

System Diagram

The diagram illustrates the CAN bus system components and their connections. The components are numbered 1 through 12:

- 1: Blue CAN bus control unit.
- 2: Grey CAN bus connector.
- 3: Grey CAN bus control unit.
- 4: Grey CAN bus connector.
- 5: Instrument cluster.
- 6: Grey CAN bus connector.
- 7: Grey CAN bus control unit.
- 8: Grey CAN bus control unit.
- 9: Grey CAN bus connector.
- 10: Grey CAN bus connector.
- 11: Grey CAN bus connector.
- 12: Grey CAN bus connector.

The connections are as follows:

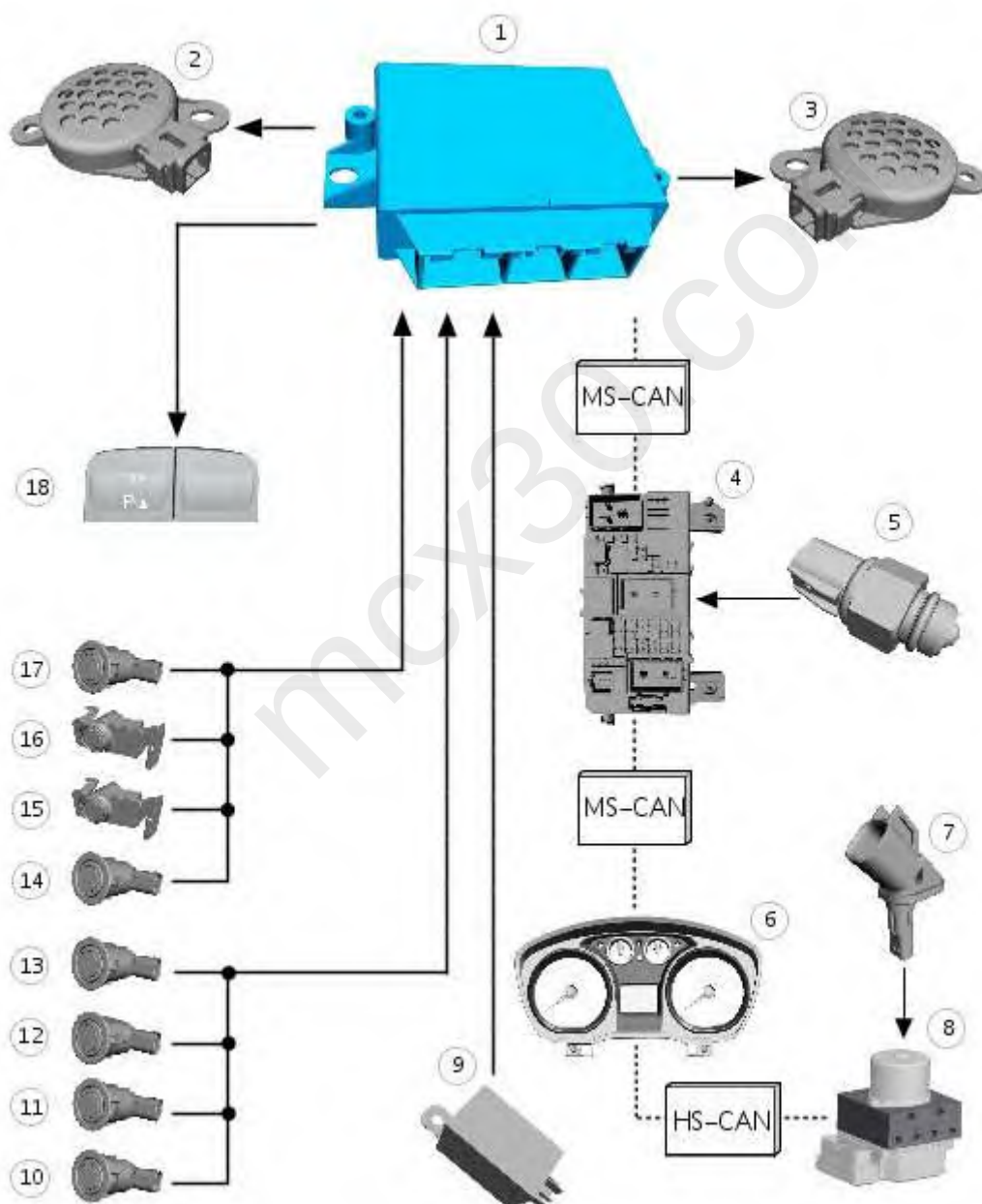
- Component 1 is connected to component 2.
- Component 1 is connected to component 3.
- Component 1 is connected to component 5.
- Component 1 is connected to component 8.
- Component 1 is connected to component 9.
- Component 1 is connected to component 10.
- Component 1 is connected to component 11.
- Component 1 is connected to component 12.
- Component 3 is connected to component 4.
- Component 3 is connected to component 5.
- Component 3 is connected to component 7.
- Component 5 is connected to component 7.
- Component 7 is connected to component 6.
- Component 6 is connected to component 8.
- Component 8 is connected to component 9.
- Component 9 is connected to component 10.
- Component 10 is connected to component 11.
- Component 11 is connected to component 12.

E97473

Item	Description
1	Parking aid module Refer to Component Description:
2	Rear parking aid speaker Refer to Component Description:
3	Generic Electronic Module (GEM)
4	Reverse gear switch

5	Instrument cluster
6	ABS sensor assembly
7	ABS
8	Trailer relay
9	Rear parking aid sensor Refer to Component Description: Parking aid sensors
10	Rear parking aid sensor Refer to Component Description: Parking aid sensors
11	Rear parking aid sensor Refer to Component Description: Parking aid sensors
12	Rear parking aid sensor Refer to Component Description: Parking aid sensors

Vehicles with front and rear parking aid

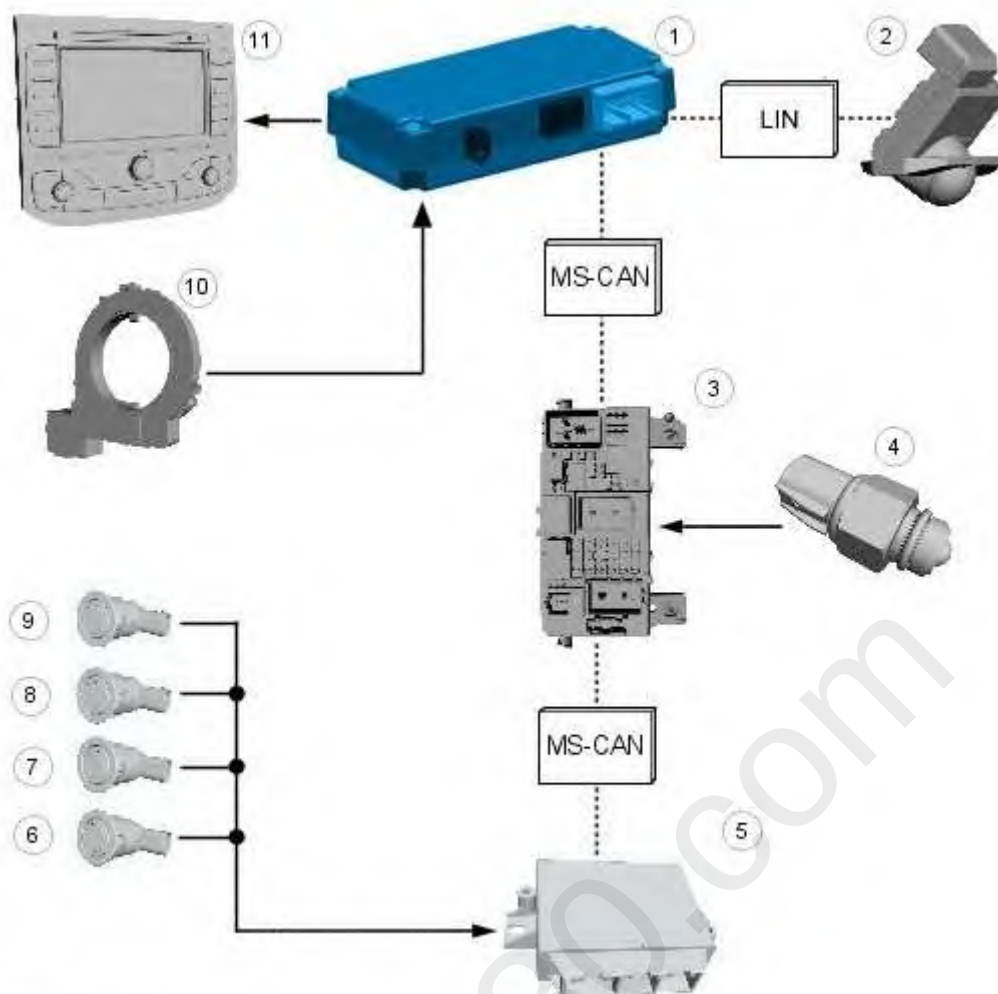


E97419

Item	Description
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1	Parking aid module Refer to Component Description:
2	Front parking aid speaker Refer to Component Description:
3	Rear parking aid speaker Refer to Component Description:
4	Generic Electronic Module (GEM)
5	Reverse gear switch
6	Instrument cluster
7	ABS sensor assembly
8	ABS
9	Trailer relay
10	Rear parking aid sensor Refer to Component Description: Parking aid sensors
11	Rear parking aid sensor Refer to Component Description: Parking aid sensors
12	Rear parking aid sensor Refer to Component Description: Parking aid sensors
13	Rear parking aid sensor Refer to Component Description: Parking aid sensors
14	Front parking aid sensor Refer to Component Description: Parking aid sensors
15	Front parking aid sensor Refer to Component Description: Parking aid sensors
16	Front parking aid sensor Refer to Component Description: Parking aid sensors
17	Front parking aid sensor Refer to Component Description: Parking aid sensors
18	Parking aid switch (with light emitting diode (LED)) Refer to Component Description: Parking aid switch

Vehicles with parking aid camera



E97855

Item	Description
1	Parking aid camera module Refer to Component Description: Parking aid camera module
2	Parking Aid Camera Refer to Component Description: Parking aid camera module
3	Generic Electronic Module (GEM)
4	Reverse gear switch
5	Parking aid module Refer to Component Description:
6	Rear parking aid sensor Refer to Component Description: Parking aid sensors
7	Rear parking aid sensor Refer to Component Description: Parking aid sensors
8	Rear parking aid sensor Refer to Component Description: Parking aid sensors
9	Rear parking aid sensor Refer to Component Description: Parking aid sensors
10	steering angle sensor
11	Navigation device

System Operation

Parking Aid

 **WARNING:** It is the driver's responsibility to stay alert during reversing procedures. The system may fail to detect small children or animals.

 **NOTICE:** The driver is responsible for detecting obstacles and judging the distance between these and the vehicle. The system may fail to detect some hanging objects, barriers, narrow obstacles or painted surfaces, which could damage the vehicle. Always pay attention when parking.

The parking aid provides an audible warning to the driver if there are any obstacles in front of or behind the vehicle during reverse parking maneuvers.

At low speeds, the parking aid module uses the parking aid sensors to monitor the area around the vehicle. If an object is detected within a monitored area, the parking aid module emits a warning tone using the respective parking aid speaker.

The rear parking aid is switched on with the ignition. However, it is only enabled when reverse gear is selected.

The front and rear parking aid is always switched off when the ignition is switched on. It is switched on when reverse gear is selected or if the parking aid switch in the center console is actuated up to a speed of 16 km/h.

The parking aid is switched off when the vehicle is travelling forwards at more than 16 km/h or if the parking aid switch in the center console is actuated again.

When the parking aid module activates the system, the parking aid switch LED is illuminated. If the vehicle is only fitted with the rear parking aid, there is no switch.

The parking aid sensors emit a series of ultrasonic impulses and switch to receiver mode to receive the echo reflected by an obstacle within the detection range. The received echo signals are amplified and converted from an analog signal to a digital signal by the sensor. The digital signal is passed to the parking aid module and compared with pre-programmed data stored in an EEPROM within the module. The module calculates the distance to the obstacle by measuring the time taken between the emitted and received impulses.

If no objects are detected there are no further warning tones. If an object is detected, repeated audible tones are emitted from either parking aid speaker(s) as appropriate. The time delay between the tones decreases as the distance between the object and the vehicle decreases, until at approximately 250 mm (10 inches), the audible tone becomes continuous.

If the distance between the obstacle and the vehicle does not decrease, the warning tone remains constant if the object has been detected by an internal parking aid sensor. If the obstacle was detected by an external sensor and the distance remains unchanged, the warning tone stops after 3 seconds.

The parking aid module continues to monitor the distance and will resume the warning tones if a decrease in distance is detected.

If a trailer is connected to the vehicle, a signal is sent to the **GEM (generic electronic module)** via the trailer relay. This signal is sent to the parking aid module via the MS CAN bus. When the parking aid module detects that a trailer is connected to the vehicle, the rear parking aid sensors are disabled to prevent constant warnings due to the close proximity of the trailer.

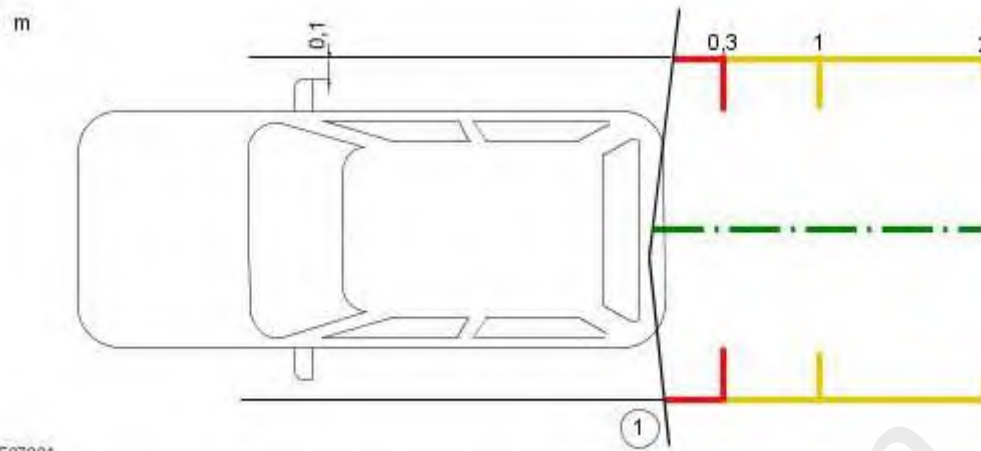
Parking Aid Camera

For vehicles with a DVD navigation system with a touch screen, the parking aid camera is supplied as standard. For vehicles with a standard navigation system, the camera can be ordered as an optional extra. The system essentially consists of a camera with a wide angle lens, a control unit and a wiring harness which is not integrated in the vehicle wiring harness.

On the navigation display screen, the drivers sees a video image of the area behind the vehicle. Guides integrated in the camera images by the parking aid camera module and

displayed on the screen help the driver to find out about the steering angle, vehicle width, cornering and driving straight ahead. The system generates these guides using:

- Vehicle parameters (length, width)
- Steering Angle
- Vehicle position during the parking maneuver

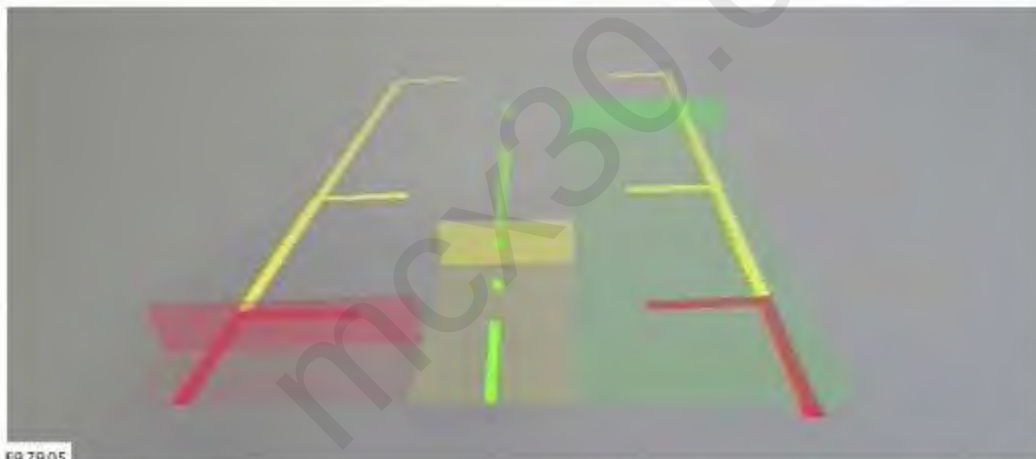


E97904

Item	Description
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1	Monitoring angle
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If the vehicle is also fitted with a rear parking aid, the distances to the obstacle are displayed as a 3D illustration.



E97905

The area behind the vehicle is shown on the navigation display screen when the ignition is switched on and reverse gear is engaged (1). The rear view is always given priority, regardless of what is currently being shown on the display.

The camera view is automatically disabled 10 seconds after disengaging reverse gear (2).



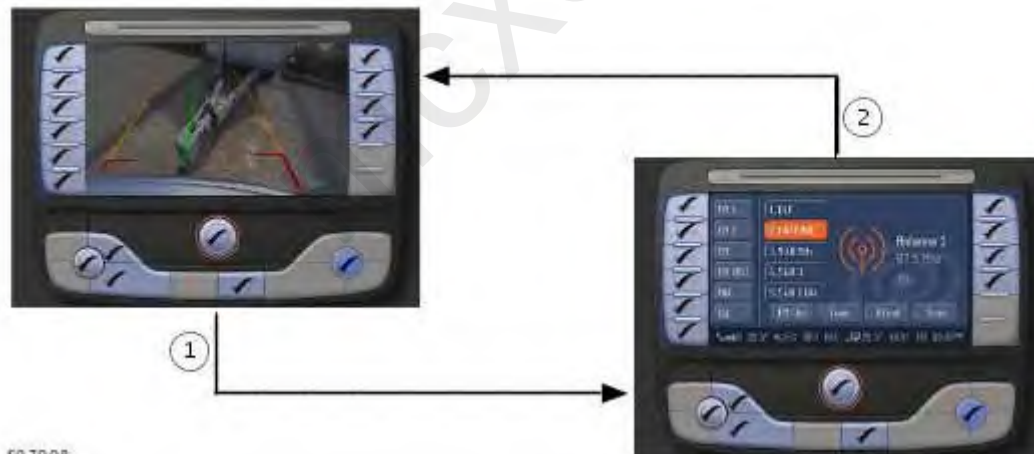
E97906



E97909

If the blue button is pressed during operation of the reversing camera, the camera view disappears from the screen. When reverse gear is engaged again, the system returns to the camera view. Exception: For incoming telephone calls, the screen shows the corresponding menu and then automatically returns to the camera view.

The green buttons can be pressed during operation of the reversing camera, and the screen retains the camera view.



E97908

Component Description

Rear parking aid speaker



E89773

The rear parking aid speaker, in addition to its actual function, is also used for audible indication of various types of error in the front and rear parking aids. If the rear parking aid speaker becomes defective, the front parking aid speaker will then be used to indicate failure modes.

If an error is detected in the system, a signal tone is emitted via the speaker for 3 seconds.

Parking aid sensors

NOTICE:



Always keep sensors free from dirt, ice and snow. Do not use any sharp objects to clean the sensors.



If a high-pressure cleaner is used to wash the vehicle, the jet must only be aimed at the sensors briefly at a distance of at least 20 cm.

The parking aid sensor consists of the following:

- Plastic housing
- Aluminum membrane with Piezo disc
- Decoupling ring
- Printed circuit board (PCB)

The parking aid sensor consists of a sensor and a holder. The holder makes sure that each parking aid sensor is correctly orientated in relation to its location in the rear bumper.

The sensors have a 3-pin connector which is connected to the wiring harness of the front bumper. This in turn is connected to the main body wiring harness. Three pins provide for power supply, ground and signal lines to and from the parking aid module.

The disc resonates at a frequency of ca. 50kHz, producing the ultrasonic output. The disc also receives the reflected echo signal from any objects within range.

Parking aid module



E89772

The parking aid module has three connectors which provide for power, ground and MS CAN bus connections, as well as the front and rear parking aid sensors, the parking aid switch and parking aid speaker.

The parking aid module carries out self-check routines and when the parking aid is active, checks the parking aid sensor wiring for short or open circuits. If a concern is detected, a diagnostic trouble code (DTC) is stored in a memory in the parking aid module and the

front and rear parking aid sensors will be disabled until the DTC is cleared and the ignition cycled. The driver recognizes a problem through the flashing LED and a shrill continuous tone, which is emitted for 3 seconds when the parking aid is activated. If the parking aid is working properly, short tones are emitted instead of this continuous tone. DTCs can be read using the Ford approved diagnostic tool through the data link connector (DLC).

Front parking aid speaker



E89773

The front parking aid speaker, in addition to its actual function, is also used for audible indication of various types of error in the front and rear parking aids when the rear parking aid speaker fails.

Parking aid switch



E97703

The parking aid switch is a non-locking switch with an integrated LED for switching the parking aid on and off. When pressed, the parking aid switch momentarily connects a ground to the parking aid module. The LED indicates when the parking aid is active. The LED is controlled by the parking aid module.

The parking aid switch allows the driver to disable the parking aid when reverse gear is selected or to activate the parking aid sensors when not in reverse gear.

If a high tone is emitted for 3 seconds and the lights in the switch flash, this indicates that there is a fault. The system is then deactivated.

Parking aid camera module



E97856

The data from the optional parking aid is sent to the module via the Mid Speed CAN data bus. The signals from the steering angle sensor are sent to the module via cable. The module is connected to the navigation device via a video-in/out cable.

Parking Aid Camera



E97857

The wide angle lens camera is fixed in the handle strip of the tailgate. It is connected to the parking aid camera module via a separate line.

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