■JAM PROTECTION FUNCTION

1. General

- The jam protection function is controlled by the power window ECU or the back door ECU.
- The jam protection function automatically stops the power window and moves it downward if a foreign object gets jammed in the door window during one-touch auto-up operation or manual-up operation.
- The mechanism uses a Hall IC to detect the door glass position and direction of movement.

2. Front Door

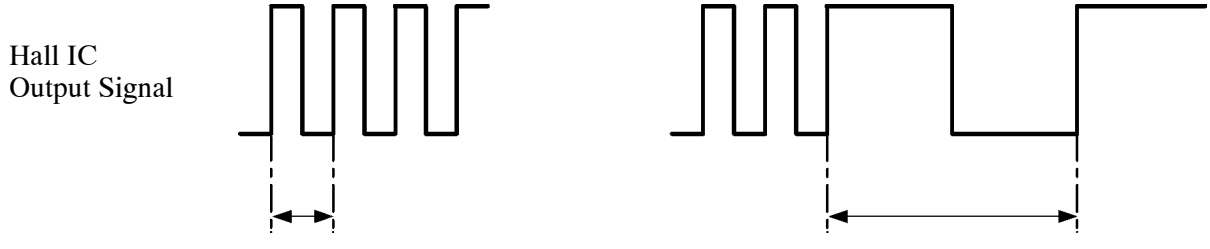
General

- The power window ECU is built into the driver and front passenger power window motor assemblies.
- The reverse-direction conditions and amount of down movement after jam detection are as follows: The jam protection function operates and lowers the window approximately 50 mm (1.9 in.). After this, if the amount (space) that the door glass is open has not reached approximately 200 mm (7.87 in.), the jam protection function will continue to lower the window until the space is approximately 200 mm (7.87 in.). If the door glass reaches the fully open position before the initial 50 mm (1.9 in.) lowering of the door glass is reached, the jam protection function will stop at that time.

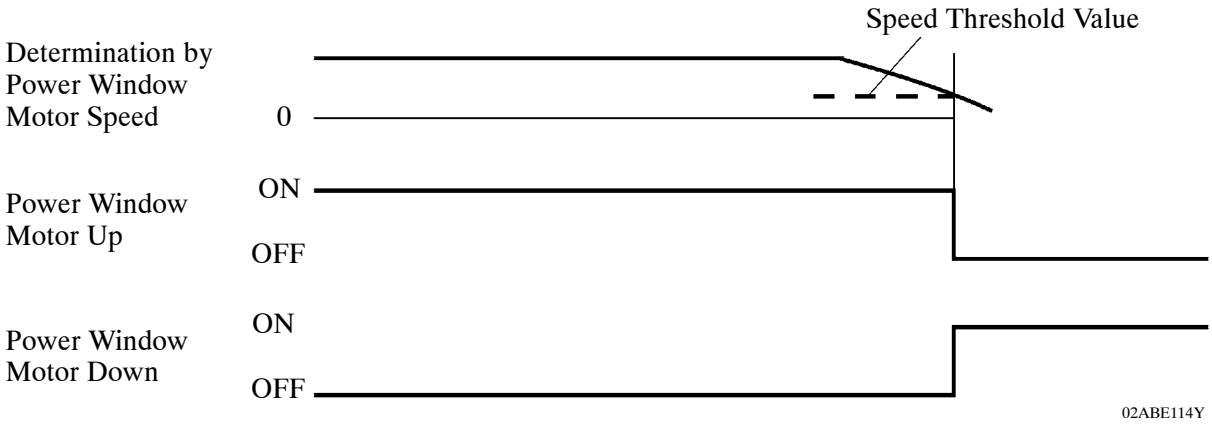
Jammed Window Detection Mechanism

- The jammed window detection mechanism consists of a magnet that is provided on the worm gear of the driver and front passenger power window motor assemblies, the power window ECU, and the Hall IC that is provided on the power window ECU.
- The following two factors are used to determine that jamming has occurred.
  1) The Hall IC converts the changes in the magnetic flux that occur through the rotation of the worm gear into block wave signals and outputs them to the power window ECU.
  2) The power window ECU calculates the speed threshold value of the power window motor in accordance with the window glass position, rough road condition, and various operating conditions at the time the power window motor is started. The power window ECU determines that jamming has occurred if the threshold value is exceeded, and retracts the window glass.

▶ Determination by Hall IC ◀



▶ Determination by Power Window Motor Speed ◀



3. Back Door

General

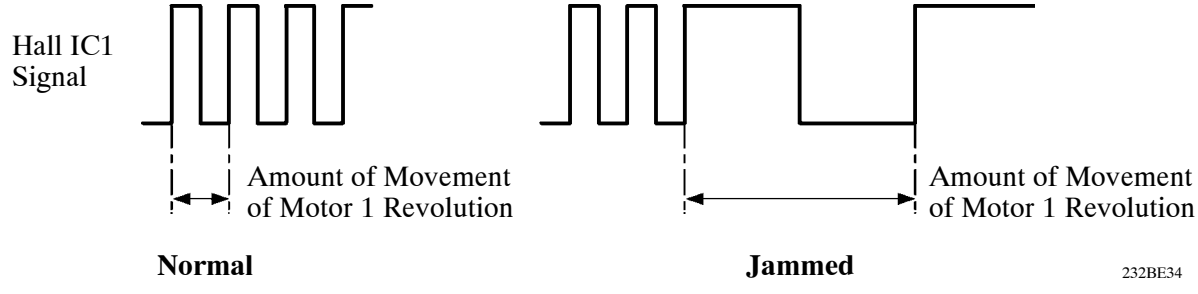
The jam protection function consists of a back door power window motor assembly and back door ECU. The back door ECU receives signals from the back door power window motor assembly in order to determine whether the back door window is jammed.

Jammed Window Detection Mechanism

- The Hall IC converts the changes in the magnetic flux that occur through the rotation of the worm gear into pulse signals and outputs them to the back door ECU.
- To control the jam protection function, the back door ECU determines the amount of movement and the jamming of the power window from the pulse signals from the Hall IC1, and the moving direction of the power window from the phase difference between the pulses from the Hall IC1 and Hall IC2.

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▶ Judgment of Amount of Movement and Jamming ◀



▶ Judgment of Moving Direction ◀

