

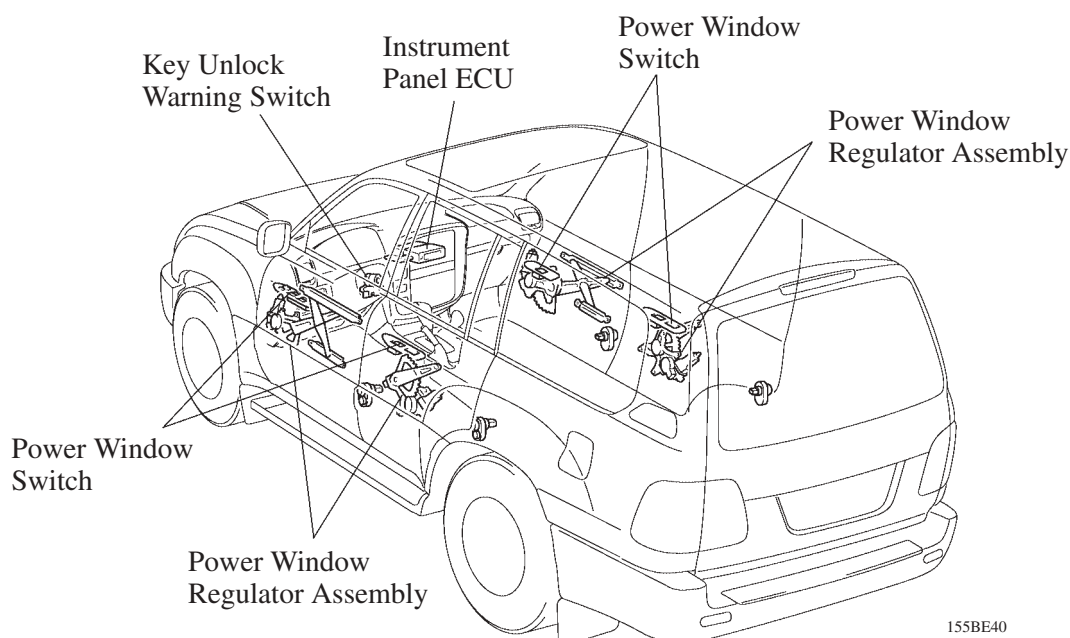
■ POWER WINDOW

1. General

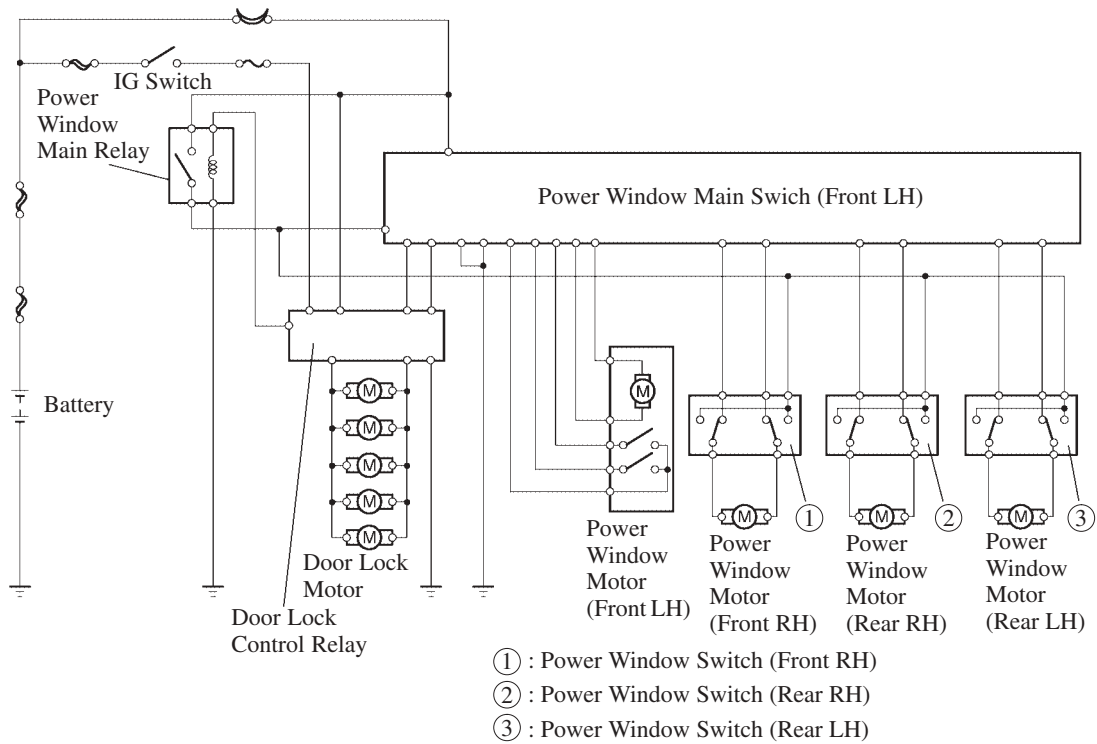
- The new model has adopted a one-touch auto-down function, which enable the door window to fully open at a touch of the power window switch.
- On models for Europe, in addition to the one-touch auto-down function, a one-touch auto-up function has been added, thus enabling the driver's door window to fully close at the touch of the switch.
In conjunction with this function, a jam protection function has been newly added. If a foreign object becomes jammed between the glass and the window frame during one-touch auto-up or key-off operation, this function automatically stops the power window's upward movement and moves it downward.
- All models are provided with a key-off operation function in which the power windows can be operated for a prescribed length of time even after the ignition switch has been turned OFF.

2. Layout of Components

The major function parts of jam protection function of the power window are shown below.



3. Wiring Diagram



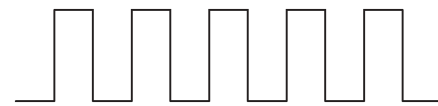
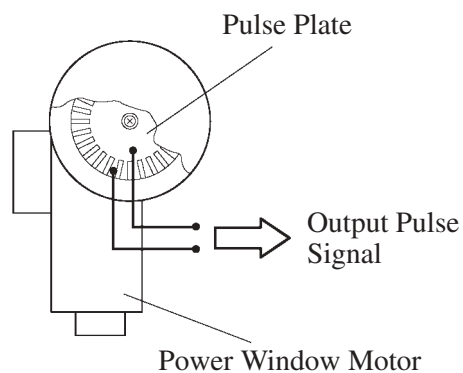
156BE16

LHD Model

4. Construction

Pulse Sensor and Limit Switch

By way of the pulse plate that is attached to the reduction gear of the power window motor, the pulse sensor outputs a pulse signal with an amplitude that is appropriate for the rpm of the motor to the controller. In addition, a limit switch is enclosed in the reduction gear. This switch determines the neutral zone in which the jam function does not operate.



Output Pulse Signal

155BE21

155BE38

Controller

Consisting of a pulse input circuit, jam judgment circuit, and motor drive circuit, the controller is integrated with the power window master switch.
The jam judgment circuit detects if a foreign object is jammed in the window by sensing a change in the signal that is output by the pulse sensor.

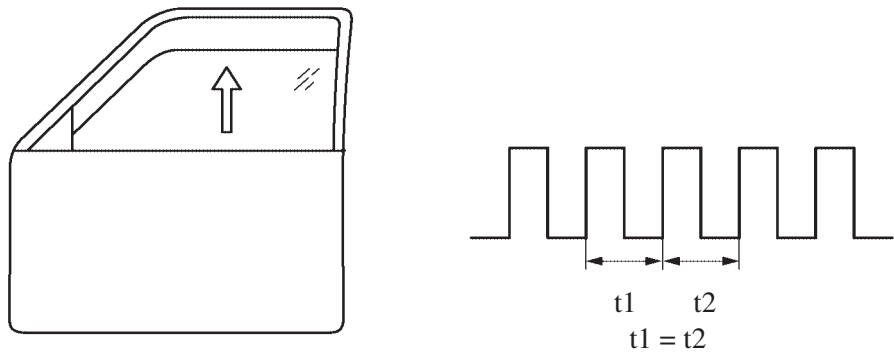
Power Window Master Switch

The power window master switch outputs control signals for the power window’s up, down, one-touch auto-up, one-touch auto-down functions to the power window motor.

5. Operation

Normal Operation

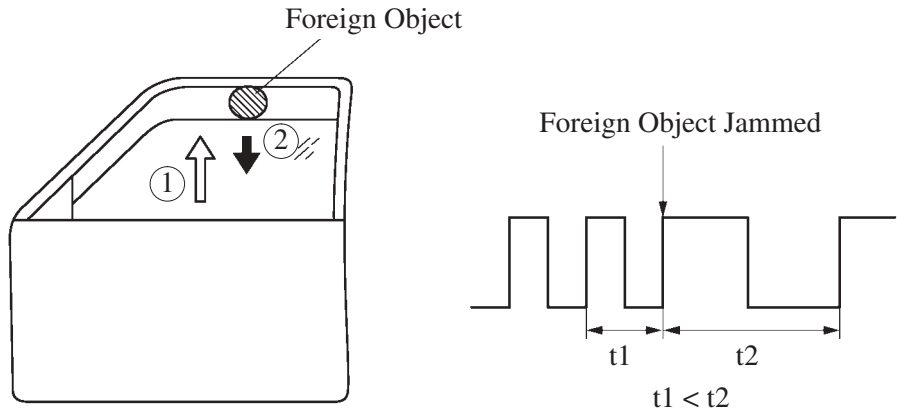
During the normal operation of the power window, the power window motor rotates at a constant speed. Accordingly, the width of the pulse signals that are output by the pulse sensor to the controller is uniform. When the controller receives pulse signals with a uniform width, it determines that no jamming occurred. Thus, the controller determines the power window movement according to the signal that is received by the controller.



Output Pulse Signal 155BE22

Jam Protection Operation

If an object becomes jammed between the glass and the window frame during one-touch auto-up operation, the power window motor’s speed decreases (①). Accordingly, the width of the pulse signals that are output by the pulse sensor to the controller increases. After the motor’s deceleration rate exceeds a predetermined value, the jam judgment circuit determines that jamming occurred. Then, the controller stops the upward movement of the window, and automatically moves the window downward so that there will be a window opening of 200 mm (7.9 in.) or more (②). The jam protection function operates only during a one-touch auto-up operation.



Output Pulse Signal 155BE23

NOTE: Immediately before the window is fully closed, there is an area in which the jam protection function does not operate.