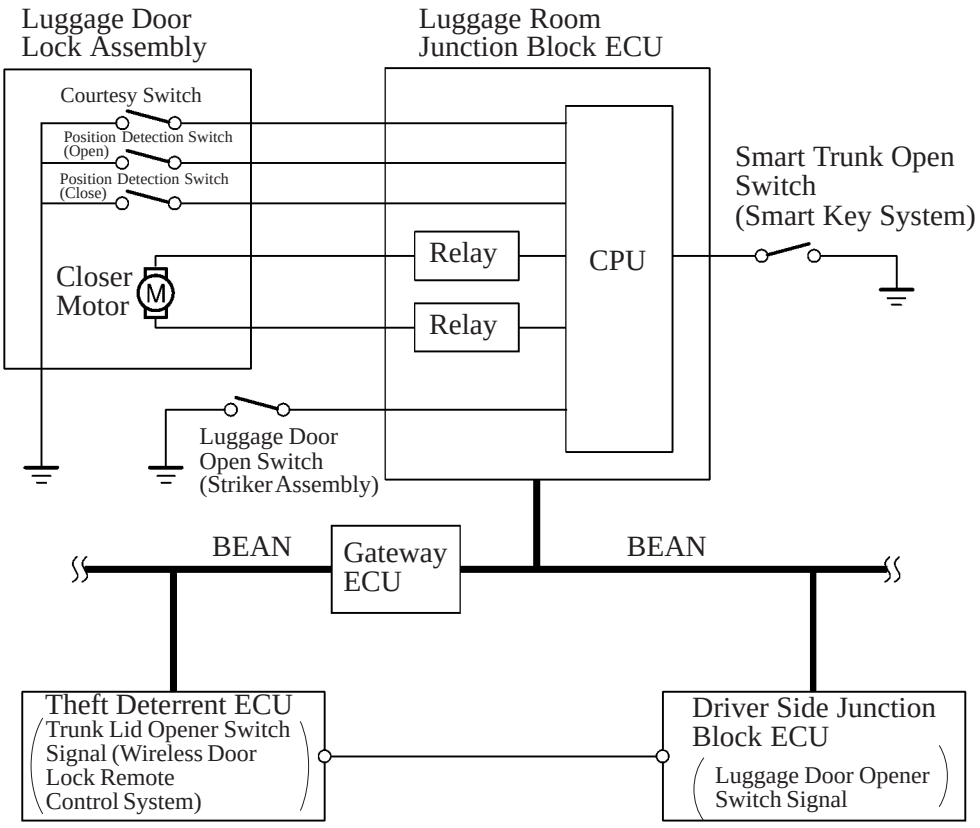
■LUGGAGE DOOR OPENER AND CLOSER SYSTEM

1. General

- The luggage door opener and closer system has been adopted as standard equipment.
  A single actuator to perform both the opener and closer functions is provided in the luggage door lock assembly to achieve a lightweight and compact configuration.
  The closer function automatically closes the luggage door entirely even if only a light pressure is applied to close the luggage door in order to realize excellent ease of use.
- A jam protection function has been adopted so that if the presence of a foreign object is detected between the luggage door and the body while the system is in the closer mode, the system stops this mode and transfers to the opener mode.
- While this system is operating in the closer mode, if the trunk lid opener switch of the transmitter or the smart trunk open switch (smart key system) or the luggage door opener switch is pressed, or if the luggage door key cylinder is turned, the system cancels its operation and opens the luggage door.
- This system is controlled by the luggage room junction block ECU. In accordance with the signals received from the switches, the ECU controls the opener or closer function by actuating the closer motor in order to push and turn the latch.
  The luggage room junction block ECU transmits its signals via the BEAN (Body Electronics Area Network) and belongs to the steering column bus.

▶ System Diagram ◀



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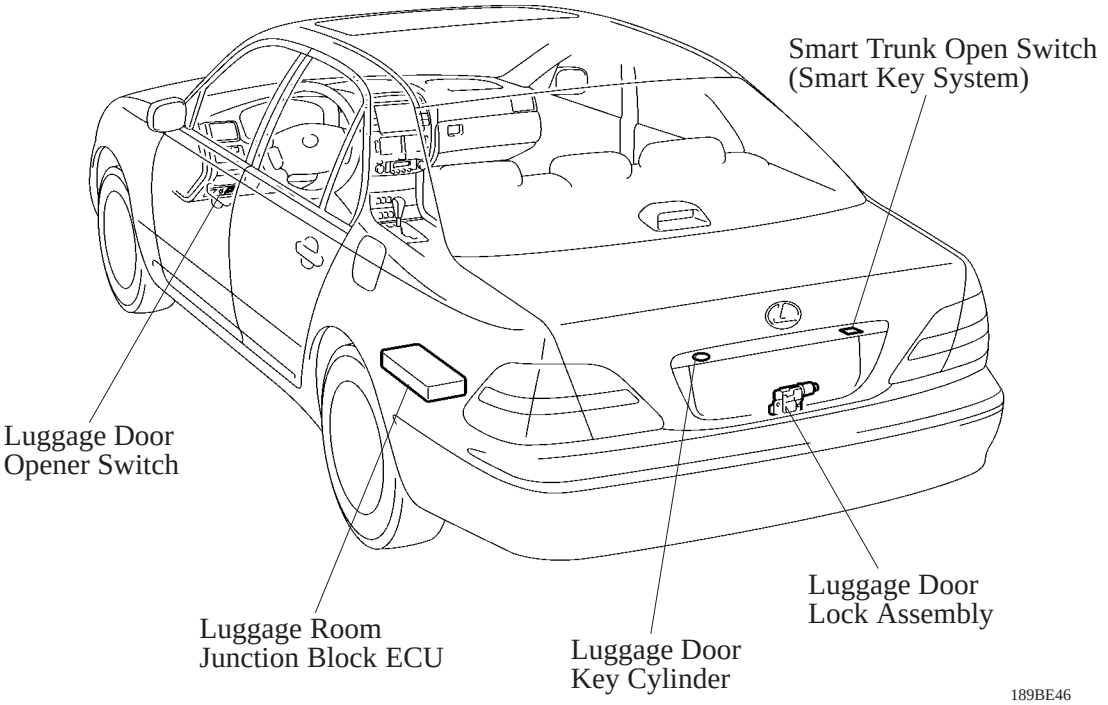
2. Layout of Main Components



3. Function of Main Components

The luggage door opener and closer system mainly consists of a luggage door lock assembly and the luggage room junction block ECU. The luggage door lock assembly contains switches and a motor. The constituent parts provide the functions listed below.

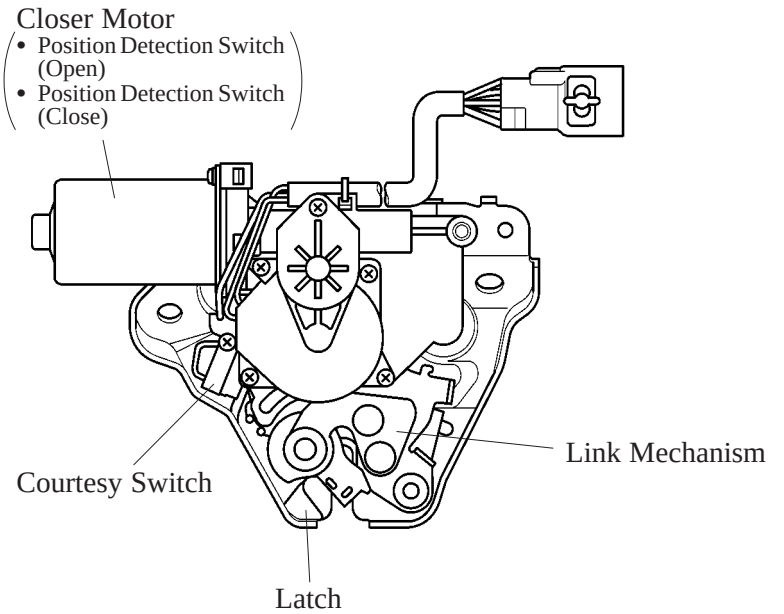
Components	Function
Luggage Door Lock Assembly	The luggage door lock assembly provides both the opener and closer functions. In accordance with the signals received from the switches, the luggage door lock assembly automatically closes the luggage door that is ajar to the fully closed state. This is accomplished by actuating the closer motor to push and turn the latch in order to pull the striker in. Upon receiving the open signals from the switches, the system actuates the motor to disengage the latch from the link mechanism in order to free the latch. As a result, the striker disengages from the latch, enabling the luggage door to open.
Courtesy Switch	• Changing the switch signal from ON to OFF causes the closer function to start. Furthermore, while the system operates in the closer mode, if the switch detects that the luggage door has been mechanically opened through the operation of the luggage door key cylinder, it transmits a signal to the luggage room junction block ECU. Upon receiving this signal, the ECU initializes the system to the open completion state. • The luggage room light illuminates while this switch outputs an ON signal (with the luggage door open).
• Position Detection Switch (Open) • Position Detection Switch (Close)	The rotating position of the closer motor is detected through the ON/OFF patterns of the two switches and their signals are transmitted to the luggage room junction block ECU.
Closer Motor	Actuated by the signals from the luggage room junction block ECU, the closer motor performs both the closer and opener functions.
Luggage Door Striker Assembly	The luggage door striker assembly is mounted on the body. The engagement of the pole portion of the striker with the latch causes the luggage door to lock.
Luggage Door Open Switch	Detects whether the luggage door is open or closed and transmits an applicable signal to the luggage room junction block ECU.
Luggage Room Junction Block ECU	Controls the luggage opener and closer system in accordance with the signals received from the switches.
Luggage Door Open Switch	Mounted on the luggage door striker assembly, this switch is used for detecting whether the luggage door is open or closed and for transmitting an applicable signal to the luggage room junction block ECU.
Smart Trunk Open Switch*	Detects that the smart trunk open switch of the smart key system has been pressed and transmits an applicable signal to the luggage room junction block ECU.
Theft Deterrent ECU	In the wireless door lock remote control function, if the trunk lid opener switch on the transmitter is pressed, the theft deterrent ECU transmits a signal to the luggage room junction block ECU via the BEAN.
Driver Side Junction Block ECU	When the luggage door opener switch is pressed, the driver side junction block ECU transmits a signal to the luggage room junction block ECU via the theft deterrent ECU.

*: with Smart Key System

4. Construction and Operation

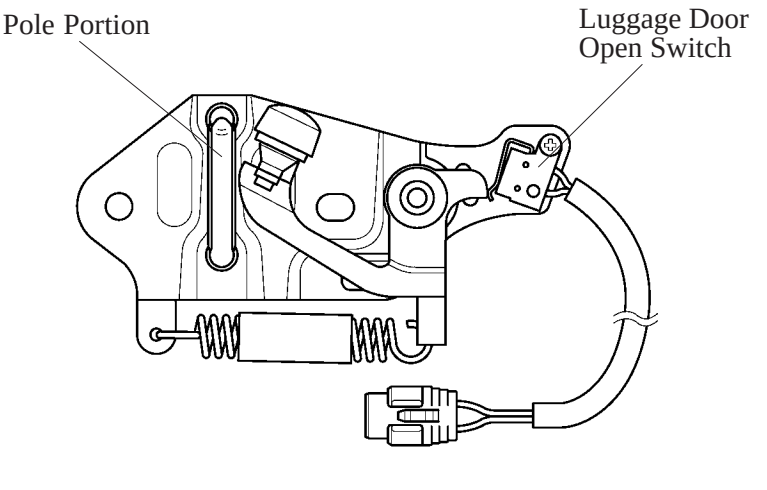
Luggage Door Lock Assembly

- The luggage door lock assembly is mounted on the luggage door and consists mainly of a link mechanism and a closer motor. It provides two functions: the closer function to automatically close the luggage door, and the opener function to disengage the striker from the luggage door latch.
- The luggage door lock assembly contains 1 courtesy light switch and 2 position (open and closed) detection switches in the closer motor.



Luggage Door Striker Assembly

- The luggage door striker assembly is mounted on the body. The engagement of the pole portion of the striker with the latch of the luggage door lock assembly causes the luggage door to lock.
- A luggage door open switch is used for detecting whether the luggage door is open or closed.



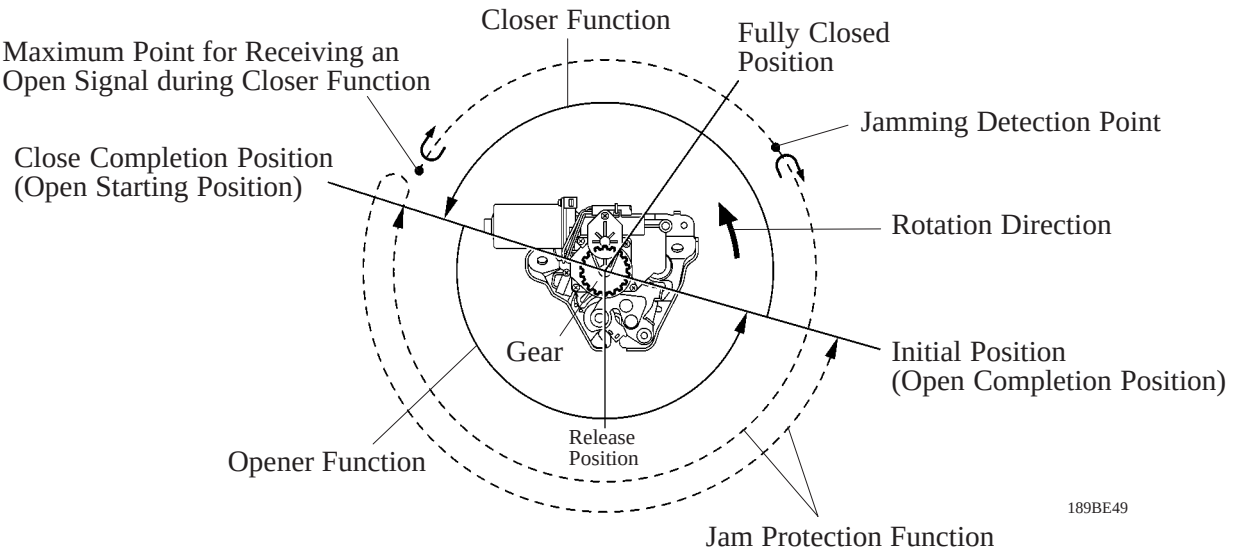
Luggage Room Junction Block ECU

1) General

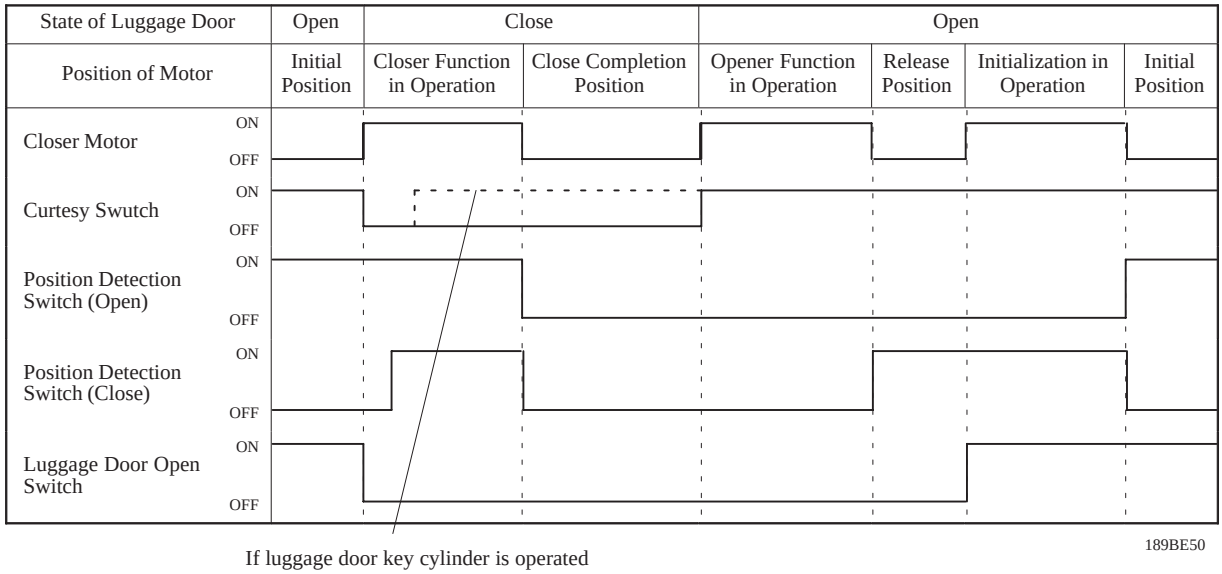
- When this system is in the opener mode, it actuates the closer motor in order to free the latch by disengaging the latch from the link mechanism under one of the following conditions:
  An open request signal from the wireless door lock remote control system or an open request signal from the luggage door opener switch is received by the ECU.
  A change in the courtesy switch signals from OFF to ON, which is caused by the operation of the luggage door key cylinder, is received by the ECU.
  At this time, because the hinges of the luggage door apply tension to the door in the open direction, the pole portion of the striker disengages from the latch.
- In the closer mode, this system operates as follows: when the state of the luggage door changes from open to ajar, the signal from the courtesy light switch changes from ON to OFF.
  Upon receiving this signal, the ECU actuates the motor in order to push and turn the latch via the link mechanism. As a result, the latch engages with the pole portion of the striker in order to fully close the luggage door.
- A jam protection function has been adopted so that if the position detection switches cannot detect a close completion position after the system has started its closer function, the system determines that an abnormal condition has occurred (such as the detection of a jammed object) in the closer function. Then, the system stops the operation of the closer function and transfers to the opener function.

2) Operation

- In the luggage door opener and closer system, after the motor rotates the gears approximately 180 degrees from its initial position (open completion position) to change the state of the luggage door from ajar to fully closed, the motor stops.
  Then, the motor rotates the gears from the close completion position (open starting position) to the release position in order to free the latch by disengaging the latch from the link mechanism. After disengaging the pole portion of the striker from the latch, the motor stops in this position.
  In this manner, the motor stops before reaching the initial position (open completion position) for the time being. Because the switches are thus not in their initial state, the system is prevented from executing the closer function, such as when prompted by the sluggishness of the luggage door.
  Thereafter, when the system detects that the state of the luggage door open switch has changed from OFF to ON (because the door has opened), it actuates the motor to rotate the gears to the initial position (open completion position) and stops the motor. The switches will then return to their initial state.
- In the jam protection function, if the system detects the jamming of an object, it reverses the motor just before it reaches the full lock position and actuates the motor until the close completion position (open starting position) has been reached.
  At this time, the latch becomes free by disengaging from the link mechanism. As a result, the pole portion of the striker disengages from the latch. Thereafter, the system actuates the motor in the forward direction to return to its initial position (open completion position).
- While the system is operating in the closer mode, if a signal that indicates that the luggage door has been opened (such as from the trunk lid opener switch (wireless door lock remote control system), trunk lid opener push switch (smart key system), luggage door opener switch, or the courtesy switch through the operation of the luggage door key cylinder), the system stops the closer function. Then, it reverses the motor, just as in the jam protection function. In this manner, the system cancels its operation and opens the luggage door regardless of its condition.



- The timing chart below shows the basic operation of the luggage door opener and closer system.



3) Fail-safe

If a system malfunction is detected by the luggage room junction block ECU, the ECU stops the system. However, even if the system is deactivated, the luggage door can be opened and closed manually.