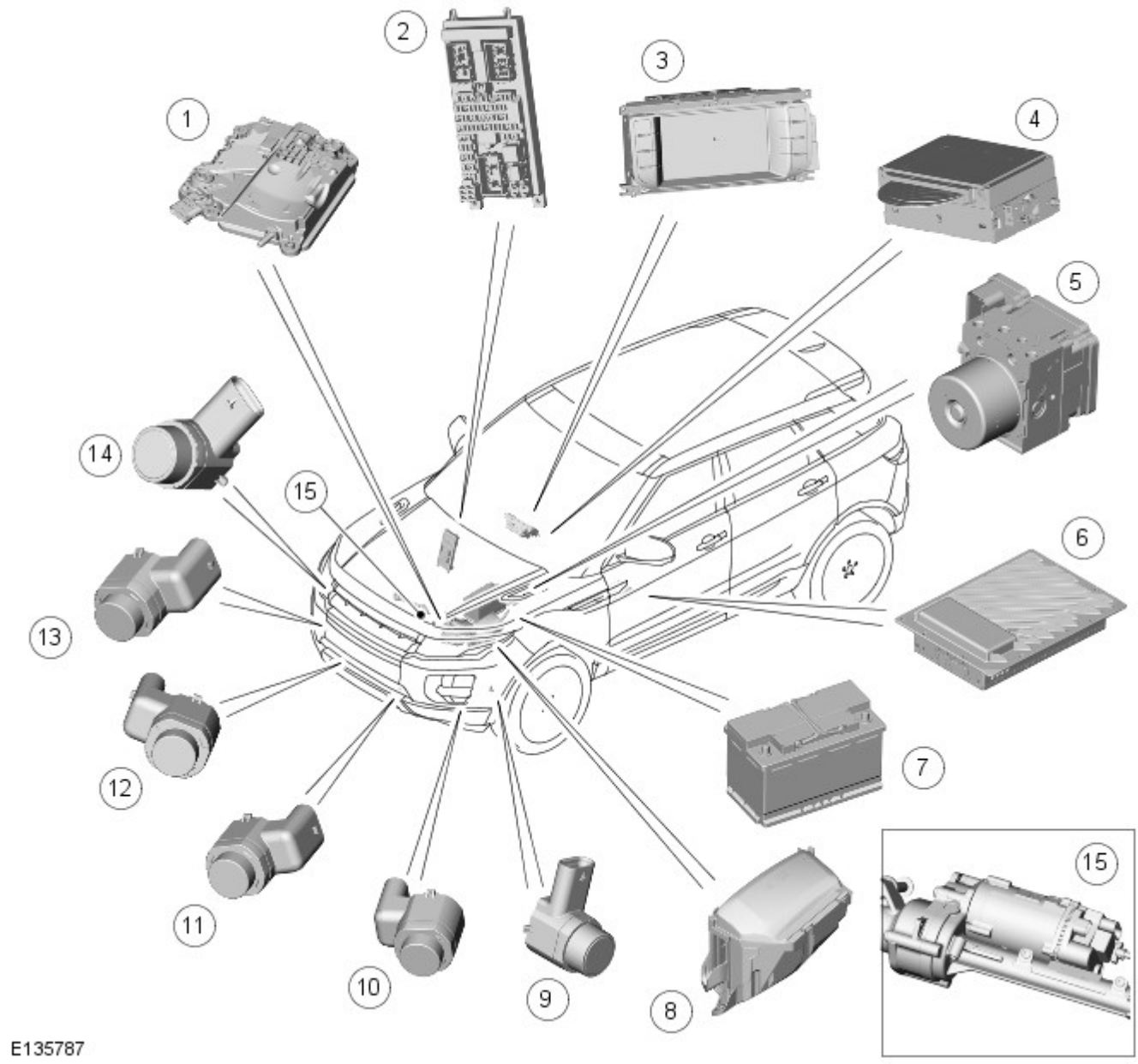
Published: 20-Feb-2013

Parking Aid - Parking Aid - Component Location

Description and Operation

NOTE: Park assist is not available to all markets.

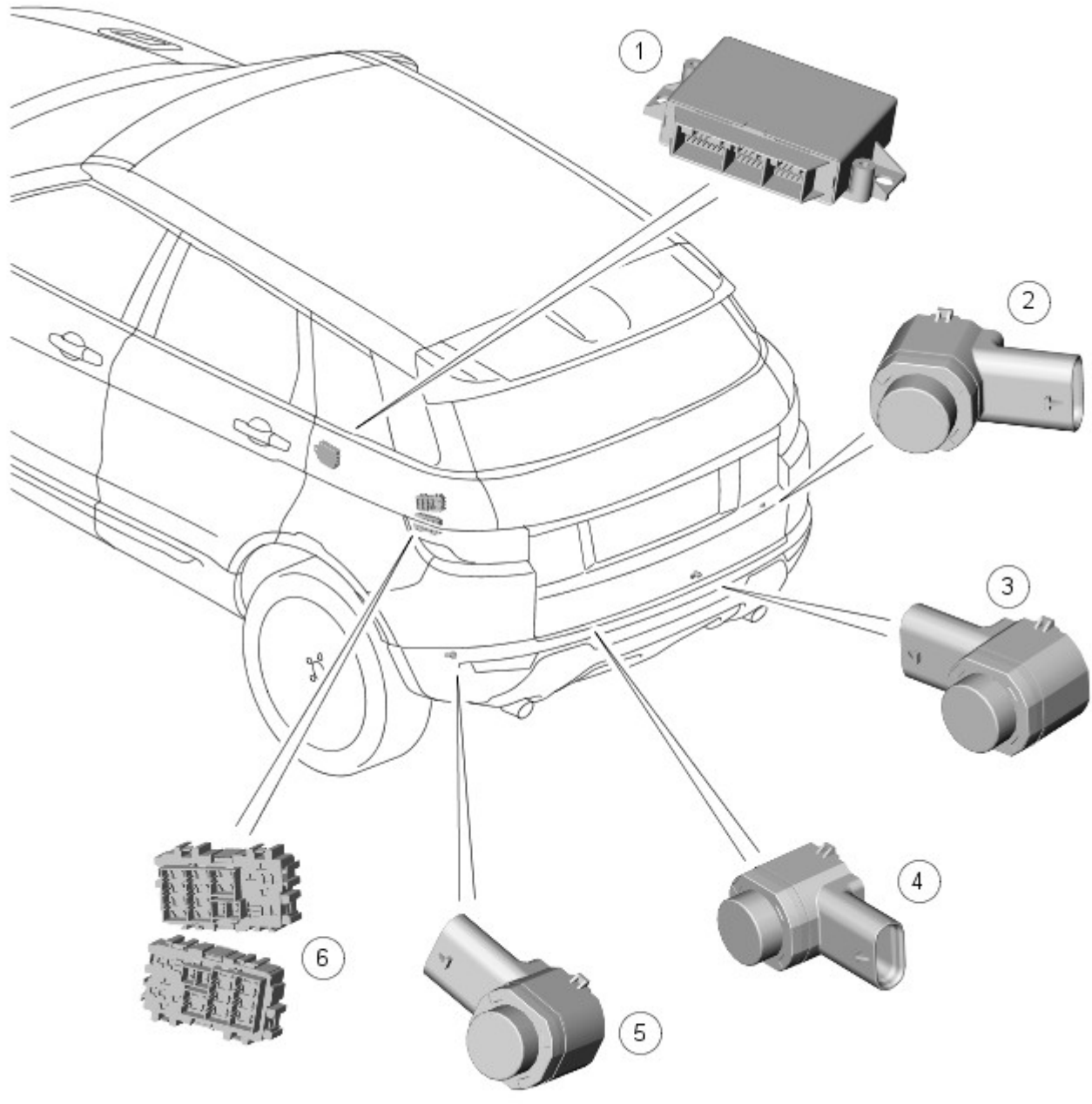
COMPONENT LOCATION - SHEET 1 OF 4 - PARKING AID AND PARK ASSIST



Item	Description
1	TCM (transmission control module)
2	CJB (central junction box)
3	Touch Screen Display (TSD)
4	Integrated Audio Module (IAM)
5	ABS (anti-lock brake system) module
6	Audio power amplifier (Hi-Line only) Refer to: Audio System (415-01 Information and Entertainment System, Description and Operation).
7	Battery
8	BJB (battery junction box)
9	LH (left-hand) front slot detect parking aid sensor
10	LH front outer parking aid sensor

11	LH front inner parking aid sensor
12	RH (right-hand) front inner parking aid sensor
13	RH front outer parking aid sensor
14	RH front slot detect parking aid sensor
15	Electric power assisted steering rack

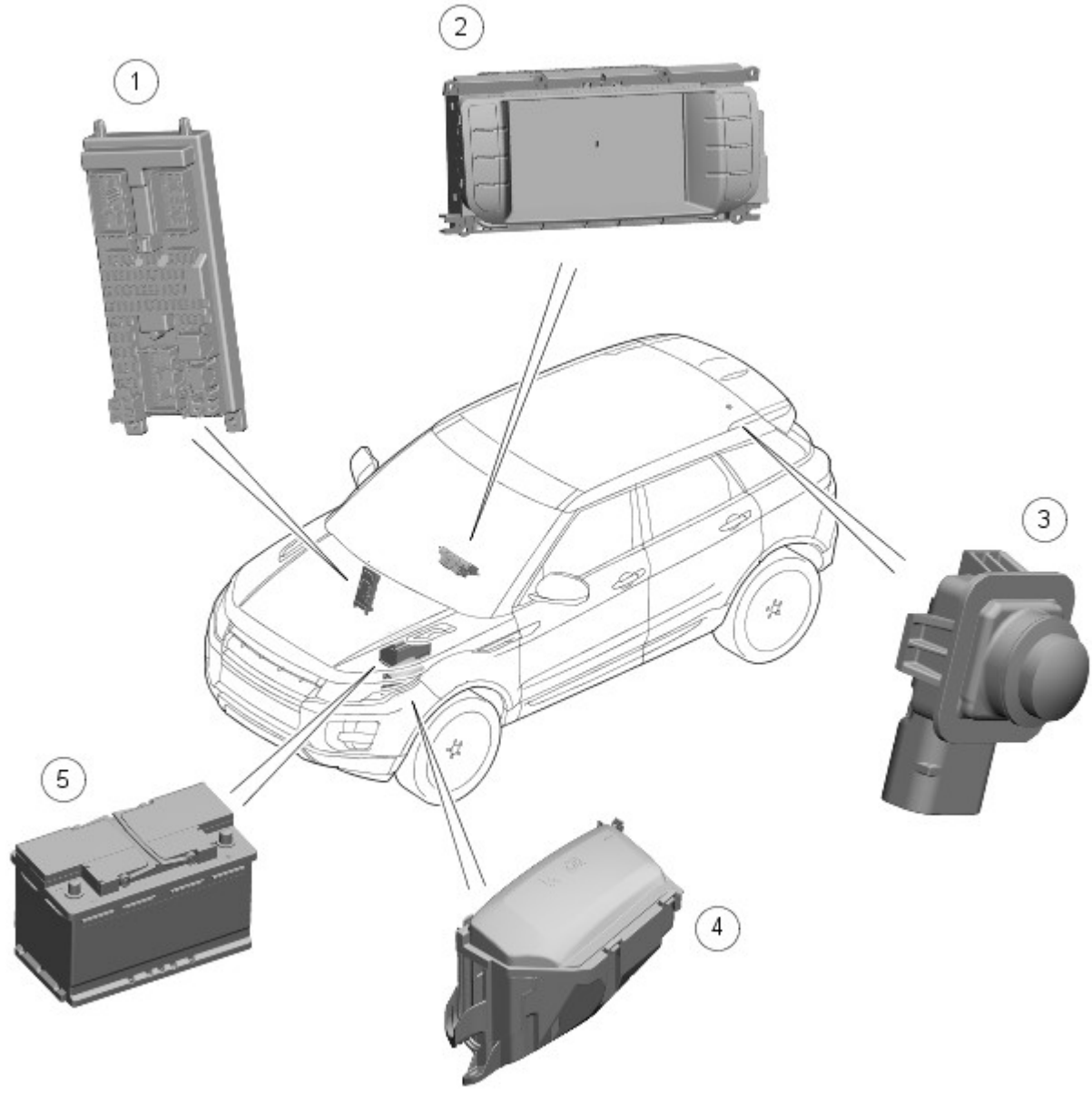
COMPONENT LOCATION - SHEET 2 OF 4 - PARKING AID AND PARK ASSIST



E135788

Item	Description
1	Park distance control module
2	RH rear outer parking aid sensor
3	RH rear inner parking aid sensor
4	LH rear inner parking aid sensor
5	LH rear outer parking aid sensor
6	RJB (rear junction box)

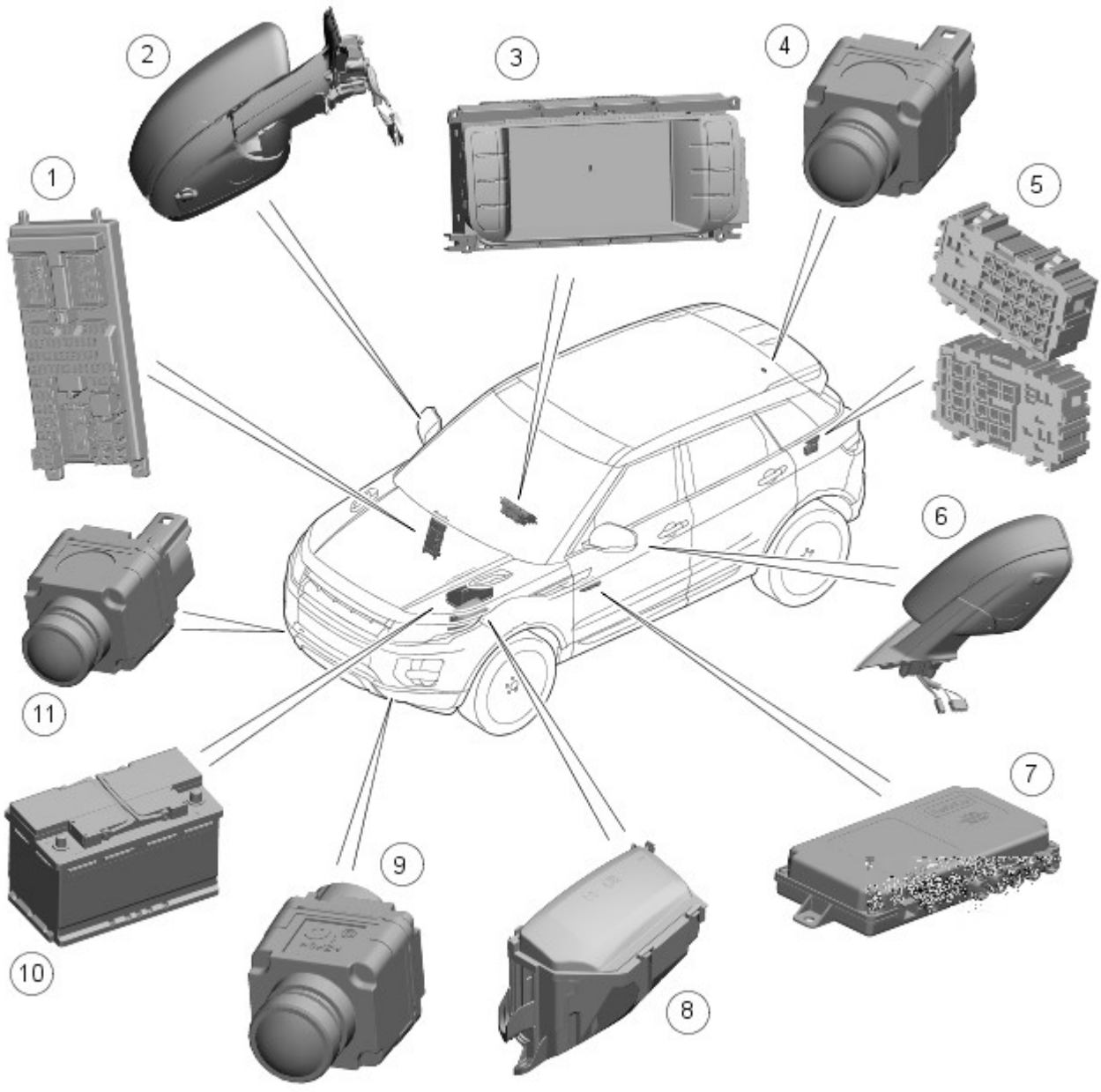
COMPONENT LOCATION - SHEET 3 OF 4 - REAR VIEW CAMERA SYSTEM (LOW-LINE)



E141704

Item	Description
1	CJB
2	Touch Screen Display (TSD)
3	Rear view camera
4	BJB
5	Battery

COMPONENT LOCATION - SHEET 4 OF 4 - PROXIMITY CAMERA SYSTEM (HI-LINE)



E141705

Item	Description
1	CJB
2	RH mirror camera
3	Touch Screen Display (TSD)
4	Rear view camera
5	RJB
6	LH mirror camera
7	Proximity camera control module
8	BJB
9	LH front bumper camera
10	Battery
11	RH front bumper camera

Published: 20-Feb-2013

Parking Aid - Parking Aid - Overview

Description and Operation

OVERVIEW

The parking aid system provides an audible warning to the driver when any obstacles are in the path of the vehicle during forward or reverse parking maneuvers. The system consists of four ultrasonic sensors in the front bumper and four ultrasonic sensors in the rear bumper, a parking aid module and a parking aid switch.

At low speeds, the parking aid module uses the ultrasonic sensors to monitor the area around the front and rear bumpers. If an object is detected within a monitored area, the module then outputs a warning using the audio system speakers. The sensors can detect solid objects such as posts, walls and other vehicles and can also detect less solid objects such as a wire mesh fence. Objects very close to the ground may not be detected, but because of their low height may not cause damage to the vehicle.

The parking aid system comprises the following components:

- Parking aid module
- Parking aid switch
- Eight parking aid sensors.

The parking aid module communicates via the medium speed CAN (controller area network) bus with the audio system via the Integrated Control Panel and the Touch Screen Display. The audio system then outputs the applicable warning tones from the front or rear speakers when an object is detected. The high speed CAN bus is used to collect vehicle data from other vehicle systems.

Park Assist - Overview

 NOTE: Park assist is not available to all markets.

The optional park assist system operates using two sensors mounted in the front wheel arch moldings, together with parking aid sensors, front and rear.

To parallel park the driver switches on the park assist function prior to identifying a potential parking space and slowly drives past the space. The sensors in the front arch moldings scan the size of the parking space as the vehicle is driven past it. The park assist control system informs the driver if the parking space is big enough to park the vehicle.

The driver is alerted to a suitable parking space on the passenger side via a graphical representation in the instrument cluster message center. If the driver decides to park on the driver's side of the vehicle the direction indicator must be operated. This action will prioritize driver's side parking space information which will be presented to the driver in the message center.

If there is sufficient space, the driver stops the vehicle, selects reverse gear and lets go of the steering wheel.

The park assist system alerts the driver to the intended reverse path, displaying information in the instrument cluster message center. Park assist then actively supports the driver by taking over the steering control and parks the vehicle in the available space.

Where a kerb is present its position is also taken into account for the calculation of the parking trajectory. If there is a lowered kerb (or none at all), the system calculates a trajectory to align the vehicle with the vehicle parked in front.

The driver continues to brake, accelerate, apply the clutch and select the correct gear. Park assist will instantly de-activate if the vehicle speed is too high or if the driver takes over the steering maneuver.

The park assist function can be switched on or off at any time by the driver using a switch located next to the 'park aid' switch. The switch is illuminated by a red LED (light emitting diode) when the system is on.

When the park assist function is switched on and prior to each separate stage of the parking maneuver the system carries out a self-check procedure.

During the park assist maneuver both front and rear parking aid sensors are active.

To activate the park assist 'search for a space' function the vehicle must be in a forward gear and travelling below 18 mph (30 km/h). Above this speed the system de-activates, only re-activating when the speed drops back below the set speed threshold. The search system is not active in reverse gear.

During the park assist reverse and forward maneuvers the system is only active up to a vehicle speed of 10 mph (16 km/h) with a warning of increased speed at 4 mph (7 km/h). The system de-activates above 10 mph (16 km/h).

The system will cancel if any force is placed upon steering wheel during any part of the parking maneuver.

Camera System - Overview

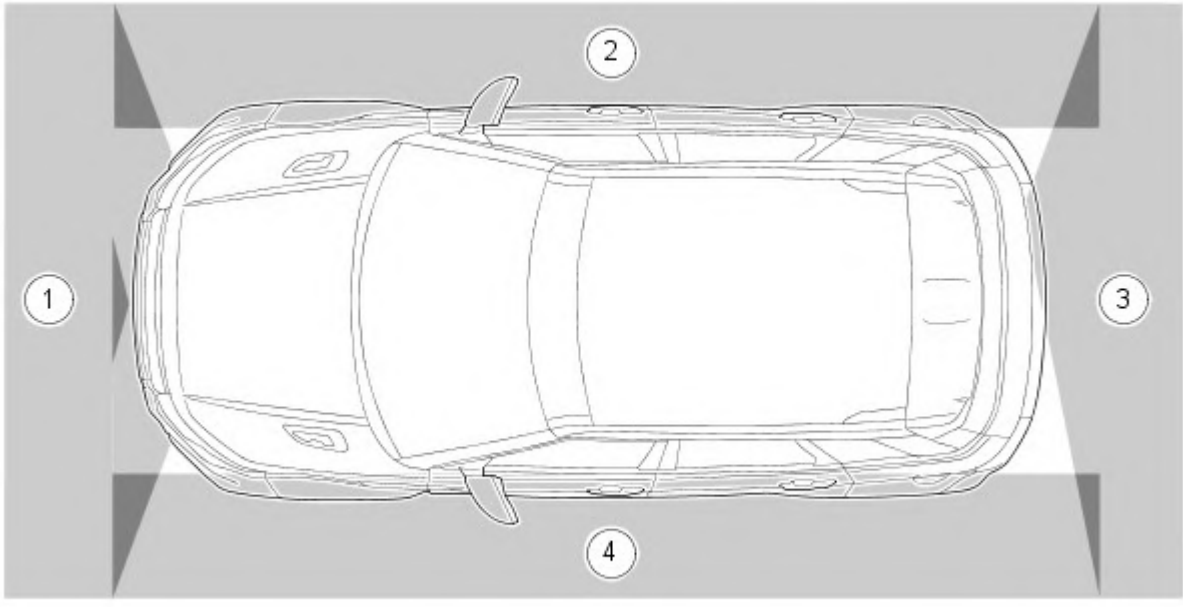
The proximity camera system provides the driver with a visual-aid when maneuvering the vehicle at low speeds. The system uses a dedicated control module to capture the camera data and display the resulting images on the TSD (Touch Screen Display), providing the driver with a 360° view around the vehicle. The camera system is also supported by various driving-aid features where graphical information and warnings are superimposed onto the images displayed on the TSD.

The proximity camera system uses five VGA (Video Graphic Array) resolution cameras:

- two mounted in the front bumper
- one mounted in each door mirror

- one mounted in the tailgate.

Camera Coverage Zones



E141724

Item	Description
1	Front camera coverage zone
2	RH (right-hand) mirror camera coverage zone
3	Rear camera coverage zone
4	LH (left-hand) mirror camera coverage zone

Published: 01-May-2013

Parking Aid - Parking Aid - System Operation and Component Description

Description and Operation

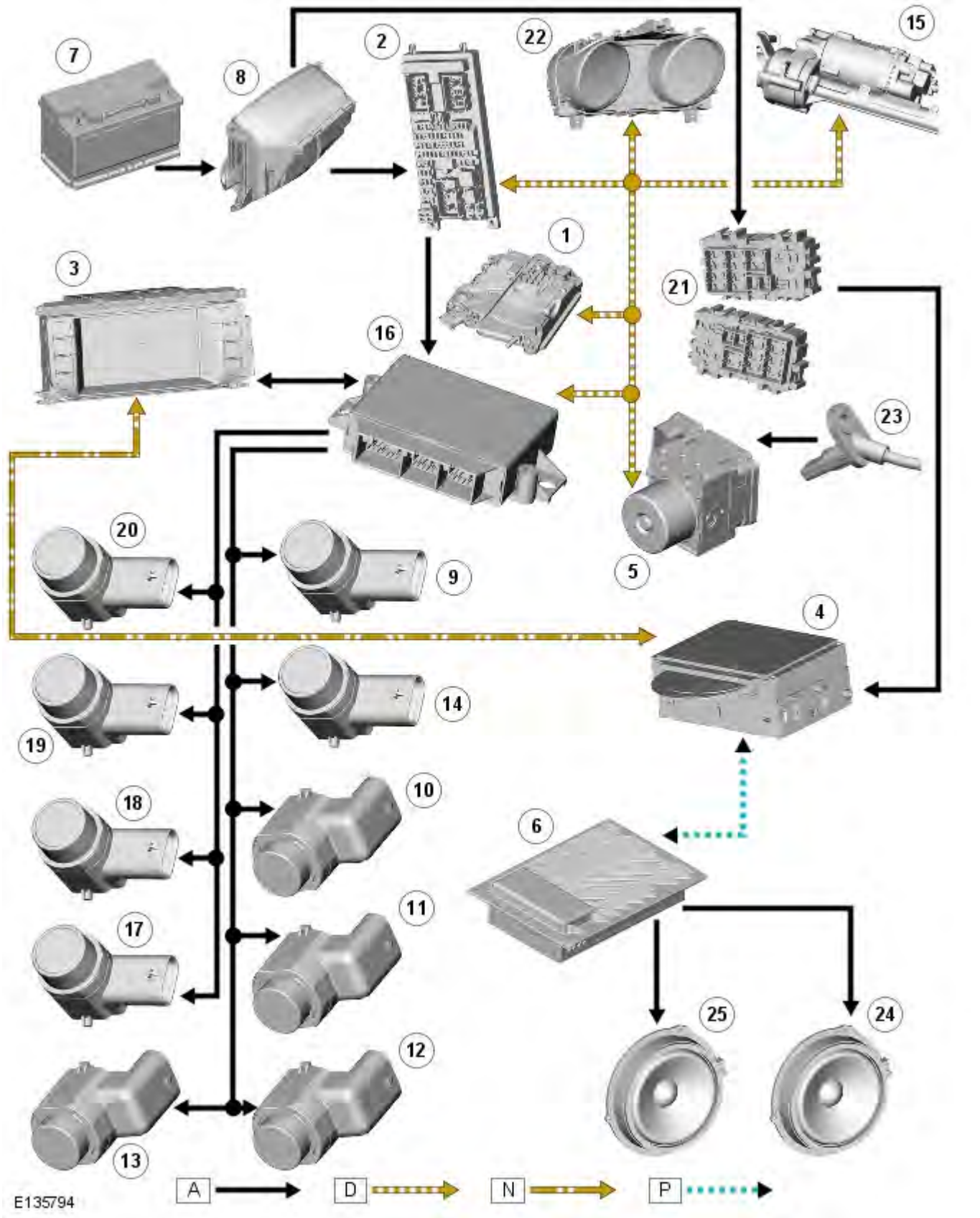
Control Diagram

NOTES:

A = Hardwired; **N** = Medium Speed CAN (controller area network) bus; **D** = High Speed CAN bus; **T** = Coaxial; **O** = LIN (local interconnect network) bus; **P** = Fibre Optic MOST; **AD** = NSTC; **AE** = LVDS;

Park assist is not available to all markets.

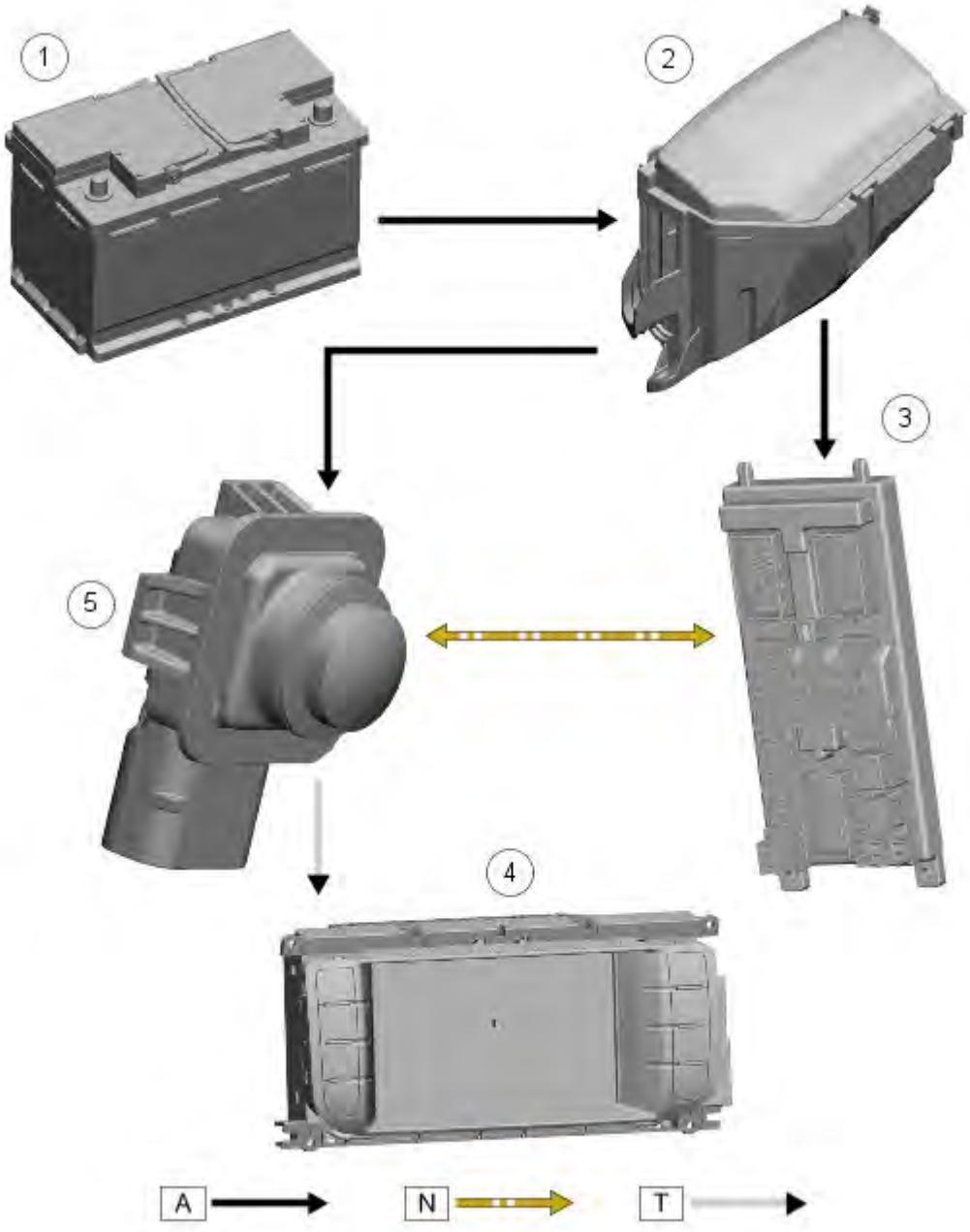
CONTROL DIAGRAM - SHEET 1 OF 3 - PARKING AID AND PARK ASSIST



Item	Description
1	TCM (transmission control module)
2	CJB (central junction box)
3	Integrated Control Panel (ICP)
4	Integrated Audio Module (IAM)
5	ABS (anti-lock brake system) module
6	Audio power amplifier (Hi-Line only) Refer to: Audio System (415-01 Information and Entertainment System, Description and Operation).
7	Battery

8	BJB (battery junction box)
9	LH (left-hand) side parking aid sensor
10	LH front outer parking aid sensor
11	LH front inner parking aid sensor
12	RH (right-hand) front inner parking aid sensor
13	RH front outer parking aid sensor
14	RHside parking aid sensor
15	Electric power assisted steering rack
16	Park distance control module
17	RH rear outer parking aid sensor
18	RH rear inner parking aid sensor
19	LH rear inner parking aid sensor
20	LH rear outer parking aid sensor
21	RJB (rear junction box)
22	Instrument cluster
23	Wheel speed sensors
24	Front audio speakers
25	Rear audio speakers

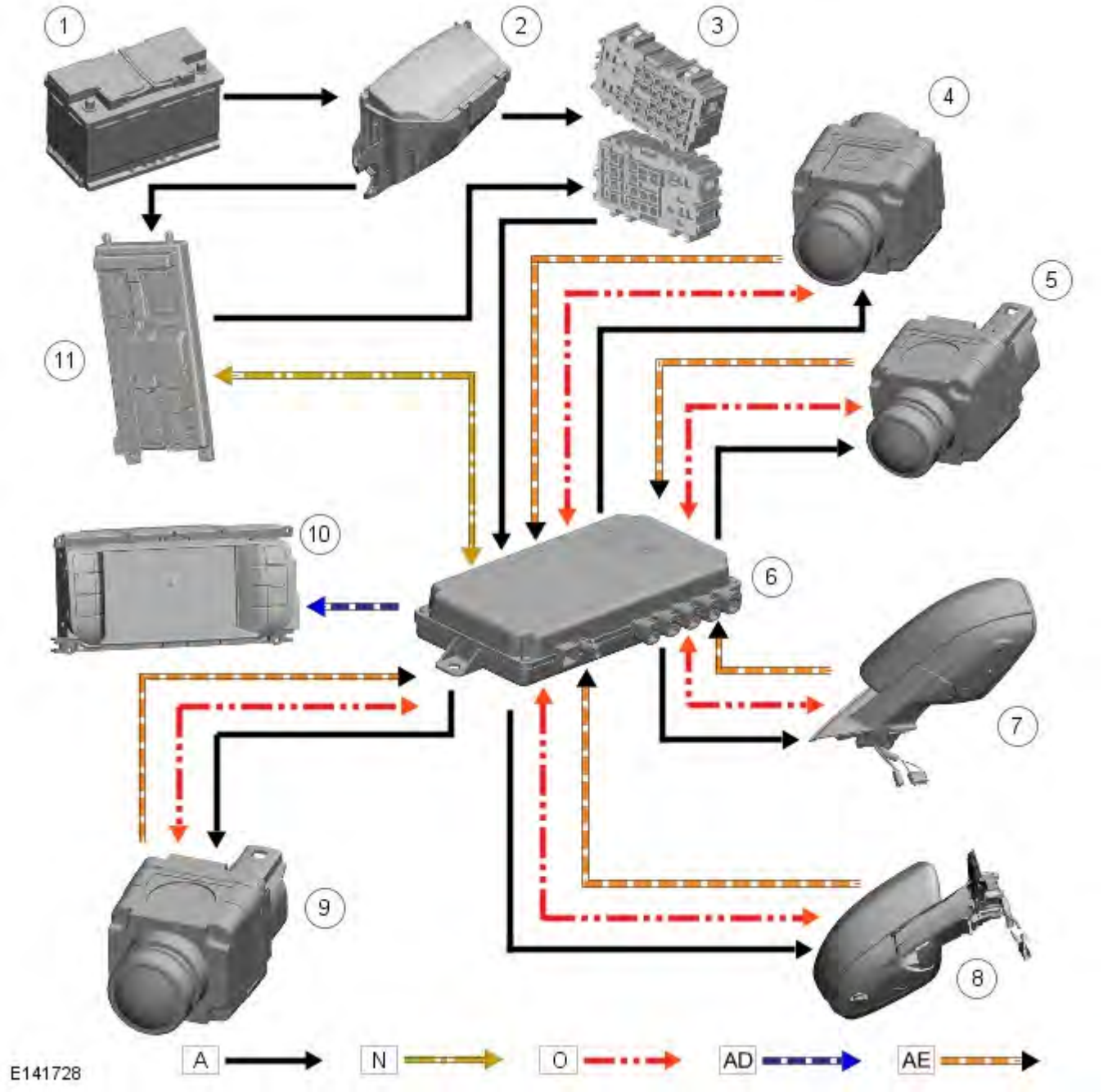
CONTROL DIAGRAM - SHEET 2 OF 3 - REAR VIEW CAMERA SYSTEM (LOW-LINE)



E141727

Item	Description
1	Battery
2	BJB
3	CJB
4	Touch Screen Display (TSD)
5	Rear view camera

CONTROL DIAGRAM - SHEET 3 OF 3 - PROXIMITY CAMERA SYSTEM (HI-LINE)



Item	Description
1	Battery
2	BJB
3	RJB
4	Front bumper camera
5	Front bumper camera
6	Proximity camera control module
7	Mirror camera
8	Mirror camera
9	Rear view camera
10	Touch Screen Display (TSD)

System Operation

PRINCIPLES OF OPERATION - PARKING AID

Vehicles Fitted With Automatic Transmission

If reverse ®) 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 parking aid sensors only 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).

Vehicles Fitted With Manual Transmission

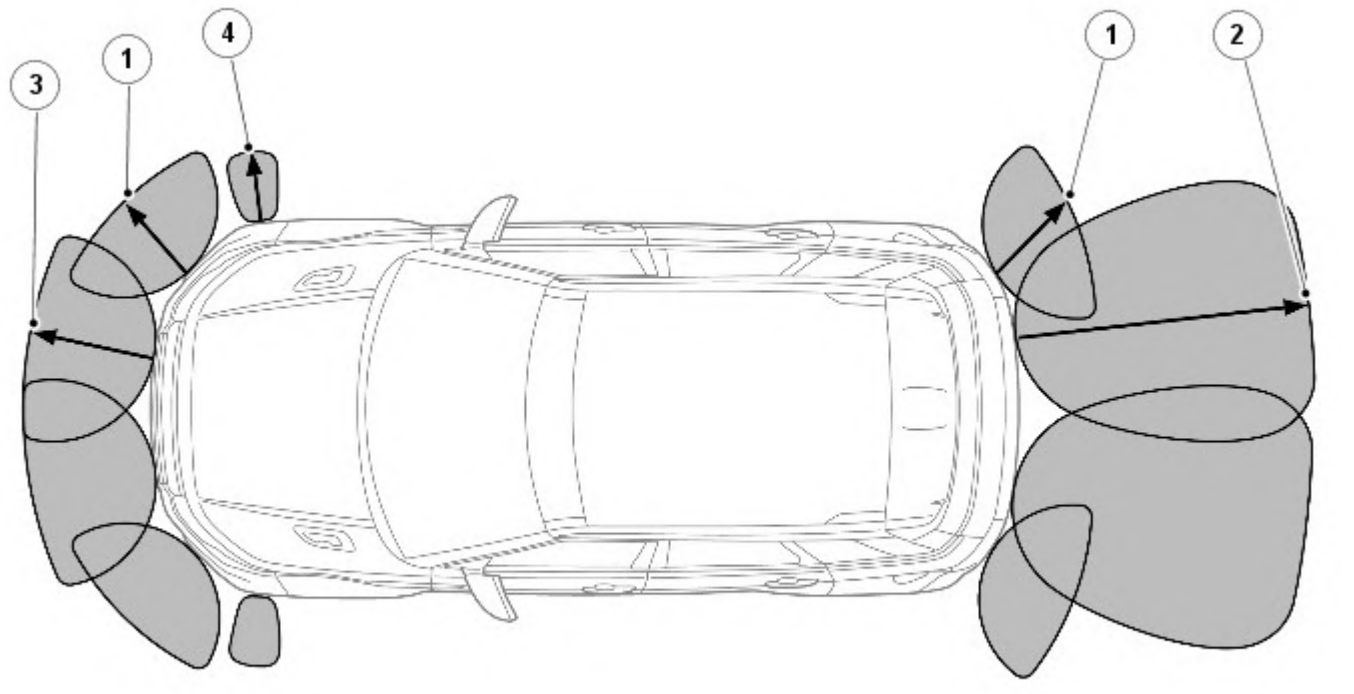
If reverse ®) is the first gear selected after the ignition is switched on, both the front (if fitted) and rear parking aid sensors will become operational. If a forward drive gear is subsequently selected, the front and rear parking aid sensors will remain operational until vehicle speed increases above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

If a forward gear 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.

Audible Warnings

The control module processes the distance readings from the ultrasonic parking aid sensors to determine if there are any objects within the detection areas. If there are no objects no audible warning will be emitted. If an object is detected, repeated audible warnings are emitted via the audio system speakers. The time delay between the audible warnings decreases as the distance between the detected object and the vehicle decreases until eventually a continuous tone is emitted from the audio system speakers.

Distance Calculation for Audible Warnings



E152250

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)
4	Front Side (If Fitted)	Approximately 400 mm (16 inches)	Approximately 300 mm (12 inches)

Detection Calculation

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 3 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 audio speakers.

The volume output of the parking aid audible tones can be adjusted using the audio volume control when the PDC is activated, the volume can also be adjusted from the home menu screen by selecting 'Setup', 'System' followed by 'Volume Presets' on the TSD. The volume can be adjusted using the + or - selections on the TSD.

The parking aid module receives a signal on the CAN from the CJB when a trailer is fitted. When this signal is detected, the parking aid module suspends operation of the rear PDC system.

NOTE: The ignition needs to be cycled once the trailer has been disconnected to activate the rear parking aid system.

Diagnostics

The control module has a diagnostic connection via the high speed CAN bus to enable faults to be retrieved using the Land Rover 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 front audio speakers when the ignition is switched on. The control switch LED will also flash 6 times when reverse gear is selected or the PDC switch is pressed.

PRINCIPLES OF OPERATION - PARK ASSIST

The park assist feature assists the driver to parallel park their vehicle. Once the system has identified a parking space using its ultrasonic sensors, it automatically steers the vehicle into place, the driver continues to brake, accelerate and select the correct gear. Informative graphics and messages are displayed in the instrument cluster message center, to guide the driver through each stage of the maneuver.

Vehicles with park assist have a separate switch to activate the system.

Park assist solely uses ultrasound sensors:

- Four sensors in the front bumper (park aid sensors)
- Two further sensors positioned on either side at the front of the vehicle to detect available spaces.
- Four sensors in the rear bumper (park aid sensors)

The park assist system is active when the following **input** conditions exist:

- The park assist switch is activated. The switch is illuminated by a amber LED (light emitting diode), powered by the PDC (park distance control) module. The switch is hardwired to the module
- The vehicle is travelling forwards below 18 mph (30 km/h). Vehicle speed information is sourced from directional wheel speed sensors via HS CAN communication from the ABS module to the PDC module.

The park assist sensors are hardwired to the PDC module. Scanned information is constantly transmitted to the module.

Once a parking space has been identified the PDC module calculates the parking trajectory, communicating **output** information to the following vehicle systems:

- The EPAS (electric power assisted steering) module via HS CAN. The trajectory calculations are processed by the EPAS module ready for the first stage of the parking maneuver. Once a vehicle speed signal is received (vehicle reversing) the EPAS module independently controls the steering trajectory.
- The instrument cluster message center via HS CAN. The message center displays the relevant park assist information/instructions to the driver
- The CJB via HS CAN which 'gateways' front and rear park aid sensor information to the Touch-screen via MS CAN. The Touchscreen 'gateways' the sensor information to the AAM (audio amplifier module) via the MOST ring. The audible warning tones are emitted through the audio system speakers.

Service Information

If the self check system fails the following warnings apply:

- The instrument cluster displays an error message
- The front audio system speakers will emit a 3 second continuous tone
- A DTC (diagnostic trouble code) is logged in the PDC module.

If a sensor failure is detected:

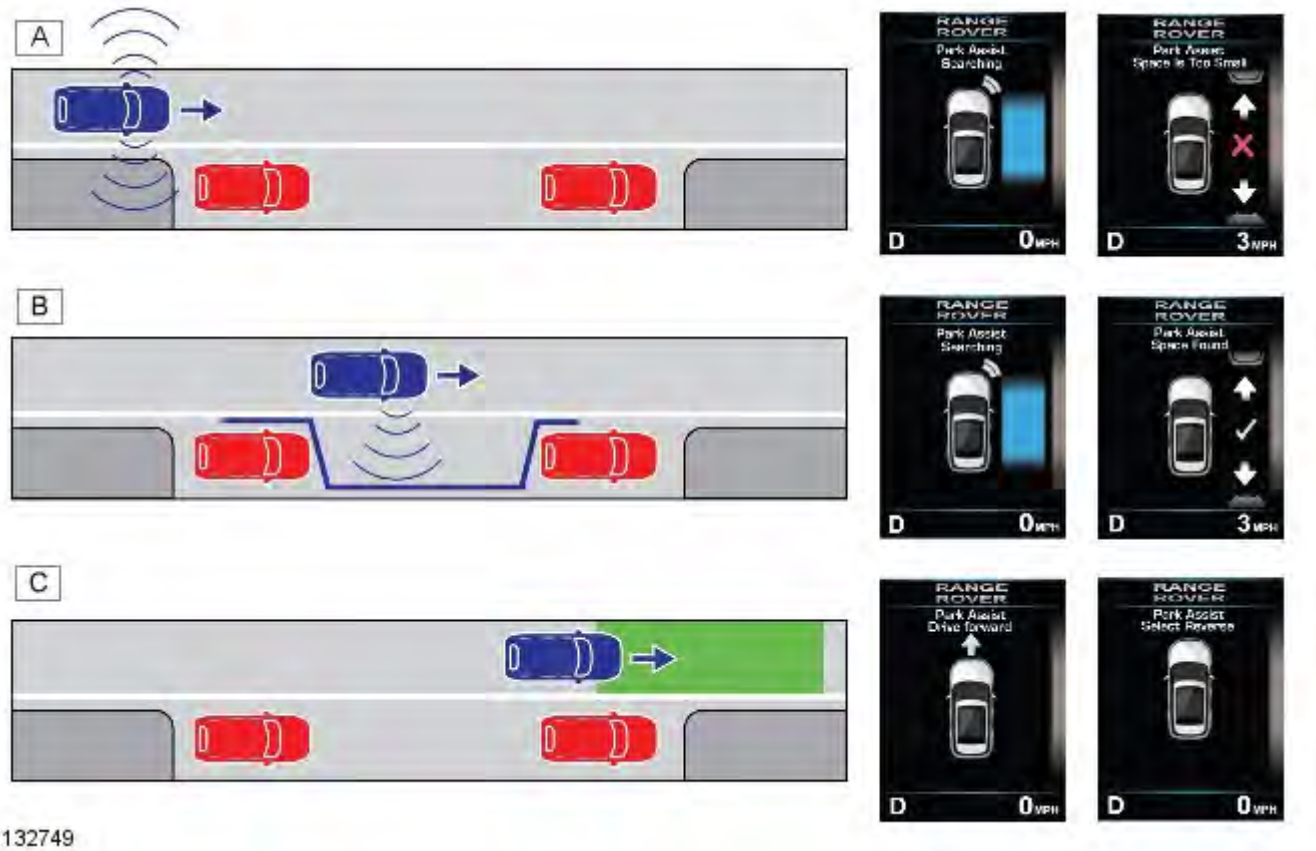
- The front audio system speakers will emit a 3 second continuous tone
- The instrument cluster displays an error message
- A DTC is logged in the PDC module.

Searching for a Parking Space

Once the driver has identified a possible parking space the park assist system carries out the following checks and procedures:

- The system constantly searches for a space on the passenger side of the vehicle. Space on the driver's side is searched via instruction from direction indicator operation.
- As the vehicle moves forward, parallel to a row of parked vehicles, it detects the parked vehicles.
- The system can detect a space up to four meters away from the side of vehicle. The system will only select a space which is 1.2 times the length of the vehicle (or greater) and deep enough to park the vehicle.
- When the vehicle detects a sufficient size parking space, the driver is instructed to stop the vehicle and select reverse gear.
- The system calculates the appropriate trajectory to park the vehicle into the detected space.

NOTE: If the driver is in slow moving traffic the system will be activated frequently when passing by other vehicles.



E132749

Item	Description
A	Park assist system activated searching for space
B	Park assist detects and measures space
C	Vehicle comes to end of space and stops ready for next state.

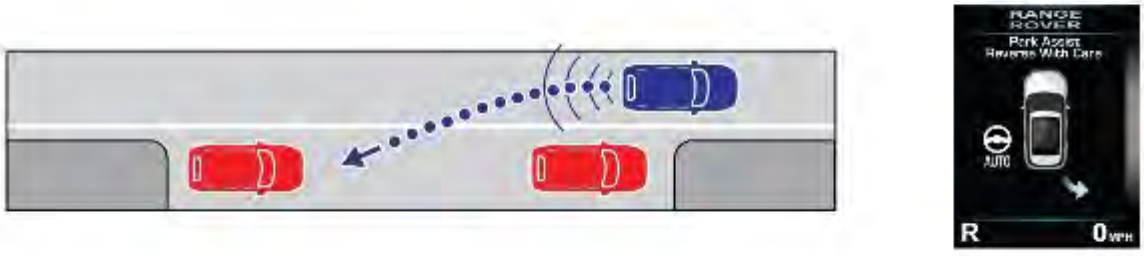
Reversing into Space

When reverse gear is selected the instrument cluster message center displays the appropriate parking instructions.

The following checks and procedures are applied:

- The driver follows message center instructions, moving the vehicle backwards along the trajectory calculated by the park assist system
- Detected obstacles at 0.9m generate an intermittent sound tone over the vehicle rear speakers

- Detected obstacles at 0.3m generate a constant sound tone over the vehicle rear speakers
- On reaching the end of the reversing maneuver the driver is instructed to apply the footbrake to stop the vehicle
- The driver selects a forward gear to prepare for the next stage of the parking maneuver
- If the vehicle has been parked in a large space the maneuver is complete and the system operation ends.



E135456

Driving Forward within Space

If the vehicle is not in the correct position after the initial reversing maneuver, the driver is instructed to select a forward gear.

When the forward gear is selected, the instrument cluster message center displays the appropriate parking instructions.

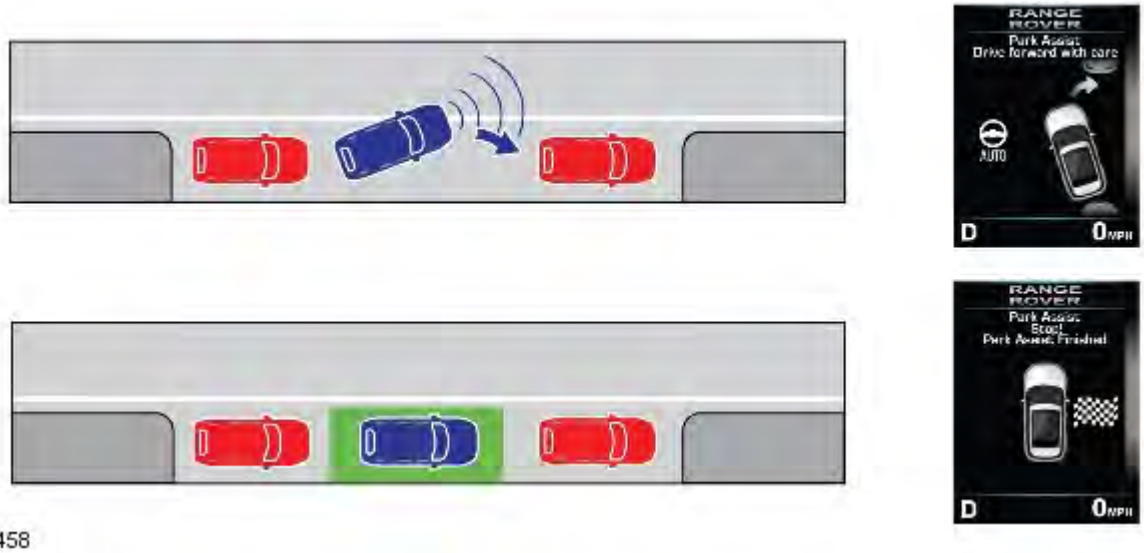
The following checks and procedures are applied:

- The driver follows message center instructions, moving the vehicle forwards along the trajectory calculated by the park assist system
- Detected obstacles at 0.4m generate an intermittent sound tone over the vehicle front speakers
- Detected obstacles at 0.3m generate a constant sound tone over the vehicle front speakers
- On reaching the end of the forward maneuver the driver is instructed to apply the footbrake to stop the vehicle
- The driver selects reverse gear to prepare for the next stage of the parking maneuver
- If the vehicle is in the final position the maneuver is complete and the system operation ends.

E135457

If the vehicle is parking in a smaller space more shuffling may be required to complete the parking maneuver.

Driver selects forward gear - further shuffling is completed



E135458

Completion of Parking

Once the system has detected the vehicle is parked in the final position the message center informs the driver the park assist function is complete. The driver selects neutral/park gear position and switches off the engine.

The park assist system is configured to operate a maximum of seven maneuvers, with each movement counting as one maneuver. This is more than adequate as most park assist maneuvers are complete and the vehicle is in the final parking position within four reverse and forward movements.

PRINCIPLES OF OPERATION - CAMERA SYSTEM

Lo-Line Camera System

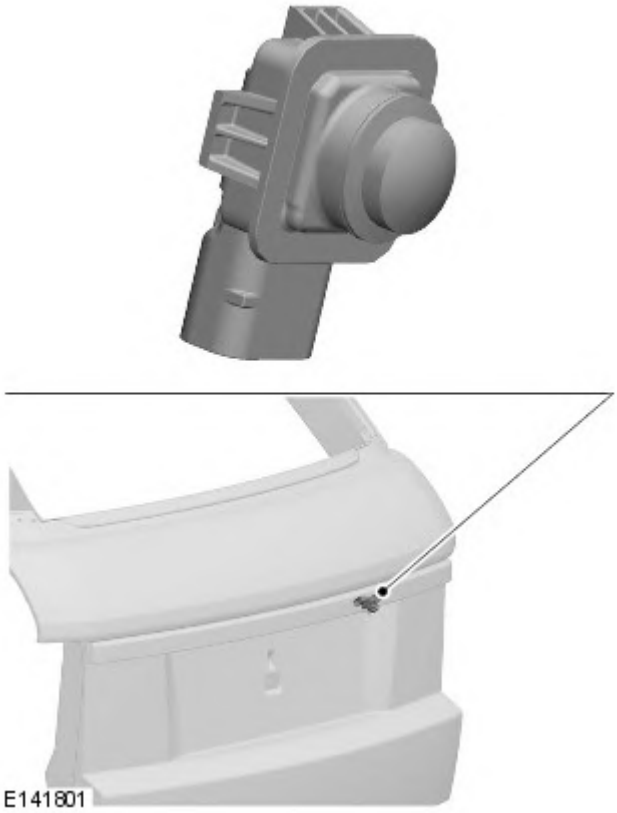
A shielded co-axial cable connection between the camera and the Touch Screen Display (TSD) is used for the video image transmission.

The camera receives power at all times when the ignition is in power mode 6 or 7. When reverse is selected, the camera then sends a message to entertainment system requesting for the image to be displayed on the TSD.

When reverse gear is deselected, the camera image remains on the TSD for 5 seconds after the transmission has been put into drive 'D', 'P', 'N', or 'S'. 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 5 second period, the camera image is removed from the TSD.

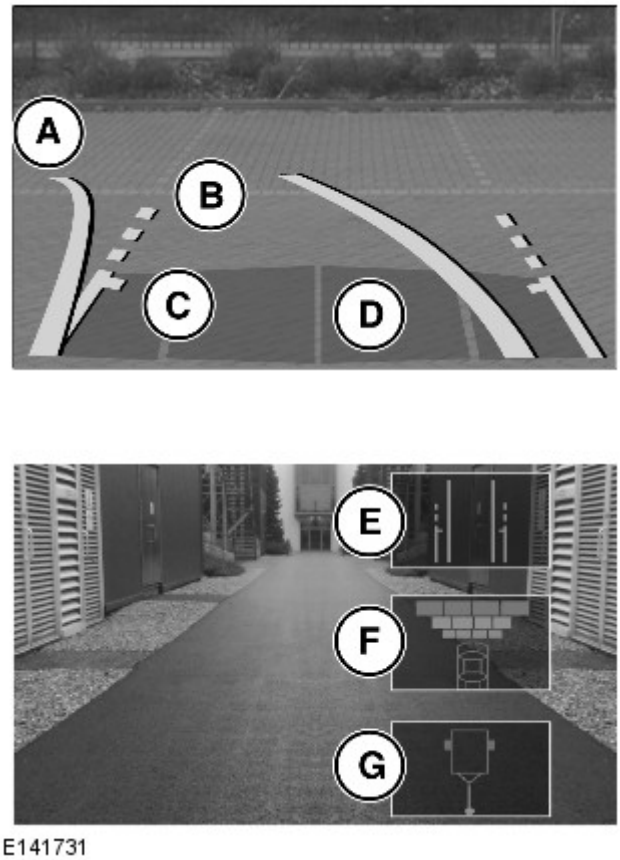
If the TSD display is switched off, the camera image will be automatically displayed when reverse gear is selected. When reverse gear is deselected and the 5 second period has expired, the TSD will revert back to its switched off state.

Lo-Line Rear View Camera



The rear view camera provides additional information to the driver when reversing the vehicle. When reverse gear is selected the camera integrated into the tailgate handle, automatically displays a wide-angle color image of the view from the rear of the vehicle onto the TSD.

Overlay graphics are displayed by a combination of signals received on the medium speed CAN to the TSD.



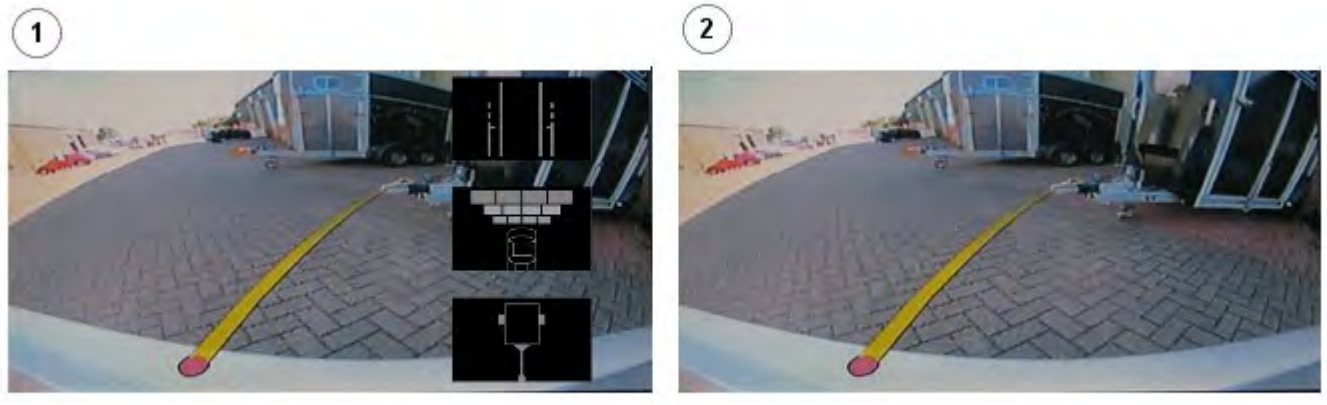
Item	Description
A	Solid line: The projected path based on current steering wheel position.

B	Dotted line: The safe working width of the vehicle (including exterior mirrors).
C	Tailgate access guideline: Do not reverse beyond this point if tailgate access is required.
D	Parking sensor activation: A colored area appears, to indicate which rear sensor(s) has been activated.
E	User option. Touch to enable/disable A, B & C.
F	User option. Touch to enable/disable D.
G	User option. Touch to enable/disable Hitch Assist guidance lines.

Tow Hitch Assist

The rear view camera provides additional information to the driver when hitching a trailer to the vehicle. When reverse gear is selected the camera integrated into the tailgate handle assembly, automatically displays a wide-angle color image of the view from the rear of the vehicle onto the TSD (touch screen display).

Within the settings menu the driver can activate the Hitch Guidance feature. Hitch guidance provides a trajectory line indicating the path of the towball in relation to the steering angle applied to the vehicle.



E152127

Item	Description
1	Touch Screen Display – Rear view menu screen
2	Tow ball trajectory line

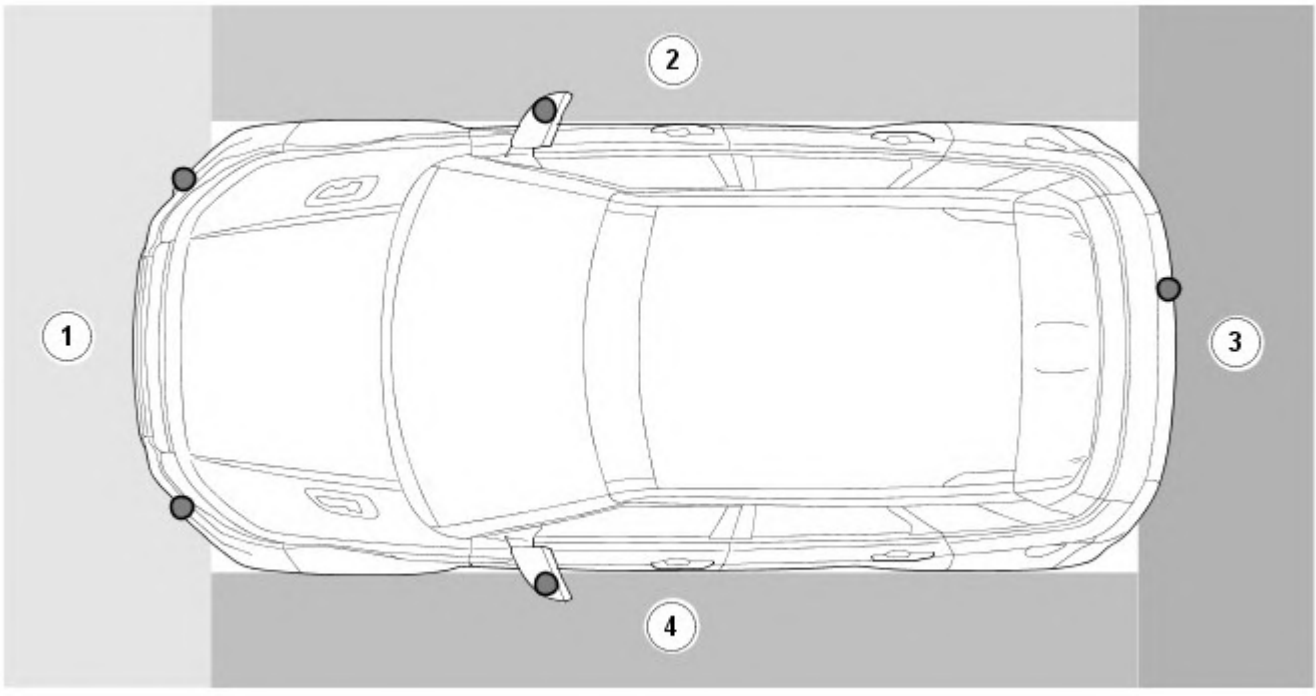
Hi-Line Camera System

The proximity camera system provides the driver with a visual-aid when maneuvering the vehicle at low speeds. The system uses a dedicated control module to capture the camera data and display the resulting images on the TSD (Touch Screen Display), providing the driver with a 360° view around the vehicle. The camera system is also supported by various driving-aid features where graphical information and warnings are superimposed onto the images displayed on the TSD.

The proximity camera system uses five VGA (Video Graphic Array) resolution cameras:

- two mounted in the front bumper
- one mounted in each door mirror
- one mounted in the rear tailgate handle assembly.

Camera Coverage Zones



E152128

Item	Description
1	Front camera coverage zone
2	Right-hand mirror camera coverage zone
3	Rear camera coverage zone
4	Left-hand mirror camera coverage zone

Automatic Operation

- Once the vehicle speed exceeds 18 km/h (11 mile/h) the images will automatically switch off.
- Once automatically switched off, the camera view will be disabled until:
- another ignition cycle occurs and the system is automatically functioned, or
- the camera system is manually selected on the Touch Screen Display (TSD)
- the vehicle speed reduces under 18km/h.
- With the ignition ‘on’ and ‘Reverse’ selected, the camera system will display the view from the rear of the vehicle.

Manual Operation

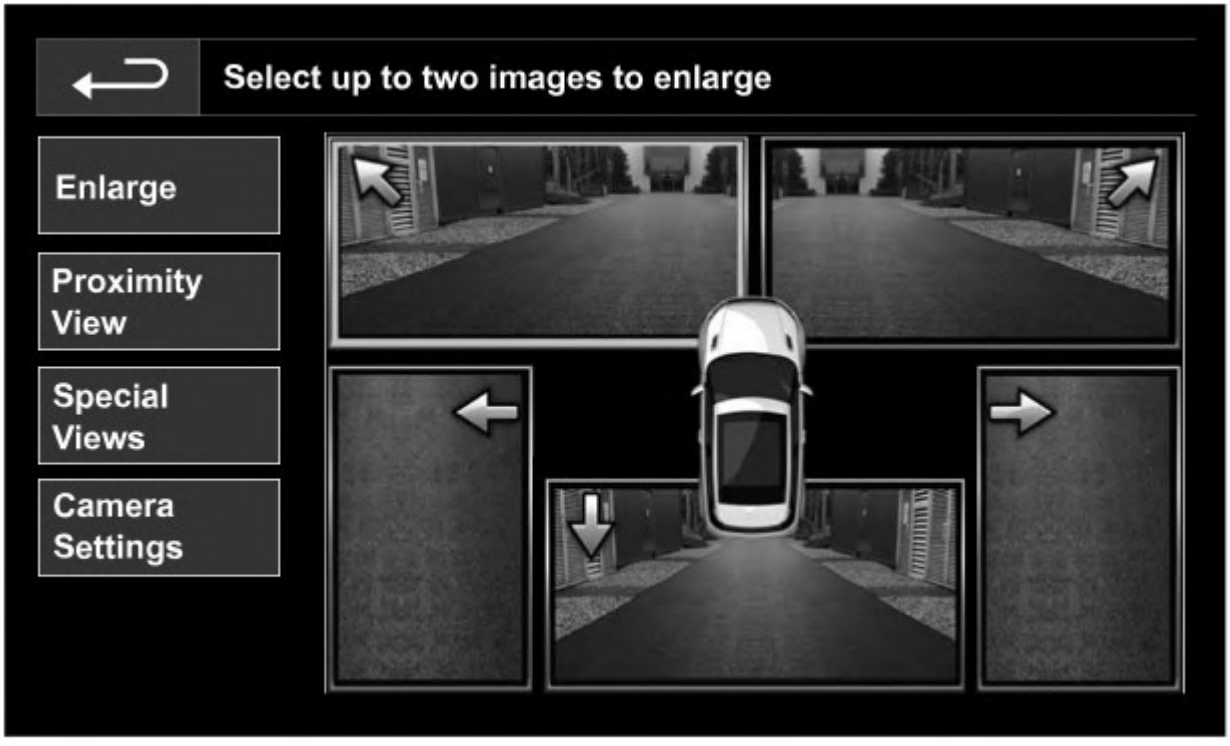
- The camera home page is accessed using the ‘Cameras’ icon on the ‘Navigation’ home screen on the TSD or via the ‘Extra Features’ menu.
- Camera views can be accessed at all times.

Selecting Views

NOTES:

Camera settings soft key is only visible on Japanese specification vehicles.

Camera home screen frame rate is reduced to 15 frames per second, all other camera views are shown at 30 frames per second.



E141729

- Displayed on the home page are real-time images transmitted from each of the five cameras.
- Any two of the images can be selected and enlarged to view side-by-side on the screen.
- When viewing any two images, any single image can then be selected to view as a full screen image which can be zoomed and panned around using the magnifier and arrow icons.

Manual Proximity View

- Selecting proximity view from the camera home screen will display a combination of three images from the front passenger side cameras. These images provide the driver with an enhanced view of the area forward and opposite the driver.

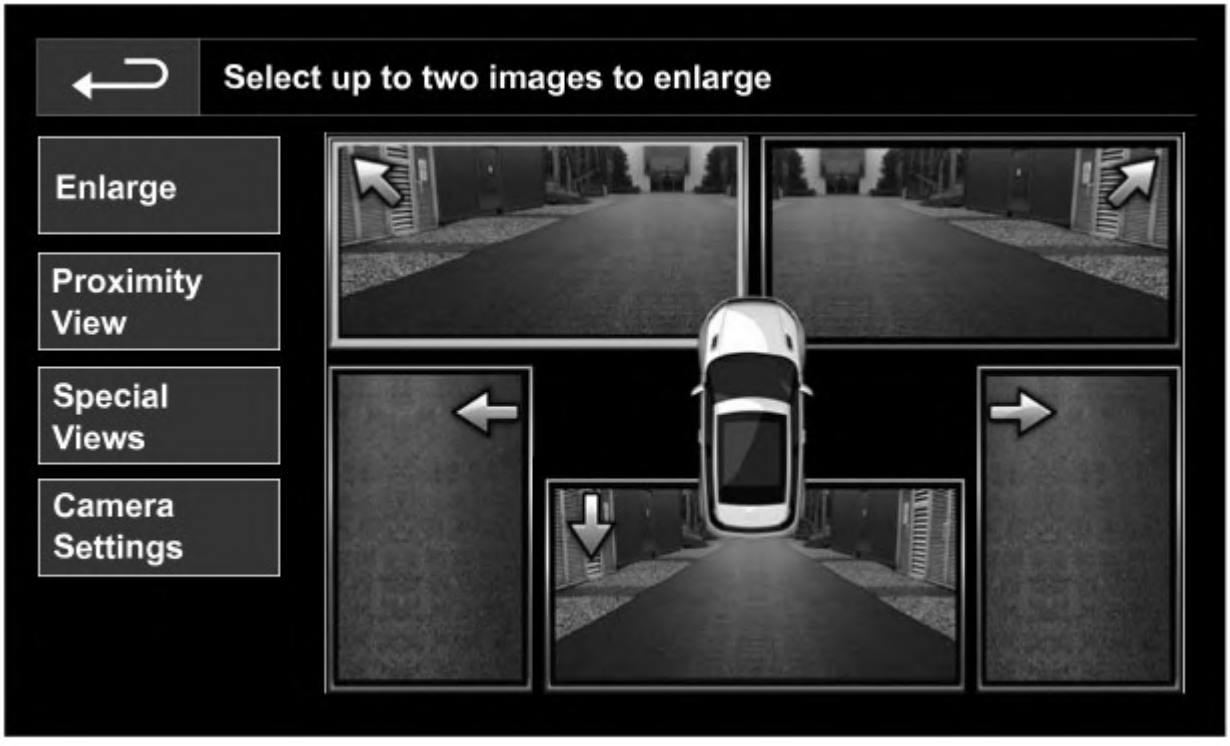
Automatic Operation

- Once the vehicle speed exceeds 18 km/h (11 mile/h) the images will automatically switch off.
- Once automatically switched off, the camera view will be disabled until:
- another ignition cycle occurs and the system is automatically functioned, or
- the camera system is manually selected on the Touch Screen Display (TSD)
- the vehicle speed reduces under 18km/h.
- With the ignition ‘on’ and ‘Reverse’ selected, the camera system will display the view from the rear of the vehicle.

Manual Operation

- The camera home page is accessed using the ‘Cameras’ icon on the ‘Navigation’ home screen on the TSD or via the ‘Extra Features’ menu.
- Camera views can be accessed at all times.

Selecting Views



E141729

- Displayed on the home page are real-time images transmitted from each of the five cameras.
- Any two of the images can be selected and enlarged to view side-by-side on the screen.
- When viewing any two images, any single image can then be selected to view as a full screen image which can be zoomed and panned around using the magnifier and arrow icons.

Manual Proximity View

- Selecting proximity view from the camera home screen will display a combination of three images from the front passenger side cameras. These images provide the driver with an enhanced view of the area forward and opposite the driver.

Hi-Line Rear View Camera

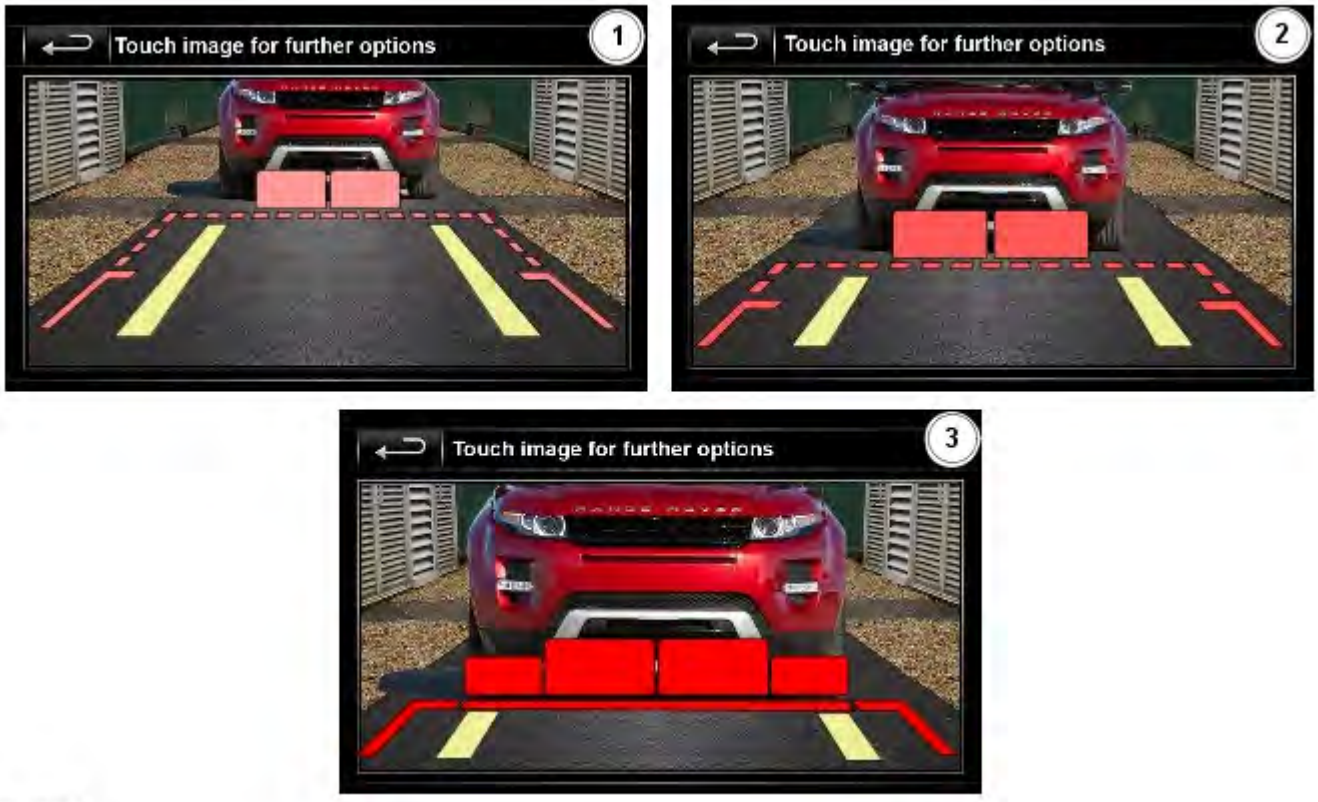
The rear view camera provides additional information to the driver when reversing the vehicle. When reverse gear is selected the camera integrated into the tailgate handle assembly, automatically displays a wide-angle color image of the view from the rear of the vehicle onto the TSD.

The rear view images are overlaid with:

- Dashed lines representing the perimeter of the vehicle.
- Solid lines representing the predicted trajectory of the vehicle; calculated from the steering wheel angle sensor.
- Colored bars represent the amount of distance between the vehicle and the object being approached. Working in conjunction with the standard ‘rear parking aid’ this adds a visual representation to the existing audible warning. The distance data is received from the parking aid module via the medium speed CAN.

The reversing-aid graphics can be disabled in the settings menu or by touching the TSD whilst reverse gear is selected and the camera view is displayed.

Reversing Visual Warnings



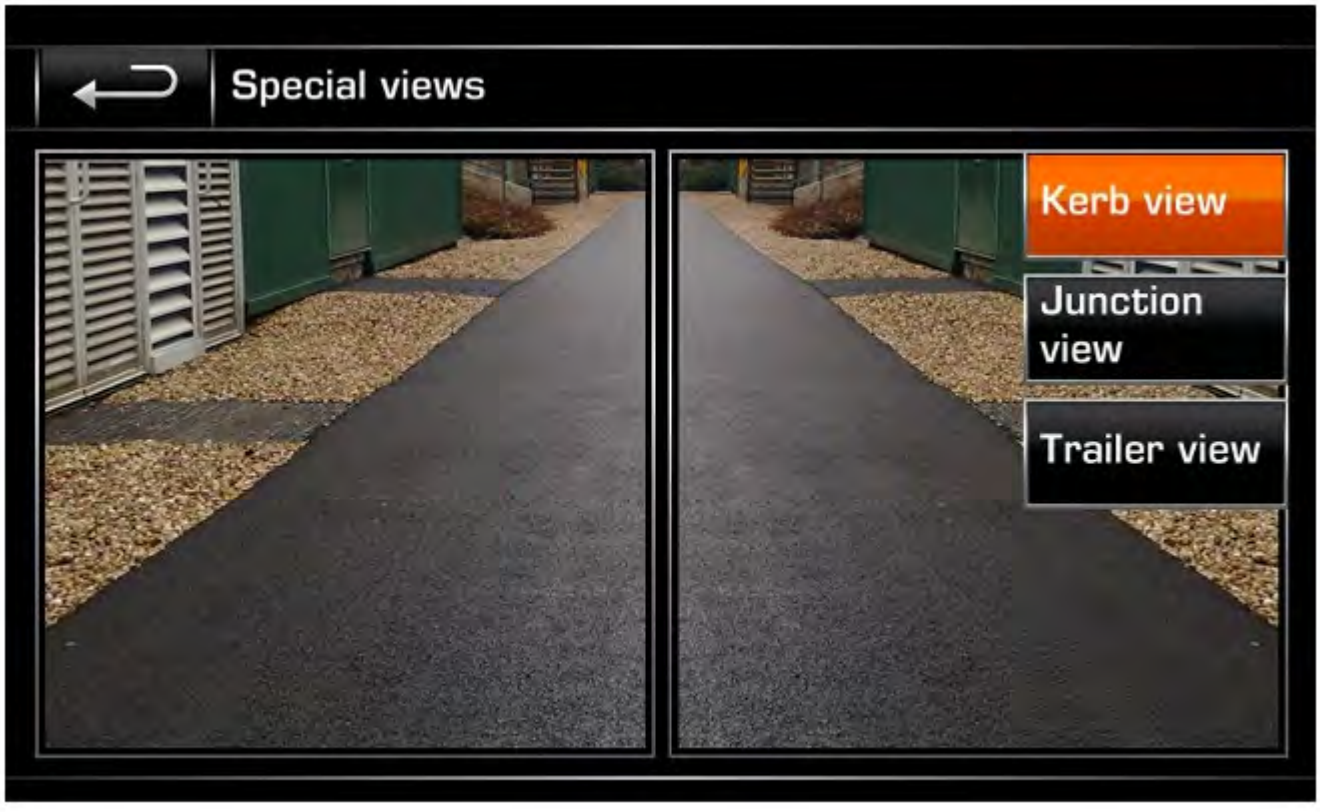
E148937

Item	Description
1	Object being approached - ‘yellow strip’ with steady intermittent warning tone
2	Object being approached - ‘orange strip’ with faster intermittent warning tone
3	Object being approached - ‘red strip’ with continuous warning tone

The rear view image will not be displayed when any of the following apply:

- Drive is selected for longer than 5 seconds.
- Drive is selected and the vehicle speed is greater than 18 km/h (11 mile/h).

Special Views



E148971

The special views are a selection of pre-set views that provide the driver with some useful driving aids. These can be considered as a shortcut to some pre-determined images that have been developed to assist the driver in various situations:

- Curb view: downward view from the two door mirror cameras.
- Junction view: outward view from the two front cameras.
- Trailer view: rear camera view of trailer being towed.

System Calibration

This level of accuracy must be maintained after any service procedures are performed on the vehicle that affects the proximity camera system. Should the control module or any one of the cameras require replacement, static re-calibration must be carried out using the approved Land Rover diagnostic equipment.

Camera replacement is detected by the proximity camera control module, through the recognition of a new serial number during the ‘camera count’ procedure that takes place during the ‘ignition on’ phase via the LIN.

If a new camera is installed calibration must be performed using the diagnostic equipment and the vehicle’s TSD (touch screen display). During the calibration procedure, setup software in the control module overlays fine colored lines on the TSD highlighting reference points on the bodywork. For example, the mirror camera image must capture the side repeater indicator, the shut-line of the doors and the lower sill trim.

Direction arrows are pressed to shift the image in the desired direction to meet the reference points viewed on the TSD.

Adjustments include:

- Up
- Down
- Left
- Right
- Rotation

When the reference points correspond exactly, the setting is saved and the calibration procedure is complete for that camera.

NOTE: If body repairs are performed that affect the camera system, a calibration procedure must be executed after the repairs are completed.

System Fault

In the event of camera fault, a DTC is logged in the proximity camera control module and an icon is presented to the driver on the TSD (touch screen display) where the camera image would normally be viewed.

Tow Hitch Assist

The rear view camera provides additional information to the driver when hitching a trailer to the vehicle. When reverse

gear is selected the camera integrated into the tailgate handle assembly, automatically displays a wide-angle color image of the view from the rear of the vehicle onto the TSD (touch screen display).

Within the settings menu the driver can activate the Hitch Guidance and Auto-towball Zoom feature. Hitch guidance provides a trajectory line indicating the path of the towball in relation to the steering angle applied to the vehicle. 'Auto-towball Zoom' initiates an automatic image zoom when the trailer is within 60cm of the towball to allow more accurate alignment of vehicle to trailer.

Item	Description
1	Touch Screen Display – Auto towball Zoom feature
2	Tow ball trajectory line
3	Automatic zoom

Tow Assist

Tow Assist aids the driver with the reversing of a trailer by displaying information on the TSD (touch screen display).

The system uses a tracking target sticker attached to the trailer to monitor and predict the direction of the trailer. Calculations are made by the proximity camera control module, based on the relationship of angles between the vehicle and trailer and the current steering wheel position.

Tow Assist becomes active when a trailer is attached to the vehicle and the trailer electrical plug is attached to the vehicle socket. The CJB detects the connection has been made and sends a message via the medium speed CAN to the proximity camera control module.

NOTE: If the connection is not detected, setup can be manually prompted by touching the 'Tow Assist' icon on the 'Camera' home screen.

Tow Assist – New Trailer

When the CJB detects the trailer electrical plug has been connected, the trailer setup screen is displayed automatically on the TSD with the question: 'Has a trailer been connected?'

Selecting 'Yes' will bring up the first of a number of trailer setup screens. On first use the setup screens take the user through a series of configuration options for the connected trailer. To configure a new trailer select 'Add New' and then 'OK'.

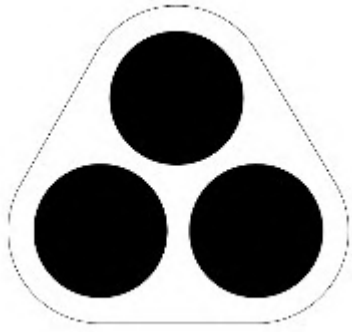
Trailer Setup – Step 1 of 6

- Choose from the list of generic trailer descriptive names for the trailer attached, then select 'Next'.

Trailer Setup – Step 2 of 6

- Position the trailer straight behind the vehicle, to allow more accurate positioning of the target. Stick the self adhesive tracking target to the front of the trailer within the orange highlighted zone displayed, then select 'Next'.
- The highlighted zone will turn green when the target sticker is correctly positioned.

Tracking target sticker



E125745

Trailer Setup – Step 3 of 6

- Select the correct number of axles for the chosen trailer, then select ‘Next’.

Trailer Setup – Step 4 of 6

- Select the preferred camera view for use with this trailer, then select ‘Next’.

NOTE: The Side Cameras view is more suited to tall and/or long trailers for example caravans. The Reverse Camera view is more suited to small and/or short trailers.

Trailer Setup – Step 5 of 6

- Using the numeric pad, enter the Hitch Length of the trailer, then select ‘Next’.

NOTE: Hitch Length is the distance from the hitch point to the pivot point of the trailer. The pivot point will vary depending on the number of axles, and will be:

- the center-line of the axle on a single axle trailer,
- the mid-point between the axles on a twin axle trailer,
- the center line of the center axle on a triple axle trailer.

Trailer Setup – Step 6 of 6

- Using the distance adjustment buttons, set the orange overlay graphics at the width of the trailer wheels and then select ‘Finish’.

NOTE: The orange overlay graphics determine the position of the trailer reverse guidance lines.

A confirmation message will appear to show that the trailer information has been retained.

Finally, highlight the trailer that has been memorized, and select ‘OK’.

NOTE: In order to learn the central position of the trailer, the vehicle must be driven forwards at less than 15mph with the steering wheel in the straight-ahead position. There is currently no confirmation for when this process has completed, however the status can be derived by selecting Reverse gear and noting the presence of message 'Trailer tracking in progress'. Whilst tracking feature is learning the central position, the trailer trajectory lines will appear in a light blue color, when process is complete they will change to a dark purple color.

The Tow Assist feature is now ready to use.

Tow Assist – Previously Saved Trailer

When the CJB detects the trailer electrical plug has been connected, the trailer setup screen is displayed automatically on the TSD with the question: ‘Has a trailer been connected?’

Selecting ‘Yes’ from the previous screen brings a list of pre-set, or previously saved, trailers. Highlight the required trailer, and select ‘OK’.

NOTE: In order to learn the central position of the trailer, the vehicle must be driven forwards at less than 15mph with the steering wheel in the straight-ahead position. There is currently no confirmation for when this process has completed, however the status can be derived by selecting Reverse gear and noting the presence of message 'Trailer tracking in progress'. Whilst tracking feature is learning the central position, the trailer trajectory lines will appear in a light blue color, when process is complete they will change to a dark purple color.

The Tow Assist feature is now ready to use.

Component Description

Parking Aid Module

E117295

The parking aid module is located on the LH side of the luggage compartment, behind the 'C' pillar trim panel.

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.

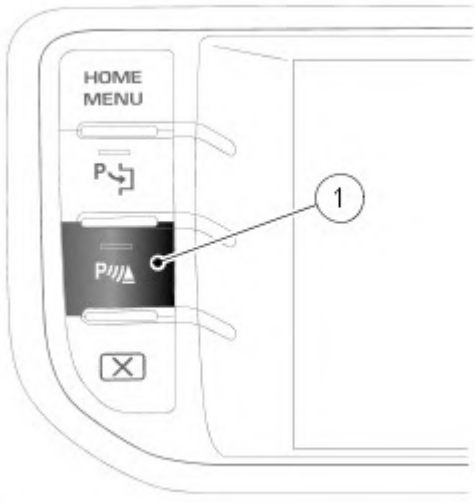
The high speed CAN bus connections provide for the receipt of the following information from other systems:

- ABS module - Road speed signal
- TCM - Reverse gear engaged signal

The module also outputs messages on the medium speed CAN bus which are received by the Integrated Control Panel (ICP). The ICP processes these messages and converts them into medium speed CAN messages which are passed to the integrated audio module that converts them into Media Orientated System Transport (MOST) signals system. 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 high speed CAN bus to enable faults to be retrieved using the Land Rover 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 front audio speakers when the ignition is switched on. The control switch LED will also flash 6 times when reverse gear is selected or the PDC switch is pressed.

Parking Aid Switch



E135793

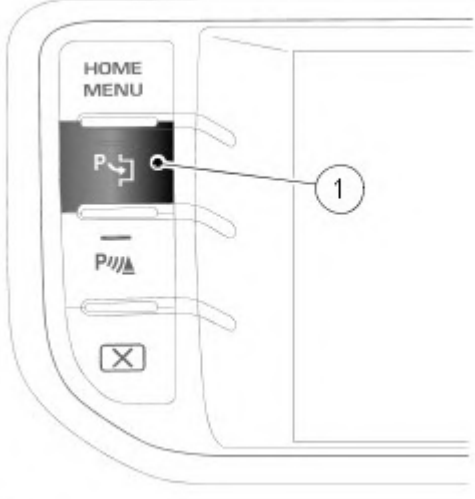
Item	Description
1	Parking aid switch

The parking aid switch is located in the instrument panel switch pack.

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.

Park Assist Switch



E136341

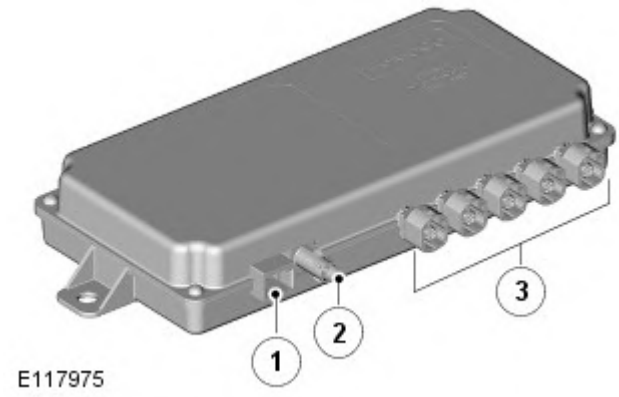
Item	Description
1	Park assist switch

The park assit switch is located in the instrument panel switch pack.

The switch is a non-latching push switch which allows the driver to select the park assist system on or off. When pressed, the switch momentarily connects a ground to the parking aid module. The LED indicates when the park assist system is active. The LED is controlled by the parking aid module.

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

Proximity Camera Control Module



Item	Description
1	Power supply, ground and BUS connector
2	Connection to touch screen display
3	Five camera connections

The proximity camera control module is located under the left-hand-front seat; connections to the module include:

- medium speed CAN network
- five camera inputs
- video signal output to the TSD
- power supply and ground.

The control module gathers the camera images and analyses and alters them by adjusting perspectives and applying corrections. The resulting processed images are then relayed to the touch screen display via the NTSC (National Television System Committee) analogue video line.

The control module also adds guidance and warning overlays to the camera images to create the various driving-aid features supported by the camera proximity system; for example, visual direction is made available when reversing the vehicle.

The module communicates with each individual camera via the LIN bus connection. This data link transmits diagnostic information, for example camera serial numbers and fault notifications to the control module. Camera adjustments, for instance a correction to color-balance are also communicated via the LIN bus link to the camera.

In addition to the data lines the camera receives a power supply and a ground from the control module.

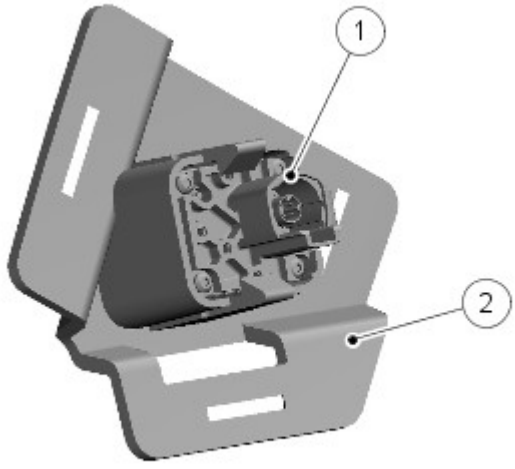
NOTE: Care must be taken when routing, disconnecting and reconnecting the camera harnesses.

Cameras

The system uses five VGA resolution cameras, permanently powered whenever the ignition is 'on'. Each camera provides an image covering a zone approximately 130° wide by 112° deep and is capable of capturing approximately thirty frames per second.

NOTE: Reversing lights are crucial to successful night operation of the rear view camera.

Camera mounting



E141726

Item	Description
1	Camera
2	Camera ‘break free’ bracket

To reduce the cost of accident repair the mounting of the front bumper cameras feature a ‘snap free’ bracket. On impact, the bracket will release the camera preventing damage to the camera itself. Depending on the severity of the accident it may also be possible to reuse the brackets as they are manufactured from a memory type plastic.

The front cameras are not ‘handed’ so therefore interchangeable. This is also applicable for the door-mirror cameras, although these cameras do feature the approach lighting LED integral within the camera body.

The positioning accuracy of all the cameras is crucial for the successful operation of the proximity camera system. The camera housings are manufactured using metal to maintain a structural stability in high-ambient temperatures. Without this stability a loss of image focus would be a possibility, therefore care must be taken when mounting the cameras in ensuring they sit correctly into their locations. Secure mounting of the cameras provides an initial ‘build up’ tolerance accurate to 2 mm. In the event of camera replacement, a calibration routine must be performed.

Published: 05-Mar-2013

Parking Aid - Front Inner Parking Aid Sensor

Removal and Installation

Removal

CAUTION: LH illustration shown, RH is similar.

NOTES:

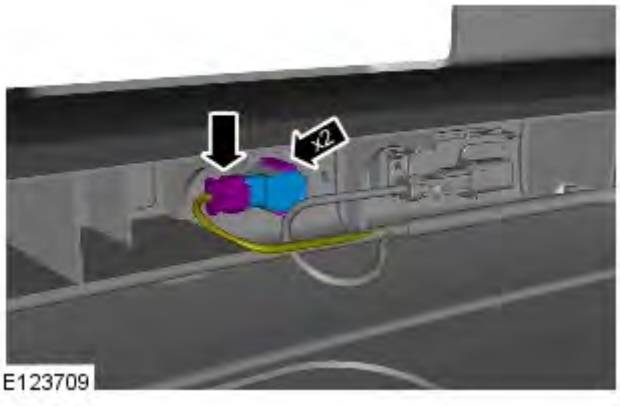
Removal steps in this procedure may contain installation details.

The ignition must be switched off.

1. WARNING: Make sure to support the vehicle with axle stands.

   Raise and support the vehicle.

2. Refer to: Front Bumper Cover (501-19 Bumpers, Removal and Installation).

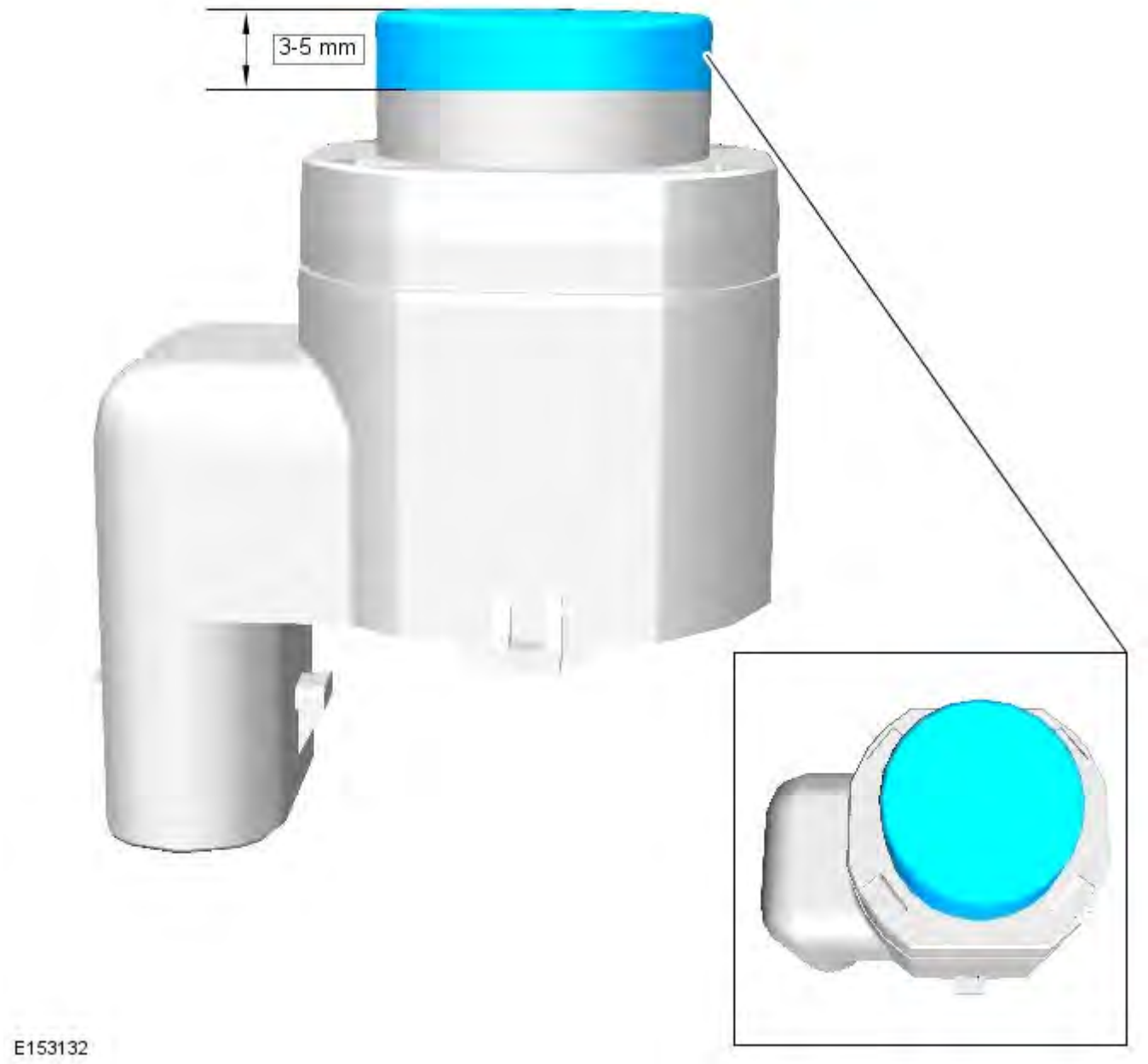


3. NOTE: Some variation in the illustrations may occur, but the essential information is always correct.

Installation

1. CAUTION: If a new sensor is installed, make sure that the area illustrated is the **only** area painted. Failure to follow this instruction may result in the component malfunctioning.

   NOTE: On vehicles that are equipped with black or unpainted bumpers, the sensor(s) do not require painting.



2. To install, reverse the removal procedure.

Published: 05-Mar-2013

Parking Aid - Front Outer Parking Aid Sensor

Removal and Installation

Removal

CAUTION: LH illustration shown, RH is similar.

NOTES:

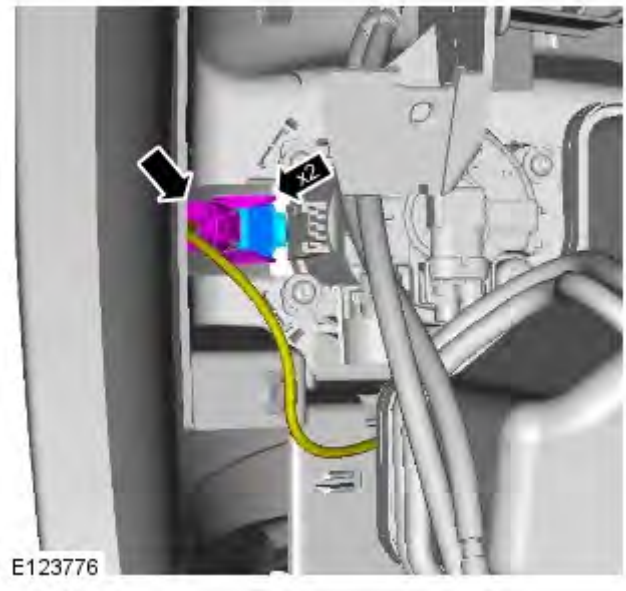
Removal steps in this procedure may contain installation details.

The ignition must be switched off.

1. WARNING: Make sure to support the vehicle with axle stands.

   Raise and support the vehicle.

2. Refer to: Fender Splash Shield (501-02 Front End Body Panels, Removal and Installation).

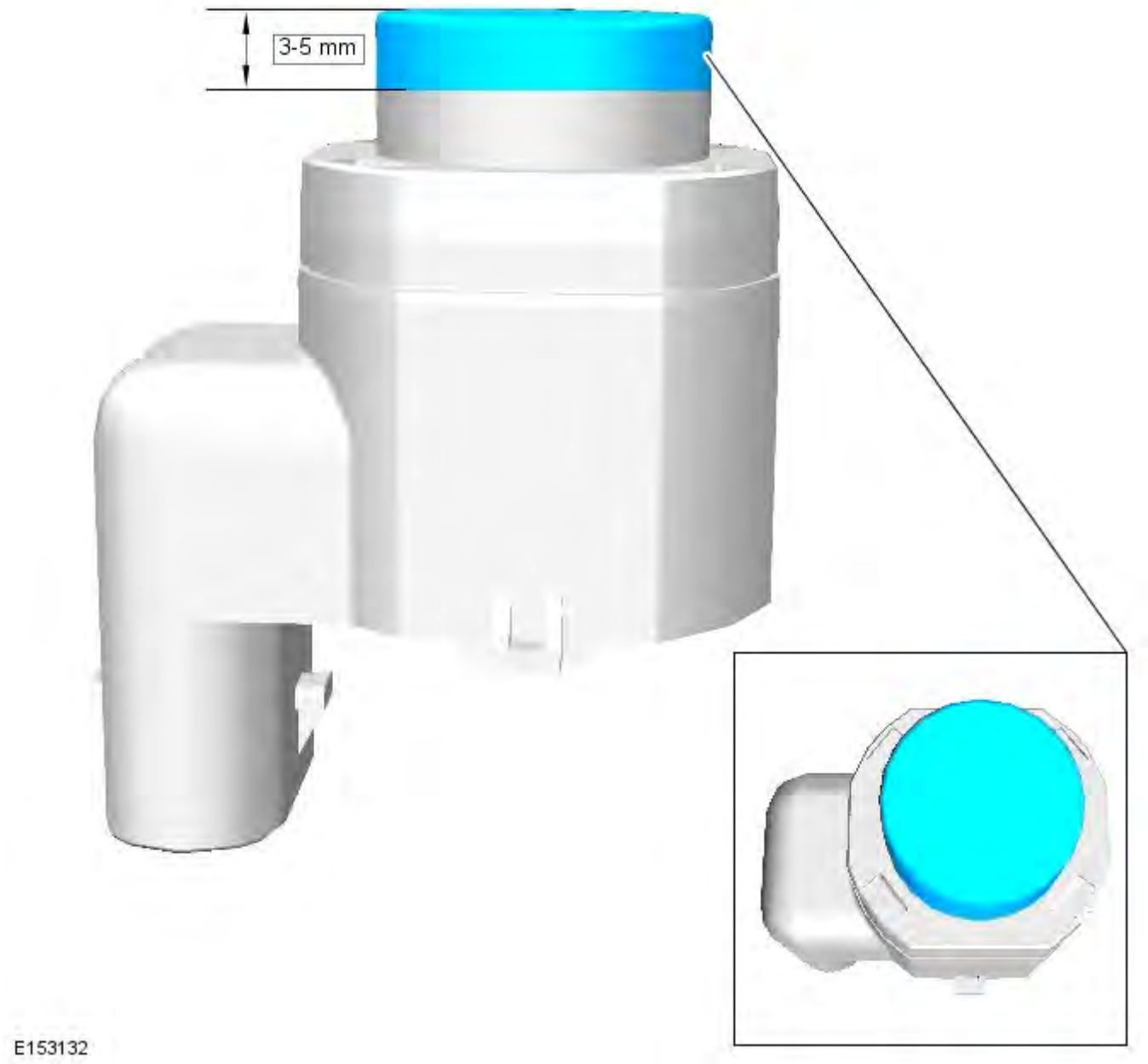


3. NOTE: Some variation in the illustrations may occur, but the essential information is always correct.

Installation

1. CAUTION: If a new sensor is installed, make sure that the area illustrated is the **only** area painted. Failure to follow this instruction may result in the component malfunctioning.

   NOTE: On vehicles that are equipped with black or unpainted bumpers, the sensor(s) do not require painting.



2. To install, reverse the removal procedure.

Published: 09-Jun-2011

Parking Aid - Parking Aid Module

Removal and Installation

Removal

NOTES:

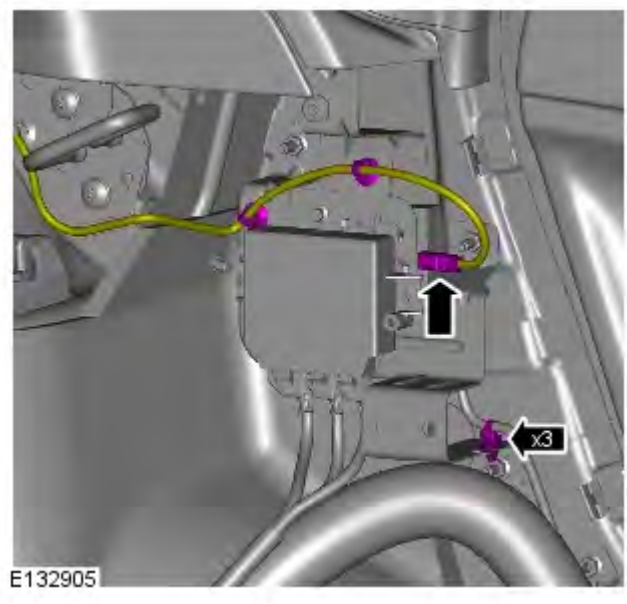
If a new parking aid module is to be installed, configure the parking aid module using the Land Rover approved diagnostic system.

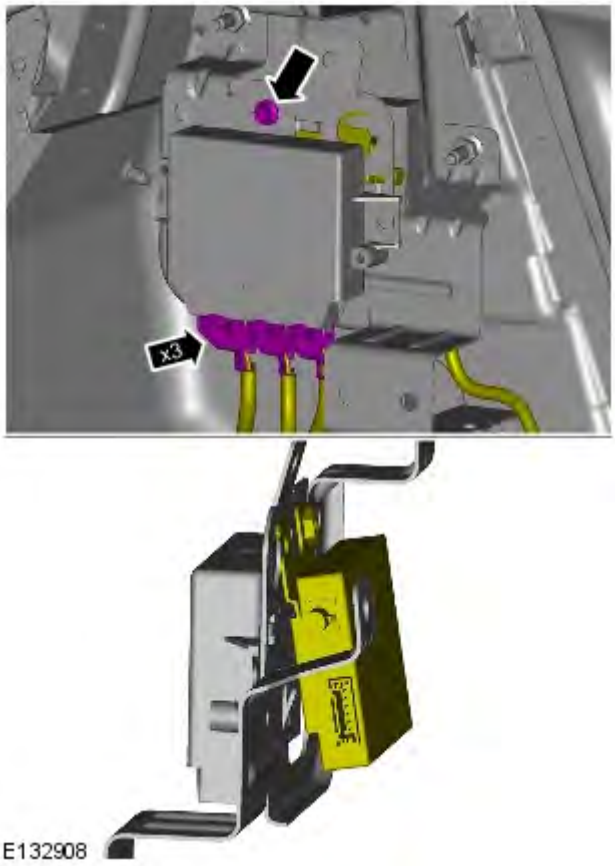
Removal steps in this procedure may contain installation details.

The ignition must be switched off.

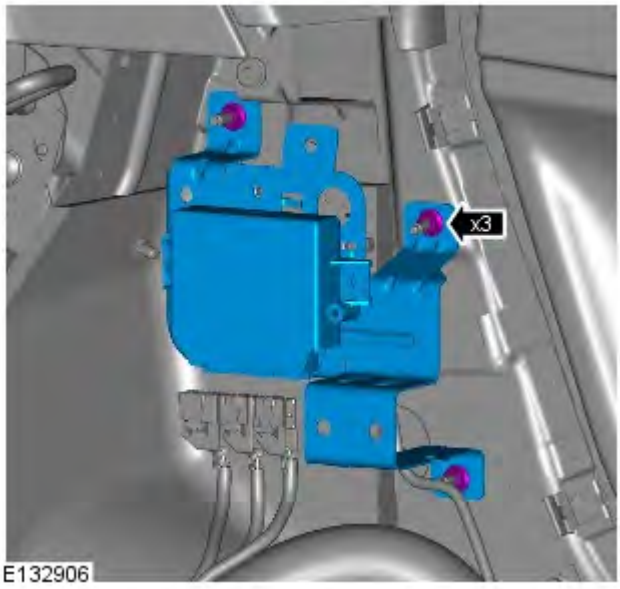
1. Refer to: Loadspace Trim Panel (501-05 Interior Trim and Ornamentation, Removal and Installation).

2.

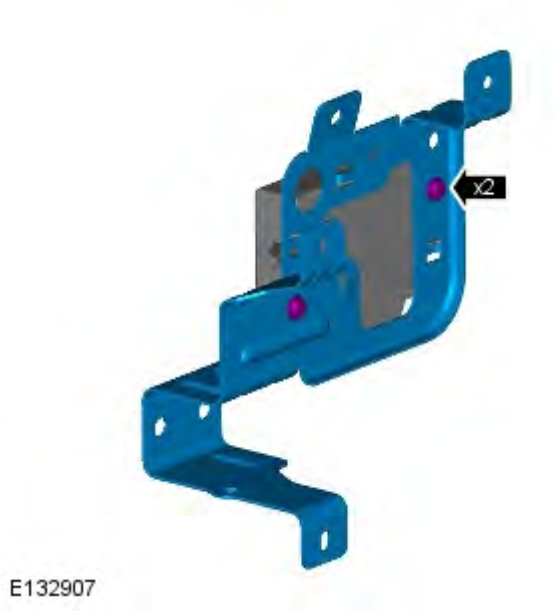




3. *Torque:* 10 Nm



4. *Torque:* 20 Nm



5. NOTE: Do not disassemble further if the component is removed for access only.

   Torque: 10 Nm

Installation

1. To install, reverse the removal procedure.

Published: 05-Mar-2013

Parking Aid - Rear Inner Parking Aid Sensor

Removal and Installation

Removal

NOTES:

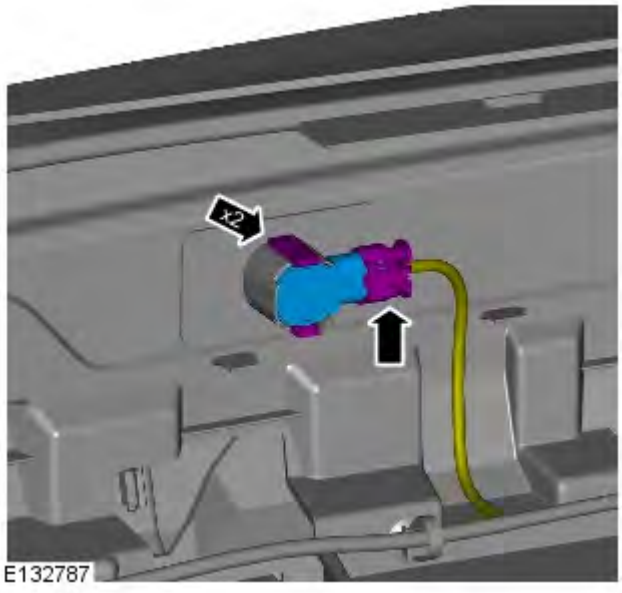
Removal steps in this procedure may contain installation details.

The ignition must be switched off.

1. WARNING: Make sure to support the vehicle with axle stands.

   Raise and support the vehicle.

2. Refer to: Rear Bumper Cover (501-19 Bumpers, Removal and Installation).

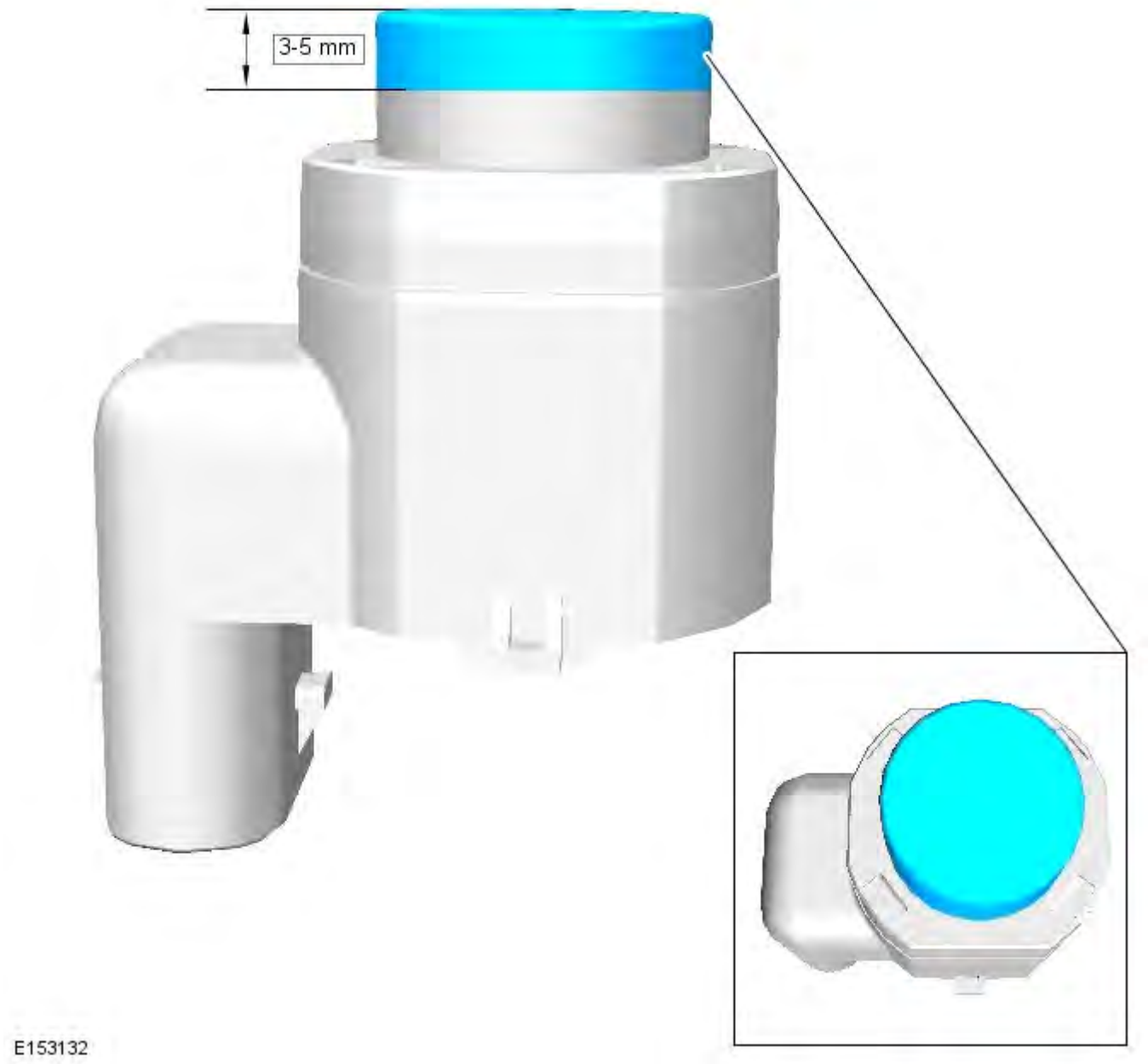


3. NOTE: RH illustration shown, LH is similar.

Installation

1. CAUTION: If a new sensor is installed, make sure that the area illustrated is the **only** area painted. Failure to follow this instruction may result in the component malfunctioning.

   NOTE: On vehicles that are equipped with black or unpainted bumpers, the sensor(s) do not require painting.



2. To install, reverse the removal procedure.

Published: 05-Mar-2013

Parking Aid - Rear Outer Parking Aid Sensor

Removal and Installation

Removal

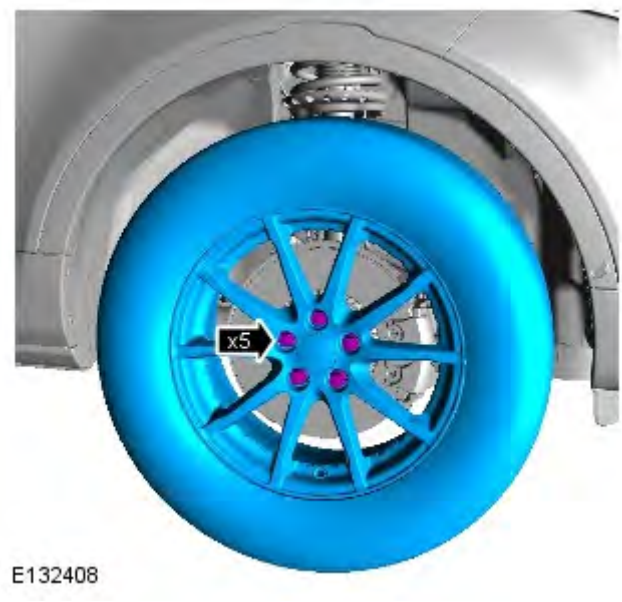
NOTES:

Removal steps in this procedure may contain installation details.

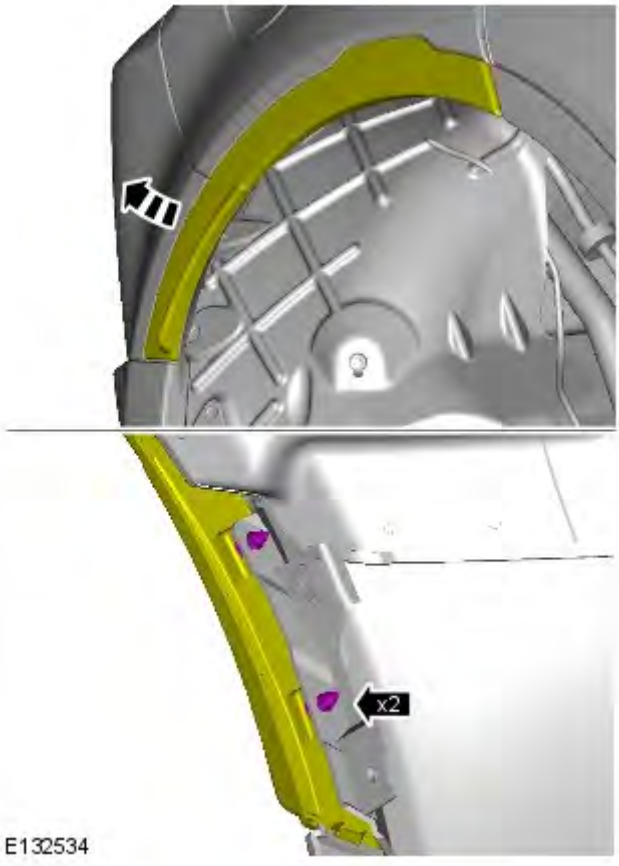
The ignition must be switched off.

1. WARNING: Make sure to support the vehicle with axle stands.

   Raise and support the vehicle.

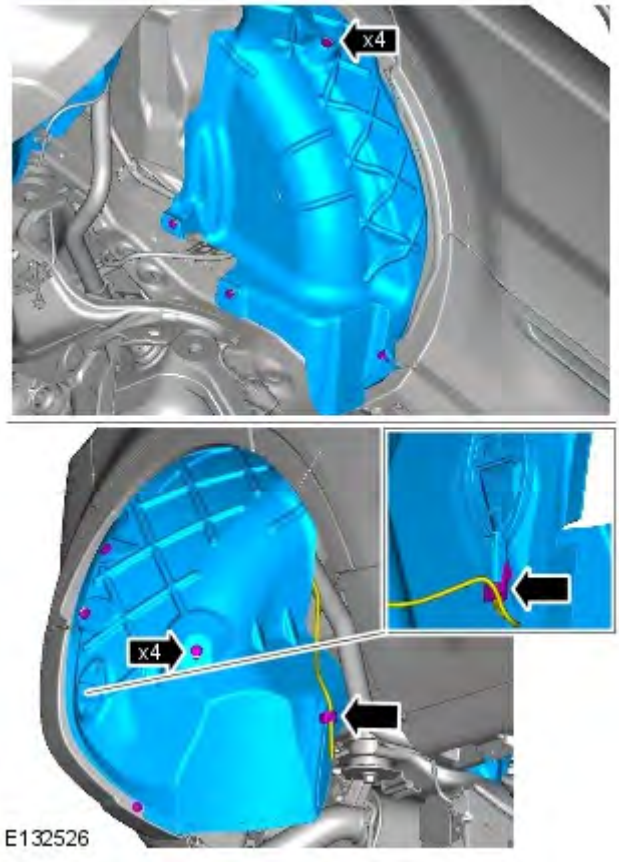


2. *Torque:* 133 Nm

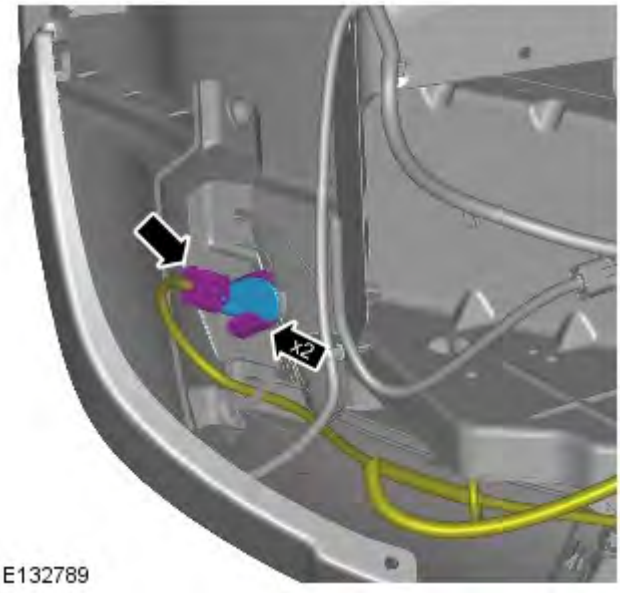


3. CAUTION: Take extra care not to damage the component.

NOTE: The step must be carried out on both sides.



4.

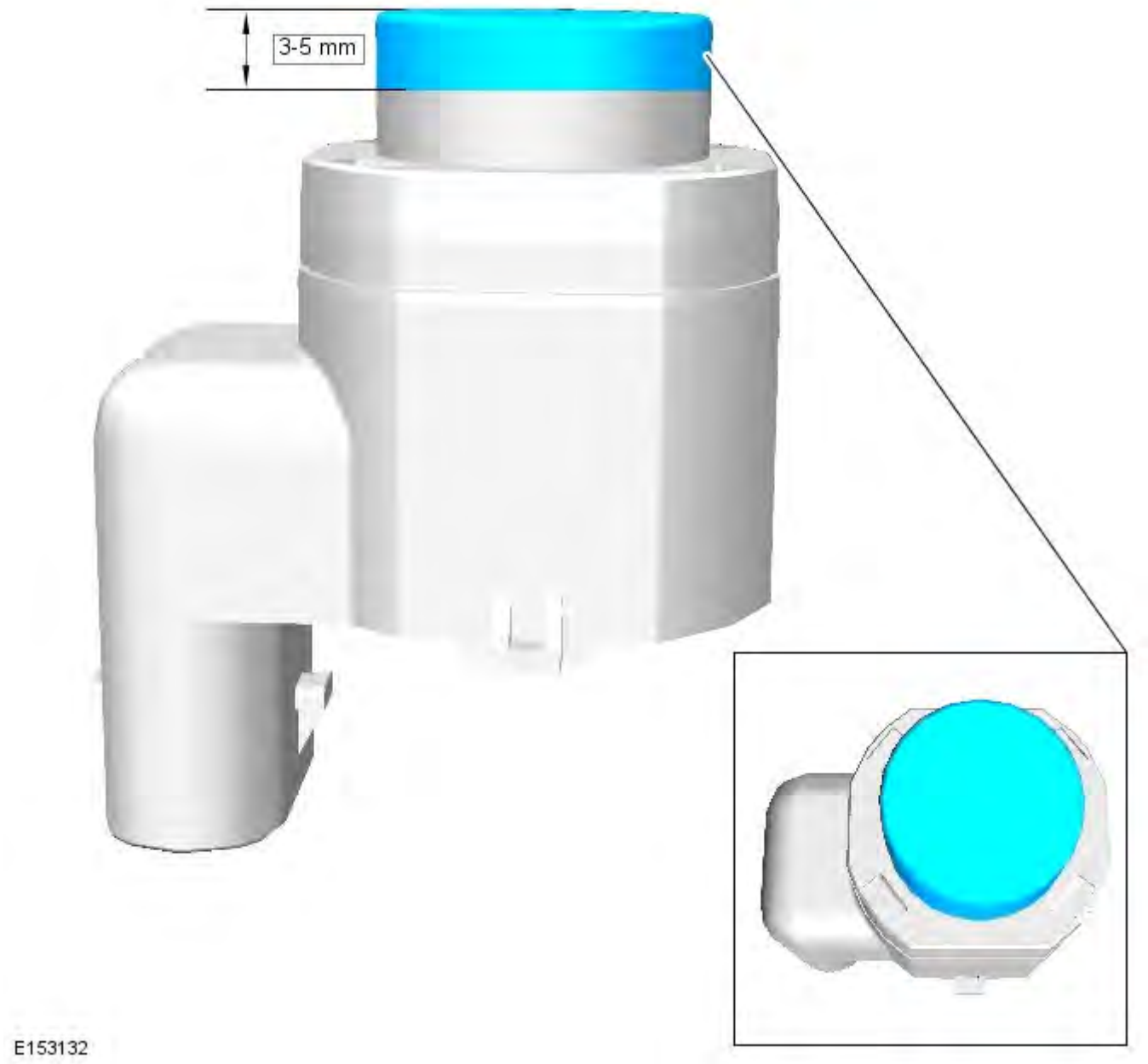


5. NOTE: RH illustration shown, LH is similar.

Installation

1. CAUTION: If a new sensor is installed, make sure that the area illustrated is the **only** area painted. Failure to follow this instruction may result in the component malfunctioning.

   NOTE: On vehicles that are equipped with black or unpainted bumpers, the sensor(s) do not require painting.



2. To install, reverse the removal procedure.

Published: 09-Jun-2011

Parking Aid - Front Parking Aid Camera

Removal and Installation

Removal

NOTES:

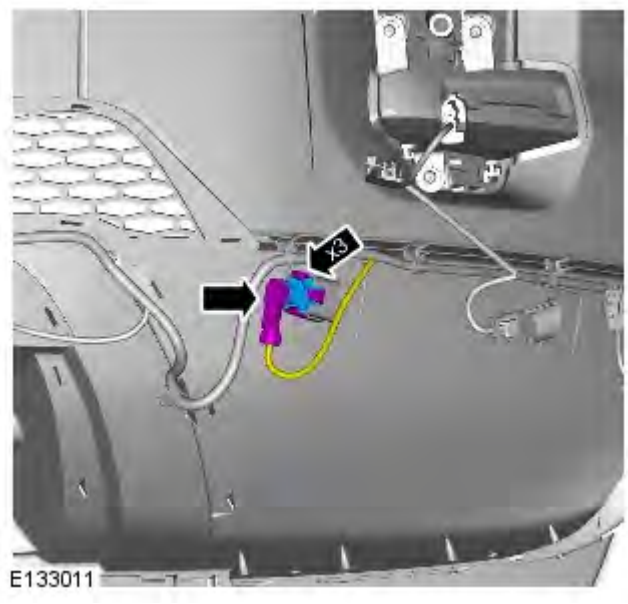
Removal steps in this procedure may contain installation details.

The ignition must be switched off.

1. WARNING: Make sure to support the vehicle with axle stands.

   Raise and support the vehicle.

2. Refer to: Front Bumper Cover (501-19 Bumpers, Removal and Installation).



3. CAUTIONS:

   Make sure that the component is correctly located on the locating dowels.

   Take extra care not to damage the wiring harnesses.

   NOTE: RH illustration shown, LH is similar.

Installation

1. To install, reverse the removal procedure.

2. If a new component has been installed, configure using Land Rover approved diagnostic equipment.

Published: 09-Jun-2011

Parking Aid - Side Parking Aid Camera

Removal and Installation

Removal

NOTES:

Removal steps in this procedure may contain installation details.

The ignition must be switched off.

1. Refer to: Exterior Mirror Glass (501-09 Rear View Mirrors, Removal and Installation).

2. CAUTION: Take extra care not to damage the wiring harnesses.

   NOTE: RH illustration shown, LH is similar.

3. CAUTION: Take extra care not to damage the component.

   NOTE: RH illustration shown, LH is similar.

   Torque: 0.5 Nm

Installation

1. To install, reverse the removal procedure.

2. If a new component has been installed, configure using Land Rover

approved diagnostic equipment.

Published: 09-Jun-2011

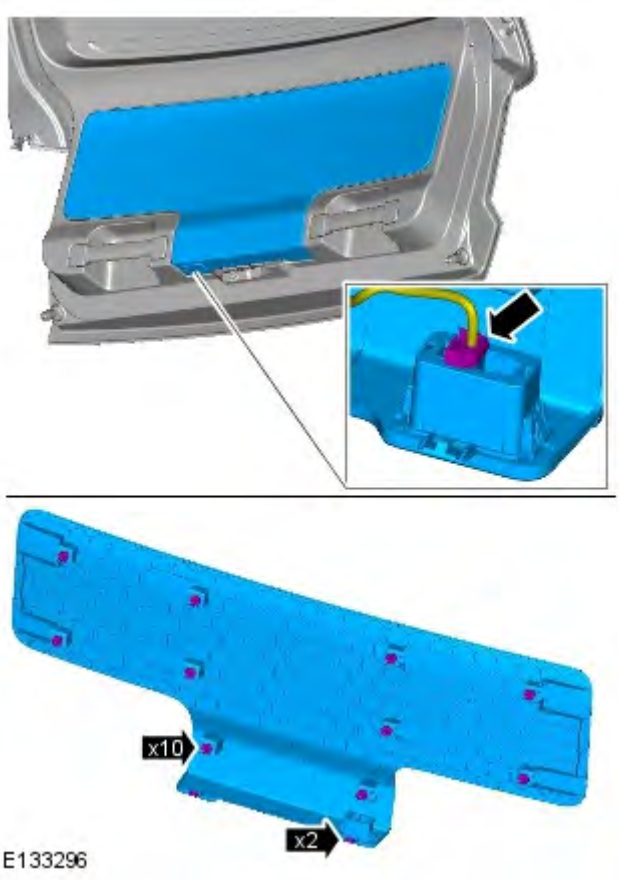
Parking Aid - Parking Aid Camera
Removal and Installation

Removal

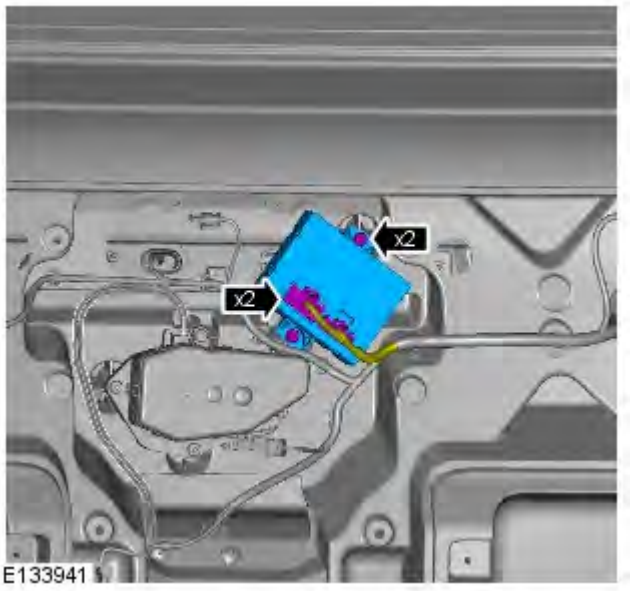
NOTES:

Removal steps in this procedure may contain installation details.

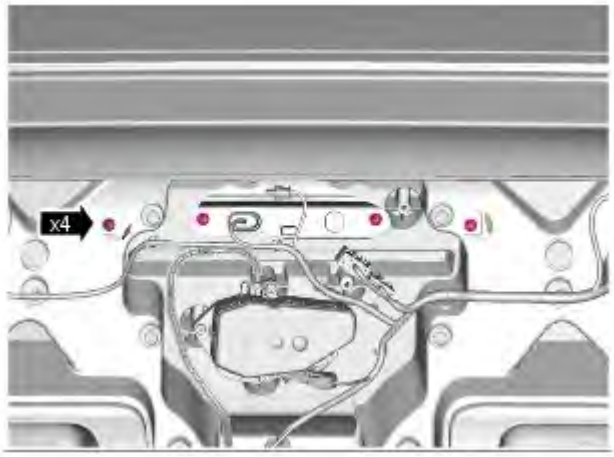
The ignition must be switched off.



1.

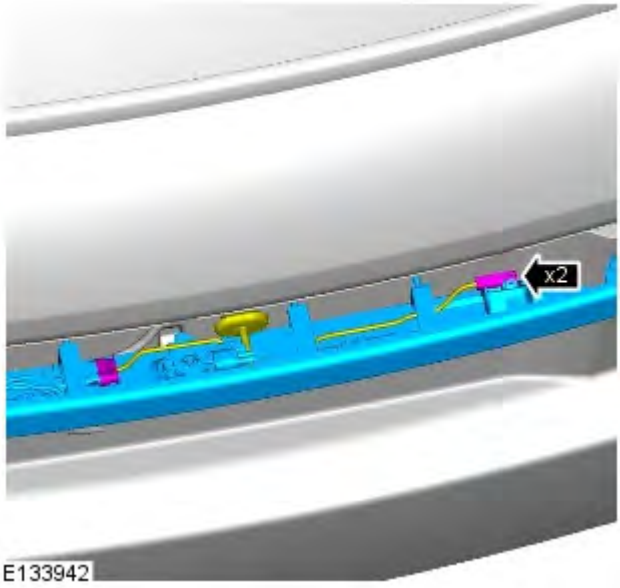


2. *Torque:* 4 Nm



E133944

3. *Torque:* 4 Nm



E133942

4.

5. CAUTION: Make sure that the component is correctly located on the locating dowels.

E133943

Installation

1. To install, reverse the removal procedure.

2. If a new component has been installed, configure using Land Rover approved diagnostic equipment.

Published: 09-Jun-2011

Parking Aid - Parking Aid Camera Module

Removal and Installation

Removal

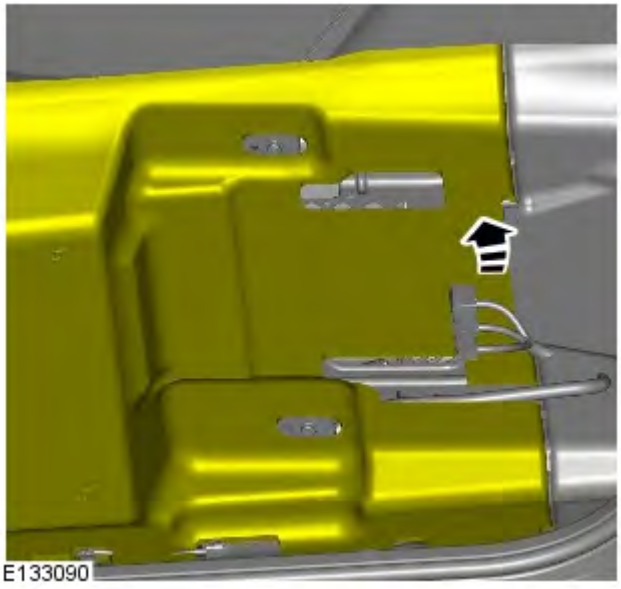
NOTES:

Removal steps in this procedure may contain installation details.

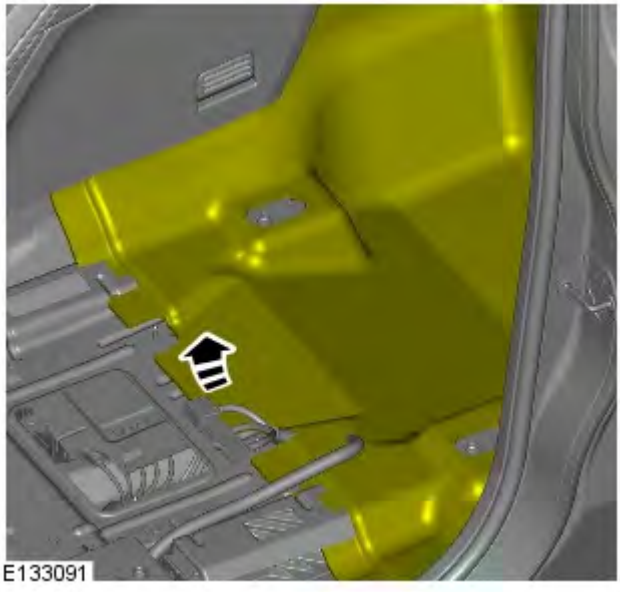
The ignition must be switched off.

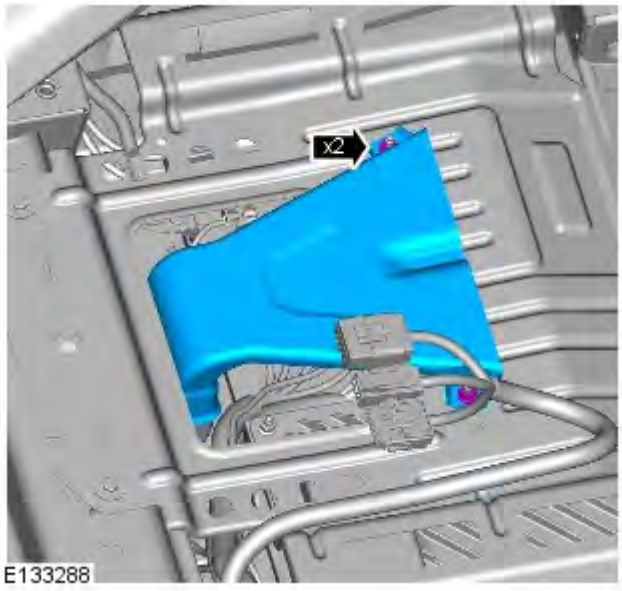
1. Refer to: Front Seat (501-10 Seating, Removal and Installation).

2.

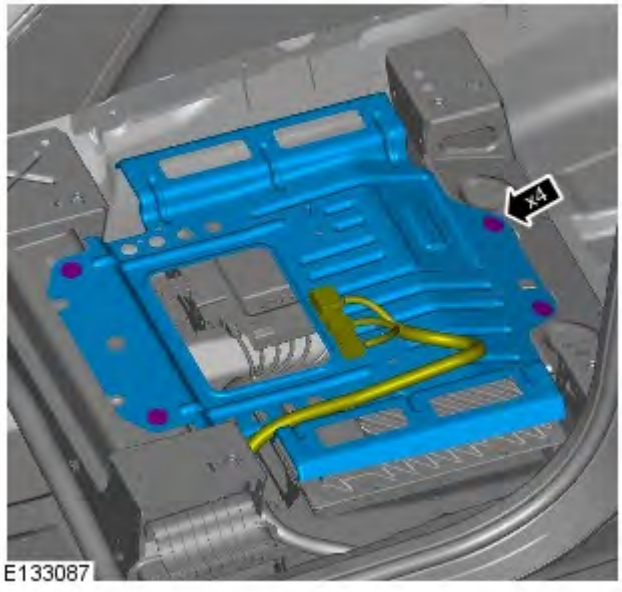


3.

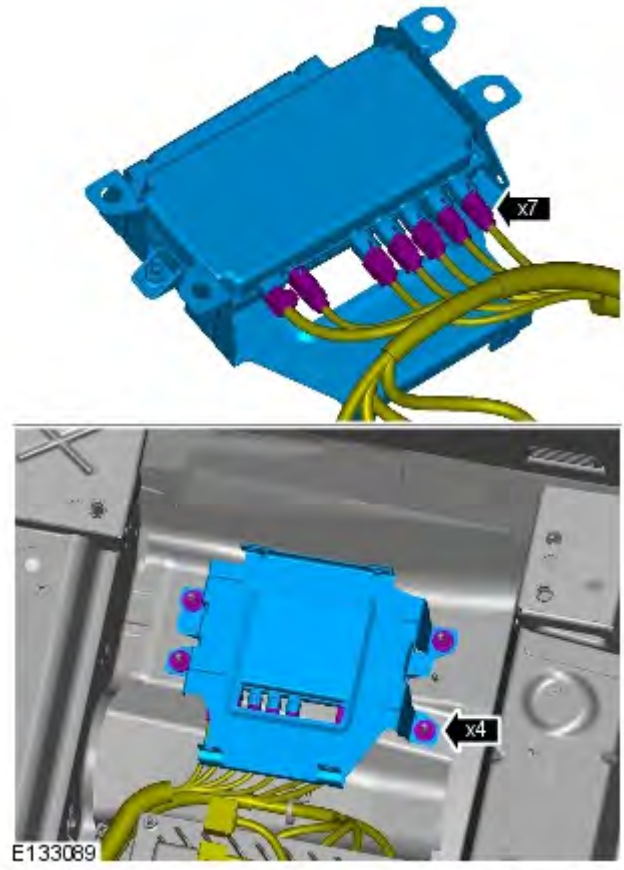




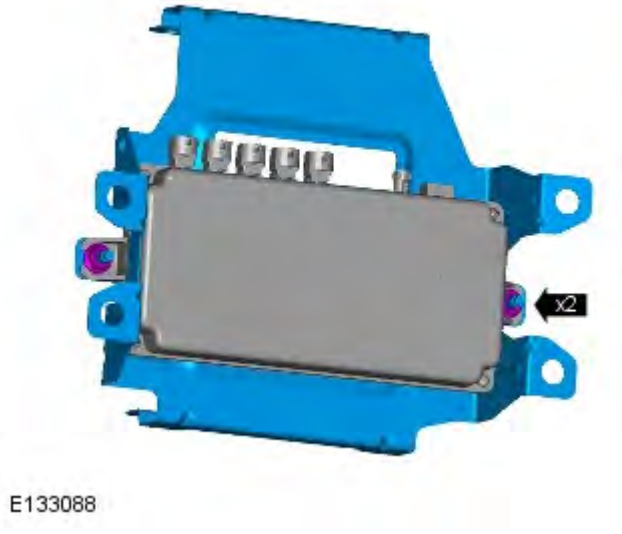
4. *Torque:* 10 Nm



5. *Torque:* 20 Nm



6. *Torque:* 10 Nm



7. NOTE: Do not disassemble further if the component is removed for access only.

   Torque: 10 Nm

Installation

1. To install, reverse the removal procedure.

2. If a new component has been installed, configure using Land Rover approved diagnostic equipment.

Published: 18-Oct-2012

Parking Aid -

General Specification

Item	Specification
Detection (Rear):	
Outer sensors	Approximately 600 mm (24 in)
Inner sensors	Approximately 1800 mm (71 in)
Continuous tone	Approximately 300 mm (12 in)
Detection (Front):	
Outer sensors	Approximately 600 mm (24 in)
Inner sensors	Approximately 800 mm (31 in)
Side sensors	Approximately 400 mm (16 in)
Continuous tone	Approximately 300 mm (12 in)

Published: 04-Dec-2013

Parking Aid - Parking Aid

Diagnosis and Testing

Principles of Operation

For a detailed description of the parking aid system, characteristics and limitations refer to the relevant description and operation section in the workshop manual. REFER to: (413-13 Parking Aid)

Parking Aid (Description and Operation),
Parking Aid (Description and Operation),
Parking Aid (Description and Operation).

Parking Aid System On-Board Self-Test

As part of the strategy of the system if any DTCs are detected, a long high-pitched tone approx 3 seconds will sound and the parking aid switch (where fitted) indicator LED will flash 6 times at ignition on

- If a fault is present when the parking aid system is activated then the parking aid switch (where fitted) status LED will flash 6 times indicating an issue with front or rear parking aid sensors, wiring switch, parking aid control module or hard wired sounders
- The rear parking aid sounder/rear audio system will emit an error tone for approx 3 seconds at ignition on if a fault is detected with the front or rear sensors, the switch, or if there is a controller area network (CAN) bus error
- (Only applicable to vehicles fitted with front parking aid and a hard wired rear parking aid sounder). If there is a fault with the rear parking aid sounder the error tone will come from the front parking aid sounder unit (integral with the instrument cluster)

Audible and Visual Warnings when Parking Aid System is in Error State

Rear Parking Aid System Fitted and No Parking Aid System Switch Fitted	Rear Parking Aid System Fitted and Parking Aid System Switch Fitted	Front and Rear Parking Aid System Fitted with Parking Aid System Switch Fitted
A long high-pitched error tone will sound at Ignition On for approx 3 seconds	• A long high-pitched error tone will sound at ignition on for approx 3 seconds and the parking aid switch indicator LED will flash 6 times at ignition on. Every time the parking aid system is activated within the same ignition cycle, parking aid switch indicator LED will flash 6 times	• A long high-pitched error tone will sound at ignition on for approximately 3 seconds and the parking aid switch indicator LED will flash 6 times at ignition on. Every time the parking aid system is activated within the same ignition cycle the parking aid switch indicator LED will flash 6 times

Inspection and Verification

CAUTIONS:

If the control module or a component is suspect and the vehicle remains under manufacturer warranty, refer to the warranty policy and procedures manual (section B1.2), or determine if any prior approval programme is in operation, prior to the installation of a new module/component.

Diagnosis by substitution from a donor vehicle is **NOT** acceptable. Substitution of control modules does not guarantee confirmation of a fault, and may also cause additional faults in the vehicle being tested and/or the donor vehicle

Do not apply any grease based products to any parking aid system connector or pins

NOTE: Check DDW for open campaigns. Refer to the corresponding bulletins and SSMs which may be valid for the specific customer complaint and carry out the recommendations as required.

1. Verify the customer concern
2. Visually inspect for obvious signs of mechanical or electrical damage
3. Ensure that the parking aid sensor face is clear of contamination that could affect the performance of the sensor

Visual Inspection

Mechanical	Electrical
• Parking aid sensor condition/damaged • Parking aid sensor installation and holder • Parking aid sensor alignment • Parking aid sensor contamination • Bumper cover(s) • Vehicle ride height • Non standard/non manufacturer approved accessories fitted	• Battery • Fuse(s) • Relays • Wiring harness • Electrical connector(s) • Front parking aid sensor(s) • Rear parking aid sensor(s) • Parking aid switch and LED • Parking aid control module • Parking aid sounder • Audio system

4. If an obvious cause for an observed or reported concern is found, correct the cause (if possible) before proceeding to the next step
5. If the cause is not visually evident, check for diagnostic trouble codes (DTCs) and refer to the DTC index

Symptom Chart

 CAUTION: Do not apply any grease based products to any parking aid system connector or pins

NOTES:

 Please note if this diagnosis is being carried out on a vehicle without a hard wired parking aid speaker, ensure the in car infotainment system is fully functional and configured correctly

 Parking aid sensors that are painted incorrectly and not to the manufacturer standards, will not be considered in any warranty claim

Symptom	Possible Causes	Action
 NOTE: Permanent/Intermittent fault Parking aid system not functioning correctly. (No DTCs displayed)	• Front or rear parking aid sensors dirty • Front or rear parking aid sensor position incorrect • Front or rear parking aid sensor incorrectly installed • Front or rear parking aid sensor coupling rings not installed/incorrectly installed • Parking aid control module or parking aid sensor connector not fully latched • Parking aid sensors painted without being removed from the bumper assembly or not painted to the manufacturer specification	• Clean front or rear parking aid sensors • Check the front or parking aid rear sensor position • Check the front or rear parking aid sensor are correctly installed • Check front or rear parking aid sensor coupling rings are installed/installed correctly • Ensure all parking aid system connectors are correctly latched • Remove parking aid sensor and ensure correctly painted parking aid sensor is installed • Parking aid sensors that are painted incorrectly and not to the manufacturer standards, will not be considered in any warranty claim
 NOTE: Permanent/Intermittent fault Parking aid system not functioning correctly. (No DTCs displayed). System characteristics or environmental effects	• Parking aid sensors incorrectly mounted • Incorrect vehicle ride height • Dirty parking aid sensor face. Ice/snow covered sensor. Debris trapped between parking aid sensor and parking aid sensor body. Heavy rain or water splash from the ground • Non standard, bumper, exhausts/tailpipes, tow bar or external spare wheel mounting • Area around vehicle is not clear of obstacles such as channels, gutters or other items on the ground • Exhaust gas and warm air clouds creating ghost echoes • Vehicle not on level ground or next to a gradient • Parking aid sensors painted without being removed from the bumper assembly or not painted to the manufacturer specification	• Ensure the sensors are a tight fit in the holder and locked. Ensure the sensors are central in the holder and bumper and at the correct angle • Ensure vehicle ride height is within the specified limits. Rectify as required • Clean the sensor face as required. Defrost the sensor and dry as required. Clear any debris from the sensor and holder as required. Water flowing over the sensor is a system limitation. (no action required) • Check for non standard, bumper, exhausts/tailpipe, tow bar or external spare wheel mounting that may be being detected by the parking aid system. Rectify as required • Ensure the area around the vehicle is clear of any obstacles, move the vehicle to a suitable area before continuing diagnosis • Ensure no exhaust gas or warm area clouds are in the area around the parking aid sensor detection range • Ensure the vehicle is on level ground and clear of any ramps, potholes or speed bumps, move the vehicle to a suitable area before continuing diagnosis • Remove parking aid sensor and ensure correctly painted parking aid sensor is installed • Parking aid sensors that are painted incorrectly and not to the manufacturer standards, will not be considered in any warranty claim
Parking aid sensors are being returned with no faults found or signs of water ingress/corrosion	Possible issue with sensor connectors not latched correctly	• When either no/intermittent operation has been reported the following action should be taken • 1. Using Datalogger, identify the position of the suspect parking aid sensor within the bumper • 2. Visually locate the position of the suspect parking aid sensor. Inspect and provide details in claim if the sensor has any sign of physical damage • 3. Remove the bumper. Disconnect the wiring at the main harness connector. Inspect the main harness connectors and terminals for signs of damage, backed out pins, corrosion and water ingress, or damage to the seals. Provide details in claim if any of the above symptoms are present • 4. Attempt to remove the harness connector

Symptom	Possible Causes	Action
		from the suspect parking aid sensor without using the connector latch i.e. lightly pull back on **ALL** wires together, ensuring the harness is held close to the back of the connector, not elsewhere on the wiring harness. **DO NOT** apply excessive force. If the connector can be removed without using the latch, provide details in claim if connector is loose. If the connector is fully latched, disconnect it from the sensor • 5. Inspect and provide details in claim if the suspect sensor harness connector has any sign of water ingress/corrosion • 6. Inspect and provide details in claim if the suspect parking aid sensor harness connector shows any sign that the terminals have backed-out of the connector or for any damage to the terminal seals. Replace/repair the harness as required and proceed • 7. Remove the suspect parking aid sensor from the bumper. Inspect the parking aid sensor connector for signs of water ingress/corrosion. Provide details in claim if corrosion/water ingress is present • 8. Exchange the suspect parking aid sensor with another parking aid sensor within the bumper that is performing correctly. Reconnect all sensors and reconnect the bumper main harness connector. Repeat step 1. Confirm if the original fault now appears at the new position of the suspect parking aid sensor, if so, proceed to step 10 • 9. If not, carry out the appropriate open circuit and short circuit checks between the original suspect parking aid sensor harness connector and the parking aid control module • 10. Refit the parking aid sensors to their original position in the bumper • 11. Reconnect the parking aid sensor to the bumper harness connector. Reconnect main harness connector and refit the bumper • 12. Repeat Step 1. If fault is still present, **replace only the faulty sensor**

PINPOINT TEST A : PARKING AID SYSTEM NOT FUNCTIONING CORRECTLY WITH NO DTCS LOGGED	
TEST CONDITIONS	**DETAILS/RESULTS/ACTIONS**
A1: PERMANENT FAULT	
	1 When the parking aid system is activated, there is a vibration on the parking aid sensor membrane. This can be verified by touching the parking aid sensor face with a hard item such as a pencil, ball-pen, small screwdriver, or fingernail. **Ensure no damage is caused to sensor painted surface**
	Are the parking aid sensor(s) vibrating? **Yes** GO to A2. **No** GO to A5.
A2: SENSORS VIBRATING WITH PARKING AID FAULT	
	1 Clean the parking aid sensor face
	Parking aid system functioning correctly? **Yes** No further action required **No** GO to A3.
A3: SENSORS VIBRATING WITH PARKING AID FAULT	
	1 Check parking aid sensors correctly mounted. Parking aid sensor holder correctly mounted. Parking aid sensor decoupler ring fitted or fitted correctly. Parking aid sensor positioning correct. Parking aid sensor painted without being removed from the bumper assembly or not painted to manufacturer specification. Rectify as required
	Parking aid system functioning correctly? **Yes** No further action required **No** GO to A4.
A4: SENSORS VIBRATING WITH PARKING AID FAULT	
	1 Carry out speaker test. Only applicable to vehicles with rear hard wired parking aid speakers. Check the parking aid speaker wiring circuit and connector. Rectify as required. Check and install a new parking aid speaker as required. Vehicles with audio parking aid system. Confirm audio system is functioning correctly. Refer to the relevant section of the workshop manual
	Parking aid system functioning correctly **Yes** No further action required

A5: SENSORS NOT VIBRATING WITH PARKING AID FAULT	
	1 Isolate the fault to front or rear parking aid sensors
	Are all rear parking aid sensors vibrating? **Yes** GO to A6. **No** GO to A10.
A6: FRONT SENSORS NOT VIBRATING WITH PARKING AID FAULT	
	1 Check the parking aid control module is correctly configured. Check and update the car configuration file as required
	Parking aid system functioning correctly? **Yes** No further action required **No** GO to A7.
A7: FRONT SENSORS NOT VIBRATING WITH PARKING AID FAULT	
	1 Check the correct parking aid control module is installed to the vehicle
	Parking aid system functioning correctly? **Yes** No further action required **No** GO to A8.
A8: FRONT SENSORS NOT VIBRATING WITH PARKING AID FAULT	
	1 If all 4 front parking aid sensors are not vibrating, carry out harness test on common ground, power supply. Check main parking aid harness connector to bumper harness connector. Rectify as required
	Parking aid system functioning correctly? **Yes** No further action required **No** GO to A9.
A9: FRONT SENSORS NOT VIBRATING WITH PARKING AID FAULT	
	1 Check and install a new parking aid control module as required. Refer to the warranty policy and procedures manual, or determine if any prior approval programme is in operation, prior to the installation of a new module/component
	Parking aid system functioning correctly **Yes** No further action required
A10: REAR SENSORS NOT VIBRATING WITH PARKING AID FAULT	
	1 Check the parking aid control module is correctly configured. Check and update the car configuration file as required
	Parking aid system functioning correctly? **Yes** No further action required **No** GO to A11.
A11: REAR SENSORS NOT VIBRATING WITH PARKING AID FAULT	
	1 If all 4 rear parking aid sensors are not vibrating, carry out harness test on common ground, power supply. Check main parking aid harness connector to bumper harness connector. Rectify as required
	Parking aid system functioning correctly **Yes** No further action required **No** GO to A12.
A12: REAR SENSORS NOT VIBRATING WITH PARKING AID FAULT	
	1 Check and install a new parking aid control module as required. Refer to the warranty policy and procedures manual, or determine if any prior approval programme is in operation, prior to the installation of a new module/component
	Parking aid system functioning correctly **Yes** No further action required

PINPOINT TEST B : PARKING AID SYSTEM NOT FUNCTIONING CORRECTLY WITH NO DTCS LOGGED	
TEST CONDITIONS	**DETAILS/RESULTS/ACTIONS**
B1: PARKING AID SYSTEM GIVES WARNING SIGNAL WITHOUT OBSTACLE	
	1 Clean the parking aid sensor face. Check for any damage to the parking aid sensor face. Rectify as required. Snow, water or ice on sensor face. Parking aid sensor face has been repainted to the incorrect thickness. Rectify as required
	Parking aid system functioning correctly? **Yes** No further action required **No** GO to B2.
B2: PARKING AID SYSTEM GIVES WARNING SIGNAL WITHOUT OBSTACLE	
	1 Ensure the vehicle ride height is within manufacturer specified limits. Rectify as required
	Parking aid system functioning correctly? **Yes** No further action required **No** GO to B3.
B3: PARKING AID SYSTEM GIVES WARNING SIGNAL WITHOUT OBSTACLE	

	1 Check for any non standard accessories are not fitted, such as tow bar, bike rack, body kit, modified exhaust, lighting or licence plate holder
	Parking aid system functioning correctly? **Yes** No further action required **No** GO to B4.
B4: PARKING AID SYSTEM GIVES WARNING SIGNAL WITHOUT OBSTACLE	
	1 Limitations or characteristics of the parking aid system such as vehicle on a gradient, exhaust gas vapour, signal reflection
	Parking aid system functioning correctly? **Yes** No further action required **No** For a detailed description of the parking aid system, refer to the relevant description and operation section in the workshop manual. REFER to: (413-13 Parking Aid) Parking Aid (Description and Operation), Parking Aid (Description and Operation), Parking Aid (Description and Operation).

DTC Index

For a list of diagnostic trouble codes that could be logged on this vehicle, please refer to Section 100-00.
REFER to: Diagnostic Trouble Code (DTC) Index - DTC: Parking Aid Module (PAM) (100-00 General Information, Description and Operation).