

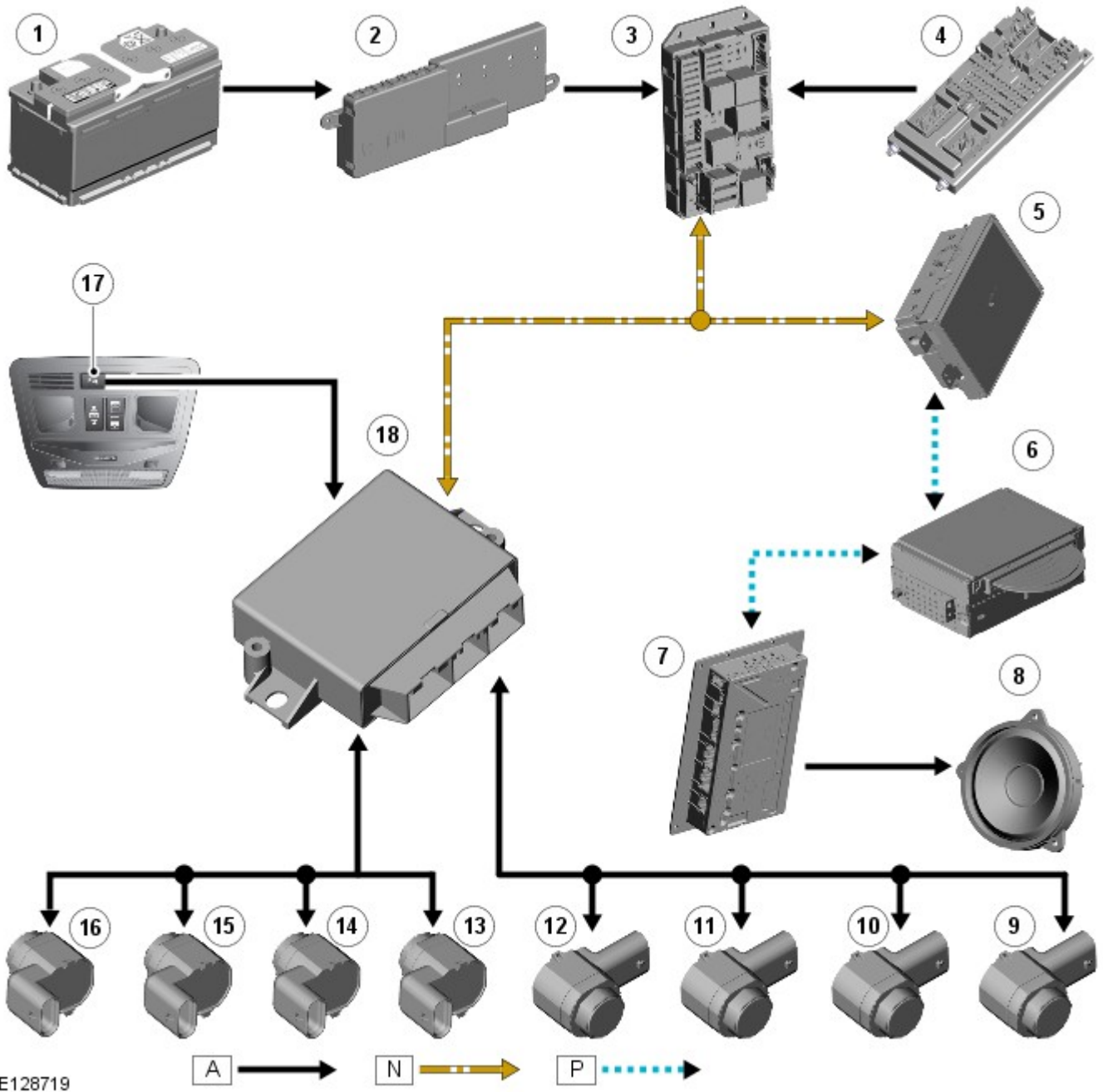
Parking Aid - Parking Aid - System Operation and Component Description

Description and Operation

Control Diagram



NOTE: A = Hardwired; O = LIN bus; D = High speed CAN bus; N = Medium speed CAN bus; P = MOST (media orientated system transport) ring; I = CVBS signal

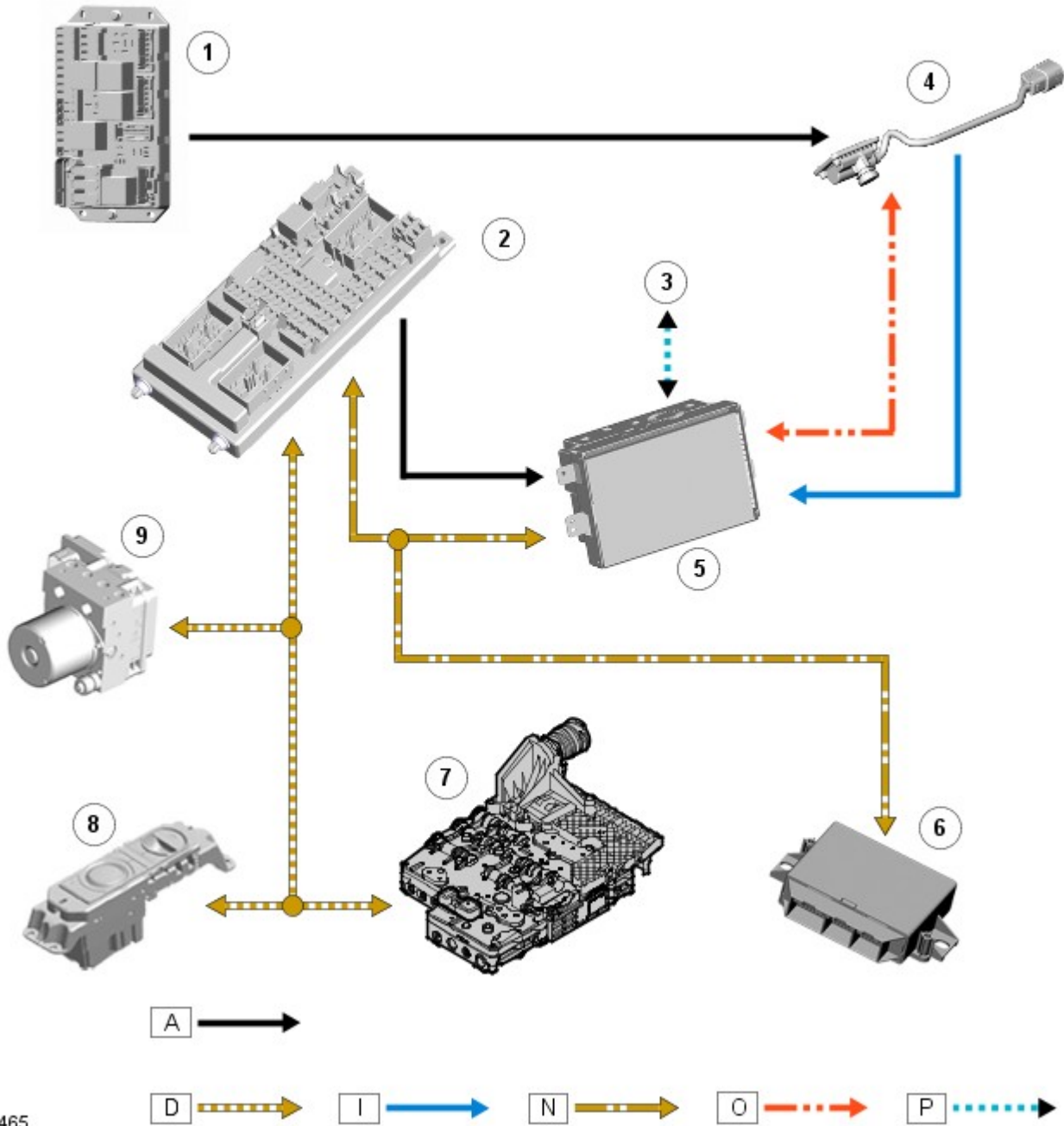


E128719

Item	Description
1	Battery
2	BJB (battery junction box)
3	RJB (rear junction box)
4	CJB (central junction box)
5	TSD (touch screen display)
6	IAM (integrated audio module)
7	Audi amplifier
8	Speakers

9	RH (right-hand) outer rear sensor
10	RH (right-hand) inner rear sensor
11	LH (left-hand) inner rear sensor
12	LH (left-hand) outer rear sensor
13	RH (right-hand) outer front sensor
14	RH (right-hand) inner front sensor
15	LH (left-hand) inner front sensor
16	LH (left-hand) outer front sensor
17	Parking aid switch
18	Parking aid module

CONTROL DIAGRAM - PARKING AID CAMERA



E120465

Item	Description
1	RJB (rear junction box)
2	CJB (central junction box)
3	To MOST ring
4	Rear view camera

5	TSD (touch screen display)
6	Parking aid module
7	TCM (transmission control module)
8	Jaguar Drive control
9	ABS (anti-lock brake system) module

System Operation

PARKING AID

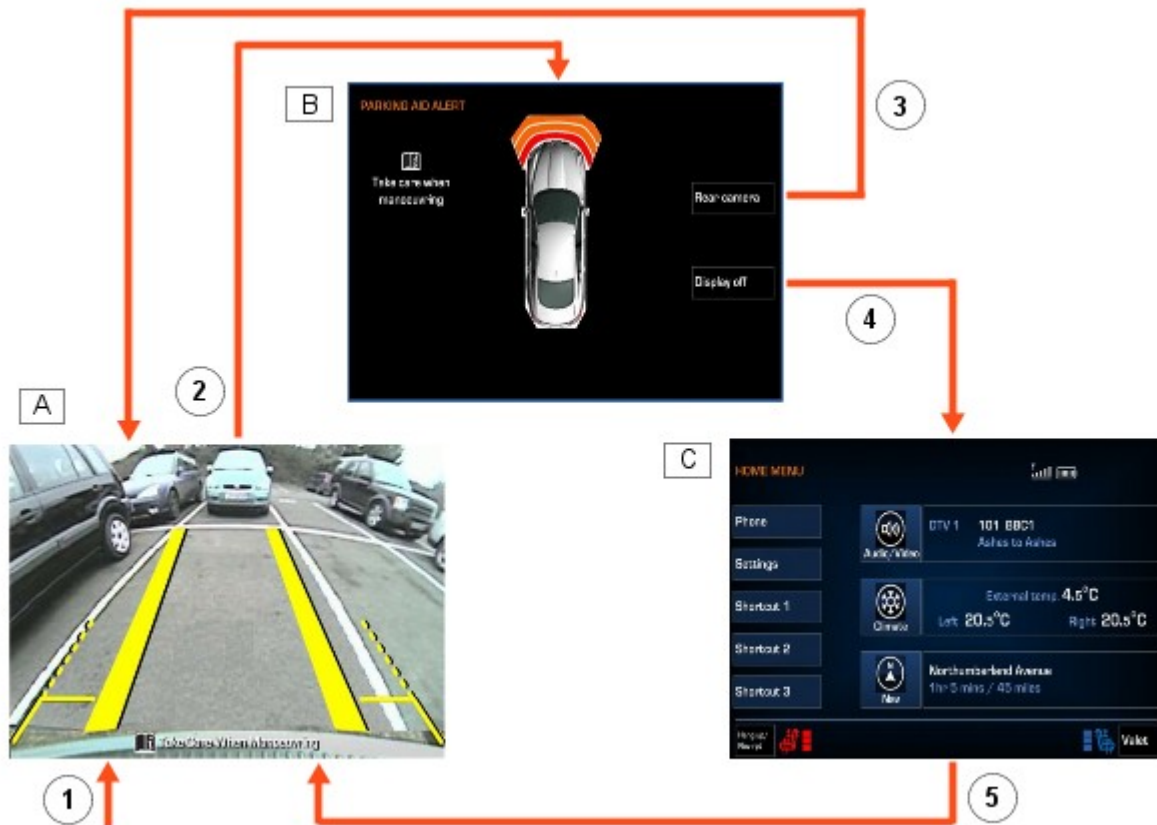
The parking aid module receives and ignition power mode 6 supply from the [RJB \(rear junction box\)](#) .

The parking aid module is connected to the entertainment system control module by the medium speed [CAN \(controller area network\)](#) bus and the Media Orientated System Transport (MOST). The entertainment system is used by the parking aid system to provide the driver with an audible warning. If an obstacle is sensed by the rear parking aid sensors, the rear audio system speakers will sound. If an obstacle is sensed by the front parking aid sensors (if fitted), the front audio system speakers will sound.

The parking aid system operates using ultrasonic signals which are transmitted by the sensors. The reflected echo from this output is received by the sensors and used by the parking aid module to calculate the distance from an object.

When the parking aid module activates the system, the switch [LED \(light emitting diode\)](#) is illuminated to indicate that the system is operating. The parking aid module then processes signals received from the sensors to determine if there is an object with the detection range of the sensors. A parking aid screen is automatically displayed in the Touch Screen Display. If the vehicle has a parking aid camera fitted, the camera display is automatically displayed in the TSD in preference to the parking aid alert display. To view the parking aid sensor display, a single touch of the TSD screen will remove the camera image display and show the parking aid alert display.

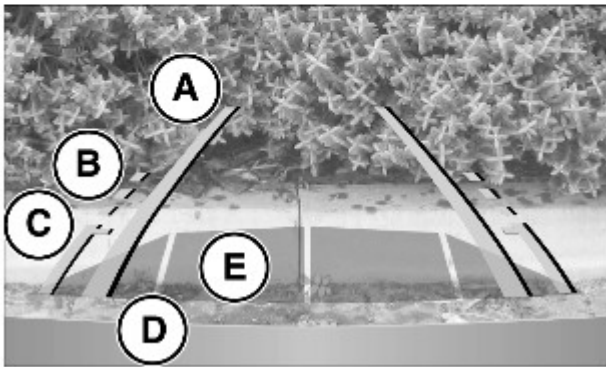
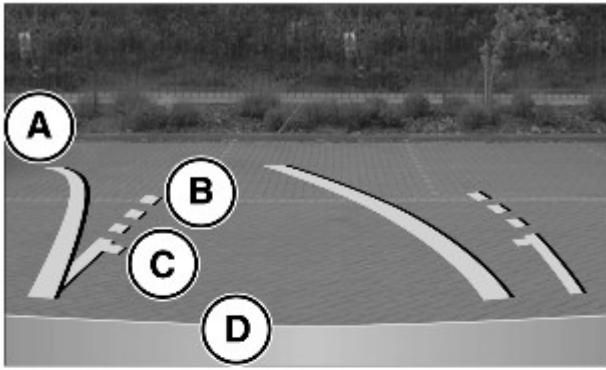
Parking Aid Alert Display



E 120458

Item	Description
A	Camera image
B	PDC (park distance control) image
C	Original Touch-screen image
1	User selects reverse
2	User touches screen
3	Rear camera soft key selected

4	(a)'Display off' soft key selected (b) User selects 'Park' c) Vehicle exceeds 16 km/h (10 mph)
5	User selects reverse



E137441

Item	Description
A	Solid line: The projected wheel trajectory
B	Dotted line: The safe working width of the vehicle (including exterior mirrors)
C	Luggage compartment access guideline: Do not reverse beyond this point if luggage compartment access is required
D	Bumper inclusion
E	Parking sensor activation: A colored area appears, to indicate which rear sensors have been activated

In the combined mode, the sensors emit a series of ultrasonic impulses and then 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 analogue 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 (electrically erasable programmable read only memory)** within the module. The module receives this data via the signal line from the sensor and calculates the distance from the object using the elapsed time between the transmitted and received impulse. The duration of the impulse duration is determined by the module, with the sensor controlling the frequency of the impulse output.

In receiver mode, the sensor receives impulses that were emitted by adjacent sensors. The module uses this information to precisely determine the position and distance of the object.

If no objects are detected there are no further warning tones. If an object is detected, repeated audible tones are emitted from either the front or rear audio speakers as appropriate. The time delay between the tones decreases as the distance between the object and the vehicle decreases, until at approximately 300 mm (12 inches), the audible tone becomes continuous.

After the initial detection of an object, if there is no decrease in the distance between an object and the central sensors, the time delay between the audible warnings remains constant. If an object is detected by one of the corner sensors only, the audible warnings stop after approximately 5 seconds if there is no change in the distance between an object and the corner sensor.

When approaching several objects within detection range, the control module recognises the distance from the vehicle to the nearest object.

The PDC module will prioritise the objects detected, the nearest object detected will take priority and the corresponding audio outputs will be emitted. For example if 2 objects are detected (one front one rear) the nearest detected object will take priority and relevant audible tone will be heard.

If two objects are detected at equal distance (one front one rear) the audible tones will alternate between the front and rear speakers.

If reverse (R) is the first gear selected after the ignition is switched on, both the front (if fitted) and rear parking aid sensors will become operational. If a forward drive gear is subsequently selected, the front and rear parking aid sensors will remain operational until vehicle speed increases above 16 km/h (10 mph), park (P) is selected or the PDC control switch is pressed.

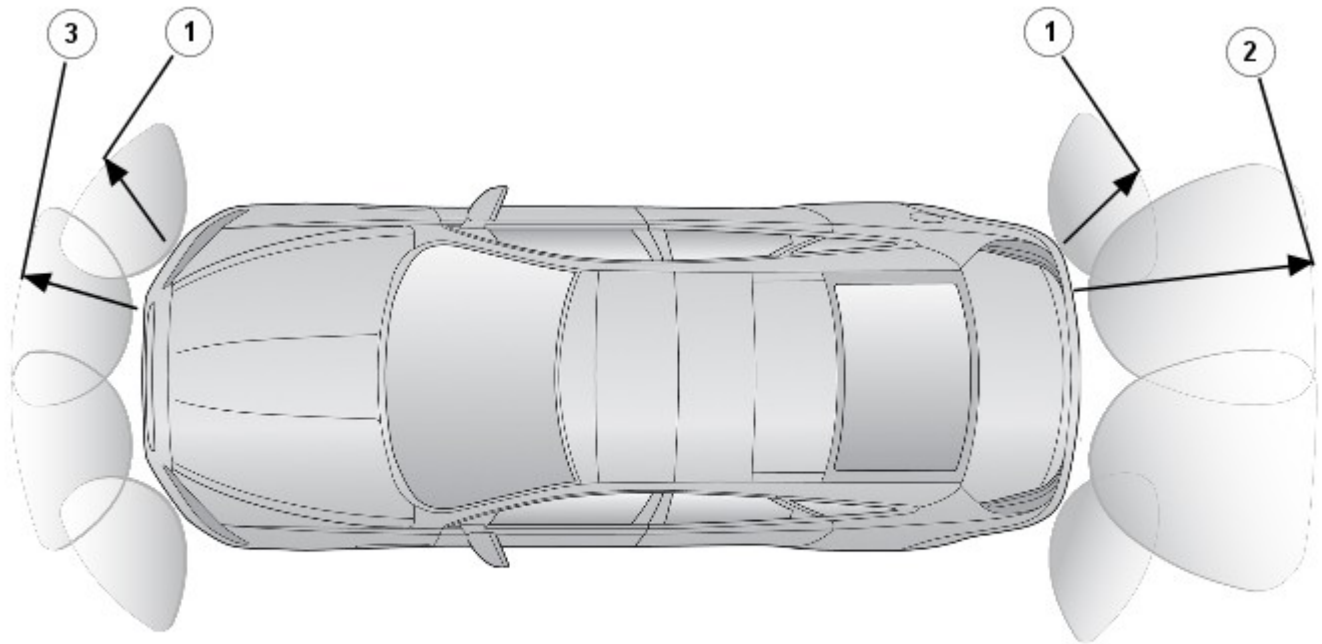
If drive (D) is the first gear selected after the ignition is switched on the parking aid system will have to be activated by pressing the PDC control switch.



NOTE: The PDC system can not be activated whilst the vehicle is in park (P).

The volume output of the parking aid audible tones can be adjusted by selecting the 'Vehicle Settings' menu and selecting 'Parking' from the menu on the TSD. The volume can be adjusted using the + or - selections on the TSD.

Distance Calculation



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The detection ranges of the sensors are shown in the table below.

Item Number	Sensor Location	Maximum Detection Range Audio Tone	Continuous Audio Tone
1	Rear/Front Outer	Approximately 600 mm (24 inches)	Approximately 300 mm (12 inches)
2	Rear Inner	Approximately 1800 mm (71 inches)	Approximately 300 mm (12 inches)
3	Front Inner	Approximately 800 mm (31 inches)	Approximately 300 mm (12 inches)

PARKING AID CAMERA

The parking aid camera receives an ignition power mode 6 power supply from the RJB . It also has a LIN (local interconnect network) bus connection from the RJB which is not used at the moment but installed for a later enhancement of the parking aid camera.

A shielded co-axial cable connection between the camera and the Touch Screen Display (TSD) is used for the video image transmission.

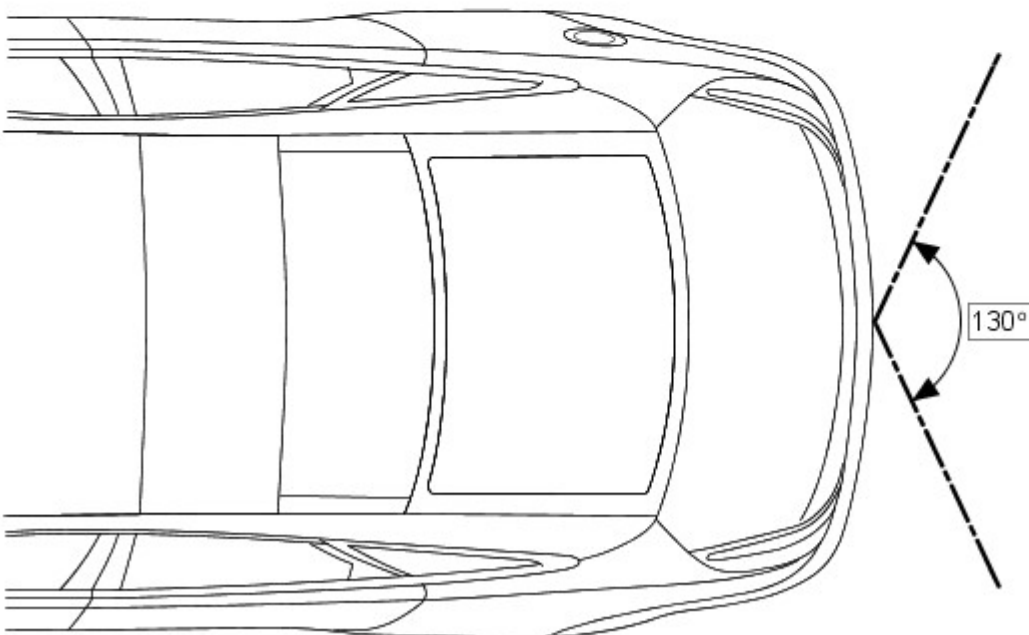
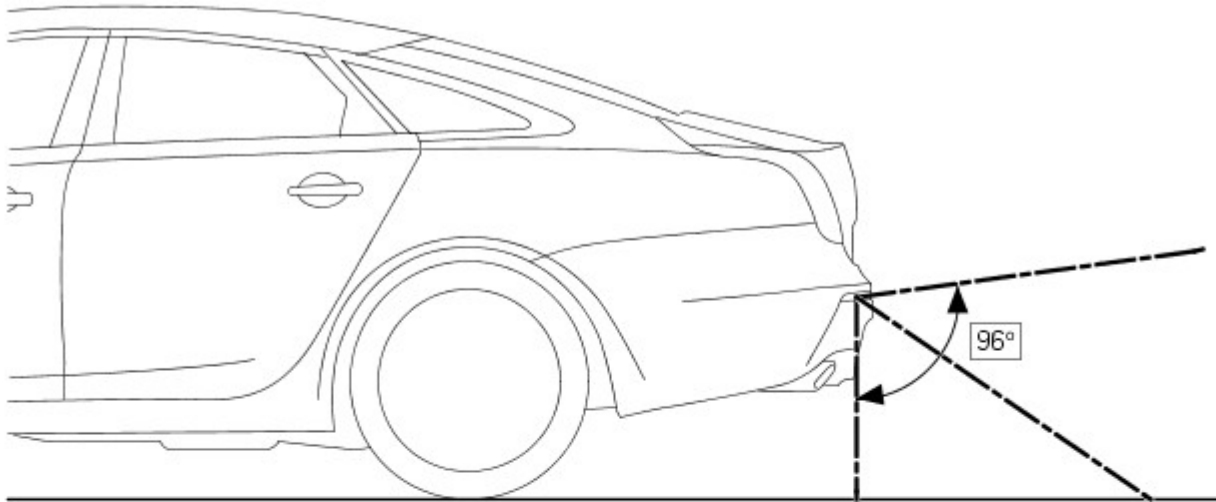
The camera receives power at all times when the ignition is in power mode 6. When reverse gear is selected, the RJB transmits a reverse selected signal on the medium speed CAN bus message to the entertainment system control module. This message is transferred on the MOST to the TSD which displays the parking aid camera video input from the camera in preference to the parking aid alert screen.

If the driver does not require the camera image in the TSD, a single touch on the screen will revert the display to the parking aid alert screen. The camera view can be reselected by pressing the 'Rear Camera' softkey on the TSD.

When reverse gear is deselected, the camera image remains on the TSD for 10 seconds after the transmission has been put into drive 'D'. This is to prevent the TSD switching between screens if the vehicle is being manoeuvred into a parking space. If the vehicle forward speed exceeds 16 km/h (10 mph) within the 10 second period, the camera image is removed from the TSD.

If the TSD display is switched off, the camera image will be automatically displayed when reverse gear is selected. When reverse gear is deselected and the 10 second period has expired, the TSD will revert back to its switched off state.

Camera Viewing Angles



E120461

Component Description

PARKING AID

Parking Aid Module

The parking aid module is located on the **LH (left-hand)** 'A' pillar.

The parking aid module has three connectors which provide for power, ground and **CAN** bus connections, front parking aid sensors and rear parking aid sensors. The medium speed **CAN** bus connections provide for the receipt of the following information from other systems:

- **ABS (anti-lock brake system)** module - Road speed signal
- **TCM (transmission control module)** - Reverse gear engaged signal

The module also outputs messages on the medium speed CAN bus which are received by the TSD. The TSD processes these messages and converts them into Media Orientated System Transport (MOST) signals which are passed to the audio system power amplifier. These signals are then used by the power amplifier to emit the applicable warning tones from the front or rear audio speakers when an object is detected by the front or rear parking aid sensors. A warning tone can also be emitted to alert the driver to a fault in the parking aid system.

The control module has a diagnostic connection via the medium speed CAN bus to enable faults to be retrieved using the Jaguar approved diagnostic equipment. Additionally an on-board diagnostic routine within the control module constantly monitors the system and alerts the driver to a system fault by emitting a 3 second continuous tone through the rear audio system speakers when the ignition is switched on. If front parking aid sensors are fitted, the control switch LED will also flash 6 times.

Parking Aid Sensors

Four ultrasonic sensors are located in the front (if fitted) and rear bumpers.

Each sensor has a three pin connector which mates with a bumper harness, which in turn is connected to the main body harness. Three pins provide for power supply, ground and signal lines to and from the parking aid module.

The parking aid module controls the operation of each sensor using a digital output on the signal line. The module controls the sensor in one of two modes; combined transmitter and receiver mode or receiver mode only.

Parking Aid Switch



E128721

The parking aid switch is located in the instrument panel switch pack, above the touch screen. The switch is the LH switch with an integral LED.

The switch is a non-latching push switch which allows the driver to select the parking aid system on or off. When pressed, the switch momentarily connects a ground to the parking aid module.

The LED indicates when the parking aid system is active. The LED is controlled by the parking aid module.



NOTE: The control switch allows the driver to activate/deactivate the parking aid system if operation is required or not required.

PARKING AID CAMERA

The parking aid camera is located on a bracket which is attached to the luggage compartment lid finisher.

The camera is connected to the vehicle harness by one 3 pin connector for the power, ground and LIN bus and a second connector for the video co-axial cable.

the camera produces color images to an analogue NTSC format, with a resolution of 640 x 480 pixels and an aspect ratio of 4:3.

The image captured by the camera is mirrored to give the driver a true representation of the rear view on the TSD.