■SYSTEM OPERATION

1. General

This system performs the function 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 door control transmitter*1/key*2 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 door control transmitter*1/key*2 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	Upon receiving an ON signal from the power back door opener/closer switch, power back door closer switch with the back door open, or the power back door button on the door control transmitter*1/key*2, 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.
Jam Protection Function	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. The power back door buzzer sounds for 0.1 seconds when a jammed object is detected.
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 door control transmitter*1/key*2, 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	In accordance with the signals received from the Hall ICs, the Power Back Door ECU effects the following controls: • 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 (Instrument Panel Junction Block) via the CAN. For details, see the 2008 HIGHLANDER Repair Manual (Pub. No. RM06J0U).

*1: Models without Smart Key System *2: Models with Smart Key System

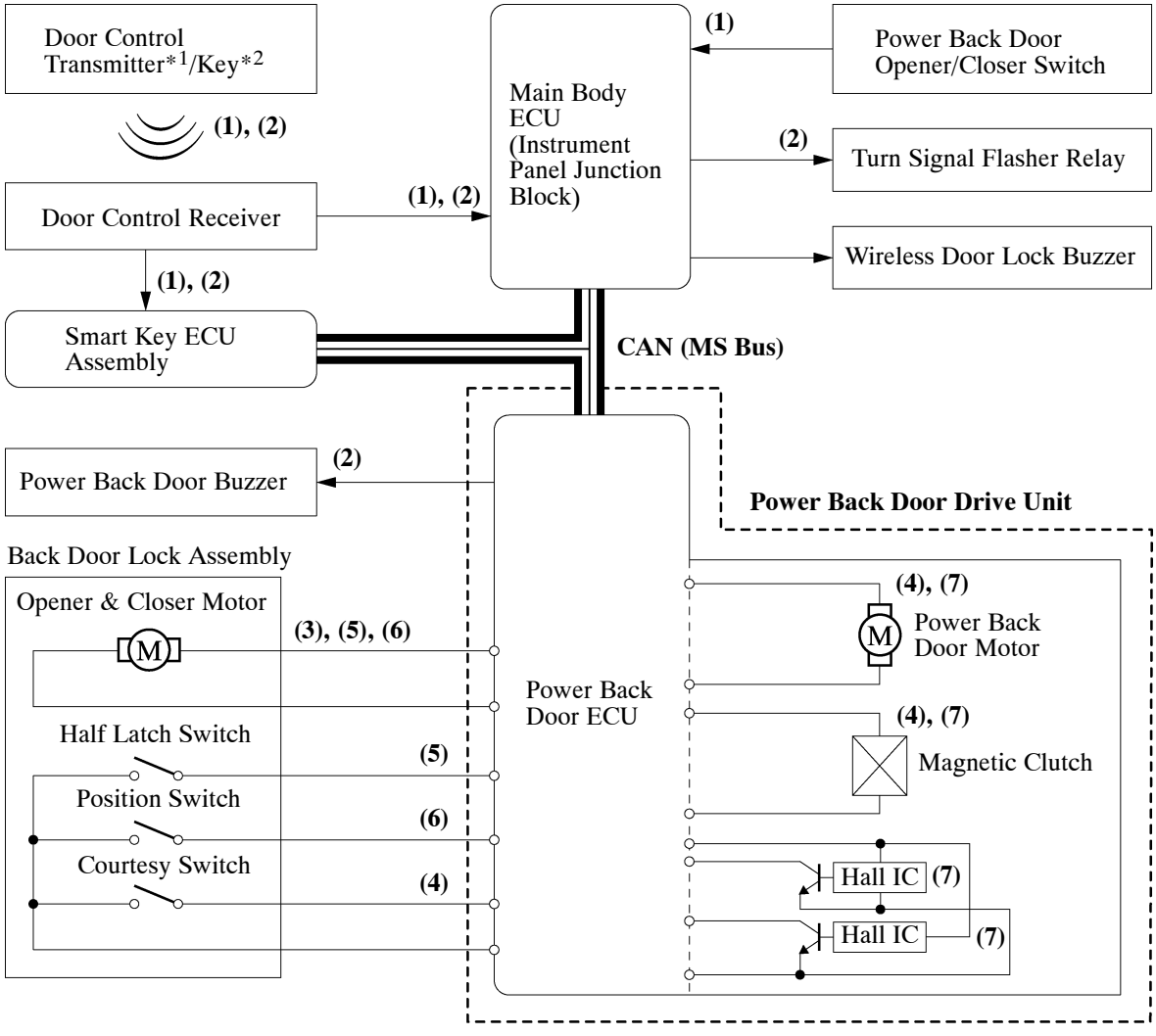
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Function	Outline
Fail-safe	If the Power Back Door ECU detects any of the malfunctions listed below during power back door operation, the Power Back Door ECU stops the power back door motor and sounds the power back door buzzer simultaneously, then turns OFF the magnetic clutch and stops the system. • 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. 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.

2. Opener Function

(1) The power back door opener/closer switch or the power back door button on the door control transmitter*1/key*2 is turned ON for 1 second or more with the back door unlocked.
(2) The power back door buzzer and wireless door lock buzzer continue to sound while the power back door button is being pressed. 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.

*1: Models without Smart Key System *2: Models with Smart Key System



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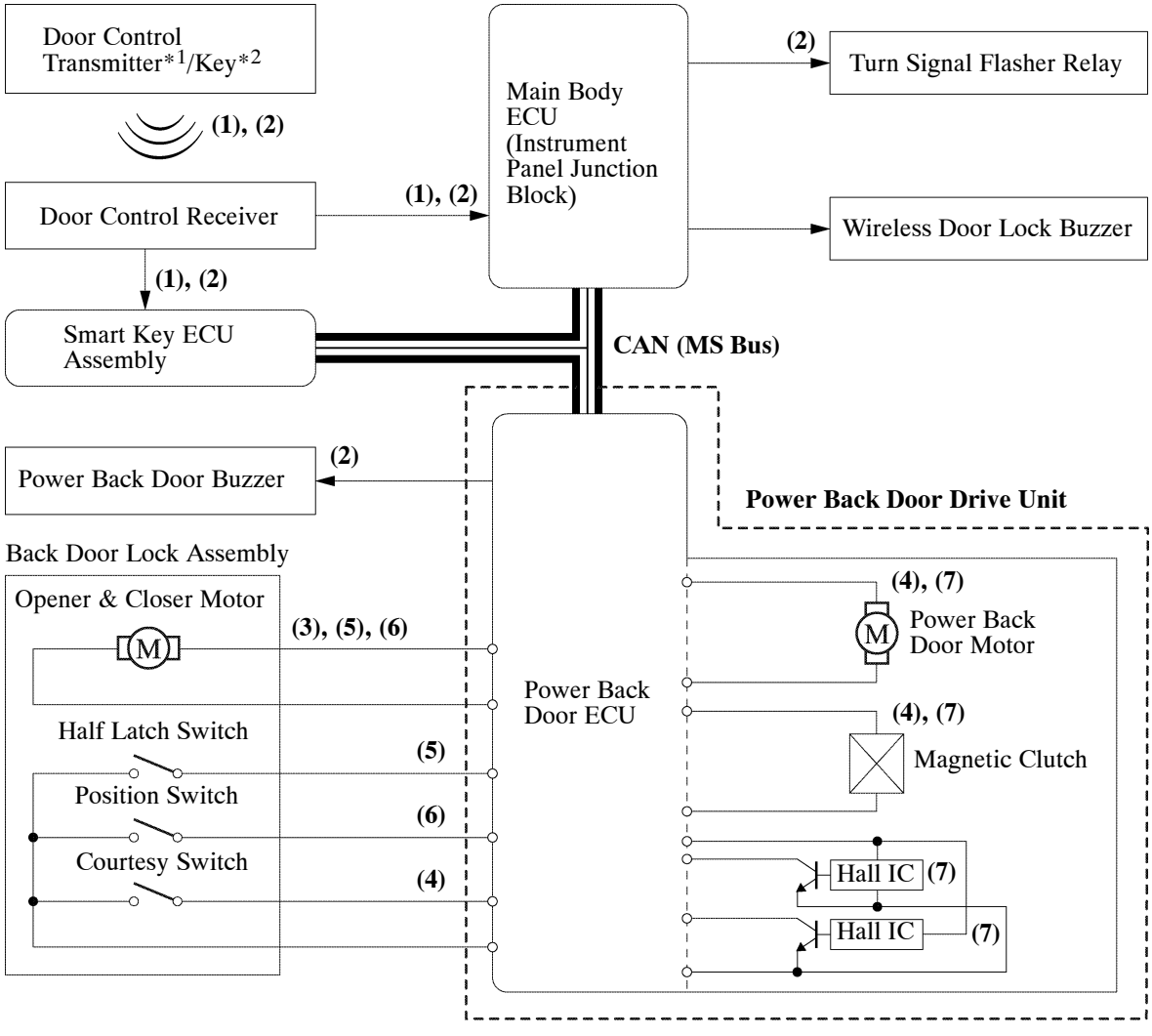
*1: Models without Smart Key System
*2: Models with Smart Key System

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3. One-motion Opener Function

(1) The power back door button on the door control transmitter*1/key*2 is turned ON for 1 second or more with the back door locked.
(2) The power back door buzzer and wireless door lock buzzer continue to sound while the power back door button is being pressed. 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.

*1: Models without Smart Key System *2: Models with Smart Key System



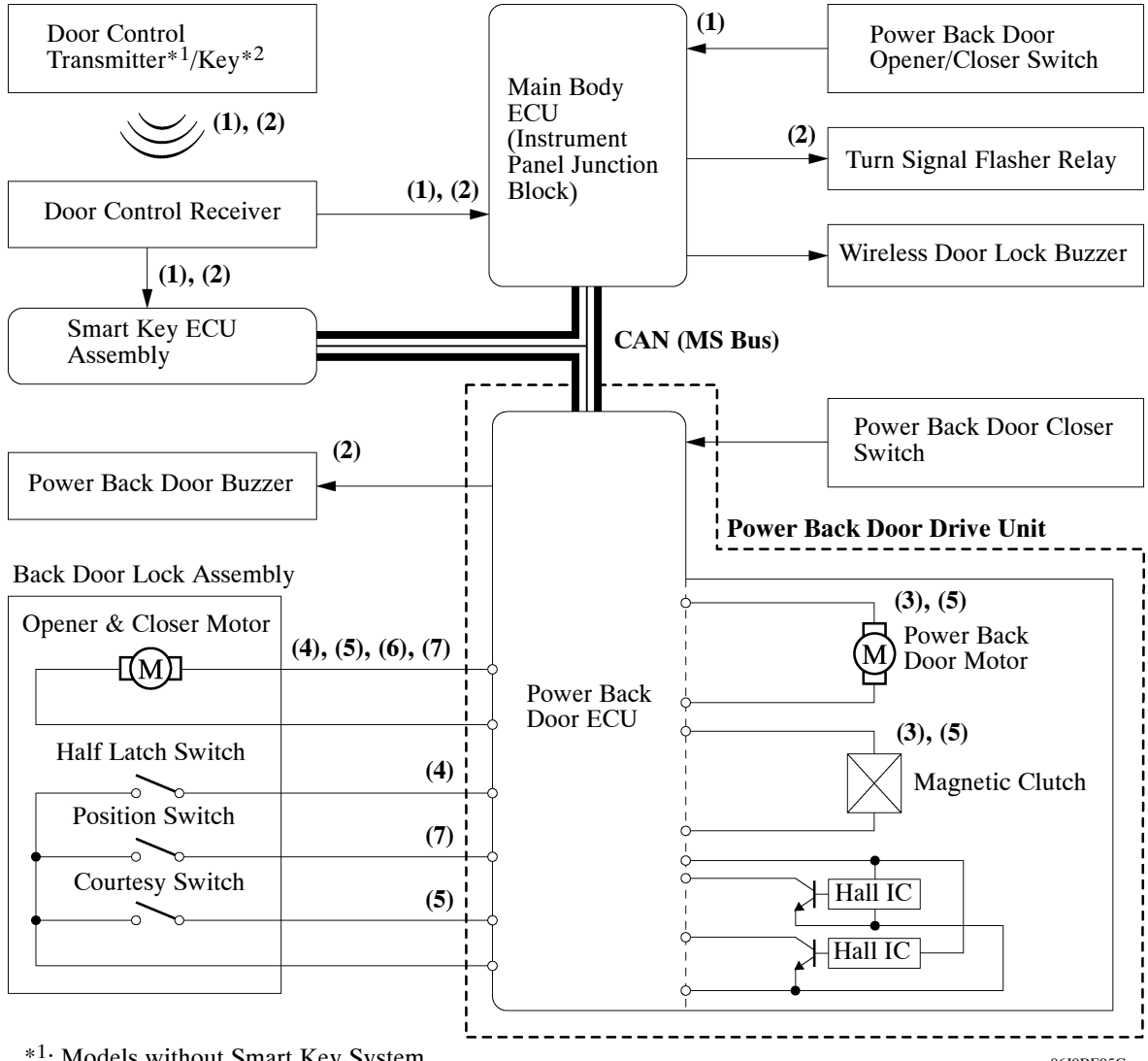
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*1: Models without Smart Key System
*2: Models with Smart Key System

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 door control transmitter*1/key*2 is turned ON for 1 second or more with the back door open, or the back door is manually closed to a predetermined position.
(2) The power back door buzzer continues to sound while the power back door button is being pressed. 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.

*1: Models without Smart Key System *2: Models with Smart Key System



*1: Models without Smart Key System
*2: Models with Smart Key System

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5. Jam Protection Function

Power Back Door ECU determines a jam 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	The back door is reversed when one of the following conditions is met: • Jam condition detected through Hall IC signal. • Lock condition detected through Hall IC signal. • Jam condition 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	The back door is reversed when one of the following conditions is met: • Lock condition detected through Hall IC signal. • Jam condition 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	The back door is reversed when one of the following conditions is met: • Jam condition detected through Hall IC signal. • Lock condition 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)