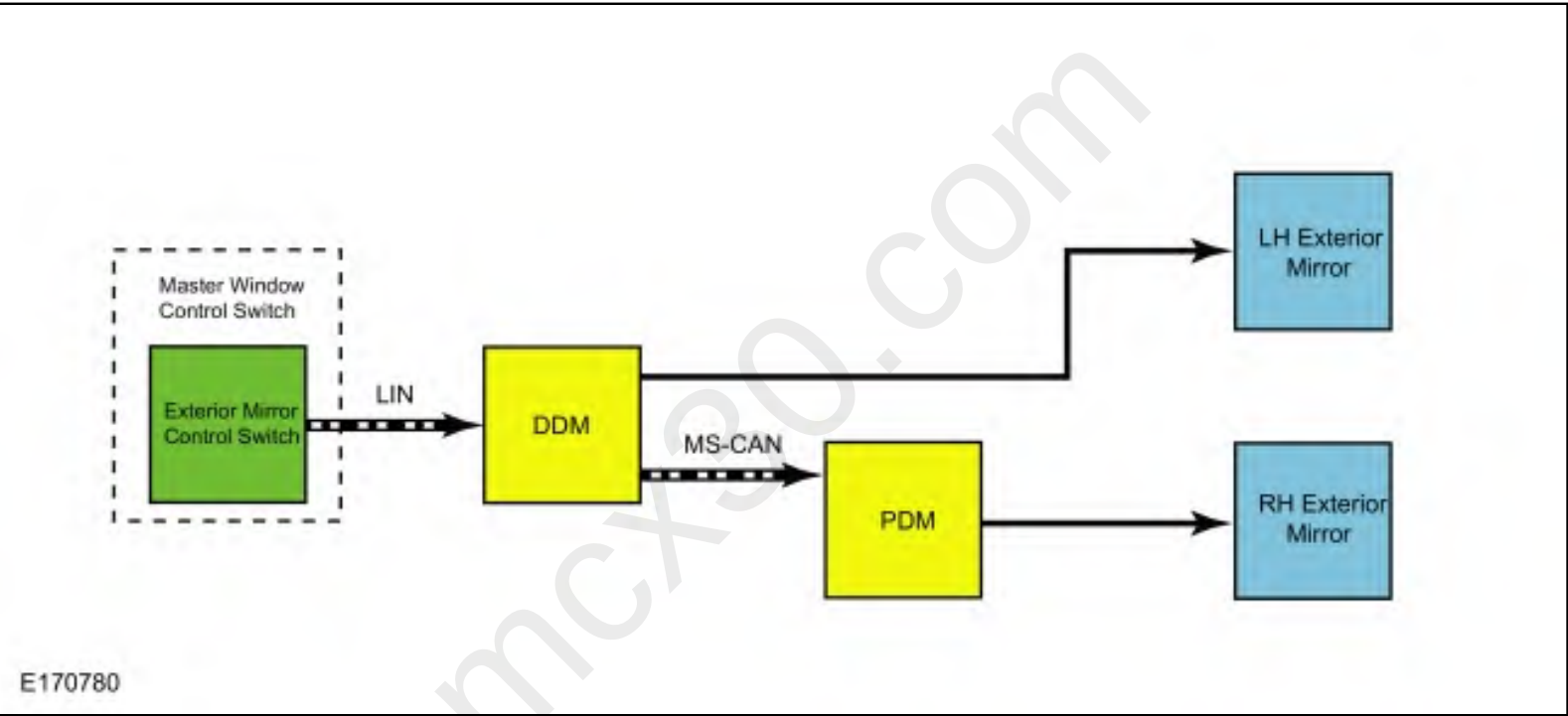


Rear View Mirrors - System Operation and Component Description

System Operation

System Diagram - Exterior, Power, Without Memory



Network Message Chart

Module Network Input Messages — PDM

Broadcast Message	Originating Module	Message Purpose
Passenger mirror command	DDM	Contains the movement requests for the RH exterior mirror glass generated by the exterior mirror control switch.

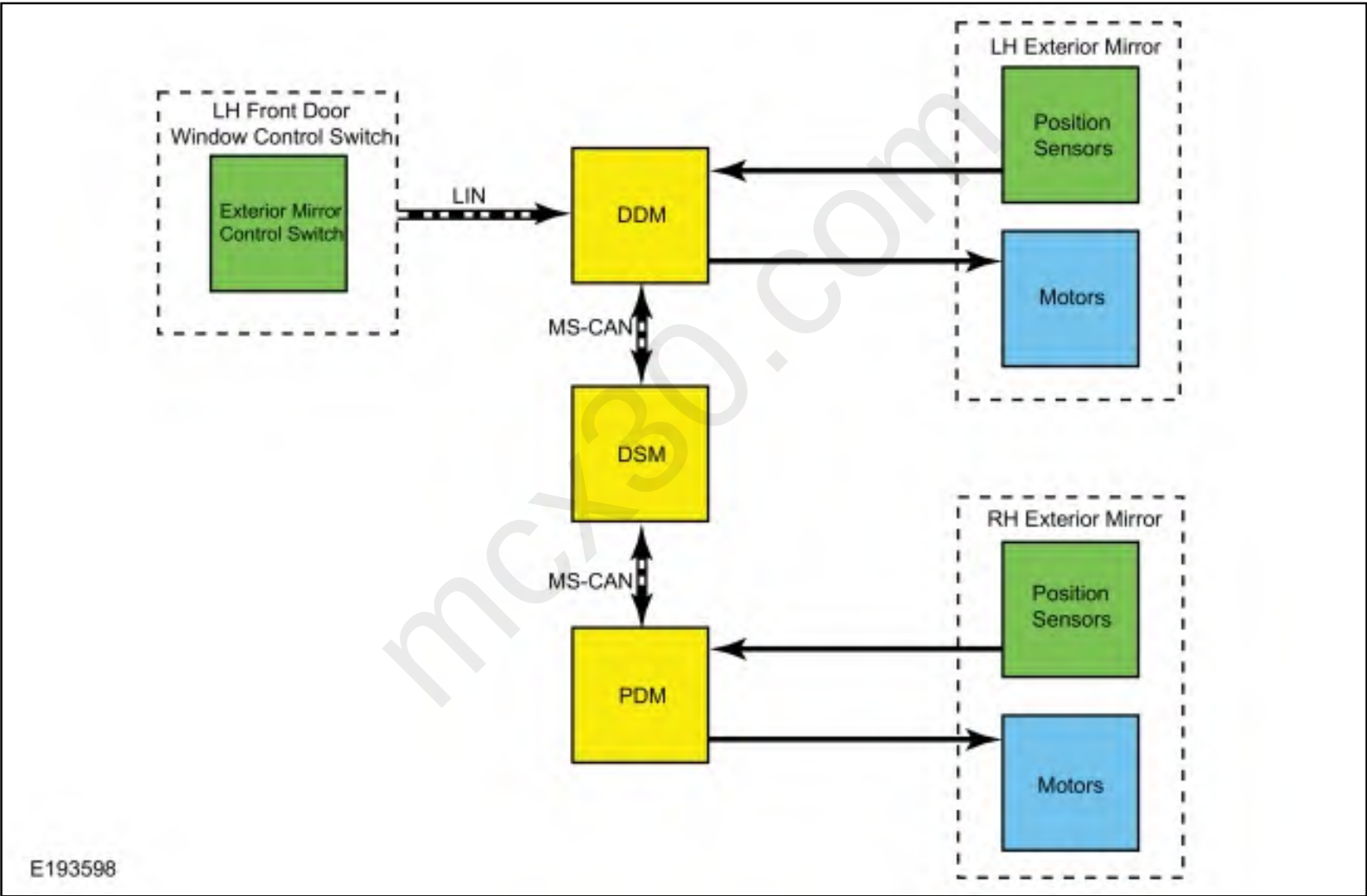
System Operation - Exterior, Power, Without Memory

All functions of the power mirror feature are integrated into one switch module (integral to the LH front door

window control switch). The left and right side selection buttons have an LED to indicate which side is active and a directional pad is used for directional control. Neutral is achieved by pressing the lit button to deactivate the left or right exterior mirror, or by allowing the system to time out and reset to neutral.

When the exterior mirror directional pad switch is pressed left, right, up or down with the LH or RH exterior mirror selected, the movement request is sent to the DDM through a LIN circuit. If the LH mirror is selected, the DDM supplies voltage and ground to the appropriate LH exterior mirror motor. If the RH mirror is selected, the DDM sends the passenger mirror command message with the input from the exterior mirror control switch to the PDM. The PDM then supplies voltage and ground to the appropriate RH exterior mirror motor. The DDM and PDM controls the glass movements by reversing polarity of the voltage and ground circuits being supplied to each motor.

System Diagram - Exterior, Power, With Memory



Network Message Chart

Module Network Input Messages — PDM

Broadcast Message	Originating Module	Message Purpose

Passenger mirror command	DDM	Contains the movement requests for the RH exterior mirror glass generated by the exterior mirror control switch.
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Module Network Input Messages — DDM and PDM

Broadcast Message	Originating Module	Message Purpose
Memory command	DSM	Commands the door modules to initiate a memory save or recall and is used to abort a memory recall that is in progress.

System Operation - Exterior, Power, With Memory

NOTE: *If the DDM or PDM detects a mirror motor feedback circuit fault, a timeout strategy disables the memory operations for 30 seconds to prevent system damage. After the 30 second timeout, normal operation resumes.*

All functions of the power mirror feature are integrated into one switch module (integral to the LH front door window control switch). The left and right side selection buttons have an LED to indicate which one is active and a directional pad is used for directional control. Neutral is achieved by pressing the lit button to deactivate the left or right exterior mirror, or by allowing the system to time out and reset to neutral.

When the exterior mirror directional pad switch is pressed left, right, up or down with the LH or RH exterior mirror selected, the movement request is sent to the DDM through a LIN circuit. If the LH mirror is selected, the DDM supplies voltage and ground to the appropriate LH exterior mirror motor. If the RH mirror is selected, the DDM sends the passenger mirror command message with the input from the exterior mirror control switch to the PDM. The PDM then supplies voltage and ground to the appropriate RH exterior mirror motor. The DDM and PDM controls the glass movements by reversing polarity of the voltage and ground circuits being supplied to each motor.

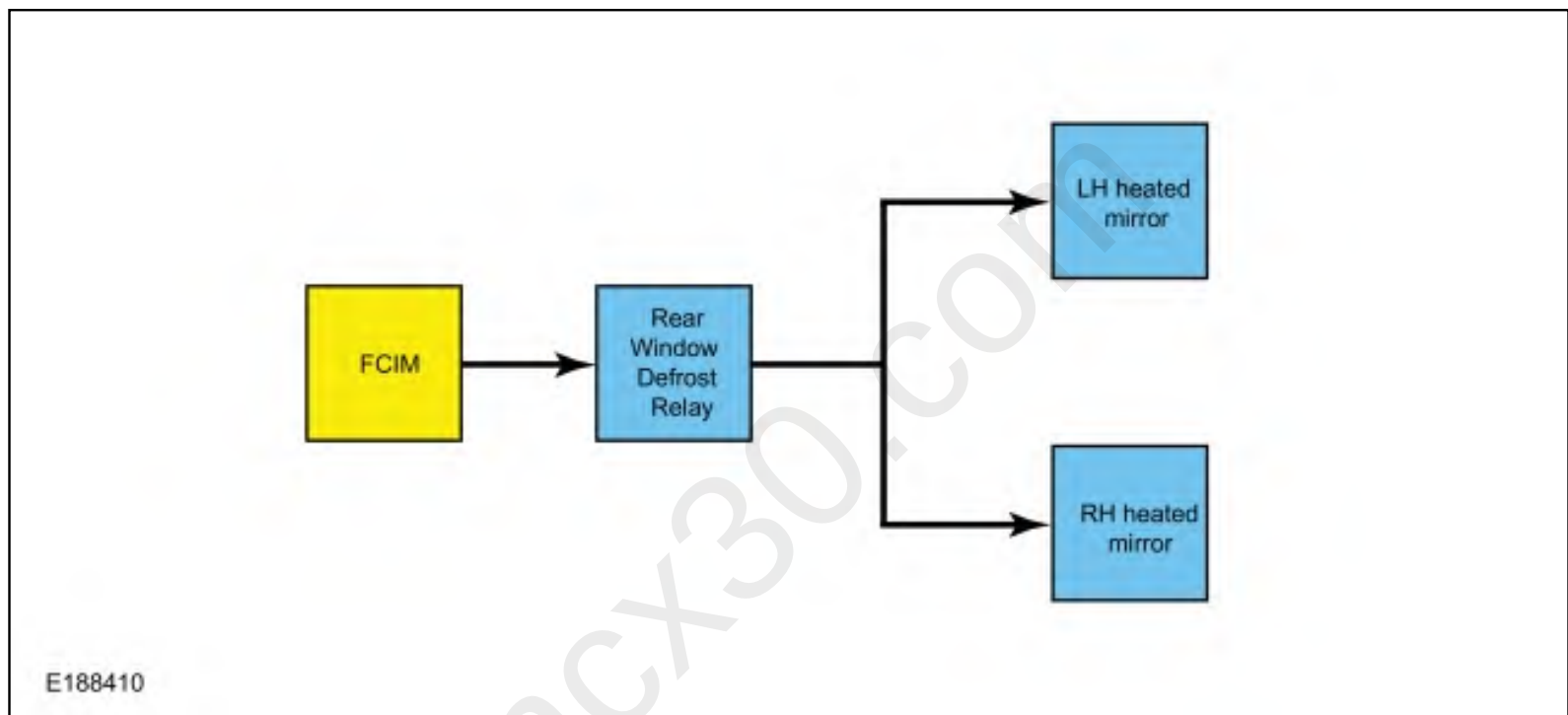
When a memory recall or save is initiated, the DSM sends the memory command message to the DDM and PDM through the MS-CAN. Based on this message, the DDM and PDM recall the requested memory preset mirror position from internal memory or save the current mirror position to correspond with the requested preset. During a memory recall, the DDM and PDM supply voltage and ground to the appropriate exterior mirror motors to achieve the desired memory positions that are stored in memory based on feedback from the mirror motor potentiometers. To support the memory function, the DDM supplies a 5 volt reference and ground to the LH mirror motor potentiometers and the PDM supplies a 5 volt reference and ground to the RH mirror motor potentiometers. The DDM monitors the feedback voltage from the horizontal and vertical potentiometers to determine the position of the LH mirror glass and the PDM monitors the feedback voltage from the horizontal and vertical potentiometers to determine the position of the RH mirror glass. If the exterior mirror control switch is activated in any direction during a memory recall, the DDM sends the manual mirror override message to the DSM. After this message is received, the DSM sends the memory command message to abort the memory recall. After the recall is aborted, the DDM or PDM respond to the exterior mirror control switch inputs. A memory recall is also aborted if the driver seat control switch is activated in any direction during a memory recall.

The LH exterior mirror glass position presets are stored in the DDM and the RH exterior mirror glass position presets are stored in the PDM.

A memory recall or memory save can be initiated by the memory set switch, a RKE transmitter or the keyless entry keypad. For additional information on memory recall or memory save, refer to the Owner's Literature.

For additional information on the memory feature function,
Refer to: [Front Seats - System Operation and Component Description](#) (501-10A Front Seats, Description and Operation).

System Diagram - Exterior, Heated



System Operation - Exterior, Heated

On vehicles equipped with rear window defrost, the heated exterior mirror glass and if equipped, the heated trailer tow spotter mirror glass operates when the rear defrost system is activated.

On vehicles equipped with heated mirrors only, the heated exterior mirror glass and if equipped, the heated trailer tow spotter mirror glass operates when the heated mirror button is pressed on the FCIM.

The heated mirrors are heated for a period of 10 minutes when the engine is running and the defrost system is activated.

The LH and RH heated exterior mirror glass voltage is supplied by the rear window defrost relay through BJB fuse 63 (15A).

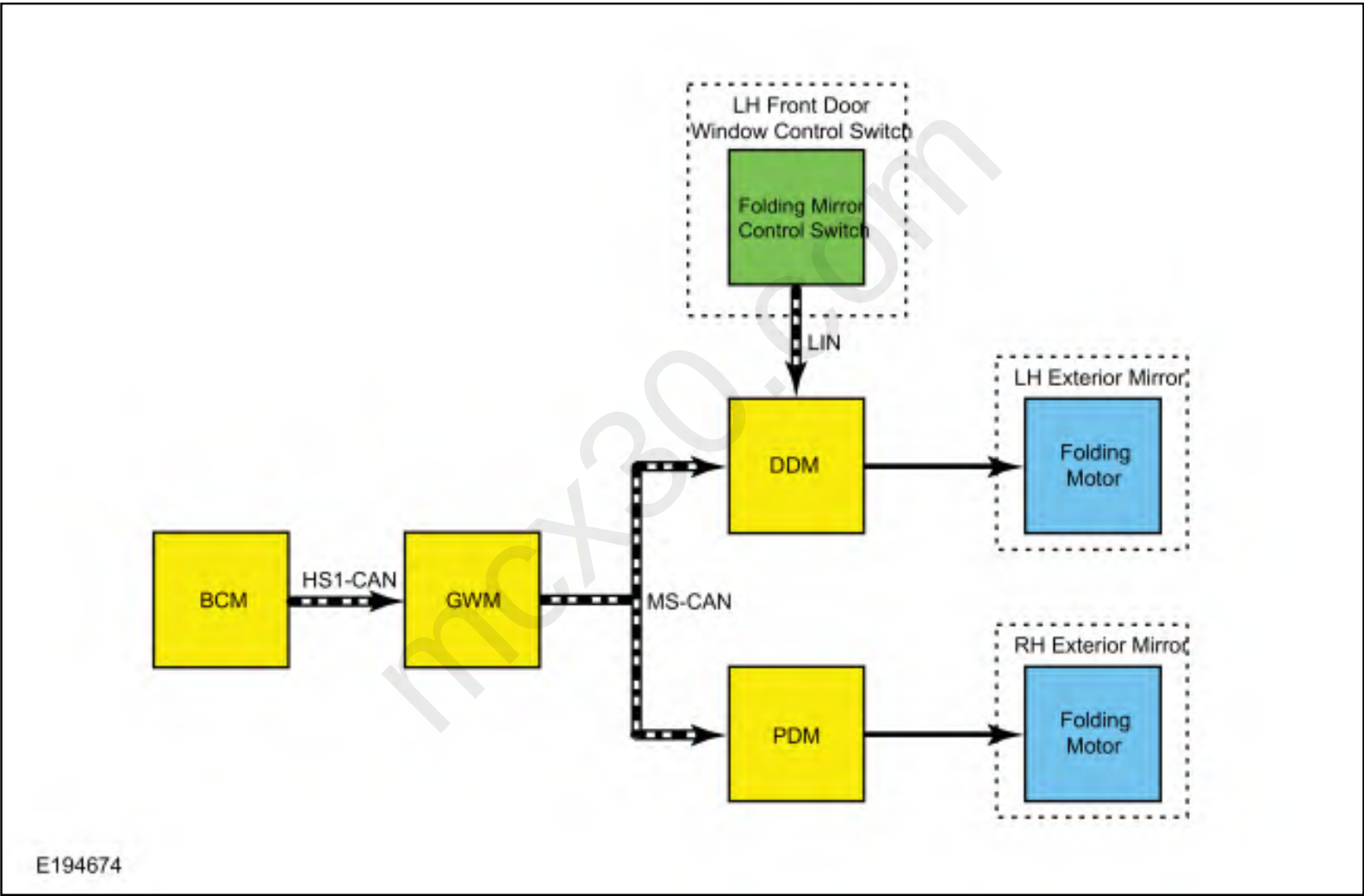
On vehicles equipped with a LH exterior auto-dimming mirror, the LH exterior mirror glass takes longer to defrost

than the RH exterior mirror glass due to differences in the mirror glass thickness.

If equipped, the rear window defrost can also be commanded on and off using voice commands or by touching the rear window defrost button located on the touchscreen interface (FDIM). For additional information on voice or touchscreen commanded features, refer to the Owner's Literature.

For additional information on the rear window defrost system,
Refer to: [Glass, Frames and Mechanisms - System Operation and Component Description](#) (501-11 Glass, Frames and Mechanisms, Description and Operation).

System Diagram - Exterior, Power Fold



Network Message Chart

Module Network Input Messages — DDM

Broadcast Message	Originating Module	Message Purpose

Ignition status	BCM	Used to determine if the ignition switch conditions have been met to fold or unfold the exterior mirrors
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Module Network Input Messages — PDM

Broadcast Message	Originating Module	Message Purpose
Passenger mirror command	DDM	Used by the PDM to control operation of the RH power folding exterior mirror.

System Operation - Exterior, Power Fold

NOTE: *If the exterior mirrors are folded and unfolded several times consecutively, the power lockout feature disables the system for approximately 3-10 minutes to prevent damage to the power fold motors. After 3-10 minutes have elapsed, normal operation resumes.*

NOTE: *The power folding mirrors must be synchronized anytime the LH, RH or both power folding mirrors are folded or unfolded without using the power folding mirror control switch, or if a new power folding mirror has been installed. Refer to Power Folding Mirrors Synchronization in this section.*

The power folding exterior mirror feature allows both power exterior rear view mirrors to be folded or unfolded using the exterior mirror fold switch (integral to the LH front door window control switch). The LH and RH power folding mirrors fold or unfold at the same time and cannot be controlled independently.

On vehicles equipped with areo mirrors, pushing the power fold button (there is no indicator light) activates the fold function with no additional action required. The power folding mirror mode must be deactivated before going to the LH or RH exterior mirror glass adjust mode. When a left or right mirror adjust mode is active, pressing the folding mirror switch overrides the mirror adjust mode and goes directly to folding mode.

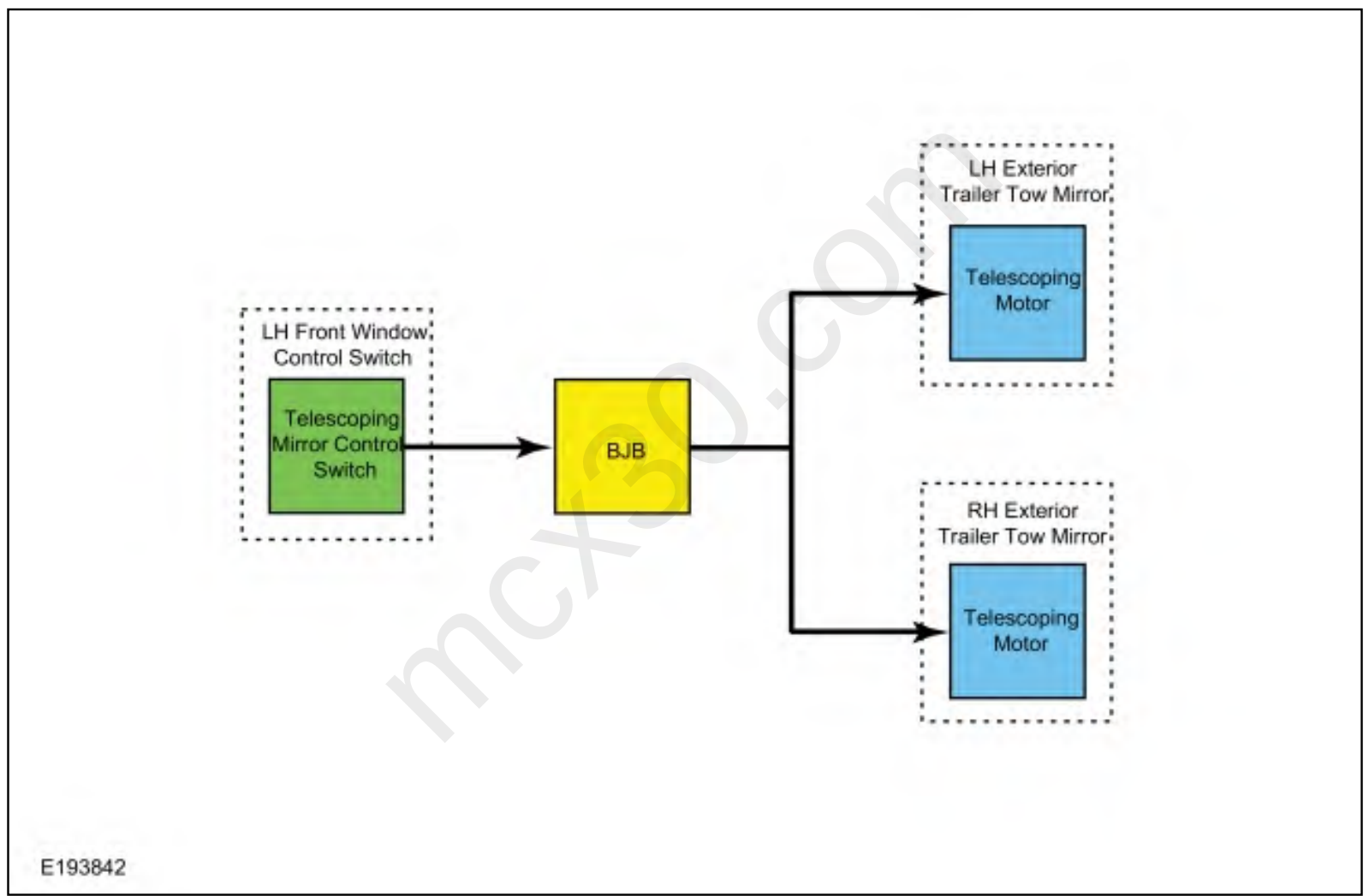
On vehicles equipped with trailer tow mirrors, pushing the power fold mirror button while an LED is lit on the left or right side selection button changes from glass adjustment mode to fold mode. Pushing the left or right side selection button while the power fold button is lit (active) does not change the system to glass adjustment mode. The fold switch must be returned to neutral by pushing the power fold button to deactivate the folding mode or allowing it to time out. Pushing the fold button activates the LED indicator and the function. Pushing the directional control pad up or down initiates the fold function, which folds the mirrors from the deployed or stowed position to the opposite position. The direction (up or down) initiates the fold, but does not control the direction of the fold. The fold mode remains active until the fold button is pushed again to deactivate it or the system times out and returns to neutral.

The DDM monitors the ignition status messages from the BCM, with the GWM acting as a gateway, and when the ignition is on and a mirror fold is initiated, the DDM supplies voltage and ground to the LH exterior mirror folding motor(s) and sends the passenger mirror command message to the PDM. The PDM uses this message to supply

voltage and ground to the RH exterior mirror folding motor(s). When the exterior mirror fold switch is utilized again, the DDM reverses the polarity of the voltage supplied to the LH exterior mirror folding motor(s) and sends the passenger mirror command message to the PDM, which reverses the polarity of the voltage supplied to the RH exterior mirror folding motor(s).

The aero power folding mirrors contain one power fold motor in the pivot. The trailer tow power folding mirrors contain two folding motors, one in each arm. The power folding mirror motors are not replacable. If a power folding mirror motor is found to be inoperative, a new power folding exterior rear view mirror assembly must be installed.

System Diagram - Exterior, Power Telescoping



System Operation - Exterior, Power Telescoping

NOTE: If the exterior mirrors are extended and retracted several times consecutively, the power lockout feature disables the system for approximately 3-10 minutes to prevent damage to the power telescoping motors. After 3-10 minutes have elapsed, normal operation resumes.

NOTE: The power telescoping mirrors must be synchronized anytime the LH, RH or both power telescoping mirrors are extended or retracted without using the power telescoping mirror control switch, or if a new power

telescoping mirror has been installed. Refer to Power Folding Mirrors Synchronization in this section.

The power telescoping mirror feature allows the LH and RH power exterior mirrors to be electronically extended or retracted using the telescoping mirror control switch (integral to the LH front door window control switch). The LH and RH power telescoping mirrors extend and retract simultaneously and cannot be controlled independently.

Pushing the power telescoping mirror button while an LED is lit on the left or right side selection button overrides the mirror adjust mode and goes directly to telescoping mode. Pushing the left or right side selection button while the power telescoping button is lit (active) does not change the system to glass adjustment mode, the telescoping switch must be returned to neutral by pushing the telescoping button to deactivate the telescoping mode or allowing it to time out. Pushing the telescoping button activates the LED indicator and the function. Pushing the directional control pad left telescopes the mirrors out, pushing right telescopes in. The telescoping mode remains active until the telescoping button is pushed again to deactivate it or the systems times out and returns to neutral.

When the ignition is on or the accessory delay feature is active and the power telescoping mirror system is initiated by pressing the telescoping mirror control switch, the LH front door window control switch supplies voltage to the BJB retract or extend relay. The activated relay then provides voltage to the LH and RH exterior telescoping mirror motors.

The power telescoping mirrors contains two telescoping mirror motors which are not replaceable. If a power telescoping mirror motor is found to be inoperative, a new power telescoping rear view mirror assembly needs to be installed.

System Operation - Exterior Auto-Dimming

The LH exterior mirror is equipped with an auto-dimming feature. This feature automatically reduces the glare caused by bright light behind the vehicle during nighttime conditions. The interior auto-dimming mirror supplies voltage and ground to electronically darken the LH exterior mirror glass based on ambient lighting conditions. The reflectance level of the mirror glass is variable and depends on the amount of rear glare in relation to ambient light conditions in front of the interior mirror.

To provide increased visibility when backing up, the interior auto-dimming mirror glass and LH exterior mirror glass automatically returns to a high reflectance mode whenever the vehicle in REVERSE, regardless of exterior lighting conditions.

An interior auto-dimming mirror concern can affect the operation of the LH exterior mirror auto-dimming mirror.

System Operation- Interior Manual-Dimming

The manual interior rear view mirror can be adjusted from a day position to a night position to reduce unwanted glare caused by headlamps from behind the vehicle. Adjusting the interior mirror is accomplished by using the day/night tab, located on the bottom of the interior mirror. Pulling the tab rearward, towards the driver, adjusts the mirror to the night position. Pushing the tab forward, away from the driver, adjusts the mirror to the day position.

System Operation- Interior Auto-Dimming

The auto-dimming feature is active any time the ignition is ON. The interior auto-dimming mirror uses 2 integral photoelectric sensors to detect exterior lighting conditions. When the forward facing sensor detects daytime conditions, the rearward facing sensor is inactive and the mirror glass stays in a high reflectance mode. When the forward facing sensor detects nighttime conditions, the rearward facing sensor is active. When bright lights (glare) are detected by the rearward facing sensor, the mirror glass is electronically darkened. To provide increased visibility when backing up, the interior rear view mirror automatically returns to a high reflectance mode any time reverse gear is selected, regardless of exterior lighting conditions.

NOTE: *Blockage of either sensor causes false readings.*

Component Description

Exterior Mirror Control Switch

The exterior mirror control switch is a momentary contact switch that is integral to the LH front door window control switch, which is connected to the DDM through a LIN circuit. The LED on each exterior mirror selection button illuminates to indicate which exterior mirror is selected for adjustment.

Exterior Mirror Fold Switch

The exterior power folding mirror control switch is integral to the LH front window control switch, which is connected to the DDM through a LIN circuit.

Exterior Mirror Telescoping Switch

The exterior power telescoping mirror control switch is integral to the LH front window control switch, which is connected to the DDM through a LIN circuit.

Exterior Mirror

Each exterior mirror has 2 bi-directional motors that are used to control the position of the exterior mirror glass. Adjusting the exterior mirror control switch to the LH or RH position determines which exterior mirror motor to control.

If equipped with heated exterior mirrors, heated exterior mirrors use heating elements that are integral to the exterior mirror glass.

If equipped with the LH exterior auto-dimming mirror, the LH exterior auto-dimming mirror glass electronically darkens when bright light is detected by the interior auto-dimming mirror from behind the vehicle during nighttime conditions.

If equipped with memory mirrors, each exterior mirror motor is equipped with an integral potentiometer that is monitored by the DDM (LH mirror) or PDM (RH mirror) to determine the position of the exterior mirror glass. Vehicles equipped with memory exterior mirrors are capable of setting Diagnostic Trouble Codes (DTCs) for the mirror circuits.

If equipped with power folding mirrors, the folding mirror control switch, integral to the LH front door window control switch, allows the power folding mirrors to be folded or unfolded.

If equipped with power telescoping mirrors, the telescoping mirror control switch, integral to the LH front door window control switch, allows the power telescoping mirrors to be extended or retracted.

The exterior mirrors may include turn signal indicators and spot lamps. For additional information on the mirror-mounted turn signal indicators or spot lamps,

Refer to: [Exterior Lighting - System Operation and Component Description](#) (417-01 Exterior Lighting, Description and Operation).

The exterior mirrors may include puddle lamps. For additional information on the mirror-mounted puddle lamps,

Refer to: [Interior Lighting - System Operation and Component Description](#) (417-02 Interior Lighting, Description and Operation).

The exterior mirrors may include parking lamps. For additional information on the mirror-mounted parking lamps,

Refer to: [Exterior Lighting - System Operation and Component Description](#) (417-01 Exterior Lighting, Description and Operation).

The exterior mirrors may include BLIS® Light Emitting Diodes (LEDs). For additional information on the mirror-mounted BLIS®,

Refer to: [Blind Spot Information System - System Operation and Component Description](#) (419-04 Side and Rear Vision, Description and Operation).

The exterior mirrors may include side cameras. For additional information on the mirror-mounted side cameras,

Refer to: [Parking Aid - System Operation and Component Description](#) (413-13B Parking Aid - Vehicles With: Parking Aid Camera, Description and Operation).

The exterior mirrors use a jumper harness between the vehicle wiring harness and the exterior mirror motors and the heated mirror glass. The exterior mirror jumper harness is integral to the exterior mirror. Before replacing an exterior mirror or motor, inspect the jumper harness for opens, shorted circuits or damaged and pushed-out pins. If a concern with the exterior mirror jumper harness exists, attempt to repair the jumper harness.

DDM

For the exterior power functions, the DDM receives mirror movement requests through the LIN circuit from the LH front door window control switch. When the LH exterior mirror is selected, the DDM provides voltage and ground to the appropriate LH exterior mirror motor to drive the mirror glass in the desired direction. The DDM sends RH exterior mirror movement requests to the PDM through the MS-CAN.

If the vehicle is equipped with exterior power folding mirrors, the DDM receives mirror movement requests through the LIN circuit from the LH front door window control switch. When a mirror fold is initiated, the DDM supplies voltage and ground to the LH exterior mirror folding motor. When the exterior mirror fold switch is utilized again, the DDM reverses the polarity of the voltage supplied to the LH exterior mirror folding motor. The DDM sends RH exterior mirror fold requests to the PDM through the MS-CAN.

If the vehicle is equipped with memory mirrors, the DDM monitors the potentiometers in the LH exterior mirror to determine the position of the exterior mirror glass. Preset memory positions for the LH exterior mirror glass are stored in the DDM.

When a concern exists, the DDM is capable of setting and storing Diagnostic Trouble Codes (DTCs) for the LH exterior mirror motor drive circuits, position sensor circuits (if equipped) and folding mirror motor circuits (if equipped).

PDM

For the exterior power functions, when the RH exterior mirror is selected, the PDM supplies voltage and ground to the appropriate RH exterior mirror motor to drive the mirror glass in the desired direction based on messages received from the DDM through the MS-CAN.

If the vehicle is equipped with exterior power folding mirrors, when the PDM receives the RH exterior mirror movement requests from DDM over the MS-CAN, it provides voltage and ground to the RH exterior mirror folding motor.

If the vehicle is equipped with memory mirrors the PDM monitors the potentiometers in the RH exterior mirror to determine the position of the exterior mirror glass. Preset memory positions for the RH exterior mirror glass are stored in the PDM.

When a concern exists, the PDM is capable of setting and storing Diagnostic Trouble Codes (DTCs) for the RH exterior mirror motor drive circuits, position sensor circuits (if equipped) and folding mirror motor circuits (if equipped).

Interior Rear View Mirror - Manual-Dimming

The manual dimming interior rear view mirror has a lever at the back of the mirror that must be pulled forward or pushed rearward by the driver to activate the manual dimming function. Manual dimming is completely controlled by the driver.

Interior Rear View Mirror - Auto-Dimming

The auto-dimming rear view mirror has 2 photoelectric sensors, one on the front of the mirror (facing the windshield) and one on the rear of the mirror (at the top of the mirror glass). Based on inputs from these sensors, the automatic dimming feature adjusts the reflectance level of the interior rear view mirror glass to eliminate unwanted glare. The reflectance level of the mirror glass is variable and depends on the amount of rear glare in relation to ambient light conditions in front of the interior mirror.