

ACCESSORIES & EQUIPMENT

Engine Immobiliser System - (w/o Smart Key) (Diagnostics - Introduction) - Sienna

ENGINE IMMOBILISER SYSTEM (W/O SMART KEY SYSTEM)

PRECAUTION

PRECAUTION

1. PRECAUTIONS WHEN USING TECHSTREAM

- a. When using the Techstream to troubleshoot the engine immobiliser system:

Connect the Techstream to the DLC3 while the ignition switch is off, and turn a door courtesy light switch on and off at 1.5-second intervals until communication between the Techstream and vehicle begins.

2. PRECAUTIONS FOR THE KEY

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

PARTS LOCATION

ILLUSTRATION

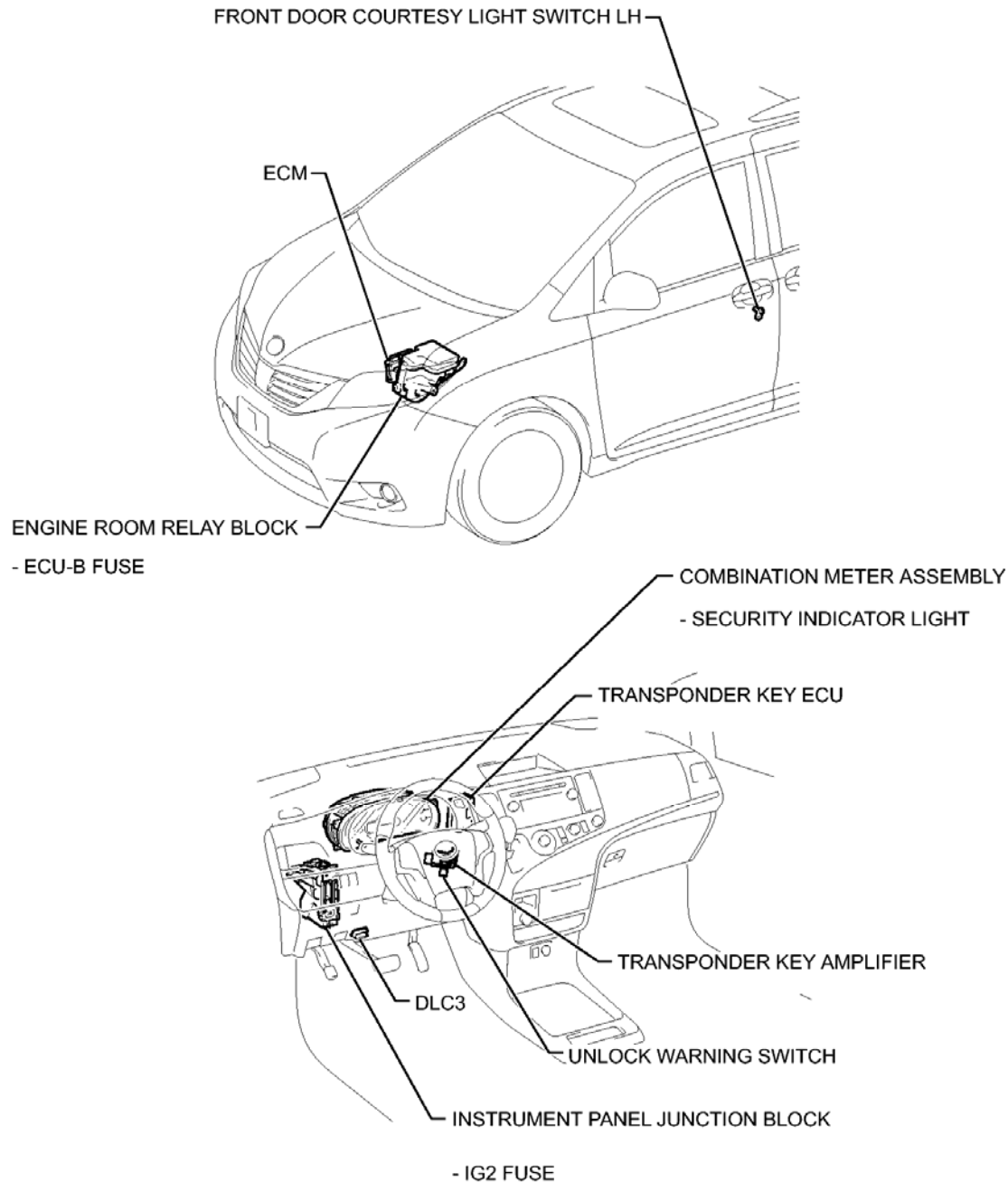


Fig. 1: Engine Immobiliser System (W/O Smart Key System) Components Location
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

SYSTEM DIAGRAM

SYSTEM DIAGRAM

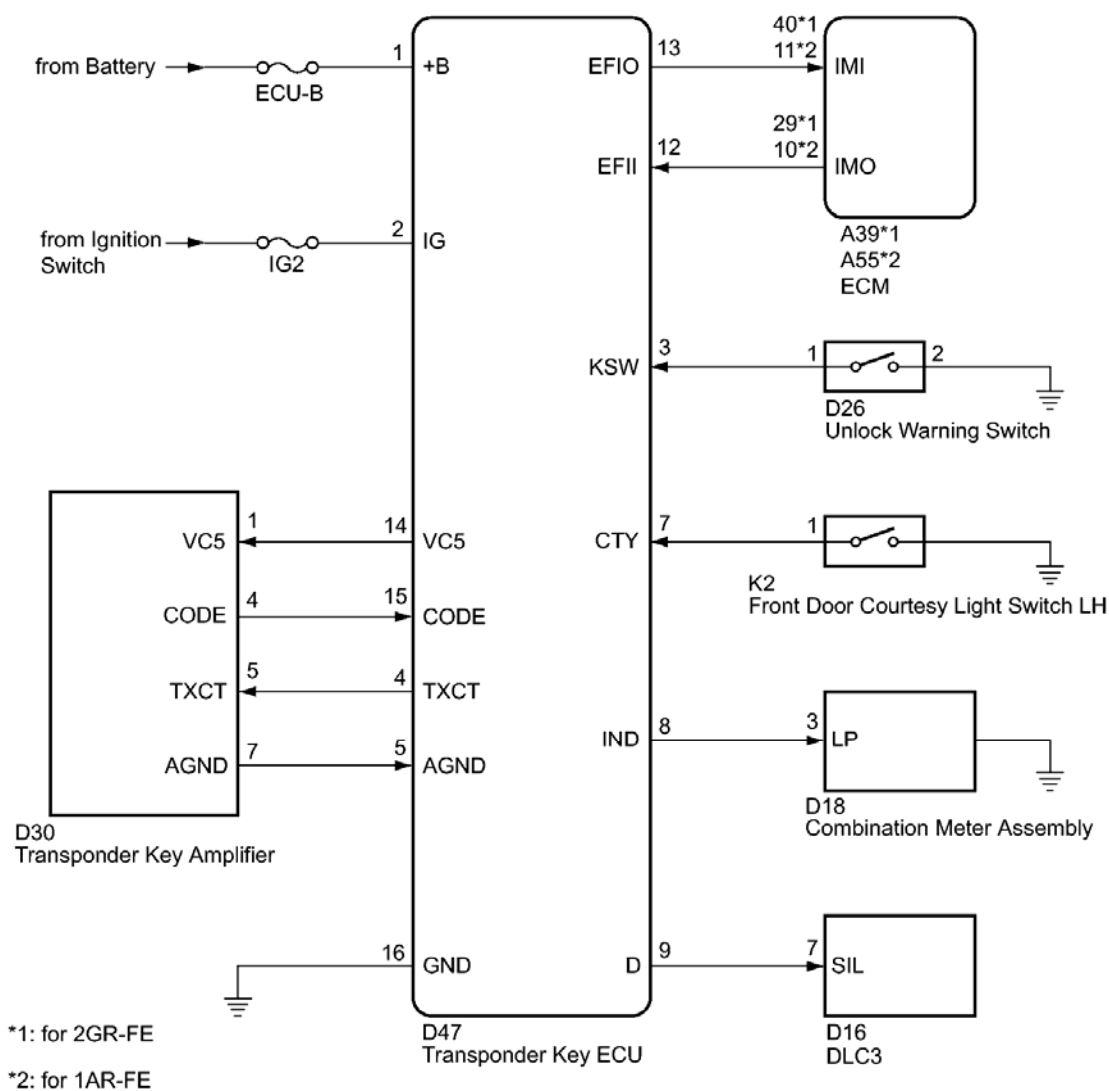


Fig. 2: Engine Immobilizer System Diagram

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

HOW TO PROCEED WITH TROUBLESHOOTING

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HINT:

Use the following procedure to troubleshoot the engine immobiliser system.

*: Use the Techstream.

1. VEHICLE BROUGHT TO WORKSHOP

NEXT: Go to next step

2. CUSTOMER PROBLEM ANALYSIS CHECK

- a. Interview the customer to confirm the trouble. Refer to **HOW TO PROCEED WITH TROUBLESHOOTING** .

NEXT: Go to next step

3. INSPECT BATTERY VOLTAGE

- a. Measure the battery voltage.

Standard voltage

11 to 14 V

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

NEXT: Go to next step

4. CRANK ENGINE FOR MORE THAN 10 SECONDS

NEXT: Go to next step

5. CHECK FOR DTCS (ENGINE IMMOBILISER SYSTEM)*

- a. Check for DTCS and note any codes that are output.
- b. Clear the DTCS. Refer to **DTC CHECK / CLEAR**.
- c. Recheck for DTCS. Based on the DTCS output above, try to duplicate the engine immobiliser system DTC by simulating the symptoms indicated by the DTCS.

RESULT

Result	Proceed to
No DTCS are output	A
Engine immobiliser system DTC is output	B

B --> GO TO DIAGNOSTIC TROUBLE CODE CHART. Refer to DIAGNOSTIC TROUBLE CODE CHART

A: Go to next step

6. CHECK FOR DTCS (SFI SYSTEM)*

- a. Clear the DTCs. Refer to **DTC CHECK / CLEAR**.
- b. Recheck for DTCs.

HINT:

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

RESULT

Result	Proceed to
No DTCs are output	A
Engine immobiliser system DTC is output (DTC B2799, B279A or B279C)	B
SFI system DTC is output (except DTC B2799, B279A and B279C) (for 2GR-FE)	C
SFI system DTC is output (except DTC B2799, B279A and B279C) (for 1AR-FE)	D

B --> GO TO DIAGNOSTIC TROUBLE CODE CHART. Refer to DIAGNOSTIC TROUBLE CODE CHART

C --> GO TO SFI SYSTEM. Refer to DIAGNOSTIC TROUBLE CODE CHART

D --> GO TO SFI SYSTEM. Refer to DIAGNOSTIC TROUBLE CODE CHART

A: Go to next step

7. READ VALUE USING TECHSTREAM*

- a. Connect the Techstream to the DLC3.
- b. Turn the ignition switch to ON.
- c. Turn the Techstream on.
- d. Enter the following menus: Body Electrical / Immobiliser / Data List.
- e. Read the Data List according to the display on the Techstream.

IMMOBILISER

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

OK

On the Techstream screen, the item changes between ON and OFF according to the chart above.

NG --> GO TO DTC B2780. Refer to DTC B2780: Push Switch / Key Unlock Warning Switch Malfunction

OK: Go to next step

8. PROBLEM SYMPTOMS TABLE

- a. Refer to **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 10

A: Go to next step

9. OVERALL ANALYSIS AND TROUBLESHOOTING*

- Data List / Active Test. Refer to **DATA LIST / ACTIVE TEST**
- Terminals of ECU. Refer to **TERMINALS OF ECU**

NEXT: Go to next step

10. REPAIR OR REPLACE

NEXT: Go to next step

11. CONFIRMATION TEST

NEXT --> END

REGISTRATION

REGISTRATION

1. DESCRIPTION OF CODE REGISTRATION

HINT:

The key has 2 codes: the key code (immobiliser code) and the wireless code. Both of these codes need to be registered. For the wireless code registration procedures, refer to Wireless Door Lock Control System. Refer to **REGISTRATION** .

- When adding master keys or sub keys (Additional registration):
 - Register the key code (immobiliser code) in the transponder key ECU.

Target	
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ECU	Refer to
Transponder key ECU	Procedure "B"

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

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

Target ECU	Refer to
Transponder key ECU	Procedure "A"

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

Target ECU	Refer to
ECM	Procedure "E"

c. When replacing the ECM:

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

Target ECU	Refer to
Transponder key ECU	Procedure "F"

d. When replacing the transponder key ECU and the ECM:

1. Register the key codes (immobiliser codes) in the new transponder key ECU.

Target ECU	Refer to
Transponder key ECU	Procedure "A"

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

Target ECU	Refer to
Transponder key ECU	Procedure "F"

e. When erasing key codes:

1. Erasing all of the key codes except the master key.

Target ECU	Refer to
Transponder key ECU	Procedure "C"

2. Erasing all of the key codes.

Target ECU	Refer to
Transponder key ECU	Procedure "D"

2. KEY REGISTRATION

- a. New key code registration (Procedure "A"):

NOTE: Make sure that no key codes are registered in the transponder key ECU.

HINT:

- In this mode, a maximum of 3 key codes for 2 master keys and 1 sub-key can be registered. The master keys and sub-key can be registered in any order because the transponder key ECU can distinguish between different types of keys.
- New key codes must be registered with the battery connected. The ignition switch can be either ON or off.
- When a new transponder key ECU is installed, key codes must be registered in the transponder key ECU assembly.

AUTOMATIC KEY CODE REGISTRATION (NEW REGISTRATION)

Procedure	Security Indicator Light Condition
1. Start	Blinking HINT: Until first key is inserted
2. Insert the master key into the ignition key cylinder.	ON

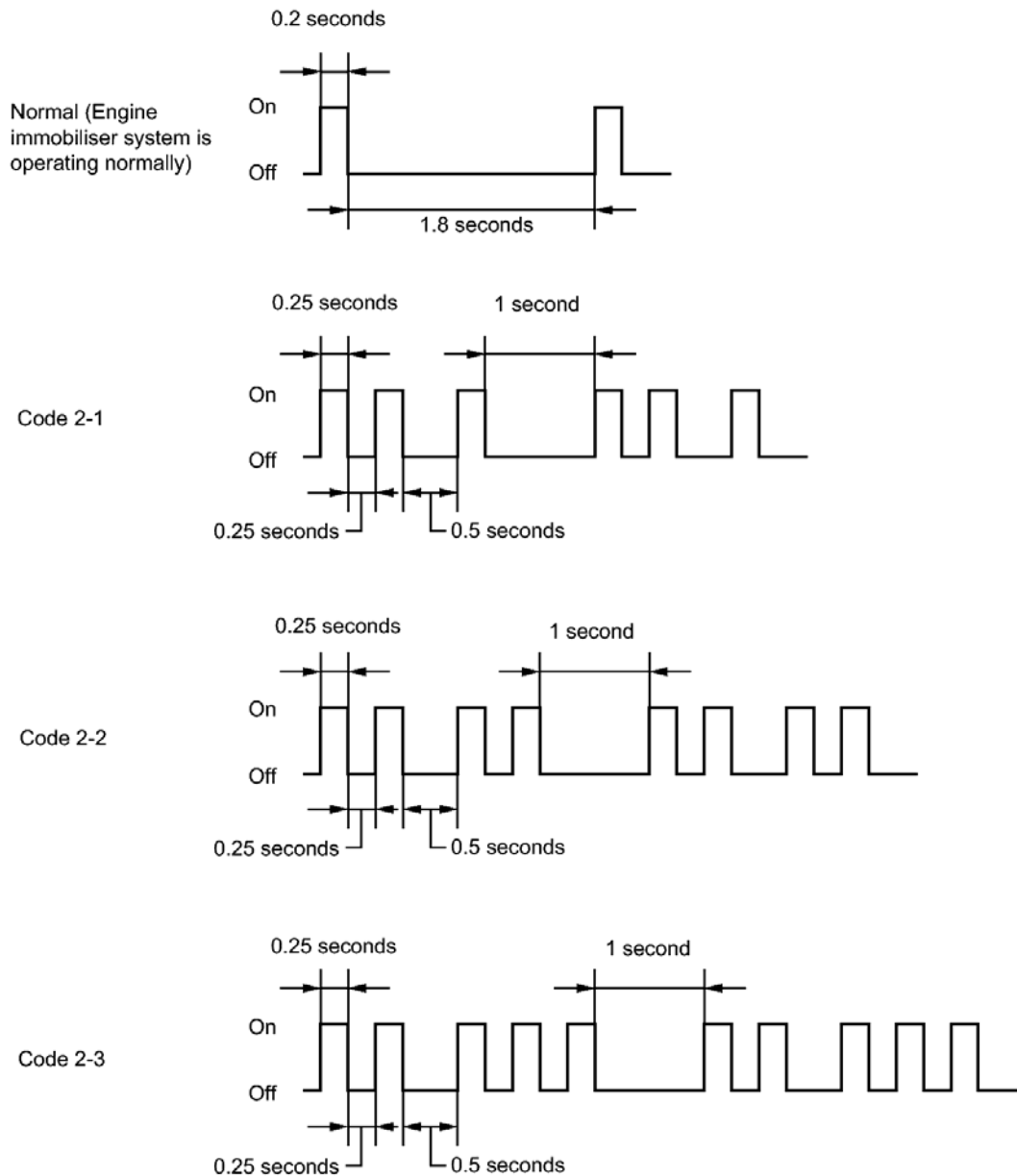
3. Techstream operation Enter the following menus: Body Electrical / Immobiliser / Utility / Key Registration HINT: After completing the above operation, proceed to the next step in accordance with the prompts on the Techstream screen.	OFF for 1 second and then ON
4. Remove the key and then select Next on the Techstream.	ON
5. Insert the master key to be registered and then select Next on the Techstream.	OFF for 1 second and then ON
6. Remove the key and then select Next on the Techstream.	ON
7. Insert the sub-key to be registered and then select Next on the	OFF for 1 second and then ON for 0.5 seconds

Techstream.	and then OFF
8. Remove the key.	Blinking
9. End (Procedure "E")	

HINT:

- When the engine immobiliser system is operating normally and the key is pulled out, the security indicator light blinks continuously.
- If the new key code registration fails, code 2-1 will be output through the security indicator light. 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 maximum limit, code 2-3 will be output through the security indicator light. The output details are shown below.

Security Indicator Light:



N

Fig. 3: Identifying Security Indicator Light Condition
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- 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.

HINT:

Follow the instruction on the Techstream screen to end new key code registration mode.

3. REGISTRATION OF ADDITIONAL KEY

a. Additional registration (Procedure "B"):

HINT:

- A maximum of 5 key codes and 3 sub-key codes can be registered.
- Registration mode will end if any step is not completed within the specified time.
- When the ignition cylinder or the key cylinder set is replaced, remove the transmitter module from the original master key. Then install this transmitter module to a new key and use the new key as the master key. If necessary, use this master key to register other keys.

NOTE: When the ignition key cylinder has been replaced, locking and unlocking doors are possible with the new master key's transmitter module (removed 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 battery in the new master key's transmitter module fails, the original master key can be used to lock and unlock doors through the door key cylinder.

ADDITIONAL REGISTRATION

Procedure	Time to Complete Operation	Security Indicator Light Condition
1. Start	-	Blinking HINT: Until first key is inserted
2. Insert the already registered master key into the ignition key cylinder and turn the ignition switch to ON.	-	OFF
3. Techstream operation Enter the		

following menus: Body Electrical / Immobiliser / Utility / Key Registration HINT: After completing the above operation, proceed to the next step in accordance with the prompts on the Techstream screen.	Within 120 sec.	ON
4. Remove the master key.	Within 20 sec. HINT: After the Techstream instruction	ON
5. Insert the key to be registered in the ignition key cylinder.	Within 10 sec.	Blinking
6. Wait for 60 sec. after the key is registered. HINT: The security indicator light goes off.	-	OFF
7. Remove the key.	-	Blinking
8. End		

HINT:

- A brief outline of a key code registration procedure is shown above. For detailed information,

refer to the Techstream screen.

- When the engine immobiliser system is operating normally and the key is pulled out, the security indicator light blinks continuously.
- If the key code registration has failed in automatic key code registration mode, code 2-1 will be output through the security indicator light. 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 maximum limit, code 2-3 will be output through the security indicator light. The details are shown in procedure "A".

4. ERASURE OF KEY CODE

- a. Key code erasure (Procedure "C"):

HINT:

- Performing this procedure will erase all key codes 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.
- This procedure will be canceled if each step is not completed within the specified time.

KEY CODE ERASURE

Procedure	Time to Complete Operation	Security Indicator Light Condition
1. Start	-	Blinking HINT: Until first key is inserted
2. Insert the already registered master key in the ignition key cylinder and turn the ignition switch to ON.	-	OFF
3. Techstream operation Enter the following menus: Body Electrical / Immobiliser /		

Utility / Transponder Code Erasure HINT: After completing the above operation, proceed to the next step in accordance with the prompts on the Techstream screen.	Within 120 sec.	ON for 1 sec. then OFF
4. Remove the master key.	Within 10 sec. HINT: After the Techstream instruction	ON
5. End		

HINT:

- A brief outline of a key code registration procedure is shown above. For detailed information, refer to the Techstream screen.
 - When the engine immobiliser system is operating normally and the key is pulled out, the security indicator light blinks continuously.
- b. All key code erasure (Procedure "D"):

HINT:

- To perform this procedure, at least 1 key should have been registered to the transponder key ECU.
- This procedure can be performed using either a registered or unregistered key.

ALL KEY CODE ERASURE

Procedure	Time to Complete Operation	Security Indicator Light Condition
1. Start	-	Blinking
2. Insert		

previously registered master key or unregistered key into ignition key cylinder and turn ignition switch to ON.	Within 10 min.	ON or OFF
3. Using TIS, confirm that user and vehicle match.		
4. Techstream operation Enter the following menus: Body Electrical / Immobiliser / Utility / Transponder Code Erasure HINT: After completing the above operation, proceed to the next step in accordance with the prompts on the Techstream screen.	Within 15 min.	ON for 1 sec. then OFF
5. Completion of erasure of all key codes is displayed.	Within 10 sec. HINT: After the Techstream instruction	ON

6. End

HINT:

- A brief outline of a key code registration procedure is shown above. For detailed information, refer to the Techstream screen.
- When the engine immobiliser system is operating normally and the key is pulled out, the security indicator light blinks continuously.

5. ECU COMMUNICATION ID REGISTRATION

- a. ECU communication ID registration (Procedure "E"):

NOTE:

- When the transponder key ECU is replaced, the ECU communication ID of the ECM must be registered into the transponder key ECU to match their ECU communication IDs.
- The engine cannot be started unless the ECU communication IDs match.
- Do not turn the ignition switch from ON to off 20 times or more before registering the ECU communication ID. Turning the ignition switch from ON to off 20 times or more will result in the engine not starting unless the transponder key ECU is replaced with a new one.
- After the registration, turning the ignition switch to the START position may not start the engine on the first try. If so, turn the ignition switch to the START position again.
- After the engine is started, clear DTC B2799 (code for ECM immobiliser communication error) by either of the following:
 - Using the Techstream
 - Disconnecting the battery for 30 seconds

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

- SST: 09843-18040

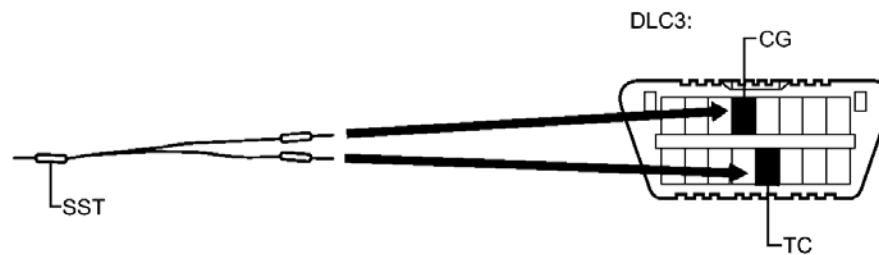


Fig. 4: Connecting Terminals TC And CG Of DLC3
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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

HINT:

Do not start the engine.

3. Check that the engine starts.
- b. ECU communication ID registration (Procedure "F"):

NOTE: The ECU communication ID should be registered when the ECM and transponder key ECU are replaced or when the ECM only is replaced in order to match the ECU communication ID.

ECU COMMUNICATION ID REGISTRATION

Procedure	Security Indicator Light Condition
1. Start	OFF
2. Insert an already registered key into the ignition key cylinder.	
3. Start the engine.	
4. Check that the	

engine starts and stays on for more than 3 seconds.	
5. End	

PROBLEM SYMPTOMS TABLE

PROBLEM SYMPTOMS TABLE

HINT:

- Use the table below to help determine the cause of problem symptoms. If multiple suspected areas are listed, the potential causes of the symptoms are listed in order of probability in the "Suspected Area" column of the table. Check each symptom by checking the suspected areas in the order they are listed. Replace parts as necessary.
- Inspect the fuses and relays related to this system before inspecting the suspected areas below.

ENGINE IMMOBILISER SYSTEM

Symptom	Suspected Area	See
Unable to register the key.	Front door courtesy light switch LH	Refer to <u>Door Courtesy Switch Circuit</u>
	Wire harness or connector	-
	Transponder key ECU	-
Engine does not start.	Key	Refer to <u>DATA LIST / ACTIVE TEST</u>
	ECU power source circuit	Refer to <u>ECU Power Source Circuit</u>
	SFI system (for 2GR-FE)	Refer to <u>HOW TO PROCEED WITH TROUBLESHOOTING</u>
	SFI system (for 1AR-FE)	Refer to <u>HOW TO PROCEED WITH TROUBLESHOOTING</u>
	Transponder key ECU	-
Security indicator light is always on.	Transponder key ECU	Refer to <u>Security Indicator Light Circuit</u>
	Wire harness or connector	-
	Combination meter assembly	-
Security indicator light is off.	Transponder key ECU	Refer to <u>Security Indicator Light Circuit</u>
	Wire harness or connector	-
	Combination meter assembly	-
Security indicator light is blinking abnormally.	Transponder key ECU	-
Engine immobiliser	Wire harness or connector	Refer to <u>Diagnosis Circuit</u>

system DTCs are not output.	Transponder key ECU	-
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TERMINALS OF ECU

TERMINALS OF ECU

1. CHECK TRANSPONDER KEY AMPLIFIER

- Disconnect the D30 transponder key amplifier connector.

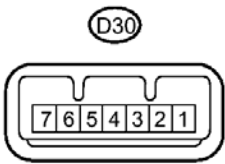


Fig. 5: Transponder Key Amplifier Connector Terminal Identification
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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

HINT:

Measure the values on the wire harness side with the connector disconnected.

Terminal No. (Symbol)	Wiring Color	Terminal Description	Condition	Specified Condition
D30-7 (AGND) - Body ground	SB - Body ground	Ground	Always	Below 1 ohms

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

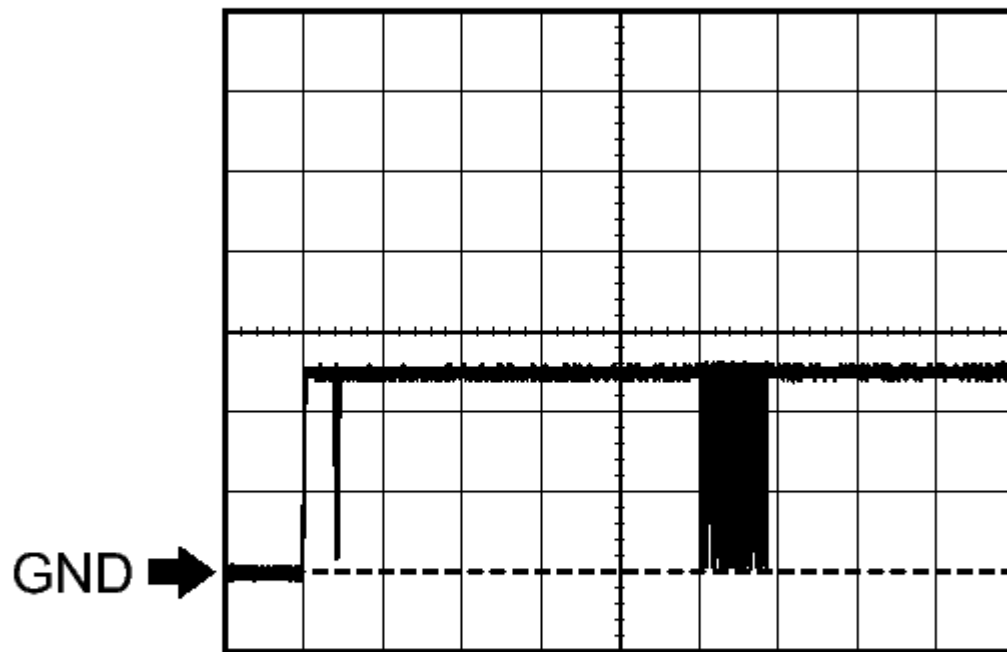
- Reconnect the D30 transponder key amplifier connector.
- Measure the voltage according to the value(s) in the table below.

Terminal No. (Symbol)	Wiring Color	Terminal Description	Condition	Specified Condition
D30-1			No key in ignition key	Below 1 V

(VC5) - D30-7 (AGND)	B - SB	Power source	cylinder	
			Key in ignition key cylinder	4.6 to 5.4 V
D30-4 (CODE) - D30-7 (AGND)	Y - SB	Demodulated signal of key code data	No key in ignition key cylinder	Below 1 V
			Key in ignition key cylinder	Pulse generation (See Fig. 6)
D30-5 (TXCT) - D30-7 (AGND)	R - SB	Key code output signal	No key in ignition key cylinder	Below 1 V
			Key in ignition key cylinder	Pulse generation (See Fig. 7)

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

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

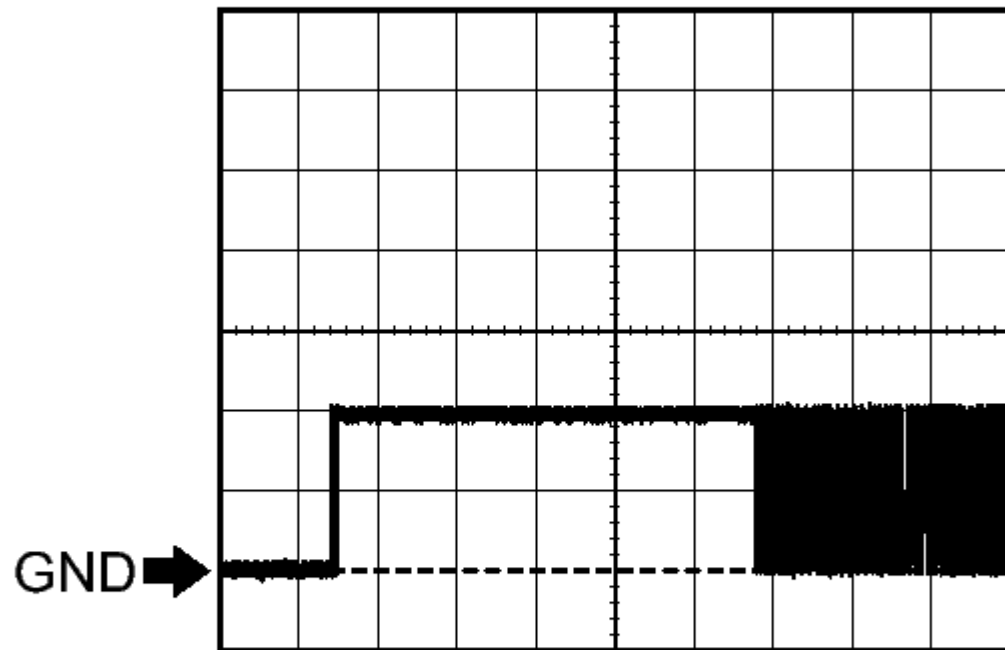


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Fig. 6: Identifying Waveform 1 Graph
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Tester Connection	D30-4 (CODE) - D30-7 (AGND)
Tool Setting	2 V/DIV., 20 ms./DIV.
Condition	Key is in ignition key cylinder

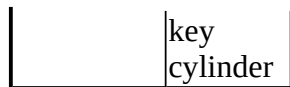
2. Waveform 2



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Fig. 7: Identifying Waveform 2 Graph
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Tester Connection	D30-5 (TXCT) - D30-7 (AGND)
Tool Setting	2 V/DIV., 10 ms./DIV.
Condition	Key is in ignition



2. CHECK TRANSPONDER KEY ECU

- a. Disconnect the D47 transponder key ECU connector.

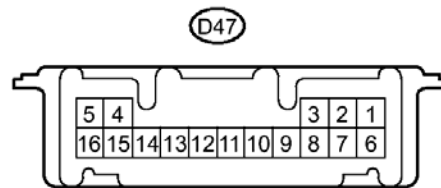


Fig. 8: Transponder Key ECU Connector Terminal Identification
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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

HINT:

Measure the values on the wire harness side with the connector disconnected.

Terminal No. (Symbol)	Wiring Color	Terminal Description	Condition	Specified Condition
D47-16 (GND) - Body ground	W-B - Body ground	Ground	Always	Below 1 ohms
D47-1 (+B) - D47-16 (GND)	W - W- B	Battery	Always	11 to 14 V
D47-2 (IG) - D47-16 (GND)	B - W- B	Ignition switch signal	Ignition switch off	Below 1 V
			Ignition switch ON	11 to 14 V
D47-3 (KSW) - D47-16 (GND)	R - W- B	Unlock warning switch signal	No key in ignition key cylinder	10 kohms or higher
			Key in ignition key	Below 1 ohms

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

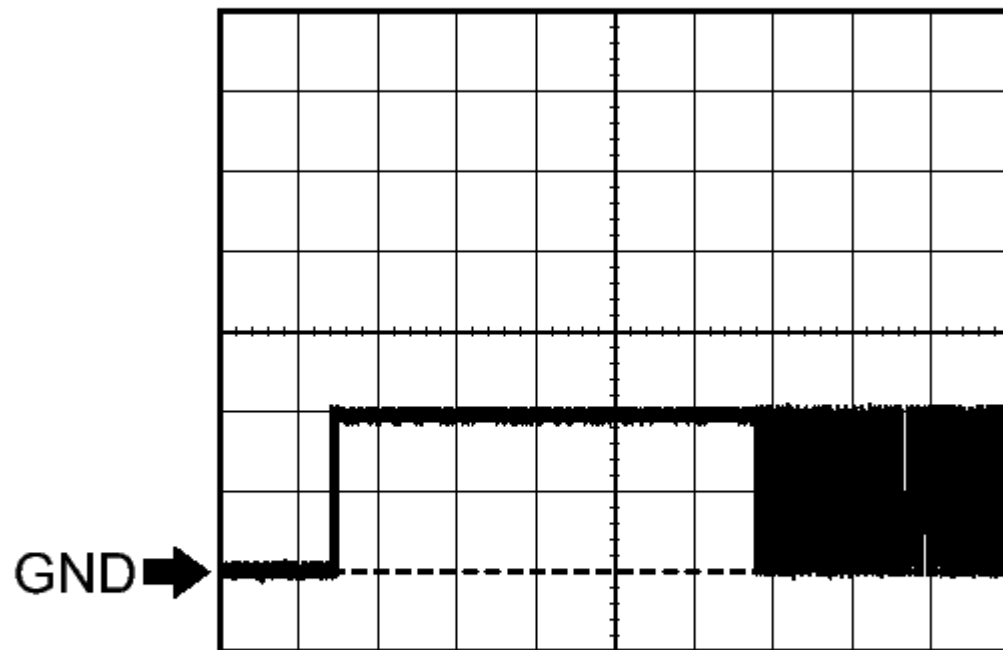
- c. Reconnect the D47 transponder key ECU assembly connector.
- d. Measure the resistance and voltage according to the value(s) in the table below.

Terminal No. (Symbol)	Wiring Color	Terminal Description	Condition	Specified Condition
D47-5 (AGND) - Body ground	SB - Body ground	Ground	Always	Below 1 ohms
D47-3 (KSW) - D47-16 (GND)	R - W-B	Unlock warning switch signal	No key in ignition key cylinder	11 to 14 V
			Key in ignition key cylinder	Below 1 V
D47-14 (VC5) - D47-5 (AGND)	B - SB	Power source	No key in ignition key cylinder	Below 1 V
			Key in ignition key cylinder	4.6 to 5.4 V
D47-4 (TXCT) - D47-5 (AGND)	R - SB	Transponder key amplifier communication signal	No key in ignition key cylinder	Below 1 V
			Key in ignition key cylinder	Pulse generation (See Fig. 9)
D47-15 (CODE) - D47-5 (AGND)	Y - SB	Transponder key amplifier communication signal	No key in ignition key cylinder	Below 1 V
			Key in ignition key cylinder	Pulse generation (See Fig. 10)
D47-13 (EFIO) - D47-16 (GND)	V - W-B	ECM output signal	Ignition switch off	Below 1 V
			Ignition switch ON	Pulse generation (See Fig. 11)
			Ignition switch	11 to 14 V

D47-12 (EFII) - D47-16 (GND)	G - W-B	ECM input signal	off	
			Within 3 seconds after starter operates and initial combustion occurs, or within 3 seconds after ignition switch first turned on (IG) after battery disconnected and connected.	Pulse generation (See Fig. 12)
D47-9 (D) - D47-16 (GND)	W - W-B	Diagnostic tester communication	Without communication	Below 1 V
			During communication	Pulse generation
D47-7 (CTY) - D47-16 (GND)	P - W-B	Door courtesy signal	Switch pushed	11 to 14 V
			Switch free	Below 1 V
D47-8 (IND) - D47-16 (GND)	B - W-B	Security indicator signal	Ignition switch off, security indicator light blinks	Alternating between 11 to 14 V and below 1 V
			Ignition switch ON, security indicator light off	Below 1 V

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

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

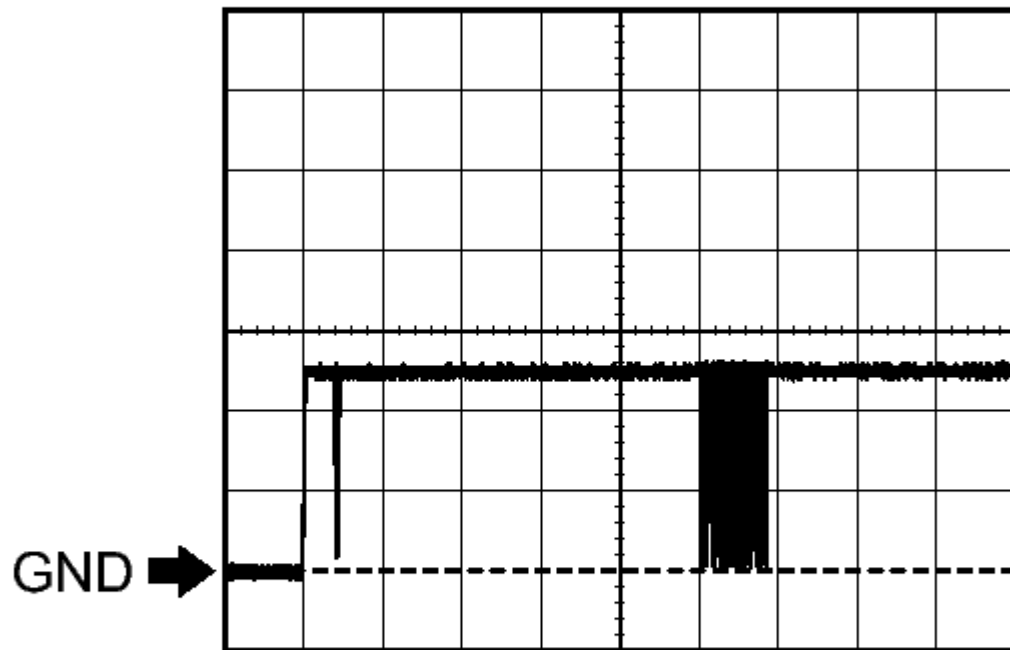


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Fig. 9: Identifying Waveform 1 Graph
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Tester Connection	D47-4 (TXCT) - D47-5 (AGND)
Tool Setting	2 V/DIV., 10 ms./DIV.
Condition	Key is in ignition key cylinder

2. Waveform 2



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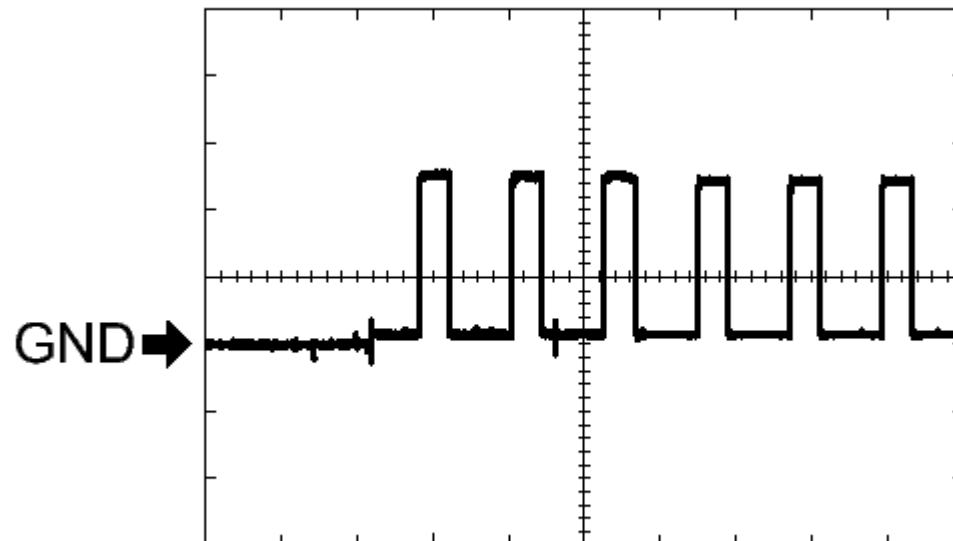
Fig. 10: Identifying Waveform 2 Graph

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

Tester Connection	D47-15 (CODE) - D47-5 (AGND)
Tool Setting	2 V/DIV., 20 ms./DIV.
Condition	Key is in ignition

	key cylinder
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3. Waveform 3

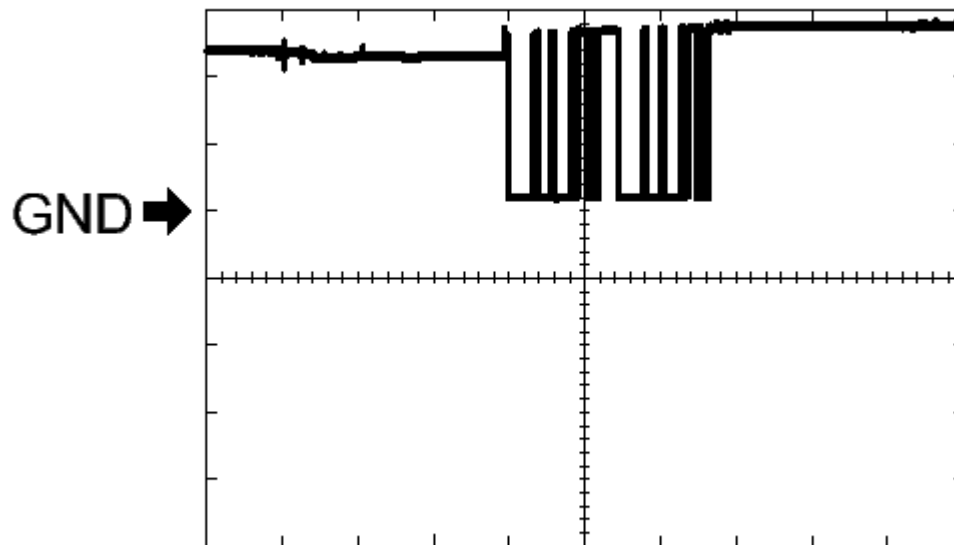


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Fig. 11: Identifying Waveform 3 (Reference)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Tester Connection	D47-13 (EFIO) - D47-16 (GND)
Tool Setting	5 V/DIV., 50 ms./DIV.
Condition	Ignition switch ON

4. Waveform 4 (Reference)



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Fig. 12: Identifying Waveform 4

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

Tester Connection	D47-12 (EFII) - D47-16 (GND)
Tool Setting	5 V/DIV., 500 ms/DIV.
Condition	Within 3 seconds after starter operates and initial combustion occurs, or within 3 seconds after ignition switch first turned ON after battery disconnected and connected.

3. CHECK ECM (for 2GR-FE)

- The values listed under "Specified Condition" are reference values. Because waterproof connectors are used for ECM, inspections can not be performed with the connectors connected.

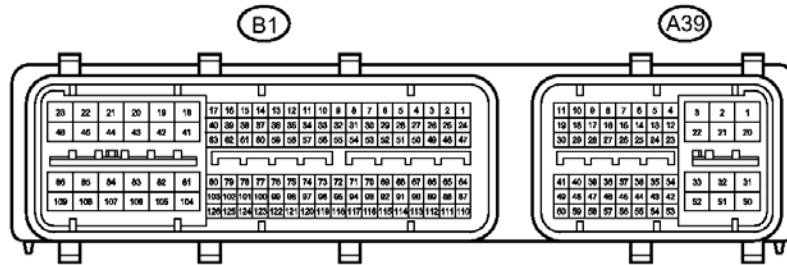
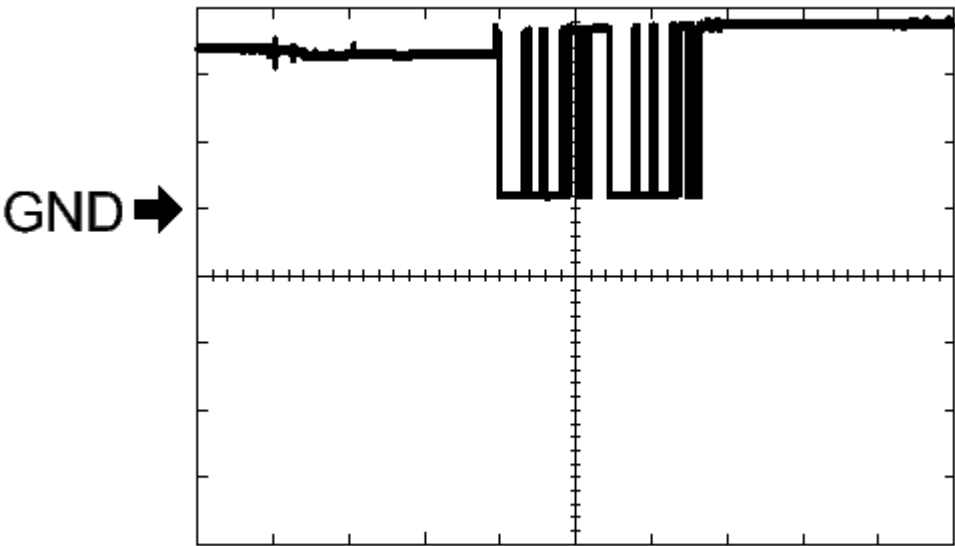


Fig. 13: ECM Connector Terminal Identification (For 2GR-FE)
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Terminal No. (Symbol)	Wiring Color	Terminal Description	Condition	Specified Condition
B1-81 (E1) - Body ground	BR - Body ground	Ground	Always	Below 1 ohms
A39-29 (IMO) - B1-81 (E1)	G - BR	Transponder key ECU output signal	Ignition switch off	11 to 14 V
			Within 3 seconds after starter operates and initial combustion occurs, or within 3 seconds after ignition switch first turned ON after battery disconnected and connected.	Pulse generation (See Fig. 14)
A39-40 (IMI) - B1-81 (E1)	V - BR	Transponder key ECU input signal	Ignition switch off	Below 1 V
			Ignition switch ON	Pulse generation (See Fig. 15)

- b. Inspect using an oscilloscope.
 - 1. Waveform 1



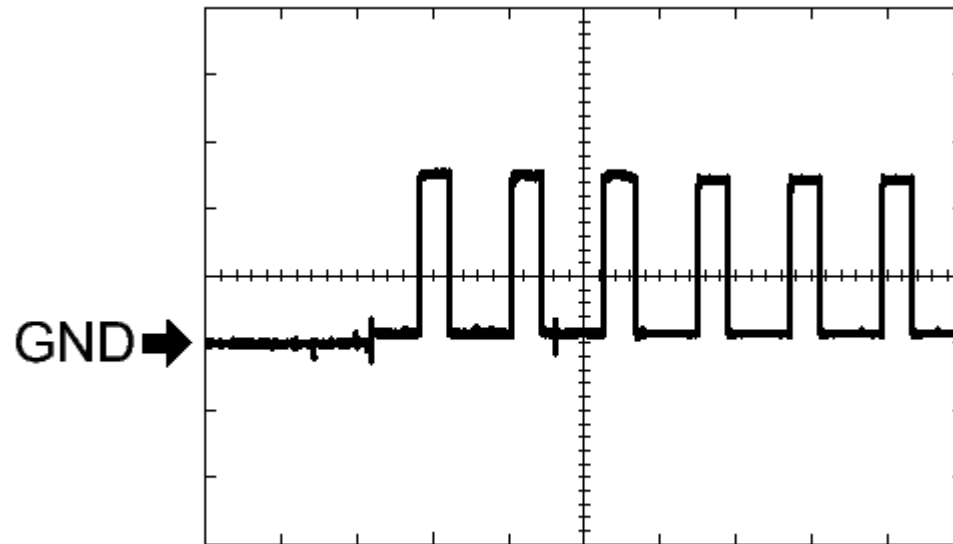
H

Fig. 14: Identifying Waveform 1
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Tester Connection	A39-29 (IMO) - B1-81 (E1)
Tool Setting	5 V/DIV., 500 ms/DIV.
Condition	Within 3 seconds after starter operates and initial combustion occurs, or within 3 seconds after ignition switch first turned ON after battery disconnected and

connected.

2. Waveform 2



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Fig. 15: Identifying Waveform 2 (Reference)

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

Tester Connection	A39-40 (IMI) - B1-81 (E1)
Tool Setting	5 V/DIV., 50 ms./DIV.
Condition	Ignition switch ON

4. CHECK ECM (for 1AR-FE)

- The values listed under "Specified Condition" are reference values. Because waterproof connectors are used for ECM, inspections can not be performed with the connectors connected.

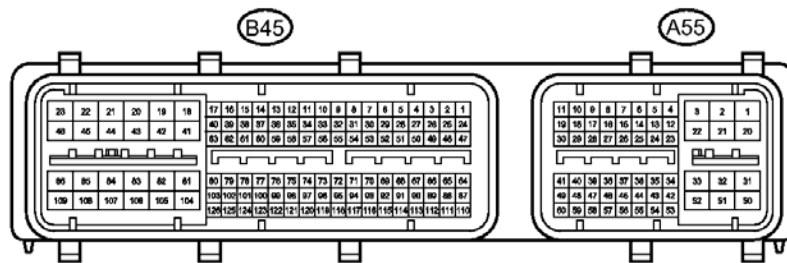
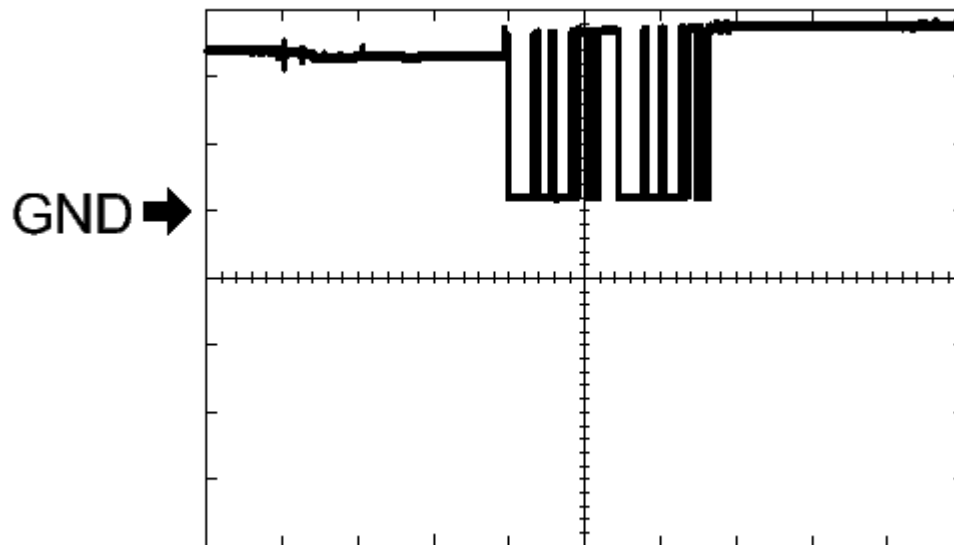


Fig. 16: ECM Connector Terminal Identification (For 1AR-FE)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Terminal No. (Symbol)	Wiring Color	Terminal Description	Condition	Specified Condition
B45-104 (E1) - Body ground	BR - Body ground	Ground	Always	Below 1 ohms
A55-10 (IMO) - B45-104 (E1)	G - BR	Transponder key ECU output signal	Ignition switch off Within 3 seconds after starter operates and initial combustion occurs, or within 3 seconds after ignition switch first turned ON after battery disconnected and connected.	11 to 14 V Pulse generation (See Fig. 17)
A55-11 (IMI) - B45-104 (E1)	V - BR	Transponder key ECU input signal	Ignition switch off Ignition switch ON	Below 1 V Pulse generation (See Fig. 18)

b. Inspect using an oscilloscope.

1. Waveform 1



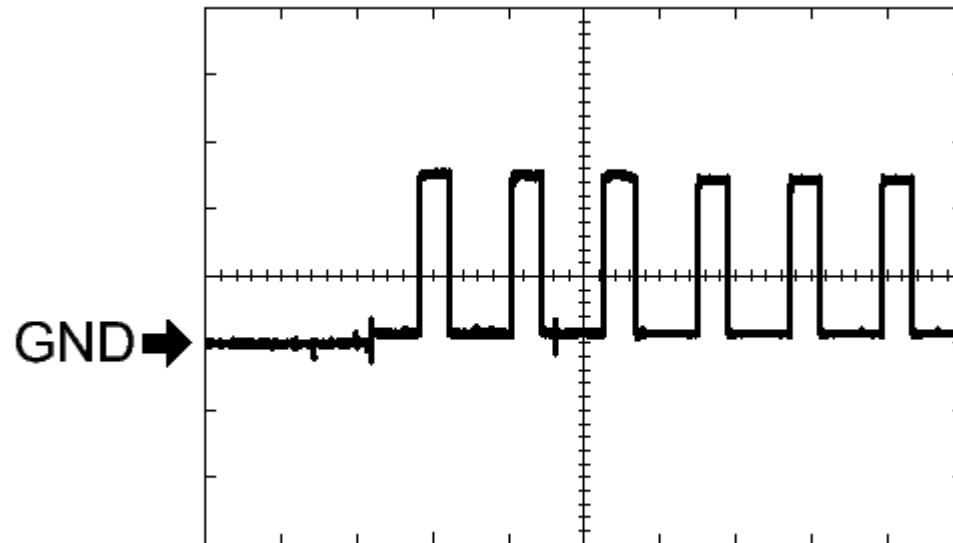
H

Fig. 17: Identifying Waveform 1

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

Tester Connection	A55-10 (IMO) - B45-104 (E1)
Tool Setting	5 V/DIV., 500 ms/DIV.
Condition	Within 3 seconds after starter operates and initial combustion occurs, or within 3 seconds after ignition switch first turned ON after battery disconnected and connected.

2. Waveform 2



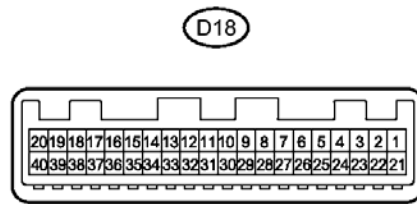
H

Fig. 18: Identifying Waveform 2 (Reference)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Tester Connection	A55-11 (IMI) - B45-104 (E1)
Tool Setting	5 V/DIV., 50 ms./DIV.
Condition	Ignition switch ON

5. COMBINATION METER ASSEMBLY

- Disconnect the D18 combination meter assembly connector.



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Fig. 19: Combination Meter Assembly Connector Terminal Identification
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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

HINT:

Measure the values on the wire harness side with the connector disconnected.

Terminal No. (Symbol)	Wiring Color	Terminal Description	Condition	Specified Condition
D18-1 (B) - Body ground	W - Body ground	Battery	Always	11 to 14 V
D18-20 (ES) - Body ground	BR - Body ground	Ground	Always	Below 1 ohms

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

- c. Reconnect the D18 combination meter assembly connector.
d. Measure the voltage according to the value(s) in the table below.

Terminal No. (Symbol)	Wiring Color	Terminal Description	Condition	Specified Condition
D18-3 (LP) - Body ground	B - Body ground	Security indicator light signal	Ignition switch ON, security indicator light off	11 to 14 V
			Ignition switch off, security	Alternating between 11 to 14 V

			indicator light blinks	and below 1 V
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If the result is not as specified, the accessory meter assembly may have a malfunction.

DIAGNOSIS SYSTEM

DIAGNOSIS SYSTEM

1. DESCRIPTION

- a. The transponder key ECU controls the vehicle's immobiliser system functions. Immobiliser system data and Diagnostic Trouble Code (DTC) can be read through the vehicle's Data Link Connector 3 (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 Techstream to check for malfunctions and perform repairs.

2. CHECK DLC3

- a. Check the DLC3. Refer to **GENERAL INFORMATION**.

3. INSPECT BATTERY VOLTAGE

- a. Measure the battery voltage.

Standard voltage

11 to 14 V

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

DTC CHECK / CLEAR

DTC CHECK / CLEAR

1. CHECK FOR TRANSPONDER KEY ECU DTC

- a. Connect the Techstream to the DLC3.
- b. Turn the ignition switch to ON.
- c. Turn the Techstream on.
- d. Enter the following menus: Body Electrical / Immobiliser / Trouble Codes.
- e. Check the details of the DTC(s). Refer to **DIAGNOSTIC TROUBLE CODE CHART**.

2. CHECK FOR ECM DTC

- a. Connect the Techstream to the DLC3.

- b. Turn the ignition switch to ON.
- c. Turn the Techstream on.
- d. Enter the following menus: Powertrain / Engine / Trouble Codes.
- e. Check the details of the DTC(s). Refer to **DIAGNOSTIC TROUBLE CODE CHART** for engine immobiliser system. Refer to **DIAGNOSTIC TROUBLE CODE CHART** for SFI system (for 2GR-FE). Refer to **DIAGNOSTIC TROUBLE CODE CHART** for SFI system (for 1AR-FE).

3. CLEAR TRANSPONDER KEY ECU DTC

- a. Connect the Techstream to the DLC3.
- b. Turn the ignition switch to ON.
- c. Turn the Techstream on.
- d. Enter the following menus: Body Electrical / Immobiliser / Trouble Codes.
- e. Clear the DTCs.

4. CLEAR ECM DTC

- a. Connect the Techstream to the DLC3.
- b. Turn the ignition switch to ON.
- c. Turn the Techstream on.
- d. Enter the following menus: Powertrain / Engine / Trouble Codes.
- e. Clear the DTCs.

DATA LIST / ACTIVE TEST

DATA LIST / ACTIVE TEST

1. READ DATA LIST

HINT:

Using a Techstream to read the Data List allows the values or states of switches, sensors, actuators and other items to be read without removing any parts. This non-intrusive inspection can be very useful because intermittent conditions or signals may be discovered before parts or wiring is disturbed. Reading the Data List information early in troubleshooting is one way to save diagnostic time.

NOTE: In the table below, the values listed under "Normal Condition" are for reference values. Do not depend solely on these reference values when deciding whether a part is faulty or not.

- a. Connect a Techstream to the DLC3.
- b. Turn the ignition switch to ON.
- c. Turn the Techstream on.
- d. Enter the following menus: Body Electrical / Immobiliser / Data List.
- e. According to the display on the Techstream, read the "Data List".

IMMOBILISER

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
D Door Courtesy SW	Driver door courtesy light switch signal / ON or OFF	ON: Driver door open OFF: Driver door closed	-
Key SW	Unlock warning switch signal/ON or OFF	ON: Key is in ignition key cylinder OFF: No key is in ignition key cylinder	-
IG SW	Ignition switch signal/ON or OFF	ON: Ignition switch ON or START OFF: Ignition switch ACC or OFF	-
Immobiliser	Immobiliser system status/SET or UNSET	UNSET: Ignition switch ON SET: Without key	-
Response	Transponder chip data/NG or OK	NG: Data error OK: Data OK	-
Frame Error	Transponder chip data/NG or OK	NG: Data error OK: Data OK	-
Different Serial Number	Transponder chip data/NG or OK	NG: Data error OK: Data OK	-
Different Encrypt Code	Transponder chip data/NG or OK	NG: Data error OK: Data OK	-
Abnormal Status	Transponder chip data/NG or OK	NG: Data error OK: Data OK	-
Bcc Malfunction	Transponder chip data/NG or OK	NG: Incorrect data being sent OK: Correct data being sent	-
Sub Key	Sub key code signal/NOMATCH or MATCH	NOMATCH: Non-matching sub key code is sent MATCH: Sub key code is	-

		sent	
Master Key	Master key code signal/NOMATCH or MATCH	NOMATCH: Non-matching master key code is sent MATCH: Master key code is sent	-
Transponder S-Code	Number of registered sub key/min. 0, max. 15	Number of registered sub keys	-
Transponder M-Code	Number of registered master key/min. 0, max. 15	Number of registered master keys	-
Reg Code Space Full	Memory space for key codes registration/NOT FULL or FULL	NOT FULL: More key code registration possible FULL: No more key code registration possible	-
+B	Power source/BRAKE or NORMAL	BRAKE: Power source open NORMAL: Power source normal	-
Antenna Coil Status	Transponder key amplifier coil condition/NORMAL or FAIL	NORMAL: Antenna coil is normal FAIL: Antenna coil is malfunctioning	-
EEPROM Status	EEPROM status/OK or NG	OK: EEPROM is normal NG: EEPROM is malfunctioning	-
E/G Start Permission	Permit (Start) signal/OK or NG	NG: No permission for engine start OK: Engine start permission	-
		Unknown:	

Immobi ECU Comm Spd	Immobiliser ECU Communication Speed status/Unknown, No Response, 50 bps or 200 bps	ECU not connected No Response: ECU connected but does not respond 50 bps: Low speed 200 bps: High speed	-
The Number of DTCs	Number of trouble codes/Min.: 0 or Max.: 255	Number of DTCs will be displayed	-

2. PERFORM ACTIVE TEST

HINT:

Using the Techstream to perform Active Tests allows relays, VSVs, actuators and other items to be operated without removing any parts. This non-intrusive functional inspection can be very useful because intermittent operation may be discovered before parts or wiring is disturbed. Performing Active Tests early in troubleshooting is one way to save diagnostic time. Data List information can be displayed while performing Active Tests.

- Connect the Techstream to the DLC3.
- Turn the ignition switch to ON.
- Turn the Techstream on.
- Enter the following menus: Body Electrical / Immobiliser / Active Test.
- According to the display on the Techstream, perform the "Active Test".

IMMOBILISER

Tester Display	Test Part	Control Range	Diagnostic Note
Security Indicator	Security indicator light	ON/OFF	-

DIAGNOSTIC TROUBLE CODE CHART

DIAGNOSTIC TROUBLE CODE CHART

HINT:

If a trouble code is stored during the DTC check, inspect the trouble areas listed for that code. For details of the code, refer to appropriate information below.

1. TRANSPONDER KEY ECU DIAGNOSTIC TROUBLE CODE CHART

TRANSPONDER KEY ECU

DTC Code	Detection Item	Trouble Area	See
B2780	Push Switch / Key Unlock Warning Switch Malfunction	- Wire harness connector - Unlock warning switch - Transponder key ECU	Refer to <u>DTC B2780: Push Switch / Key Unlock Warning Switch Malfunction</u>
B2784	Antenna Coil Open / Short	- Wire harness connector - Transponder key amplifier - Transponder key ECU	Refer to <u>DTC B2784: Antenna Coil Open / Short</u>
B2793	Transponder Chip Malfunction	Key	Refer to <u>DTC B2793: Transponder Chip Malfunction</u>
B2794	Unmatched Encryption Code	Key	Refer to <u>DTC B2794: Unmatched Encryption Code</u>
B2795	Unmatched Key Code	Key	Refer to <u>DTC B2795: Unmatched Key Code</u>
B2796	No Communication in Immobiliser System	- Key - Transponder key amplifier - Transponder key ECU	Refer to <u>DTC B2796: No Communication in Immobiliser System; DTC B2798: Communication Malfunction No. 2</u>

B2797	Communication Malfunction No. 1	- Key - Transponder key amplifier - Transponder key ECU	Refer to <u>DTC B2797: Communication Malfunction No. 1</u>
B2798	Communication Malfunction No. 2	- Key - Transponder key amplifier - Transponder key ECU	Refer to <u>DTC B2796: No Communication in Immobiliser System; DTC B2798: Communication Malfunction No. 2</u>

2. ECM DIAGNOSTIC TROUBLE CODE CHART

HINT:

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

ECM

DTC Code	Detection Item	Trouble Area	See
B2799	Engine Immobiliser System Malfunction	- Wire harness connector - ECM - Transponder key ECU	Refer to <u>DTC B2799: Engine Immobiliser System Malfunction</u>
B279A	Theft Deterrent System Communication Line High Fixation	- Wire harness connector - Transponder key ECU - ECM	Refer to <u>DTC B279A: Theft Deterrent System Communication Line High Fixation</u>
B279C	Theft Deterrent System Presence Detection	ECM	Refer to <u>DTC B279C: Theft Deterrent System Presence</u>

			<u>Detection</u>
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