Last Modified: 12-04-2024	6.11:8.1.0	**Doc ID:** RM10000000290A4
Model Year Start: 2023	**Model:** Prius Prime	**Prod Date Range:** [12/2022 -]
Title: THEFT DETERRENT / KEYLESS ENTRY: SMART KEY SYSTEM (for Start Function): Power Source Mode does not Change to ON (IG and ACC); 2023 - 2024 MY Prius Prius Prime [12/2022 -]		

Power Source Mode does not Change to ON (IG and ACC)

DESCRIPTION

When the ignition switch cannot be turned to ACC or ON, interior verification may be abnormal or there may be a malfunction in the ACC relay or IG relay circuit. If interior verification cannot be performed, the certification ECU (smart key ECU assembly) may be malfunctioning or communication may not be possible between the No. 1 indoor electrical key antenna assembly (front floor), No. 2 indoor electrical key antenna assembly (rear floor) and the electrical key transmitter sub-assembly and electrical key and tire pressure monitoring system receiver assembly.

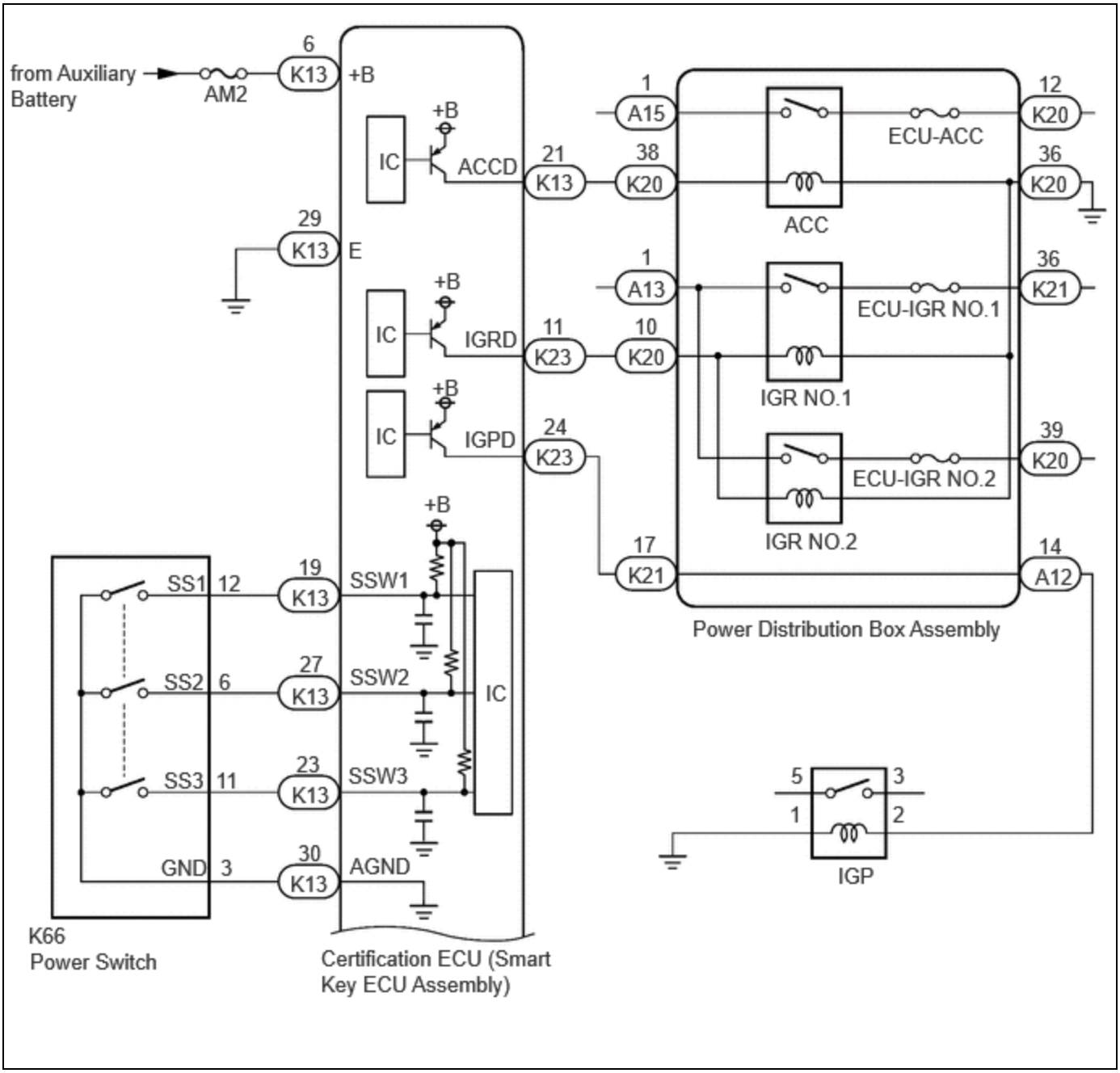
When an electrical key transmitter sub-assembly is brought into the cabin, its key ID code is compared with the key ID code stored in the certification ECU (smart key ECU assembly). If these codes do not match, key verification will fail and the ignition switch will not be able to be turned to ACC or ON.

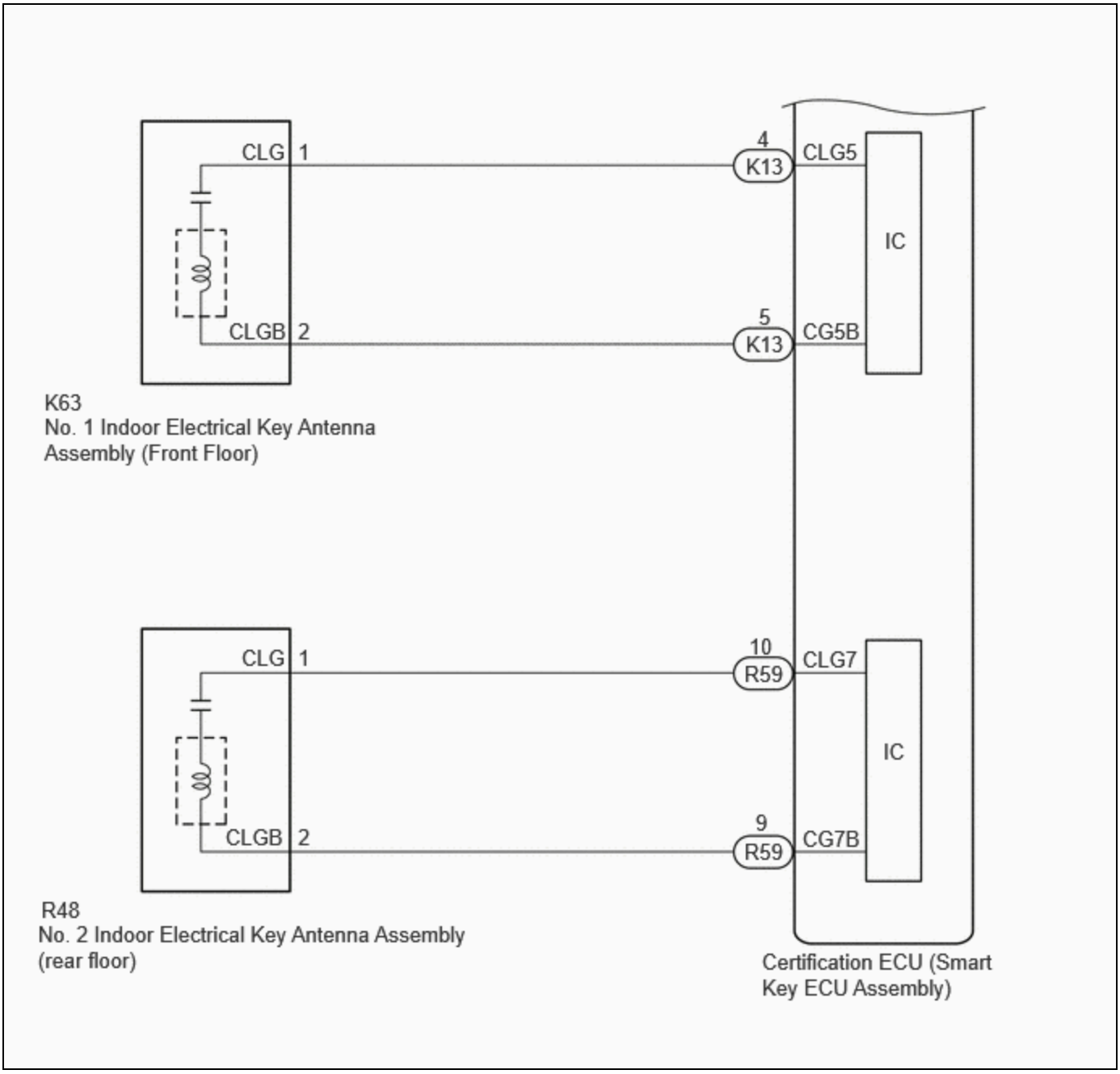
When a door is unlocked and an electrical key transmitter sub-assembly is brought into the cabin, the certification ECU (smart key ECU assembly) activates the indoor electrical key antenna assemblies to form the interior detection area. The electrical key transmitter sub-assembly then responds to the detection signals with its key ID code. This response signal is received by the electrical key and tire pressure monitoring system receiver assembly and sent to the certification ECU (smart key ECU assembly).

Related Data List and Active Test Items

PROBLEM SYMPTOM	DATA LIST AND ACTIVE TEST
Power source mode does not change to ON or on ACC	**Power Source Control** • Push Start Switch 1 • Push Start Switch 2 • Push Start Switch 3 • IGP Relay Circuit (Outside) Monitor • ACC Relay Monitor • IGR Relay Circuit (Outside) Monitor • Power Supply Condition

WIRING DIAGRAM


from Auxiliary Battery
AM2
6
K13
+B
29
K13
E
IC
ACCD
21
K13
IGRD
11
K23
IGPD
24
K23
19
K13
SSW1
27
K13
SSW2
23
K13
SSW3
30
K13
AGND
SS1
12
SS2
6
SS3
11
GND
3
IC
K66
Power Switch
Certification ECU (Smart Key ECU Assembly)
1
A15
38
K20
12
K20
ECU-ACC
36
K20
ACC
1
A13
10
K20
36
K21
ECU-IGR NO.1
IGR NO.1
39
K20
ECU-IGR NO.2
IGR NO.2
17
K21
14
A12
Power Distribution Box Assembly
5
3
1
2
IGP



CAUTION / NOTICE / HINT

NOTICE:

- When using the GTS with the ignition switch off, perform lock and unlock operations using the door control switch of the multiplex network master switch assembly at intervals of 1.5 seconds or less until communication between the GTS and the vehicle begins, and then select the vehicle model manually.

  Then select Model Code "KEY REGIST" under manual mode and enter the following menus: Body Electrical / Smart Key(CAN). While using the GTS, periodically perform lock and unlock operations using the door control switch of the multiplex network master switch assembly at intervals of 1.5 seconds or less to maintain communication between the GTS and the vehicle.
- The smart key system (for Start Function) uses the LIN communication system and CAN communication system. Inspect the communication function by following How to Proceed with Troubleshooting. Troubleshoot the smart key system (for Start Function) after confirming that the communication systems are functioning properly.

  Click here INFO
- Make sure that no DTCs are output. If any DTCs are output, proceed to Diagnostic Trouble Code Chart.

- If the smart key system (for Start Function) has been disabled, enable the system before performing troubleshooting.

  Click here INFO
- Inspect the fuses for circuits related to this system before performing the following procedure.
- Before replacing the certification ECU (smart key ECU assembly) or an electrical key transmitter sub-assembly, refer to Registration.

  Click here INFO
- After completing repairs, confirm that the problem does not recur.
- After performing repairs, confirm that no DTCs are output by performing "DTC Output Confirmation Operation."
- The indoor electrical key antenna assemblies have an antenna coil between each terminal.
- The electrical key and tire pressure monitoring system receiver assembly is also related to interior certification.

HINT:

- If interior verification is unsuccessful, Vehicle Control History (RoB) may be stored.
- If Vehicle Control History (RoB) has been stored, refer to the Vehicle Control History (RoB) List to determine the detection conditions and narrow down trouble areas.

Body Electrical > Smart Key > Utility

TESTER DISPLAY
Vehicle Control History (RoB)

PROCEDURE

1.	**CHECK POWER SOURCE MODE**

(a) Get into the vehicle while carrying the electrical key transmitter sub-assembly that has already been registered.

(b) Move the shift position to P.

(c) Press the power switch with the brake pedal released and check that the power source mode changes.

Click here INFO

RESULT	PROCEED TO
Power source mode cannot be changed when electrical key transmitter sub-assembly is in push button start function operation range for front side	A
Power source mode cannot be changed when electrical key transmitter sub-assembly is in push button start function operation range for inside luggage compartment	B
Power source mode cannot be changed	C

B ▶ GO TO STEP 6

C ▶ GO TO STEP 10

A

2.	**CHECK WAVE ENVIRONMENT**

(a) Install the transmitter battery to the electrical key transmitter sub-assembly.

Click here INFO

(b) Bring the electrical key transmitter sub-assembly near the No. 1 indoor electrical key antenna assembly (front floor) and perform a smart key system check.

Click here INFO

NOTICE:

Communication may not be possible if the electrical key transmitter sub-assembly is within 0.2 m (0.656 ft.) of the No. 1 indoor electrical key antenna assembly (front floor).

HINT:

- As the effect of wave interference decreases by moving the electrical key transmitter sub-assembly close to each indoor electrical key antenna assembly, it may be possible to check whether wave interference is the cause of the problem.
- If the inspection result is that the problem only occurs in certain locations or at certain times of day, the possibility of wave interference is high. Also, added vehicle components may cause wave interference. If installed, remove them and perform the operation check.
- There may be wave interference if the vehicle is near broadcasting antennas, large video displays, wireless garage door opener systems, wireless security cameras, home security systems, etc. In this case, move the vehicle to a different location and check if there is any improvement.
- If a tool for checking radio waves, such as a signal strength meter, is available, move around the area while observing both the LF band (used by the vehicle antenna to form the detection area) and RF band (used by the electrical key transmitter sub-assembly for transmission) to check for locations where there is wave interference.

OK:

The hybrid control system starts when the electrical key transmitter sub-assembly is held near each indoor electrical key antenna assembly and the power switch is pressed with the brake pedal depressed.

OK ▶ **AFFECTED BY WAVE INTERFERENCE**

NG

3.	**CHECK KEY DIAGNOSTIC MODE**

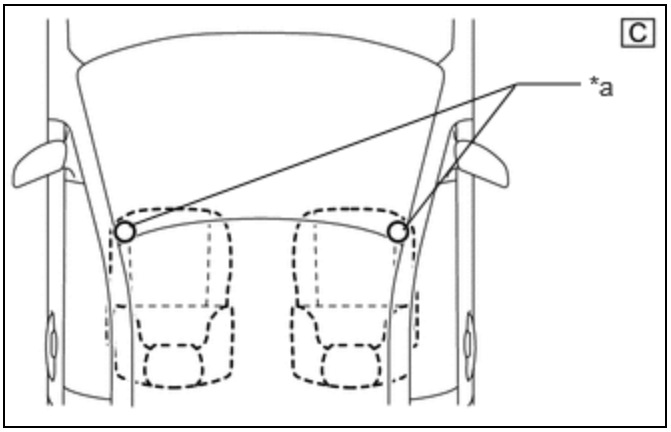
(a) Check the following antennas in key diagnostic mode.

(b) Check the No. 1 indoor electrical key antenna assembly (front floor).

When the electrical key transmitter sub-assembly is at either inspection point, check that the wireless buzzer sounds.

HINT:

- Select either channel 1 or channel 2 and perform the key diagnostic mode inspection for each channel.
- If the buzzer sounds with [CH1] displayed but not with [CH2], the electrical key transmitter sub-assembly cannot be detected by channel 2 due to a malfunction, such as wave interference.
- It is possible to check which No. 1 indoor electrical key antenna assembly(front floor) is operating by the sounding of the buzzer.
- When the wireless buzzer sounds for all indoor electrical key antenna assemblies, they can be judged as operating properly and a malfunction in the certification ECU (smart key ECU assembly), which performs verification, is suspected.
- When the wireless buzzer does not sound for all indoor electrical key antenna assemblies, it can be judged that the certification ECU (smart key ECU assembly), which controls the indoor electrical key antenna assemblies, is malfunctioning.



*a	Electrical Key Transmitter Sub-assembly Inspection Point

Body Electrical > Smart Key > Utility

TESTER DISPLAY
Communication Check(Key Diag Mode)

RESULT	PROCEED TO
The wireless buzzer does not sound	A
The wireless buzzer sounds	B

B ▶ **AFFECTED BY WAVE INTERFERENCE**

A ▼

4.	**CHECK HARNESS AND CONNECTOR (CERTIFICATION ECU (SMART KEY ECU ASSEMBLY) - NO. 1 INDOOR ELECTRICAL KEY ANTENNA ASSEMBLY (FRONT FLOOR))**

(a) Disconnect the K13 certification ECU (smart key ECU assembly) connector.

(b) Disconnect the K63 No. 1 indoor electrical key antenna assembly (front floor) connector.

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

Standard Resistance:

EWD INFO

Click Location & Routing(K13,K63)
Click Connector(K13)
Click Connector(K63)

TESTER CONNECTION	CONDITION	SPECIFIED CONDITION
K13-4 (CLG5) - K63-1 (CLG)	Always	Below 1 Ω
K13-5 (CG5B) - K63-2 (CLGB)	Always	Below 1 Ω
K13-4 (CLG5) or K63-1 (CLG) - Other terminals and body ground	Always	10 kΩ or higher
K13-5 (CG5B) or K63-2 (CLGB) - Other terminals and body ground	Always	10 kΩ or higher

NG ▶ **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK ▼

5.	**CHECK CERTIFICATION ECU (SMART KEY ECU ASSEMBLY) (OUTPUT TO NO. 1 INDOOR ELECTRICAL KEY ANTENNA ASSEMBLY (FRONT FLOOR))**

(a) Connect the K13 certification ECU (smart key ECU assembly) connector.

(b) Using an oscilloscope, check the waveform.

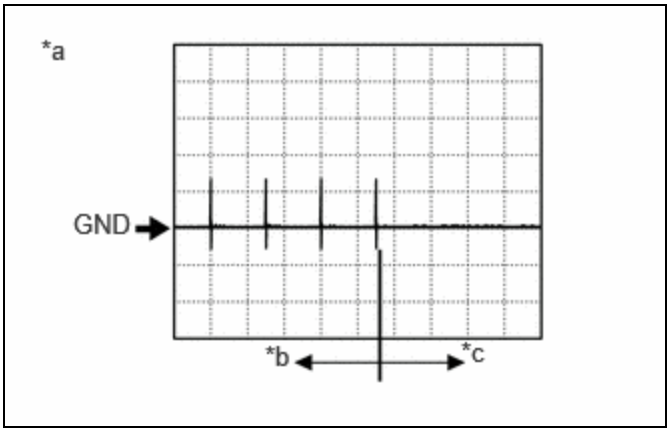
OK:

EWD INFO

Click Location & Routing(K63)
Click Connector(K63)

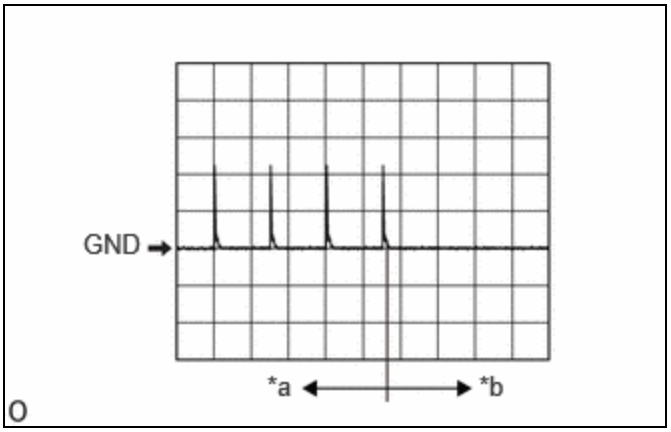
TESTER CONNECTION	CONDITION	TOOL SETTING	SPECIFIED CONDITION
K63-1 (CLG) - K63-2 (CLGB)	Procedure: 1. Ignition switch off 2. Electrical key transmitter sub-assembly not inside vehicle 3. Within 30 seconds of closing any door	5 V/DIV., 500 ms./DIV.	Pulse generation (See waveform)

Type A:



*a	Waveform
*b	For 30 seconds after closing any door
*c	After 30 seconds or more have elapsed since any door closed

Type B:



*a	Waveform
*b	For 30 seconds after closing any door
*c	After 30 seconds or more have elapsed since any door closed

OK ▶ **REPLACE NO. 1 INDOOR ELECTRICAL KEY ANTENNA ASSEMBLY (FRONT FLOOR)**

NG ▶ **REPLACE CERTIFICATION ECU (SMART KEY ECU ASSEMBLY)**

Click here INFO

6.	**CHECK WAVE ENVIRONMENT**

(a) Install the transmitter battery to the electrical key transmitter sub-assembly.

Click here INFO

(b) Bring the electrical key transmitter sub-assembly near the No. 2 indoor electrical key antenna assembly (rear floor) and perform a smart key system check.

Click here INFO

NOTICE:

Communication may not be possible if the electrical key transmitter sub-assembly is within 0.2 m (0.656 ft.) of the center of the No. 2 indoor electrical key antenna assembly (rear floor).

HINT:

Check that the customize setting "Ignition Available Area" is set to "All".

HINT:

- As the effect of wave interference decreases by moving the electrical key transmitter sub-assembly close to each indoor electrical key antenna assembly, it may be possible to check whether wave interference is the cause of the problem.
- If the inspection result is that the problem only occurs in certain locations or at certain times of day, the possibility of wave interference is high. Also, added vehicle components may cause wave interference. If installed, remove them and perform the operation check.
- There may be wave interference if the vehicle is near broadcasting antennas, large video displays, wireless garage door opener systems, wireless security cameras, home security systems, etc. In this case, move the vehicle to a different location and check if there is any improvement.
- If a tool for checking radio waves, such as a signal strength meter, is available, move around the area while observing both the LF band (used by the vehicle antenna to form the detection area) and RF band (used by the electrical key transmitter sub-assembly for transmission) to check for locations where there is wave interference.

OK:

The hybrid control system starts when the electrical key transmitter sub-assembly is held near each indoor electrical key antenna assembly and the power switch is pressed with the brake pedal depressed.

OK ▶ **AFFECTED BY WAVE INTERFERENCE**

NG ▼

7.	**CHECK KEY DIAGNOSTIC MODE**

(a) Check the following antennas in key diagnostic mode.

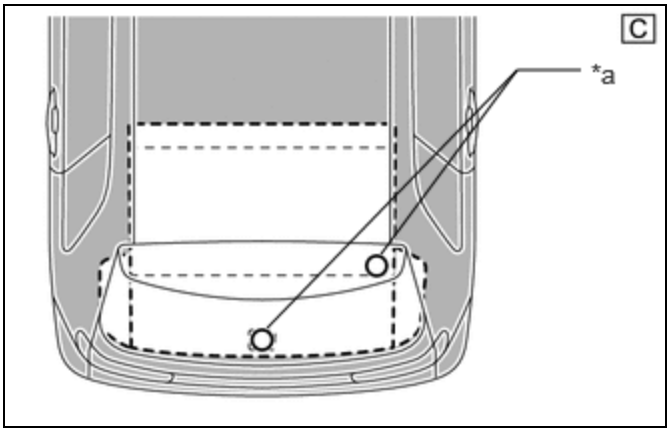
(b) Check the No. 2 indoor electrical key antenna assembly (rear floor).

When the electrical key transmitter sub-assembly is at either inspection point, check that the wireless buzzer sounds.

HINT:

- Select either channel 1 or channel 2 and perform the key diagnostic mode inspection for each channel.

- If the buzzer sounds with [CH1] displayed but not with [CH2], the electrical key transmitter sub-assembly cannot be detected by channel 2 due to a malfunction, such as wave interference.
- It is possible to check which No. 2 indoor electrical key antenna assembly (rear floor) is operating by the sounding of the buzzer.
- When the wireless buzzer sounds for all indoor electrical key antenna assemblies, they can be judged as operating properly and a malfunction in the certification ECU (smart key ECU assembly), which performs verification, is suspected.
- When the wireless buzzer does not sound for all indoor electrical key antenna assemblies, it can be judged that the certification ECU (smart key ECU assembly), which controls the indoor electrical key antenna assemblies, is malfunctioning.



*a	Electrical Key Transmitter Sub-assembly Inspection Point

Body Electrical > Smart Key > Utility

TESTER DISPLAY
Communication Check(Key Diag Mode)

RESULT	PROCEED TO
The wireless buzzer does not sound	A
The wireless buzzer sounds	B

B ▶ **AFFECTED BY WAVE INTERFERENCE**

A ▼

8.	**CHECK HARNESS AND CONNECTOR (CERTIFICATION ECU (SMART KEY ECU ASSEMBLY) - NO. 2 INDOOR ELECTRICAL KEY ANTENNA ASSEMBLY (REAR FLOOR))**

(a) Disconnect the R59 certification ECU (smart key ECU assembly) connector.

(b) Disconnect the R48 No. 2 indoor electrical key antenna assembly (rear floor) connector.

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

Standard Resistance:

EWD INFO

Click Location & Routing(R59,R48)

Click Connector(R59)
Click Connector(R48)

TESTER CONNECTION	CONDITION	SPECIFIED CONDITION
R59-10 (CLG7) - R48-1 (CLG)	Always	Below 1 Ω
R59-9 (CG7B) - R48-2 (CLGB)	Always	Below 1 Ω
R59-10 (CLG7) or R48-1 (CLG) - Other terminals and body ground	Always	10 kΩ or higher
R59-9 (CG7B) or R48-2 (CLGB) - Other terminals and body ground	Always	10 kΩ or higher

NG ▶ **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK ▼

9.	**CHECK CERTIFICATION ECU (SMART KEY ECU ASSEMBLY) (OUTPUT TO NO. 2 INDOOR ELECTRICAL KEY ANTENNA ASSEMBLY (REAR FLOOR))**

(a) Connect the R59 certification ECU (smart key ECU assembly) connector.

(b) Using an oscilloscope, check the waveform.

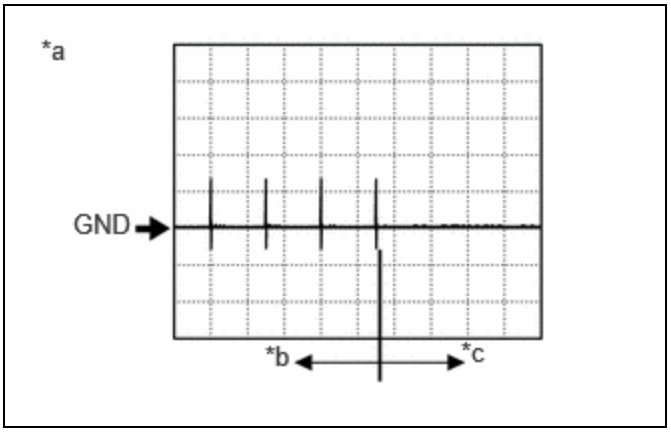
OK:

EWD INFO

Click Location & Routing(R48)
Click Connector(R48)

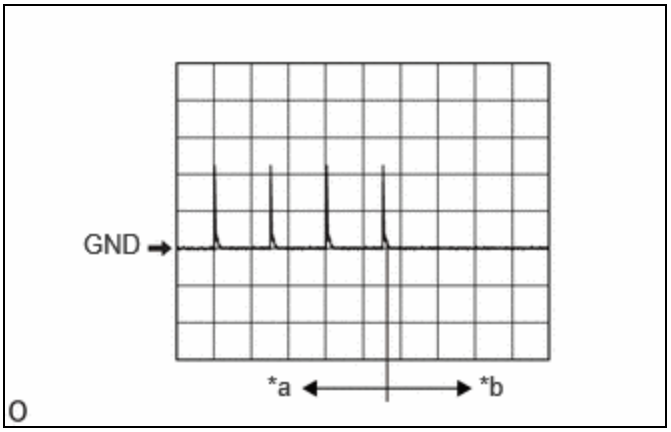
TESTER CONNECTION	CONDITION	TOOL SETTING	SPECIFIED CONDITION
R48-1 (CLG) - R48-2 (CLGB)	Procedure: 1. Ignition switch off 2. Electrical key transmitter sub-assembly not inside vehicle 3. Within 30 seconds of closing any door	5 V/DIV., 500 ms./DIV.	Pulse generation (See waveform)

Type A:



*a	Waveform
*b	For 30 seconds after closing any door
*c	After 30 seconds or more have elapsed since any door closed

Type B:



*a	Waveform
*b	For 30 seconds after closing any door
*c	After 30 seconds or more have elapsed since any door closed

OK ▶ **REPLACE NO. 2 INDOOR ELECTRICAL KEY ANTENNA ASSEMBLY (REAR FLOOR)**

Click here INFO

NG ▶ **REPLACE CERTIFICATION ECU (SMART KEY ECU ASSEMBLY)**

Click here INFO

10.	**INSPECT TRANSMITTER BATTERY**

(a) Check the transmitter battery level of the electrical key transmitter sub-assembly that was checked first.

(1) Press and hold the lock switch of the electrical key transmitter sub-assembly for 5 seconds and check the number of times that the LED illuminates.

HINT:

- The electrical key transmitter sub-assembly sends voltage information to the certification ECU (smart key ECU assembly) when it is being used. "Yes" is displayed for the Data List item Key Low Battery when this voltage information indicates 2.2 V or less.

  Click here INFO
- Even if the transmitter battery is depleted, it is still possible to start the hybrid control system by holding the electrical key transmitter sub-assembly near the power switch, depressing the brake pedal and pressing the power switch.

RESULT	PROCEED TO
LED illuminates 3 times or more when switch is pressed and held	A
LED does not illuminate when switch is pressed and held	B
LED illuminates once or twice but not a third time	C

B ▶ **GO TO STEP 18**

C ▶ **REPLACE TRANSMITTER BATTERY**

A ▼

11.	**CHECK ENTRY LOCK / UNLOCK OPERATION**

(a) Check that the entry lock and unlock functions operate on each door.

Click here INFO

HINT:

If the electrical key and tire pressure monitoring system receiver assembly is defective, code verification does not begin in the cabin and the entry lock and unlock functions do not operate.

RESULT	PROCEED TO
Entry functions operate normally for all doors (w/ Wireless Charging System)	A
Entry functions operate normally for all doors (w/o Wireless Charging System)	B
An entry function does not operate normally for a door	C

B GO TO STEP 13

C GO TO SMART KEY SYSTEM (for Entry Function) (All Door Entry Lock/Unlock Functions and Wireless Functions do not Operate)

A

12.	**CHECK WIRELESS CHARGING SYSTEM**

(a) Wireless charging system off.

Click here INFO

(b) Check that interior verification is performed.

Click here INFO

RESULT	PROCEED TO
Interior verification is not performed normally	A
Interior verification is performed normally	B

B GO TO WIRELESS CHARGING SYSTEM

A

13.	**READ VALUE USING GTS (PUSH START SWITCH 1, PUSH START SWITCH 2, PUSH START SWITCH 3)**

(a) Read the Data List according to the display on the GTS.

Body Electrical > Power Source Control > Data List

TESTER DISPLAY	MEASUREMENT ITEM	RANGE	NORMAL CONDITION	DIAGNOSTIC NOTE
Push Start Switch 1	Power switch 1 status	OFF or ON	OFF: Power switch not pressed ON: Power switch pressed	• If the power switch is pressed for a short time, the display may not change. • Use this item to determine if the power switch input signal is malfunctioning.
Push Start Switch 2	Power switch 2 status	OFF or ON	OFF: Power switch not pressed ON: Power switch pressed	• If the power switch is pressed for a short time, the display may not change. • Use this item to determine if the power switch input signal is malfunctioning.
Push Start Switch 3	Power switch 3 status	OFF or ON	OFF: Power switch not pressed ON: Power switch pressed	• If the power switch is pressed for a short time, the display may not change. • Use this item to determine if the power switch input signal is malfunctioning.

Body Electrical > Power Source Control > Data List

TESTER DISPLAY
Push Start Switch 1
Push Start Switch 2
Push Start Switch 3

OK:

The value of "Start Switch1", "Start Switch2" and "Start Switch3" change correctly in response to the power switch operation.

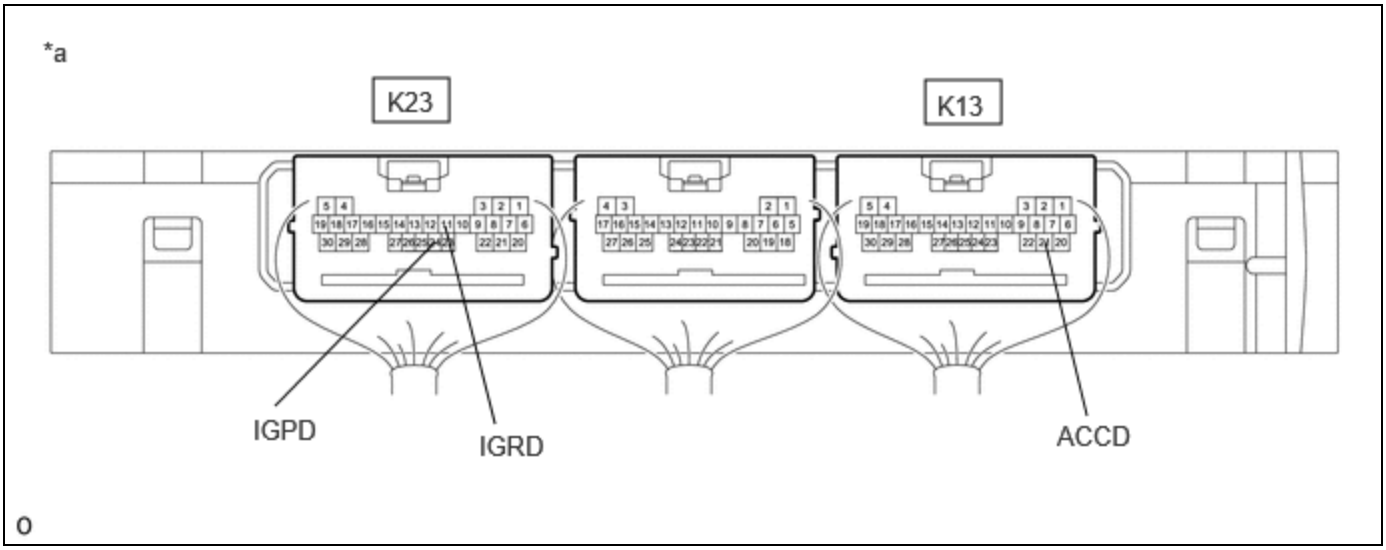
NG ▶ **GO TO STEP 16**

OK ▼

14.	**CHECK CERTIFICATION ECU (SMART KEY ECU ASSEMBLY)**

(a) Measure the voltage while checking the Data List on the GTS.

(1) Read the Data List according to the display on the GTS.



*a	Component with harness connected (Certification ECU (Smart Key ECU Assembly))	-	-

Body Electrical > Power Source Control > Data List

TESTER DISPLAY	MEASUREMENT ITEM	RANGE	NORMAL CONDITION	DIAGNOSTIC NOTE
Power Supply Condition	Power supply state	OFF, ACC ON, IGR ON, IGP ON or Starter ON	OFF: Ignition switch off ACC ON: Ignition switch ACC IGR ON: Ignition switch ON IGP ON: Ignition switch ON Starter ON: Sending hybrid control system start request signal	-

Body Electrical > Power Source Control > Data List

TESTER DISPLAY
Power Supply Condition

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

Standard Voltage:

EWD INFO

Click Location & Routing(K23,K13)
Click Connector(K23)
Click Connector(K13)

TESTER CONNECTION	CONDITION	SPECIFIED CONDITION
K23-11 (IGRD) - Body ground	Ignition switch off	Below 1 V
	Ignition switch ACC	Below 1 V

TESTER CONNECTION	CONDITION	SPECIFIED CONDITION
	Ignition switch ON	9 V or higher
K23-24 (IGPD) - Body ground	Ignition switch off	Below 1 V
	Ignition switch ACC	Below 1 V
	Ignition switch ON	9 V or higher
K13-21 (ACCD) - Body ground	Ignition switch off	Below 1 V
	Ignition switch ACC	8.5 V or higher
	Ignition switch ON	8.5 V or higher

NG ▶ **REPLACE CERTIFICATION ECU (SMART KEY ECU ASSEMBLY)**

Click here INFO

OK ▼

15.	**CHECK HARNESS AND CONNECTOR (POWER DISTRIBUTION BOX ASSEMBLY - BODY GROUND)**

(a) Disconnect the K20 power distribution box assembly connector.

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

Standard Resistance:

EWD INFO

Click Location & Routing(K20)
Click Connector(K20)

TESTER CONNECTION	CONDITION	SPECIFIED CONDITION
K20-36 - Body ground	Always	Below 1 Ω

OK ▶ **REPLACE POWER DISTRIBUTION BOX ASSEMBLY**

Click here INFO

NG ▶ **REPAIR OR REPLACE HARNESS OR CONNECTOR**

16.	**INSPECT POWER SWITCH**

Click here INFO

NG ▶ **REPLACE POWER SWITCH**

OK ▼

17.	**CHECK HARNESS AND CONNECTOR (CERTIFICATION ECU (SMART KEY ECU ASSEMBLY) - POWER SWITCH)**

(a) Disconnect the K13 certification ECU (smart key ECU assembly) connector.

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

Standard Resistance:

EWD INFO

Click Location & Routing(K13,K66)
Click Connector(K13)
Click Connector(K66)

TESTER CONNECTION	CONDITION	SPECIFIED CONDITION
K13-19 (SSW1) - K66-12 (SS1)	Always	Below 1 Ω
K13-27 (SSW2) - K66-6 (SS2)	Always	Below 1 Ω
K13-23 (SSW3) - K66-11 (SS3)	Always	Below 1 Ω
K13-30 (AGND) - K66-3 (GND)	Always	Below 1 Ω
K13-19 (SSW1) or K66-12 (SS1) - Other terminals and body ground	Always	10 kΩ or higher
K13-27 (SSW2) or K66-6 (SS2) - Other terminals and body ground	Always	10 kΩ or higher
K13-23 (SSW3) or K66-11 (SS3) - Other terminals and body ground	Always	10 kΩ or higher
K13-30 (AGND) or K66-3 (GND) - Other terminals and body ground	Always	10 kΩ or higher

OK ▶ **REPLACE CERTIFICATION ECU (SMART KEY ECU ASSEMBLY)**

Click here INFO

NG ▶ **REPAIR OR REPLACE HARNESS OR CONNECTOR**

18.	**INSPECT TRANSMITTER BATTERY**

NOTICE:

Do not wrap the lead wire ground a terminal, wedge it between terminals, or solder it. The terminal may be deformed or damaged, and the transmitter battery will not be able to be installed correctly.

Click here INFO

OK ▶ **REPLACE ELECTRICAL KEY TRANSMITTER SUB-ASSEMBLY**

NG ▶ **REPLACE TRANSMITTER BATTERY**