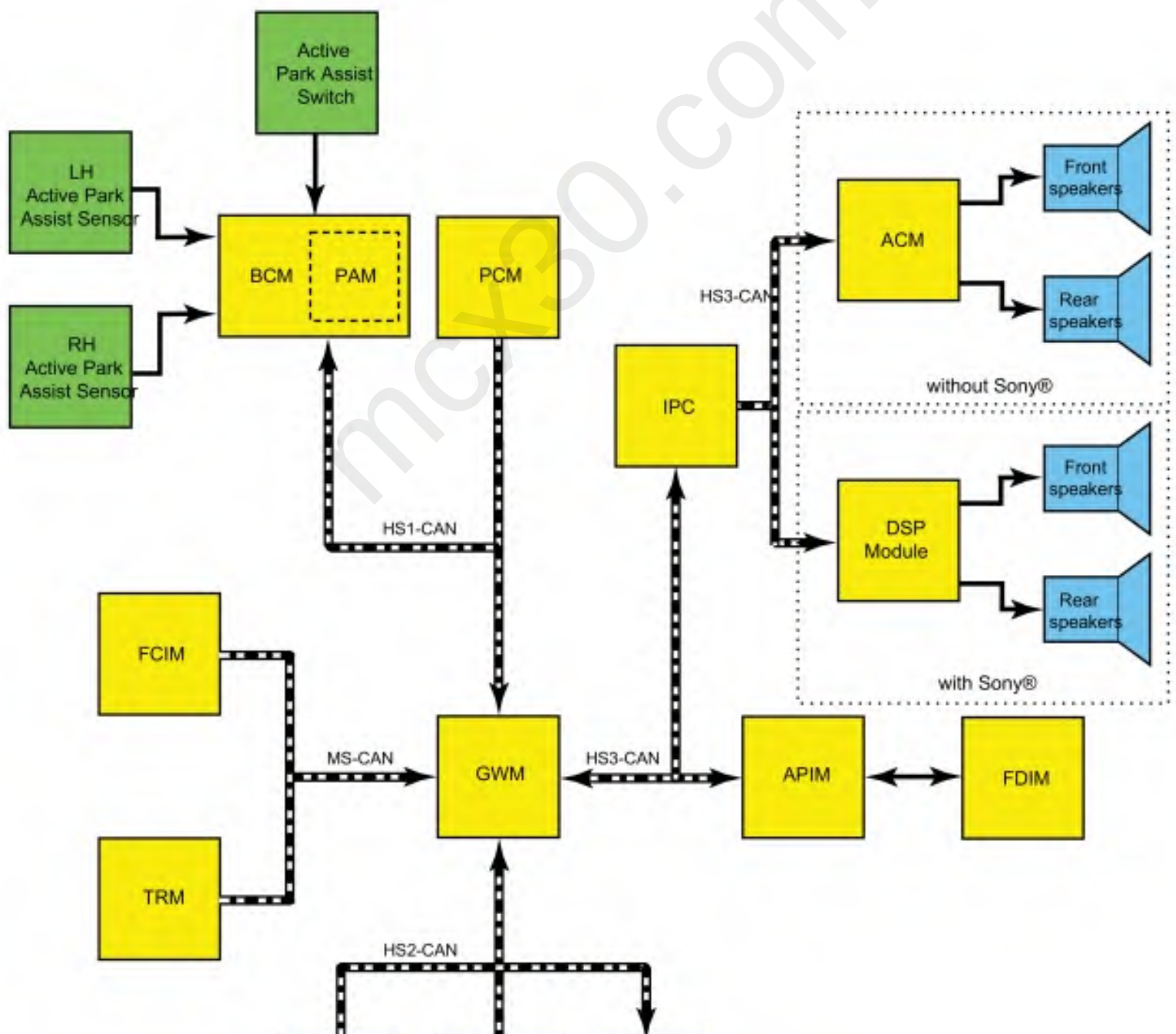


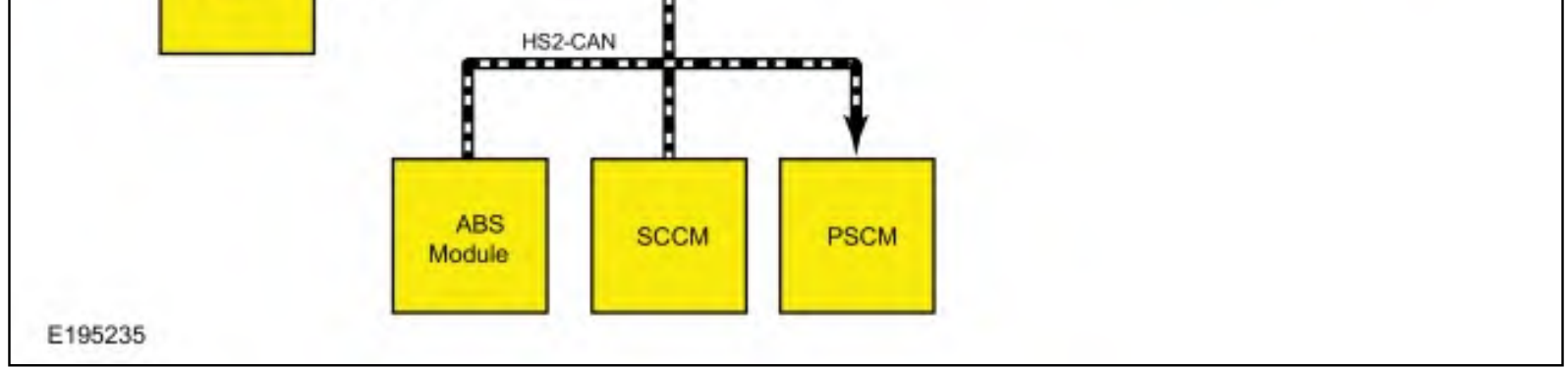
Parking Aid - System Operation and Component Description

System Operation

Active Park Assist

System Diagram





Network Message Chart

PAM Network Input Messages

Broadcast Message	Originating Module	Message Purpose
Steering column torque	PSCM	Used to detect if the driver intervenes with the steering wheel rotation during an active park assist maneuver. (for example, grabbing the steering wheel)
Active park assist steering angle request status		Provides the steering angle request confirmation to the PAM
Stability-traction control indicator request	ABS module	Disables the active park assist if a stability or traction control system activation occurs.
Steering wheel angle		Used to determine the current steering angle.
ABS warning indicator request		Disables the active park assist if an ABS activation occurs.
Wheel speed and rotation data		Used to confirm vehicle movement and calculate distance traveled during active park assist maneuvers.
Vehicle speed	PCM	Disables the active park assist system if the vehicle speed exceeds a preset threshold when the system is either scanning or actively parking in a spot.
Gear position		Used to determine the current gear selection.
Outside air temperature	FCIM	Used to temperature compensate the active park assist sensor inputs.
Parking aid settings	APIM	Allows the driver to change the parking aid settings through the centerstack infotainment display.
Trailer lamp connected	TRM	Disables the active park assist if a trailer is electrically connected to the vehicle.

Turn signal status	SCCM	Determines which side of the vehicle the intended parking space is located on.
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PSCM Network Input Messages

Broadcast Message	Originating Module	Message Purpose
Active park assist steering angle request	PAM	Used to command the steering angle during active park assist maneuvers.
Active park assist steering activation request	PAM	Request PSCM to allow the PAM to take control of the steering angle.
Vehicle speed	PCM	Disables active park assist if vehicle speed is too high during a maneuver.
Steering angle	ABS module	Used to determine the current steering angle.

IPC Network Input Messages

Broadcast Message	Originating Module	Message Purpose
Parking aid chime request	PAM	Used to command audio prompts during active park assist maneuvers.
Parking aid fault status	PAM	Used by IPC to display the active park assist fault messages to the driver.

APIM Network Input Messages

Broadcast Message	Originating Module	Message Purpose
Active park assist messages	PAM	Used to generate driver instructions through the centerstack infotainment display during active park assist maneuvers.

Active Park Assist

NOTE: Aftermarket or modified audio systems may disable necessary audible warnings.

The PAM communicates with several modules to control the functions of the active park assist system. The PAM utilizes steering angle, vehicle wheel rotation count and direction, active park assist sensor inputs, parking aid sensor inputs, vehicle speed and transmission selection to calculate vehicle position and distance in relation to the parking space. The inputs are used by the PAM to command the steering angles required to maneuver the vehicle into a parallel parking space.

When the active park assist switch is pressed the PAM activates the active park assist system. The PAM uses active park assist sensor inputs, parking aid sensor inputs, vehicle speed and transmission selection to determine if the operator is attempting to maneuver the vehicle into a parallel parking space.

Pressing and releasing the active park assist switch at any time during an active park assist maneuver disables the active park assist system. If the system is disabled by the operator after the system starts to control the steering, the centerstack infotainment display displays an active park assist canceled message followed by a warning chime.

The PAM continuously monitors the active park assist sensor signals any time the ignition is on. When no signal is detected from an active park assist sensor, the PAM set a DTC.

If an input module fault or other system malfunction is present, the active park assist system is disabled. An active park assist fault message is shown on the centerstack infotainment display and a DTC is set in the PAM.

Certain conditions can cause the active park assist system to incorrectly align the vehicle in the parking space:

- A spare tire installed or one of the tires on the vehicle has significantly more or less treadwear than the other tires.
- The vehicle has been equipped with various accessories (cycle rack, trailer) which are not recognized by the active park assist system.
- The factory-installed tire size is not used on the vehicle.
- Poor ambient weather conditions such as heavy rain or snow.
- The active park assist sensors are damaged or obstructed.
- The curb along the parking space is irregular.
- The vehicle or objects bordering the space are not positioned correctly.
- The parking space dimensions or parked objects position have changed after the vehicle has initially passed the parking space.
- The ambient temperature changes quickly such as the vehicle driven from a heated garage into the cold or just leaving a car wash before the system was activated.
- One of the surrounding parked vehicles has a high or overhanging attachment, such as a salt spreader or a large truck bed, that the sensors cannot detect.

NOTE: *The active park assist system is disabled when a trailer is electrically connected to the vehicle.*

Parallel Parking Operation

After the active park assist system is activated and the PAM has determined the driver is attempting to maneuver the vehicle into a parallel parking space, the PAM begins searching for a parking space using the active park assist sensors. The multifunction switch turn signal input from the SCCM determines the side of the vehicle that the PAM searches for a parking space. When a side is selected with the turn signal, the PAM search on that side of the

vehicle until active park assist is switched off, ignition is cycled, or the opposite side is selected by the driver. By default, the PAM search for spots on the passenger side of the vehicle.

The system measures the available parking spaces and its surroundings as the operator drives by to determine if the vehicle can be maneuvered into the available parking space. The PAM uses inputs from the active park assist sensors and the wheel speed and rotation data message to find an acceptable parking space. After a space has been located, a chime is sounded through the audio system and the centerstack infotainment display shows a message informing the driver that a parking space has been located on the left or right side and requesting the driver to pull forward to park. After the driver moves the vehicle forward to the appropriate start position, as determined by the PAM, the system requests the driver to stop, shift the transmission into reverse and remove hands from the steering wheel. After the transmission is in reverse and no driver input torque on the steering wheel is detected (driver has removed their hands from the wheel), the active park assist system takes control of the steering and prompts the driver to begin backing into the parking space. The active park assist system sounds tones through the audio system and issues commands through the centerstack infotainment display instructing the driver to back up and pull forward as necessary while the system controls the steering to position the vehicle within the detected parking space. The operator maintains full control of the gear shifting, accelerator and brakes during active park assist maneuvers.

The PAM determines that the parallel parking maneuvers are completed based on the final vehicle alignment. The vehicle should be located approximately 0 to 12 in (30 cm) from the street curb if a curb is detected, otherwise the system aligns the vehicle to the front vehicle. When the active park assist maneuver is complete, the centerstack infotainment display displays an active park assist finished message followed by an audible chime.

Parking Aid System

The active park assist system uses input from the audible parking aid system when parking the vehicle. Input from the rear parking aid sensors help the PAM to determine the position of the vehicle in the parking space. For more information on the operation of the audible parking aid system,

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

EPAS Control

The PSCM controls the steering during active park assist maneuvers based on the active park assist steering angle request message received from the PAM. The PSCM also provides steering column torque data to the PAM to determine if the driver has placed their hand(s) on the steering wheel while the active park assist system has control of the steering.

Active Park Assist Chimes

The active park assist audio system chimes are controlled by the IPC. Based on the parking aid chime request message received from the PAM, the IPC prioritizes the incoming chime request and then commands the ACM (for vehicle without Sony® audio system) or the DSP (for vehicle with Sony® audio system) to sound the chime through the audio system speakers. In the event of an audio system fault, the IPC sounds the chimes through an integral speaker.

Refer to: [Warning Chimes - System Operation and Component Description](#) (413-01 Instrumentation, Message

Center and Warning Chimes, Description and Operation).

Active Park Assist Message Display

Active park assist messages are shown on the centerstack infotainment display. Conditions that can cause the active park assist system to be temporarily unavailable or cause the current active park assist system maneuver to be cancelled are:

NOTE: For active park assist fault message in the infotainment display, consult the diagnosis and testing PAM symptom chart in in this section.

Cancellation Event	FDIM Message/Audio Chime
Vehicle speed above 18 mph (29 km/h) during the measuring/searching phase for 30 consecutive second. Note, the screen is shown while driving faster than 18 mph (29 km/h), screen goes away and system deactivates after 30 seconds.	PARALLEL PARK REDUCE SPEED TO SCAN FOR PARKING SPOT
Deactivation of the Advance Trac® system by the driver while the active park assist system is currently scanning for parking slots.	ACTIVE PARK ASSIST NOT AVAILABLE REFER TO OWNER GUIDE followed by a chime
A vehicle attachment is detected by the reverse parking aid system, such as a trailer or bike rack.	ACTIVE PARK ASSIST NOT AVAILABLE REFER TO OWNER GUIDE followed by a chime
Driver grabbing steering wheel while the active park assist system has control of the steering.	ACTIVE PARK ASSIST CANCELLED BY DRIVER followed by a chime
The driver changes from reverse to drive before the vehicle is far enough inside the parking space.	
Vehicle speed above 6 mph (10 km/h) when the active park assist system has control of the steering.	ACTIVE PARK ASSIST DEACTIVATED followed by a chime
Deactivation of the Advance Trac® system by the driver while the active park assist system has control of the steering.	
An ABS activation or an Advance Trac® system activation occurs while the active park assist system has control of the steering.	

Active Park Assist Sensors

The active park assist sensors are narrow beam ultrasonic sensors. The sensors continuously send out ultrasonic signals to detect an available parking space and communicate the information back to the PAM. The sensors are active when the vehicle is moving regardless of whether the operator has pressed the active park assist switch. Only objects that reflect a sufficient amount of sound waves are detected by the active park assist sensors. The surface properties, size and composition of an object can affect the ability of the sensors to detect the object. Incorrect sensor alignment, dirt covered sensors, heavy rain and snow can cause objects not to be detected.

PAM

The PAM is the controlling module for the active park assist system, processing the active park assist and parking aid sensor data, providing the steering angle commands to the PSCM and generating driver input requests through the centerstack infotainment display and audio system. The PAM sets and stores Diagnostic Trouble Codes (DTCs) for the active park assist system. The PAM is integral to the BCM but communicates as a separate module on the HS-CAN1.

Active Park Assist Switch

The active park assist switch is a momentary contact switch that enables and disables the active park assist system. The switch is located on the center console.

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