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1984 FORD Capri OEM Service and Repair Workshop Manual

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3	PCM (powertrain control module)
4	BEV (battery electric vehicle) - SOBDMC (secondary on-board diagnostic control module C)

Network Message Chart

PCM (powertrain control module) Network Input Messages

Broadcast Message	Originating Module	Message Purpose
Vehicle speed	ABS (anti-lock brake system) module	Vehicle speed is used to determine positioning of the active grille shutters.
Active Grille Shutter Position Requests from DCDC (direct current/direct current converter control module) , BECM (battery energy control module) , Battery, Motor and AC (alternating current) pressure	SOBDMC (secondary on-board diagnostic control module C) / ISC (Inverter System Converter)	Position AGS to provide air flow for temperature control of BEV (battery electric vehicle) components and vehicle cabin environment.

Active Grille Shutter

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

During normal operation, the grille shutter may be partially to fully open, depending on the ambient temperature. After ignition ON, 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 (diagnostic trouble code) when the timer reaches a predetermined limit. Other faults also trigger a recalibration request, but not until a grille shutter DTC (diagnostic trouble code) is set in the PCM (powertrain control module) .

The PCM (powertrain control module) communicates the desired position (open or closed) of the grille shutter based on various PCM (powertrain control module) inputs (vehicle speed, coolant temperature, ambient temperature, A/C (air conditioning) system pressure, etc.). The PCM (powertrain control module)

Active Grille Shutter - Overview

501-02 Front End Body Panels	***2022 F-150***
Description and Operation	***Procedure revision date: 10/2/2020***

Active Grille Shutter - Overview

Overview

The Active Grille Shutter system is primarily used to improve fuel economy by reducing aerodynamic drag while the vehicle in moving. It is also used to shorten engine warm-up time, which increases engine efficiency and provides faster heat delivery to the vehicle cabin. The active grille shutter actuator receives position commands from the PCM (powertrain control module) via the LIN (local interconnect network) .

Each Active Grille Shutter system assembly is comprised of independent upper and lower active grille shutter assemblies, a set of vanes, linkage hardware and active grille shutter actuator (motor).

The active grille shutter system carries out a self-calibration sequence whenever the engine is started, fully opening and closing the shutters before being positioned to the desired opening position as requested by the PCM (powertrain control module) .

The upper active grille shutter system is controlled in the traditional sense, which is to modulate air flow to the underhood powertrain components and accessories. The lower active grille shutter system is dedicated to thermal management of the turbocharger CAC (charge air cooler) .

Active Grille Shutter will also be active in HEV (hybrid electric vehicle) , during plug-in charging to provide airflow for HEV (hybrid electric vehicle) cabin climate conditioning and component cooling when the vehicle is stationary. In HEV (hybrid electric vehicle) vehicles, the desired Active Grill Shutter position request is transmitted by the SOBDMC (secondary on-board diagnostic control module C) and received by the PCM (powertrain control module) .

Regardless of the hardware modules present in a vehicle, the PCM (powertrain control module) will send the appropriate control signal to the Active Grill Motor.

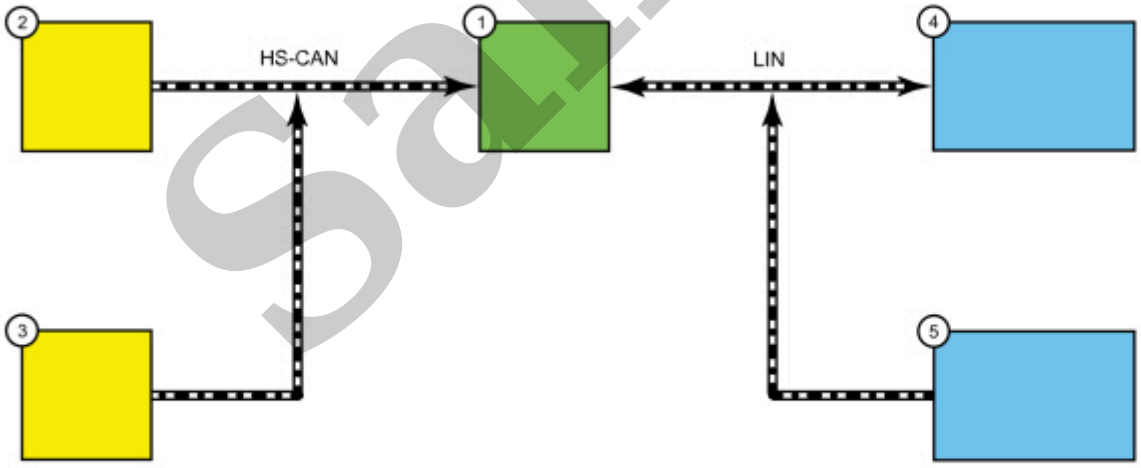
Active Grille Shutter - System Operation and Component Description

501-02 Front End Body Panels	***2022 F-150***
Description and Operation	***Procedure revision date: 11/4/2020***

Active Grille Shutter - System Operation and Component Description

System Operation

System Diagram



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Item	Description

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

The PCM (powertrain control module) 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 (powertrain control module) inputs (vehicle speed, coolant temperature, ambient temperature, A/C (air conditioning) 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 (powertrain control module) inputs such as vehicle speed, turbo charge pressure, ambient temperature, charge air temperature, etc...

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

The PCM (powertrain control module) sets active grille shutter DTC (diagnostic trouble code) s when the fault information is communicated by the active grille shutter actuator for a predetermined amount of time. Any failures of the LIN (local interconnect network) 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 (diagnostic trouble code) is set in the PCM (powertrain control module) .

Component Description

Active Grille Shutter Actuator

The active grille shutter actuator is a smart motor which receives position requests from the PCM (powertrain control module) via the LIN (local interconnect network) . 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.

3	Power hood striker
4	Power hood latch
5	FHCM (Front Hatch Control Module)
6	Power hood anti-pinch strip LH (left-hand)
7	Power hood strut LH (left-hand)

Power Hood - System Operation and Component Description

501-02 Front End Body Panels	***2022 F-150***
Description and Operation	***Procedure revision date: 04/22/2022***

Power Hood - System Operation and Component Description

System Operation

System Diagram

6	Exterior Release Switch
7	Anti-Pinch Switches
8	Emergency Release Switch
9	ECG
10	BCM
11	FHCM
12	Frunk Tub Lamp Switch
13	Exterior Sounder
14	Power Hood Latch Assembly
15	Latch/Cinch Switches
16	Release Motor
17	Cinch Motor

Network Message Chart

FHCM (Front Hatch Control Module) Network Input Messages

Broadcast Message	Originating Module	Message Purpose
Hood request	BCM (body control module)	Used by the FHCM (Front Hatch Control Module) to open/close the hood when the BCM (body control module) receives a valid request from a programmed RKE (remote keyless entry) transmitter or the passive entry feature.
Gear lever position	PCM (powertrain control module)	Used by the FHCM (Front Hatch Control Module) to inhibit power hood operation if the transmission is not in PARK.
Power hood mode	IPC (instrument panel cluster)	Used by the FHCM (Front Hatch Control Module) to enable/disable the power hood operation from both front power hood switches.

- When the power hood reaches the full open position, the FHCM (Front Hatch Control Module) removes the power from the drive motors.

If any of the power hood switches is activated, a request for the hands-free feature is detected or a double press of the button on a RKE (remote keyless entry) transmitter occurs during a power open, the hood stops and holds its position.

Power Close

The power hood power close operation begins when:

- the FHCM (Front Hatch Control Module) detects the front power hood switch is pressed.
- the FHCM (Front Hatch Control Module) detects the front interior power hood switch is pressed.
- the FHCM (Front Hatch Control Module) receives a message from the BCM (body control module) (indicating a request from a programmed RKE (remote keyless entry) transmitter or a passive entry feature request).

Once the close request is received, the power hood closes by carrying out the following:

- The FHCM (Front Hatch Control Module) checks the gear selector lever position and vehicle speed status from the messages received.
- The FHCM (Front Hatch Control Module) starts an audible chime via the audio system.
- The FHCM (Front Hatch Control Module) supplies power to the drive motors.
- While the power hood is closing, the FHCM (Front Hatch Control Module) monitors the power hood motor position sensor (for hood position and velocity) and the anti-pinch switches. If an obstruction is detected, the power hood stops and reverses.
- The FHCM (Front Hatch Control Module) monitors the hood ajar state.
- When the FHCM (Front Hatch Control Module) detects the latch has engaged the striker (switches in the latch changing state), power is supplied to the cinching motor to pull the hood into the primary latch position and power is removed from the hood drive motors.
- When the FHCM (Front Hatch Control Module) detects the primary latch position has been reached (hood is fully closed), the FHCM (Front Hatch Control Module) reverses the direction of the cinching motor until the sector gear switch indicates a start position.

If any of the power hood switches is activated, a request for the hands-free feature is detected or the button on the RKE (remote keyless entry) transmitter is double pressed during a power close, the hood stops and holds its position.

NOTE

The front interior power hood switch (located on the bottom of the hood trim panel) is a momentary contact switch that routes the voltage signal from the FHCM (Front Hatch Control Module) to ground when pressed. Pressing this switch closes the power hood. The power hood does not open or release the latch from the interior power hood switch.

Exterior Hood Release Switch

The exterior hood release switch is a momentary contact switch that routes the voltage signal to ground when pressed. The signal is sent from the BCM (body control module) and the FHCM (Front Hatch Control Module) .

If the doors were not previously electronically unlocked when the exterior hood release switch is pressed, the BCM (body control module) activates the hood passive entry feature. If the BCM (body control module) detects a valid programmed passive key, the BCM (body control module) sends a message to the FHCM (Front Hatch Control Module) to open the hood. If no passive key is detected, the request is ignored.

If the doors were previously electronically unlocked when the hood switch is pressed, the FHCM (Front Hatch Control Module) opens the hood. The FHCM (Front Hatch Control Module) receives the door lock/unlock status from the BCM (body control module) over the CAN (controller area network) .

Any subsequent presses of the switch stops the motion or reverses direction.

Power Hood Latch

The power hood latch is responsible for unlatching, latching and cinching the hood. The power hood latch contains an unlatch motor, a cinching motor, a pawl switch, forkbolt primary and secondary switches, and a sector gear switch.

Unlatch Motor

The unlatch motor is only driven in one direction to unlatch the hood, similar to an actuator activating. A spring returns the unlatch motor to a rest position.

Cinching Motor

The cinching motor is driven in one direction to cinch the hood and in the opposite direction to its start position.

During a cinch operation, power is supplied to the cinching motor by the FHCM (Front Hatch Control Module) when the secondary latch position is reached during a power close operation. When the motor activates, it pulls the hood into the primary latch position. When the fully latched position is reached, the FHCM (Front Hatch Control Module) reverses the polarity to the cinching motor until it reaches its start position.

Pawl Switch, Forkbolt Primary and Secondary Switches

The pawl, forkbolt primary and secondary switches provide input to the FHCM (Front Hatch Control Module) to determine the hood latch position. The hood is in the primary position when the hood is in the full closed position. The hood is in the unlatched position when the hood is open and completely out of the striker. The