PROBLEM SYMPTOMS TABLE

HINT:

- Use the table below to help determine the cause of the problem symptom. 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.

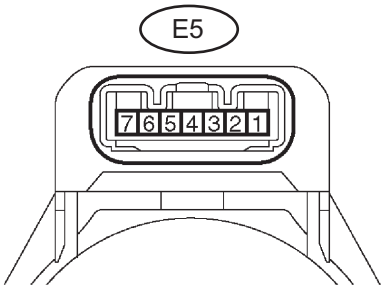
Engine immobiliser system:

Symptom	Suspected area	See page
Engine does not start	1. ECU power source circuit	EI-41
	2. SFI system	ES-24
Security indicator light malfunction	1. Clock sub-assembly*1	EI-38
	2. Heater control panel*2	EI-38
	3. Transponder key ECU	EI-38

HINT:
*1: for Manual air conditioning system
*2: for Automatic air conditioning system

TERMINALS OF ECU

1. CHECK TRANSPONDER KEY AMPLIFIER



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(a) Disconnect the E5 amplifier connector.
(b) Measure the resistance of the wire harness side connector.

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
AGND (E5-7) - Body ground	R - Body ground	Ground	Always	Below 1 Ω

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

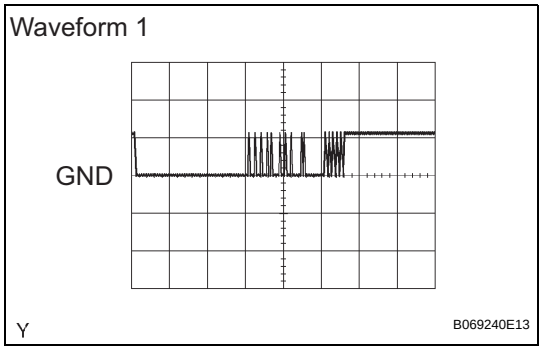
(c) Reconnect the E5 amplifier connector.
(d) Measure the resistance and voltage of the connector.

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
AGND (E5-7) - Body ground	R - Body ground	Ground	Always	Below 1 Ω
VC5 (E5-1) - AGND (E5-7)	B - R	Power source	No key is in ignition key cylinder	Below 1 V
			Key inserted	4.6 to 5.4 V
CODE (E5-4) - AGND (E5-7)	P - R	Demodulated signal of key code data	No key is in ignition key cylinder	Below 1 V
			Key inserted	Pulse generation (see waveform 1)
TXCT (E5-5) - AGND (E5-7)	G - R	Key code output signal	No key is in ignition key cylinder	Below 1 V
			Key inserted	Pulse generation (see waveform 2)

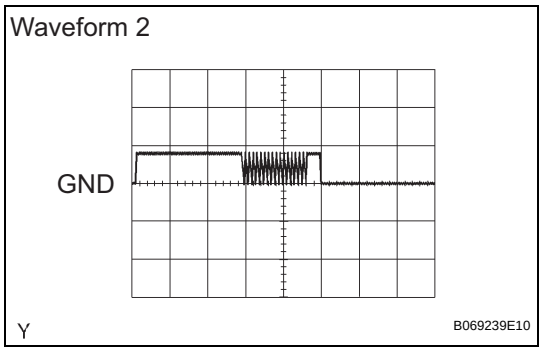
If the result is not as specified, there may be a malfunction in the amplifier.

(e) Using an oscilloscope, check the waveform 1.
Waveform 1 (Reference):

Item	Content
Symbols (Terminal No.)	CODE (E5-4) - AGND (E5-7)
Tool Setting	5 V/DIV., 20 msec./DIV.
Condition	Key inserted



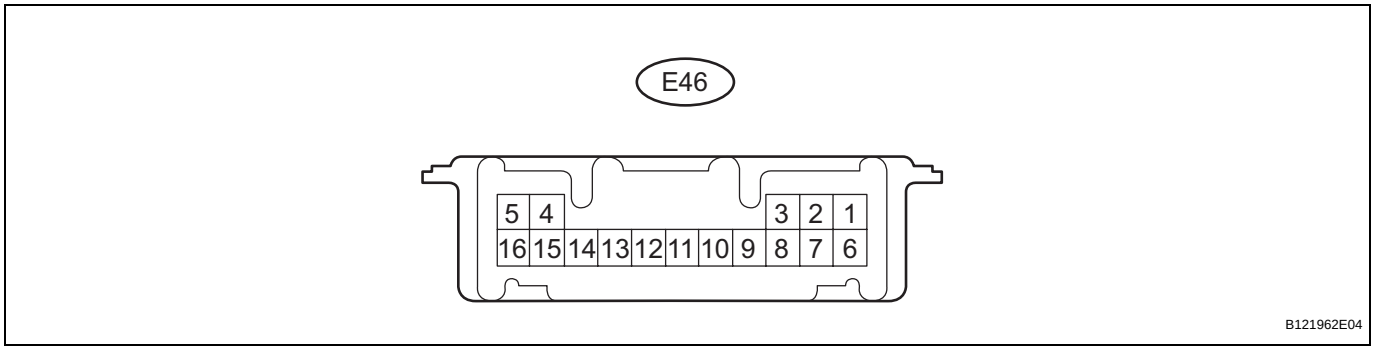
EI



(f) Using an oscilloscope, check the waveform 2.
Waveform 2 (Reference):

Item	Content
Symbols (Terminal No.)	TXCT (E5-5) - AGND (E5-7)
Tool Setting	5 V/DIV., 20 msec./DIV.
Condition	Key inserted

2. CHECK TRANSPONDER KEY ECU



(a) Disconnect the E46 ECU connector.
(b) Measure the resistance and voltage of the wire harness side connector.

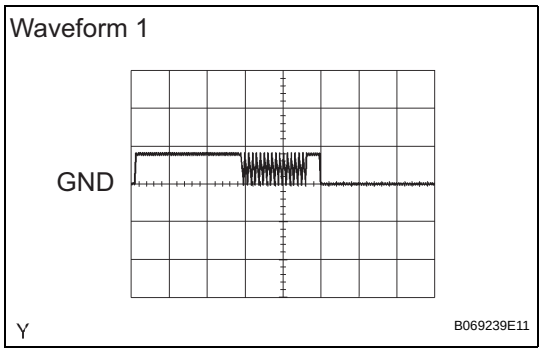
Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
GND (E46-16) - Body ground	W-B - Body ground	Ground	Always	Below 1 Ω
+B (E46-1) - GND (E46-16)	R - W-B	Battery	Always	10 to 14 V
IG (E46-2) - GND (E46-16)	B - W-B	Ignition switch	Ignition switch OFF	Below 1 V
			Ignition switch ON	10 to 14 V

If the result is not as specified, there may be a malfunction on the wire harness side.
(c) Reconnect the E46 ECU connector.
(d) Measure the resistance and voltage of the connector.

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
AGND (E46-5) - GND (E46-16)	R - W-B	Amplifier ground circuit	Always	Below 1 Ω
EGND (E46-11) - GND (E46-16)	V - W-B	ECM ground circuit	Always	Below 1 Ω
KSW (E46-3) - GND (E46-16)	L - W-B	Unlock warning switch	No key is in ignition key cylinder	10 to 14 V
			Key inserted	Below 1 V
VC5 (E46-14) - AGND (E46-5)	B - R	Power source	No key is in ignition key cylinder	Below 1 V
			Key inserted	4.6 to 5.4 V
TXCT (E46-4) - AGND (E46-5)	G - R	Transponder key amplifier communication signal	No key is in ignition key cylinder	Below 1 V
			Key inserted	Pulse generation (see waveform 1)

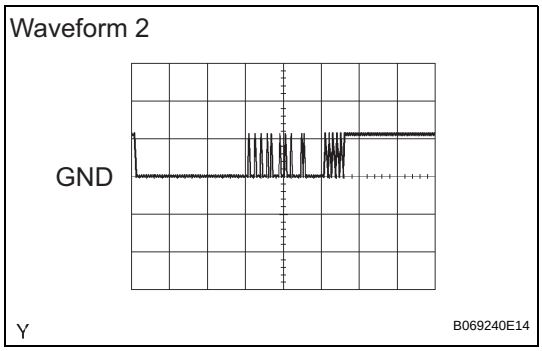
Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
CODE (E46-15) - AGND (E46-5)	P - R	Transponder key amplifier communication signal	No key is in ignition key cylinder	Below 1 V
			Key inserted	Pulse generation (see waveform 2)
EFIO (E46-13) - EGND (E46-11)	P - V	ECM output signal	Ignition switch OFF	Below 1 V
			Ignition switch ON	Pulse generation (see waveform 3)
EFII (E46-12) - EGND (E46-11)	LG - V	ECM input signal	Ignition switch OFF	Below 1 V
			Ignition switch OFF	Pulse generation (see waveform 3)
IND (E46-8)- GND (E46-16)	Y - W-B	Security indicator light signal	Engine immobiliser system SET	3 to 5 V
			Engine immobiliser system UNSET	Below 1 V
D (E46-9) - GND (E46-16)	W - W-B	Diagnosis tester communication	Ignition switch ON	Pulse generation

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



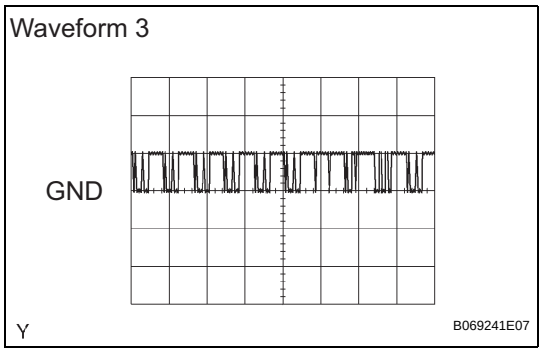
(e) Using an oscilloscope, check the waveform 1.
Waveform 1 (Reference):

Item	Content
Symbols (Terminal No.)	TXCT (E46-4) - AGND (E46-5)
Tool Setting	5 V/DIV., 20 msec./DIV.
Condition	Key inserted



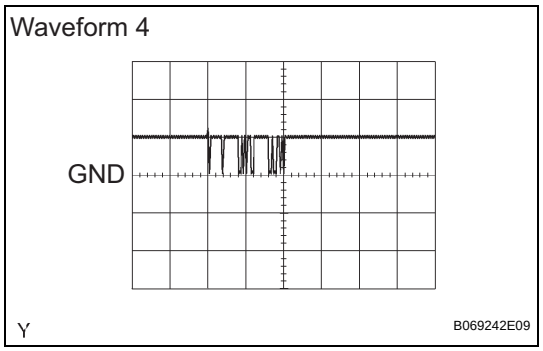
(f) Using an oscilloscope, check the waveform 2.
Waveform 2 (Reference):

Item	Content
Symbols (Terminal No.)	CODE (E46-15) - AGND (E46-5)
Tool Setting	5 V/DIV., 20 msec./DIV.
Condition	Key inserted



(g) Using an oscilloscope, check the waveform 3.
Waveform 3 (Reference):

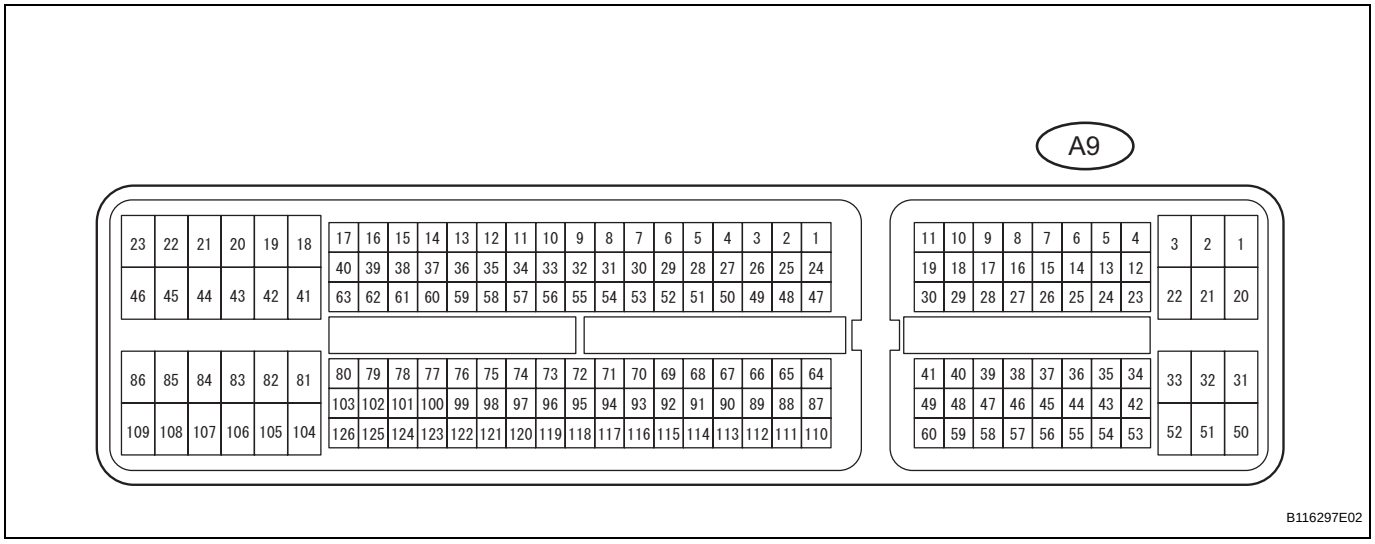
Item	Content
Symbols (Terminal No.)	EFIO (E46-13) - EGND (E46-11)
Tool Setting	10 V/DIV., 500 msec./DIV.
Condition	Ignition switch ON



(h) Using an oscilloscope, check the waveform 4.
Waveform 4 (Reference):

Item	Content
Symbols (Terminal No.)	EFII (E46-12) - EGND (E46-11)
Tool Setting	10 V/DIV., 500 msec./DIV.
Condition	Ignition switch ON

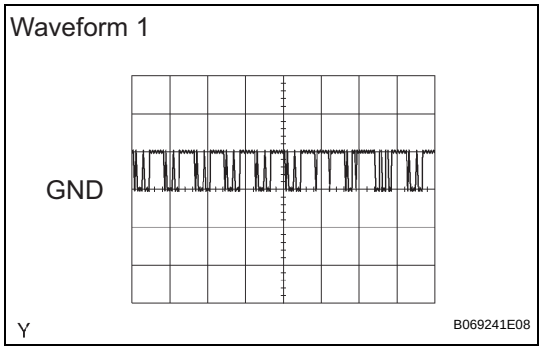
3. CHECK ECM



(a) Measure the resistance and voltage of the wire harness side connector.

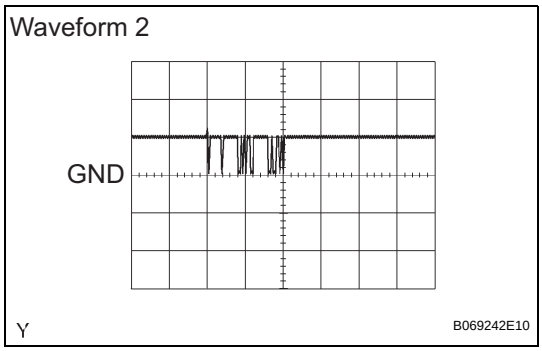
Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
EOM (A9-9) - Body ground	V - Body ground	Ground	Always	Below 1 Ω
IMI (A9-11) - EOM (A9-9)	P - V	Transponder key ECU input signal	Ignition switch OFF	Below 1 V
			Ignition switch ON	Pulse generation (see waveform 1)
IMO (A9-10) - EOM (A9-9)	LG - V	Transponder key ECU output signal	Ignition switch OFF	Below 1 V
			Ignition switch ON	Pulse generation (see waveform 2)

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



(b) Using an oscilloscope, check the waveform 1.
Waveform 1 (Reference):

Item	Content
Symbols (Terminal No.)	IMI (A9-11) - EOM (A9-9)
Tool Setting	10 V/DIV., 500 msec./DIV.
Condition	Ignition switch ON



(c) Using an oscilloscope, check the waveform 2.

Waveform 2 (Reference):

Item	Content
Symbols (Terminal No.)	IMO (A9-10) - EOM (A9-9)
Tool Setting	10 V/DIV., 500 msec./DIV.
Condition	Ignition switch ON