

IPC Network Input Messages

Broadcast Message	Originating Module	Message Purpose
Active park assist chime request	IPMB	Used by the IPC to generate the chimes for the active park assist system
Active park assist mode available	IPMB	Used by the IPC to display the active park assist available modes to the driver.
Active park assist status	IPMB	Updates the IPC with the active park assist status.

APIM Network Input Messages

Broadcast Message	Originating Module	Message Purpose
Active park assist message display	IPMB	Provides parking aid information for the message center.
Active park assist mode available	IPMB	Used by the APIM to display the active park assist available modes to the driver.
Active park assist status	IPMB	Updates the APIM with the active park assist status.

PCM Network Input Messages

Broadcast Message	Originating Module	Message Purpose
Active park assist status	IPMB	Updates the PCM with the active park assist status.
Gear request	IPMB	Controls the vehicle gear.
Vehicle speed request	IPMB	Controls the vehicle speed during parking maneuver.

ABS Module Network Input Messages

Broadcast Message	Originating Module	Message Purpose
Brake torque request	PCM	Used to slow and stop the vehicle.

Active Park Assist

NOTE: The active park assist system is not intended to be utilized while a trailer is connected to the vehicle.

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

NOTE: The system is designed to be an aid and does not relieve the operator of responsibility to drive with due care and attention.

The IPMB uses the following inputs to calculate vehicle position and distance in relation to the parking space:

- Steering angle
- Vehicle wheel rotation count and direction
- Active park assist sensors

- Parking aid sensors
- Vehicle speed
- Transmission input

The IPMB uses these inputs to command the steering angles required to maneuver the vehicle into or out of a parallel parking space or into a perpendicular parking space.

When the active park assist switch is pressed, the IPMB activates the active park assist system. The IPMB 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 or out of a parallel parking space or into a perpendicular 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 cancelled message followed by a warning chime.

The IPMB 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 IPMB sets 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 in the centerstack infotainment display and/or in the IPC message center display and a DTC is set in the IPMB. In addition to possible vehicle faults, certain driver actions and vehicle operating conditions can cause the active park assist system to be temporarily disabled.

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

- A spare tire or one of the vehicles tires has significantly more or less tread wear 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 sizes are not used on the vehicle.
- Poor weather conditions such as heavy rain or snow exist.
- The active park assist sensors are damaged or obstructed.
- The parking aid 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 length or parked objects position have changed after the vehicle has initially passed the parking space.
- The temperature around the vehicle changes quickly such as the vehicle driven from a heated garage into the cold or just leaving a car wash before the system was used.
- One of the parked vehicles has a high attachment, such as a salt spreader or moving truck bed, the sensors cannot detect.

To stop looking for a parking spot at any time press and release the active park assist switch.

Refer to the Owner's Literature for more information on the system operation.

Parallel Parking Operation

After the active park assist system is activated and the IPMB has determined the driver is attempting to maneuver the vehicle into a parallel parking space (the active park assist switch is pressed once), the IPMB begins searching for a parking space using the front active park assist sensors. The multifunction switch turn signal input from the SCCM determines which side of the vehicle the IPMB should search for a parking space. When a side is selected with the turn signal, the IPMB searches on that side of the vehicle until the active park assist is switched off, the ignition is cycled, or the opposite side is selected by the driver. By default, the IPMB searches 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 IPMB uses inputs from the front 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 IPMB, the system requests the driver to stop, shift the transmission into neutral and remove hands from the steering wheel. After the transmission is in neutral 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, acceleration and braking.

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

Parallel Park Out Assist Operation

NOTE: *The parallel park out assist system is only for exiting parallel spots.*

Parallel park out assist is available immediately after a parallel park was completed or after an ignition on. The driver must activate the active park

assist system by pressing the active park assist switch once, using the turn signal before the system measures the location, select the side to exit the parking spot. Once the turn signal status is received from the SCCM, the IPMB verifies the indicated side is clear by analyzing the clearance around the vehicle using input from the active park assist sensors and the parking aid sensors. When the indicated side is clear of obstructions, the centerstack infotainment display shows a message informing the driver to remove hands from the steering wheel and shift to neutral, depending on the detected clearances to the front and rear of the vehicle. After the transmission is shifted and no driver input torque on the steering wheel is detected (driver has removed their hands from the wheel), the system slowly pulls out of the parking spot. The IPMB sends the active park assist steering angle request to the PSCM to turn the wheels to an angle which steers the vehicle out of the parallel parking space on the desired side. A vehicle gear and speed request is sent from the IPMB to the PCM. When needed the PCM sends a brake request to the ABS module to slow or stop the vehicle.

The IPMB determines the parallel park out assist maneuvers are complete when a clear path to exit the parking space is detected. When the maneuver is complete, a chime is played and the centerstack infotainment display shows a message informing the driver to take control of the vehicle. It remains the responsibility of the driver to check for safe conditions when entering traffic from a parking space.

Perpendicular Parking Operation

The perpendicular parking feature is available when the active park assist system has been activated (the active park assist switch is pressed twice) and the IPMB has determined the driver is attempting to maneuver the vehicle into a perpendicular parking space. Using the front active park assist sensors, the multifunction turn signal input from the SCCM, the IPMB begins searching for a parking space. If the turn signal is not active, the IPMB defaults to searching 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 IPMB uses inputs from the front 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 IPMB, the system requests the driver to stop, shift the transmission into neutral and remove hands from the steering wheel. The IPMB sends the active park assist steering angle request to the PSCM to turn the wheels to an angle which steers the vehicle into the perpendicular parking space on the desired side. A vehicle gear and speed request is sent from the IPMB to the PCM. When needed the PCM will send a brake request to the ABS module to slow or stop the vehicle.

The IPMB determines the perpendicular parking maneuvers are completed based on the final vehicle alignment. The perpendicular parking aid system attempts to center the vehicle between the two vehicles and align the end vehicle angle with the angle of the parked vehicles. If only one vehicle is detected, the system aligns with that vehicle at a distance of 70 to 90 cm (28 to 35 in) in North America and South America or 55 to 75 cm (22 to 30 in) in Europe and Asia Pacific. 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 front and rear parking aid sensors help the IPMB 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 IPMB. The PSCM also provides steering column torque data to the IPMB 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 system chimes are controlled by the IPC. Based on the parking aid chime request message received from the IPMB, the IPC prioritizes the incoming chime request and then commands the ACM (for vehicles without Bang & Olufsen audio system) or the DSP (for vehicles with Bang & Olufsen 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. For more information on the IPC warning chimes,

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 Symptom Chart: Active Park Assist in this section.

Cancellation Event	FDIM Message/Audio Chime
Vehicle speed above 29 km/h (18 mph) during the measuring/searching phase for 30 consecutive seconds. Note, the screen is shown while driving faster than 29 km/h (18 mph), screen goes away and system deactivates after 30 seconds.	PARALLEL PARK REDUCE SPEED TO SCAN FOR PARKING SPOT
Deactivation of the AdvanceTrac® 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. The attachments need to be electrically connected to the vehicle to prevent the active park assist from activating.	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 10 km/h (6 mph) when the active park assist system has control of the steering.	ACTIVE PARK ASSIST DEACTIVATED followed by a chime
Deactivation of the AdvanceTrac® system by the driver while the active park assist system has control of the steering.	
An ABS activation or an AdvanceTrac® system activation occurs while the active park assist system has control of the steering.	
Maximum number of moves is exceeded during any parking maneuver. The move number is incremented each time the driver shifts gears, 9 is the maximum.	

Component Description

Active Park Assist Sensors

NOTE: The operating temperature range for the active park assist sensors is -40°C (-40°F) to 85°C (176°F).

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 IPMB. 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.

IPMB

The IPMB is the controlling module for the active park assist system. It processes the active park assist and parking aid sensor data, and camera data, provides the steering angle commands to the PSCM, ABS, PCM and generates driver input requests through the centerstack infotainment display and audio system. The IPMB sets and stores Diagnostic Trouble Codes (DTCs) for the active park assist system. The IPMB communicates on the HS-CAN2.

PMI is required if installing a new module.

Active Park Assist Switch

The active park assist switch is a momentary contact switch that enables and disables the active park assist system (parallel parking, perpendicular parking or parallel park out assist). The switch is integral to the ATCM on AWD vehicles or in the drive mode switch on non- AWD vehicles. For both options the switch is a hardwired to the IPMB.

Diagnosis and Testing

Parking Aid

Diagnostic Trouble Code (DTC) Chart

Diagnostics in this manual assume a certain skill level and knowledge of Ford-specific diagnostic practices.
REFER to: Diagnostic Methods (100-00 General Information, Description and Operation).

Diagnostic Trouble Code Chart

Module	DTC	Description	Action <i>New: hover over Pinpoint Test links to show title</i>
IPMB	B129C:08	Left Front Side Sensor: Bus Signal / Message Failure	GO to Pinpoint Test A
IPMB	B129C:96	Left Front Side Sensor: Component Internal Failure	GO to Pinpoint Test E
IPMB	B129C:98	Left Front Side Sensor: Component or System Over Temperature	GO to Pinpoint Test F
IPMB	B129D:08	Right Front Side Sensor: Bus Signal / Message Failure	GO to Pinpoint Test B
IPMB	B129D:96	Right Front Side Sensor: Component Internal Failure	GO to Pinpoint Test E
IPMB	B129D:98	Right Front Side Sensor: Component or System Over Temperature	GO to Pinpoint Test F
IPMB	B129E:13	Enable/Disable Switch - Semi-automatic Advanced Parallel Park: Circuit Open	GO to Pinpoint Test H
IPMB	B129E:9E	Enable/Disable Switch - Semi-automatic Advanced Parallel Park: Stuck On	GO to Pinpoint Test H
IPMB	B13F3:08	Left Rear Side Sensor: Bus Signal / Message Failure	GO to Pinpoint Test C
IPMB	B13F3:96	Left Rear Side Sensor: Component Internal Failure	GO to Pinpoint Test G
IPMB	B13F3:98	Left Rear Side Sensor: Component or System Over Temperature	GO to Pinpoint Test F
IPMB	B13F4:08	Right Rear Side Sensor: Bus Signal / Message Failure	GO to Pinpoint Test D
IPMB	B13F4:96	Right Rear Side Sensor: Component Internal Failure	GO to Pinpoint Test G
IPMB	B13F4:98	Right Rear Side Sensor: Component or System Over Temperature	GO to Pinpoint Test F

Symptom Chart(s)

Diagnostics in this manual assume a certain skill level and knowledge of Ford-specific diagnostic practices.
REFER to: Diagnostic Methods (100-00 General Information, Description and Operation).

Symptom Chart: Active Park Assist

Condition	Possible Sources	Actions
A module does not communicate with the diagnostic scan tool	- Fuse - Wiring, terminals or connectors - Module	REFER to: Communications Network (418-00 Module Communications Network, Diagnosis and Testing).