

POWER BACK DOOR SYSTEM

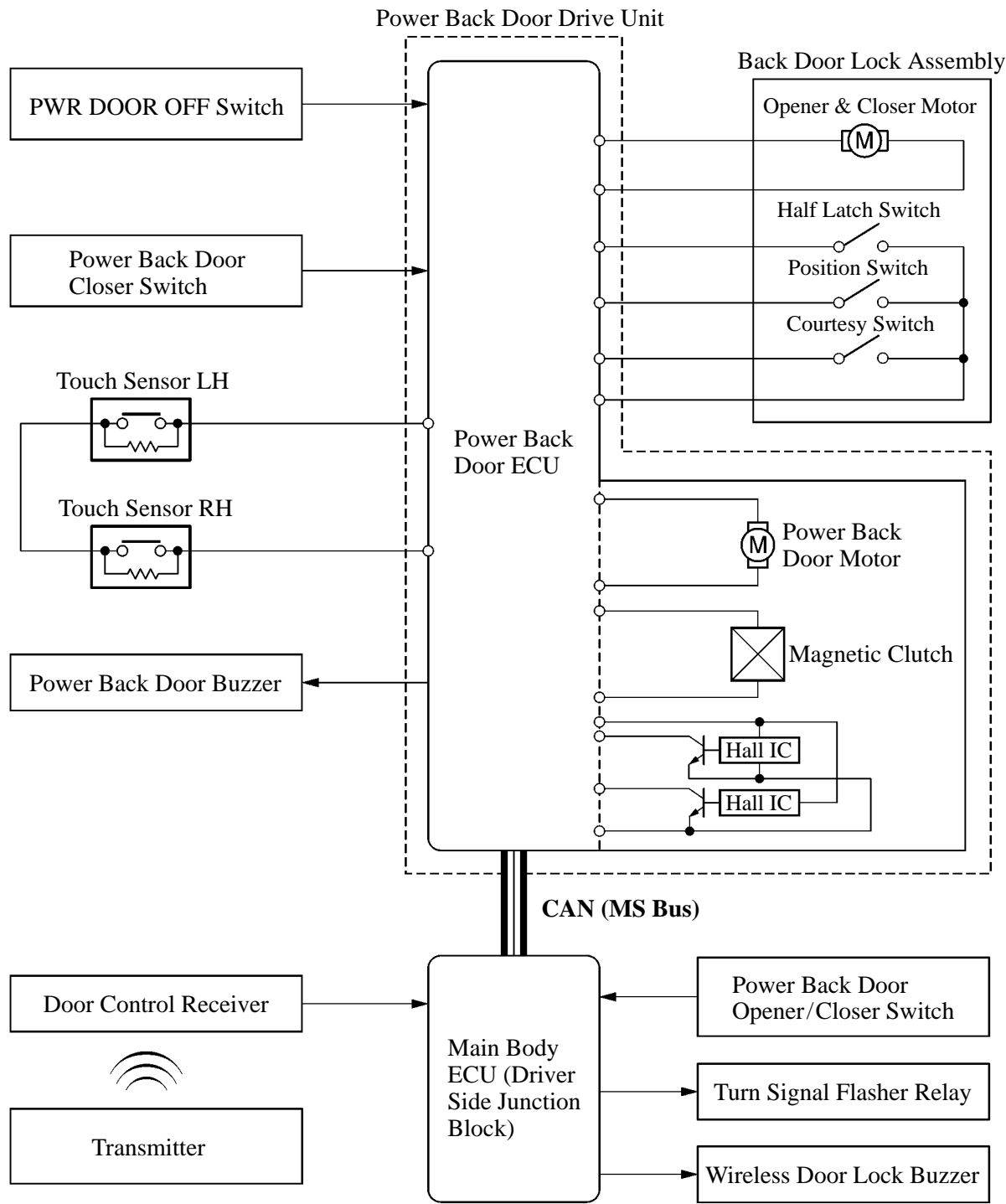
■ DESCRIPTION

The power back door system enables the back door to be opened and closed automatically by a motor in accordance with signals from the power back door opener/closer switch or the power back door button on the transmitter.

In addition, a power back door closer switch has been provided on the back door for convenience.

- The power back door system is standard equipment on the Platinum grade and optional equipment on the Limited grade.
- This system is controlled by the power back door ECU. The power back door ECU is built into the power back door drive unit.
- This system is activated when the following conditions are all met:
 - PWR DOOR OFF switch is OFF (the power back door opener has not been disabled using the switch).
 - Shift lever is in the “P” position.
 - Vehicle speed is 5 km/h (3 mph) or less.
- This system has a one-motion opener function to secure usability. This function allows the power back door to be opened from a locked state without the need to unlock it first.

■ SYSTEM DIAGRAM

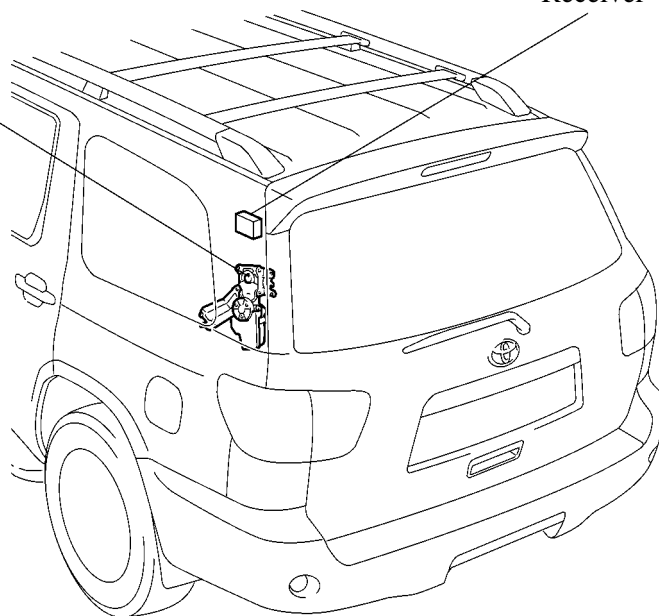


■ LAYOUT OF MAIN COMPONENTS

Power Back Door Drive Unit

- Power Back Door ECU
- Power Back Door Motor
- Magnetic Clutch

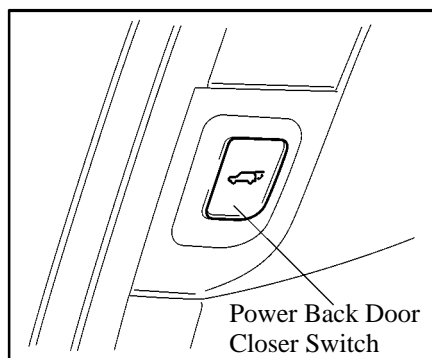
Door Control Receiver



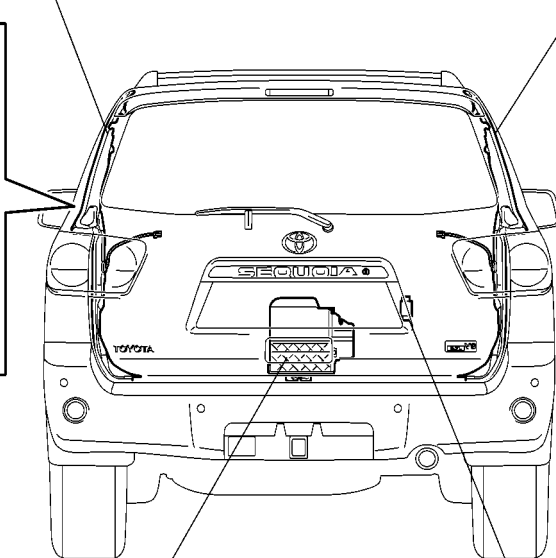
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Touch Sensor LH

Touch Sensor RH



Power Back Door Closer Switch

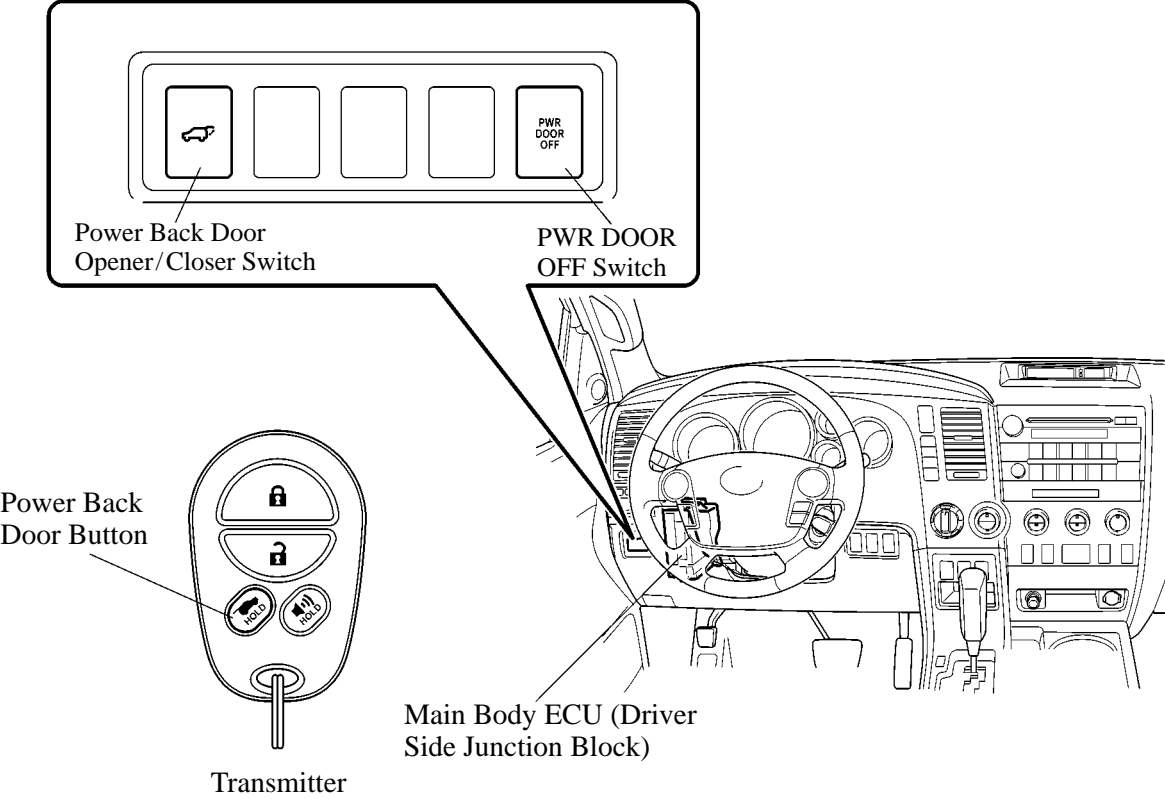


Back Door Lock Assembly

- Opener & Closer Motor
- Half Latch Switch
- Position Switch
- Courtesy Switch

Power Back Door Buzzer

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■ FUNCTION OF MAIN COMPONENTS

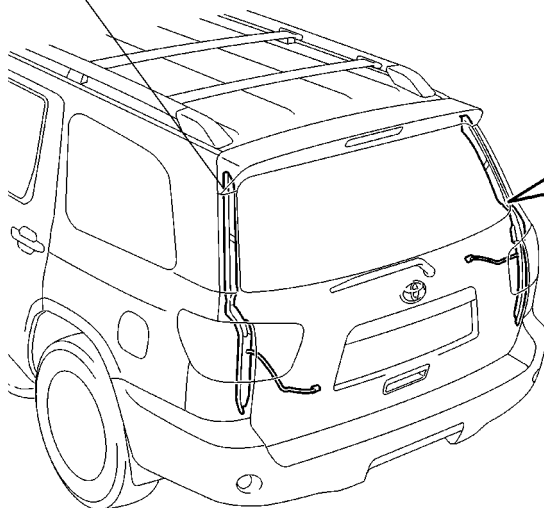
1. General

Component		Function
Power Back Door Drive Unit	Power Back Door ECU	<ul style="list-style-type: none"> Controls the power back door system in accordance with the signals received from the switches, sensors and ECU. Receives signal from the two Hall ICs and detects the back door position and the opening and closing speed of the back door.
	Power Back Door Motor	Opens and closes the back door when actuated by the power back door ECU.
	Magnetic Clutch	[Magnetic Clutch ON] <ul style="list-style-type: none"> Transmits the rotation of the power back door motor to the driven gear to automatically open the back door. [Magnetic Clutch OFF] <ul style="list-style-type: none"> Not transmits the rotation of the power back door motor to the driven gear to manually open the back door.
Back Door Lock Assembly	Opener & Closer Motor	Locks and unlocks the back door when actuated by the power back door ECU.
	Half Latch Switch	Detects the position of the back door ajar.
	Position Switch	Detects the initial (neutral) position of the driven gear of the opener & closer motor. The switch is ON when the back door lock operates to the open side, and OFF when it operates to the close side.
	Courtesy Switch	Detects whether the back door is opened or closed. This switch turns ON when the back door is opened or ajar and OFF when the back door is closed.
Power Back Door Opener/Closer Switch		The back door opens or closes when the power back door opener/closer switch is turned ON from the vehicle interior.
Power Back Door Closer Switch		The power back door closes when the power back door closer switch is turned ON from the vehicle exterior.
PWR DOOR OFF Switch		<ul style="list-style-type: none"> Setting this switch to OFF prohibits system operation. When this switch is OFF, the back door cannot be opened or closed manually as the magnetic clutch of the power back door motor is OFF.
Power Back Door Buzzer and Wireless Door Lock Buzzer		When the power back door system starts to operate, the power back door buzzer and wireless door lock buzzer sound to inform the user that the system is operating. The buzzers also sound if the operating conditions have not been met or if a jammed has been detected.
Touch Sensor (RH, LH) [See page BE-113]		Detects if an object is jammed in the back door.
Main Body ECU (Driver Side Junction Block)		The main body ECU transmits a back door lock/unlock control signal, vehicle speed signal, and a shift P signal to the power back door ECU via CAN. Also, it receives a hazard request signal from the power back door ECU via CAN, and operates the turn signal flasher relay.
Transmitter		Transmits the power back door button signal to the door control receiver.
Door Control Receiver		Receives the power back door button signal and transmits it to the main body ECU.

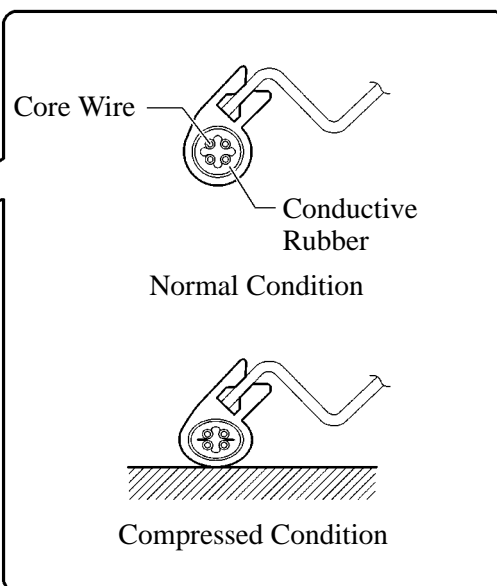
2. Touch Sensor

The touch sensor consists of conductive rubber and a core wire. When the conductive rubber is compressed, its resistance value goes down and electric current flows through the core wire. This information is input to the power back door ECU, which determines the back door condition.

Touch Sensor LH



Touch Sensor RH



■ SYSTEM OPERATION

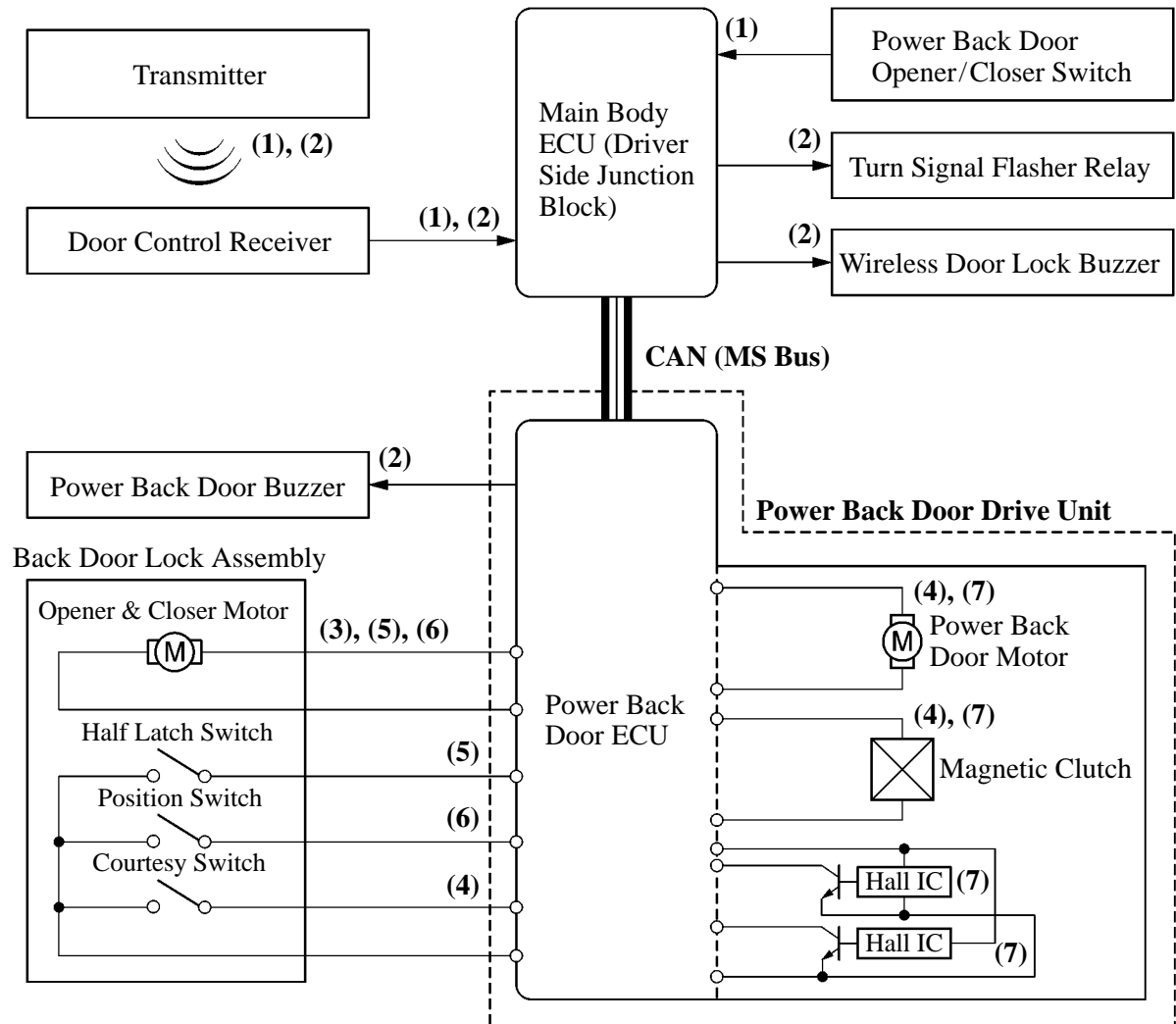
1. General

This system performs the functions listed below.

Function	Outline
Opener Function	Upon receiving an ON signal from the power back door opener/closer switch or the power back door button on the transmitter with the back door unlocked, the power back door ECU actuates the opener & closer motor and the power back door motor in order to release the latch of the back door lock and open the back door.
One-motion Opener Function	Upon receiving an ON signal from the power back door button on the transmitter with the back door locked, the power back door ECU actuates the opener & closer motor and the power back door motor in order to release the latch of the back door lock and open the back door.
Closer Function	<p>If any of the following conditions is met, the power back door ECU actuates the power back door motor and the opener & closer motor in order to close the back door and engage the latch of the back door lock.</p> <ul style="list-style-type: none"> • With the back door open, an ON signal is output from the power back door opener/closer switch. • With the back door open, an ON signal is output from the power back door closer switch. • With the back door open, the power back door button on the transmitter is pressed.
Jam Protection Function	<p>Upon receiving the signals from a touch sensor and the Hall ICs of the power back door motor, the power back door ECU detects that an object is jammed in the back door, and reverses the movement of the power back door motor.</p> <p>The power back door buzzer sounds for 0.1 seconds when a jammed object is detected.</p>
Reverse Control Function	During a power back door operation, if the power back door ECU detects an ON signal from the power back door opener/closer switch or the power back door button on the transmitter, the power back door ECU sounds the power back door buzzer for approximately 0.1 seconds and reverses the power back door motor in order to reverse the back door to a predetermined position.
Back Door Open/Close Speed Control Function	<p>In accordance with the signals received from the Hall ICs, the power back door ECU effects the following controls:</p> <ul style="list-style-type: none"> • Reduces the closing speed from approximately 330 mm (13.0 in.) before the back door is fully closed, in order to reduce the jamming load. • Reduces the opening speed from approximately 250 mm (9.8 in.) before the back door is fully open, in order to reduce the shock that occurs when it is fully open.
Diagnosis	If the power back door ECU detects a malfunction in the power back door system, the power back door ECU diagnoses the failed section and stores the DTC (Diagnostic Trouble Code) in the main body ECU via the CAN. For details, see the 2008 Sequoia Repair Manual (Pub. No. RM08L0U).
Fail-safe	<p>If the power back door ECU detects any of the malfunctions listed below during power back door operation, the power back door ECU stops the power back door motor and sounds the power back door buzzer simultaneously, then turns OFF the magnetic clutch and stops the system.</p> <ul style="list-style-type: none"> • Open circuit in the touch sensor • The power back door motor is operated continuously for 30 seconds or more. • Abnormal back door position signal (Hall IC signal) • Abnormality with position switches on back door lock assembly. <p>During a power back door operation, if the shift lever is shifted to a position other than P, the power back door ECU performs the aforementioned fail-safe operation.</p>

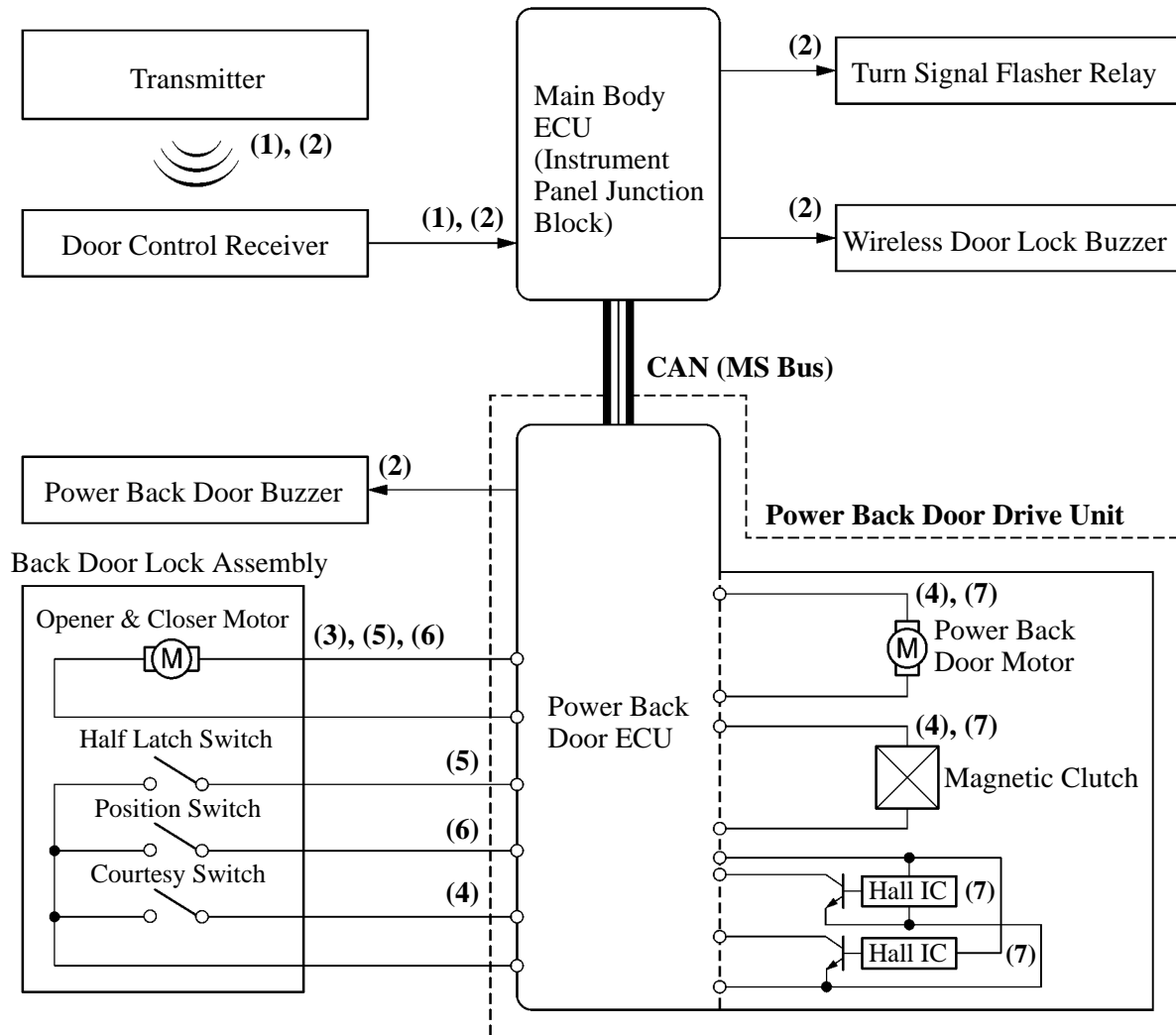
2. Opener Function

- (1) The power back door opener/closer switch or the power back door button on the transmitter is turned ON for 0.8 seconds or more with the back door unlocked.
- (2) The power back door buzzer and wireless door lock buzzer will sound for 0.8 seconds. The hazard lights will flash twice simultaneously with the start of the operation.
- (3) The opener & closer motor operates to unlock the latch.
- (4) Through the state of the courtesy switch, the power back door ECU detects that the latch has been released, and actuates the power back door motor to start opening the back door.
- (5) Through the state of the half latch switch, the power back door ECU detects that the back door is open, and reverses the opener & closer motor to its initial position.
- (6) Through the state of the position switch, the power back door ECU detects that the motor has reverted to its initial position. Then, it stops the opener & closer motor.
- (7) Through the Hall ICs of the power back door motor, the power back door ECU detects the back door position, and stops the power back door motor just before the back door is in its full open position, and turns OFF the magnetic clutch.



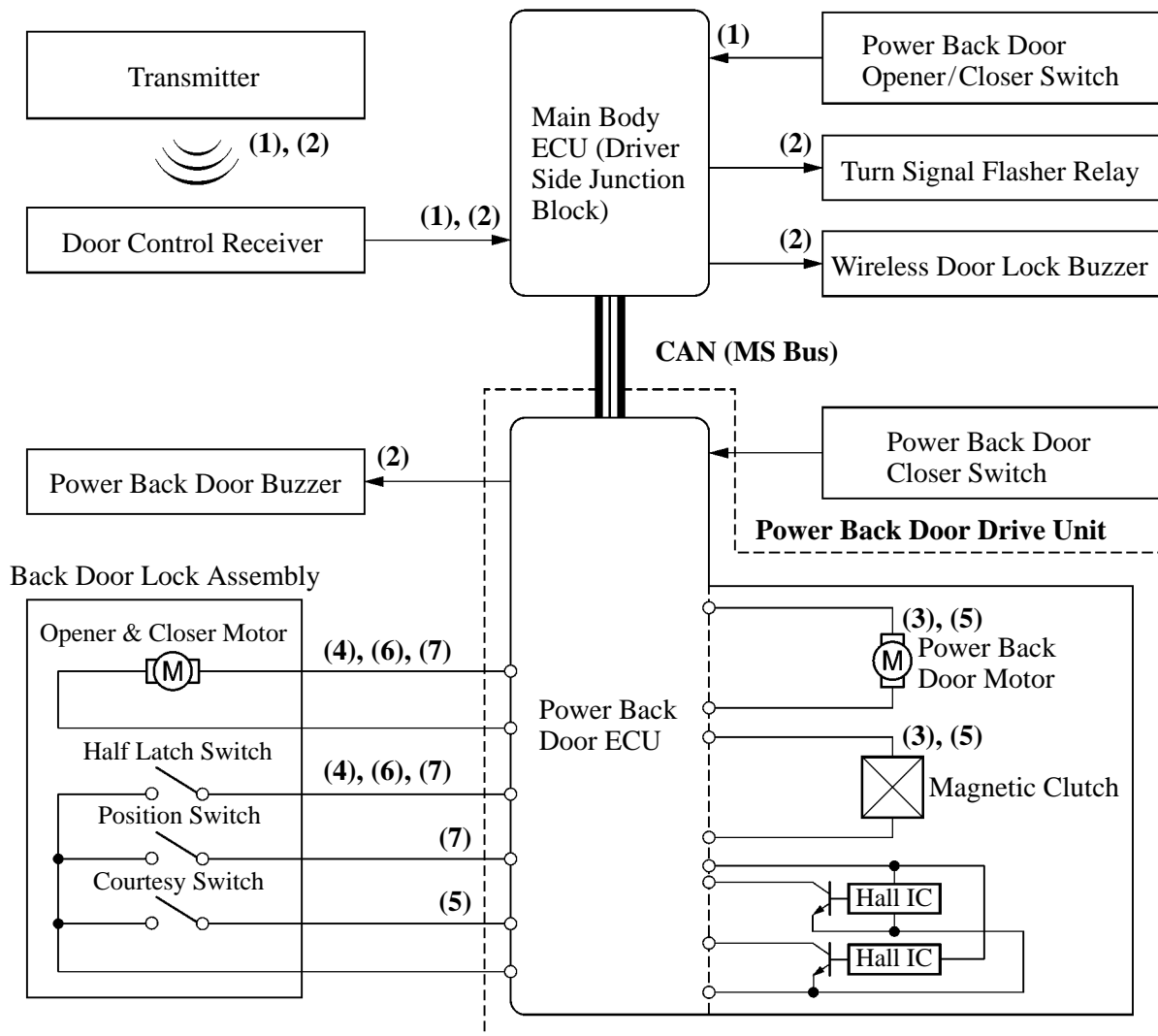
3. One-motion Opener Function

- (1) The power back door button on the transmitter is turned ON for 0.8 seconds or more with the back door locked.
- (2) The power back door buzzer and wireless door lock buzzer will sound for 0.8 seconds. The hazard lights will flash twice simultaneously with the start of the operation.
- (3) The opener & closer motor operates to unlock the latch.
- (4) Through the state of the courtesy switch, the power back door ECU detects that the latch has been released, and actuates the power back door motor to start opening the back door.
- (5) Through the state of the half latch switch, the power back door ECU detects that the back door is open, and reverses the opener & closer motor to its initial position.
- (6) Through the state of the position switch, the power back door ECU detects that the motor has reverted to its initial position. Then, it stops the opener & closer motor.
- (7) Through the Hall ICs of the power back door motor, the power back door ECU detects the back door position, and stops the power back door motor just before the back door is in its full open position, and turns OFF the magnetic clutch.



4. Closer Function

- (1) The power back door opener/closer switch, the power back door closer switch, or the power back door button on the transmitter is turned ON for 0.8 seconds or more with the back door open, or the back door is manually closed to a predetermined position.
- (2) The power back door buzzer and wireless door lock buzzer will sound for 0.8 seconds. The hazard lights will flash twice simultaneously with the start of the operation.
- (3) The power back door ECU actuates the power back door motor to start closing the back door.
- (4) Upon detecting that the latch is disengaged through the state of the half latch switch, the power back door ECU actuates the opener & closer motor to engage the latch.
- (5) Upon detecting that the back door has closed through the state of the courtesy switch, the power back door ECU stops the magnetic clutch and the power back door motor.
- (6) Upon detecting that the latch has been engaged through the state of the half latch switch (ON → OFF), the power back door ECU operates the opener & closer motor forward in order to fully close the back door.
- (7) If the power back door ECU detects that the half latch switch has been turned ON again after the back door has fully closed, it stops the opener & closer motor. Then, it operates the opener & closer motor in reverse until the position switch turns ON.



5. Jam Protection Function

The power back door ECU determines a jamming of the back door based on the power back door operation condition and operates the back door in the reverse direction.

Power Back Door Operation Condition	Detection Item	Action
Close	<p>The back door is reversed when one of the following conditions is met:</p> <ul style="list-style-type: none"> ● Jammed condition is detected through Hall IC signal. ● Lock condition is detected through Hall IC signal. ● Jammed condition is detected through touch sensor. 	Depending on detection timing, the close operation is cancelled and the back door warning buzzer sounds. → Back door is reversed (open operation).
During Lock	<p>The back door is reversed when one of the following conditions is met:</p> <ul style="list-style-type: none"> ● Lock condition is detected through Hall IC signal. ● Jammed condition is detected through touch sensor. 	Depending on detection timing, the close operation is cancelled and the back door warning buzzer sounds and the lock is released. → Back door is reversed (open operation).
Open	<p>The back door is reversed when one of the following conditions is met:</p> <ul style="list-style-type: none"> ● Jammed condition is detected through Hall IC signal. ● Lock condition is detected through Hall IC signal. 	Depending on detection timing, the open operation is cancelled and the back door warning buzzer sounds. → Back door is reversed (close operation).