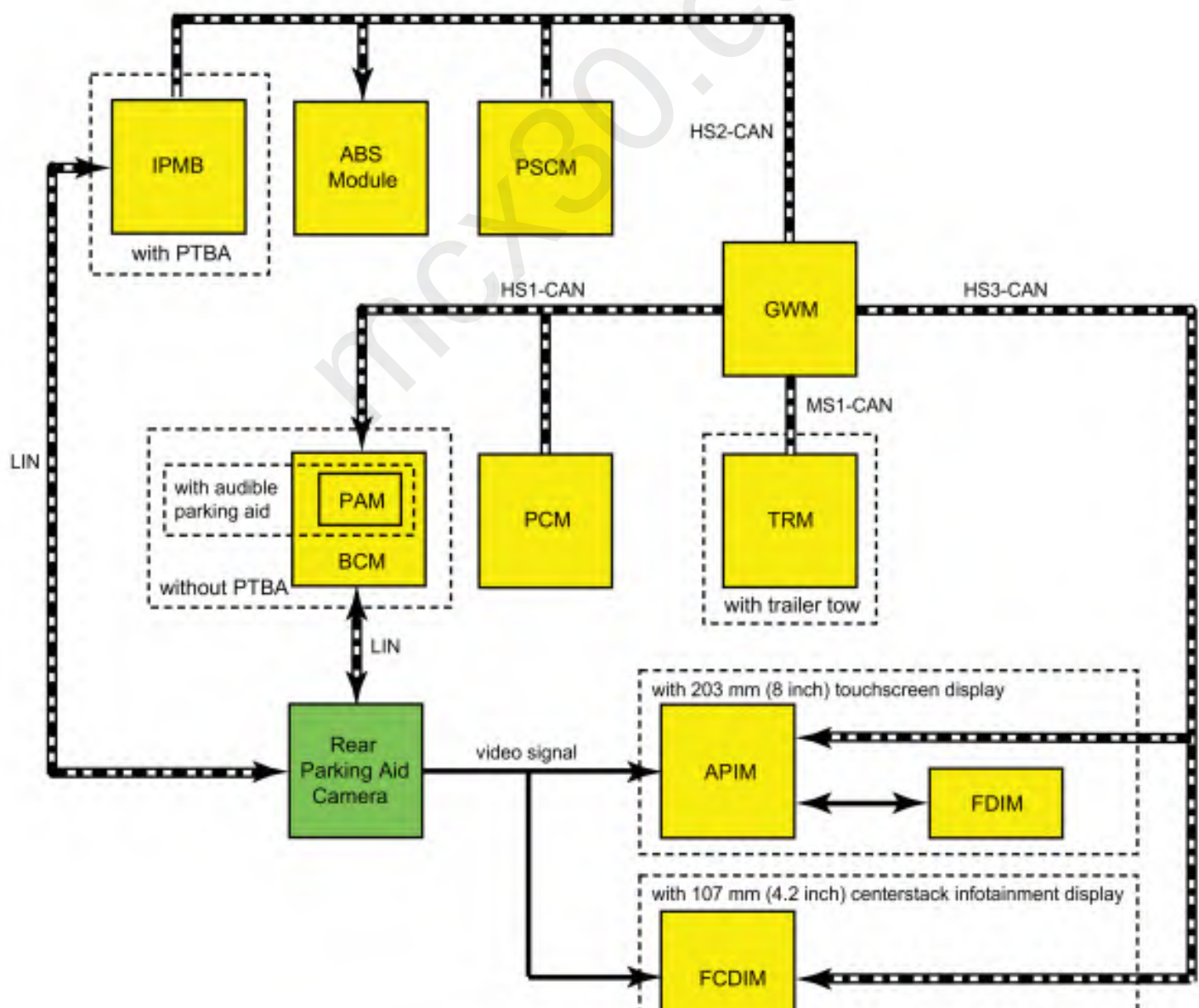


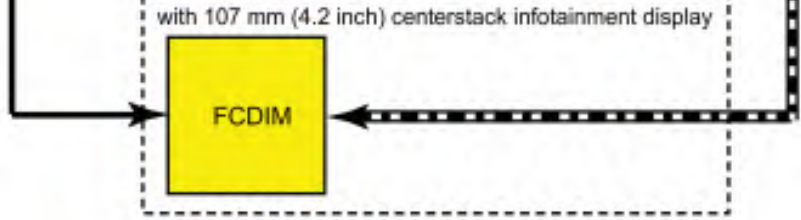
Parking Aid - System Operation and Component Description

System Operation

Rear Only Parking Aid Camera

System Diagram





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Network Message Chart

BCM Network Input Messages

Broadcast Message	Originating Module	Message Purpose
Camera commands	APIM	Used to command the zoom level on and off based on driver inputs through the FDIM.
Gear lever position	PCM	Used to support the rear parking aid camera standby mode. Turns the camera image output on when reverse gear is selected.
Parking aid sensor data	PAM	Used to generate the visual highlights in the zone where an object is detected by the rear parking aid system.
Steering angle	ABS Module	Used to generate the intended vehicle path for the active guideline feature.
Trailer lamp connected	TRM	Disables the guidelines and visual park aid alert when a trailer is electrically connected to the vehicle (if equipped with trailer tow).
Vehicle speed	PCM	Used to support the rear parking aid camera standby mode. Turns the camera image output off when vehicle speed 16 km/h (10 mph) or greater and turns the camera image output on when the vehicle speed is 8 km/h (5 mph) or less.

IPMB Network Input Messages

Broadcast Message	Originating Module	Message Purpose
Camera commands	APIM	Used to command the zoom level on and off based on driver inputs through the FDIM.
Gear lever position	PCM	Used to support the rear parking aid camera standby mode. Turns the camera image output on when reverse gear is selected.
Parking aid sensor data	PAM	Used to generate the visual highlights in the zone where an object is detected by the rear parking aid system.

Steering angle	ABS Module	Used to generate the intended vehicle path for the active guideline feature.
Trailer lamp connected	TRM	Disables the guidelines and visual park aid alert when a trailer is electrically connected to the vehicle (if equipped with trailer tow).
Vehicle speed	PCM	Used to support the rear parking aid camera standby mode. Turns the camera image output off when vehicle speed 16 km/h (10 mph) or greater and turns the camera image output on when the vehicle speed is 8 km/h (5 mph) or less.

ABS Module Network Input Messages

Broadcast Message	Originating Module	Message Purpose
Steering wheel angle sensor data	PSCM	The ABS module uses the steering angle sensor data to generate the steering angle message that is sent to the BCM to support the active guideline feature.

FCDIM Network Input Messages

Broadcast Message	Originating Module	Message Purpose
Gear lever position	PCM	Used to enable and disable the rear video display.
Parking aid sensor data	PAM	Used to generate the visual highlights in the zone where an object is detected by the rear parking aid system.
Vehicle speed	PCM	When the video delay feature is turned on, this message is used to turn the rear camera display off after the vehicle speed exceeds a preset threshold.

APIM Network Input Messages

Broadcast Message	Originating Module	Message Purpose
Camera status	IPMB	Used to display the current status for active guidelines and visual park aid alert.
Gear lever position	PCM	Used to enable the video display when reverse gear is selected.

Parking aid sensor data	PAM	Used to generate the visual highlights in the zone where an object is detected by the rear parking aid system.
Vehicle speed	PCM	When the video delay feature is turned on, this message is used to turn the rear camera display off after the vehicle speed exceeds a preset threshold.

Image Display - 203 mm (8 inch) Touchscreen Display

NOTE: *The tailgate must be fully closed for correct operation of the rear parking aid camera system.*

The rear parking aid camera image is displayed by the FDIM when reverse gear is selected. To determine the selector lever position and enable the camera display, the PCM sends the gear position message to the GWM on the HS-CAN1. The GWM then sends the message to the APIM via the HS-CAN3.

The camera is on any time it receives voltage (when the ignition is ON), but a video signal is only generated under certain conditions. When reverse gear is selected, the camera continuously generates a video signal. When any gear except reverse is selected, the camera turns the video signal off when the vehicle speed reaches 16 km/h (10 mph), and turns the video signal on when vehicle speed falls below 8 km/h (5 mph). If the camera is not configured properly, some features may be inoperative. The camera sends the video signal on shielded twisted pair wires to the APIM, which displays the image on the FDIM.

The following parking aid camera system features are driver selectable:

- Visual park aid alert — assists the driver to visually see the object causing the parking aid system to sound.
- Manual zoom — allows the driver to manually zoom the image.
- Video delay — allows the driver to see the image behind the vehicle after the vehicle is shifted out of reverse into any gear other than park.

The following camera system features are not driver selectable:

- Active guidelines — displays the intended path of the vehicle based upon steering wheel input.
- Fixed guidelines — assists the driver with aligning the vehicle with an object.

The FDIM settings menu is used to turn the visual park aid alert and video delay on and off. The visual park aid alert and video delay features are generated within the APIM.

To turn the manual zoom feature on and off, the driver uses an on screen button located on the FDIM while in reverse. The driver generated commands originate at the FDIM, which is hardwired to the APIM. The APIM sends the driver generated commands over the HS-CAN3 to the GWM. The GWM then sends the commands to the BCM on the HS-CAN1. The BCM sends the zoom command to the rear parking aid camera via the LIN circuit. The zoom is generated by the rear parking aid camera.

The fixed and active guidelines are generated by the rear parking aid camera and are not selectable by the driver.

Image Display - 107 mm (4.2 inch) Centerstack Infotainment Display

NOTE: *The tailgate must be fully closed for correct operation of the rear parking aid camera system.*

The rear parking aid camera image is displayed by the FCDIM when reverse gear is selected. To determine the selector lever position and enable the camera display, the PCM sends the gear position message to the GWM on the HS-CAN1. The GWM then sends the message to the FCDIM via the HS-CAN3.

The camera is on any time it receives voltage (when the ignition is ON), but a video signal is only generated under certain conditions. When reverse gear is selected, the camera continuously generates a video signal. When any gear except reverse is selected, the camera turns the video signal off when the vehicle speed reaches 16 km/h (10 mph), and turns the video signal on when vehicle speed falls below 8 km/h (5 mph). If the camera is not configured properly, some features may be inoperative. The camera sends the video signal on shielded twisted pair wires to the FCDIM.

The following parking aid camera system are driver selectable:

- Visual park aid alert — assists the driver to visually see the object causing the parking aid system to sound.
- Manual zoom — allows the driver to manually zoom the image.
- Video delay — allows the driver to see the image behind the vehicle after the vehicle is shifted out of reverse into any gear other than park.

The following camera system features are not driver selectable:

- Active guidelines — displays the intended path of the vehicle based upon steering wheel input.
- Fixed guidelines — assists the driver with aligning the vehicle with an object.

The visual park aid alert and video delay are turned on and off in the FCDIM. The visual park aid alert and video delay features are generated within the FCDIM.

To turn the visual park aid alert and manual zoom features on and off, the driver generated commands originate from the FCDIM. The FCDIM sends the driver generated commands to the GWM on the HS-CAN3 and the GWM sends the commands from the HS-CAN3 to the BCM on the HS-CAN1. The BCM then sends the command to the rear parking aid camera via the LIN circuit. The visual park aid alert feature is generated by a combination of the rear park aid camera and the FCDIM and the manual zoom is generated by the rear parking aid camera.

The fixed and active guidelines are generated by the rear parking aid camera and are not selectable by the driver.

LIN Communication

The BCM (rear only parking aid camera system without PTBA) or the IPMB (rear only parking aid camera system with PTBA or 360 degree view camera system) and the rear parking aid camera communicate via a LIN circuit which is a dedicated single wire communication network.

The messages sent from the BCM or the IPMB to the camera are:

- Camera configuration data

- Display manual zoom request
- Guideline on/off request
- Trailer connection status (if equipped with trailer tow)
- Steering angle
- Standby enable/disable request

The messages sent from the camera to the BCM or the IPMB are:

- Camera status
- Display zoom status
- Camera part number data
- Guideline status

Visual Park Aid Alert

NOTE: *The on-screen alert transitions may not match changes in the audible parking aid alert tone frequency.*

The visual park aid alert feature displays a visual highlight in the zone where an object has been detected by the rear parking aid system. This feature utilizes the parking aid sensor data from the PAM to generate the visual highlights on the video image. When reverse gear is selected and an object is detected by a rear parking aid sensor, the parking aid sensor data message from the PAM is used by the FCDIM or APIM to generate the alert.

For vehicles equipped with a 4.2 in (107 mm) display, if the visual park aid alert feature is enabled, the feature is still operational even if the rear parking aid system has been disabled by the driver.

Fixed Guidelines

NOTE: *The color-coded lines cannot indicate accurate or consistent distances between the rear of the vehicle and objects shown in the video image. This normal condition is due to variances in vehicle ride height, including, but not limited to, vehicle loading.*

The video camera fixed guidelines feature displays guidelines on top of the video image to assist the driver with alignment of the vehicle. A dashed line on the displayed image represents the center of the vehicle and 3 color-coded lines (red, yellow, green) identify different zones between the rear of the vehicle and objects.

If the vehicle is equipped with a TRM, the fixed guidelines are not shown when a trailer is electrically connected to the vehicle.

Active Guidelines

NOTE: *If the battery has been disconnected or discharged, or a module is disconnected or replaced, the active guidelines may be inoperative until the vehicle is driven on a flat and smooth road at 32 km/h (20 mph) or more, with hands placed loosely on the steering wheel and minimal steering correction for approximately 30 seconds.*

If the guidelines are remain inoperative, it may be necessary to disconnect the battery for 5 minutes with the driver's door open, then drive the vehicle for 5 miles in normal city driving before performing the procedure

described above.

The active guidelines feature displays dynamic guidelines that correspond to the projected path of vehicle travel, based on the current steering angle. Several modules are involved in generating the steering angle data used to support the active guidelines. The PSCM monitors the steering angle sensor and sends the steering wheel angle sensor data to the ABS module via the HS-CAN2. The ABS module uses this message from the PSCM to generate the steering angle message that is sent to the GWM on the HS-CAN2. The GWM then sends the message to the BCM via the HS-CAN1. The BCM sends the steering angle data to the rear parking aid camera via the LIN circuit. The camera uses this data to generate the active guidelines over the video image.

If the steering wheel is in the straight-ahead position, the active guidelines are not shown.

The guidelines are not shown when reverse is not selected (video delay active).

If the vehicle is equipped with a TRM, the active guidelines are not shown when a trailer is electrically connected to the vehicle.

Manual Zoom

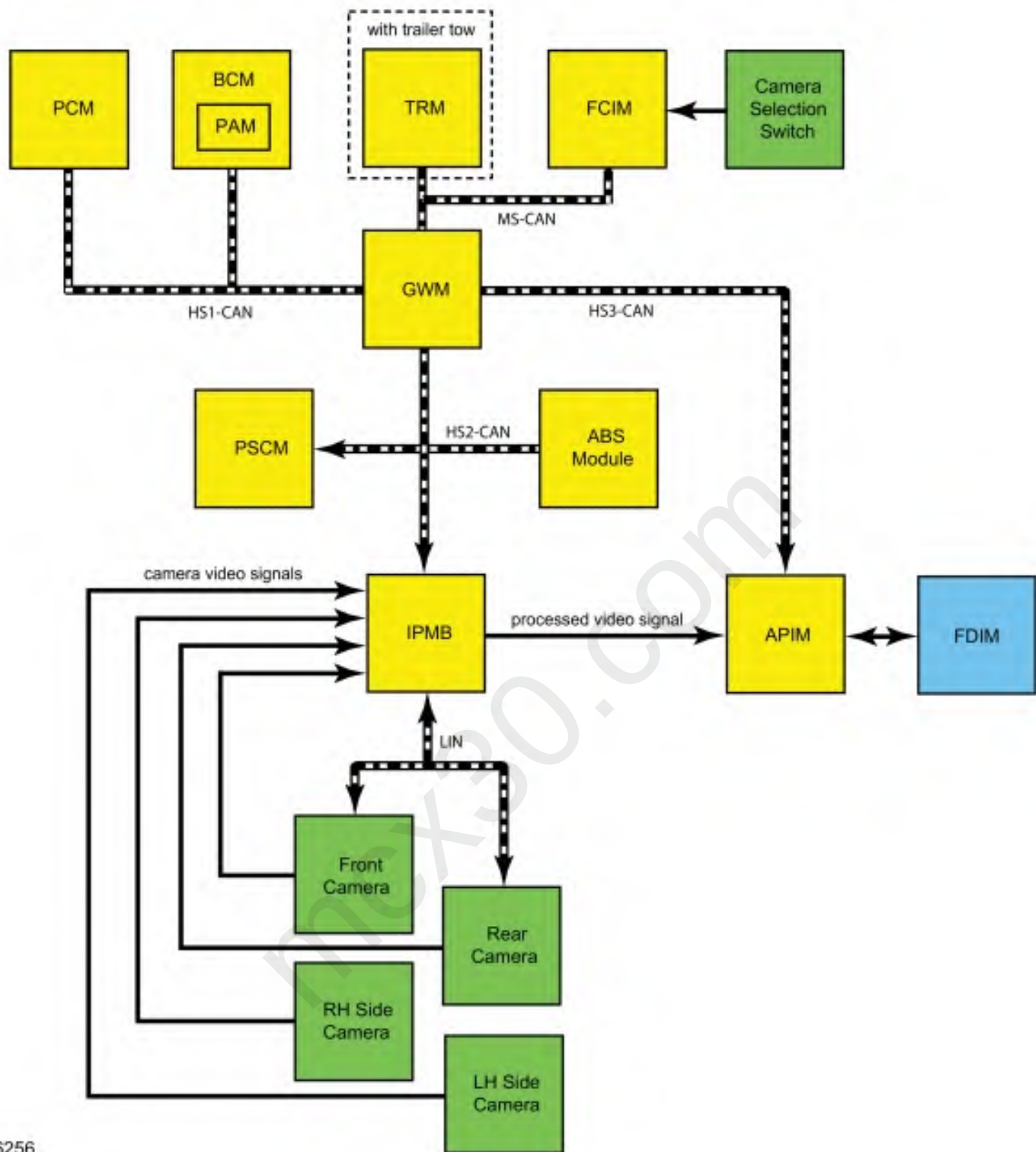
The manual zoom feature is generated by the rear parking aid camera and has one level of zoom. If the manual zoom feature is on and the vehicle is shifted out of reverse gear, the manual zoom feature is disabled and must be re-enabled the next time reverse gear is selected. When the driver turns the zoom on or off at the FDIM or FCDIM, the zoom command is sent through HS-CAN3, GWM, and HS-CAN1 to the BCM. The BCM then sends the manual zoom request message to the rear parking aid camera via the LIN circuit. The camera then turns the zoom on or off.

Video Delay

When the video delay is turned on, the display keeps the rear video display enabled after the transmission is shifted out of reverse gear, into any gear other than park, until the vehicle speed reaches 10 km/h (6 mph). With the delay off (default), the image displays until the transmission is shifted out of reverse gear.

360 Degree View Camera

System Diagram



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Network Message Chart

IPMB Network Input Messages

Broadcast Message	Originating Module	Message Purpose

Camera commands	APIM	Used to command the visual park aid alert and zoom level on and off based on driver inputs through the FDIM.
Camera selection switch status	FCIM	Used to switch the camera views dependent upon the transmission gear selection.
Driver door ajar status	BCM	Used to generate the door ajar icon on the image when the LH front door is ajar.
Reverse gear state	PCM	Used to enable the front or rear camera views based on the current gear selection.
Parking aid sensor data	PAM	Used to generate the visual highlights in the zone where an object is detected by the parking aid system.
Passenger door ajar status	BCM	Used to generate the door ajar icon on the image when the RH front door is ajar.
Steering angle	ABS Module	Used to generate the intended vehicle path for the active guideline feature.
Trailer lamp connected	TRM	Disables the guidelines and visual park aid alert when a trailer is electrically connected to the vehicle. (if equipped with trailer tow)
Tailgate ajar	BCM	Disables the guidelines and visual park aid alert when the tailgate is open.
Vehicle speed	PCM	Used to support the front and rear camera standby mode. Turns the camera image output off when vehicle speed is 16 km/h (10 mph) or greater and turns the camera image output on when the vehicle speed is 12 km/h (7.5 mph) or less.

ABS Module Network Input Messages

Broadcast Message	Originating Module	Message Purpose
Steering wheel angle sensor data	PSCM	The ABS module uses the steering angle sensor data to generate the steering angle message that is sent to the IPMB to support the active guideline feature.

APIM Network Input Messages

Broadcast Message	Originating Module	Message Purpose
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Camera status	IPMB	Used to enable the video display when the camera selection switch is pressed and any gear except reverse is selected or when driving in certain terrain management off-road modes.
Gear lever position	PCM	Used to enable and disable the video display based on the current gear selection.
Parking aid sensor data	PAM	Used to generate the visual highlights in the zone where an object is detected by the rear parking aid system.
Vehicle speed	PCM	When the video delay feature is turned on, this message is used to turn the rear camera display off after the vehicle speed exceeds a preset threshold.

Image Display

NOTE: The tailgate and doors must be fully closed for correct operation of the 360 degree view camera system.

NOTE: The front camera automatically switch on when the terrain management system is in mud/sand, rock crawl, or Baja mode and the vehicle speed is less than 24 km/h (15 mph).

The 360 degree view camera system is capable of generating several different views using the front, rear, LH side and RH side cameras, and the IPMB. The IPMB processes the video signals from the 4 cameras and generates the appropriate views that are displayed on the FDIM. The views that are displayed are determined by the transmission gear selector position.

When the ignition is ON and reverse gear is selected, the rear camera views are shown on the FDIM. The Rear 360 + Normal view is shown first. Subsequent presses of the camera selection switch when reverse gear is selected allows the driver to cycle through the rear camera views in the following order:

View order	View name	Description
1	Rear 360 + Normal	Contains the normal rear camera view, shown next to a 360 degree camera view.
2	Rear Normal	Provides an image of what is directly behind the vehicle.
3	Rear Split View	Provides an extended wide angle image of what is behind the vehicle.

When the ignition is ON and any gear **except** reverse selected, the front camera and 360 degree views are shown on the FDIM when the camera selection switch is pressed. The front images are available until the vehicle speed reaches 15 km/h (9 mph). The Front 360 + Normal view is shown first. Subsequent presses of the camera selection switch allows the driver to cycle through the front camera views in the following order:

View order	View name	Description
1	Front 360 + Normal	Contains the normal front camera view, shown next to a 360 degree camera view.
2	Front Normal	Provides an image of what is directly in front of the vehicle.
3	Front Split View	Provides an extended wide angle image is what is in front of the vehicle.

To enable the front or rear camera displays, the IPMB monitors the camera selection switch (integral to the FCIM), gear position and vehicle speed messages. The PCM sends the gear position and vehicle speed messages to the GWM through the HS-CAN1 and the FCIM sends the camera selection switch status message to the GWM through the MS-CAN. The GWM then sends the messages to the IPMB via HS-CAN2.

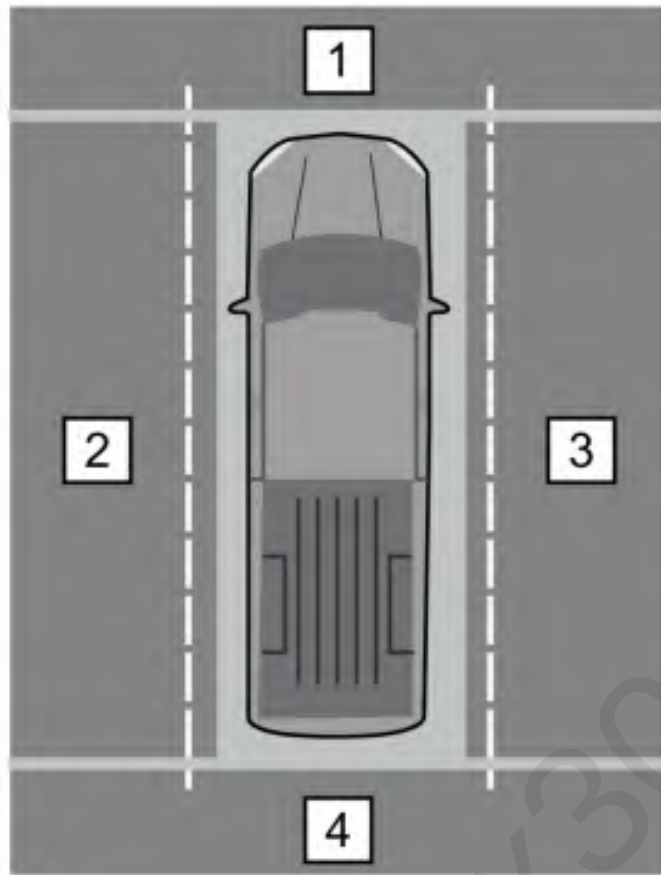
All camera views are generated by the IPMB, using the video signals from one or more of the cameras. The video signals are sent from the cameras to the IPMB through twisted pair, shielded circuits. The IPMB processes the image(s) from the cameras and sends a single image with the desired view to the APIM.

360 Degree Image Composition

To generate the 360 degree view, the IPMB combines and aligns the images from all 4 cameras to produce a single overhead view that is displayed on the FDIM along with a front or rear camera view.

NOTE: *When a camera or any body component that a camera is attached to is removed or adjusted, the 360 degree view camera alignment must be performed to create a 360 degree image.*

Refer to: [360 Degree View Camera Alignment](#) (413-13B Parking Aid - Vehicles With: Parking Aid Camera, General Procedures).



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Item	Description
1	Front camera image
2	LH side camera image
3	RH side camera image
4	Rear camera image

Camera Image Generation

The front and rear cameras are on any time they receive voltage (when the ignition is ON), but a video signal is only generated under certain conditions. When reverse gear is selected or the camera selection switch is pressed, the IPMB sends an enable request message to the front and rear cameras to turn the video signal output on. When any gear except reverse is selected, the IPMB sends a disable request message to the cameras to turn the video

signal off when the vehicle speed reaches 16 km/h (10 mph), and sends an enable request message to turn the video signal on when vehicle speed falls below 12 km/h (7.5 mph). If the front or rear camera is not configured properly, some features and views may be inoperative.

The LH and RH side cameras are on and generating a video signal any time they receive voltage from the IPMB. The IPMB supplies voltage to the LH and RH side cameras when reverse gear is selected or the camera selection switch is pressed.

LIN Communication

The IPMB communicates with the front and rear cameras via a LIN circuit, which is a dedicated single wire communication network.

The messages sent from the IPMB to the front and rear cameras are:

- Camera view request
- Camera configuration data
- Display manual zoom request (rear camera only)
- Trailer connection status (if equipped with trailer tow)
- Standby enable/disable request

The messages sent from the front and rear camera to the IPMB are:

- Camera view status
- Camera status
- Display zoom status (rear camera only)
- Camera part number data
- Guideline status (rear camera only)

Camera Features

The system supports several rear camera features to assist the driver.

The following features are driver selectable:

- Visual park aid alert — visually alerts the driver to objects causing the parking aid system to sound.
- Manual zoom — allows the driver to manually zoom the image.
- Video delay — allows the driver to see the image behind the vehicle after the vehicle is shifted out of reverse into any gear other than park.

The following features are not driver selectable:

- Active guidelines — displays the intended path of the vehicle based upon steering wheel input.
- Fixed guidelines — displays guidelines to assist the driver with aligning the vehicle with an object.

The system supports visual park aid alert on 360 + Normal and Normal views. Front and rear split view do not

include visual park aid alert. For views that include the 360 degree overhead image, the visual park aid alert is generated by the IPMB. For views that do not include the 360 degree overhead image, the visual park aid alert feature is generated by the APIM.

To turn the manual zoom on and off, the driver generated commands originate at the FDIM, which is hardwired to the APIM. The commands are sent by the APIM to the IPMB via the HS-CAN3, GWM and HS-CAN2. The IPMB then sends the zoom command to the rear camera via the LIN circuit. The image is then zoomed in or out by the rear camera.

The video delay feature is controlled within the APIM.

The fixed and active guidelines are generated by the IPMB and are not selectable by the driver.

Visual Park Aid Alert

NOTE: *The on-screen alert transitions may not match changes in the audible parking aid alert tone frequency.*

NOTE: *The visual park aid alert is not available on Front Split View and Rear Split View camera views.*

The visual park aid alert feature displays a visual highlight in the zone where an object has been detected by the parking aid system. For views that include the 360 degree overhead image, the visual park aid alert is displayed as a color changing line around the perimeter of the 360 degree view overhead vehicle graphic. This visual park aid alert feature is generated by the IPMB. For views that do not include the 360 degree overhead image, the visual park aid alert feature is displayed as a vehicle icon in the upper part of the display. This icon is generated by the APIM. These features utilize the parking aid sensor data from the PAM to generate the visual highlights on the video image.

Fixed Guidelines

NOTE: *The color-coded lines cannot indicate accurate or consistent distances between the rear of the vehicle and objects shown in the video image. This normal condition is due to variances in vehicle ride height, including, but not limited to, vehicle loading.*

Fixed guidelines are only displayed on the rear camera image in Rear 360 + Normal and Rear Normal views.

The video camera fixed guidelines feature displays guidelines on top of the rear video image to assist the driver with alignment of the vehicle. A dashed line on the displayed image represents the center of the vehicle and 3 color-coded lines (red, yellow, green) identify different zones between the rear of the vehicle and objects.

Fixed guidelines are not shown when the tailgate is open.

If the vehicle is equipped with a TRM, the fixed guidelines are not shown when a trailer is electrically connected to the vehicle.

Active Guidelines

NOTE: *If the battery has been disconnected or discharged, or a module is disconnected or replaced, the active guidelines may be inoperative until the vehicle is driven on a flat and smooth road at 32 km/h (20 mph) or more, with hands placed loosely on the steering wheel and minimal steering correction for approximately 30 seconds.*

If the guidelines are remain inoperative, it may be necessary to disconnect the battery for 5 minutes with the driver's door open, then drive the vehicle for 5 miles in normal city driving before performing the procedure described above.

Active guidelines are only displayed on the rear camera image in Rear 360 + Normal and Rear Normal views.

The active guidelines feature displays dynamic guidelines that correspond to the projected path of vehicle travel, based on the current steering angle. Several modules are involved in generating the steering angle data used to support the active guidelines. The PSCM monitors the steering angle sensor and sends the steering wheel angle sensor data to the ABS module via the HS-CAN2. The ABS module uses this message from the PSCM to generate the steering angle message that is sent to the IPMB through the HS-CAN2. The IPMB sends the steering angle data to the rear parking aid camera via the LIN circuit. The camera uses this data to generate the active guidelines over the video image.

When the steering wheel is in the straight-ahead position, the active guidelines are not shown.

Active guidelines are not shown when the tailgate is open.

If the vehicle is equipped with a TRM, the active guidelines are not shown when a trailer is electrically connected to the vehicle.

Manual Zoom

The manual zoom is only supported by the rear camera. The manual zoom is only available for Rear 360 + Normal and Rear Normal views.

The manual zoom feature has one level of zoom. If the manual zoom feature is on and the vehicle is shifted out of reverse gear, the manual zoom feature is disabled. The manual zoom feature must be re-enabled the next time reverse gear is selected. When the driver turns the zoom on or off at the FDIM, the command is sent from the APIM via the HS-CAN3 to the GWM. The GWM then sends the message to the IPMB through the HS-CAN2. The IPMB sends the manual zoom request message to the rear parking aid camera via the LIN circuit. The camera then turns the zoom on or off.

Video Delay

When the video delay is turned on, the APIM keeps the rear normal view display enabled after the transmission is shifted out of reverse gear, into any gear other than park, until the vehicle speed reaches 10 km/h (6 mph). With the delay off (default), the image displays until the transmission is shifted out of reverse gear.

360 Degree View Camera Alignment

To create a 360 degree overhead image from the 4 separate camera images, the IPMB must align the camera

images to each other and to the vehicle. As the camera alignment is very sensitive, the alignment process is necessary any time a camera or any component that a camera is attached to is removed or adjusted.

The alignment process is completed using a diagnostic scan tool and the camera calibration mats. Refer to: [360 Degree View Camera Alignment](#) (413-13B Parking Aid - Vehicles With: Parking Aid Camera, General Procedures).

Component Description

Rear Parking Aid Camera

The rear parking aid camera is located on the tailgate, below the tailgate release handle. On vehicles equipped with the 360 degree view camera system or with the rear only parking aid camera system with PTBA, the rear camera communicates with the IPMB through a LIN circuit. On vehicles equipped with the rear only parking aid camera system without PTBA, the rear camera communicates with the BCM through a LIN circuit. The camera must be configured using a diagnostic scan tool after replacement in order for all features to operate properly. (Electrical>Service Functions> LIN New Module Initialization **or** Electrical>Service Functions>LIN New Module Initialization- IPMB)

On vehicles equipped with the 360 degree view camera system, the 360 degree view camera alignment must be performed after the tailgate, tailgate handle, or any parking aid camera is removed from the vehicle.

On vehicles equipped with the 360 degree view camera system and PTBA, the 360 degree view camera alignment **and** the PTBA camera alignment must be performed after the tailgate, tailgate handle, or any parking aid camera is removed from the vehicle.

On vehicles equipped with the rear only parking aid camera system and PTBA, the PTBA camera alignment must be performed after the tailgate, tailgate handle, or rear parking aid camera is removed from the vehicle.

Refer to: [360 Degree View Camera Alignment](#) (413-13B Parking Aid - Vehicles With: Parking Aid Camera, General Procedures).

Refer to: [Pro Trailer Back Up Assist Camera Alignment](#) (413-13D Parking Aid - Vehicles With: Trailer Back Up Assist (TBA), General Procedures).

Front Parking Aid Camera (If Equipped)

The front parking aid camera is located on the front grille, below the center emblem. The camera communicates with the IPMB through a LIN circuit. The camera must be configured using a diagnostic scan tool (Electrical>Service Functions> LIN New Module Initialization- IPMB) after replacement in order for all features to operate properly.

The 360 degree view camera alignment must be performed after the front grille or front camera is removed from the vehicle.

Refer to: [360 Degree View Camera Alignment](#) (413-13B Parking Aid - Vehicles With: Parking Aid Camera, General Procedures).

LH And RH Side Parking Aid Camera (If Equipped)

The side parking aid cameras are located inside the LH and RH exterior rear view mirrors and are serviceable separately from the mirrors. The side cameras generate an image any time they receive voltage and ground. The side cameras receive voltage from the IPMB when the ignition is on. The LH and RH side parking aid cameras do not require configuration after replacement.

The 360 degree view camera alignment must be performed after the LH or RH side camera or exterior mirror is removed from the vehicle.

Refer to: [360 Degree View Camera Alignment](#) (413-13B Parking Aid - Vehicles With: Parking Aid Camera, General Procedures).

Camera selection switch (If Equipped)

The camera selection FCIM mounted switch is a momentary contact switch and an input to the FCIM. The camera views are shown on the FDIM when the camera selection switch is pressed.

Front Camera Washer (If Equipped)

Washer solvent is directed to the front camera lens when the washer pump is active. For additional information on the front camera washer,

Refer to: Wipers and Washers (501-16 Wipers and Washers) .

BCM (Vehicles Equipped With Rear Only Parking Aid Camera Without PTBA)

The BCM serves as a gateway between the rear parking aid camera and other modules on the HS-CAN1. It communicates with the rear camera via the LIN and stores Diagnostic Trouble Codes (DTCs) for the camera and the LIN in the event of a concern.

The BCM requires PMI when replaced.

Refer to: Module Configuration (418-01 Module Configuration) .

IPMB (Vehicles Equipped With Rear Only Parking Aid Camera With PTBA or 360 Degree View Camera)

NOTE: *The IPMB settings and configuration have no influence over the video signal from the parking aid cameras. The parking aid cameras provide a video signal any time they receive voltage and ground.*

For vehicles equipped with a 360 degree view camera system, all camera views are produced by the IPMB, using input from one or more camera(s). The processed video signals are sent from the IPMB to the APIM on shielded, twisted pair circuits. The IPMB receives the video signals from the front, rear, LH and RH parking aid cameras through shielded, twisted pair circuits and determines which image(s) are sent to the APIM to be displayed on the FDIM. In addition to generating the camera views, the IPMB serves as a gateway between the front and rear parking aid cameras and other modules on the HS-CAN2. It communicates with the front and rear cameras via the LIN and stores Diagnostic Trouble Codes (DTCs) for the cameras and the LIN in the event of a concern.

For vehicles equipped with a rear only parking aid camera system with PTBA, the IPMB serves as a gateway module between the video camera and other modules on the HS-CAN2. It communicates with the rear video camera via the LIN and stores Diagnostic Trouble Codes (DTCs) for the camera and the LIN in the event of a concern.

The IPMB requires PMI when replaced.

Refer to: Module Configuration (418-01 Module Configuration) .

When a new IPMB is installed, up to two camera alignment Diagnostic Trouble Codes (DTCs) can be stored until the 360 degree view camera alignment **and/or** the PTBA camera alignment are successfully completed.

Refer to: [360 Degree View Camera Alignment](#) (413-13B Parking Aid - Vehicles With: Parking Aid Camera, General Procedures).

Refer to: [Pro Trailer Back Up Assist Camera Alignment](#) (413-13D Parking Aid - Vehicles With: Trailer Back Up Assist (TBA), General Procedures).

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