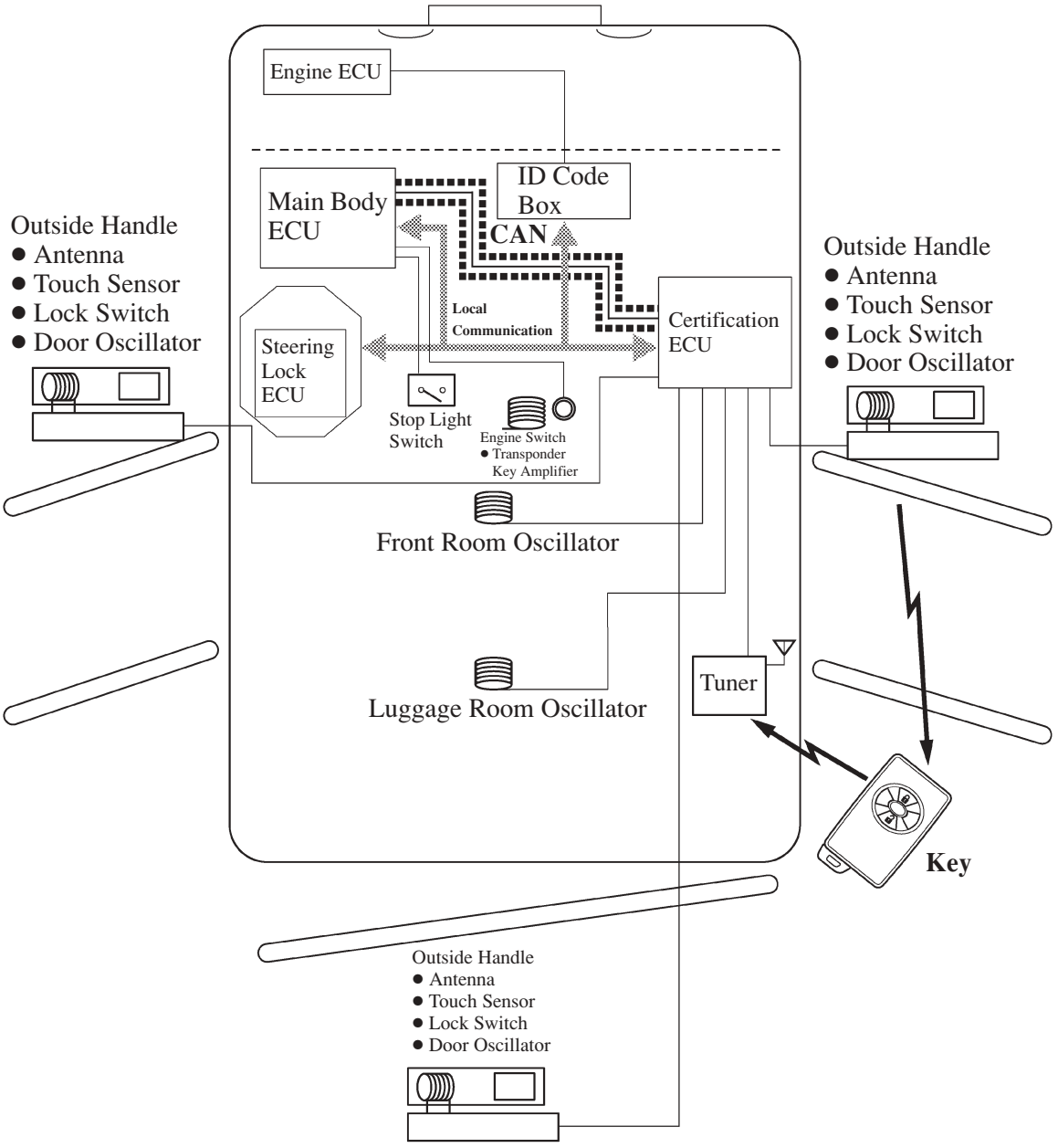
■ENTRY FUNCTION

1. System Diagram

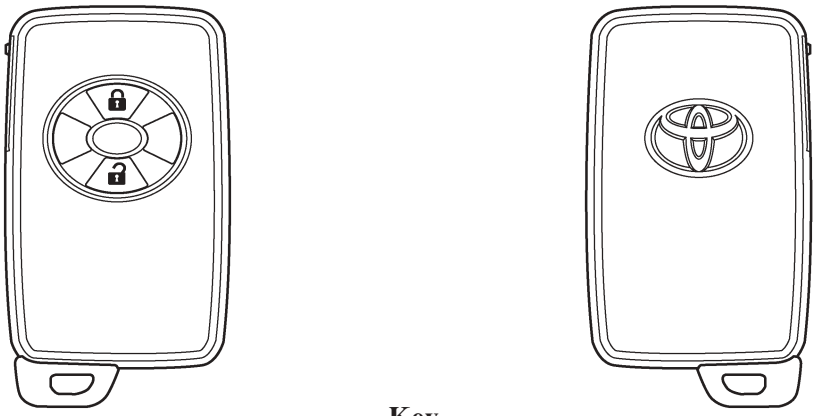
The certification ECU controls the entry function. The system diagram below shows the main components of the function.



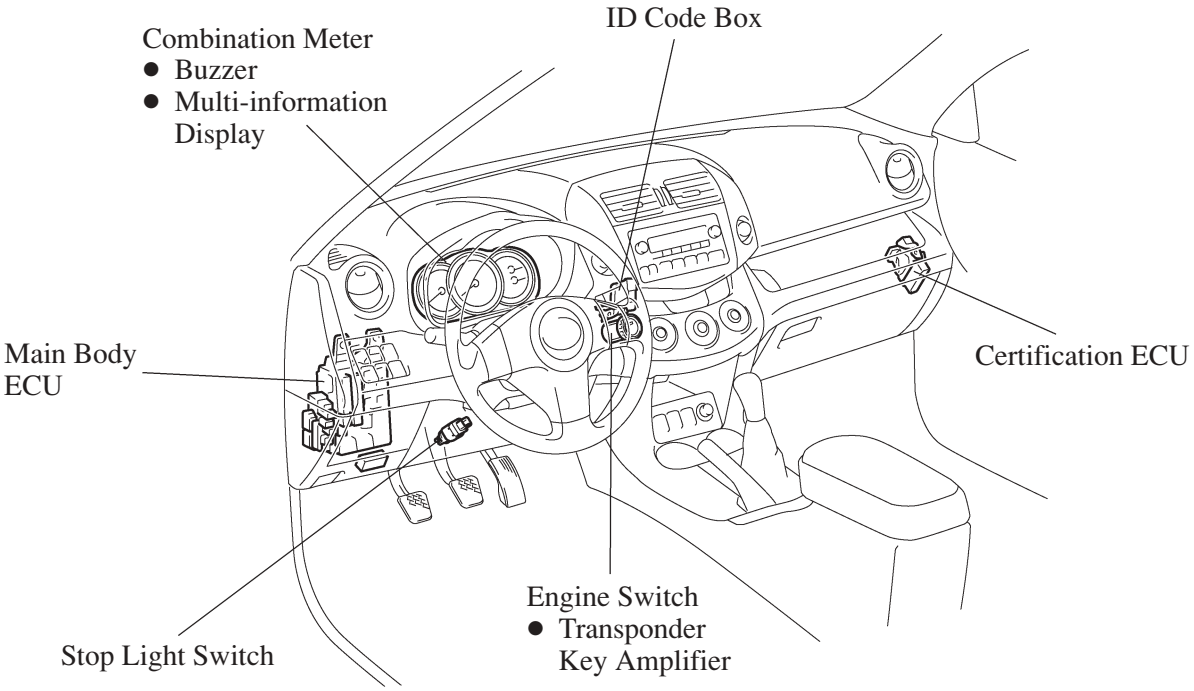
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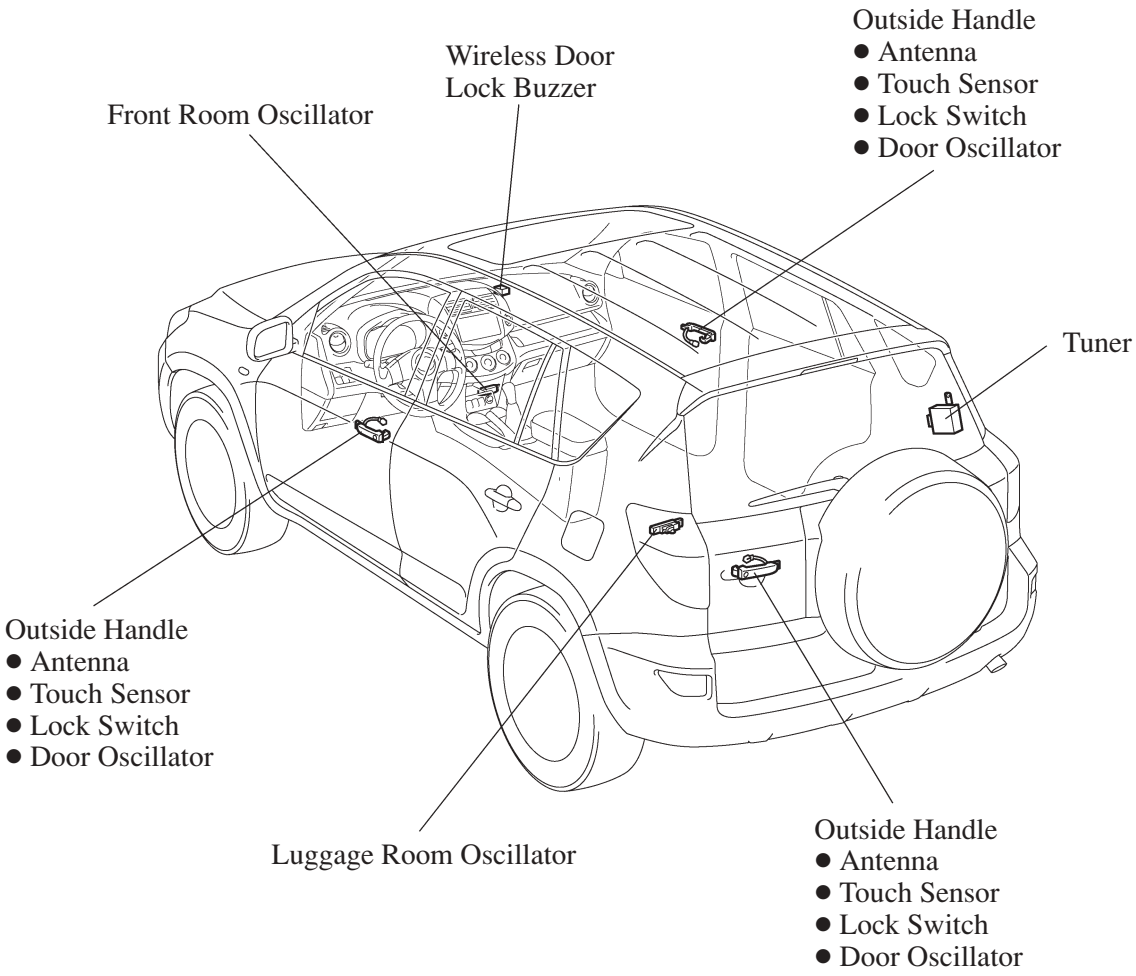
2. Layout of Main Components



Key



LHD Models


Outside Handle
● Antenna
● Touch Sensor
● Lock Switch
● Door Oscillator
Wireless Door
Lock Buzzer
Front Room Oscillator
Tuner
Outside Handle
● Antenna
● Touch Sensor
● Lock Switch
● Door Oscillator
Luggage Room Oscillator
Outside Handle
● Antenna
● Touch Sensor
● Lock Switch
● Door Oscillator

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3. Function of Main Components

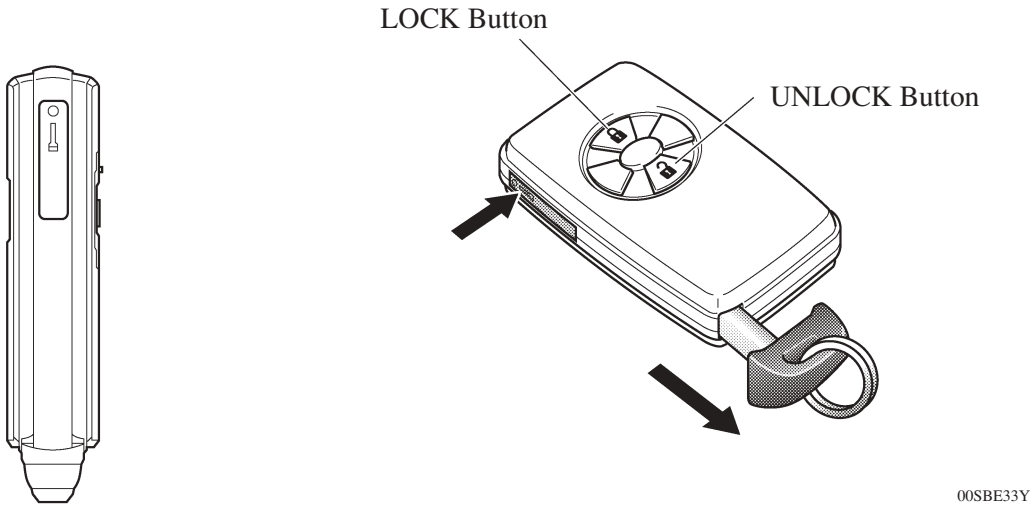
Component		Function
Key		● When receiving the request signals that are output by the room and door oscillators, outputs the information such as the key ID and vehicle ID. ● When a driver pushes the LOCK or UNLOCK button on the key, outputs the request signal. ● When receiving the radio wave that is output by the transponder key amplifier in the engine switch, outputs the information such as the key ID and vehicle ID. ● Integrates the mechanical key in order to unlock the doors when the ley battery is low.
Certification ECU		● Judges and certifies the key (valid or invalid). ● Controls the room and door oscillators, and the touch sensor. ● Transmits the door lock/unlock request signals during the entry function. ● Transmits the steering lock/unlock request signals. ● Transmits the engine immobilizer set/unset request signals. ● Records the ID codes between the certification ECU, ID code box, and steering lock ECU.
Main Body ECU		Controls the push button start system in accordance with the signals from the various switches, ECUs and combination meter. ● Transmits the key certification request signal to the certification ECU in accordance with the engine switch signal, and turns the relays ON and OFF. ● Receives the request signal from the certification ECU and actuates the door lock motor to unlock or lock all the doors and back door. ● Transmits each door condition to the certification ECU.
ID Code Box		Receives the steering unlock or engine immobilizer unset request signals from the certification ECU, certifies them, and transmits each signal to the steering lock ECU or engine ECU.
Outside Handle	Antenna	Transmits the request signals.
	Touch Sensor	Transmits the door unlock request signal to the certification ECU.
	Lock Switch	Transmits the door lock request signal to the certification ECU.
	Door Oscillator ● Front RH, LH and Back	Receives the request signal from the certification ECU, and forms the actuation area around each door.
Room Oscillator ● Front and Luggage		Receives the request signal from the certification ECU, and forms the actuation area in the vehicle interior.
Tuner		Receives the ID code from the key in the actuation area and transmits it to the certification ECU.
Stop Light Switch		Outputs the state of the brake pedal to the main body ECU.
Wireless Door Lock Buzzer		When the certification ECU detects human errors, it warns the driver by sounding the wireless door lock buzzer, displaying the multi-information display and sounding the buzzer in the combination meter in accordance with the request signal from the ECU.
Combination Meter	Multi-information Display	
	Buzzer	

4. Construction and Operation

Key

The key consists of a mechanical key, transmitter for the wireless door lock remote control, transceiver for the smart entry & start system, and transponder chip for the engine immobilizer control.

- The transceiver for the smart entry & start system receives the signals from the oscillators and returns the ID code to the tuner.
- The transmitter for the wireless door lock remote control has a LOCK button and UNLOCK button.
- When the key battery is low, the transponder chip for the engine immobilizer control returns to the engine switch the radio wave response received from the engine switch.
- This mechanical key works for the driver door, back door storage extension and glove box, but cannot start the engine.



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Oscillator (Front LH & RH Doors, Front and Luggage Rooms and Back Door)

Each oscillator transmits the request signal received from the certification ECU, and forms a key actuation area to detect the presence of a key.
The actuation area formed by front LH & RH door oscillators and back door outer oscillator are approximately 0.7 to 1.0 m (27.6 to 39.4 in.) from the outside handle of the front LH & RH doors, or the center of the rear bumper.

- The actuation area of the front LH & RH door oscillators are formed by transmitting a request signal every 250 ms while the power source mode is OFF and each door is locked. In this way it detects the proximity of a key. During entry lock, the actuation area is formed with the lock switch ON.
- The actuation area of the front and luggage room oscillators are formed when the driver door is opened or closed, during start ignition, when a warning is activated, or when the lock switch is ON.

5. Entry Function Operation

General

The entry function has the following functions.

Function	Outline
Wireless Door Lock Remote Control	This function is a convenient system for locking and unlocking all the doors and back door at a distance. The operation of this function in the smart entry & start system is the same as that in the wireless door lock remote control system. For details, see page BE-84. However, the receiver in the certification ECU uses a tuner to perform the control.
Entry Unlock [See page BE-113]	When a key is located in any actuation area of the door oscillator, all the doors and back door will be unlocked with the touch of an outside door handle.
Entry Lock [See page BE-114]	When a key is located in any actuation area of the door oscillator and the power source mode is OFF, all the doors and back door will be locked by merely pressing the lock switch on the outside door handle.
Prevention of Key Confinement [See page BE-115]	Prevents the confinement of the key if all the doors and back door are locked from the outside door handle while the key is still inside the vehicle.
Warning [See page BE-116]	The smart entry & start system causes the certification ECU to sound the buzzer in the combination meter and the wireless door lock buzzer, and display the multi-information display in order to alert the driver.
Battery Saving [See page BE-122]	This function extends the signal transmission (between the system and key) interval from 250 ms to 750 ms, or automatically deactivates the smart entry & start system in order to prevent the vehicle and/or key battery from being drained.

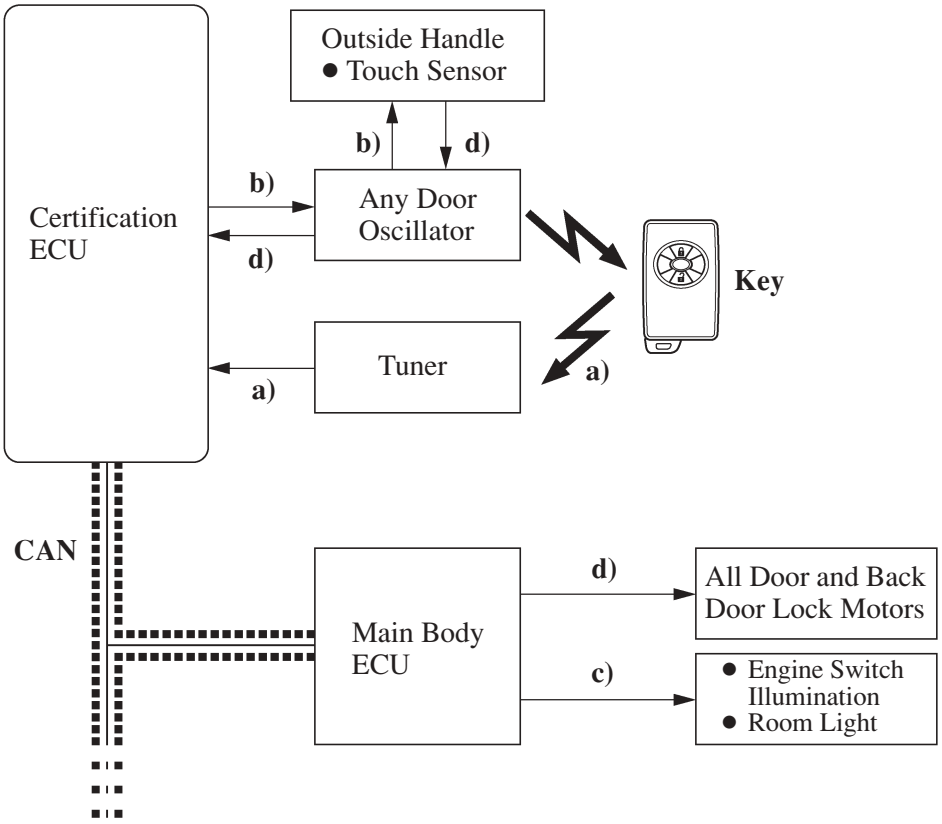
Entry Unlock

a) When a key enters any actuation area of the door oscillators, the certification ECU judges and certifies the key ID code received from the tuner.

b) After the key ID is certified, the certification ECU transmits an unlock stand-by signal to the touch sensor of the relevant door.

c) At the same time, the certification ECU transmits a lighting signal for each illumination (engine switch illumination and room light) via the main body ECU, and turns on these illuminations. (Entry Illumination Function)

d) If the touch sensor is touched in this condition, the certification ECU transmits a door unlock request signal to the main body ECU, and unlocks all the doors and back door.



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Entry Lock

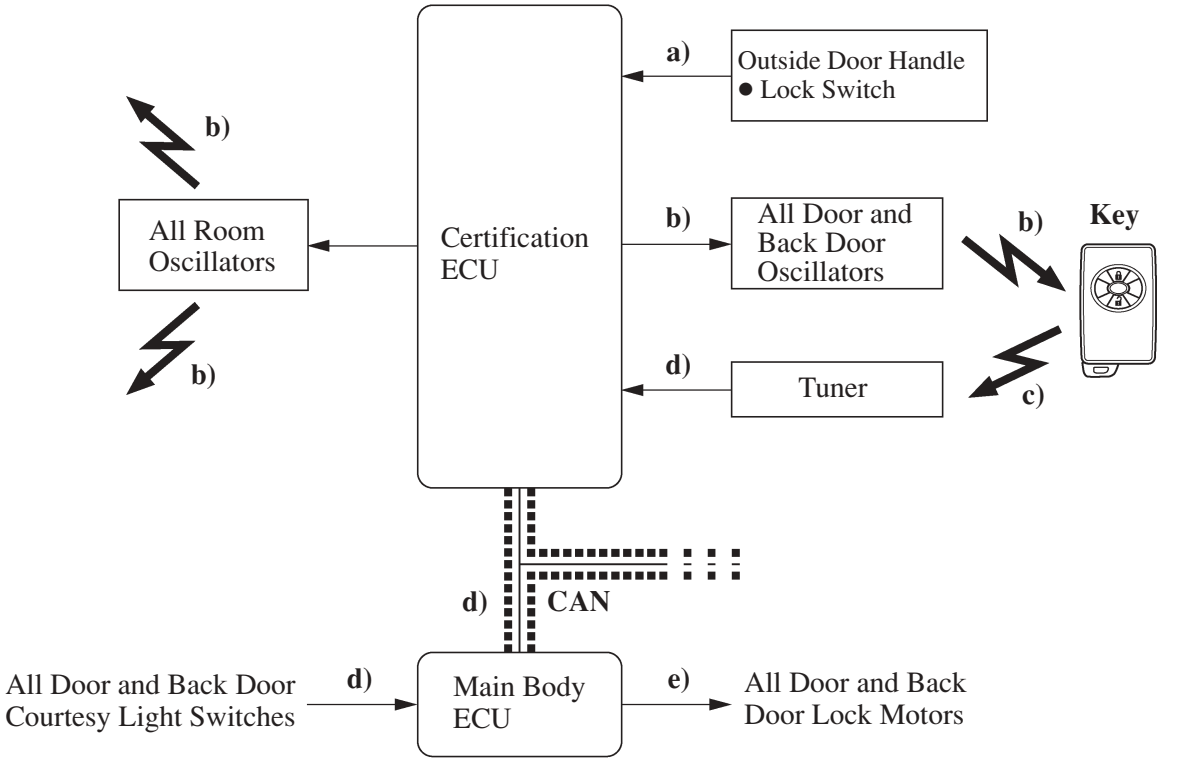
a) The lock signal is transmitted to the certification ECU when the driver exits the vehicle with the key carried in the driver's possessions and presses the lock switch.

b) The certification ECU transmits a request signal for all the doors, back door and room oscillators to form actuation areas.

c) The key transmits the ID code to the tuner.

d) The certification ECU judges and certifies the ID code from the tuner. It then checks the location of the key, and when all the doors and back door are closed, the ECU transmits a door lock request signal to the main body ECU.

e) The main body ECU actuates the door lock motors to lock all the doors and back door.



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Prevention of Key Confinement

1) General

This function has two system operations: inside interior room and luggage compartment.

2) Inside Interior Room and Luggage Compartment

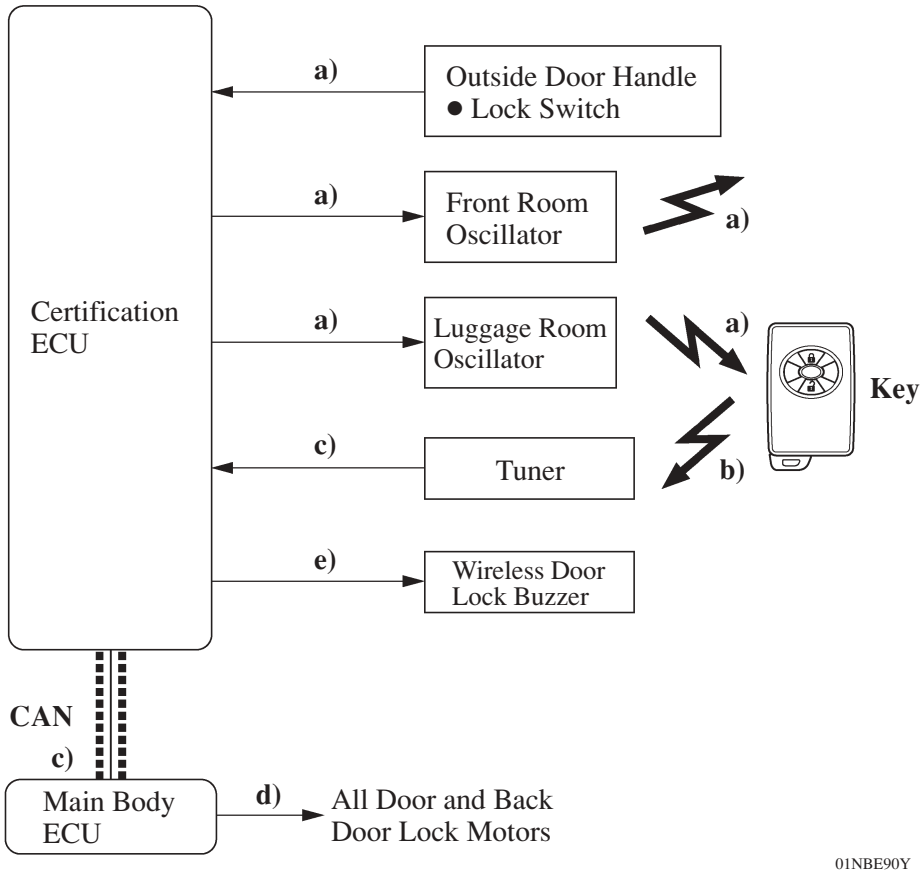
a) When the door is locked from the lock switch while the key is still inside the vehicle, the certification ECU transmits a request signal for the front and luggage room oscillators to form a actuation area.

b) The key transmits the ID code to the tuner.

c) The certification ECU judges and certifies the ID code, and checks the location of the key. The ECU transmits a door unlock request signal to the main body ECU.

d) The main body ECU receives the signal and operates each door lock motor to unlock all the doors and back door.

e) The certification ECU sounds the wireless door lock buzzer for 2 seconds as a response to unlock.



Warning

1) General

When any of the situations below occur, the smart entry & start system causes the certification ECU to sound a buzzer in the combination meter and the wireless door lock buzzer, and display the multi-information display in order to alert the driver.

Situation	Condition
A (A/T Models Only)	The shift lever is in a position other than "P" and the power source mode is a mode other than "OFF".
B	The driver door is opened while the steering is unlocked.
C (A/T Models Only)	The shift lever is in "P" and power source mode is a mode other than "OFF".
D	The entry lock is operated while any of the doors is open.
E	The occupant leaves with the key.
F	The engine switch is operated while the key is outside the actuation area.
G	The entry lock is operated while the key is inside the vehicle.
H	The key battery is low.
I	The steering lock cannot be released.
J	A steering lock ECU malfunction has been detected.
K	A main body ECU malfunction has been detected.
L	The system assumes that the driver is unfamiliar with the proper way to start the engine.
M (M/T Models Only)	A clutch start switch malfunction has been detected.

2) Situation: A (A/T Models Only)

There are two patterns for situation A.
Pattern 1. The door is opened and the user tries to leave the vehicle.
Pattern 2. In addition to the pattern1, the user holds the key and tries to move away from the vehicle.
In these situations the following control is performed.

Pattern 1.

Possible Effects without Warning		Sudden vehicle start, vehicle theft, vehicle roll-away
Warning Condition		The certification ECU gives a warning when all the following conditions are satisfied. ● Shift lever is except "P". ● Power source mode is except "OFF". ● Driver door is opened. ● Vehicle speed is 0.
Warning Stop Condition		The warning is stopped when one of the following conditions is met. ● Power source mode is "OFF". ● Shift lever is "P". ● Driver door is closed. ● Vehicle speed is above 0.
Combination Meter	Buzzer	Continuous sound

Pattern 2.

Possible Effects without Warning		Sudden vehicle start, vehicle theft, vehicle roll-away
Warning Condition		The certification ECU gives a warning when all the following conditions are satisfied. ● Shift lever is except "P". ● Power source mode is except "OFF". ● The state of the driver door changed from open to close. ● Vehicle speed is 0. ● Key is not in the vehicle.
Warning Stop Condition		The warning is stopped when one of the following conditions is met. **Key is in the vehicle:** ● Combination meter buzzer & wireless door lock buzzer stop sounding. ● Multi-information display contents only show "SHIFT TO P RANGE". **Vehicle speed is available:** ● Combination meter buzzer & wireless door lock buzzer stop sounding. ● Multi-information display contents only show "KEY IS NOT DETECTED". **Power source mode is except "ON":** ● All warnings stop.
Combination Meter	Buzzer	Continuous sound
	Multi-information Display Contents	Alternately show "SHIFT TO P RANGE" and "KEY IS NOT DETECTED".
Wireless Door Lock Buzzer		Continuous sound

3) Situation: B

In this situation the following control is performed.

Possible Effects without Warning		Vehicle theft
Warning Condition		The certification ECU gives a warning when one of the following conditions is met. ● Power source mode is "ACC " or "OFF" and driver door is opened. ● Power source mode is "OFF", steering is unlocked and driver door is opened.
Warning Stop Condition		The warning is stopped when one of the following conditions is met. ● Power source mode is "IG-ON" or driver door is closed. ● Power source mode is "OFF" and steering is locked.
Combination Meter	Buzzer	Intermittently sounds

4) Situation: C (A/T Models Only)

There are two patterns for situation C.
Pattern 1. When the shift lever is in "P", the door is closed and the user holds the key and tries to move away from the vehicle.
Pattern 2. In addition to the pattern 1, the user tries to use the entry lock and presses the lock switch.
In these situations the following control is performed.

Pattern 1.

Possible Effects without Warning		Vehicle theft, engine cannot be restarted
Warning Condition		The certification ECU gives a warning when all the following conditions are satisfied. ● Shift lever is "P". ● Power source mode is except "OFF". ● The state of the driver door changed from open to close. ● Key is not in the vehicle.
Warning Stop Condition		The warning is stopped when one of the following conditions is met. ● Power source mode is "OFF" ● Key is in the vehicle.
Combination Meter	Buzzer	Sound once
	Multi-information Display Contents	"KEY IS NOT DETECTED"
Wireless Door Lock Buzzer		Sounds three times

Pattern 2.

Possible Effects without Warning	Vehicle theft
Warning Condition	The certification ECU gives a warning when all the following conditions are satisfied. ● Shift lever is "P". ● Power source mode is except "OFF". ● All doors are closed. ● Key is not in the vehicle. ● Lock switch is pushed.
Warning Stop Condition	The warning is stopped when one of the following conditions is met. ● Power source mode is "OFF" and key is not in the vehicle. (Certification result for the outside of the vehicle is NG.) ● Key is in the vehicle. (Certification result for the inside of the vehicle is OK and that for the outside of the vehicle is NG.)
Wireless Door Lock Buzzer	Sounds for two seconds

5) Situation: D

In this situation the following control is performed.

Possible Effects without Warning		Vehicle theft
Warning Condition		The certification ECU gives a warning when all the following conditions are satisfied. ● Power source mode is "OFF". ● Any door is opened. ● The entry lock is operated.
Warning Stop Condition		The warning is stopped when one of the following conditions is met. ● Power source mode is "IG-ON". ● All doors are closed. ● Wireless door lock remote function is unlocked. ● The entry unlock is operated. ● 10 seconds has elapsed.
Wireless Door Lock Buzzer		Continuous sound

6) Situation: E

In this situation the following control is performed.

Possible Effects without Warning		Engine cannot be restarted
Warning Condition		The certification ECU gives a warning when all the following conditions are satisfied. ● Power source mode is in the mode other than "OFF". ● The state of the any door other than the driver door changed from open to close. ● Vehicle speed is 0. ● Key is not in the vehicle.
Warning Stop Condition		The warning is stopped when one of the following conditions is met. ● Power source mode is "OFF". ● Vehicle speed is above 0. ● Key is in the vehicle.
Combination Meter	Buzzer	Sounds once
	Multi-information Display Contents	"KEY IS NOT DETECTED"
Wireless Door Lock Buzzer		Sounds three times

7) Situation: F

In this situation the following control is performed.

Possible Effects without Warning		Confuses the driver
Warning Condition		The certification ECU gives a warning when all the following conditions are satisfied. ● Engine switch is pushed. ● Key is not in the vehicle.
Combination Meter	Buzzer	Sounds once
	Multi-information Display Contents	"KEY IS NOT DETECTED" (Stops displaying after 8 seconds have elapsed.)

8) Situation: G

In this situation the following control is performed.

Possible Effects without Warning	Vehicle theft
Warning Condition	The certification ECU gives a warning when all the following conditions are satisfied. ● Power source mode is "OFF". ● All doors are closed. ● Lock switch is "ON". ● Key is in the vehicle.
Wireless Door Lock Buzzer	Sounds for two seconds

9) Situation: H

In this situation the following control is performed.

Possible Effects without Warning		Smart entry & start system does not function
Warning Condition		The certification ECU gives a warning when all the following conditions are satisfied. ● Power source mode switches to "OFF" after being left in "IG-ON" for over 20 minutes. ● Key battery voltage is low. ● Key is in the vehicle.
Combination Meter	Buzzer	Sounds once
	Multi-information Display Contents	"LOW KEY BATTERY"

10) Situation: I

In this situation the following control is performed.

Possible Effects without Warning	Smart entry & start system does not function
Warning Condition	The steering lock does not release when performing the release operation, preventing the engine from starting.
Multi-information Display Contents	"S/T IS NOT UNLOCKED" (Stops displaying after 15 seconds have elapsed.)
Engine Switch Indicator Light	Green color blinks in 1-second cycles (Stops blinking after 15 seconds have elapsed.)

11) Situation: J

In this situation the following control is performed.

Possible Effects without Warning	Engine cannot be started
Warning Condition	Internal malfunction in the steering lock ECU has been detected
Warning Stop Condition	Internal malfunction in the steering lock ECU has cleared
Multi-information Display Contents	"CHECK S/T LOCK"
Engine Switch Indicator Light	Amber color blinks in 2-second cycles

12) Situation: K

In this situation the following control is performed.

Possible Effects without Warning	Engine cannot be started
Warning Condition	Internal malfunction in the main body ECU has been detected
Warning Stop Condition	Internal malfunction in the main body ECU has cleared
Engine Switch Indicator Light	Amber color blinks in 2-second cycles

13) Situation: L

In this situation the following control is performed.

Possible Effects without Warning		Smart entry & start system does not function
Warning Condition		The certification ECU gives a warning when all the following conditions are satisfied. ● Power source mode is in the mode other than "IG-ON". ● The state of the any door other than the driver door changed from open to close. ● Power source mode is selected from "OFF" to "ACC" two or more times without starting the engine.
Warning Stop Condition		The warning is stopped when one of the following conditions is met. ● 10 seconds have elapsed after the warning. ● Power source mode is "OFF". ● Power source mode is "IG-ON".
Combination Meter	Multi-information Display Contents	A/T Models: "DEPRESS THE BRAKE PEDAL" M/T Models: "DEPRESS THE CLUTCH PEDAL"
Wireless Door Lock Buzzer		Sounds three times

14) Situation: M (M/T Models Only)

In this situation the following control is performed.

Possible Effects without Warning	Engine cannot be started
Warning Condition	The certification ECU gives a warning when all the following conditions are satisfied. ● Power source mode is "OFF". ● Driver door is opened after detecting that the clutch start switch has been ON for 5 minutes or more.
Warning Stop Condition	The warning is stopped when one of the following conditions is met. ● 15 seconds has elapsed. ● The clutch start switch is detected to be normal condition.
Engine Switch Indicator Light	Green color blinks in 1-second cycles

Battery Saving

1) Vehicle Battery Saving Function

In the smart entry & start system, signals are emitted outside of the vehicle at a prescribed interval (250 ms) when the doors are locked. Therefore, the vehicle battery could be drained if the vehicle remains parked for a long time. For this reason, the controls listed below are effected.

Condition	Control
No response from key for more than 5 days	Signal transmission interval is extended from 250 ms to 750 ms.
No response from key for more than 14 days	Automatically deactivates the smart entry & start system.

▶ Reinstatement Conditions ◀

- A wireless door lock remote control signal (lock, unlock, or back door open) is input and the key ID matches.
- A driver carries the key and pushes the lock switch of the outside door handle.
- A door is locked or unlocked by the mechanical key.

2) Key Battery and Vehicle Battery Saving Function

In the smart entry & start system, if the key is constantly located within the vehicle exterior actuation area of the door oscillators, the system maintains periodic communication with the key. Therefore, if the vehicle remains parked in that state for a long time, the key battery and the vehicle battery could be drained.
For this reason, if this state continues longer than 10 minutes, the smart entry & start system automatically becomes deactivated.

▶ Reinstatement Conditions ◀

- A wireless door lock remote control signal (lock, unlock, or back door open) is input and the key ID matches.
- A driver carries the key and pushes the lock switch of the outside door handle.
- A door is locked or unlocked by the mechanical key.

Service Tip

Leaving the key close to electrical appliances that emit radio waves could cause the key to accidentally respond, which could cause the key battery to become quickly depleted.