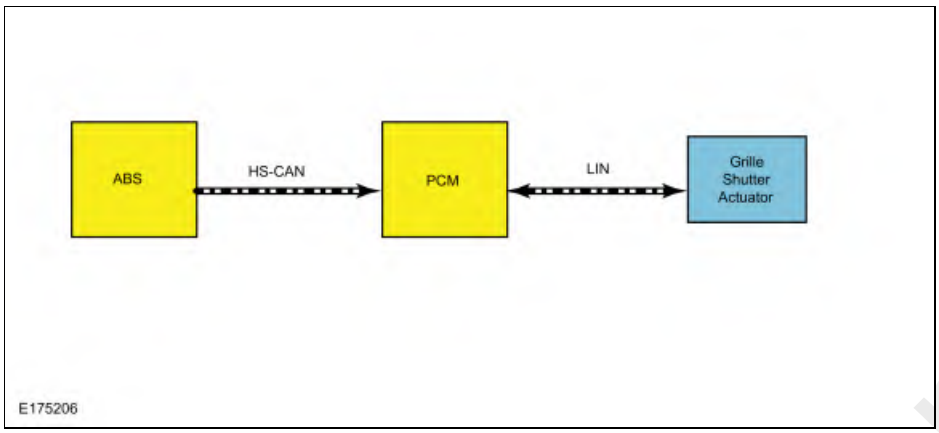
Active Grille Shutter - System Operation and Component Description

System Operation

System Diagram



Item	Description
1	ABS
2	HS-CAN
3	Grille Shutter Actuator
4	PCM
5	LIN

Network Message Chart

PCM Network Input Messages

Broadcast Message	Originating Module	Message Purpose
Vehicle speed	ABS module	Vehicle speed is used to determine positioning of the grille shutters.

Active Grille Shutter

The grille shutter actuator positions the grille shutters based on commands from the PCM. The grille shutter moves 90 degrees from fully closed to fully open and, based on the position commanded by the PCM, is set in 1 of 16 positions (approximately 6 degrees between positions).

During normal operation, the grille shutter may be partially to fully open when the engine is off depending on the ambient temperature. After an engine starting event, a calibration of the grille shutter system occurs which typically takes 15-20 seconds. The grille shutter system performs the calibration sequence by detecting the end positions, open and closed. The calibration sequence can begin in either direction, open or closed, and continues until it is successful or a fault is sensed. A long pause may occur between the 2 portions (open/close) of the calibration sequence. If certain faults are present (shutter blocked or actuator error), a recalibration is initiated in an attempt to resolve the problem. If the problem is not resolved after a calibrated number of attempts (usually 3 or 4), a timer starts and sets a DTC when the timer reaches a predetermined limit.

The PCM communicates the desired position (open or closed) of the grille shutter based on various PCM inputs (vehicle speed, coolant temperature, ambient temperature, A/C system pressure, etc.). The PCM communicates to the grille shutter actuator via a LIN. The LIN supports bi-directional communication between the grille shutter actuator and PCM, allowing the grille shutter actuator to communicate position and fault information to the PCM.

The PCM sets grille shutter Diagnostic Trouble Codes (DTCs) when the fault information is communicated by the grille shutter actuator for a predetermined amount of time. Any failures of the LIN for over 10 seconds continuously results in the grille shutter actuator positioning the grille