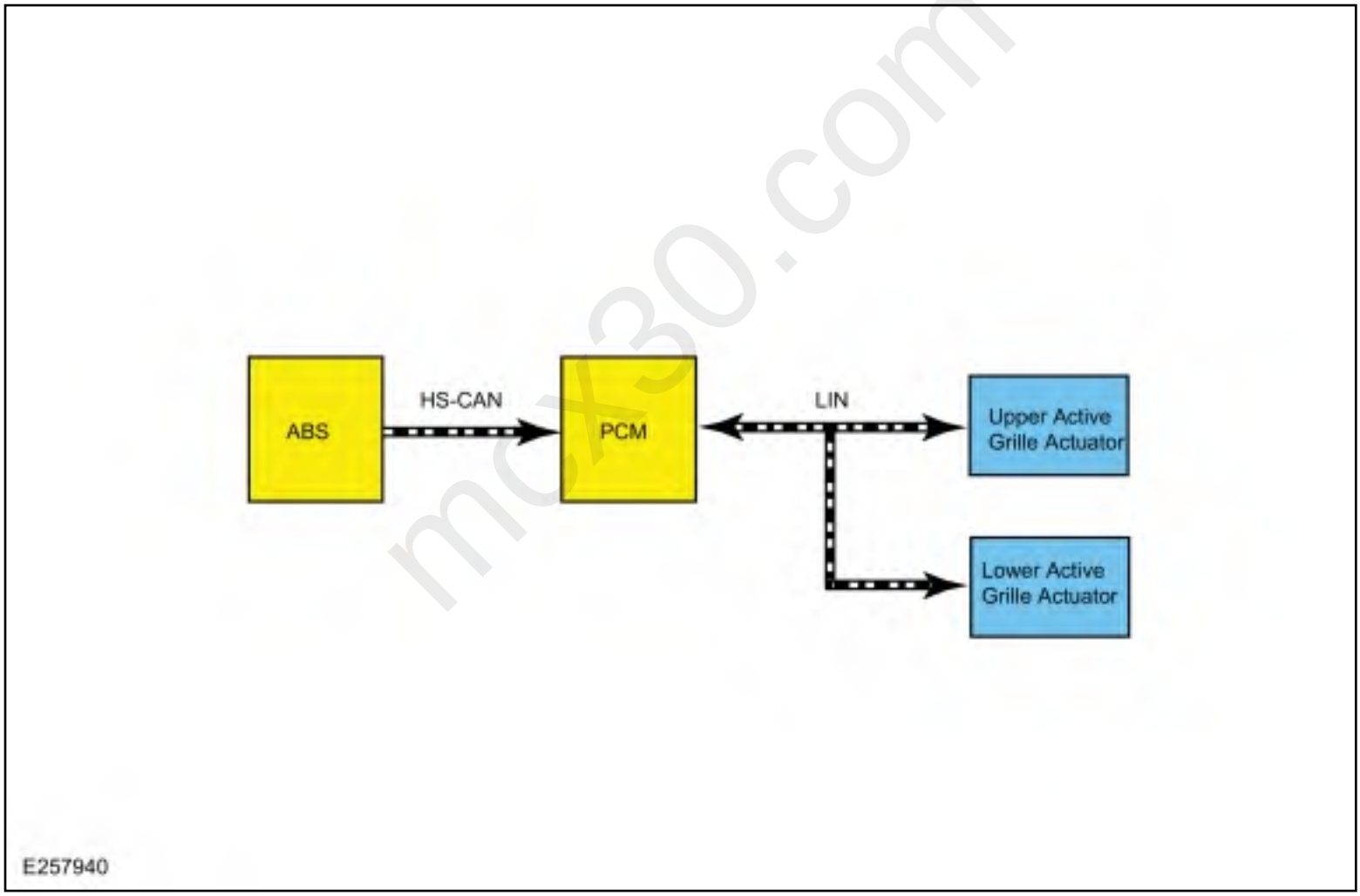
Active Grille Shutter - System Operation and Component Description

System Operation

System Diagram



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 active grille shutters.

Active Grille Shutter

The active grille shutter actuator positions the active grille shutters based on commands from the PCM. The active 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 active grille shutter may be partially to fully open when the engine is off depending on the ambient temperature. After an engine starting event, a self-calibration of the active grille shutter system occurs which typically takes 15-20 seconds. The active 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 re-calibration is initiated in an attempt to resolve the problem. If the problem is not resolved after a calibrated number of re-calibration attempts (usually 3 or 4), a timer starts and sets a DTC when the timer reaches a predetermined limit.

NOTE: *The upper and lower active grille shutter actuators operate independently from each other and transmit/receive unique commands to/from the PCM. Each active grille shutter actuator reports unique Diagnostic Trouble Codes (DTCs).*

The PCM communicates the desired position (open, closed or in between) of the active grille shutter systems. The upper active grille shutter control is based on various PCM inputs (vehicle speed, coolant temperature, ambient temperature, A/C system pressure, etc.). If equipped, the lower active grille shutter control is dedicated to managing charge air temperature into the turbocharger, and is based on PCM inputs such as vehicle speed, turbo charge pressure, ambient temperature, charge air temperature, etc...

The PCM communicates to the active grille shutter actuator(s) via a LIN. The LIN supports bi-directional communication between the active grille shutter actuator(s) and PCM, allowing the active grille shutter actuator(s) to communicate position and fault information to the PCM.

The PCM sets active grille shutter Diagnostic Trouble Codes (DTCs) when the fault information is communicated by the active grille shutter actuator for a predetermined amount of time. Any failures of the LIN for over 10 seconds continuously results in the active grille shutter actuator positioning the active grille shutter fully open. There is no indication to the driver of the vehicle when a fault with the active grille shutter system is present or a active grille shutter DTC is set in the PCM.

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Component Description

Active Grille Shutter Actuator

The active grille shutter actuator is a smart motor which receives position requests from the PCM via the LIN. One of the active grille shutter blinds connects to the active grille shutter actuator using a retainer. The active grille shutter actuator is serviced separately or can be serviced as an entire assembly, which includes the active grille shutter, active grille shutter actuator, retainer, housing and jumper harness.

The upper and lower active grille shutter actuators are not interchangeable.

Active Grille Shutter

The active grille shutter is comprised of shutter blinds which are linked to each other. One of the individual shutter blinds is fixed to the active grille shutter actuator. When the active grille shutter actuator moves, it moves the attached shutter which causes the other linked shutters to move. The active grille shutter is serviced as an entire assembly, which includes the active grille shutter, active grille shutter actuator, retainer, housing and jumper wiring harness.

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