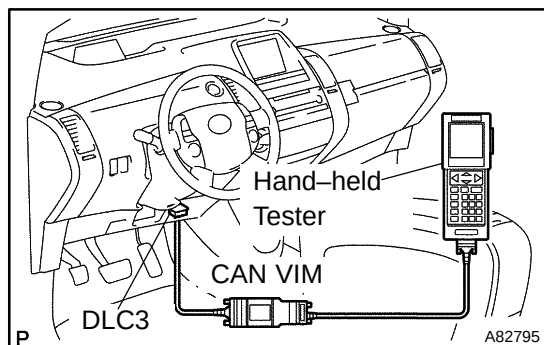
Performing the hand-held tester ACTIVE TEST allows relay, VSV, actuator, and other times to be operated without removing any parts. Performing the ACTIVE TEST early in troubleshooting is one way to shorten labor time. The DATA LIST can be displayed during the ACTIVE TEST.

- Connect the hand-held tester (with CAN VIM) to the DLC3.
- Change the power switch's power mode to ON (IG) by pushing the power switch.
- Perform the ACTIVE TEST according to the display on the tester.

Transponder key ECU:

Item	Normal Condition	Diagnostic Note
NOT P- POS WARN	Shift p-pos warning is ON/OFF	–
METER CHIME	Meter chime is ON/OFF	–
METER BUZ	Meter buzzer is ON/OFF	–
SECURITY INDIC	Turn security indicator ON/OFF	–

DTC CHECK/CLEAR



1. CHECK DTC

- (a) Connect the hand-held tester together with the Controller Area Network Vehicle Interface Module (CAN VIM). Then connect the CAN VIM to the DLC3.
- (b) Change the power switch's power mode to ON (IG) by pushing the power switch.
- (c) Read the DTCs by following the directions on the tester's screen.

HINT:

Refer to the hand-held tester operator's manual for further details.

2. CLEAR DTC

- (a) Connect the hand-held tester (with CAN VIM) to the DLC3.
- (b) Change the power switch's power mode to ON (IG) by pushing the power switch.
- (c) Erase the DTCs by following the directions on the tester's screen.

HINT:

Refer to the hand-held tester operator's manual for further details.

REGISTRATION

HINT:

The key has 3 codes: the key code (immobilizer code), the wireless code and smart code. All of these code types need to be registered. Refer to page 05-2231 for the wireless code registration procedures. And refer to page 05-2158 for the smart code registration procedures.

1. DESCRIPTION OF CODE REGISTRATION

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

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

Target ECU	See Step
Transponder key ECU	3

(b) When replacing the transponder key ECU (new registration).

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

Target ECU	See Step
Transponder key ECU	2

(2) Register the ECU COMMUNICATION ID to be used between the hybrid vehicle control ECU and the transponder key ECU.

Target ECU	See Step
Hybrid vehicle control ECU	5

(3) Register the ECU COMMUNICATION ID to be used between the smart key ECU and the transponder key ECU.

Target ECU	See Step
Smart Key ECU	6

(c) When replacing the smart key ECU.

(1) Register the ECU COMMUNICATION ID to be used between the smart key ECU and the transponder key ECU.

Target ECU	See Step
Transponder key ECU	6

(d) When replacing the hybrid vehicle control ECU.

(1) Register the ECU COMMUNICATION ID to be used between the hybrid vehicle control ECU and the transponder key ECU.

Target ECU	See Step
Transponder key ECU	7

(e) When replacing the transponder key ECU, smart key ECU and hybrid vehicle control ECU at the same time.

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

Target ECU	See Step
Transponder key ECU	2

(2) Register the ECU COMMUNICATION ID to be used between the hybrid vehicle control ECU and the transponder key ECU.

Target ECU	See Step
Hybrid vehicle control ECU	5

(3) Register the ECU COMMUNICATION ID to be used between the smart key ECU and the transponder key ECU.

Target ECU	See Step
Smart Key ECU	6

- (4) Register the ECU COMMUNICATION ID to be used between the hybrid vehicle control ECU and the transponder key ECU.

Target ECU	See Step
Transponder key ECU	7

- (f) When erasing of the key codes.

- (1) Erasure of the key codes.

Target ECU	See Step
Transponder key ECU	4

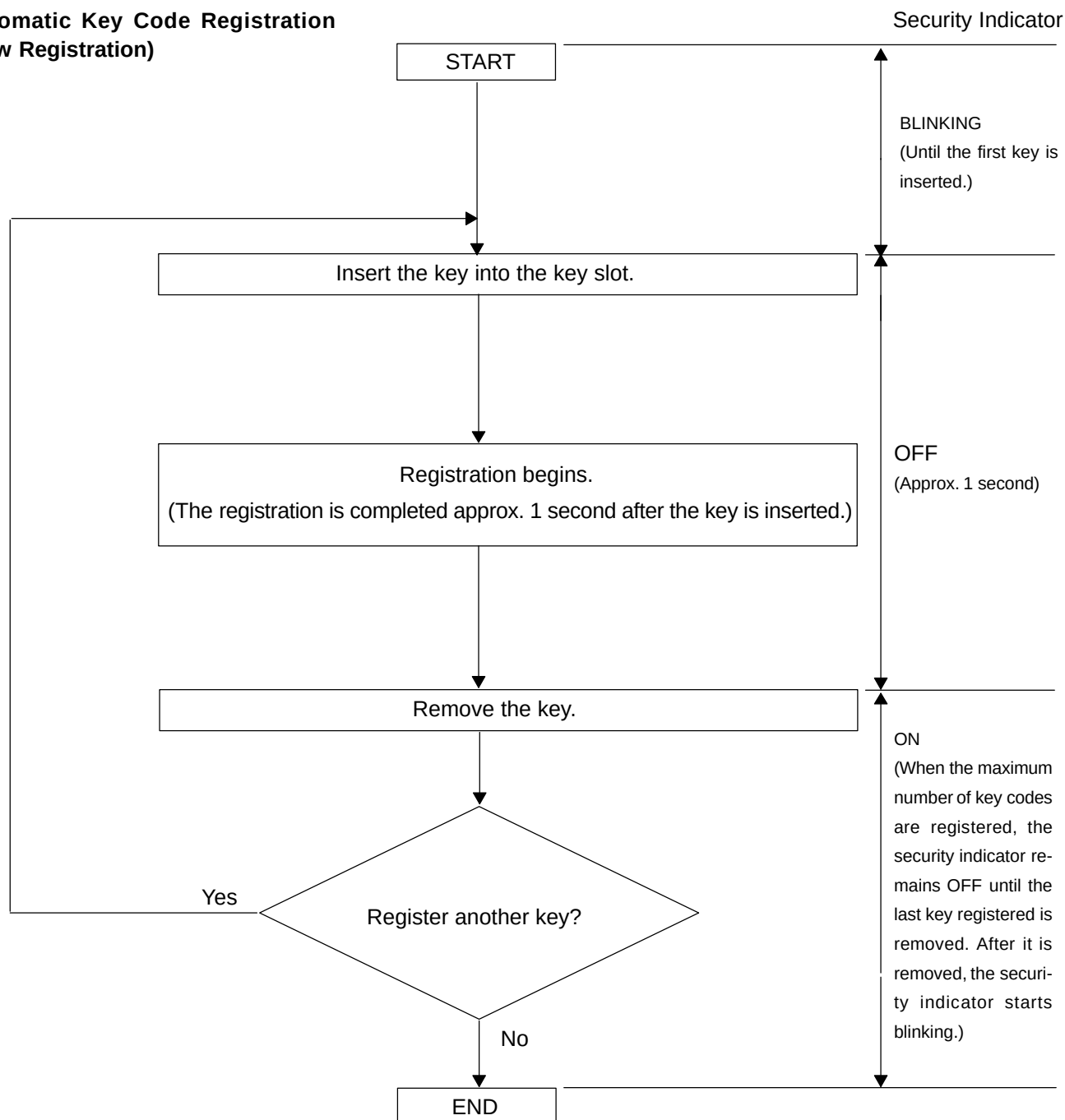
2. KEY REGISTRATION IN AUTOMATIC REGISTRATION (NEW REGISTRATION)

- (a) When a key is inserted into the key slot, the key code (immobilizer code) registration is automatic. In this mode, a maximum of 5 key codes for 4 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 can distinguish between different types of keys.

HINT:

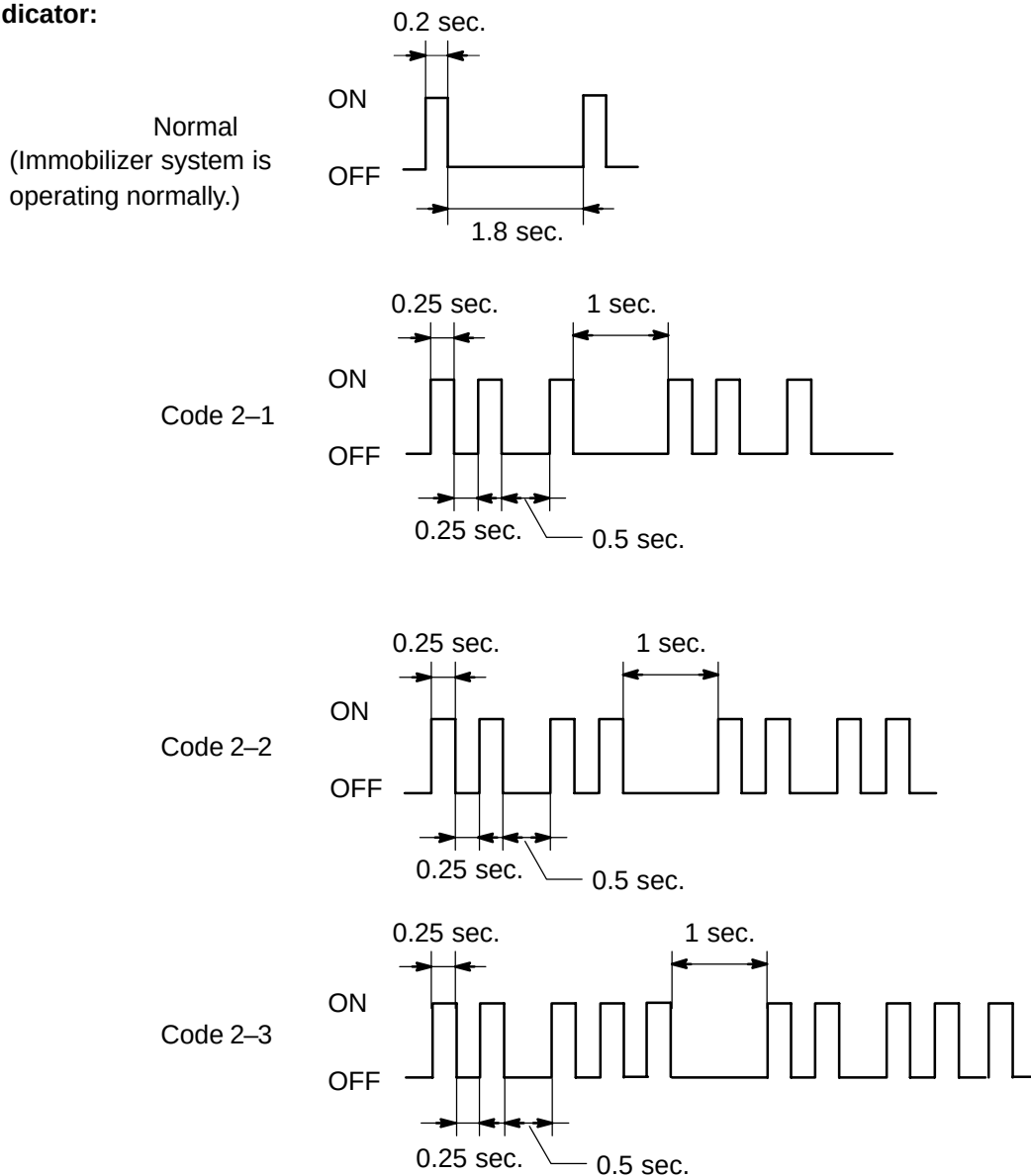
- When a new transponder key ECU is installed, key codes (immobilizer codes) must be registered in the new transponder key ECU.
- A new transponder key ECU is automatically set to automatic key code registration mode.

Automatic Key Code Registration (New Registration)



HINT:

- When no key is inserted in the key slot in automatic key code registration mode, the security indicator remains on.
- When the immobilizer 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:

(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) Insert the already registered master key into the key slot. Change the power switch's power mode between ON (IG) and OFF repeatedly 5 times within 10 seconds.

3. REGISTRATION OF ADDITIONAL KEY (ADDITIONAL REGISTRATION)

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

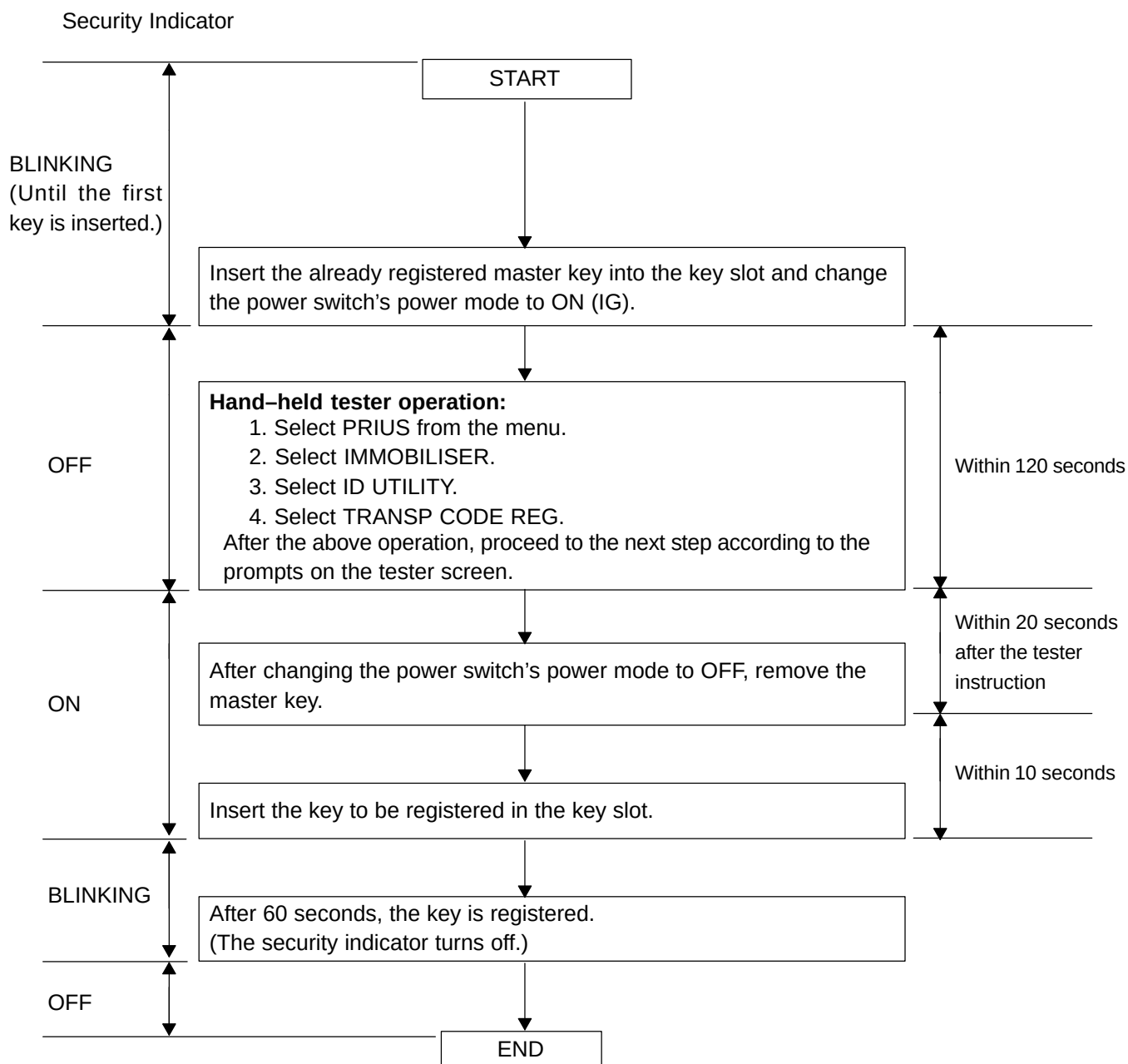
HINT:

- 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 key slot 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 key slot 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



HINT:

- A brief outline of procedures for key code registration is shown on this page. For more detailed information, please refer to the hand-held tester screen's instructions.
- When the immobilizer system is operating normally and the key is pulled out, the security indicator starts blinking.
- 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).

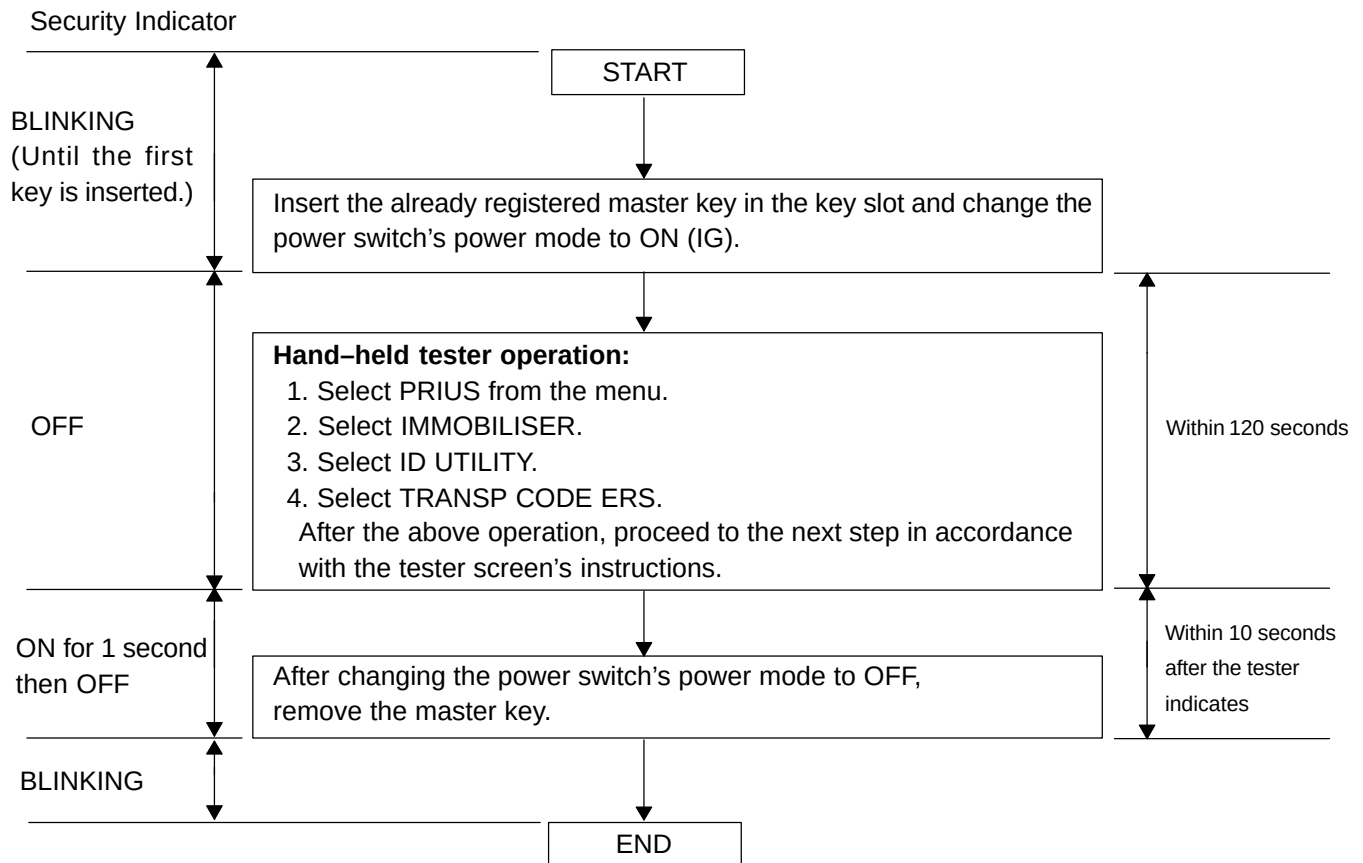
4. ERASURE OF KEY CODE

(a) Erase key codes using the hand-held 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, the key's code must be re-registered.
- Registration will be cancelled if each step is not completed within the specified time.

Erasing Key Code



HINT:

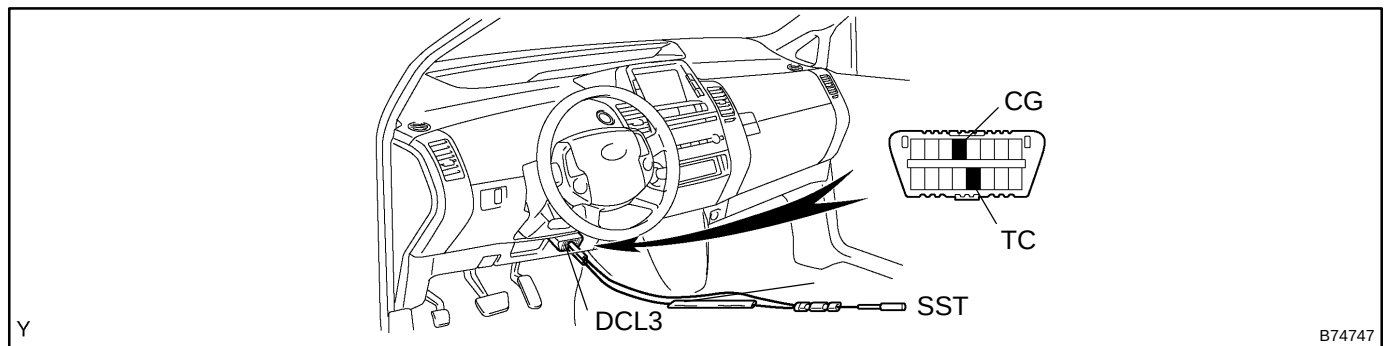
- A brief outline of procedures for key code registration is shown on this page. For more detailed information, please refer to the hand-held tester screen's instructions.
- When the immobilizer system is operating normally and the key is pulled out, the security indicator starts blinking.

5. ECU COMMUNICATION ID REGISTRATION

NOTICE:

- The ECU communication ID should be registered when the transponder key ECU and/or the hybrid vehicle control ECU is replaced in order to match the HYBRID VEHICLE CONTROL ECU COMMUNICATION ID.
- The hybrid vehicle control system cannot be started unless the HYBRID VEHICLE CONTROL ECU COMMUNICATION ID matches.
- When the transponder key ECU has been replaced, do not change the power switch's power mode from ON to OFF 20 times or more consecutively. The ECU COMMUNICATION ID must be registered before such an occurrence or the transponder key ECU will need to be replaced. If the transponder key ECU is unable to recognize the hybrid vehicle control ECU, the hybrid vehicle control system will be unable to be started. If the transponder key ECU cannot recognize the hybrid vehicle control ECU, the transponder key ECU must be replaced again with new one.
- After the registration, pressing the power switch may not start the system on the first try. If so, press the power switch again.
- After the hybrid vehicle control system is started, erase DTC 2799 (code for hybrid vehicle control ECU's immobilizer communication error) using either of the following.
Use the hand-held tester (see page 05-2351).
Disconnect the battery for 30 seconds.

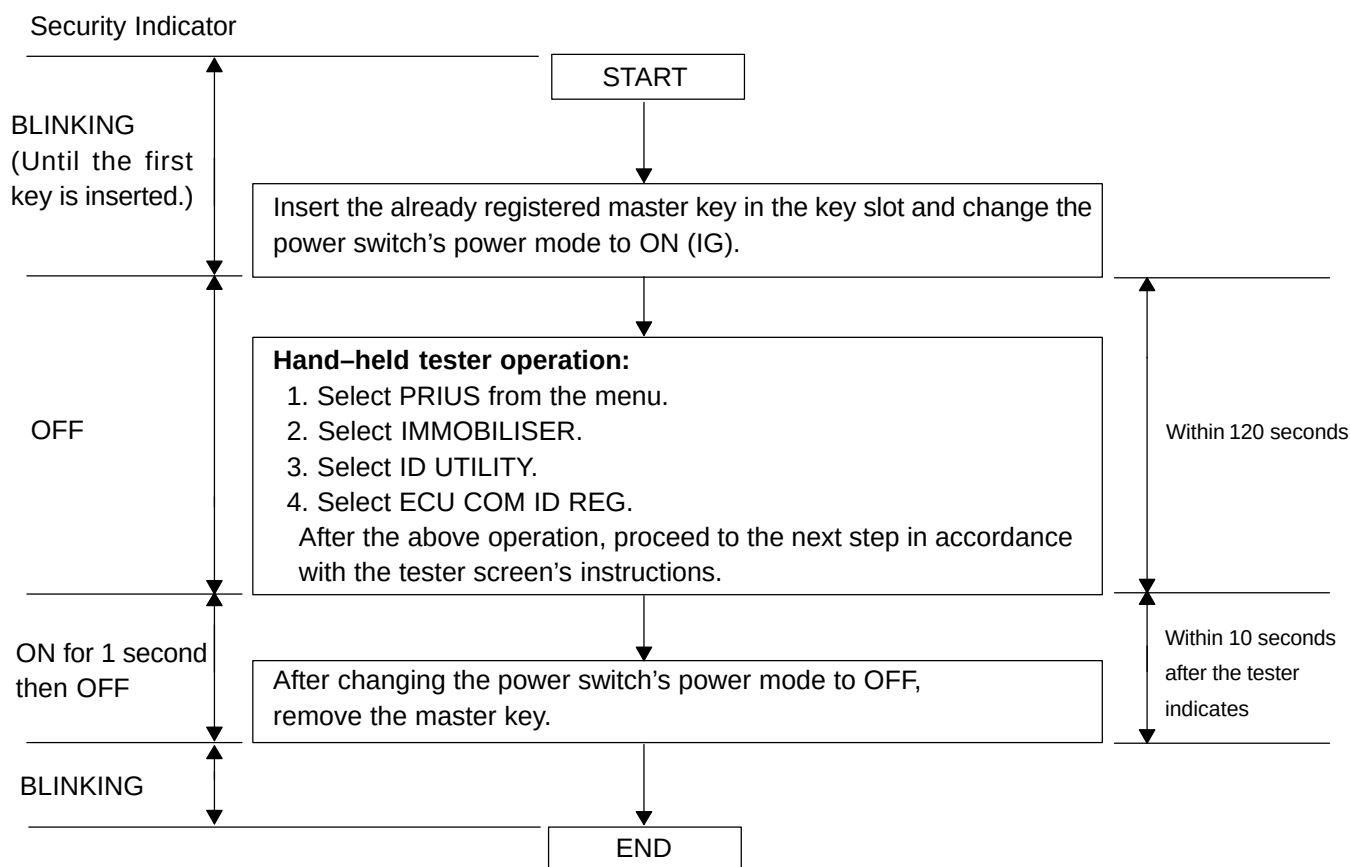
- (a) Register the ECU communication ID.



- (1) Using SST, connect terminals TC and CG of the DLC3.
SST 09843-18040
- (2) Change the power switch's power mode to ON (IG) (do not start the engine) and leave it as is for 30 minutes.
- (3) Change the power switch's power mode to OFF and disconnect terminals TC and CG.
- (4) Check that the hybrid vehicle control system starts.

6. ECU COMMUNICATION ID REGISTRATION

ECU COMMUNICATION ID REGISTRATION



HINT:

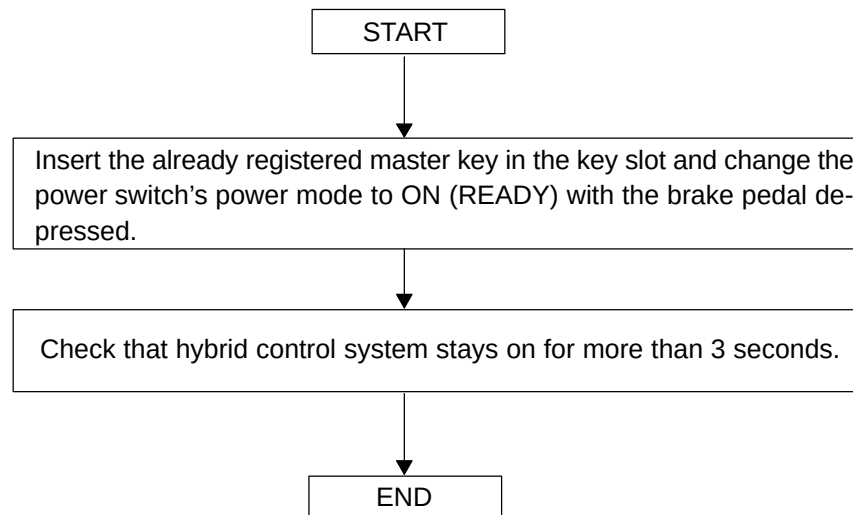
- A brief outline of procedures for key code registration is shown on this page. For more detailed information, please refer to the hand-held tester screen's instructions.
- When the immobilizer system is operating normally and the key is pulled out, the security indicator blinks continuously.

7. ECU COMMUNICATION ID REGISTRATION

NOTICE:

- The ECU communication ID should be registered when the hybrid vehicle control ECU is replaced in order to match the HYBRID VEHICLE CONTROL ECU COMMUNICATION ID.
- The hybrid vehicle control system cannot be started unless the HYBRID VEHICLE CONTROL ECU COMMUNICATION ID matches.

ECU COMMUNICATION ID Registration



SYSTEM DESCRIPTION

1. ENGINE IMMOBILIZER SYSTEM DESCRIPTION

- (a) The immobilizer system is a theft deterrent system that determines whether or not to disable starting of the TOYOTA Hybrid System II (THS II) depending on a comparison of the key's ID code and the vehicle's pre-registered code.

The immobilizer system compares the vehicle transponder key ECU's pre-registered ID code with the key-embedded transponder chip's ID code. If the ID codes do not match, the immobilizer system activates and the THS II cannot be started. The transponder key ECU manages communication with the hybrid vehicle control ECU and power source control ECU. When the ID codes of the transponder chip and transponder key ECU match, the transponder key ECU authorizes the starting of the THS II and the changing between the power switch's power modes.

2. FUNCTION OF MAIN COMPONENTS

Components	Outline
Transponder key coil/amplifier	Receives key ID code, amplifies ID code and outputs it to transponder key ECU. Key ID code is received when key is inserted into key slot.
Halfway switch (inside key slot)	Detects if key is/isn't inserted into key slot and outputs results to transponder key ECU.
Full switch (inside key slot)	Detects if key is/isn't inserted into key slot and outputs results to power source control ECU.
Room oscillator	Transmits key detection signals within detection area in vehicle interior upon receiving transmission request signal from smart key ECU. Smart key ECU request signal is activated when key is brought into vehicle interior and, without inserting key into key slot, power switch is pushed.
Door control receiver	Transmits ID code to smart key ECU. Key ID code is received when key is brought into vehicle interior and, without inserting key into key slot, power switch is pushed.
Security indicator	Illuminates or starts blinking. Illumination is controlled by multiplex network body ECU.

3. SYSTEM FUNCTION

- (a) Starting hybrid control system with smart key inserted into the key slot

- (1) When the transponder key ECU detects that the halfway switch is ON, the ECU provides current to the transponder key coil and produces a faint electric wave. A transponder chip in the key receives the faint electric wave. Upon receiving the faint electric 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.

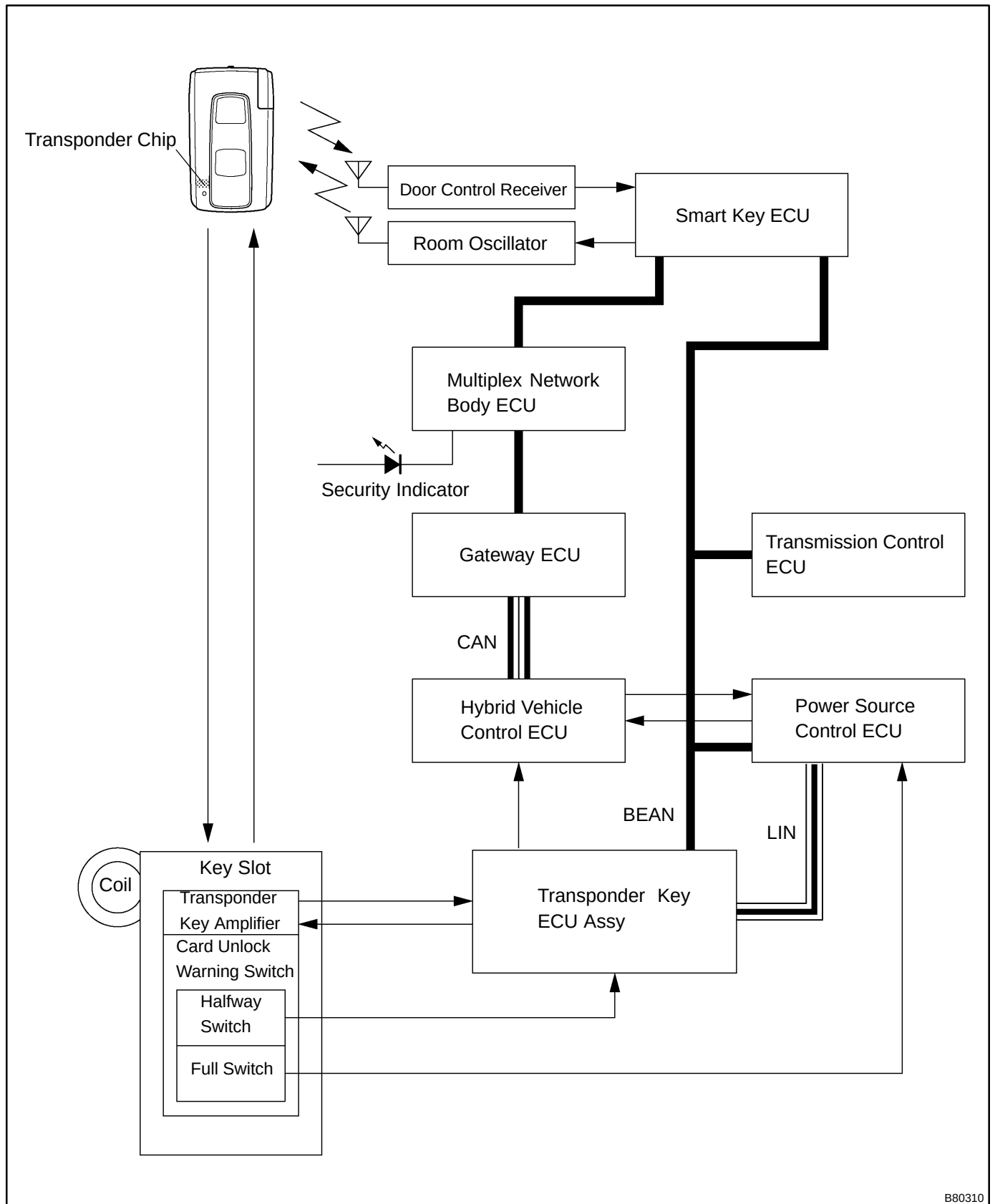
The transponder key ECU matches the key's ID code with the vehicle's ID code, which was previously registered in the ECU. If the ID codes match, then when the power switch is pushed, the code match results are sent to the power source control ECU via the transponder key ECU. When the check results reveal that the ID code is legitimate, the power source control ECU authorizes the transition of the power switch's power modes. The ACC, IG1 and IG2 relays are turned ON, supplying power to the power switch ON (ACC) and ON (IG) power modes.

Also, the power source control ECU changes the power switch's indicator lamp to amber, informing the driver that the power mode is set to ON (IG). Then, the power source control ECU sends a system start signal to the hybrid vehicle control ECU. The hybrid vehicle control ECU confirms that the key ID code has been verified. If the ID code has been verified, the hybrid vehicle control ECU bypasses the immobilizer system and starts the hybrid control system.

The ECU transmits a security indicator signal that communicates "indicator off" to the multiplex network body ECU. Then, the multiplex network body ECU turns off the security indicator lamp.

- (b) Starting hybrid control system without inserting the smart key into key slot
- (1) If a user operates the power switch while the key is in the user's possession, the smart key ECU outputs a request signal to the room oscillator. The room oscillator emits signals in order to form a smart key detection area in the vehicle interior. The key then sends its ID code signal to the smart key ECU via the door control receiver.
- The smart key ECU matches the key's ID code with the vehicle's ID code, and then the code match results are sent to the power source control ECU via the transponder key ECU. When the check results reveal that the ID code is legitimate, the power source control ECU authorizes the transition of the power switch's power modes. The ACC, IG1 and IG2 relays are turned ON, supplying power to the power switch ON (ACC) and ON (IG) power modes.
- Also, the power source control ECU changes the power switch's indicator lamp to amber, informing the driver that the power mode is set to ON (IG). Then, the power source control ECU sends a system start signal to the hybrid vehicle control ECU. The hybrid vehicle control ECU confirms that the key ID code has been verified. If the ID code has been verified, the hybrid vehicle control ECU bypasses the immobilizer system and starts the hybrid control system.

SYSTEM DIAGRAM



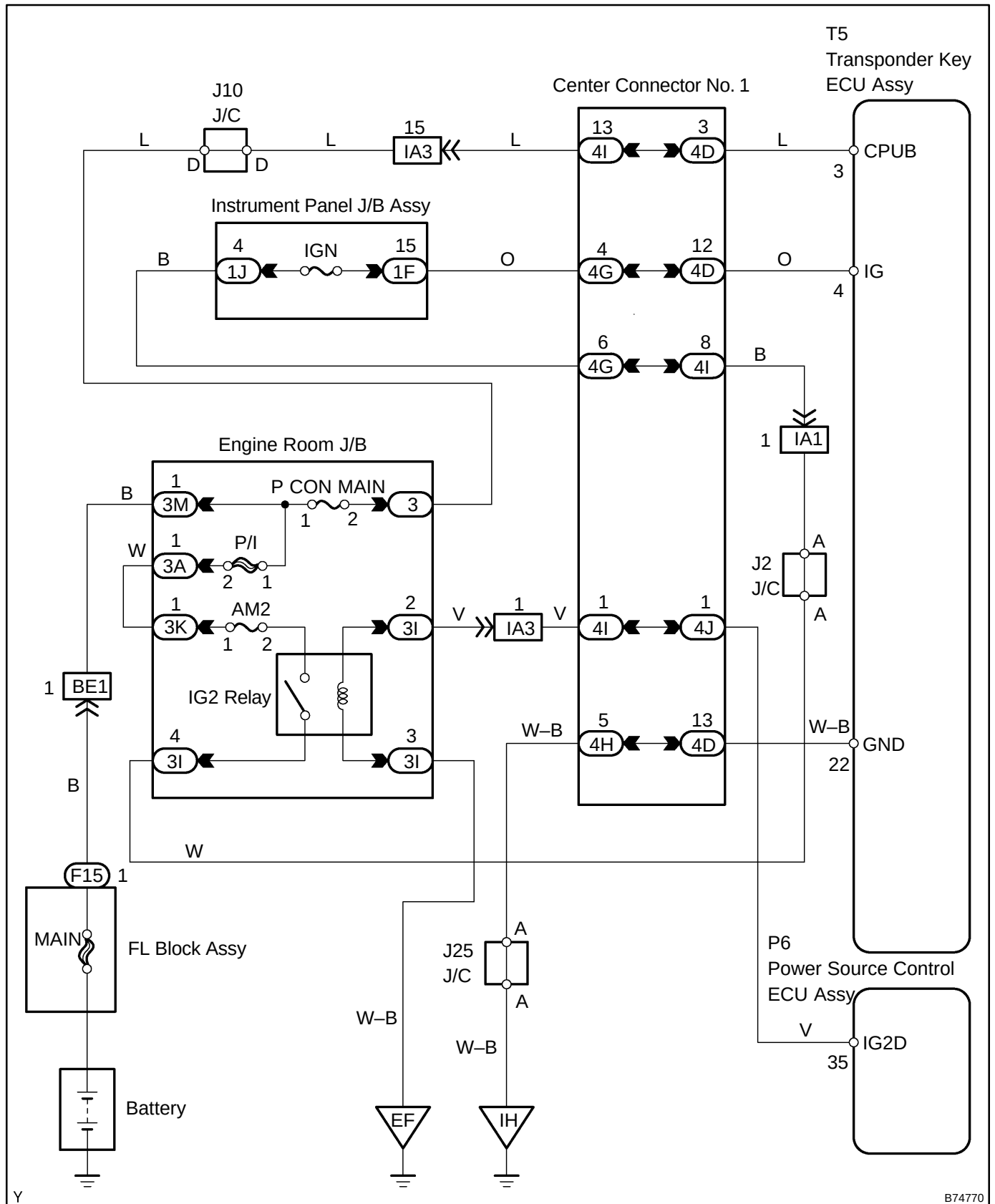
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ECU POWER SOURCE CIRCUIT

CIRCUIT DESCRIPTION

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

WIRING DIAGRAM



Y

B74770

INSPECTION PROCEDURE

1 INSPECT FUSE (IGN, P CON MAIN, AM2)

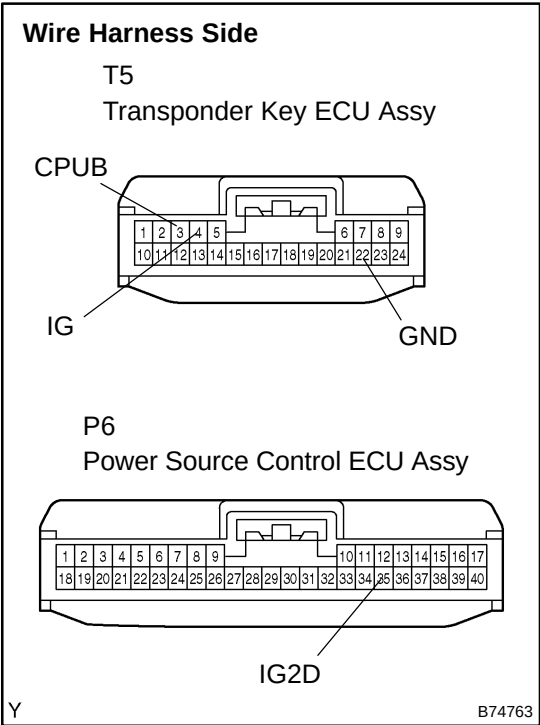
- (a) Remove the IGN fuse from the instrument panel J/B assy.
- (b) Remove the P CON MAIN and AM2 fuses from the engine room J/B.
- (c) Measure the resistance.

Standard: Below 1 Ω

NG REPLACE FUSE

OK

2 CHECK WIRE HARNESS (TRANSPONDER KEY ECU ASSY – POWER SOURCE CONTROL ECU ASSY AND BODY GROUND)



- (a) Disconnect the T5 and P6 ECU connectors.
- (b) Measure the resistance and voltage of the wire harness side connectors.

Standard:

Tester Connection	Condition	Specified Condition
T5-4 (IG) – Body ground	Power switch's power mode OFF ON (IG)	0 V 10 to 14 V
P6-35 (IG2D) – Body ground	Constant	Below 1 Ω
T5- 3 (CPUB) – Body ground	Constant	10 to 14 V
T5- 22 (GND) – Body ground	Constant	Below 1 Ω

NG REPAIR OR REPLACE WIRE HARNESS AND CONNECTOR

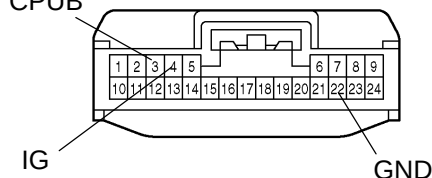
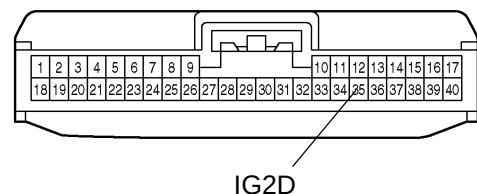
OK

PROCEED TO PUSH BUTTON START SYSTEM (See page 05-2420)

INSPECTION PROCEDURE

1 INSPECT FUSE (IGN, P CON MAIN, AM2)

- (a) Remove the IGN fuse from the instrument panel J/B assy.
- (b) Remove the P CON MAIN and AM2 fuses from the engine room J/B.
- (c) Measure the resistance.

Standard: Below 1 Ω **NG****REPLACE FUSE****OK****2 CHECK WIRE HARNESS (TRANSPONDER KEY ECU ASSY – POWER SOURCE CONTROL ECU ASSY AND BODY GROUND)****Wire Harness Side****T5****Transponder Key ECU Assy****CPUB****P6****Power Source Control ECU Assy**

Y

B74763

- (a) Disconnect the T5 and P6 ECU connectors.
- (b) Measure the resistance and voltage of the wire harness side connectors.

Standard:

Tester Connection	Condition	Specified Condition
T5-4 (IG) – Body ground	Power switch's power mode OFF $\Rightarrow$ ON (IG)	0 V $\Rightarrow$ 10 to 14 V
P6-35 (IG2D) – Body ground	Constant	Below 1 Ω
T5-3 (CPUB) – Body ground	Constant	10 to 14 V
T5-22 (GND) – Body ground	Constant	Below 1 Ω

NG**REPAIR OR REPLACE WIRE HARNESS AND CONNECTOR****OK****PROCEED TO PUSH BUTTON START SYSTEM (See page 05-2420)**

CUSTOMER PROBLEM ANALYSIS CHECK

ENGINE IMMOBILIZER SYSTEM Check Sheet

Inspector's :
Name _____

Customer's Name		VIN	
		Production Date	/ /
		License Plate No.	
Date Vehicle Brought In	/ /	Odometer Reading	km miles

Date Problem First Occurred		/ /
Frequency Problem Occurs		☐ Constant ☐ Intermittent (times a day) ☐ Only once
Weather Conditions When Problem Occurred	Weather	☐ Fine ☐ Cloudy ☐ Rainy ☐ Snowy ☐ Various/Others
	Outdoor Temperature	☐ Hot ☐ Warm ☐ Cool ☐ Cold (Approx. °C (°F))
Conditions When Problem Frequently Occurred	☐ Immediately after hybrid control system is started.	
	☐ When hybrid control system is restarted after a few hours driving (hours).	
	☐ Other	
Symptoms	☐ None of registered keys starts hybrid control system.	
	☐ Security indicator does not turn off.	☐ Key inserted into key slot. ☐ Power mode set to ON (IG).
	☐ Vehicle is not cranked normally.	
	☐ Several keys are connected together.	
	☐ Additional key registration is not possible.	
	☐ Immobilizer DTC ()	
	☐ EFI DTC ()	
	☐ DTC history ()	
	☐ Other	

DIAGNOSTIC TROUBLE CODE CHART

1. TRANSPONDER KEY ECU DTC CHART

DTC No. (See Page)	Detection Item	Trouble Area
B2784 (05-2354)	Antenna Coil Open/Short	• Wire harness • Key slot • Transponder key ECU assy
B2785 (05-2356)	Ignition Switch ON Malfunction	• Wire harness • Transponder key ECU assy • Power source control ECU
B2793 (05-2358)	Transponder Chip Malfunction	Smart key (Door control transmitter)
B2794 (05-2359)	Unmatched Encryption Code	Smart key (Door control transmitter)
B2795 (05-2360)	Unmatched Key Code	Smart key (Door control transmitter)
B2796 (05-2361)	No Communication in Immobiliser System	• Smart key (Door control transmitter) • key slot • Transponder key amplifier • Wire harness
B2797 (05-2364)	Communication Malfunction No. 1	• Smart key (Door control transmitter) • Wire harness • Key slot • Transponder key amplifier
B2798 (05-2361)	Communication Malfunction No. 2	Smart key (Door control transmitter)

2. HYBRID VEHICLE CONTROL ECU DTC CHART

DTC No. (See Page)	Detection Item	Trouble Area
B2799-539 (05-2367)	Engine Immobiliser System Malfunction	• Wire harness • Hybrid vehicle control ECU
B2799-540 (05-2367)	Engine Immobiliser System Malfunction	• Wire harness • Hybrid vehicle control ECU
B2799-541 (05-2367)	Engine Immobiliser System Malfunction	• Wire harness • Hybrid vehicle control ECU
B2799-542 (05-2367)	Engine Immobiliser System Malfunction	• Wire harness • Hybrid vehicle control ECU
B2799-543 (05-2367)	Engine Immobiliser System Malfunction	• Wire harness • Hybrid vehicle control ECU
B2799-544 (05-2367)	Engine Immobiliser System Malfunction	• Wire harness • Hybrid vehicle control ECU

HOW TO PROCEED WITH TROUBLESHOOTING

HINT:

- Use this procedure to troubleshoot the engine immobilizer system.
- The hand-held tester should be used in steps 4, 5 and 7.

1 VEHICLE BROUGHT TO WORKSHOP



2 CUSTOMER PROBLEM ANALYSIS CHECK AND SYMPTOM CHECK (See page 05-2332)



3 START HYBRID CONTROL SYSTEM

- If the power switch's power mode cannot be changed to ON (ACC) or when the hybrid control system can be started, proceed to A.
- If the power switch's power mode can be changed to ON (ACC) and the hybrid control system cannot be started, proceed to B.

B

**Go to HYBRID CONTROL SYSTEM
(See page 05-385)**

A

4 CHECK FOR ENGINE IMMOBILIZER SYSTEM DTCS

- Check for DTCS and note any codes that are output.
- Delete the DTC.
- Recheck for DTCS. Try to prompt the DTC by simulating the original activity that the DTC suggests.
 - If the DTC does not reoccur, proceed to A.
 - If the DTC reoccurs, proceed to B.

B

Go to step 7

A

5 PROBLEM SYMPTOMS TABLE (See page 05-2343)

- If the fault is not listed on the problem symptoms table, proceed to A.
- If the fault is listed on the problem symptoms table, proceed to B.

B

Go to step 7

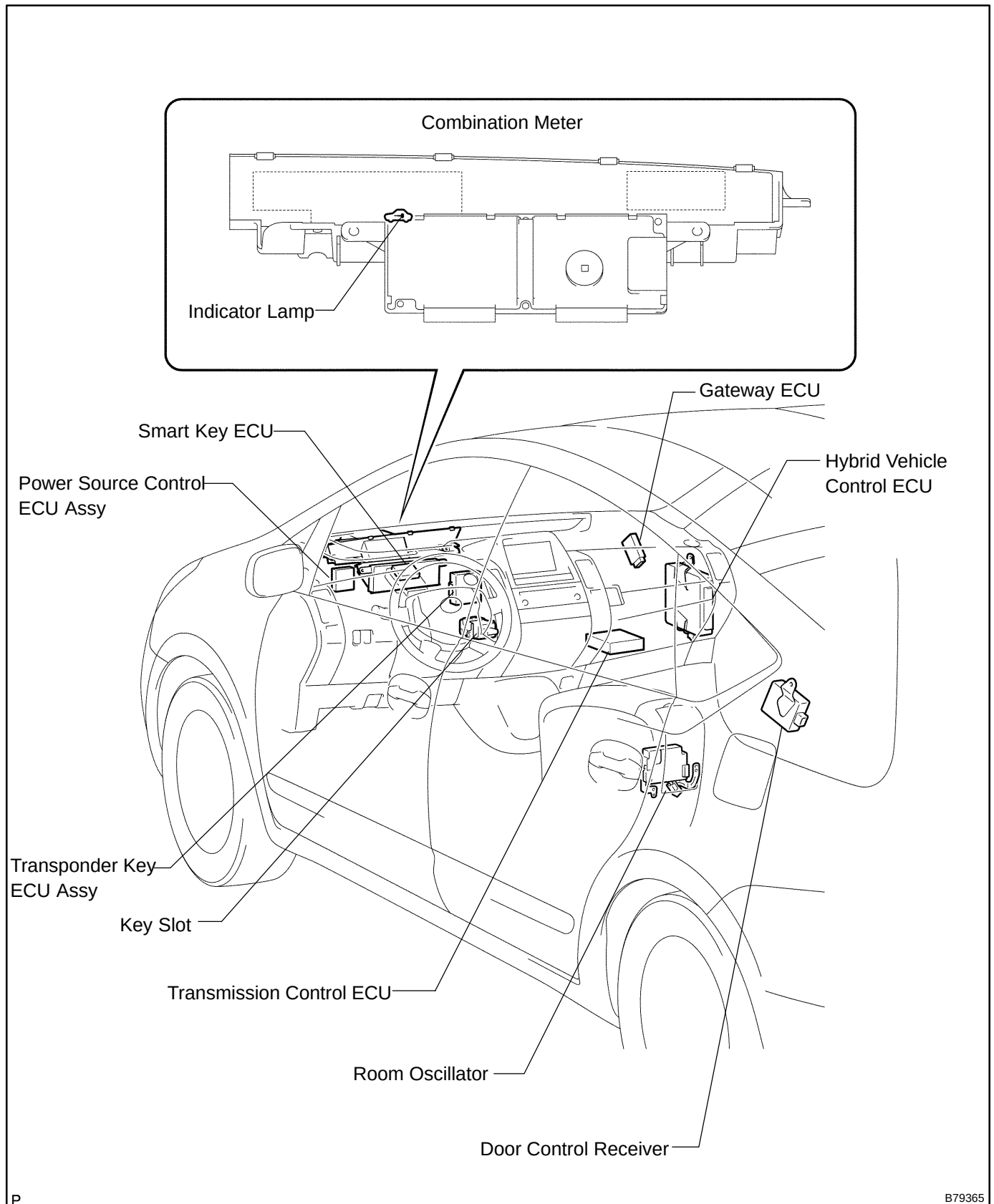
A

6 OVERALL ANALYSIS AND TROUBLESHOOTING

- (a) DATA LIST/ACTIVE TEST (see page [05-2352](#))
- (1) Inspection with the hand-held tester (DATA LIST).
 - (2) Inspection with the hand-held tester (ACTIVE TEST).
- (b) Terminals of ECU (see page [05-2344](#))

**7 ADJUST, REPAIR OR REPLACEMENT****8 CONFIRMATION TEST****END**

LOCATION



ENGINE IMMOBILIZER SYSTEM (W/ SMART ENTRY SYSTEM)

05J4J-01

PRECAUTION

NOTICE FOR INITIALIZATION:

When disconnecting the negative (–) battery terminal, initialize the following system(s) after the terminal is reconnected.

System Name	See Page
Power Window Control System	05–2028

NOTICE FOR HYBRID SYSTEM ACTIVATION:

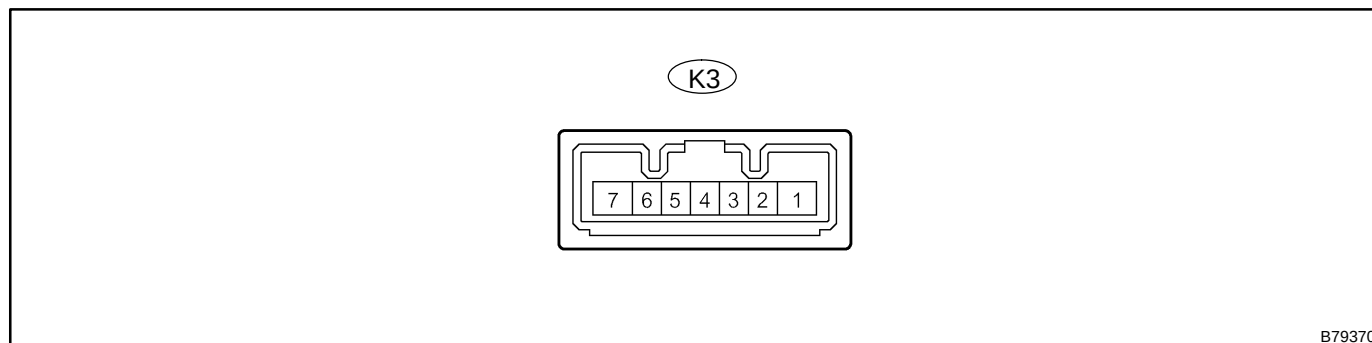
- When the warning lamp is illuminated or the battery has been disconnected and reconnected, pressing the power switch may not start the system on the first try. If so, press the power switch again.
- If the power switch's power mode is to ON (IG), the battery is disconnected, and the key is not in the key slot or not within the smart key detection area during reconnection, DTC B2799 may be output.

PROBLEM SYMPTOMS TABLE

Problem Symptom	Suspected Area	See Page
Hybrid control system does not start	1. ECU power source circuit	05-2417
	2. Push button start system	05-2420

TERMINALS OF ECU

1. CHECK KEY SLOT



B79370

- (a) Disconnect the K3 key slot connector.
- (b) Measure the resistance of the terminal of the wire harness side connector.

Standard:

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
GND (K3-7) – Body ground	P – Body ground	Ground	Constant	Below 1 Ω

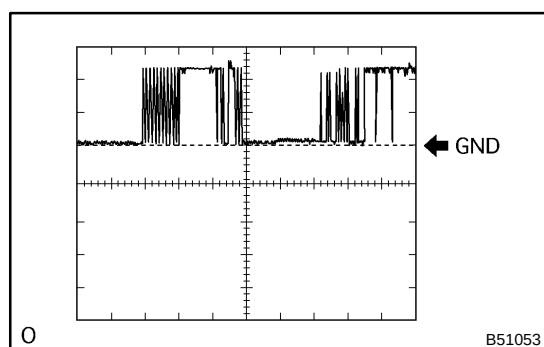
If the result is not as specified, the wire harness side may have a malfunction.

- (c) Reconnect the K3 key slot connector.
- (d) Measure the resistance and voltage of each terminal of wire harness side connector.

Standard:

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
VC5 (K3-1) – GND (K3-7)	Y – P	Power source	No key in key slot → Key inserted	0 V → 4.6 to 5.4 V
CODE (K3-4) – GND (K3-7)	L – P	Demodulated signal of key code data	No key in key slot → Key inserted	Pulse generation (see waveform 1)
TXCT (K3-5) – GND (K3-7)	LG – P	Key code output signal	No key in key slot → Key inserted	Pulse generation (see waveform 2)
GND (K3-7) – Body ground	P – Body ground	Ground	Constant	Below 1 Ω

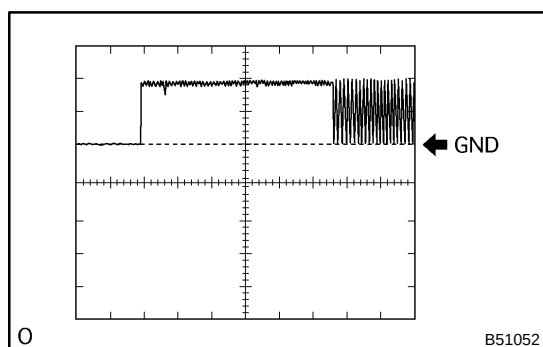
If the result is not as specified, the key slot (amplifier) may have a malfunction.



- (e) Inspect using an oscilloscope.

Waveform 1 (Reference):

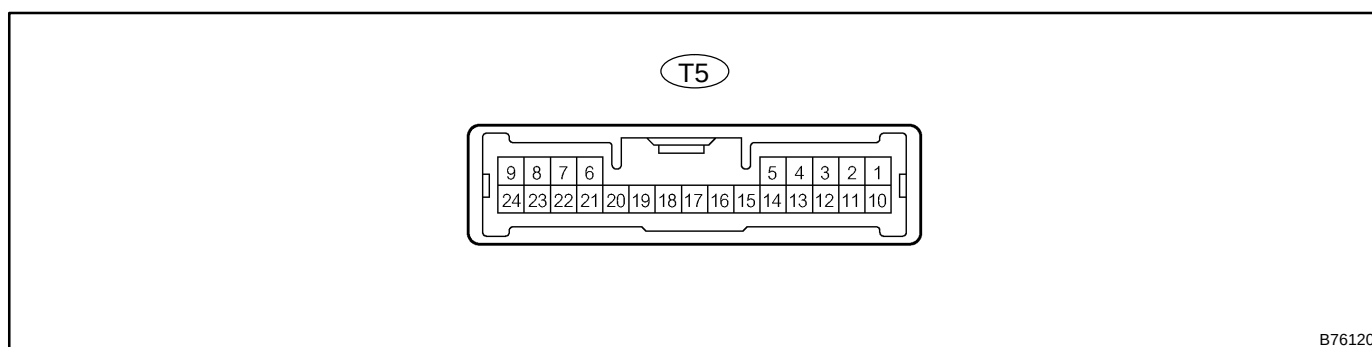
Terminal	CODE – GND
Tool Setting	2.5 V/DIV., 20 ms/DIV.
Condition	No key in key slot → Key inserted



Waveform 2 (Reference):

Terminal	TXCT – GND
Tool Setting	2.5 V/DIV., 10 ms/DIV.
Condition	No key in key slot → Key inserted

2. CHECK TRANSPONDER KEY ECU



- Disconnect the T5 ECU connector.
- Measure the resistance and voltage of each terminal of the wire harness side connector.

Standard:

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
CPUB (T5-3) – GND (T5-22)	L – W-B	Battery	Constant	10 to 14 V
IG (T5-4) – GND (T5-22)	O – W-B	Power switch (IG)	Power switch's power mode OFF → ON (IG)	0 V → 10 to 14 V
CUWS (T5-5) – GND (T5-22)	B – W-B	Unlock warning switch	No key in key slot → Key inserted	10 kΩ or higher → Below 1 Ω
AGND (T5-7) – GND (T5-22)	P – W-B	Ground	Constant	Below 1 Ω
GND (T5-22) – Body ground	W-B – Body ground	Ground	Constant	Below 1 Ω

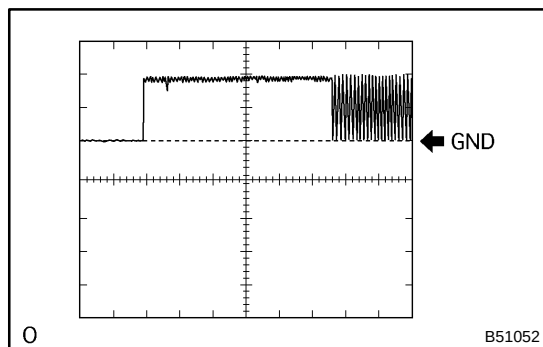
If the result is not as specified, there may be a malfunction on the wire harness side.

- Reconnect the T5 ECU connector.
- Measure the voltage of each terminal of the connector.

Standard:

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
CUWS (T5-5) – GND (T5-22)	B – W-B	Unlock warning switch	No key in key slot → Key inserted	10 to 14 V □ Below 1 V
VC5 (T5-20) – GND (T5-22)	Y – W-B	Power source	No key in key slot → Key inserted	0 V → 4.6 to 5.4 V
CODE (T5-21) – AGND (T5-7)	L – P	Transponder key amplifier communication signal	No key in key slot → Key inserted	Pulse generation (see waveform 1)
TXCT (T5-6) – AGND (T5-7)	LG – P	Transponder key amplifier communication signal	No key in key slot → Key inserted	Pulse generation (see waveform 2)
HEV0 (T5-19) – GND (T5-22)	W – W-B	Hybrid vehicle control ECU output signal	No key in key slot → Key inserted	Pulse generation (see waveform 3)
HEV1 (T5-18) – GND (T5-22)	R – W-B	Hybrid vehicle control ECU input signal	Constant	Pulse generation (see waveform 4)

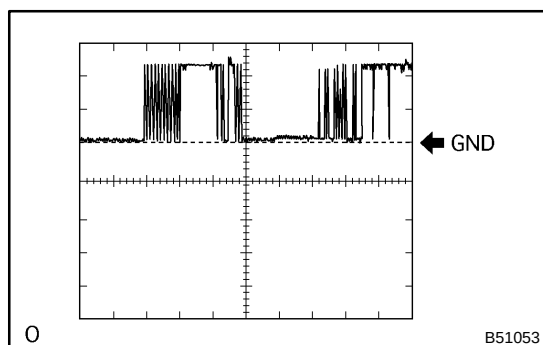
If the result is not as specified, the ECU may have a malfunction.



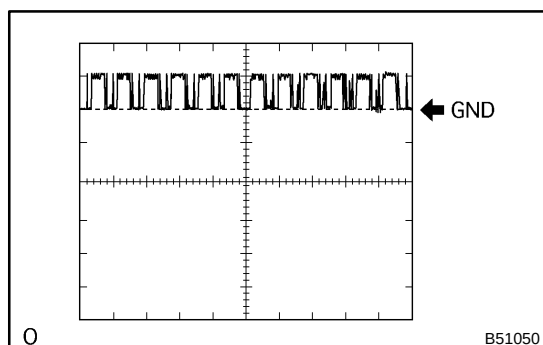
(e) Inspect using an oscilloscope.

Waveform 1 (Reference):

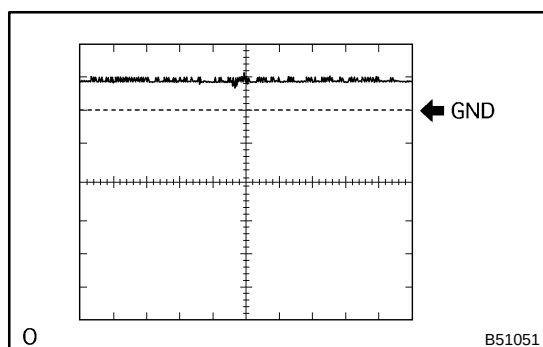
Terminal	TXCT – GND
Tool Setting	2.5 V/DIV., 10 ms/DIV.
Condition	No key in key slot → Key inserted

**Waveform 2 (Reference):**

Terminal	CODE – GND
Tool Setting	2.5 V/DIV., 20 ms/DIV.
Condition	No key in key slot → Key inserted

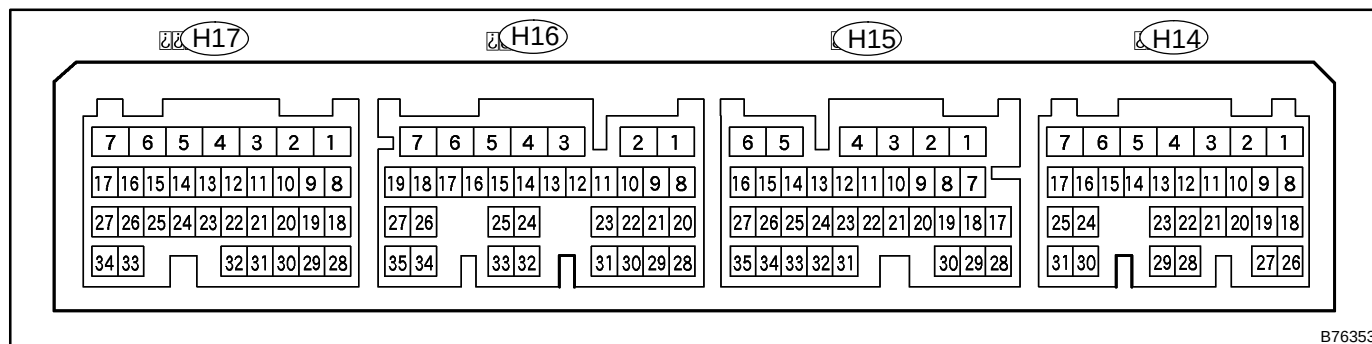
**Waveform 3 (Reference):**

Terminal	HEV0 – GND
Tool Setting	12 V/DIV., 100 ms/DIV.
Condition	No key in key slot → Key inserted

**Waveform 4 (Reference):**

Terminal	HEV1 – GND
Tool Setting	12 V/DIV., 100 ms/DIV.
Condition	Constant

3. CHECK HYBRID VEHICLE CONTROL ECU



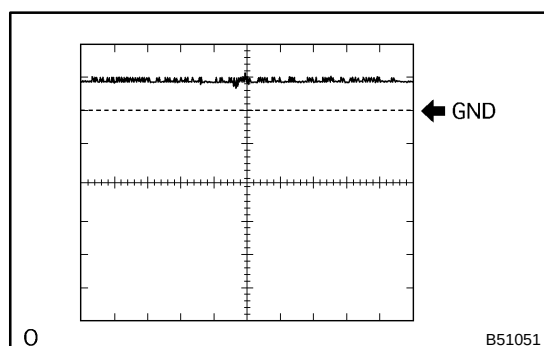
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(a) Measure the resistance and voltage of each terminal of the connectors.

Standard:

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
ST2 (H14-5) – GND1 (H14-1)	Y – W-B	Ignition start control signal input	Hybrid control system stopped and power switch's power mode ON (READY)	10 to14 V
IGSW (H14-7) – GND1 (H14-1)	O – W-B	Ignition ready control signal input	Hybrid control system stopped and power switch's power mode ON (IG)	10 to14 V
BATT (H15-6) – GND1 (H14-1)	Y – W-B	Battery	Constant	10 to14 V
+B1 (H16-7) – GND1 (H14-1)	L – W-B	Ignition power supply	Power switch's power mode ON (IG)	10 to14 V
+B2 (H16-6) – GND1 (H14-1)	L – W-B	Ignition power supply	Power switch's power mode ON (IG)	10 to14 V
IMI (H14-6) – GND2 (H14-4)	W – W-B	Transponder key ECU input signal	Power switch's power mode ON (IG)	Pulse generation (see waveform 1)
IMO (H14-26) – GND2 (H14-4)	R – W-B	Transponder key ECU input signal	No key in key slot → Key insert	Pulse generation (see waveform 2)
GND1 (H14-1) – Body ground	W-B – Body ground	Ground	Constant	Below 1 Ω
GND2 (H14-4) – Body ground	W-B – Body ground	Ground	Constant	Below 1 Ω

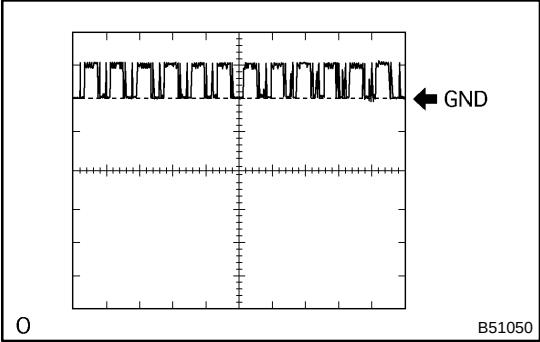
If the result is not as specified, the ECU may have a malfunction.



(b) Inspect using an oscilloscope.

Waveform 1 (Reference):

Terminal	IMI – GND1
Tool Setting	12 V/DIV., 100 ms/DIV.
Condition	Power switch's power mode ON (IG)



Waveform 2 (Reference):

Terminal	IMO – GND2
Tool Setting	12 V/DIV., 100 ms/DIV.
Condition	No key in key slot → Key inserted