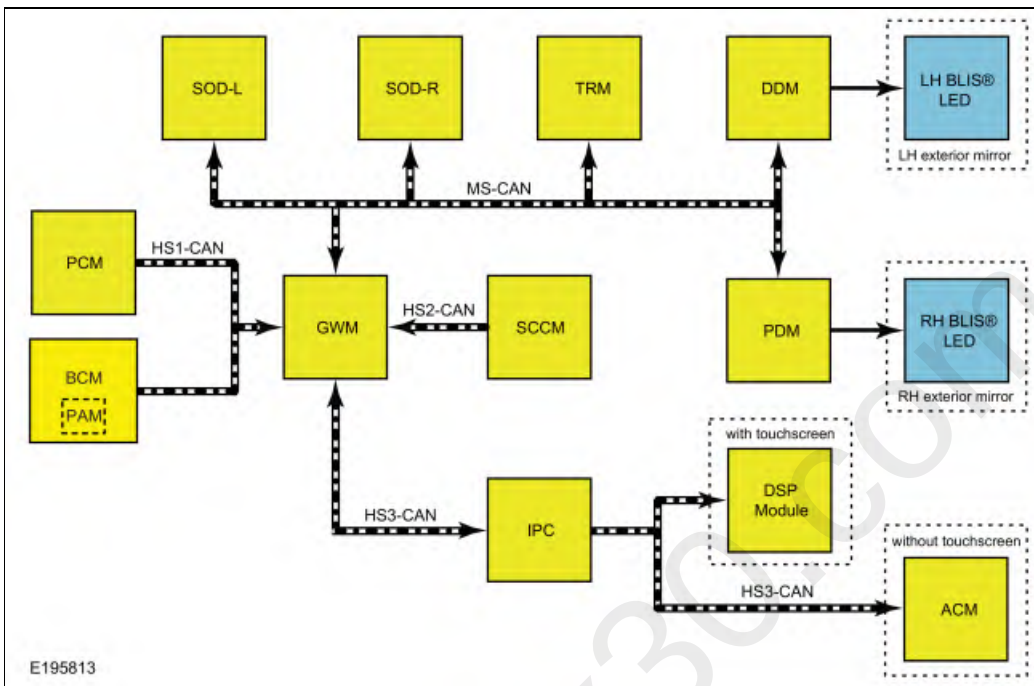


Blind Spot Information System - System Operation and Component Description

System Operation

BLIS® and CTA

System Diagram



Item	Description
1	TRM
2	SODR
3	GWM
4	SCCM
5	HS-CAN1
6	HS-CAN2
7	HS-CAN3
8	IPC
9	PCM
10	SODL
11	DDM
12	PDM
13	MS-CAN
14	BCM
15	PAM
16	ACM
17	without touchscreen
18	HS-CAN3
19	LH exterior mirror

20	LH BLISÂ® LED
21	RH exterior mirror
22	RH BLISÂ® LED
23	with touchscreen
24	DSP module

Network Message Chart

IPC Network Input Messages

Broadcast Message	Originating Module	Message Purpose
BLIS trailer tow left status	SODL	Used to communicate the operating status of the SODL and to command the BLISÂ®.
BLIS trailer tow right status	SODR	Used to communicate the operating status of the SODR and to command the BLISÂ®.
Cross traffic alert left status	SODL	Used to command the CTA audio chime and the BLISÂ® RTT.
Cross traffic alert right status	SODR	
Side obstacle sensor status - left	SODL	Used to communicate the operating status of the SODL and to command the CTA message center displays.
Side obstacle sensor status - right	SODR	Used to communicate the operating status of the SODR and to command the CTA message center displays.

ACM Network Input Messages

Broadcast Message	Originating Module	Message Purpose
Chime source	IPC	Used to command the all audio chimes on without touchscreen.

DSP Network Input Messages

Broadcast Message	Originating Module	Message Purpose
Chime source	IPC	Used to command the all audio chimes on vehicles with touchscreen.

DDM Network Input Messages

Broadcast Message	Originating Module	Message Purpose
Cross traffic alert left status	SODL	Used to command the LH BLISÂ®/ CTA LED on and off.
Side obstacle sensor status-left	SODL	Used to command the LH BLISÂ®/ CTA LED on and off.
Side detect left illumination	SODL	Used to command the LH BLISÂ®/ CTA LED on and off.

PDM Network Input Messages

Broadcast Message	Originating Module	Message Purpose
Cross traffic alert right status	SODR	Used to command the RH BLISÂ®/ CTA LED on and off.
Side obstacle sensor status-right	SODR	Used to command the RH BLISÂ®/ CTA LED on and off.
Side detect right illumination	SODR	Used to command the RH BLISÂ®/ CTA LED on and off.

SODL Network Input Messages

Broadcast Message	Originating Module	Message Purpose
BLISÂ® LED status driver side	DDM	Used to confirm the operating status of the LH exterior mirror BLISÂ® LED.
BLISÂ®/ CTA enable/disable command	IPC	Used to enable/disable the BLISÂ® or CTA based on driver input.
Ignition key type	BCM	Used to disable the ability to turn off the BLISÂ® and CTA when a MyKeyÂ® restricted key is in use.
Gear lever position	PCM	Used to turn the BLISÂ® and CTA system on and off depending the gear lever position.
Front wiper status	SCCM	Used to determine ambient weather conditions for correct system operation.
Turn signal switch status	SCCM	Used to generate the secondary alert when a turn signal is activated.
Trailer lamp connected	TRM	Disables the BLISÂ® and CTA when a trailer is electrically connected to the vehicle.
Vehicle speed	PCM	The vehicle speed input is used to turn the BLISÂ® on above 10 km/h (6 mph).

SODR Network Input Messages

Broadcast Message	Originating Module	Message Purpose
BLISÂ® LED status driver side	PDM	Used to confirm the operating status of the RH exterior mirror BLISÂ® LED.
BLISÂ®/ CTA enable/disable command	IPC	Used to enable/disable the BLISÂ® or CTA based on driver input.
Ignition key type	BCM	Used to disable the ability to turn off the BLISÂ® and CTA when a MyKeyÂ® restricted key is in use.
Gear lever position	PCM	Used to turn the BLISÂ® and CTA system on and off depending the gear lever position.
Front wiper status	SCCM	Used to determine ambient weather conditions for correct system operation.
Turn signal switch status	SCCM	Used to generate the secondary alert when a turn signal is activated.
Trailer lamp connected	TRM	Disables the BLISÂ® and CTA when a trailer is electrically connected to the vehicle.
Vehicle speed	PCM	The vehicle speed input is used to turn the BLISÂ® on above 10 km/h (6 mph).

BLISÂ®

The BLISÂ® provides alerts to the driver when the vehicle is in a forward gear and the vehicle speeds is greater than 10 km/h (6 mph).

The BLISÂ® can trigger an alert for vehicles that enter the blind zone from the rear, front, or merge into the blind zone from the side. The exterior mirror BLISÂ®/ CTA LED illuminates in the right and/or left exterior mirror when a target is present. For vehicles that pass through the blind zone quickly, typically less than 2 seconds, the BLISÂ® may not trigger an alert.

If a turn signal is active while BLISÂ® has detected a target in the blind zone, the BLISÂ®/ CTA LED flashes rapidly. When the turn signal is off, the BLISÂ® target warnings are a constant LED illumination.

NOTE: *The BLISÂ® is not intended to detect parked vehicles, pedestrians, or objects such as fences, guard rails or trees.*

Due to the nature of radar technology, false alerts may occur under certain circumstances. False alerts occur when the LED illuminates with no target present. False alerts up to 3% (3 out of 100 targets) is considered normal operation. False alerts are temporary and self-correcting. False alerts may be caused by sharp turns around a pole or building, jogging pedestrians or fast moving shopping carts.

Missed targets occur when a target is present and the LED does not illuminate. Missed targets up to 1% (1 out of 100 targets) is considered normal operation.

Circumstances that cause missed alerts are:

- Debris build-up or damage to the rear lamp assemblies
- Certain maneuvering of the vehicles entering and exiting the blind zone
- Vehicles passing through the blind zone at high rates of speed
- When several vehicles forming a convoy pass through the blind zone

The BLISÂ® may not detect an adjacent target immediately when the vehicle accelerates from a standing start with another vehicle alongside.

BLISÂ® with Trailer Tow (BTT)

NOTE: *The BLISÂ® With Trailer Tow is an extended feature of BLISÂ® and depends on the proper functionality of BLISÂ®.*

NOTE: *The transmission needs to be in park (P) in order to select a specific trailer or to input the needed measurements into the IPC message center.*

NOTE: *The BLISÂ® with Trailer Tow only functions with a conventional trailer. If 5th wheel or gooseneck is selected then BLISÂ® and CTA functions will turn off.*

The BLISÂ® with Trailer Tow can be turned off through the IPC message center. If the BLISÂ® is turned off, then the BLISÂ® with Trailer Tow automatically turns off.

The following steps should be performed when setting up a trailer through the IPC message center:

- Select the type of trailer: conventional, 5th wheel or gooseneck. If 5th wheel or gooseneck is selected then BLISÂ® and CTA functions will turn off.
- Select whether or not the width of the new trailer is less than or equal to 2.6 m (8.5 ft).
- Enter the length of the new trailer. The length is measured between the trailer ball hitch and the back of the trailer. BLISÂ® with Trailer Tow should turn on and CTA turn off. However, if the trailer length is entered as 3 feet, then CTA remain on (3 feet length is reserved for bike racks and cargo racks).

When the trailer is first connected a message appear in the IPC message center that says "Trailer connected". When connecting to a four pin trailer connector the brake pedal must be depressed immediately afterwards in order to get the "Trailer connected" message. If a preset trailer exists in the IPC then BLISÂ® with Trailer Tow automatically receives preset trailer information. If the trailer just connected is not the preset trailer, then select the correct trailer from the IPC menu or add a new trailer with the correct dimensions. If there are no preset trailers in the IPC, then the IPC automatically request trailer information. If at this point the driver exits the message center menus, then BLISÂ® and CTA automatically turn off. Otherwise, the driver must add new trailer information through the IPC.

False alerts are possible with a truck and trailer operating with BLISÂ® with Trailer Tow. If the ignition is cycled, the BLISÂ® with Trailer Tow continues to function using the last trailer selected.

The BLISÂ® with Trailer Tow is designed to work with any trailer whose front width is 2.6 m (8.5 ft) or less and the total length from the trailer hitch ball to the rear of the trailer is 10 m (33 ft) or less. Different trailers may cause a slight change in performance as outlined below.

- Large box trailers may cause false alerts to trigger when driving next to buildings or near parked cars.
- A false alert may also occur while making a 90-degree turns.
- Trailers that are 2.6 m (8.5 ft) wide at the front and have a total length greater than 6 m (20 ft) may have delayed alerts from passing vehicles when the vehicle is passing at high speed.
- A box trailer whose front width is 2.6 m (8.5 ft) may cause early alerts when over taking a vehicle.

CTA System

NOTE: *The CTA system is only active when reverse gear is selected.*

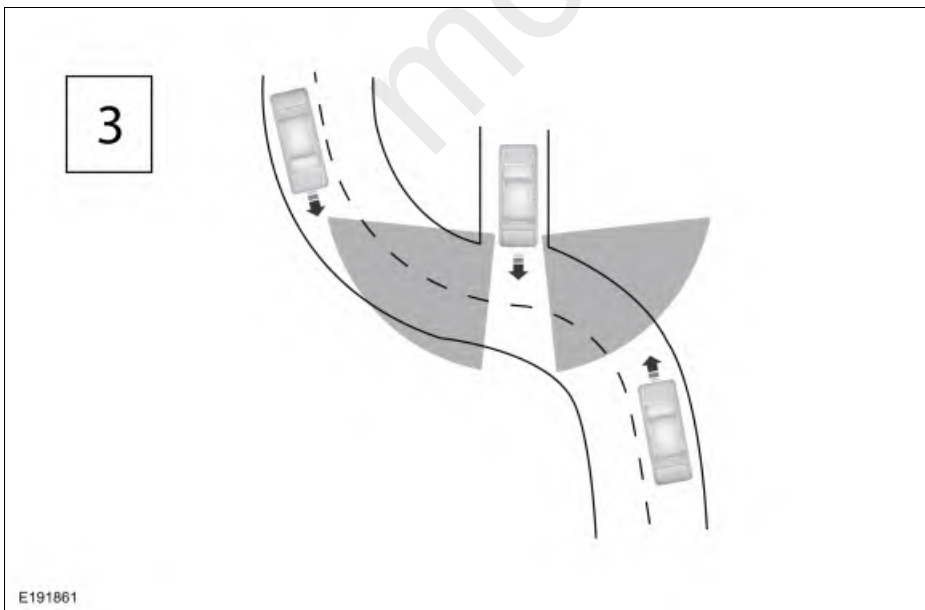
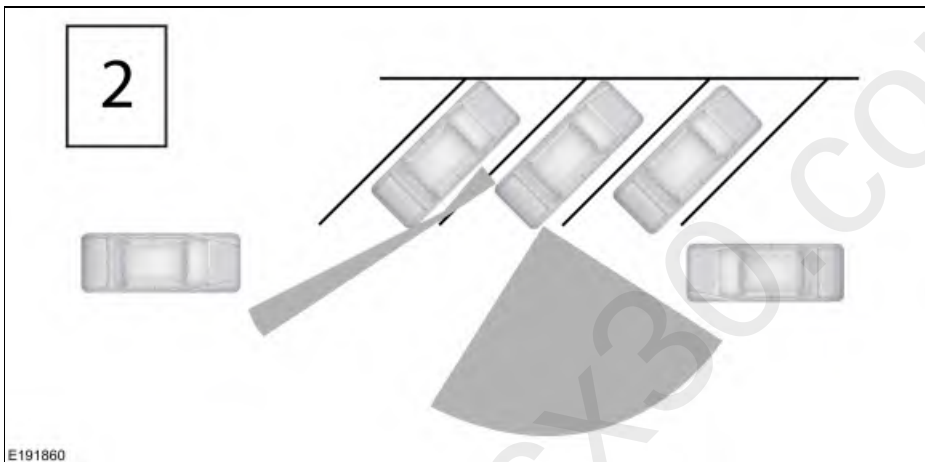
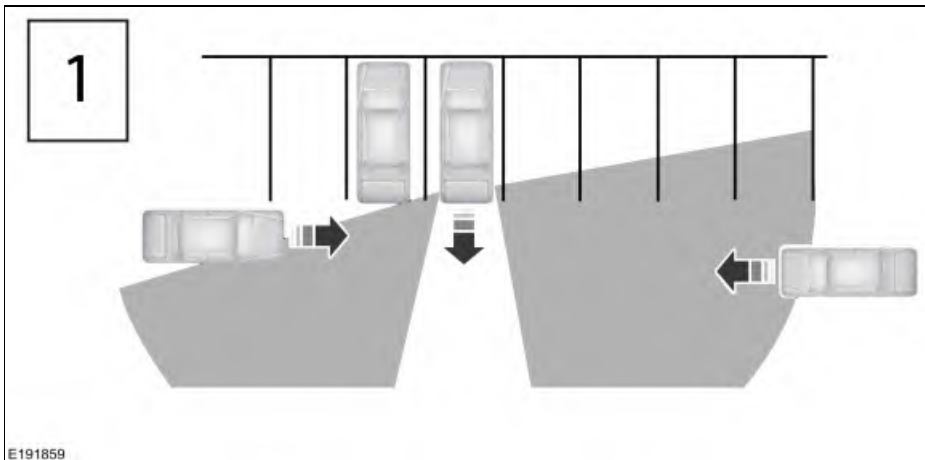
When the transmission is in reverse, the CTA system can detect a vehicle or a bicycle that is approaching at a speed between 8 km/h and 64 km/h (5 mph and 40 mph) and time to impact is between 1 and 2.5 seconds. The distance at which an alert is generated varies depending on the speed of the approaching vehicles or bicycles. The CTA system response time and performance can degrade if vehicles are approaching at speeds

greater than 64 km/h (40 mph).

An adjacent parked vehicle or object can affect the systems ability to detect approaching vehicles or bicycles (refer to figure 1). Parking at extreme angles can further affect the systems ability to detect approaching vehicles or bicycles (refer to figure 2).

Backing towards a curve road can also affect systems ability to detect approaching vehicles or bicycles (refer to figure 3).

CTA detection zones:



The CTA system is designed to detect any objects approaching the vehicle at a speed equal to or greater than 8 km/h (5 mph). This includes vehicles and bicycles. The CTA system has some detection limitations due to the nature of the radar technology used by the SODL and SODR. The system cannot normally detect stationary vehicles, humans, animals or objects such as fences, guard rails or trees.

Circumstances that may cause non-detection are:

- Debris build-up or damage to the rear lamp assemblies
- The rear quarter panel of the vehicle is obstructed or partially obstructed by an adjacently parked vehicle or object
- Vehicle approaching at speeds greater than 64 km/h (40 mph)
- Driving in reverse faster than 12 km/h (8 mph)
- Damage to sensor and/or sensor area

Due to the nature of radar technology, there may be certain instances when the CTA system alerts the operator, when no object or vehicle is present while backing up. This is known as a false alert. False alerts up to 3% of the time (3 times out of 100 reversals) are considered normal. A false alert may occur when backing out of a garage or backing into a parking space and objects or vehicles are very close to the radar sensors. False alerts are temporary and self-correcting.

Missed targets occur when a target is present and the LED does not illuminate. Missed targets up to 1% (1 out of 100 targets) is considered normal operation.

Circumstances that cause missed alerts are:

- Debris build-up or damage to the rear lamp assemblies
- Certain maneuvering of the vehicles entering and exiting the detection zone
- Vehicles passing through the detection zone at high rates of speed
- When several vehicles forming a convoy pass through the detection zone

Exterior Mirror Indication

When the BLISÂ® or CTA system is active and an object is detected by the SODL or SODR, the BLISÂ®/ CTA LED command message is sent from the SODL or SODR to the DDM or PDM. The DDM and PDM supply voltage and ground to illuminate their respective exterior mirror BLISÂ®/ CTA LED based on messages received from the SODL and SODR.

Each time the vehicle is started, the SODL and SODR command the DDM and PDM to illuminate the exterior mirror BLISÂ®/ CTA Light Emitting Diodes (LEDs) for approximately 3 seconds, indicating the BLISÂ® and CTA system is operational.

If a BLISÂ® or CTA system fault is present, the exterior mirror BLISÂ®/ CTA CTA Light Emitting Diodes (LEDs) remains off, the IPC BLISÂ® RTT illuminates and a message center warning displays BLIND SPOT SYSTEM FAULT.

BLISÂ® and CTA Message Center Function

NOTE: CTA system faults may not be detected until the transmission is placed in reverse.

NOTE: The BLISÂ® and CTA system menus in the message center are not available when a MyKeyÂ® restricted key is in use.

BLISÂ® can be turned off by using the blind spot on/off function in the message center. When the BLISÂ® has been turned off by the driver or if a system fault is present, the BLISÂ® RTT in the message center remains on. When turning the system on or off, the exterior mirror Light Emitting Diodes (LEDs) flash 2 times. When the BLISÂ® is turned off, the driver cannot receive any alerts. The system remains off until turned back on by the driver.

The CTA system can be turned off by selecting the CTA system on/off function in the message center. The system defaults to on with each ignition cycle.

There are some system faults that set Diagnostic Trouble Codes (DTCs) in the SODL, SODR, DDM or PDM. These Diagnostic Trouble Codes (DTCs) can set a message in the IPC message center that displays BLIND SPOT SYSTEM FAULT and/or CROSS TRAFFIC SYSTEM FAULT. There are also symptom based faults that do not set a DTC.

Blocked Sensor

NOTE: Blockage sensing becomes active after the wipers are activated.

NOTE: A blocked state is not a system fault. A blocked state is a normal mode of operation under blocked conditions.

An excessive build-up of materials on the rear lamp assemblies, such as mud or snow, can cause the BLISÂ® or CTA system functionality to degrade. Heavy rain can have the same affect on the system. If a blocked state is detected, the SODL and SODR blockage sensing senses the performance degradation and enters the SODL and SODR into a blocked state. The performance degradation means alerting late on targets or additional missed targets. Upon entering a blocked state, the SODL and/or SODR send a status message over the MS-CAN to the GWM. The GWM then sends the status message to the IPC on the HS-CAN3. The message center displays BLIND SPOT NOT AVAILABLE SENSOR BLOCKED or CROSS TRAFFIC NOT AVAILABLE SENSOR BLOCKED and the LH and RH exterior mirror BLISÂ®/ CTA Light Emitting Diodes (LEDs) illuminate.

The message center warning can be cleared by the driver, but the amber BLISÂ® off RTT in the IPC remains illuminated. A blocked state will self-clear when blockage sensing senses performance has returned to normal operation. The ignition can also be cycled off to clear the blocked state. If the blockage is still present after the ignition cycle, or after some drive time the system detects again that it is blocked, the blocked sensor message is displayed again in the message center and the amber BLISÂ® off IPC RTT is illuminated again.

Due to the nature of radar technology, it is possible to get a blocked sensor warning without the radar sensor being blocked. This is rare and is known as a false blockage warning. A false blocked condition either self-clears or clears after an ignition cycle.

Component Description

SODL / SODR

The SODL and SODR are radar based sensors that are located into the rear lamp assemblies. These sensors detect targets for the BLISÂ® and CTA system. The modules are capable of storing Diagnostic Trouble Codes (DTCs) for the BLISÂ® or CTA system when a concern exists. The SODL and SODR communicate through the MS-CAN.

BLISÂ®/ CTA LED

The BLISÂ®/ CTA LED is integral to the LH and RH exterior mirror glass.

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