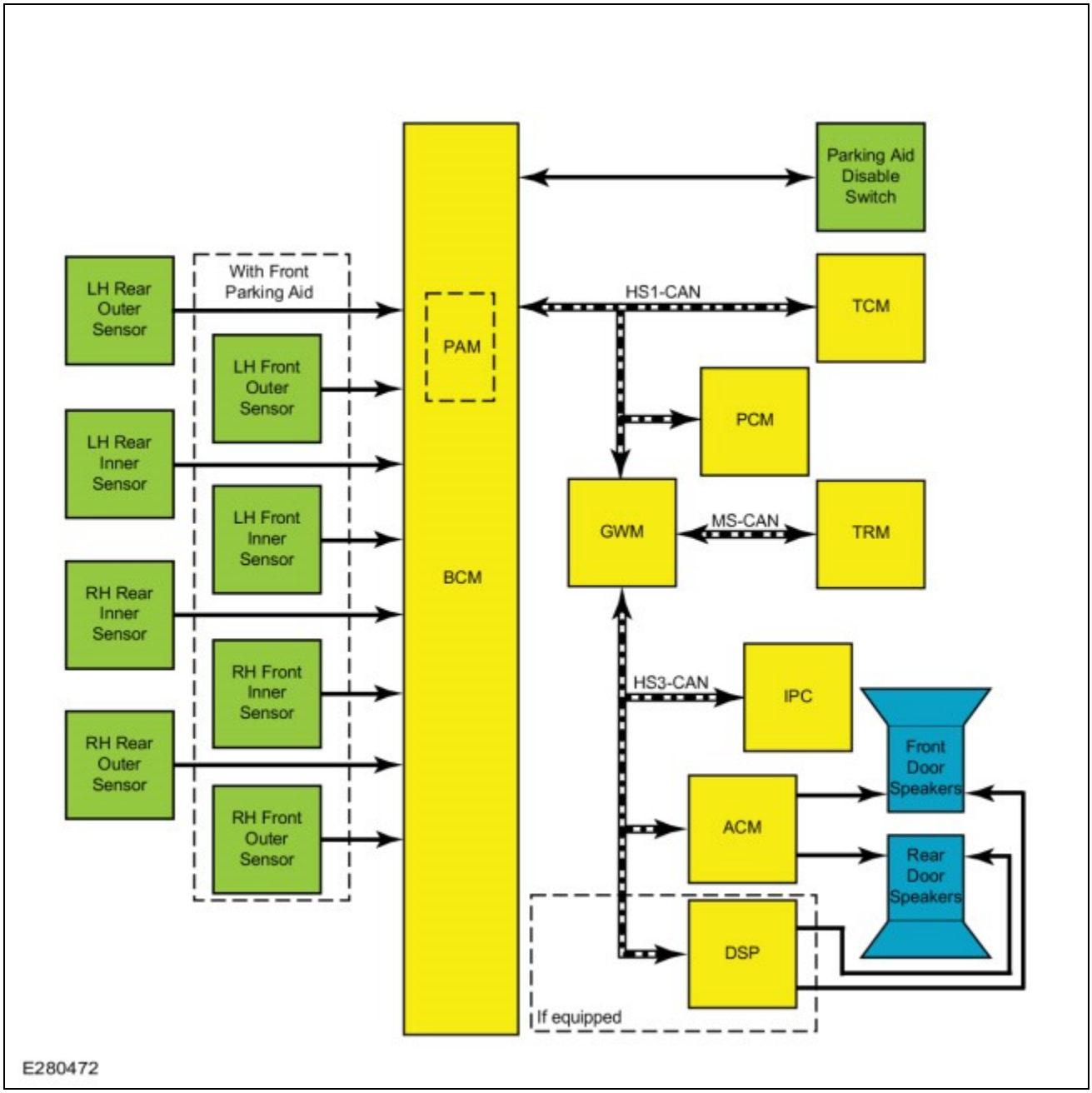
Parking Aid - System Operation and Component Description

System Operation

Parking Aid - Audible

System Diagram



Network Message Chart

PAM Network Input Messages

Broadcast Message	Originating Module	Message Purpose
Ignition key type	BCM	Used to disable the parking aid menus if a MyKey® is in use.
Ignition status	BCM	Used to communicate the ignition switch state.
Outside air temperature	FCIM	Used to temperature compensate the parking aid sensors.
Parking aid enable request	IPC	Used to enable or disable the rear parking aid.
Parking aid switch request	FCIM	Used to enable or disable the rear parking aid and front parking aid. (Vehicles with rear parking aid and front parking aid)
Gear lever position	TCM	Used to enable or disable the front or rear parking aid depending on the gear lever position.
Trailer lamp connected	TRM	Used to disable the rear parking aid when a trailer is electrically connected to the vehicle.
Vehicle speed	PCM	Used to disable the parking aid if the vehicle speed exceeds a preset threshold.

IPC Network Input Messages

Broadcast Message	Originating Module	Message Purpose
Audio system response status	ACM	Used to provide feedback to the IPC.
DSP Chime request	DSP	Used to provide feedback to the IPC.
Parking aid chime request	PAM	Used to command parking aid warning tones through the audio system speakers.

Audible Parking Aid System Operation

When the rear parking aid and/or front parking aid system is active, the PAM calculates the distance to an object within a 170 degree semicircular area (azimuth) around the rear or front of the vehicle. A variable frequency warning tone is generated through the audio speakers in proportion to the distance from the rear and/or front of the vehicle to the object.

The rear parking aid system calculates the distance to an object around the rear of the vehicle using 4 ultrasonic sensors. The rear parking aid sensors detect objects approximately 180 cm (70 in) from the rear of the vehicle, 50 cm (20 in) from the rear side of the vehicle, and 30 cm (12 in) above the ground. To detect objects behind the vehicle, the PAM supplies voltage and ground to the rear ultrasonic sensors while monitoring a signal return circuit from each sensor. The 4 rear sensors share common voltage and ground circuits.

The front parking aid system calculates the distance to an object around the front of the vehicle using 4 ultrasonic sensors. The front parking aid sensors detect objects approximately 70 cm (27 in) from the front of the vehicle, 50 cm (20 in) from the front side of the vehicle, 30 cm (12 in) above the ground. To detect

objects in front of the vehicle, the PAM supplies voltage and ground to the front ultrasonic sensors while monitoring a signal return circuit from each sensor. The 4 front sensors share common voltage and ground circuits. Vehicles equipped with active park assist must be equipped with front parking aid.

Only objects that reflect a sufficient amount of sound waves are detected by the parking aid sensors. The surface properties, size and composition an object can affect the ability of the parking aid system to detect the object.

Also affecting the parking aid operation are:

- Improper sensor installation or alignment
- Dirt or ice covered sensors
- Heavy rain or snow

The parking aid system detects objects under the following conditions:

- The vehicle is in REVERSE (rear parking aid)
- The vehicle is in motion in any gear except NEUTRAL (front parking aid)
- The vehicle is moving toward the object.
- The vehicle is stationary and the object is moving toward the vehicle.
- The vehicle and object are both moving toward one another.

Parking Aid Audible Alert

Audio system volume is automatically reduced when a parking aid alert tone is sounded. The alert tone frequency increases as the vehicle gets closer to an obstacle. When an object is detected within 30 cm (12 in) of the sensors, the warning tone becomes continuous. Objects detected outside the continuous tone area to the side of the vehicle generate a warning tone for 3 seconds. The warning tones are prioritized to the closest object. If the front and rear objects are located the same distance from the vehicle, the rear object is prioritized.

Component Description

Parking Aid Sensors

The parking aid sensors are wide beam ultrasonic sensors. The sensors continuously send out ultrasonic signals to detect objects and communicate the information back to the PAM.

Only objects which reflect enough sound waves are detected by the sensors. This varies due to the shape, surface properties and size of objects being detected. Incorrect sensor alignment, dirt covered sensors, heavy rain or snow can cause objects not to be recognized.

Parking Aid Switch (if equipped)

The parking aid switch (if equipped) is part of the active park assist/differential lock switch cluster. The switch is a direct input to the PAM. Intregrated into the switch is a status indicator light that comes on when the system is turned off.

PAM

The PAM calculates and reports (via audio system tones) the distance between the front or rear bumper of the vehicle and an object. The PAM is integral to the BCM and requires PMI when replaced.