2018 ACCESSORIES AND BODY, CAB

Parking Aid - F-Type/X152

PARKING AID

SPECIFICATIONS

GENERAL SPECIFICATIONS

ITEM	SPECIFICATION
Detection (Rear)	Â
Center sensors	1800 mm (70.9 in)
Side sensors	700 mm (27.6 in)
Continuous Tone (Rear)	Â
Center sensors	300 mm (11.8 in)
Side sensors	400 mm (15.7 in)
Detection (Front)	Â
Center sensors	1000 mm (39.3 in)
Side sensors	700 mm (27.6 in)
Continuous Tone (Front)	Â
Center sensors	500 mm (19.7 in)
Side sensors	400 mm (15.7 in)

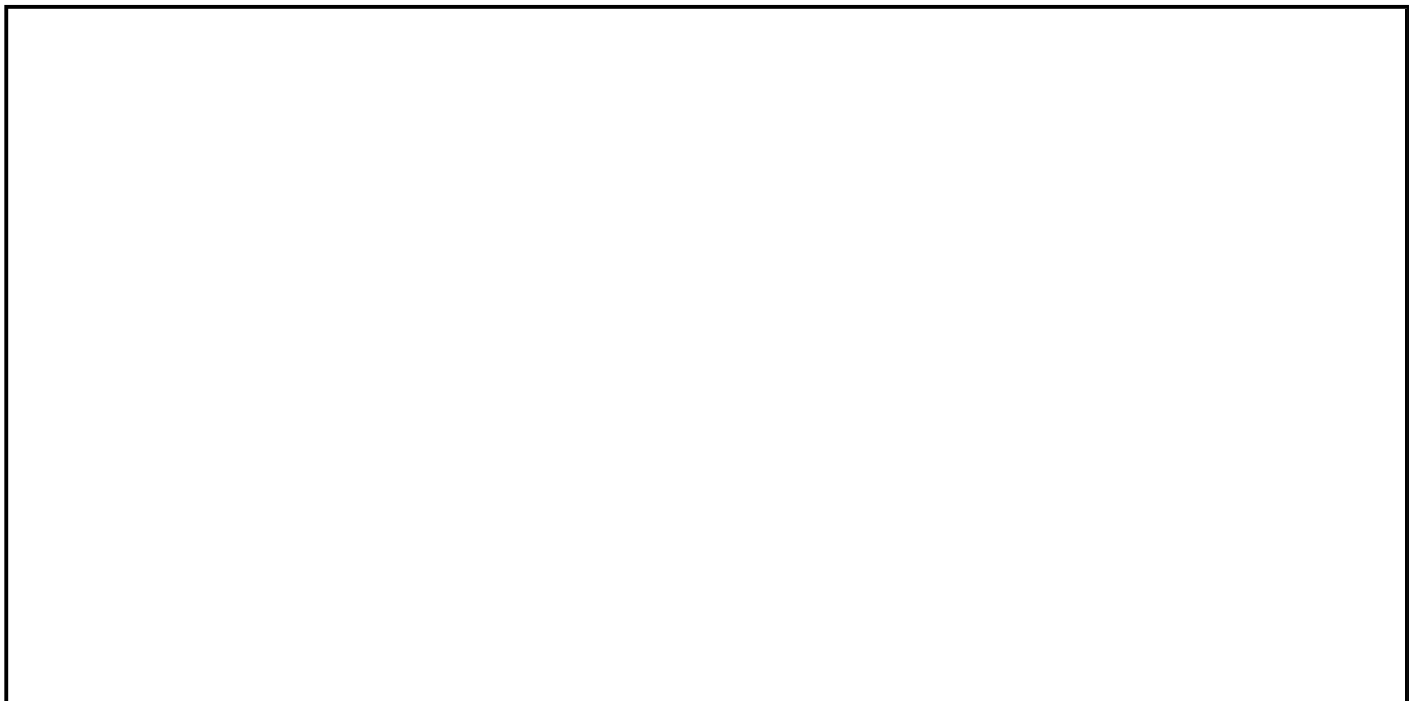
TORQUE SPECIFICATIONS

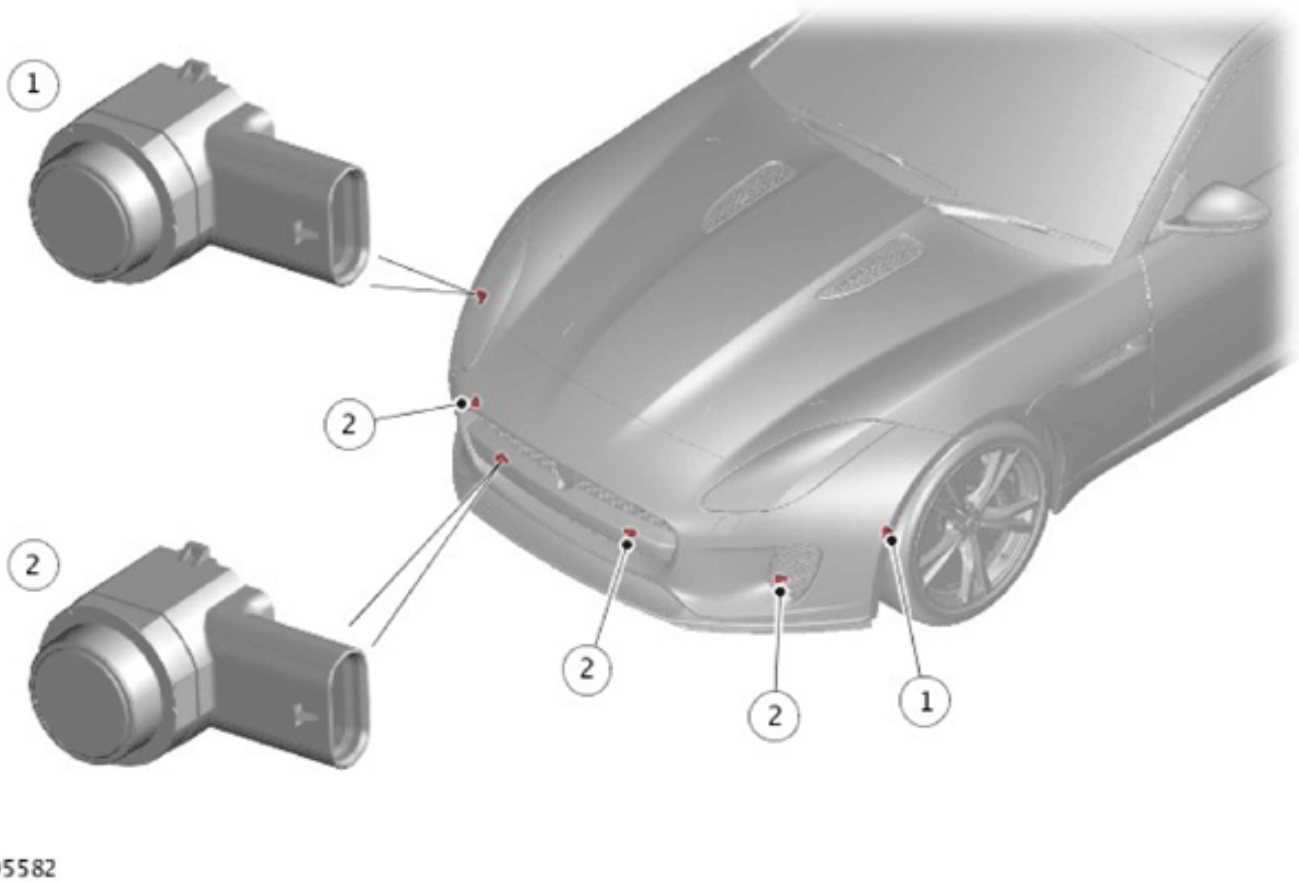
ITEM	NM	LB-FT	LB-IN
Parking aid module nuts	10	Â	88

DESCRIPTION AND OPERATION

COMPONENT LOCATION

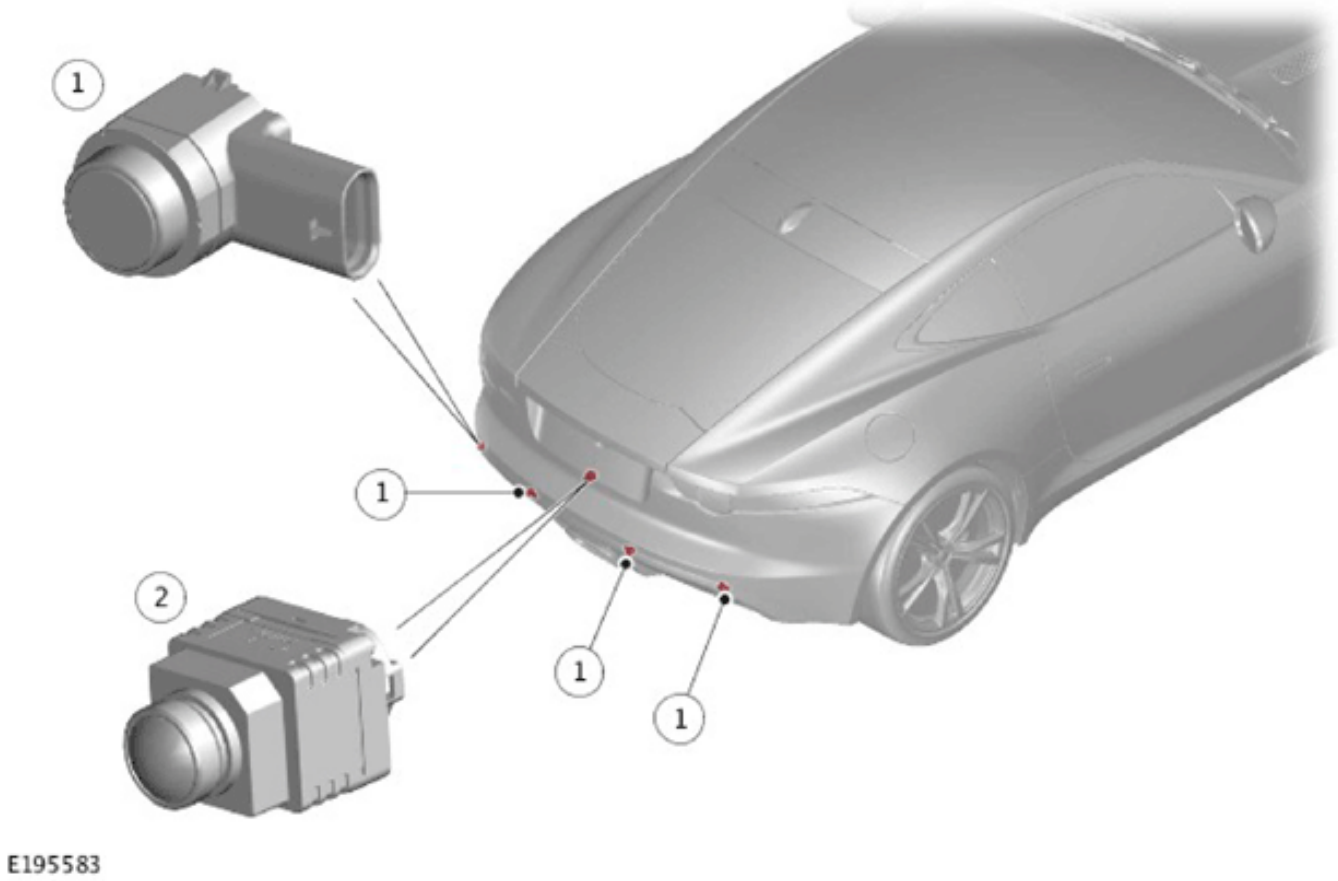
COMPONENT LOCATION - 1 OF 3





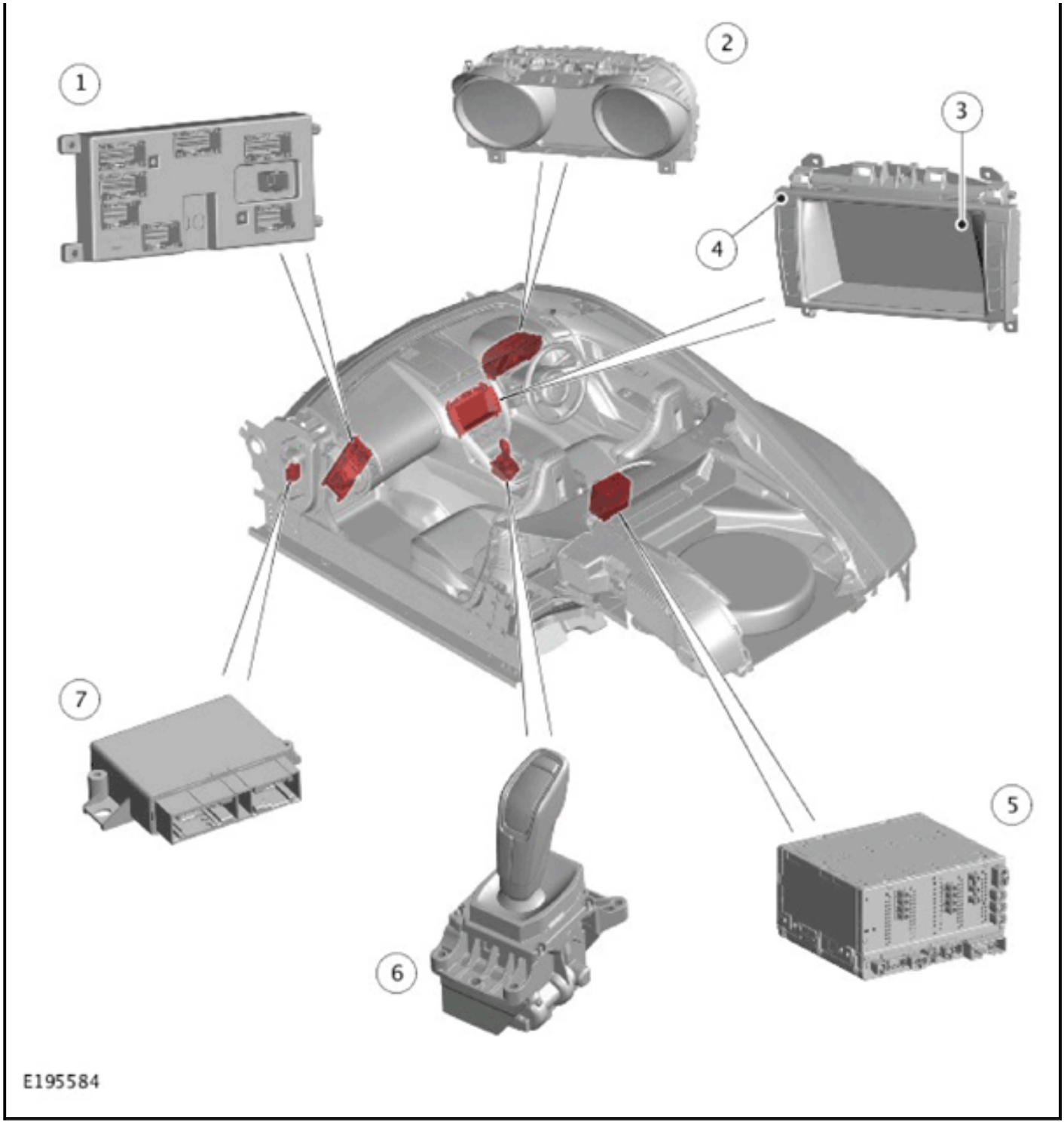
ITEM	DESCRIPTION
1	Park assist sensors - Front (2 off)
2	Parking aid sensors - Front (4 off)

COMPONENT LOCATION - 2 OF 3



ITEM	DESCRIPTION
1	Parking aid sensors - Rear (4 off)
2	Rear View Camera (RVC)

COMPONENT LOCATION - 3 OF 3



ITEM	DESCRIPTION
1	Body Control Module/Gateway Module (BCM/GWM) assembly
2	Instrument Cluster (IC)
3	Touch Screen (TS)
4	Touch Screen (TS) switchpack
5	Infotainment Master Controller (IMC)
6	Transmission Control Switch (TCS)
7	Parking Assist Control Module (PACM)

OVERVIEW

PARKING AID SYSTEM

The parking aid system provides an audible warning to the driver when any obstacles are in the path of the vehicle during a forward or reverse parking maneuver.

The system comprises of:

- Parking Assist Control Module (PACM)
- Parking aid switch
- Four ultrasonic sensors in the front bumper
- Four ultrasonic sensors in the rear bumper.

During low speeds, the PACM uses the ultrasonic sensors to monitor the area around the front and rear bumpers. If an object is detected within a monitored area, the PACM then outputs a warning signal using the audio system speakers.

The sensors can detect solid objects such as posts, walls and other vehicles. Objects may not be reported, for example narrow posts, fences, gates. Objects very close to the ground may not be detected, but because of their low height may not cause damage to the vehicle.

PARK ASSIST SYSTEM

The park assist system allows the vehicle to maneuver into and out of a parking space.

There are two available features to park assist:

1. Parallel parking
2. Parking exit.

The system comprises of:

- Parking Assist Control Module (PACM)
- Park assist switch
- Two ultrasonic sensors on the wheel arch outer front finishers
- Four ultrasonic sensors in the front bumper
- Four ultrasonic sensors in the rear bumper.

When one of the features of park assist is selected, instructions are displayed in the Instrument Cluster (IC) message center.

These instructions are communicated to the driver using the following methods:

- Visual - Graphical and text message instructions.
- Audible - Variable sound tones.

If a system fault is detected, a continuous tone will sound and a fault message is displayed in the IC message center.

REVERSE TRAFFIC DETECTION

The Reverse Traffic Detection (RTD) system provides a warning to the driver of any moving vehicle, at either side that may cause an accident during a reversing maneuver. To avoid this, the system is able to use the following warning modes to inform the driver, when the vehicle is in a reversing maneuver:

- An amber warning icon, which flashes in the relevant door mirror, and warning tones via the audio system.
- The rear camera screen, or
- The parking aid screen is shown on the Touch Screen (TS), with the warning icon on the relevant side.

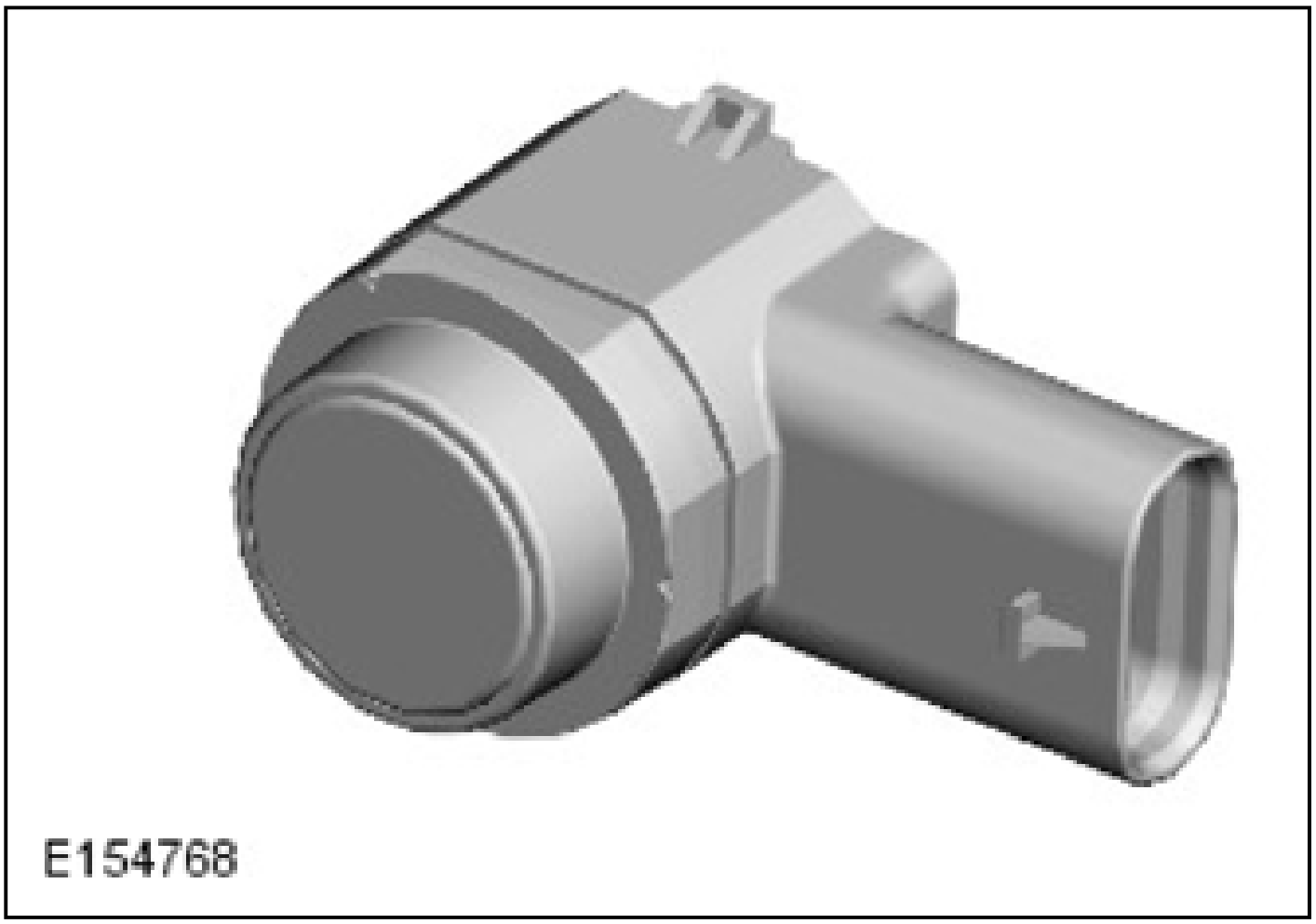
The RTD function is a part of the blind spot monitoring system.

REAR VIEW CAMERA

The Rear View Camera (RVC) provides additional information to the driver when reversing or maneuvering the vehicle. When the Reverse (R) gear is selected, the RVC system automatically displays a wide-angle color image of the view from the rear of the vehicle onto the Touch Screen (TS).

DESCRIPTION

PARKING AID AND PARK ASSIST SENSORS

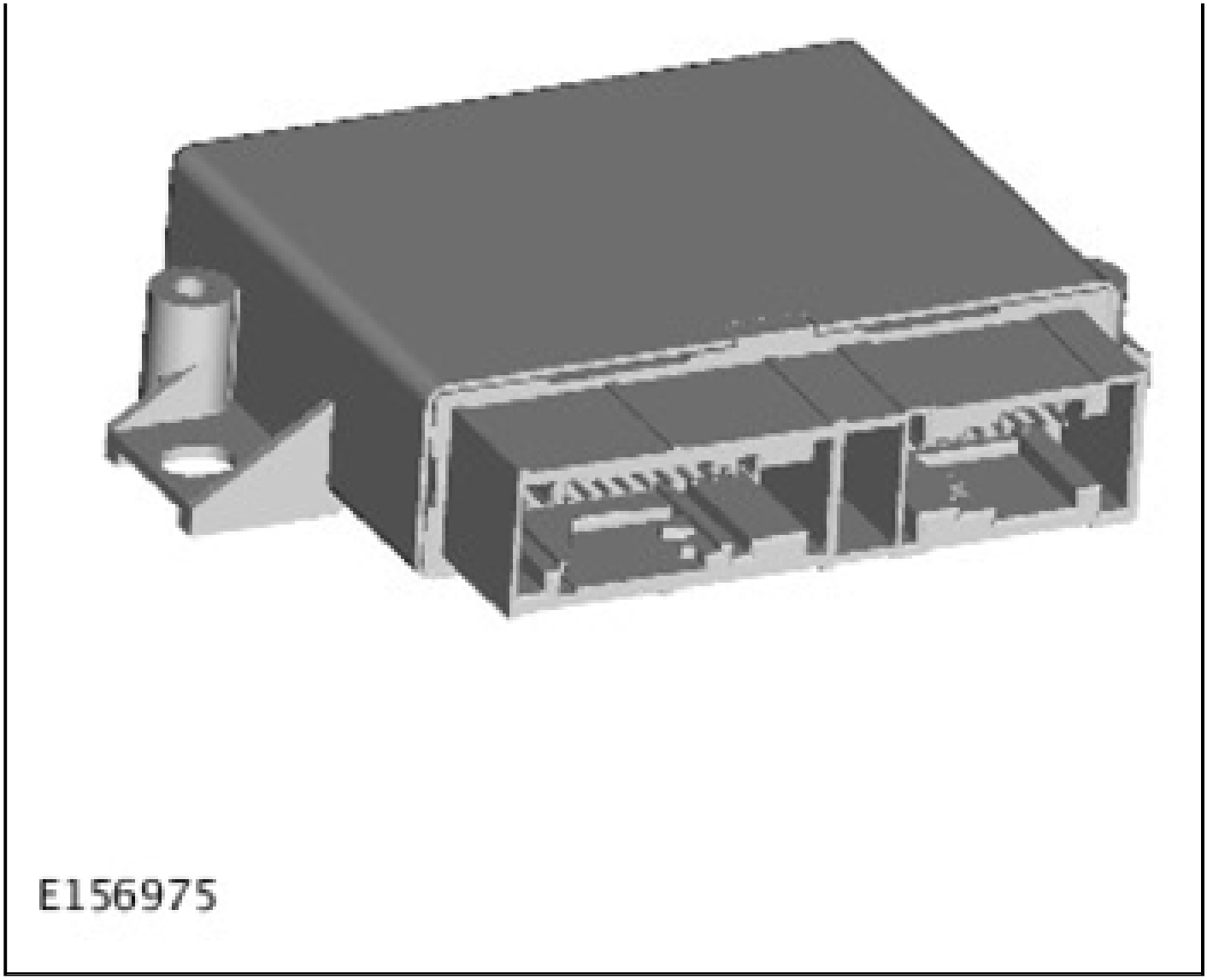


The rear parking aid sensors are installed on brackets on the inner top edge of the rear valance, with the head of each sensor protruding through the valance.

The front parking aid sensors are installed in brackets on the inside of the center grille bar and each outer grille of the front bumper. Each sensor head are protruding through the center grille bar/outer grille. The front park assist sensors are installed in brackets on the inside of the front bumper's side.

The parking aid and park assist sensors are ultrasonic proximity detectors that measure the distance from the vehicle to nearby objects. An electrical connector on each parking aid sensor provides power, ground and signal connections with the Parking Assist Control Module (PACM).

PARKING ASSIST CONTROL MODULE



The Parking Assist Control Module (PACM) is located on the bulkhead panel at the front of the left footwell, under the floor trim.

The PACM has two electrical connectors which comprise:

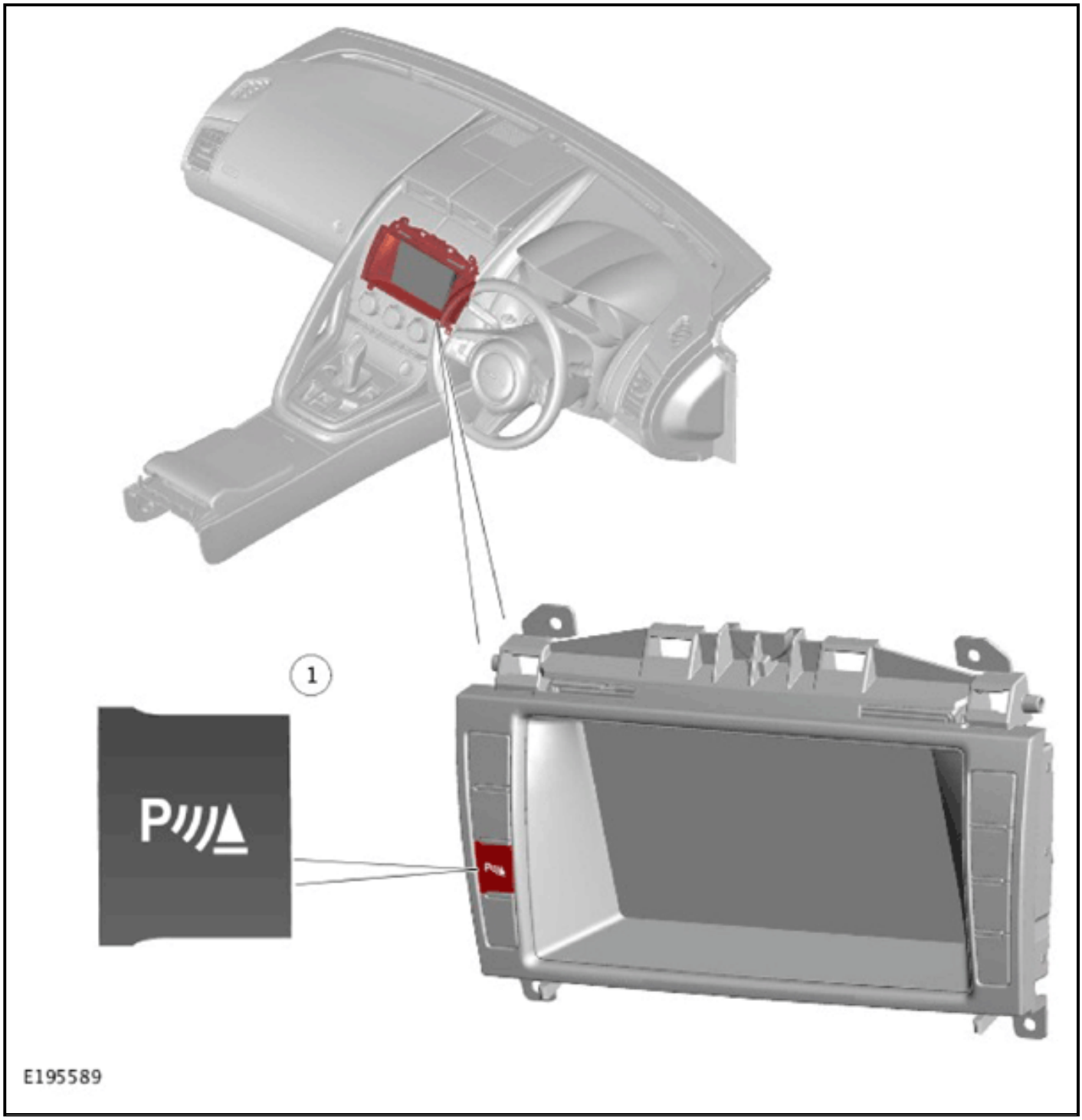
- Power supply and ground connection
- HS (High Speed) CAN (Controller Area Network) chassis systems bus connection
- Connection for front parking aid sensors
- Connection for rear parking aid sensors
- Connection for front park assist sensors
- Connection for the Touch Screen (TS) switchpack.

The PACM also outputs messages for the Infotainment Master Controller (IMC) via the Body Control Module/Gateway Module (BCM/GWM) assembly on the HS CAN chassis systems bus. The BCM/GWM assembly processes these messages and converts them into HS CAN comfort systems bus messages, which are passed to the IMC. These signals are then used to generate 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 PACM has a diagnostic connection via the HS CAN chassis systems bus to enable faults to be retrieved using the Jaguar approved diagnostic equipment. Additionally an on-board diagnostic routine within the PACM constantly

monitors the system. The PACM alerts the driver to a system fault by emitting a 3 seconds continuous tone through the front audio speakers when the ignition is switched on. The parking aid switch Light Emitting Diode (LED) will also flash six times when Reverse (R) gear is selected or the parking aid switch is operated.

PARKING AID SWITCH



ITEM	DESCRIPTION
1	Parking aid switch

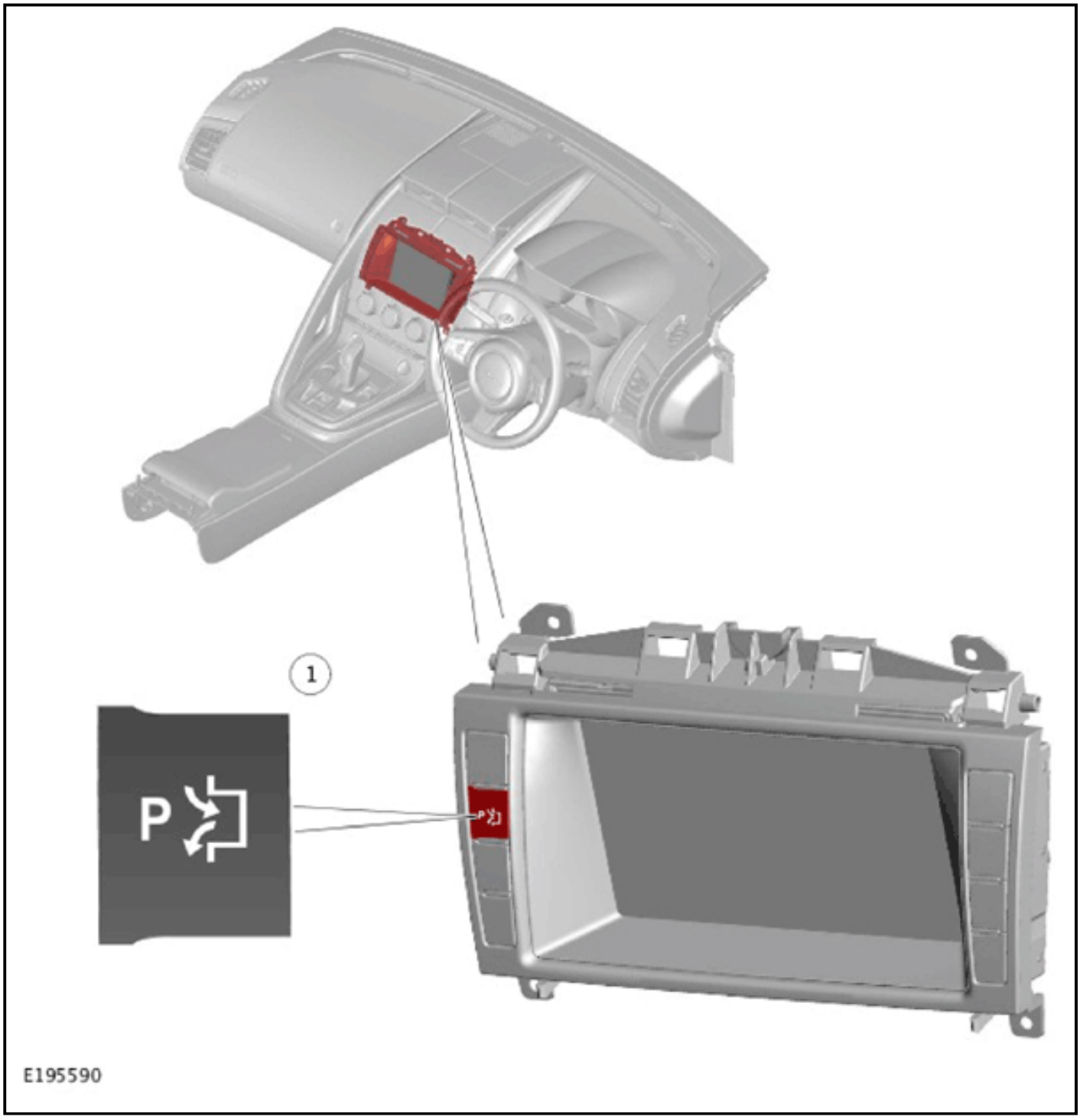
The parking aid switch is located in the left Touch Screen (TS) switchpack.

The parking aid switch is a non-latching push switch, which allows the driver to select the parking aid on or off.

When operated, the switch momentarily connects to ground to the Parking Assist Control Module (PACM).

The Light Emitting Diode (LED) indicates when the parking aid system is active. The LED is controlled by the PACM.

PARK ASSIST SWITCH



ITEM	DESCRIPTION
1	Park assist switch

The park assist switch is located in the left Touch Screen (TS) switchpack.

The park assist switch is a non-latching push switch.

Once operated the park assist switch will turn the system on and parallel parking will be the first available option. Further operation of the switch will scroll the remaining options.

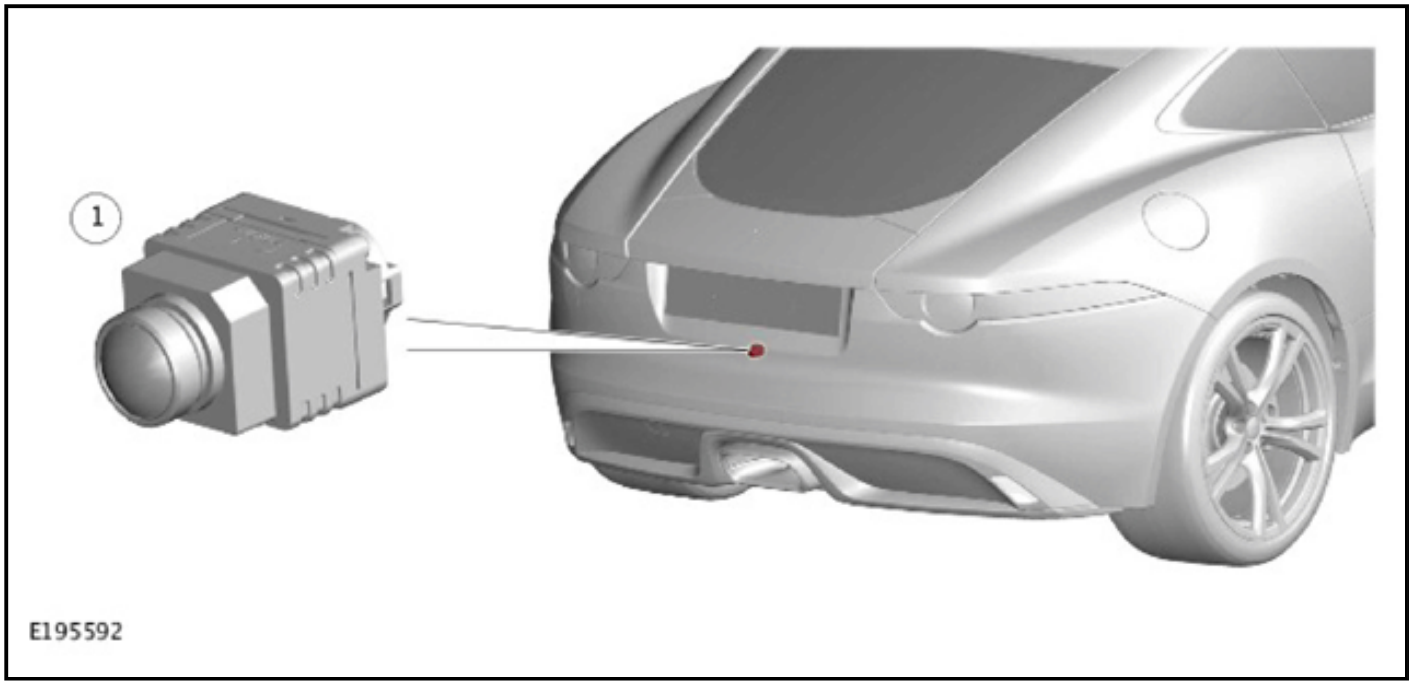
The sequence is as follows:

1. Parallel parking
2. Parking exit
3. Park assist off.

The switch connects a ground to the Parking Assist Control Module (PACM).

The Light Emitting Diode (LED) indicates when the park assist system is active. The LED is controlled by the PACM.

REAR VIEW CAMERA



ITEM	DESCRIPTION
1	Rear View Camera (RVC)

The Rear View Camera (RVC) is a high resolution digital camera, installed in a bracket on the inside of the rear bumper. The RVC is located immediately below the rear license plate, with the camera lens protruding through the bumper.

The RVC provides an image covering a zone approximately 180Â° wide by 112Â° deep and is capable of capturing approximately 30 frames per second.

The RVC employs high-quality digital, high dynamic range imaging, which is a set of techniques that allow a greater range of luminance between light and dark areas of an image scene. This allows the RVC to more accurately represent the varying intensity levels found in the image scenes that can range from direct sunlight to deep shadows.

An electrical connector on the RVC provides the following connections:

- Power
- Ground
- High Speed (HS) Controller Area Network (CAN) comfort systems bus
- Low-Voltage Differential Signalling (LVDS).

The RVC provides additional information to the driver when reversing the vehicle. When Reverse (R) gear is selected the camera automatically displays a wide-angle color image of the view from the rear of the vehicle on the Touch Screen (TS) via the Infotainment Master Controller (IMC).

The IMC gathers the camera images and analyses and alters them by adjusting perspectives and applying corrections. The IMC also adds guidance and warning overlays to the camera images to create the various driving aid features supported by the RVC system. For example, visual direction is made available when reversing the vehicle.

The resulting processed images are then relayed to the TS via an Automotive Pixel Link 2 (APIX 2) connection.

The positioning accuracy of the camera is crucial for successful operation. Therefore care must be taken when installing the RVC to make sure, that it sits correctly in the bracket. In the event of RVC replacement, the vehicle must be driven approximately 10 minutes to calibrate the RVC.

OPERATION

PARKING AID SYSTEM

The parking aid system is activated when:

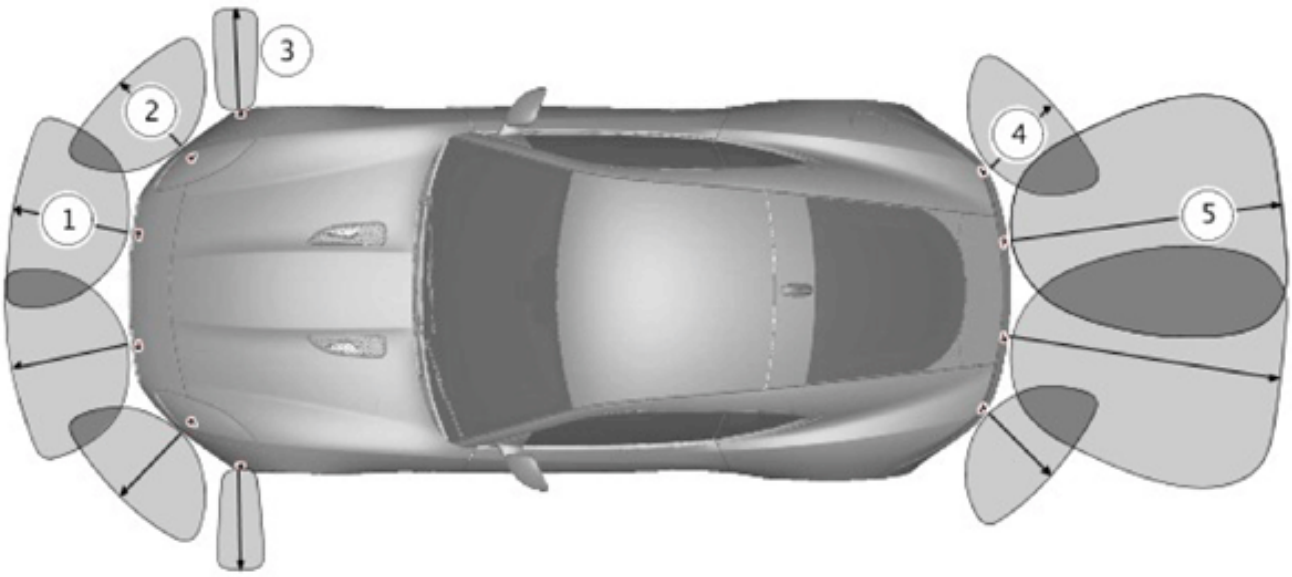
- The 'Automatic PDC' function is enabled in the parking aid systems Settings menu on the Touch Screen (TS).
- Reverse (R) gear is selected directly form Park (P).
- Drive (D) gear is selected directly from Park (P) and the Parking aid switch is operated. The front and side sensors are activated only. The sensors will remain active until the vehicle speed is less than 16 km/h (10 mph).
- The parking aid switch is operated for 3 seconds and the vehicle speed decreases to less than 10 km/h (6 mph), or the vehicle speed is above 16 km/h (10 mph), or Reverse (R) gear is selected and the vehicle speed is below 16 km/h (10 mph).

The 'Automatic PDC' function can be disabled using the parking aid settings menu on the TS. When the function is inactive the driver can activate the parking aid function manually with the parking aid switch on the TS switchpack.

AUDIBLE WARNINGS

The Parking Assist Control Module (PACM) 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.

DISTANCE CALCULATION FOR AUDIBLE WARNINGS



ITEM NUMBER	SENSOR LOCATION	MAXIMUM DETECTION RANGE AUDIO TONE	CONTINUOUS AUDIO TONE
1	Front inner	Approximately 1200 mm (47 in)	Approximately 500 mm (12 in)
2	Front outer	Approximately 500 mm (12 in)	Approximately 500 mm (12 in)
3	Side sensor - Front	Approximately 1500 mm (59 in)	Approximately 500 mm (12 in)
4	Rear outer	Approximately 1200 mm (47 in)	Approximately 500 mm (12 in)
5	Rear inner	Approximately 1500 mm (59 in)	Approximately 500 mm (12 in)

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 Assist Control Module (PACM) and compared with preprogrammed data. The data is stored in an Electrically Erasable Programmable Read Only Memory (EEPROM) within the PACM. The PACM receives this data via the signal line from the sensor and calculates the distance from the object. The PACM uses the elapsed time between the transmitted and received impulse for distance calculation. The duration of the impulse is determined by the PACM, with the sensor controlling the frequency of the output impulse.

In Reverse (R) gear, both the front and rear sensors are active. When the vehicle is in a forward gear only the front sensors are active.

In receiver mode, the sensor receives impulses that were emitted by adjacent sensors. The PACM 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 500 mm (20 in), 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.

When approaching several objects within detection range, the PACM recognizes the distance from the vehicle to the nearest object.

The PACM will prioritize the objects detected, the nearest object detected will take priority and the corresponding audio outputs will be emitted. For example if two objects are detected the nearest detected object will take priority and relevant audible tone will be heard.

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

PARK ASSIST SYSTEM

When park assist system is enabled the park assist switch is used to scroll through the park assist options:

- Parallel parking.
- Parking exit.

When selected, instructions for the three park assist options are displayed in the Instrument Cluster (IC) message center.

Instructions are then communicated to the driver using the following methods:

- Visual - graphical and text message instructions in the IC message center.
- Audible - variable sound tones through vehicle speakers.

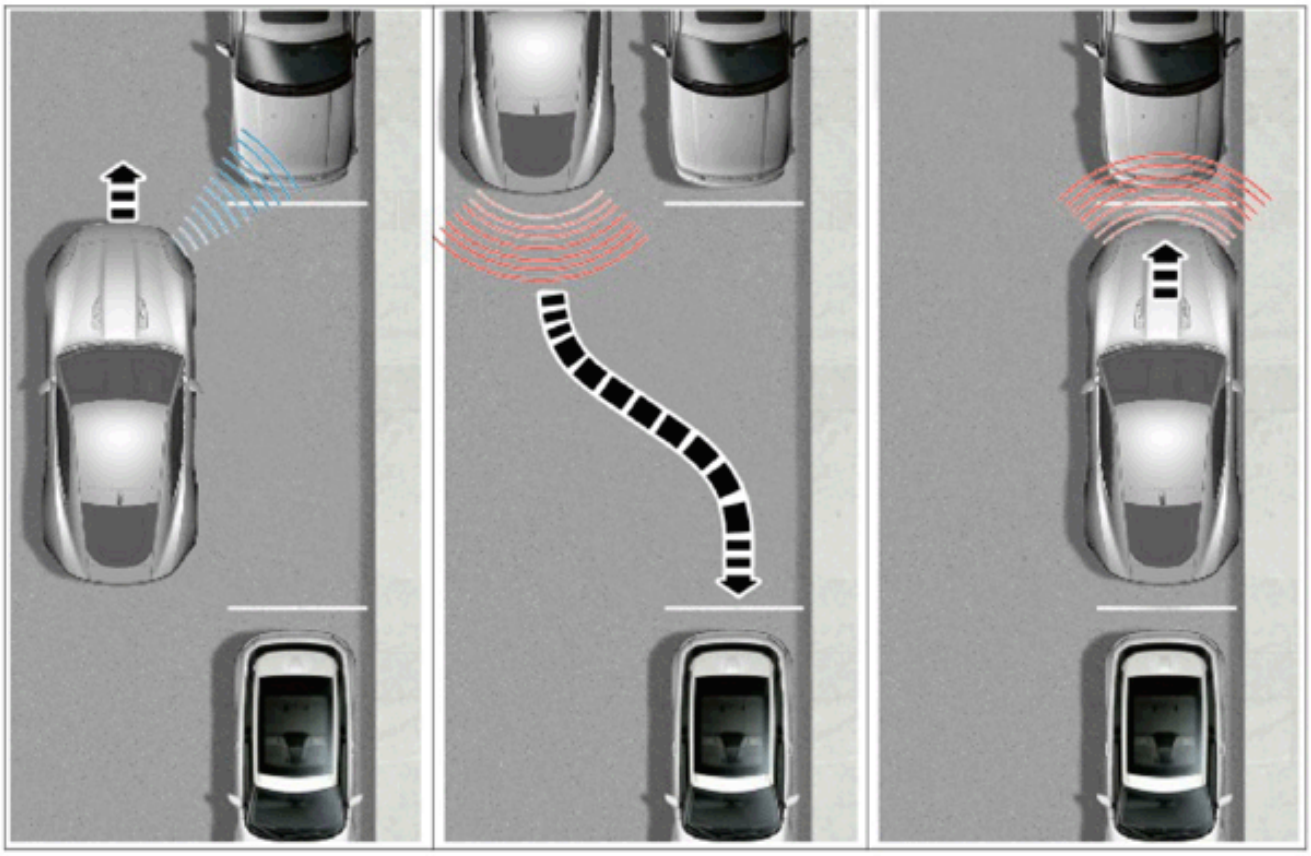
The park assist system only becomes active when the vehicle speed is less than 30 km/h (18 mph).

The park assist system must not be used if:

- A temporary spare wheel is in use.
- A sensor is damaged or the bumper is damaged sufficiently to affect a sensor mounting point.
- A sensor is obstructed by items attached to the vehicle, for example bumper covers, a ski carrier, stickers.

During any park assist maneuver, the parking aid system will remain active and will sound when objects are detected near the vehicle. A parking maneuver can be cancelled at any point by holding/turning the steering wheel or by pressing the park assist switch.

PARALLEL PARKING



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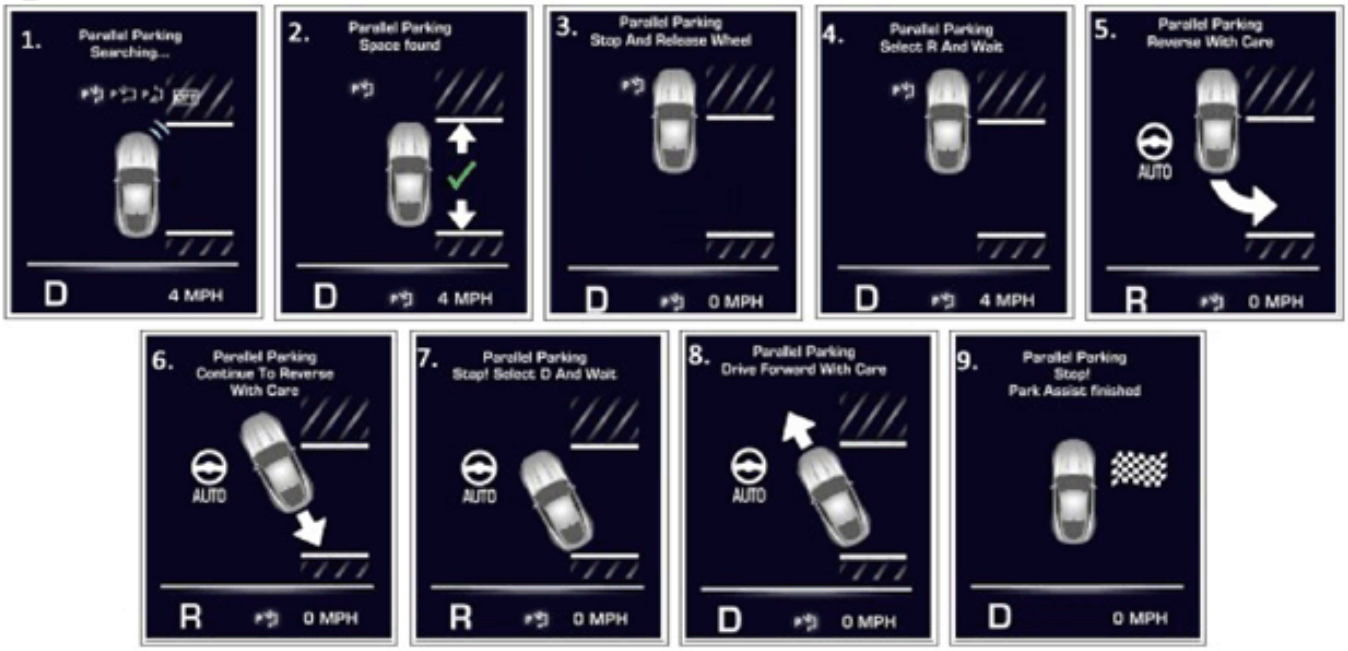


E195588

ITEM	DESCRIPTION
1	Parallel parking sequence

When parallel parking is selected, the system automatically searches for a space that is big enough to maneuver into using the park assist sensors. By default the system scans the potential parking space on the side opposite the driver. To search for a space on the driver side of the vehicle, signal a turn in that direction with the left steering column multifunction switch.

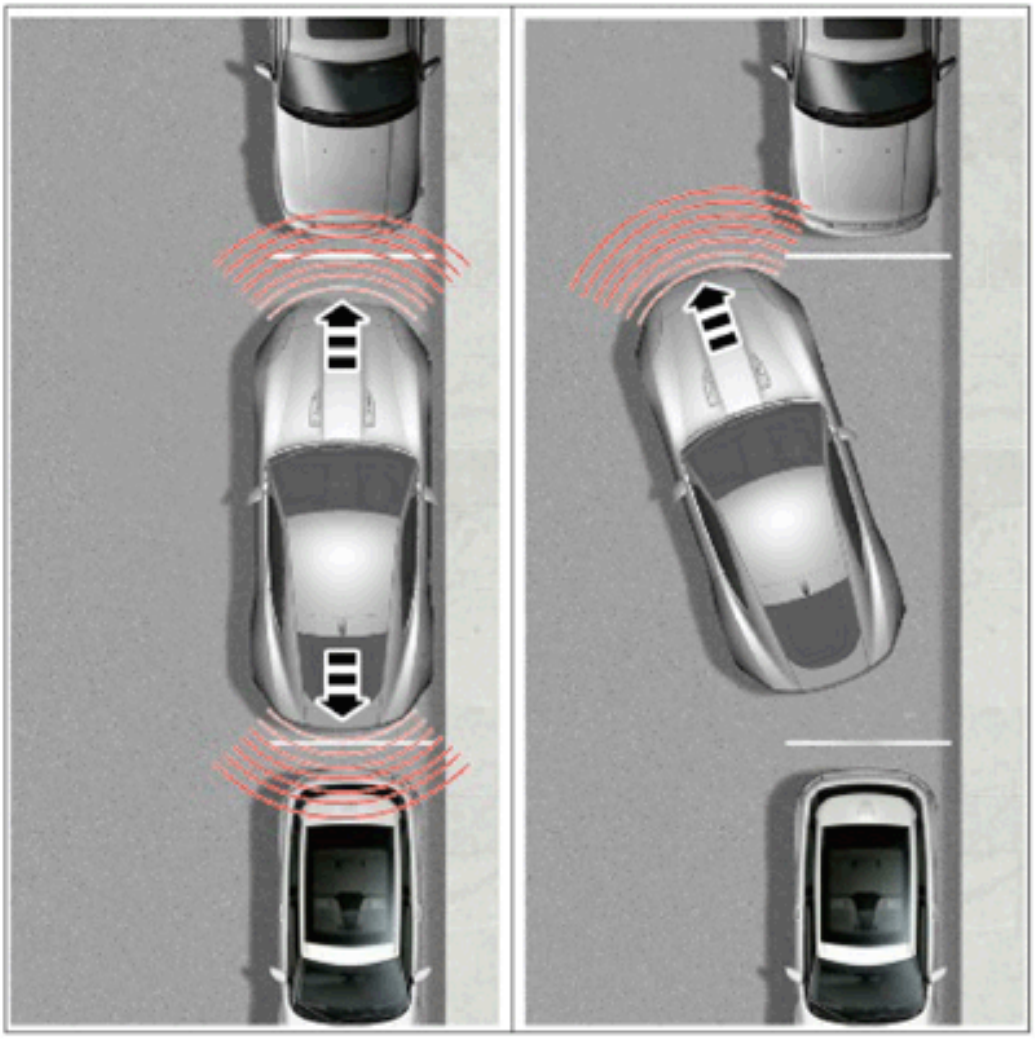
When a parking space has been identified the Parking Assist Control Module (PACM) processes the information provided by the sensors for creating a parking trajectory. The PACM then sends a High Speed (HS) Controller Area Network (CAN) chassis bus message via the Body Control Module/Gateway Module (BCM/GWM) assembly to the Instrument Cluster (IC). A message will then be displayed in the Instrument Cluster (IC) message center and an audio warning from the speakers will inform the driver of this.

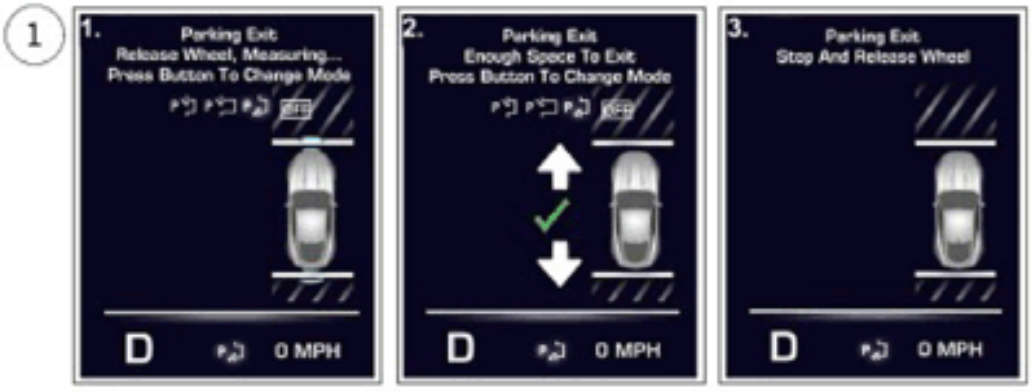
The IC message center will then instruct the driver to drive past the space slowly until the instructions on the IC message center tells the driver to stop. Once the PACM has established that vehicle has stopped, the PACM will then send information to the IC message center, for the driver to let go off the steering wheel.

The PACM will then inform the IC to instruct the driver to select Reverse (R) gear. Once the driver has followed these instructions, information is then sent to the Transmission Control Module (TCM) and Power Steering Control Module (PSCM) and back to the PACM for parallel parking sequence to begin.

During the parallel parking sequence, the PACM, the PSCM, and the IC will continue to communicate with each other. The PACM will send out information that it receives, and send back to the IC message center instructions for the driver to follow.

PARKING EXIT





E195591

ITEM	DESCRIPTION
1	Parking exit sequence

When parking exit is selected, the park assist sensors search the area for a space that is big enough to maneuver out of.

When a parking space has been identified the Parking Assist Control Module (PACM) processes the information provided by the sensors for creating a parking exit trajectory. The PACM then sends a High Speed (HS) Controller

Area Network (CAN) chassis systems bus message via the Body Control Module/Gateway Module (BCM/GWM) assembly to the Instrument Cluster (IC). A message will then be displayed in the IC message center and an audio warning from the speakers will inform the driver of this.

The PACM will then inform the IC to instruct the driver to select Reverse (R) gear. Once the driver has followed these instructions, information is then sent to the Transmission Control Module (TCM) and Power Steering Control Module (PSCM) and back to the PACM for parking exit sequence to begin.

The driver will then be instructed to select Drive (D) gear and will continue to follow instructions that are displayed on the IC message center.

Once the procedure is finished, the PACM will inform the IC message center that the parking out procedure is now complete. The driver will be informed by a message in the IC message center.

SYSTEM DIAGNOSTICS FOR PARKING AID AND PARK ASSIST

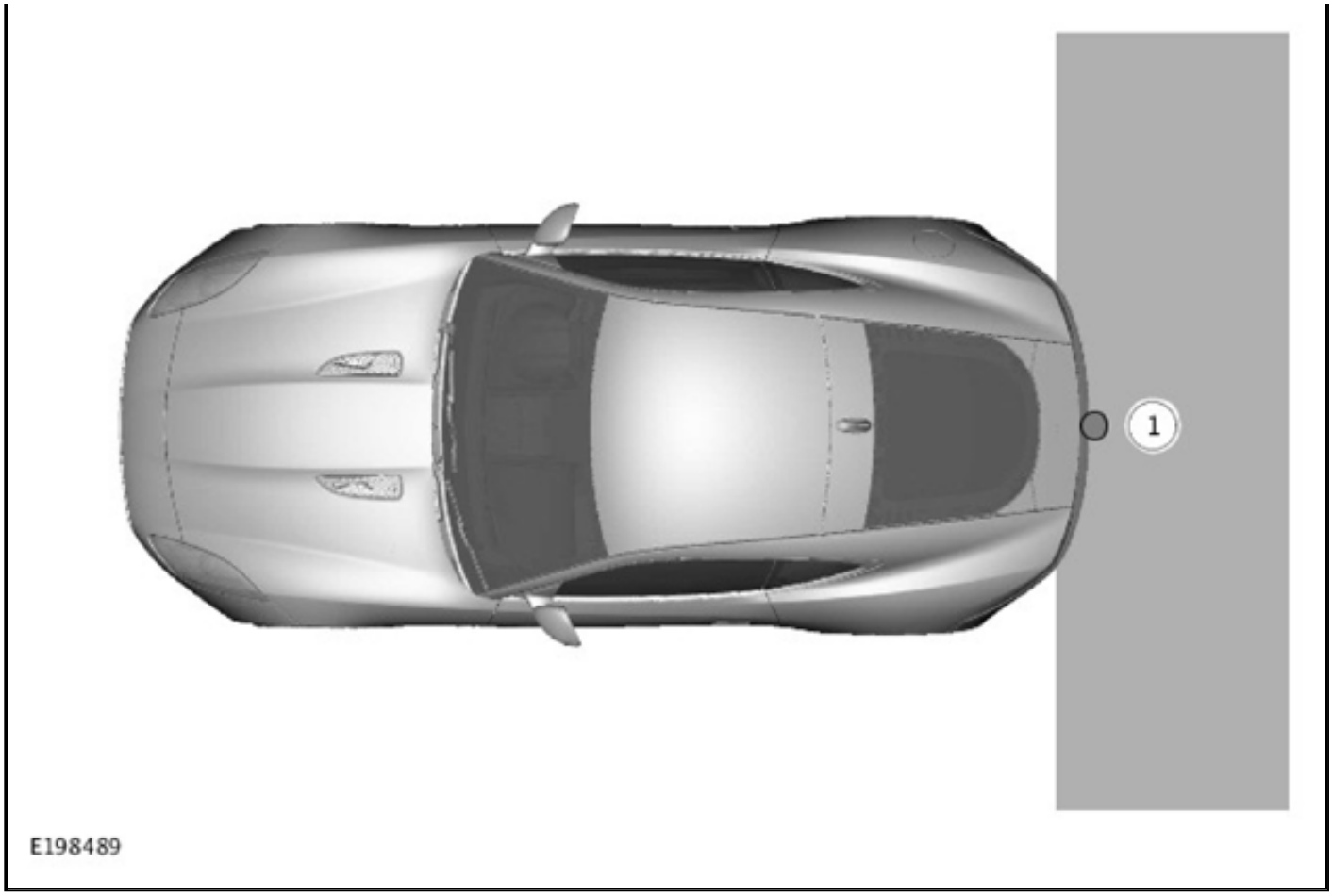
If the On-Board Diagnostic (OBD) system identifies a failure, the following warnings will be apply:

- The Touch Screen (TS) displays an error message.
- The front audio system speakers will emit a 3 second continuous tone.
- A Diagnostic Trouble Code (DTC) is logged in the Parking Assist Control Module (PACM).

The PACM has a diagnostic connection via the High Speed (HS) Controller Area Network (CAN) chassis systems bus to enable DTCs to be retrieved using the Jaguar approved diagnostic equipment. Additionally an OBD routine within the PACM constantly monitors the system. The PACM 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 Light Emitting Diode (LED) will also flash six times when Reverse (R) gear is selected or the parking aid system switch is operated.

REAR VIEW CAMERA

Rear View Camera Coverage Zone



ITEM	DESCRIPTION
1	Rear View Camera (RVC) coverage zone

The Rear View Camera (RVC) receives power at all times when the ignition is switched on or the engine is running. When Reverse (R) gear is selected the RVC receives a reverse gear selected signal on the High Speed (HS) Controller Area Network (CAN) comfort systems bus from the Body Control Module/Gateway Module (BCM/GWM) assembly. The RVC then sends the camera view on a Low-Voltage Differential Signalling (LVDS) connection to the Infotainment Master Controller (IMC).

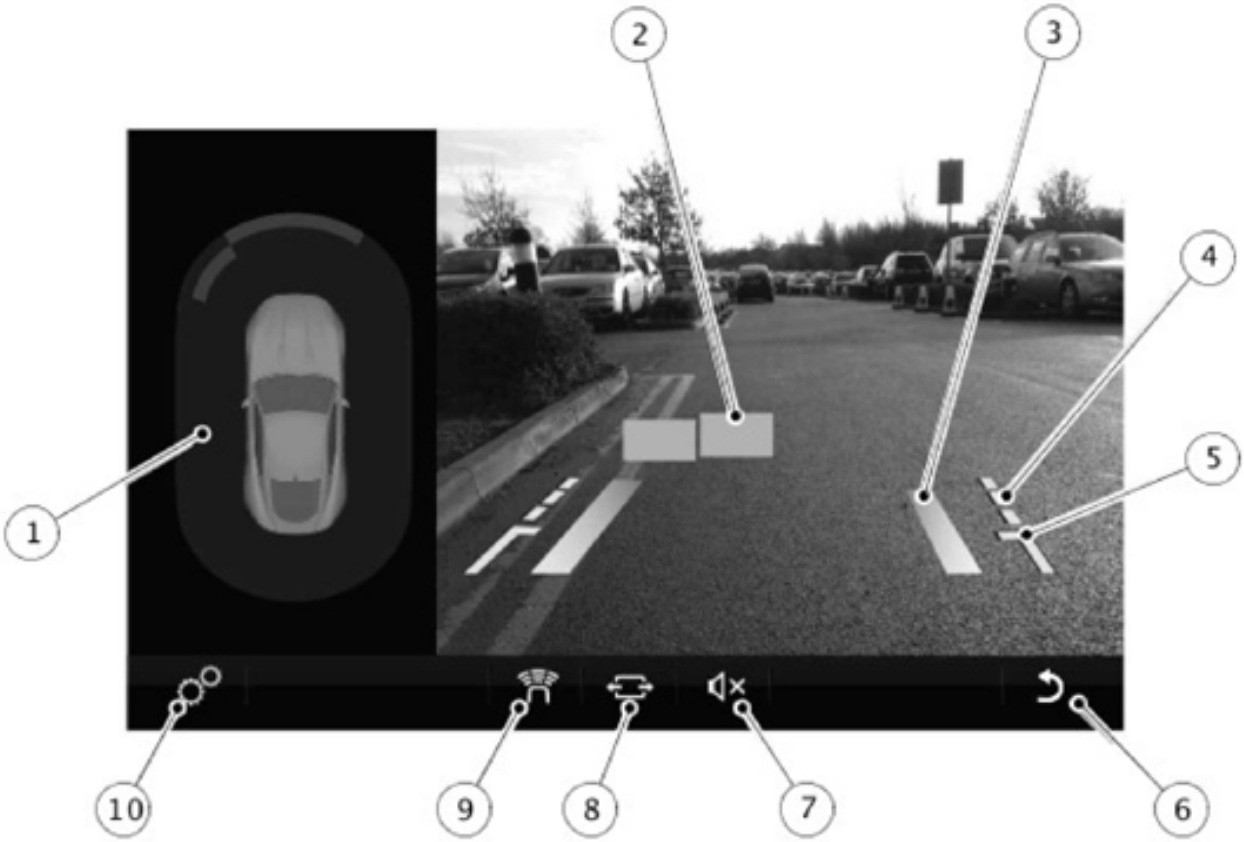
The RVC provides additional information to the driver when reversing the vehicle. When Reverse (R) gear is selected the IMC automatically displays a wide-angle color image of the view from the rear of the vehicle on the Touch Screen (TS).

The IMC gathers the camera images and analyses and alters them by adjusting perspectives and applying corrections. The IMC also adds guidance and warning overlays to the camera images to create the various driving aid features supported by the RVC system. For example, visual direction is made available when reversing the vehicle.

The resulting processed images are then relayed to the TS via an Automotive Pixel Link 2 (APIX 2) connection.

When Reverse (R) gear is deselected, the camera image remains on the TS for 5 seconds. This is to prevent the TS switching between screens if the vehicle is being maneuvered 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 TS.

Rear View Camera Image



ITEM	DESCRIPTION
1	Parking aid plan view
2	Parking aid information
3	Parking guidance solid line
4	Parking guidance dashed line
5	Luggage compartment access guideline
6	Return to previous menu
7	Volume softkey
8	Camera softkey
9	Parking guidance softkey
10	Settings softkey

The Rear View Camera (RVC) provides additional information to the driver when reversing the vehicle. When Reverse (R) gear is selected the RVC automatically displays a wide-angle color image of the view from the rear of the vehicle onto the Touch Screen (TS). Overlay graphics are displayed by a combination of signals received on the High Speed (HS) Controller Area Network (CAN) comfort systems bus to the Infotainment Master Controller (IMC).

The rear view images are overlaid with:

- Colored bars representing the distance between the vehicle and the object being approached. Working in conjunction with the rear parking aid sensors, this adds a visual representation to the existing audible warning. The Body Control Module/Gateway Module (BCM/GWM) assembly receives distance data on the HS CAN chassis systems bus from the Parking Assist Control Module (PACM) and forwarded to the IMC on the HS CAN comfort systems bus.

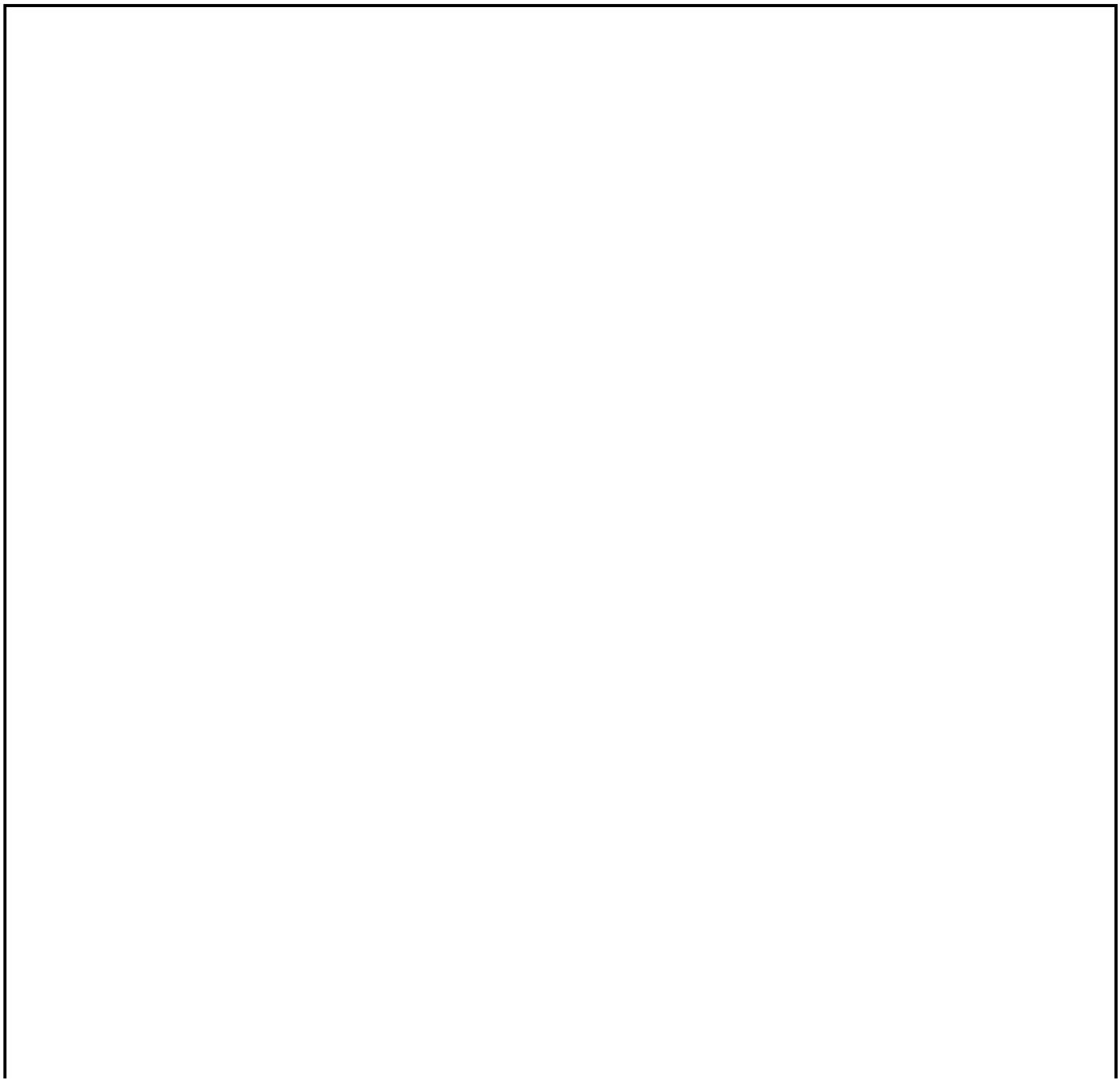
- Solid lines representing the predicted trajectory of the vehicle. The predicted trajectory is calculated from the Steering Angle Sensor Module (SASM) signals.
- Dashed lines representing the perimeter of the vehicle, including the door mirrors.
- Luggage compartment access guideline: Do not reverse beyond this point, if luggage compartment access is required.

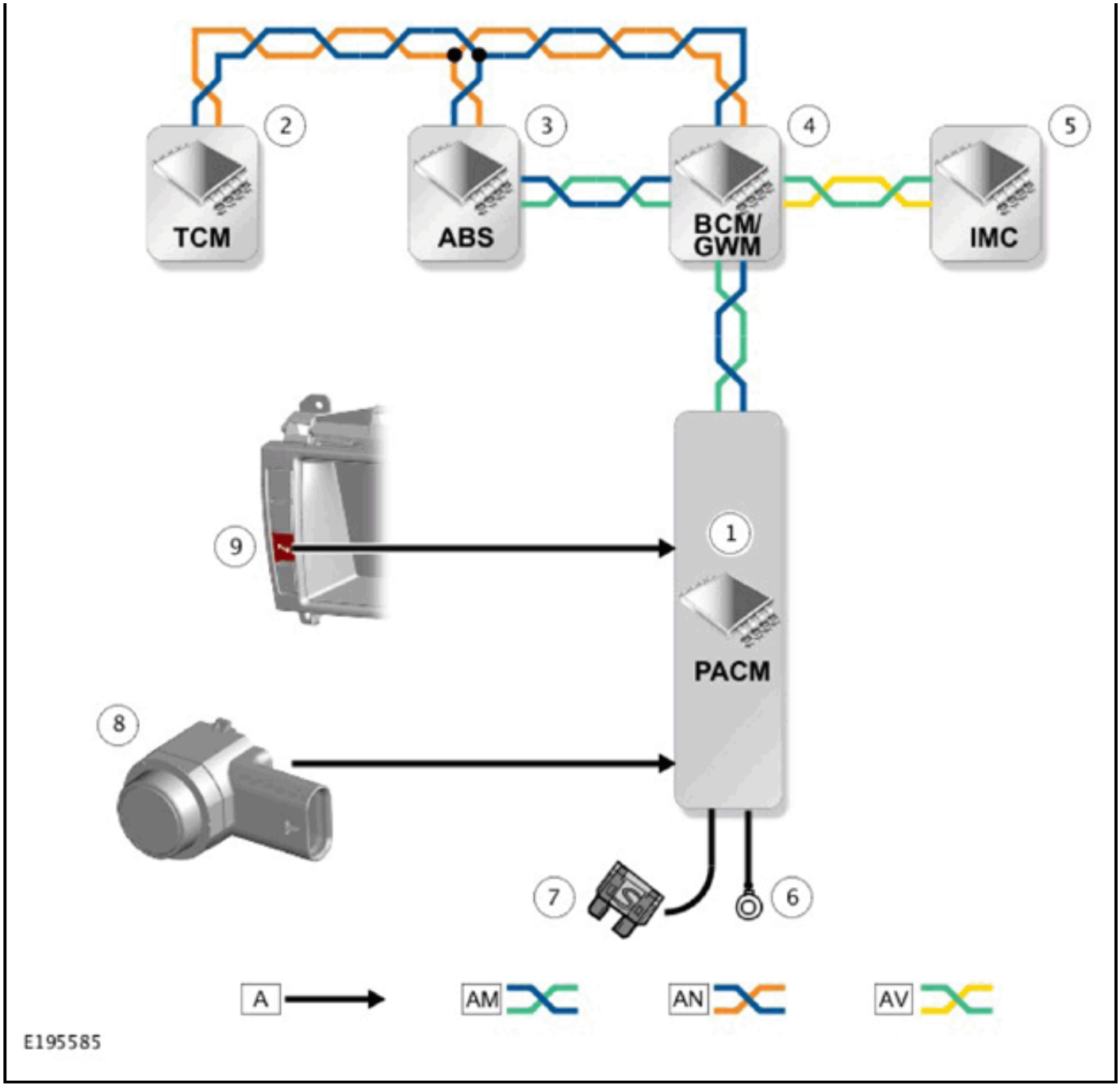
The softkeys under the rear view camera image provide the following features:

- Settings softkey: Touch to select the Camera settings menu.
- Parking guidance softkey: Touch to switch the parking guidance graphics on or off.
- Camera softkey: Touch to select wider or narrower view of the camera image.
- Volume softkey: Touch to mute the volume of the parking aid warning tones.

CONTROL DIAGRAM

CONTROL DIAGRAM - 1 OF 3 - PARKING AID SYSTEM



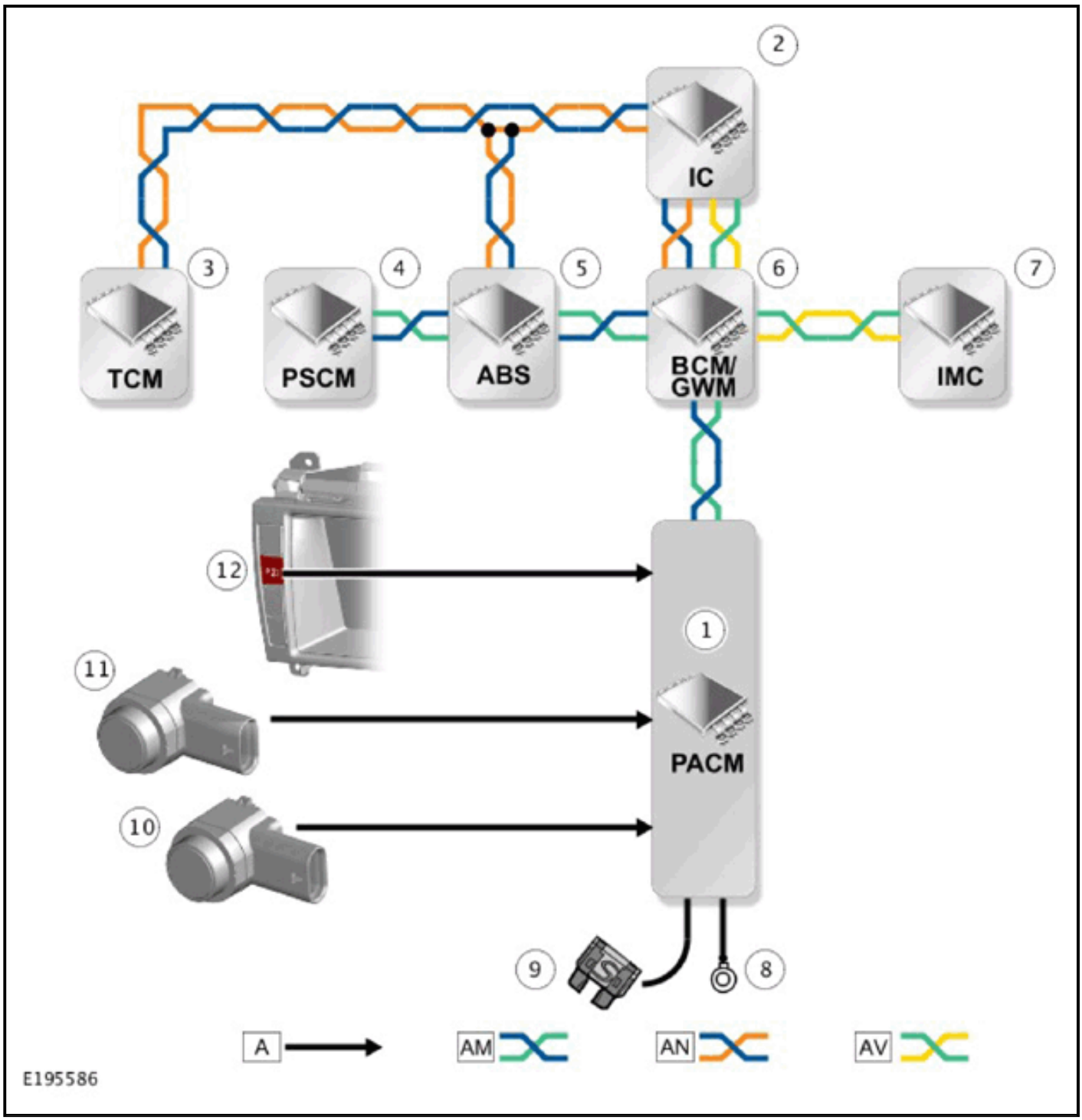


A = HARDWIRED, AM = HIGH SPEED (HS) CONTROLLER AREA NETWORK (CAN) CHASSIS SYSTEMS BUS, AN = HIGH SPEED (HS) CONTROLLER AREA NETWORK (CAN) POWERTRAIN SYSTEMS BUS, AV = HIGH SPEED (HS) CONTROLLER AREA NETWORK (CAN) COMFORT SYSTEMS BUS.

ITEM	DESCRIPTION
1	Parking Assist Control Module (PACM)
2	Transmission Control Module (TCM)
3	Anti-lock Brake System (ABS) control module
4	Body Control Module/Gateway Module (BCM/GWM) assembly
5	Infotainment Master Controller (IMC)
6	Power Supply
7	Ground
8	Parking aid sensor (8 off)

ITEM	DESCRIPTION
9	Parking aid switch

CONTROL DIAGRAM - 2 OF 3 - PARK ASSIST SYSTEM

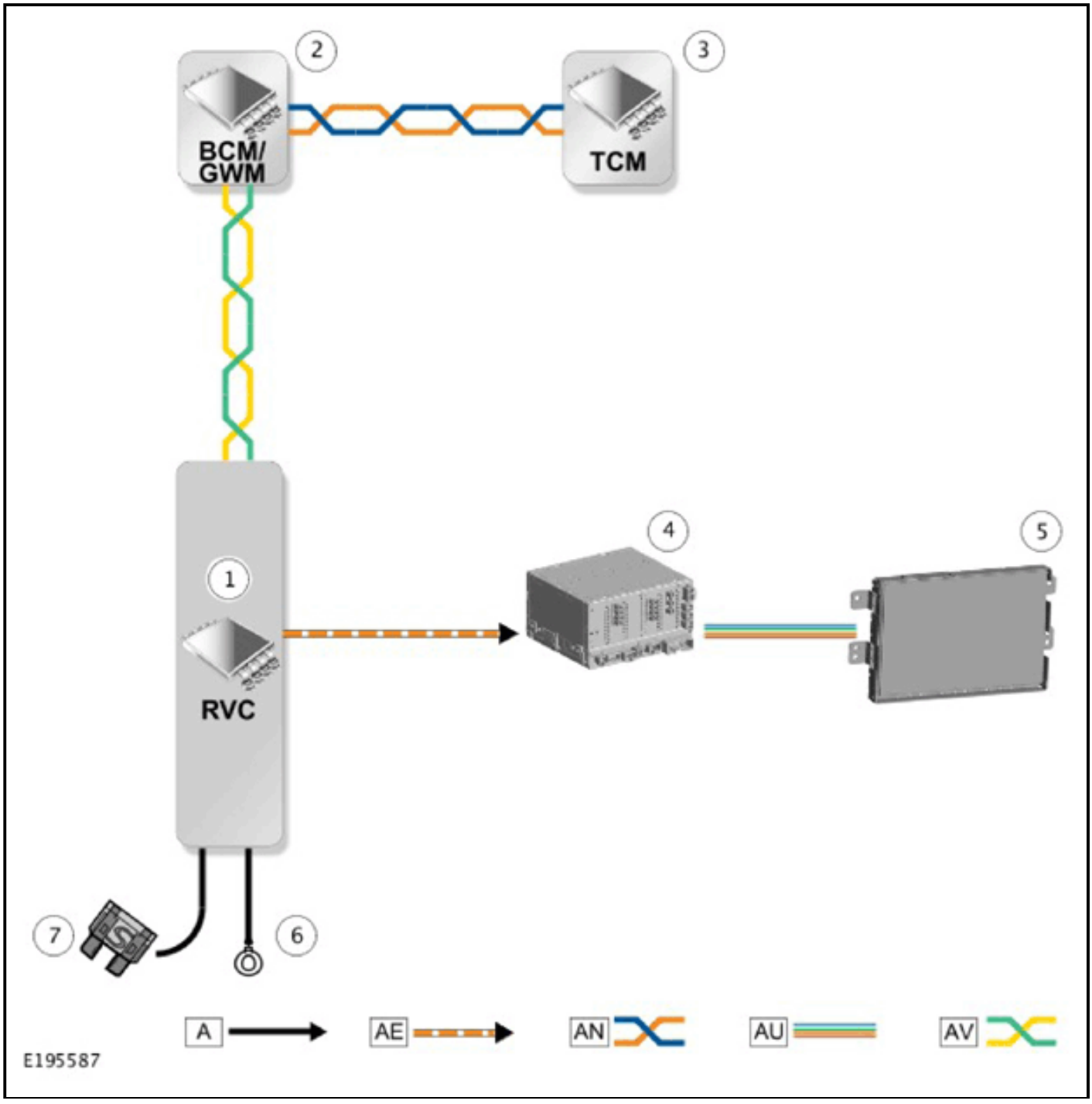


A = HARDWIRED, AM = HIGH SPEED (HS) CONTROLLER AREA NETWORK (CAN) CHASSIS SYSTEMS BUS, AN = HIGH SPEED (HS) CONTROLLER AREA NETWORK (CAN) POWERTRAIN SYSTEMS BUS, AV = HIGH SPEED (HS) CONTROLLER AREA NETWORK (CAN) COMFORT SYSTEMS BUS.

ITEM	DESCRIPTION
1	Parking Assist Control Module (PACM)
2	Instrument Cluster (IC)

ITEM	DESCRIPTION
3	Transmission Control Module (TCM)
4	Power Steering Control Module (PSCM)
5	Anti-lock Brake System (ABS) control module
6	Body Control Module/Gateway Module (BCM/GWM) assembly
7	Infotainment Master Controller (IMC)
8	Ground
9	Power supply
10	Park assist sensor (2 off)
11	Parking aid sensor (8 off)
12	Park assist switch

CONTROL DIAGRAM - 3 OF 3 - REAR VIEW CAMERA



A = HARDWIRED, AE = LOW-VOLTAGE DIFFERENTIAL SIGNALLING (LVDS), AN = HIGH SPEED (HS) CONTROLLER AREA NETWORK (CAN) POWERTRAIN SYSTEMS BUS, AU = AUTOMOTIVE PIXEL LINK 2 (APIX2), AV = HIGH SPEED (HS) CONTROLLER AREA NETWORK (CAN) COMFORT SYSTEMS BUS.

ITEM	DESCRIPTION
1	Rear View Camera (RVC)
2	Body Control Module/Gateway Module (BCM/GWM) assembly
3	Transmission Control Module (TCM)
4	Infotainment Master Controller (IMC)
5	Touch Screen (TS)
6	Ground
7	Power supply

DIAGNOSIS AND TESTING

PARKING AID

PRINCIPLES OF OPERATION

For a detailed description of the parking aid system, characteristics and limitations refer to the relevant description and operation service information, refer to **DESCRIPTION AND OPERATION**.

PARKING AID SYSTEM ON-BOARD SELF-TEST

As part of the strategy of the system if any DTC's 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

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

CAUTION:

- **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, refer to **Visual Inspection**.
3. Ensure that the parking aid sensor face is clear of contamination that could affect the performance of the sensor
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**.

VISUAL INSPECTION

MECHANICAL	ELECTRICAL

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

SYMPTOM CHART

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

NOTE:

- **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

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

SYMPTOM	POSSIBLE CAUSES	ACTION
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 • Using Datalogger identify the position of the suspect parking aid sensor within the bumper • 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

SYMPTOM	POSSIBLE CAUSES	ACTION
		• 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 symptom's are present • Attempt to remove the harness connector 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 • Inspect and provide details in claim if the suspect sensor harness connector has any sign of water ingress/corrosion • 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 • 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 • 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 • 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 • Refit the parking aid sensors to their original position in the bumper • Reconnect the parking aid sensor to the bumper harness connector. Reconnect main harness connector and refit the bumper • Repeat Step 1. If fault is still present, **replace only the faulty sensor**

PINPOINT TEST

PINPOINT TEST A: Parking Aid System Not Functioning Correctly With No DTCS Logged

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 service information.

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

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 service information.

Refer to Parking Aid - **DESCRIPTION AND OPERATION**.

DTC INDEX

For a list of diagnostic trouble codes that could be logged on this vehicle, refer to **Diagnostic Trouble Code (DTC) Index - DTC: Parking Aid Control Module (PACM)** .

PROXIMITY CAMERA (REAR VIEW CAMERA)

PRINCIPLES OF OPERATION

For a detailed description of the rear view camera system, refer to the relevant description and operation service information, refer to **REAR VIEW CAMERA**.

INSPECTION AND VERIFICATION

CAUTION: **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.**

NOTE:

- **If a control module or a component is suspect and the vehicle remains under manufacturer warranty, 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.**
- **When performing voltage or resistance tests, always use a digital multimeter accurate to three decimal places, and with an up-to-date calibration certificate.**

When testing resistance always take the resistance of the digital multimeter leads into account.

- **Check and rectify basic faults before beginning diagnostic routines involving pinpoint tests.**

1. Verify the customer concern
2. Visually inspect for obvious signs of damage and system integrity, refer to **Visual Inspection**.
3. If an obvious cause for an observed or reported concern is found, correct the cause (if possible) before proceeding to the next step
4. If the cause is not visually evident, verify the symptom and refer to the **SYMPTOM CHART**, alternatively check for Diagnostic Trouble Codes (DTCs) and refer to the **DTC INDEX**.
5. 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.

VISUAL INSPECTION

MECHANICAL	ELECTRICAL
• Touch screen • Infotainment master controller (where fitted) • Audio head unit (where fitted) • Rear view camera/Low line camera	• Fuses • Wiring harnesses and connectors • Touch screen • Infotainment master controller (where fitted) • Audio head unit (where fitted) • Rear view camera/Low line camera

SYMPTOM CHART

SYMPTOM	POSSIBLE CAUSE	ACTION
Rear view camera image slow to react	• System operation within specification	**NOTE:** **After selecting reverse, it may take up to 20 seconds for the image to be displayed.** • No further action necessary
Blank screen	• Touch screen fault • Rear view camera not functioning	• Using the manufacturer approved diagnostic system, check the infotainment master controller/audio head unit/touch screen (as fitted) for related DTCs and refer to the relevant DTC index • GO to to **Pinpoint Test A**.
Blue screen	• Video in signal absent	• GO to **Pinpoint Test B**.

SYMPTOM	POSSIBLE CAUSE	ACTION
No tracking lines	• Missing/invalid reverse gear signal • CAN fault	• Using the manufacturer approved diagnostic system, check the body control module for related DTCs and refer to the relevant DTC index • GO to **Pinpoint Test C**.
Frozen tracking lines	• CAN data gateway fault	• GO to **Pinpoint Test D**.

PINPOINT TESTS

PINPOINT TEST A: Permanent Blank Screen Tests

A1: PERMANENT BLANK SCREEN TEST 1

A blank screen is the default display when the rear view camera is not transmitting an image.

1. Refer to the applicable SYSTEM WIRING DIAGRAM(S) and check the power and ground connections to the rear view camera

Are the power and ground circuits within specification?

Yes : GO to A2.

No : Repair power or ground circuit as necessary

A2: PERMANENT BLANK SCREEN TEST 2

CAUTION: Do not probe the STP (Single twisted pair) cable connectors as they are prone to damage.

NOTE: A DC resistance measurement is not a reliable test method as the system operates at low voltage and high frequency.

1. Check the integrity of the rear view camera STP cable connectors (at rear view camera, the touch screen and in-line connectors)
2. Check the STP cable for excessive bending, clamping and insulation damage

Is the rear view camera STP cable disconnected or damaged?

Yes : Reconnect or install a new STP cable as necessary

No : Install a new rear view camera

NOTE:

PINPOINT TEST B: Blue Screen Tests

B1: BLUE SCREEN TEST 1

A blue screen is the default display when the video in signal is absent.

1. Select reverse gear and observe the touch screen

Is the touch screen blue?

Yes : Check the integrity of the rear view camera STP cable connectors (at rear view camera, the touch screen and in-line connectors), and retest

No : GO to **Pinpoint Test A**.

PINPOINT TEST C: Absent Tracking Lines Tests

C1: ABSENT TRACKING LINES TEST 1

1. Refer to the applicable SYSTEM WIRING DIAGRAM(S) and check the rear view camera CAN bus circuit for short circuit to ground, short circuit to power, open circuit, high resistance

Is a CAN bus circuit fault present?

Yes : Repair the CAN bus circuit as necessary

No : Install a new rear view camera

NOTE: **The vehicle may take 30 seconds (or 100m) to learn the steering center position after starting the engine. This is normal.**

PINPOINT TEST D: Frozen Tracking Lines Tests

D1: FROZEN TRACKING LINES TEST 1

1. Start the engine
2. Wait at least 30 seconds
3. Select reverse gear
4. Turn the steering wheel and observe the touch screen

Do the tracking lines react to steering input?

Yes : No fault present

No : Potential CAN data gateway fault

DTC INDEX

For a list of Diagnostic Trouble Codes (DTCs) that could be logged on this vehicle, refer to:

Diagnostic Trouble Code (DTC) Index - DTC: Rear View Camera (RVC) ,

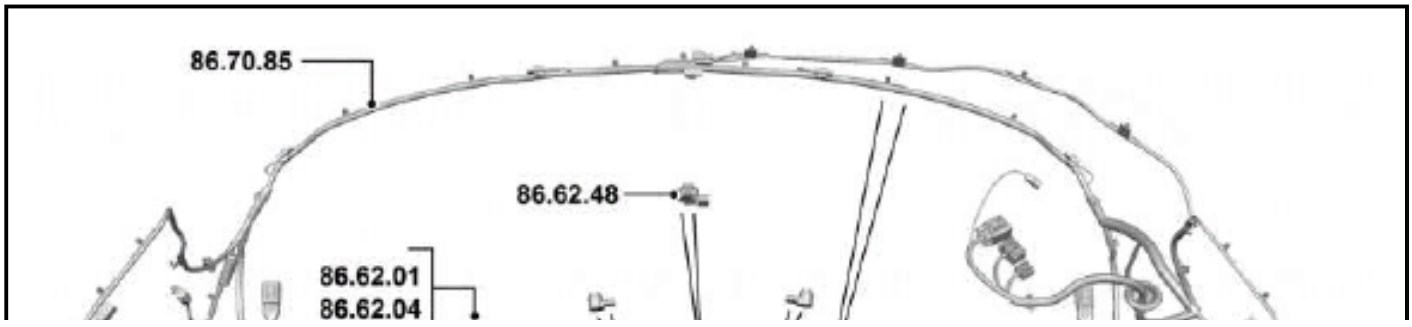
Diagnostic Trouble Code (DTC) Index - DTC: Touch Screen (TS) and

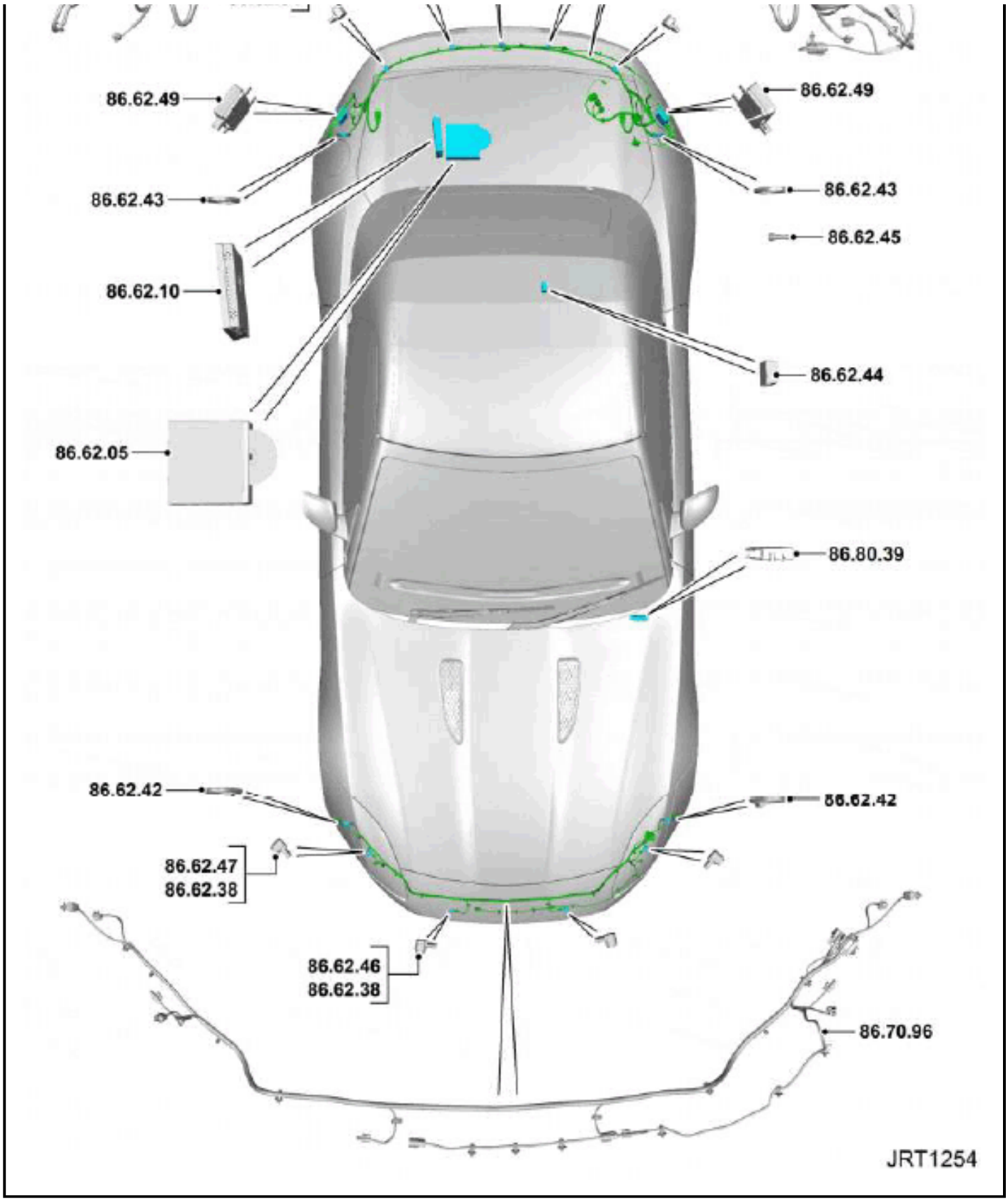
Diagnostic Trouble Code (DTC) Index - DTC: Infotainment Master Controller (IMC) .

REMOVAL AND INSTALLATION

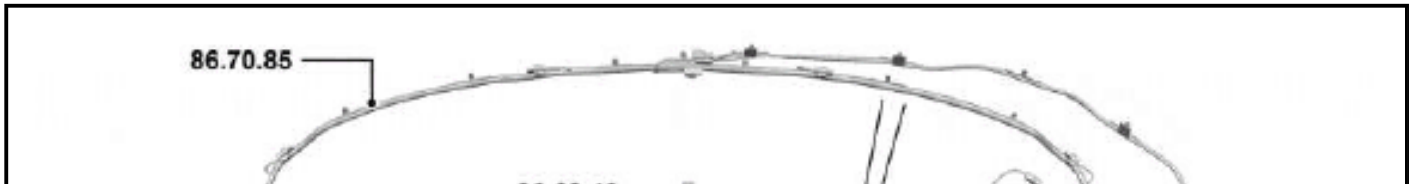
FRONT INNER PARKING AID SENSOR (G1584081)

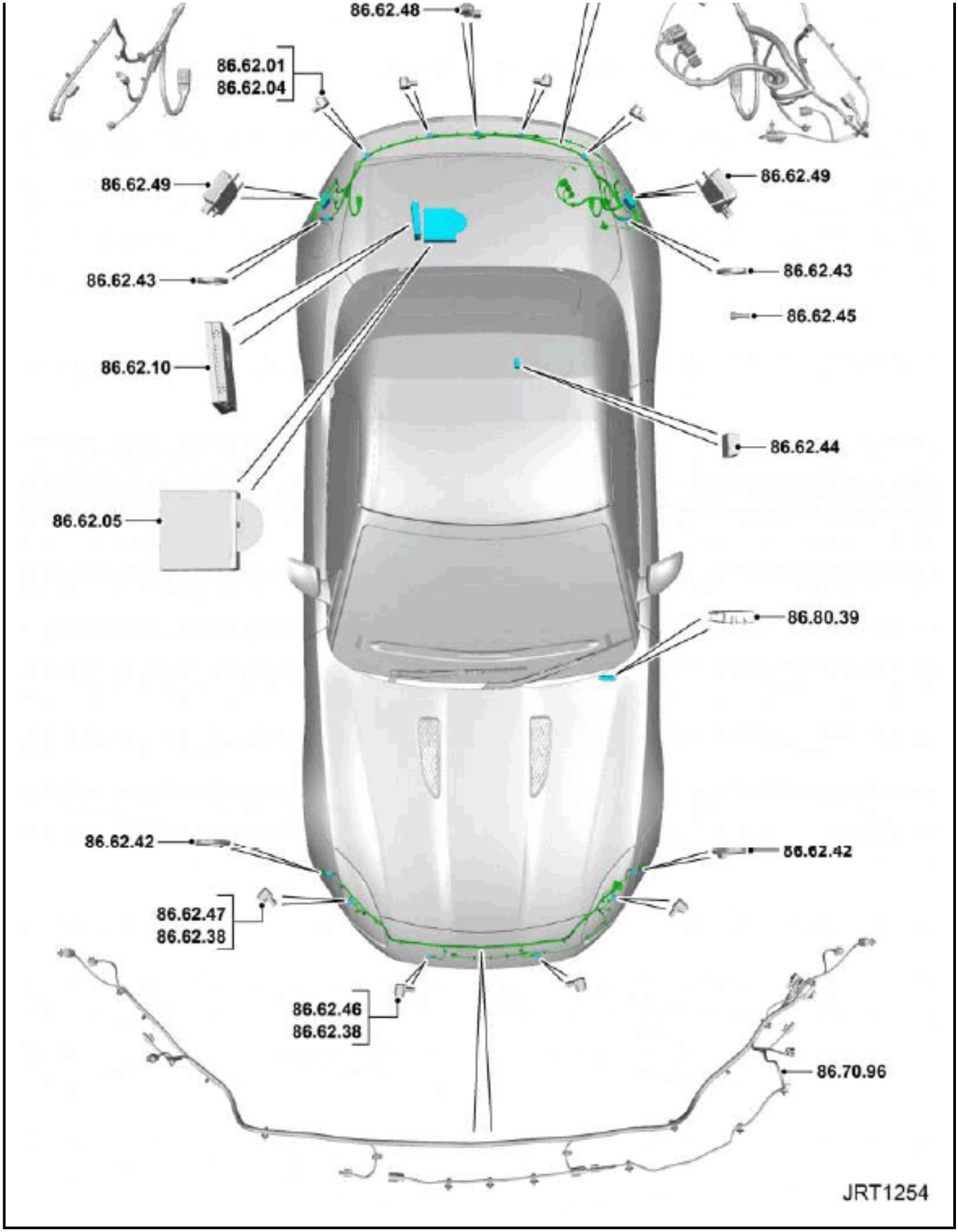
86.62.46	FRONT PARKING AID CONTROL SENSOR - INNER - RENEW	ALL DERIVATIVES	1.5





86.62.46	FRONT PARKING AID CONTROL SENSOR - INNER - RENEW	SVR	1.8





Removal

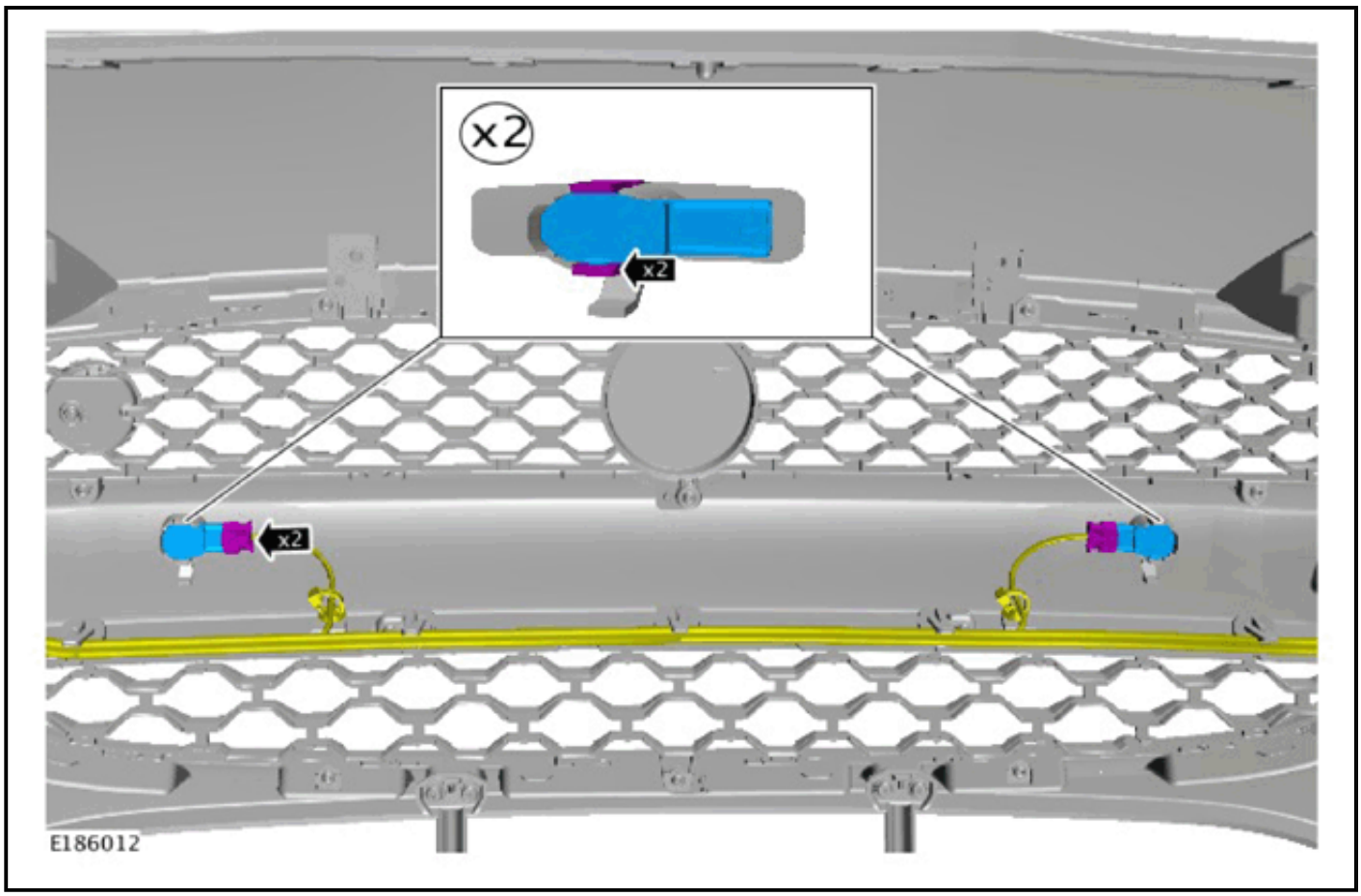
NOTE:

- **Some variation in the illustrations may occur, but the essential information is always correct.**
- **Some components shown removed for clarity.**
- **Removal steps in this procedure may contain installation details.**

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

   Raise and support the vehicle.

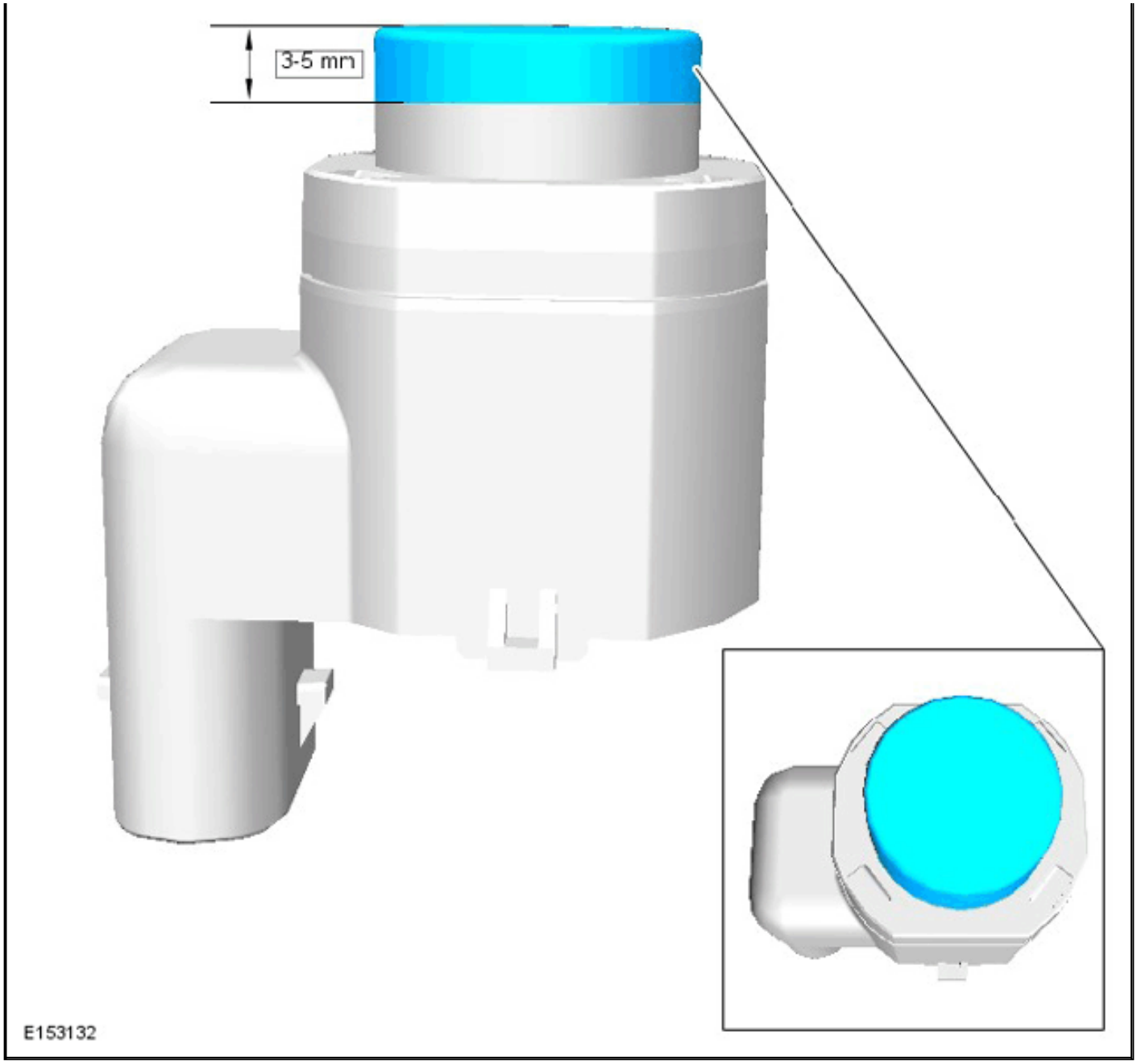
2. Refer to: **Front Bumper Cover** (Removal and Installation).



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.**

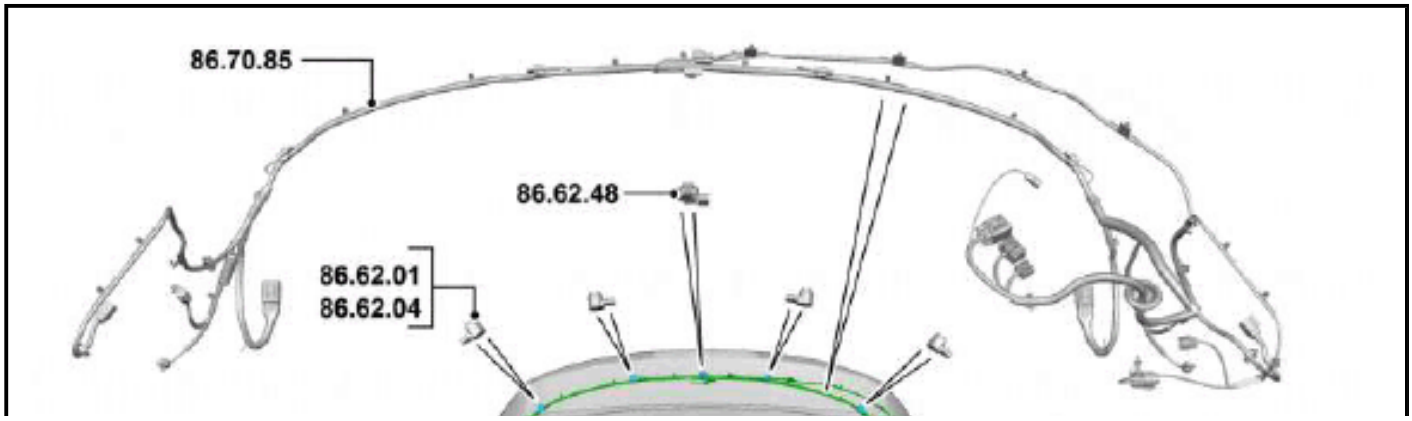
   NOTE: **On vehicles that are equipped with black or unpainted bumpers, the sensor(s) do not require painting.**

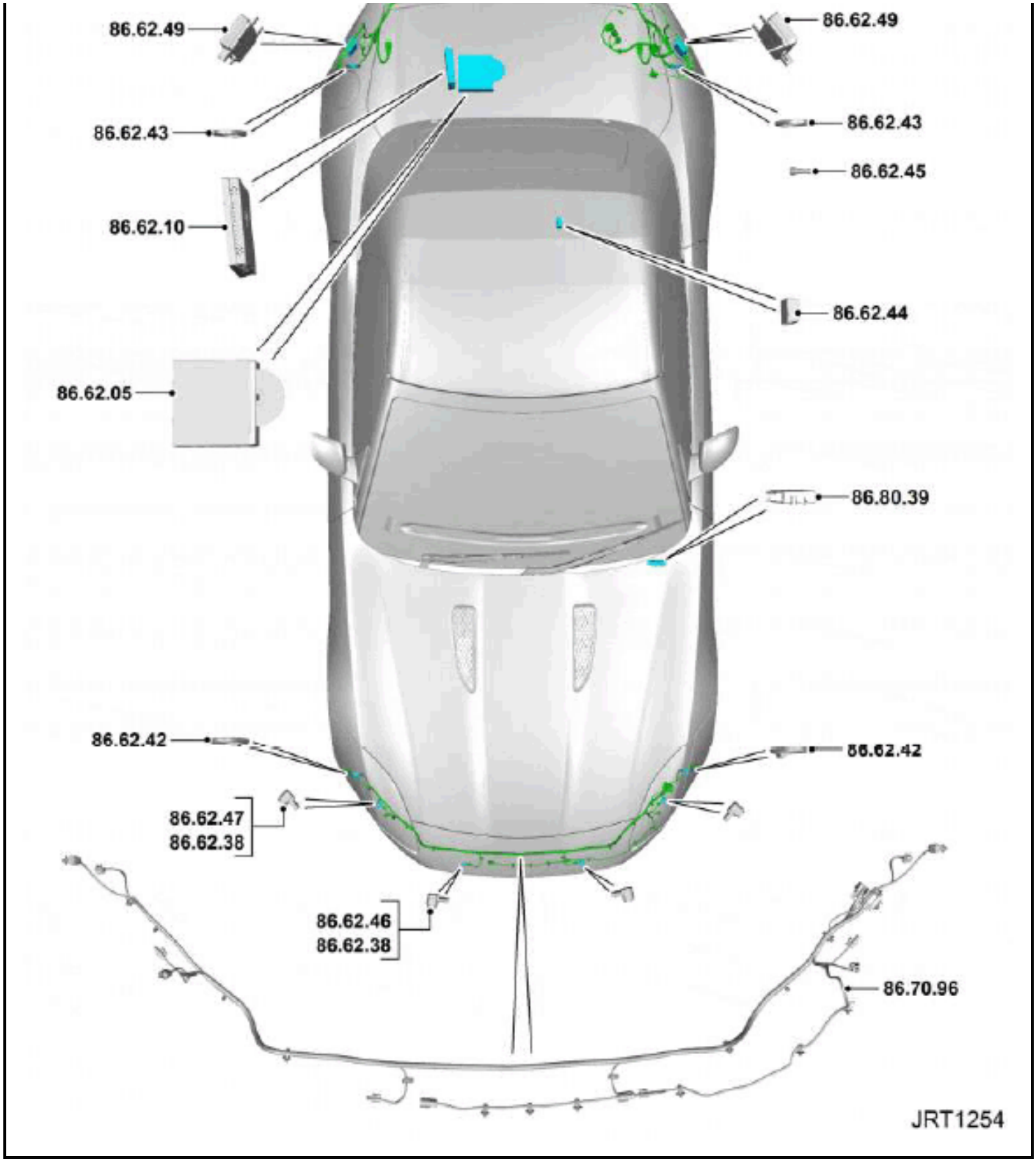


2. To install reverse the removal procedure.

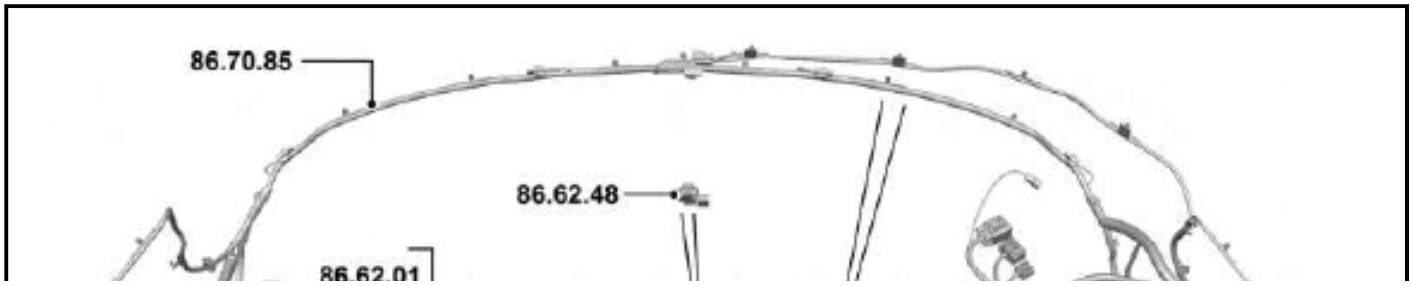
FRONT OUTER PARKING AID SENSOR (G1584082)

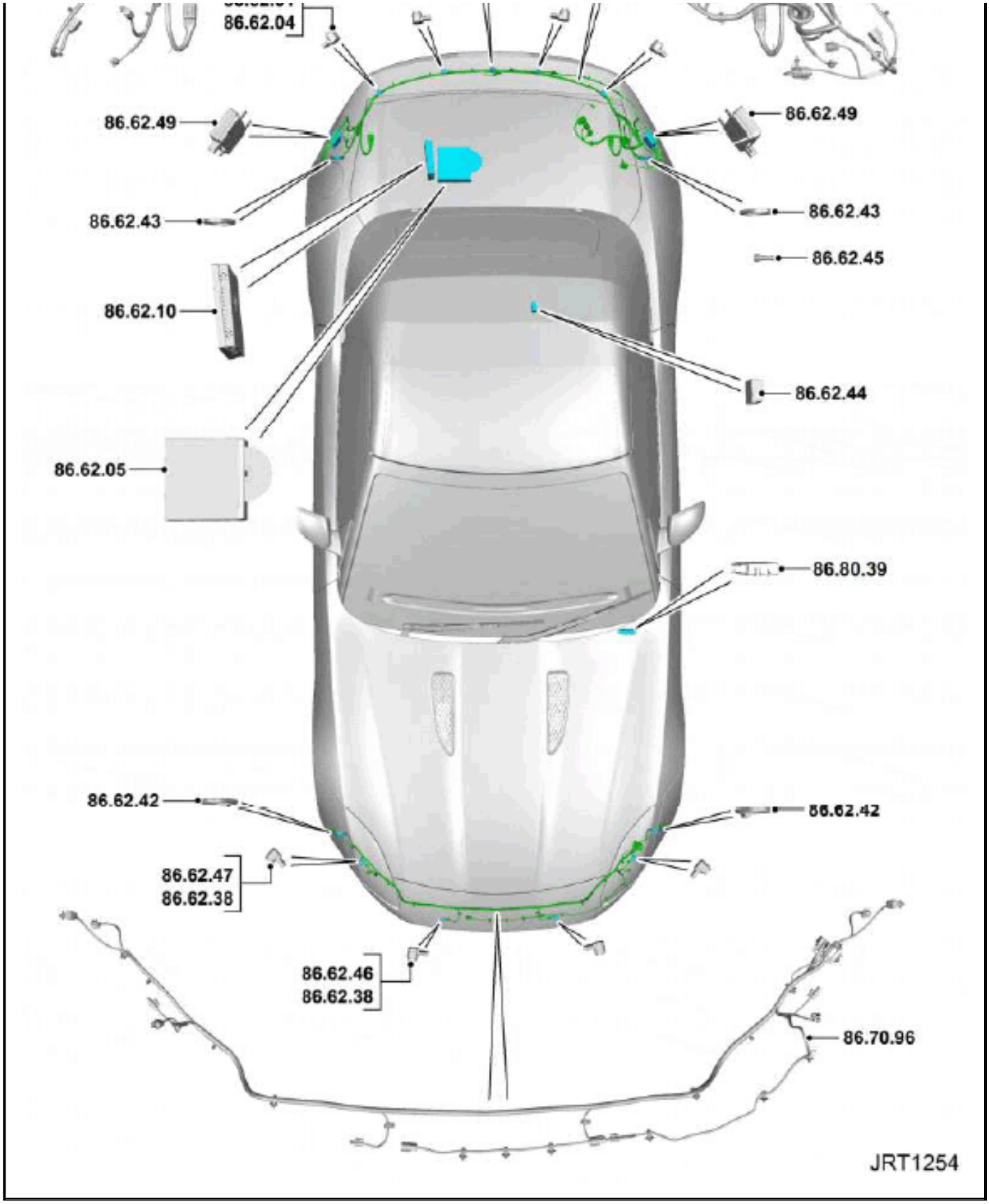
86.62.47	FRONT PARKING AID CONTROL SENSOR - OUTER - RENEW	ALL DERIVATIVES	1.5





86.62.47	FRONT PARKING AID CONTROL SENSOR - OUTER - RENEW	SVR	1.8





Removal

NOTE:

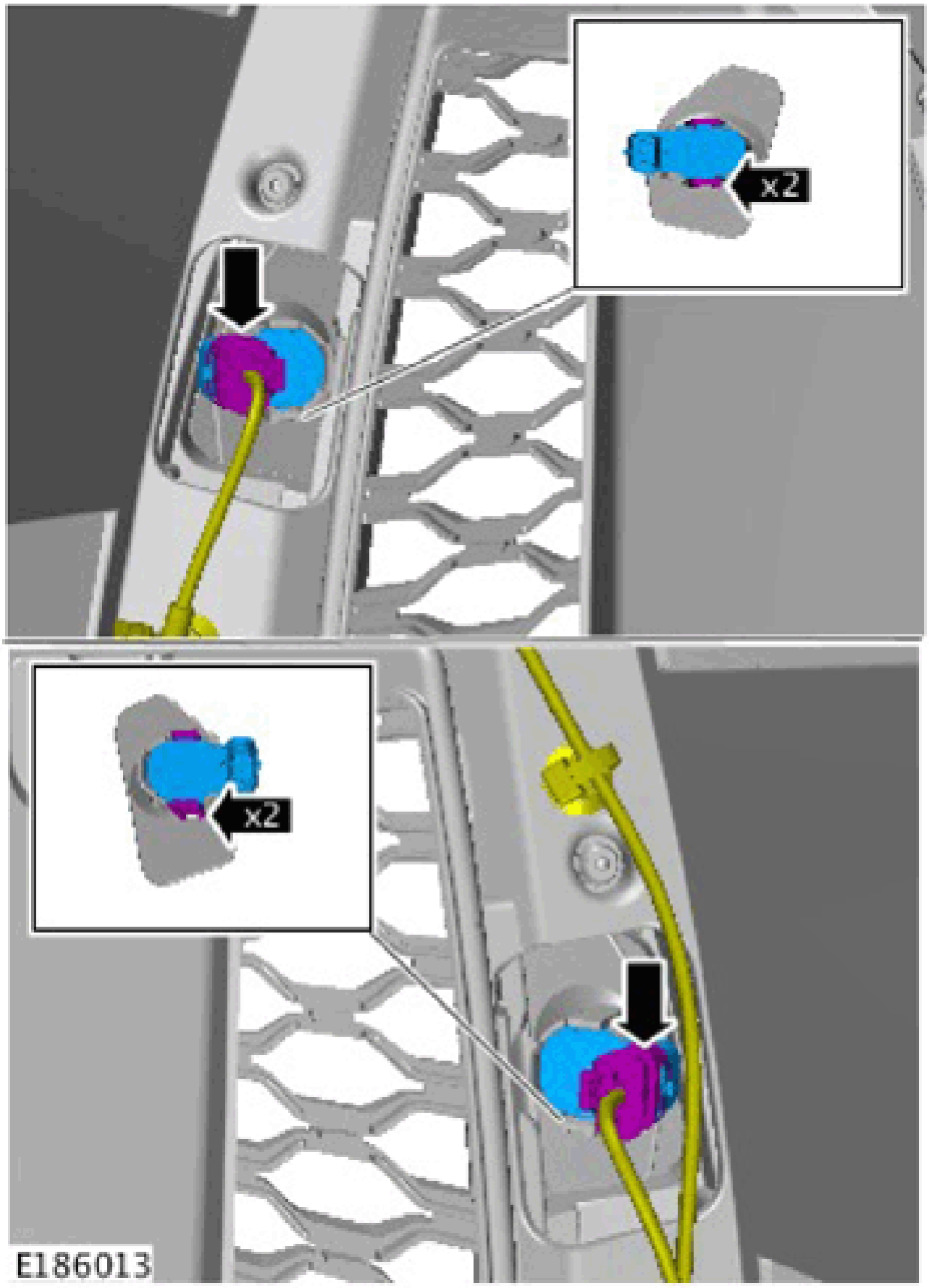
- **Some variation in the illustrations may occur, but the essential information is always correct.**
- **Some components shown removed for clarity.**

- **Removal steps in this procedure may contain installation details.**

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

   Raise and support the vehicle.

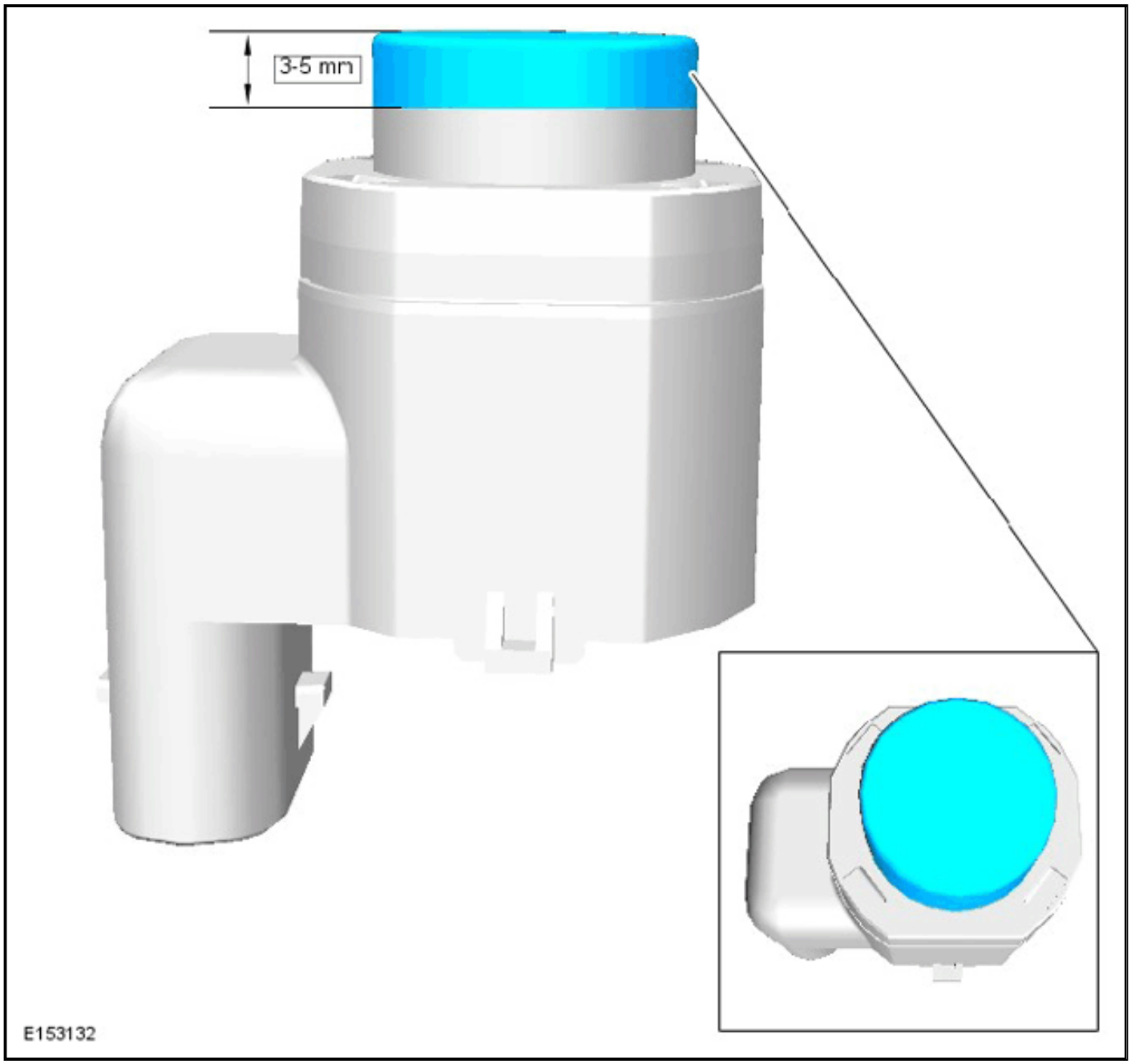
2. Refer to: **Front Bumper Cover** (Removal and Installation).



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.**

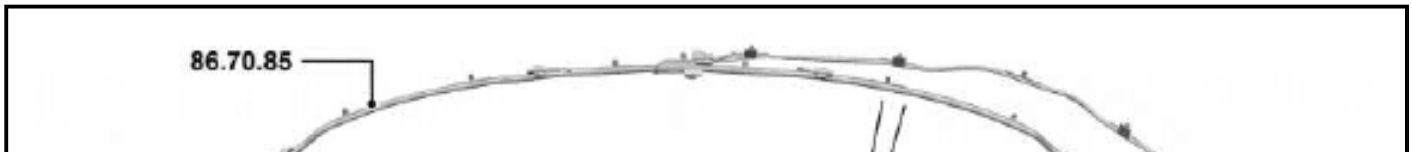
NOTE: **On vehicles that are equipped with black or unpainted bumpers, the sensor(s) do not require painting.**

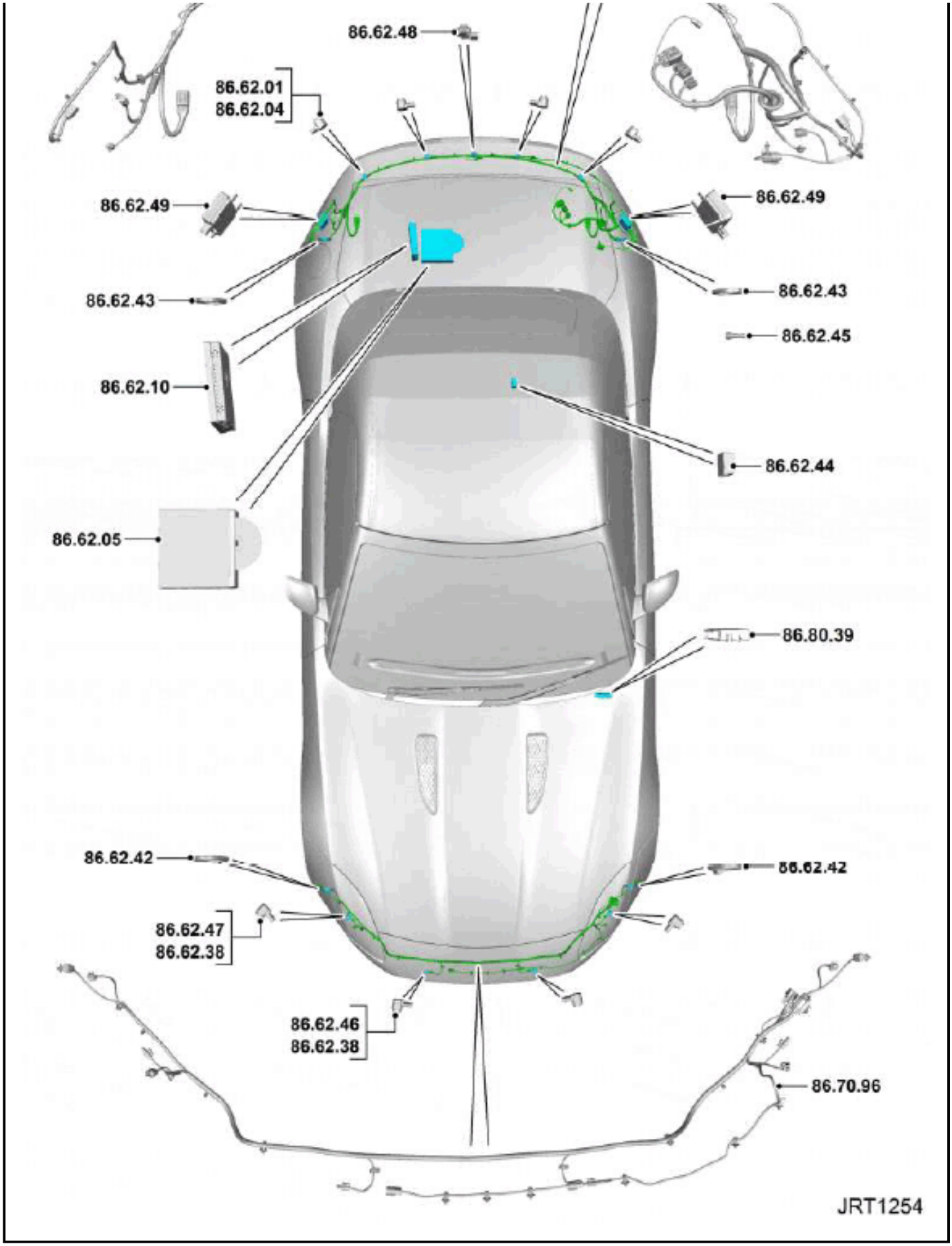


2. To install reverse the removal procedure.

PARKING AID CAMERA (G1584083)

86.62.48	REAR PARKING AID CAMERA - RENEW	CABRIOLET	1.6




86.62.48
86.62.01
86.62.04
86.62.49
86.62.49
86.62.43
86.62.43
86.62.45
86.62.10
86.62.44
86.62.05
86.80.39
86.62.42
86.62.42
86.62.47
86.62.38
86.62.46
86.62.38
86.70.96
JRT1254

Removal

NOTE: **Removal steps in this procedure may contain installation details.**

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

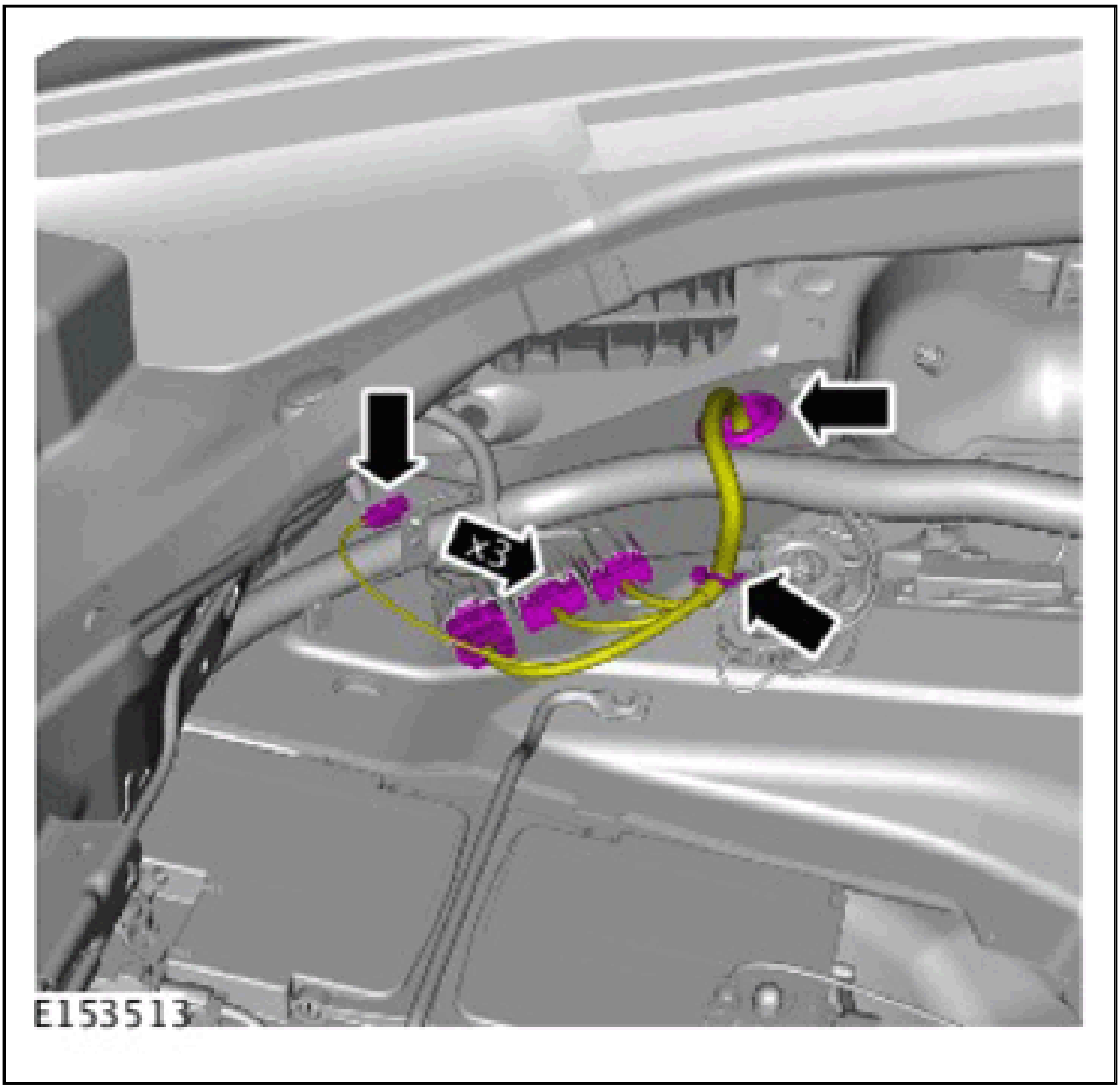
   Raise and support the vehicle.

2. **NOTE:** **The procedure must be carried out on both sides.**

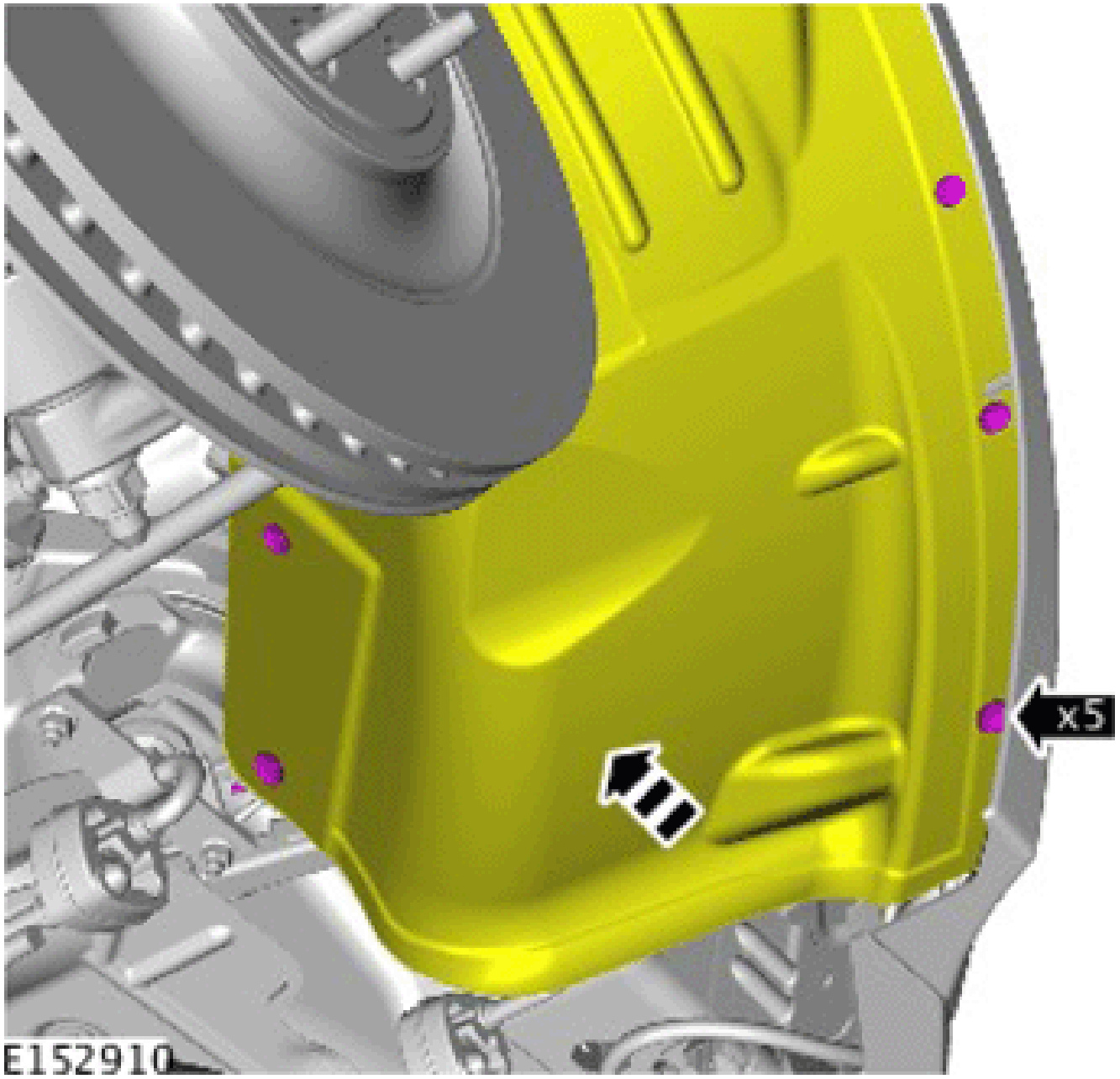
   Refer to: **Wheel and Tire** (Removal and Installation).

3. **NOTE:** **LH side only.**

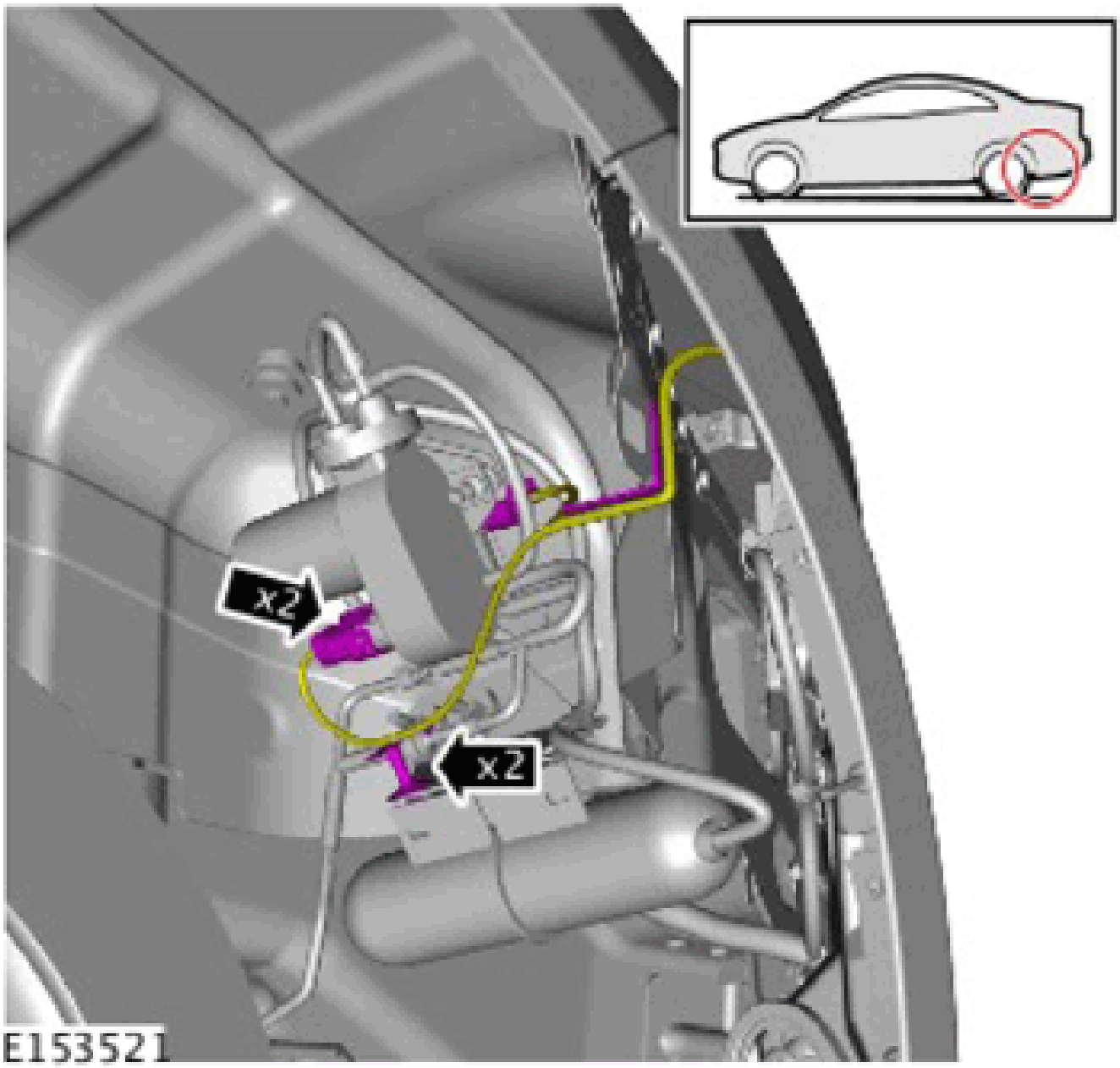
   Refer to: **Loadspace Trim Panel** (Removal and Installation).

4. 

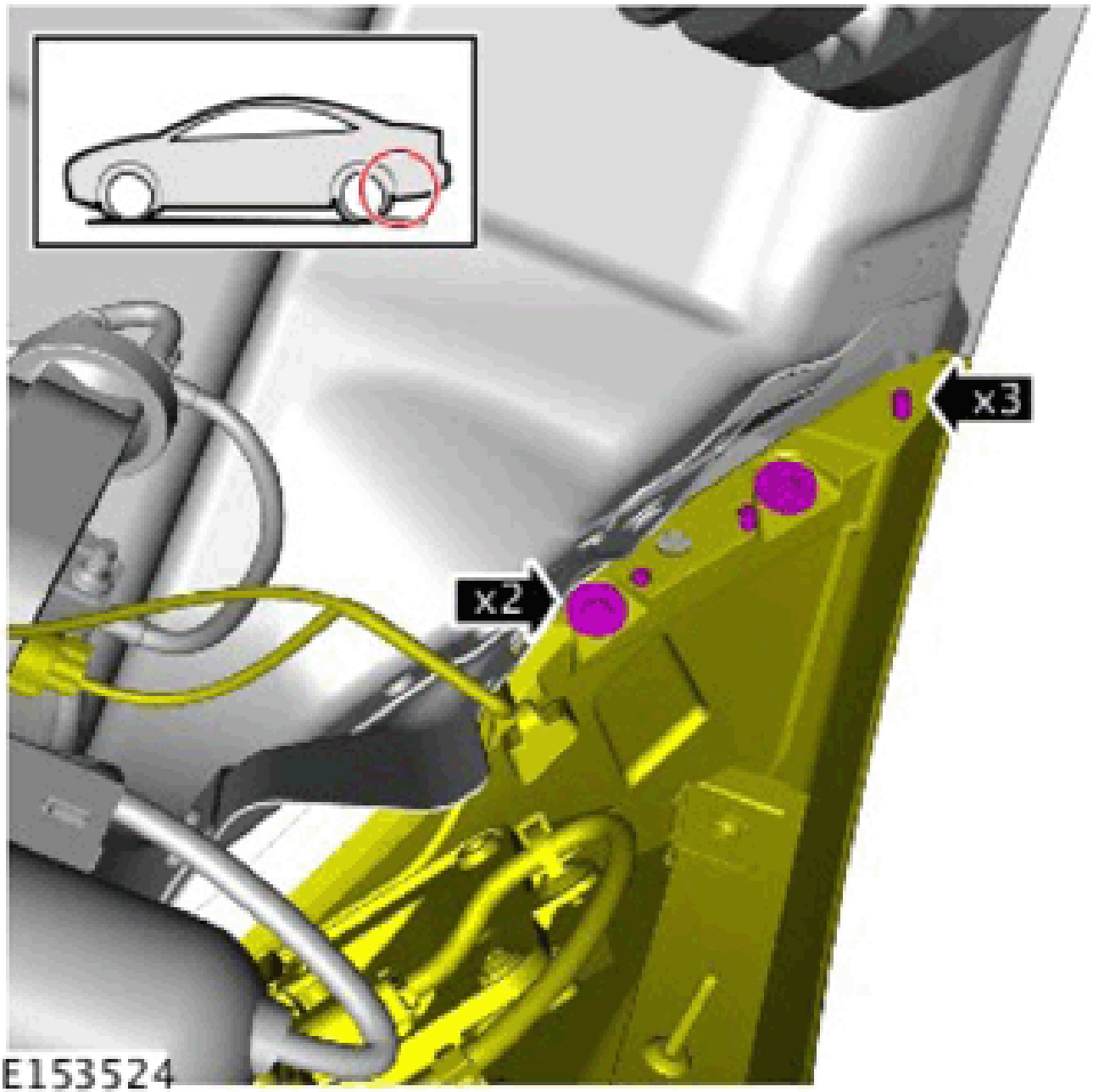
5. **NOTE:** **The step must be carried out on both sides.**



6.

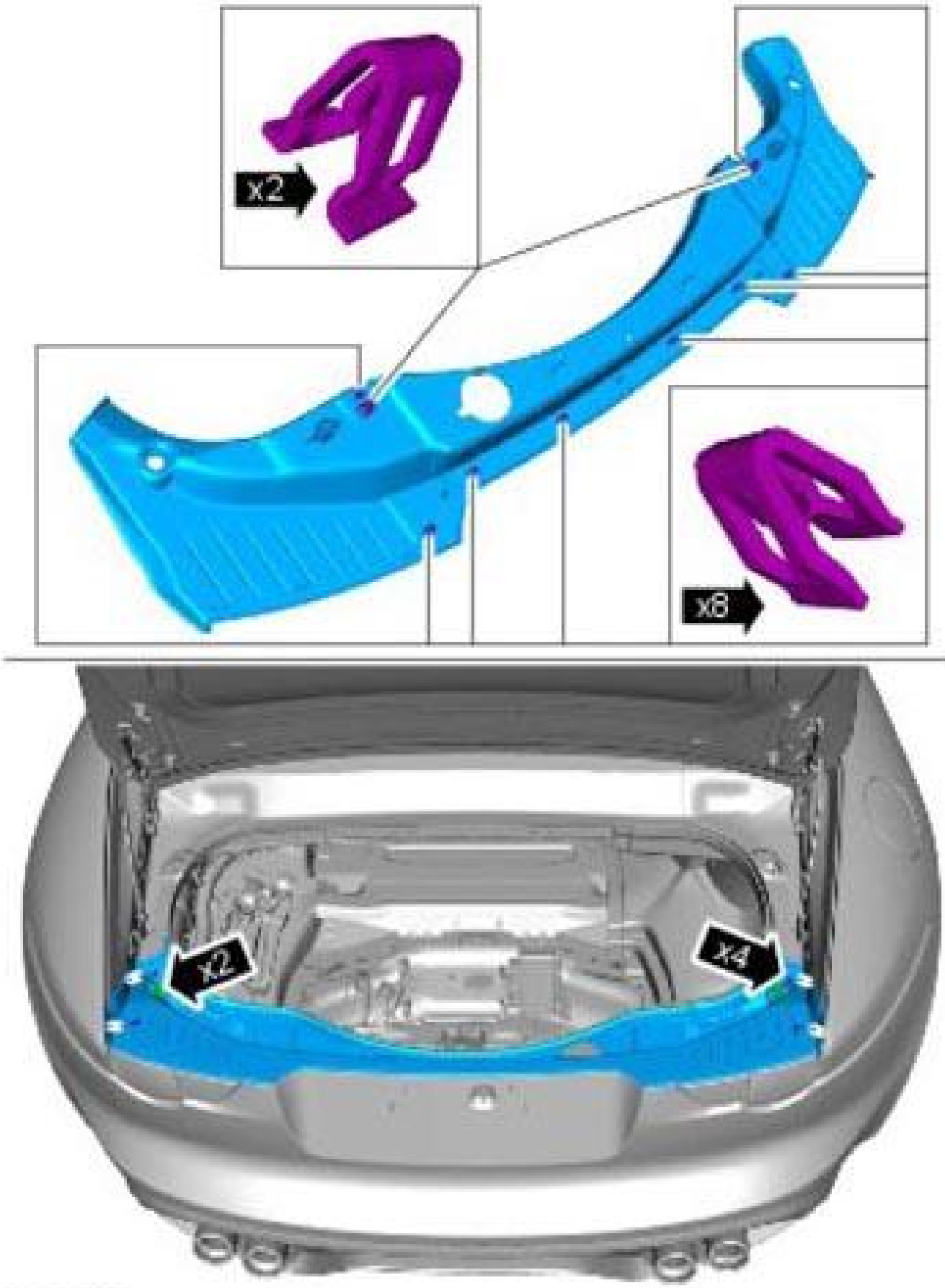


7. **NOTE:**
   - **The step must be carried out on both sides.**
   - **Make sure that the component is installed to the noted removal position.**



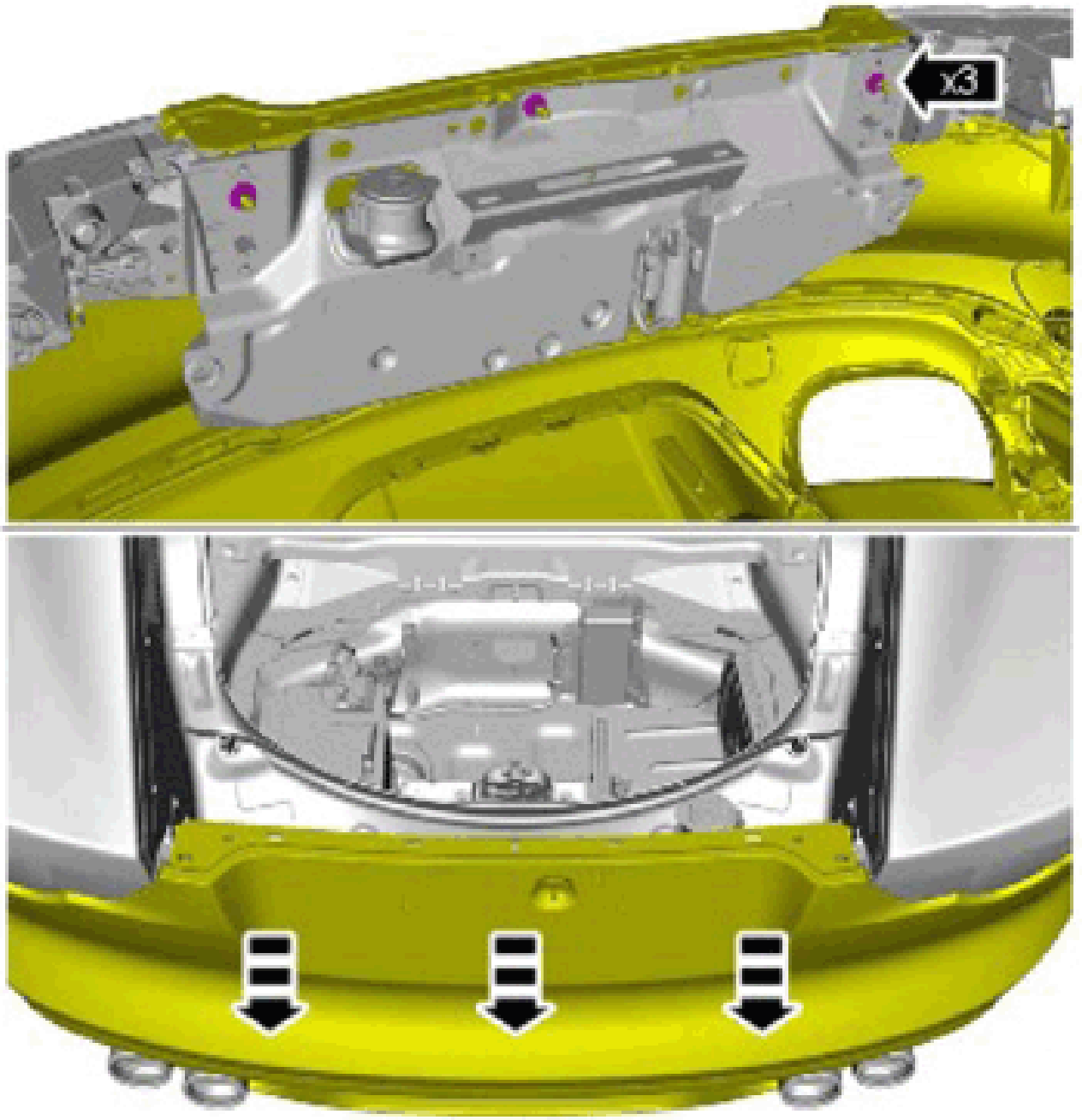
Torque Specification: **4.1 Nm**

8.



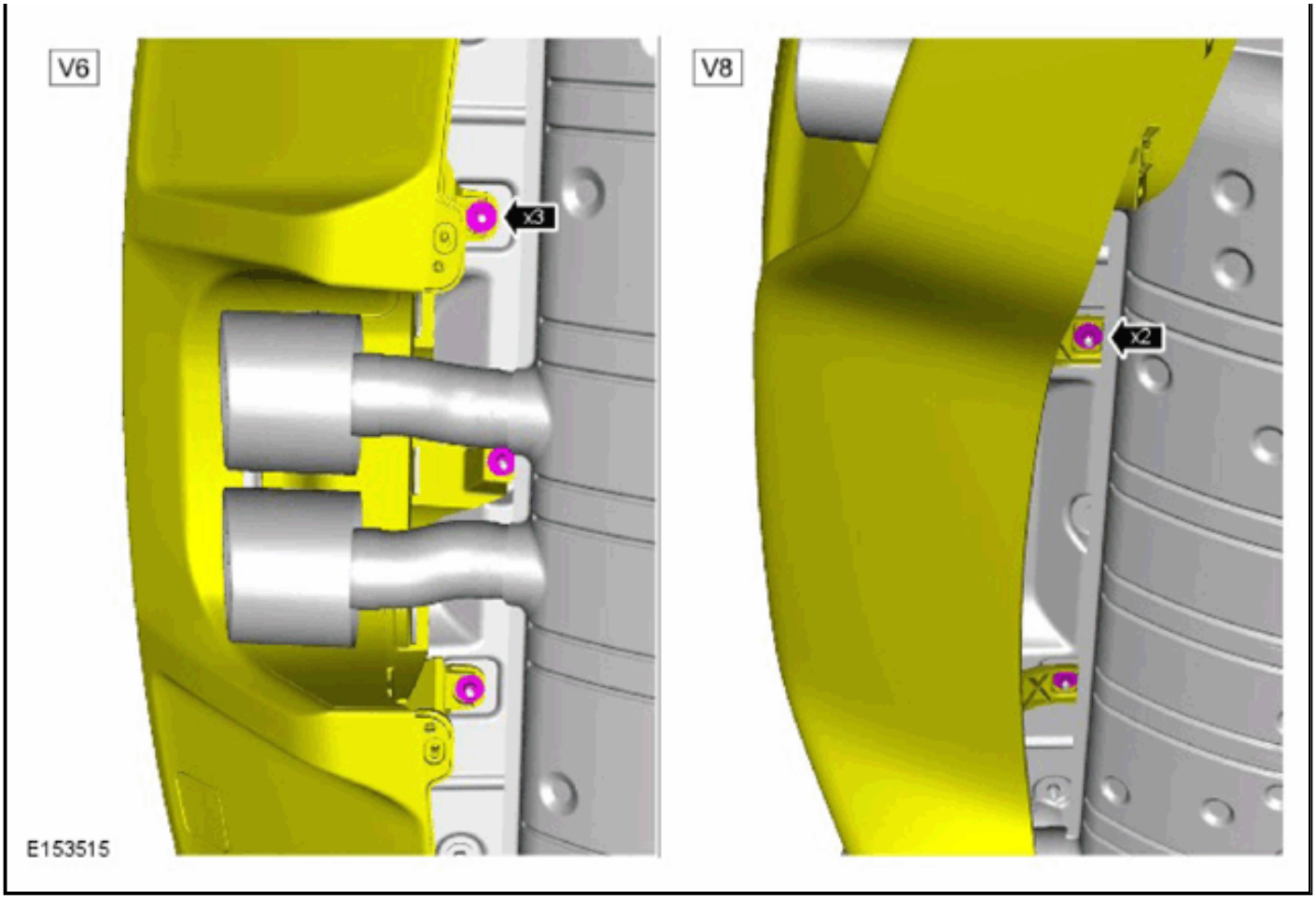
E153519

9.



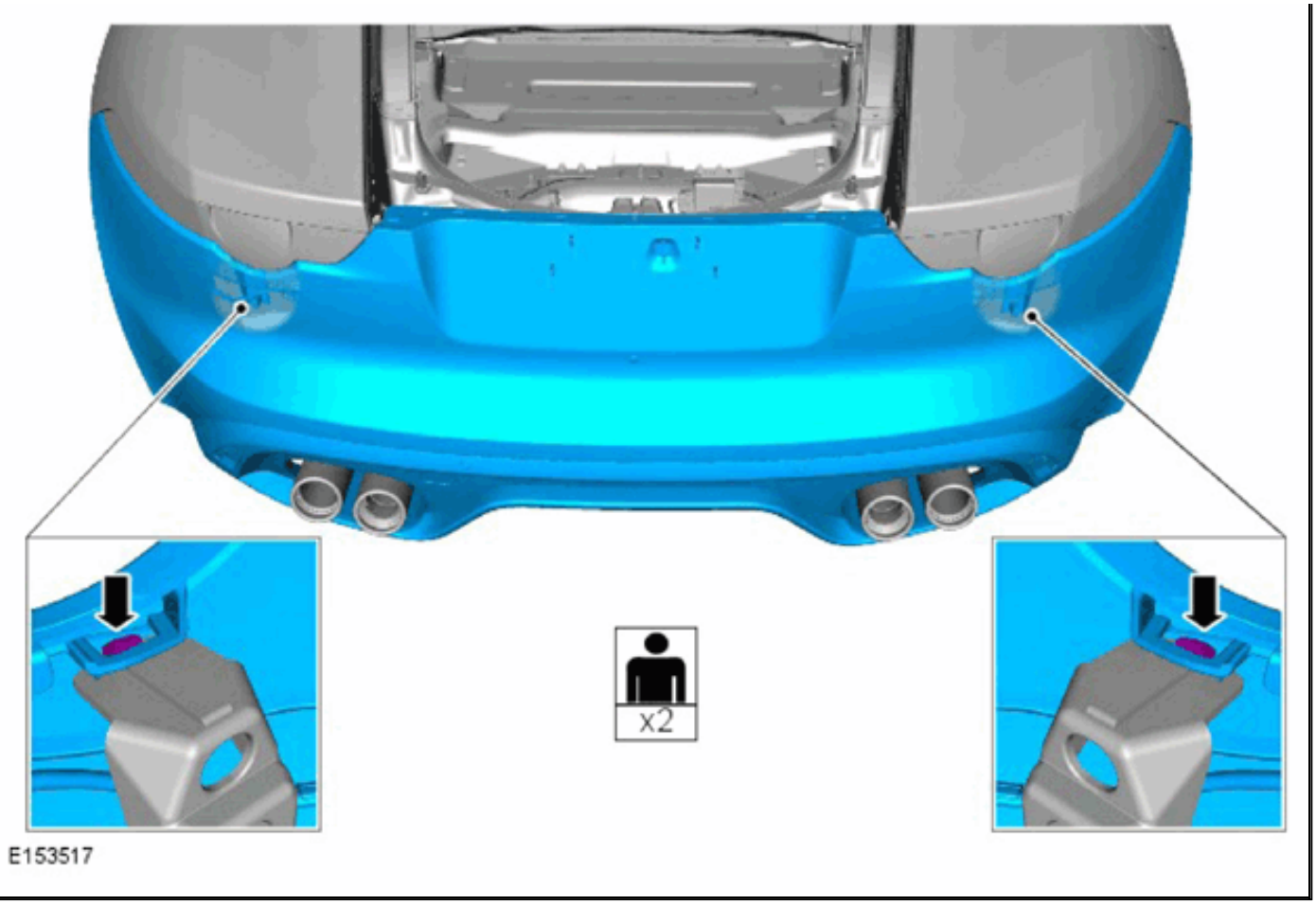
Torque Specification: **4.1 Nm**

10.

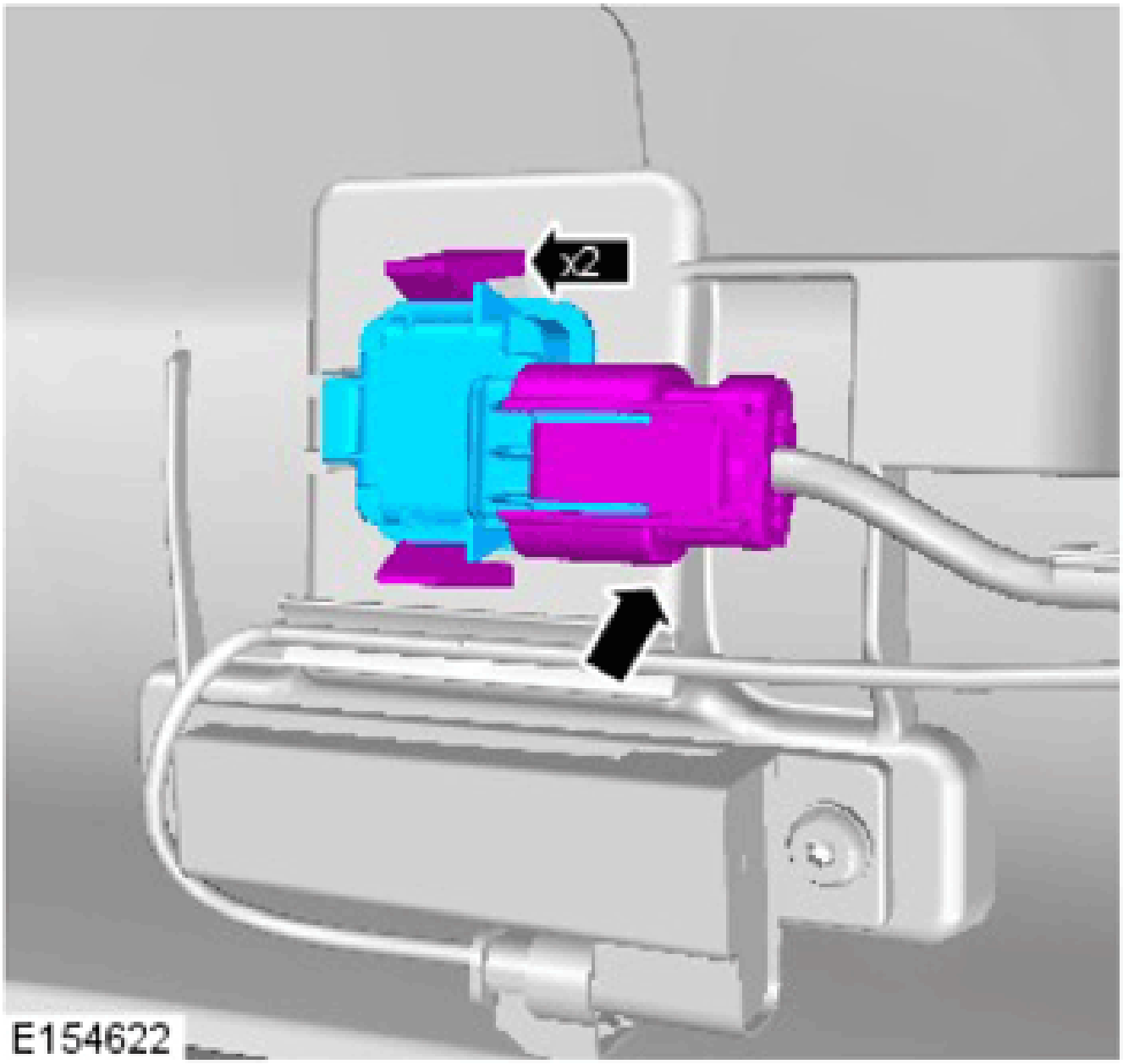


Torque Specification: **4.1 Nm**

11.



12. **CAUTION: Take extra care not to damage the component.**

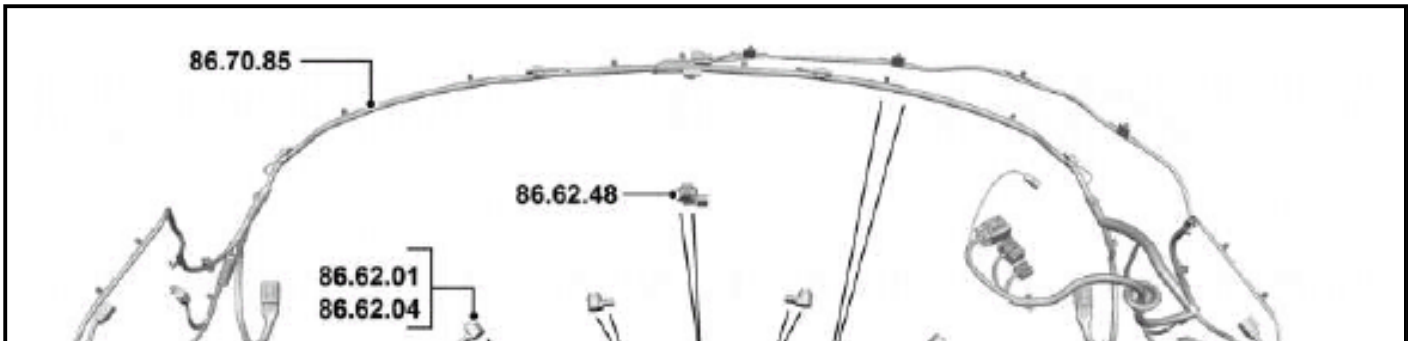


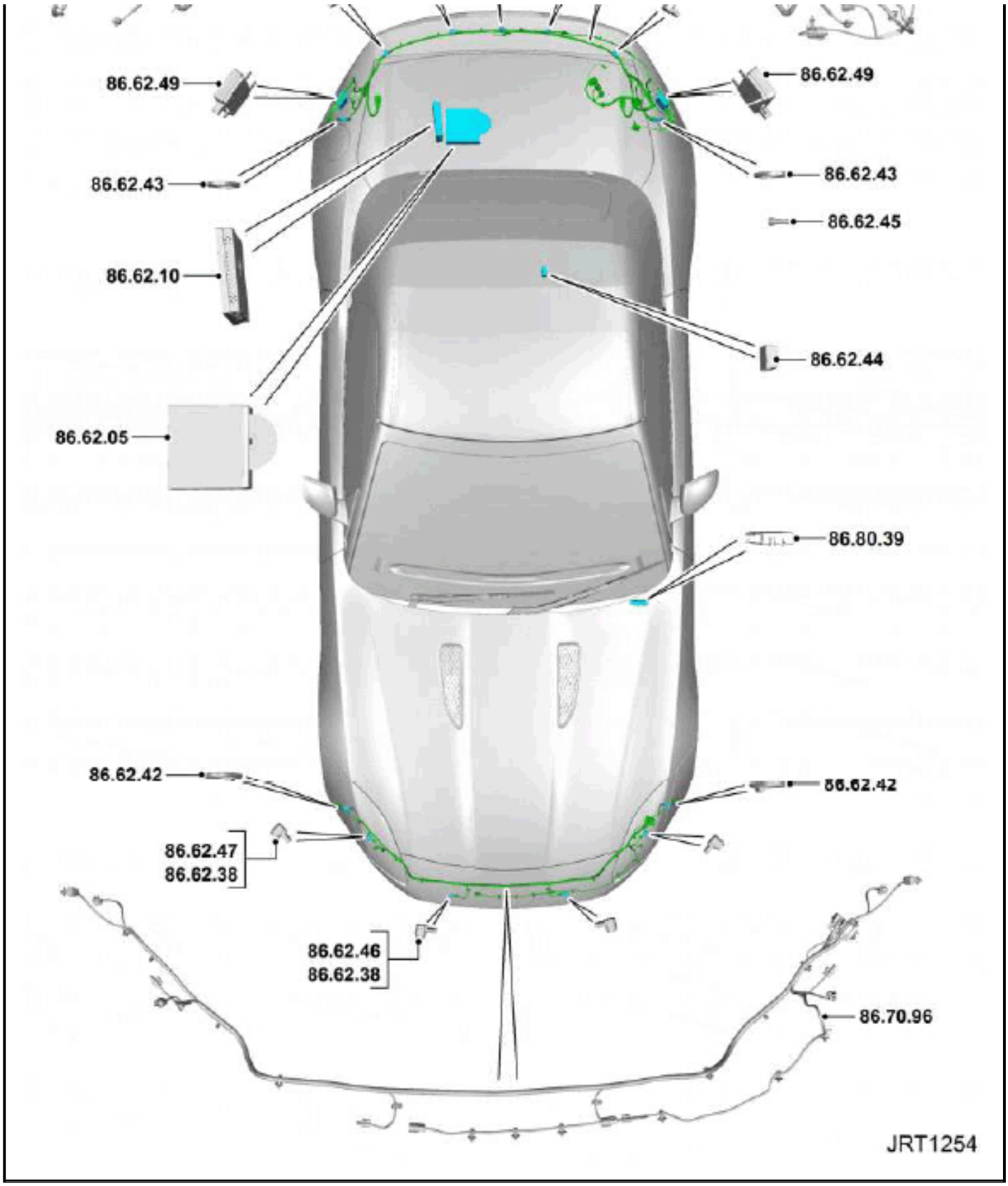
Installation

1. To install, reverse the removal procedure.

PARK DISTANCE CONTROL MODULE (G1584084)

86.80.39	REVERSE PARK CONTROL CONTROL MODULE - RENEW	ALL DERIVATIVES	0.4





Removal

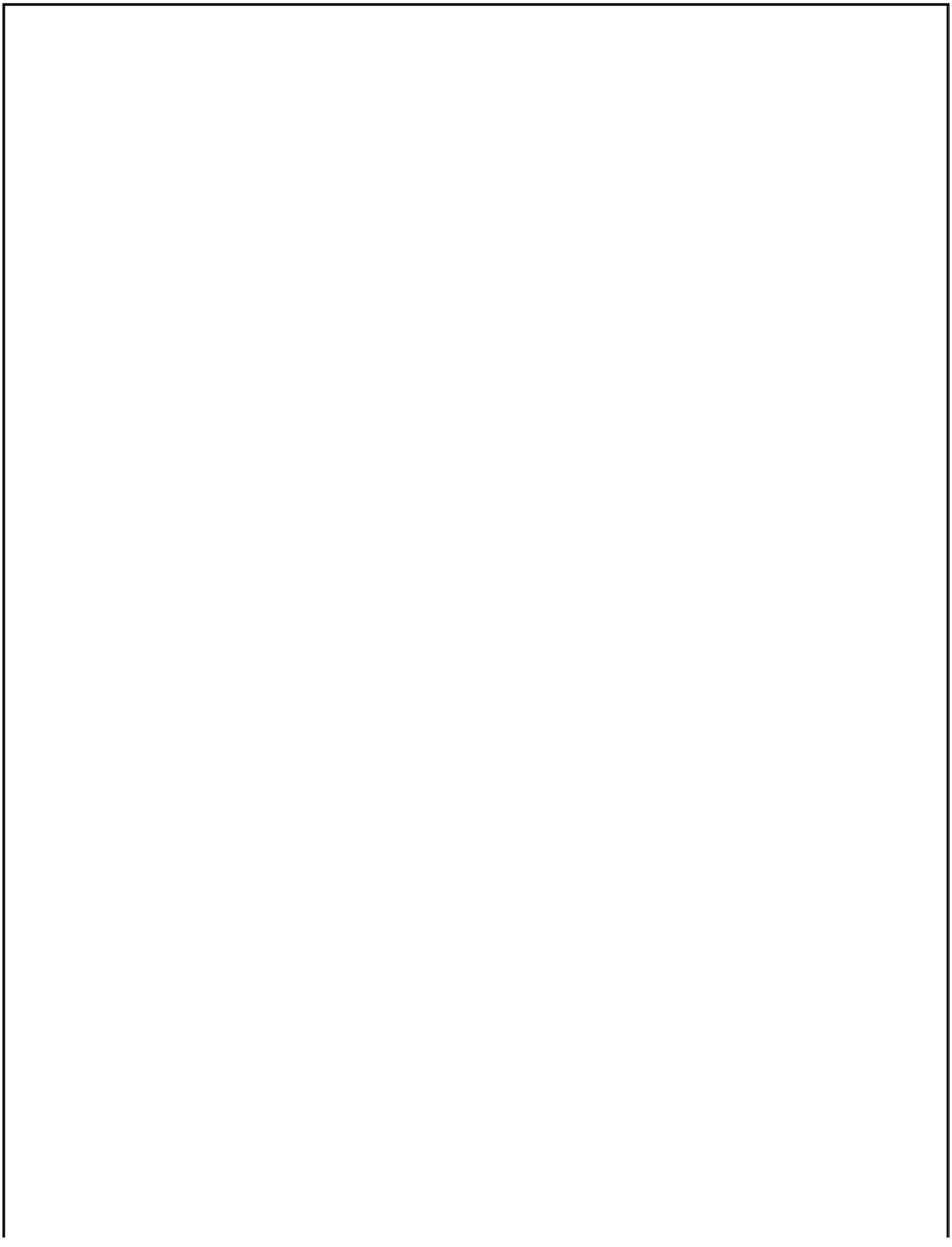
NOTE: **Removal steps in this procedure may contain installation details.**

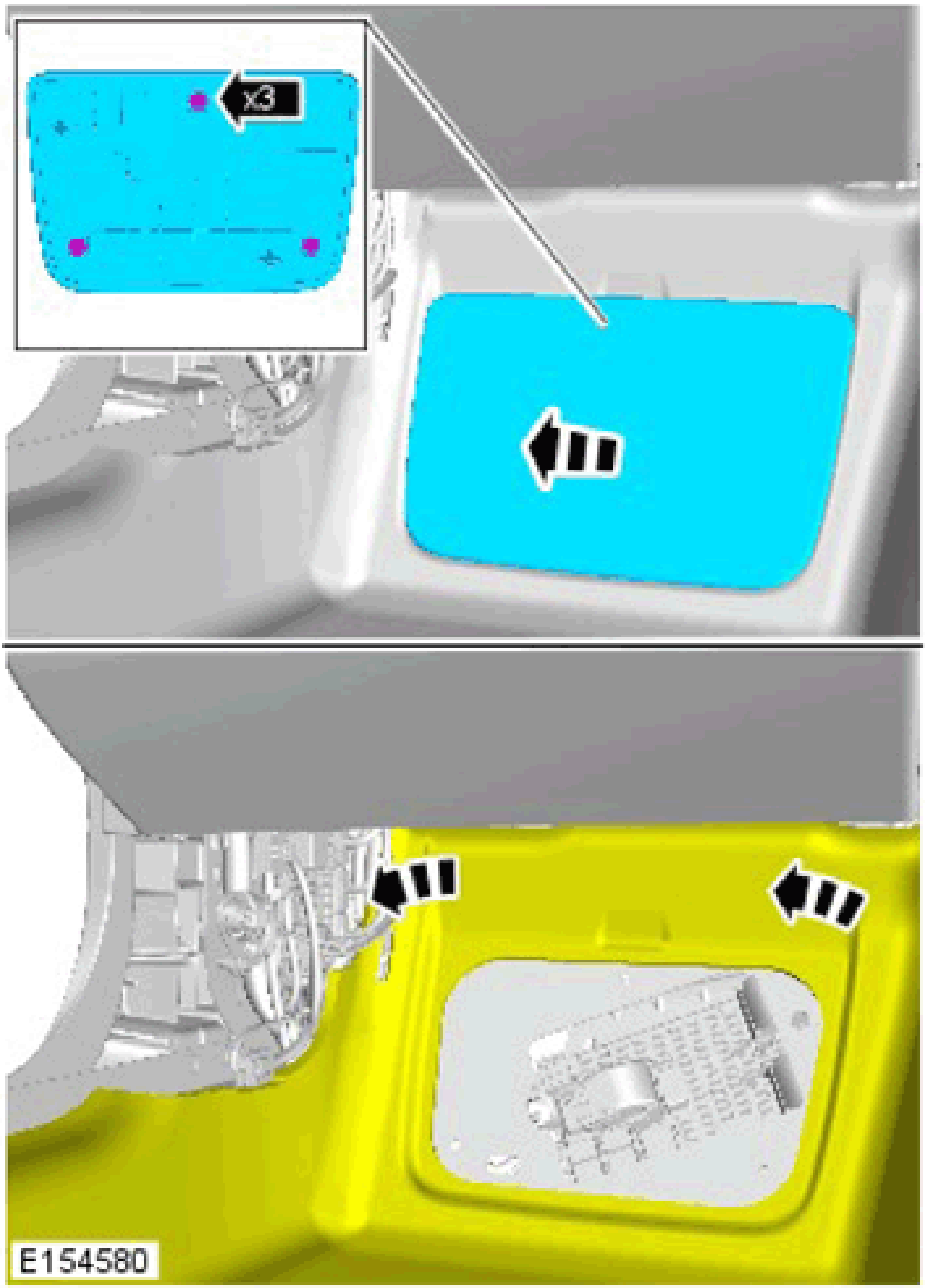
All vehicles

1. Remove the cover and disconnect the battery ground cable. Refer to: **Battery Disconnect and Connect** (General Procedures).

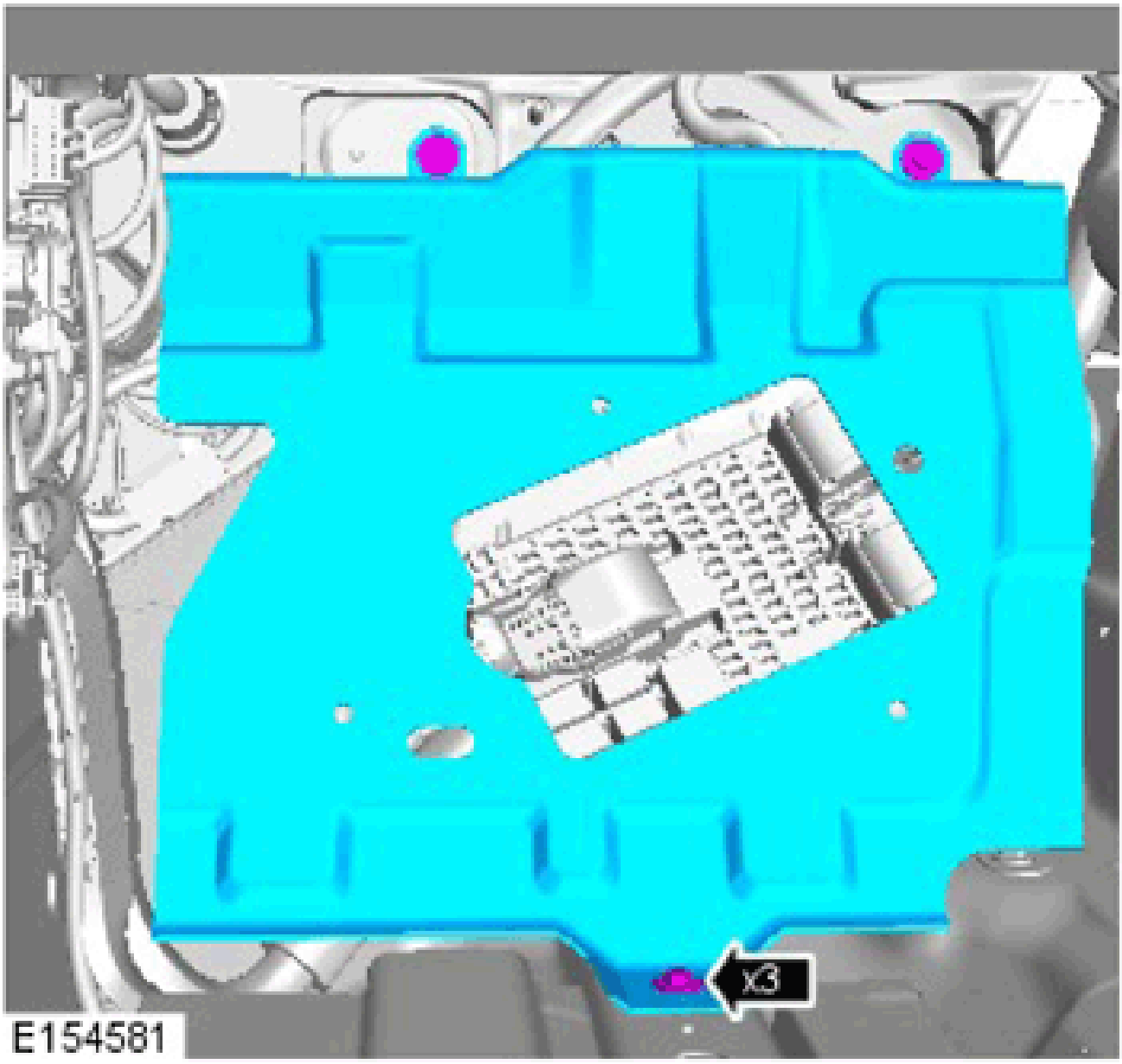
2. Refer to: **Cowl Side Trim Panel** (Removal and Installation).

Right-hand drive vehicles

1. 



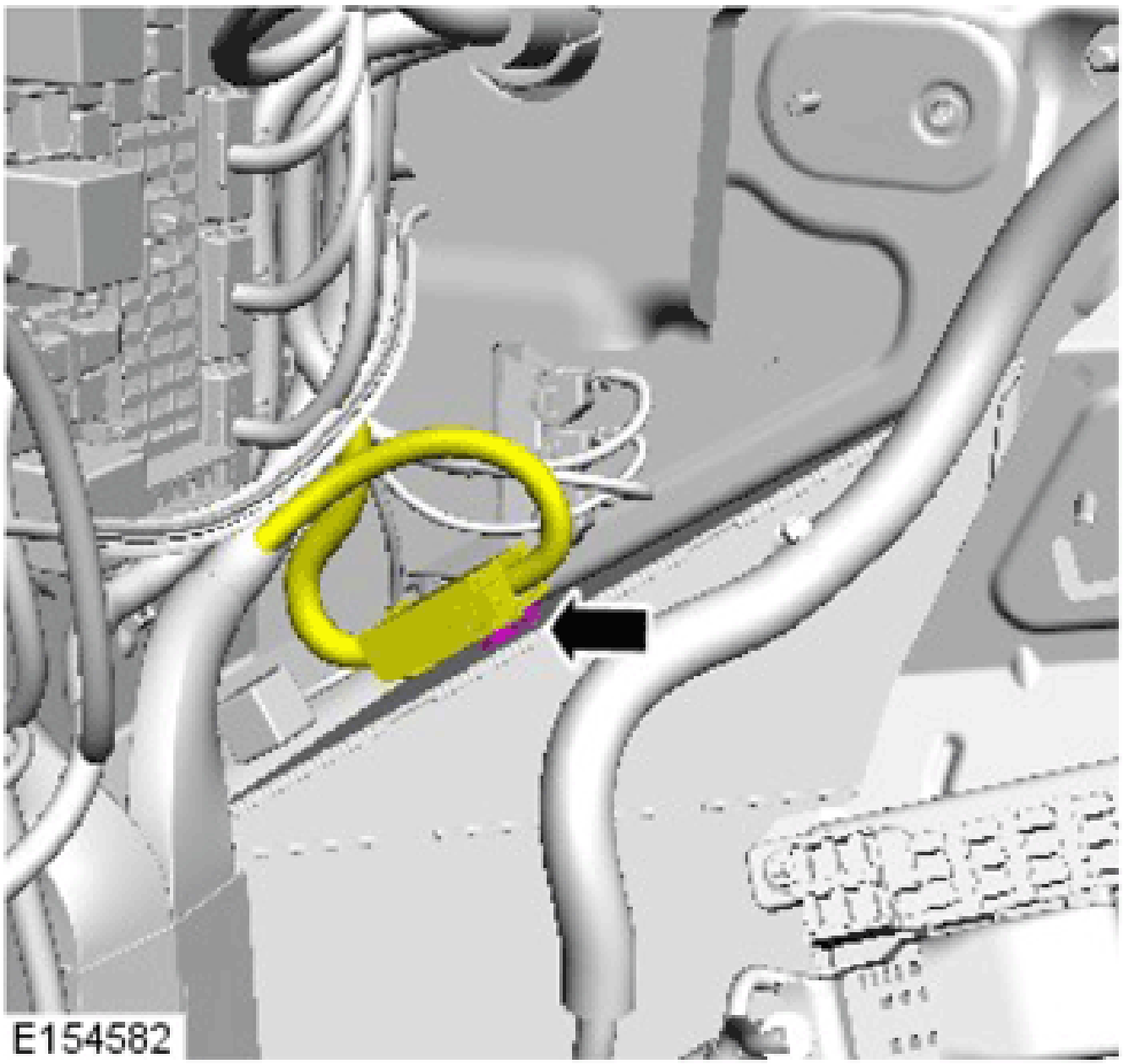
2.



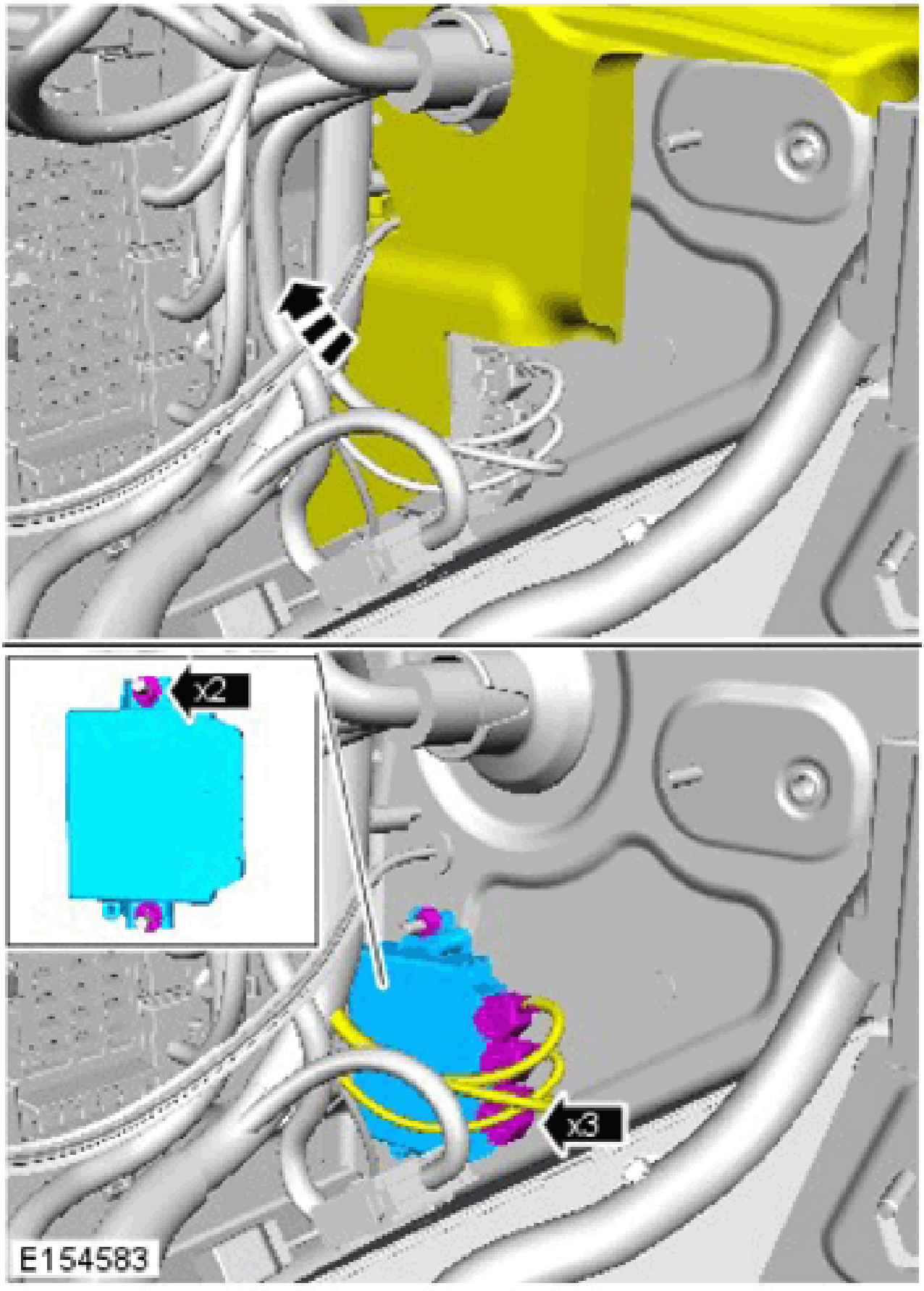
Torque Specification: **9 Nm**

All vehicles

1.



2.


X2
X3
E154583

Torque Specification: **5 Nm**

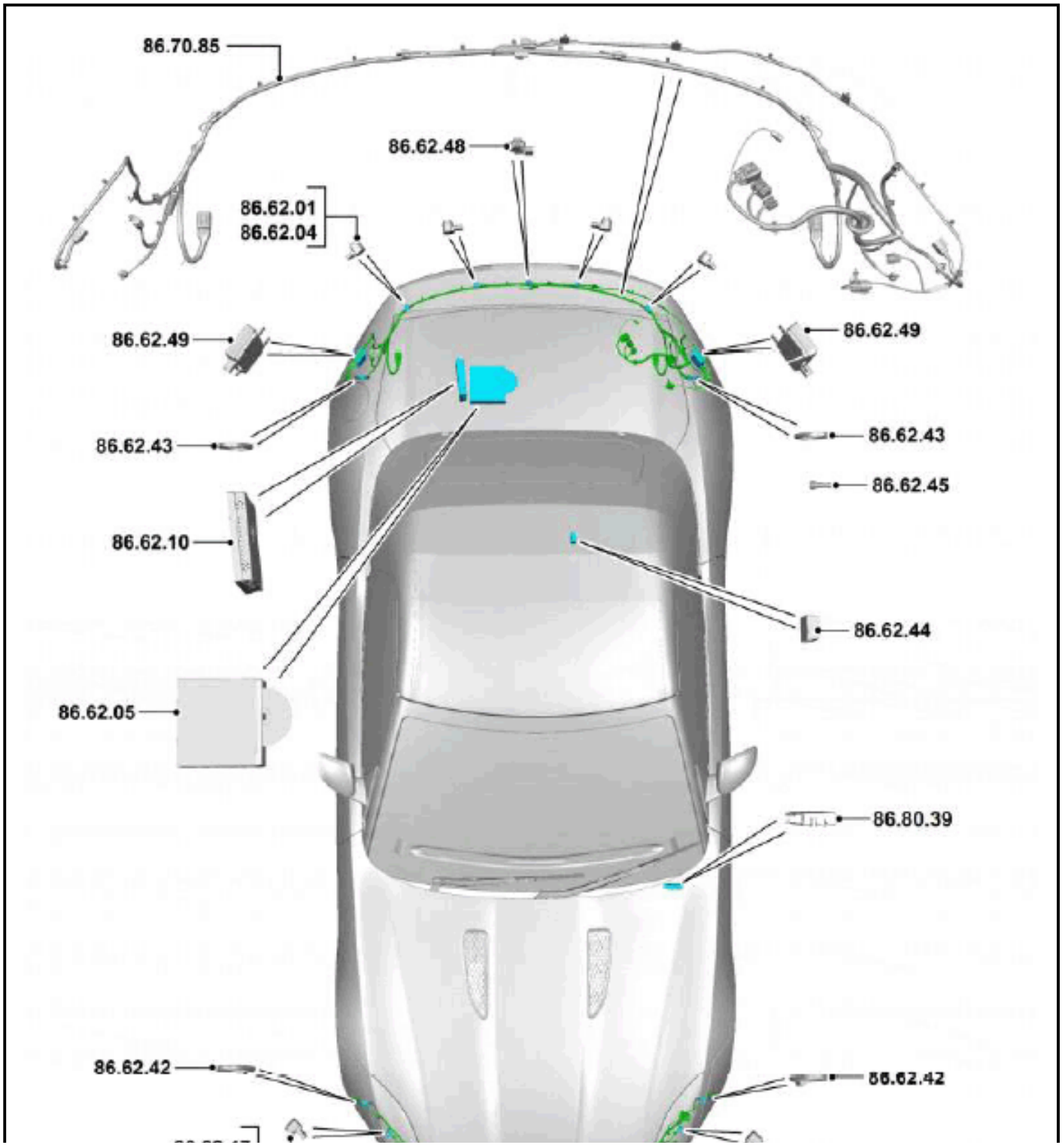
Installation

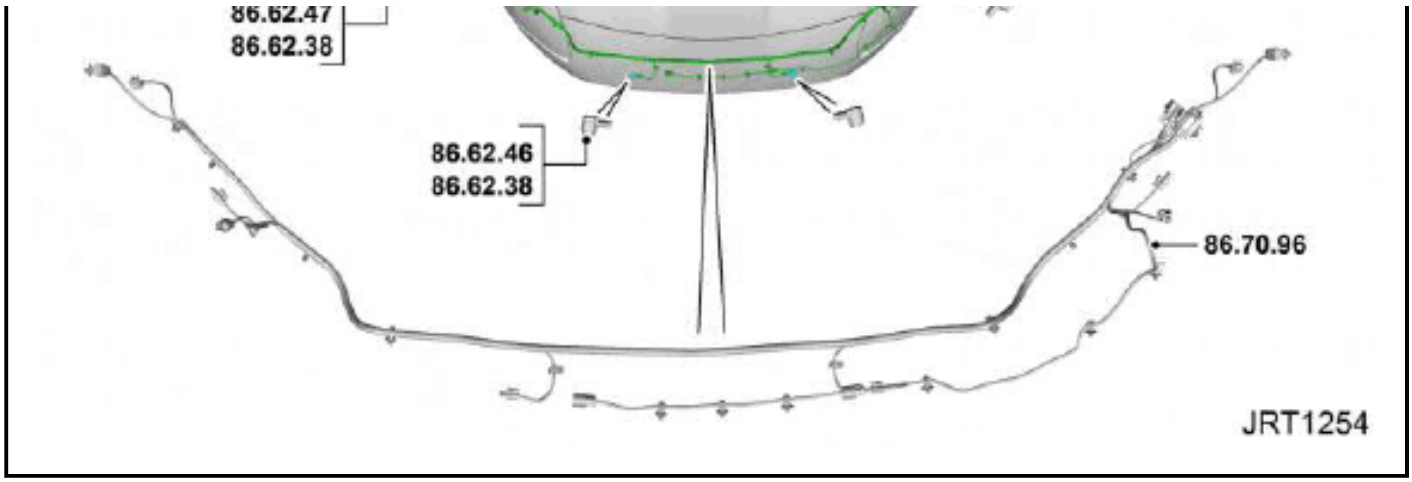
1. **NOTE:** **New units must be configured using the Programmable Module Installation Routine in the diagnostic tool.**

To install, reverse the removal procedure.

REAR PARKING AID SENSOR (G1584085)

86.62.01	REVERSE PARKING AID CONTROL SENSOR - RENEW	CABRIOLET	1.6



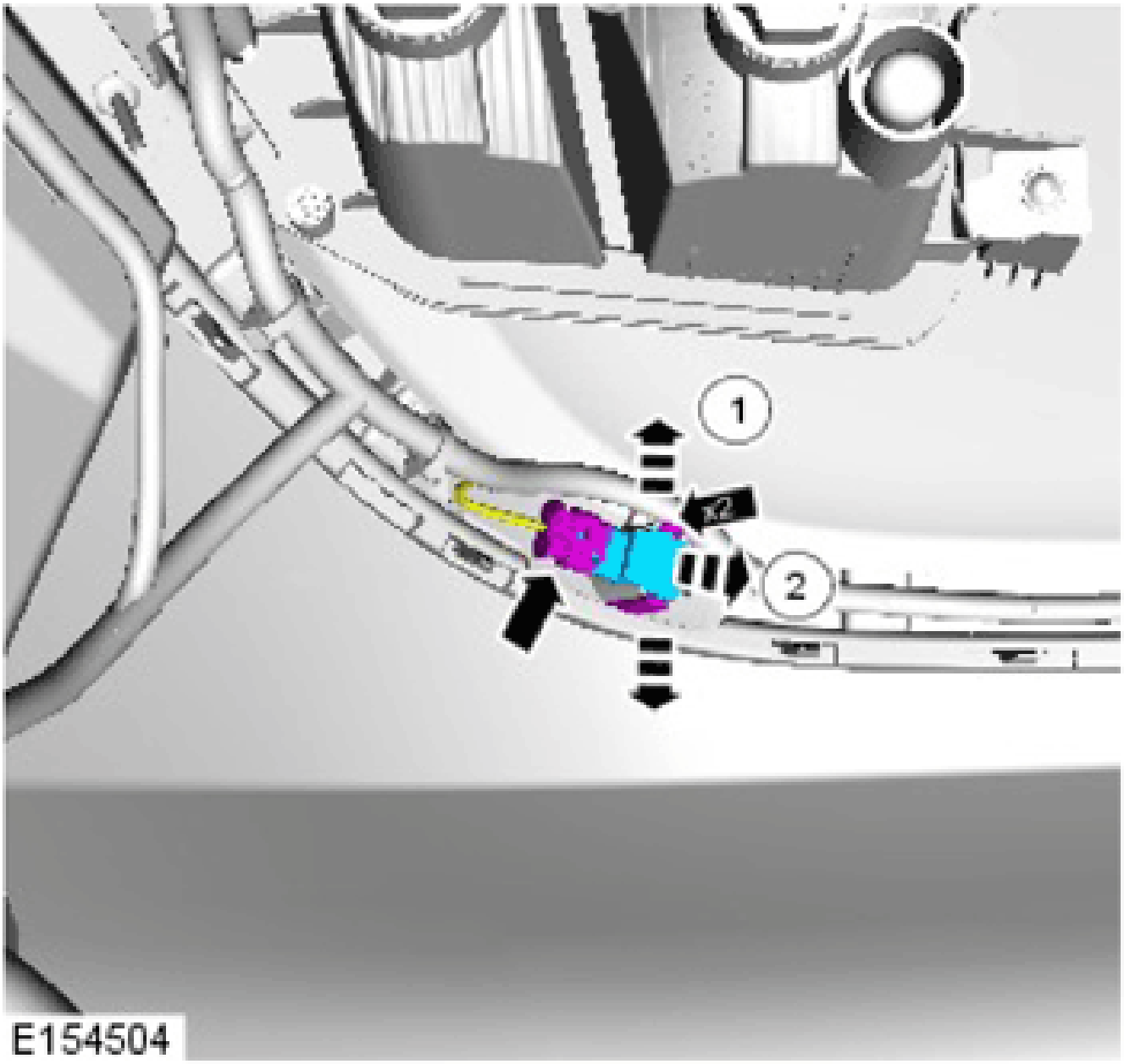


Removal

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

   Raise and support the vehicle.

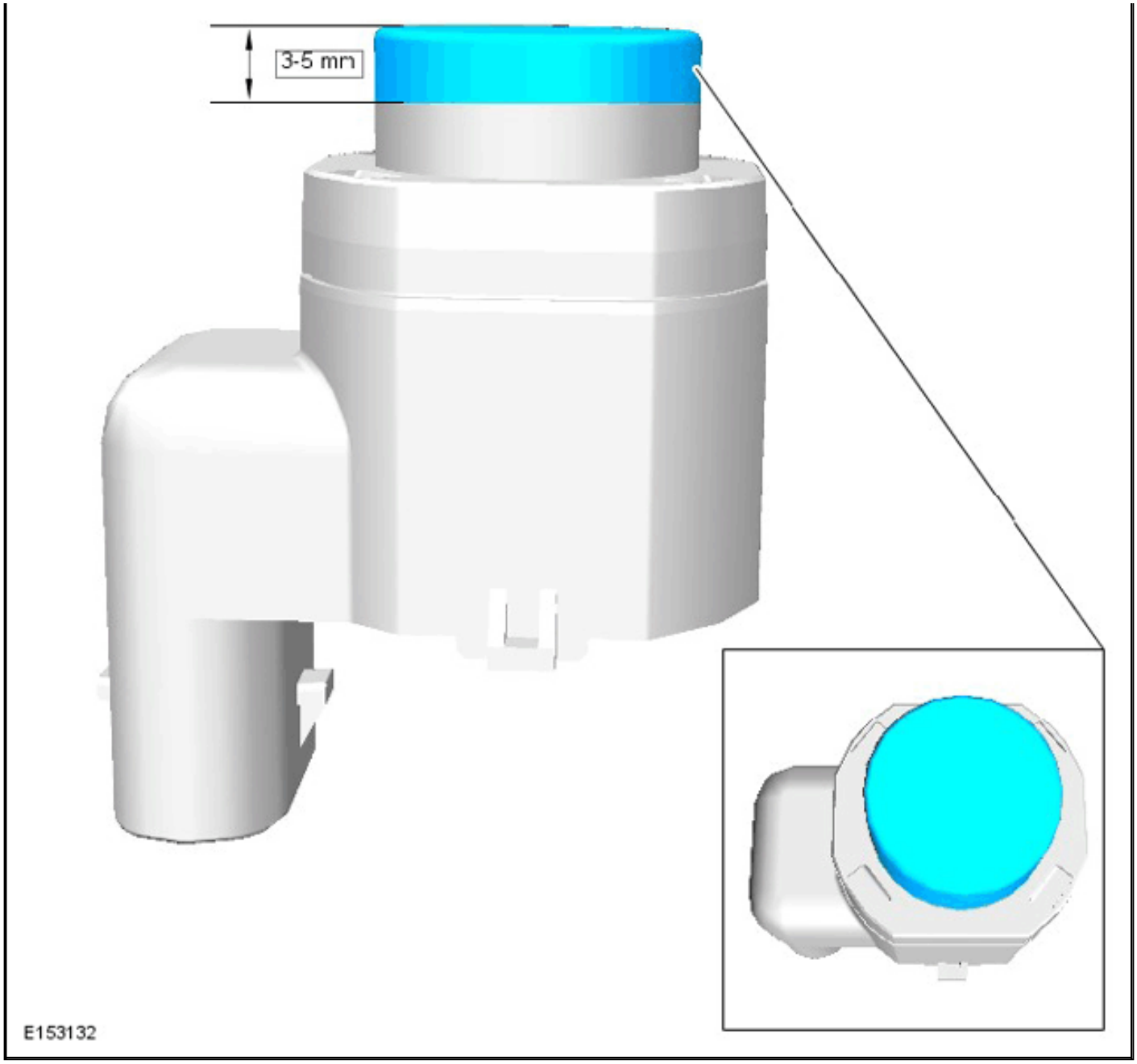
2. Refer to: **Rear Bumper Cover** (Removal and Installation).



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.

PARK ASSIST SENSORS (G2062763)

Removal

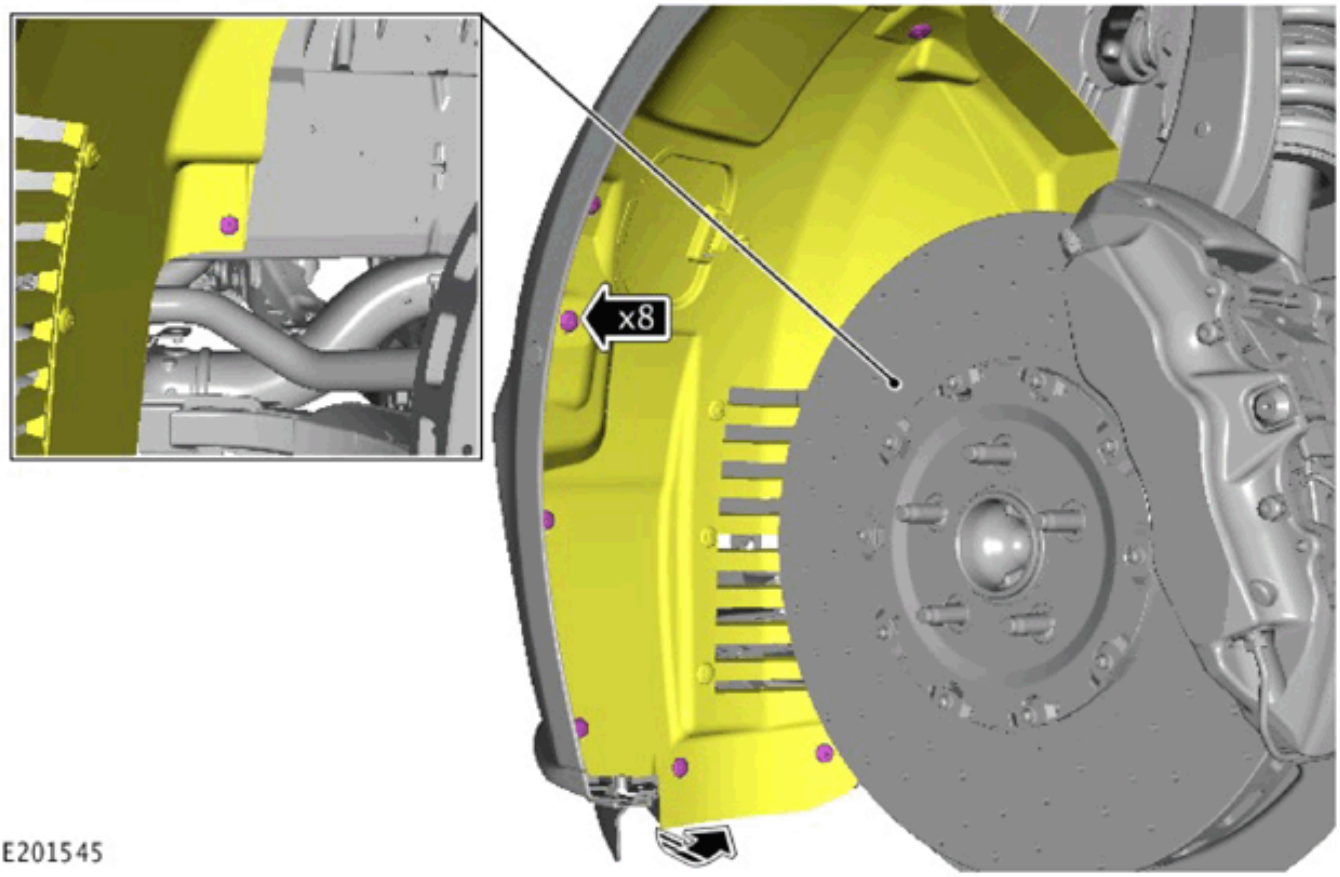
NOTE:

- **This procedure contains some variation in the illustrations depending on the vehicle specification, but the essential information is always correct.**
- **This procedure contains illustrations showing certain components removed to provide extra clarity.**
- **Left side is shown, right side is similar.**

1. Raise and support the vehicle on a suitable 2 post lift. Refer to: **LIFTING POINTS-TWIN-POST HOIST AND FLOOR JACK** .
2. Remove the front wheel.

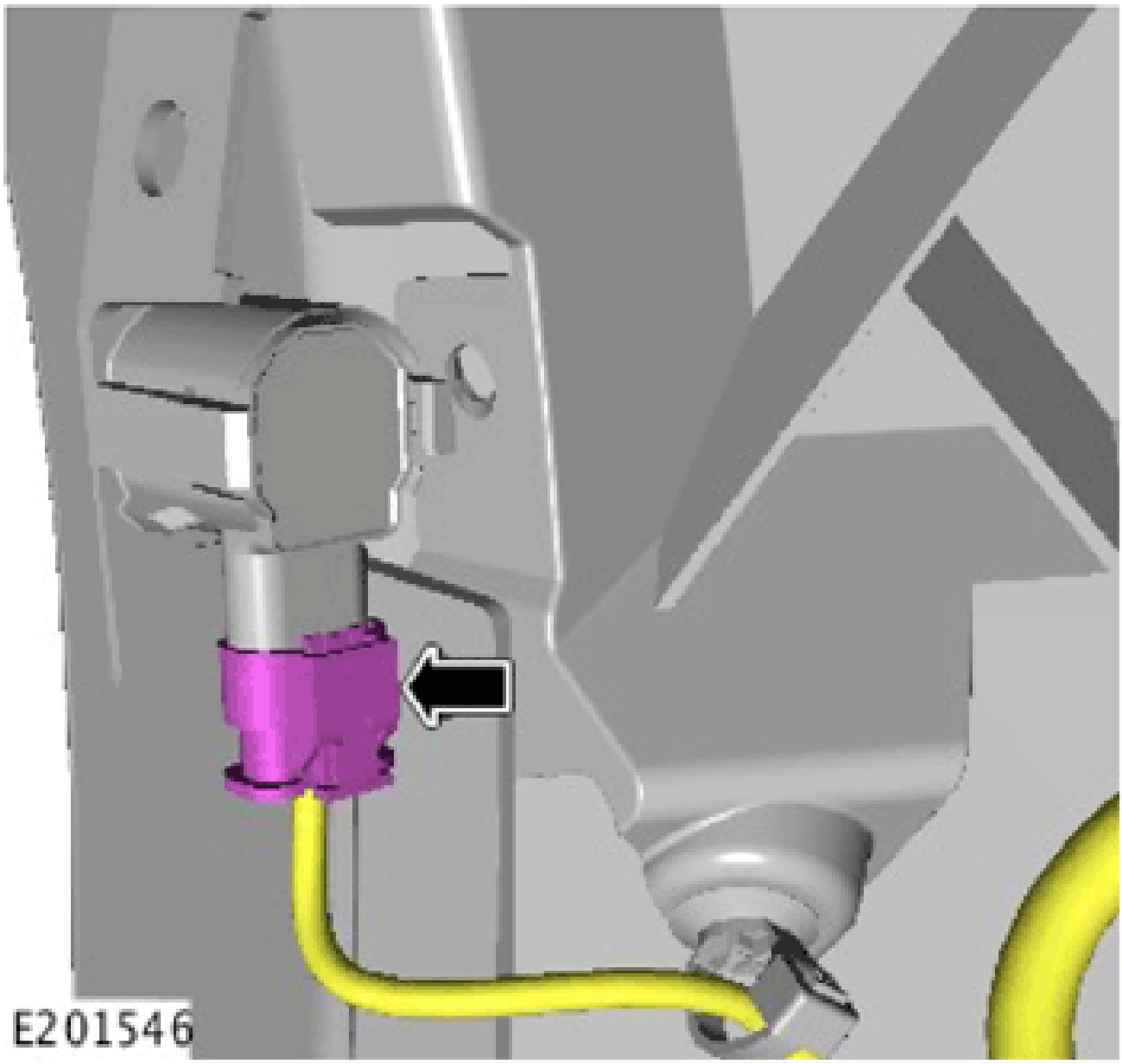
Refer to: **Wheel and Tire** (Removal and Installation).

3.



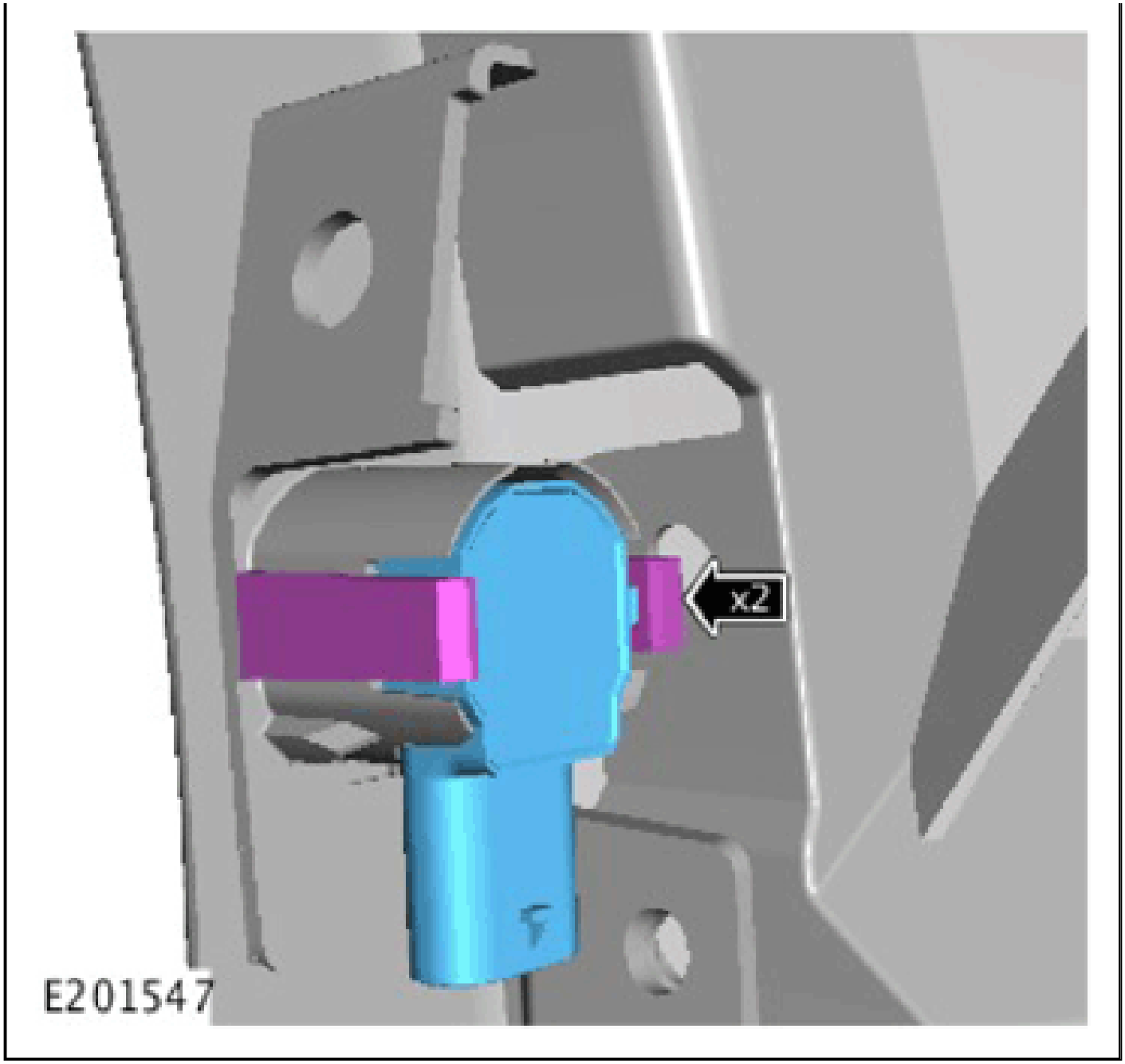
Release the wheel arch liner.

4.



Disconnect the electrical connector.

5.



Remove the park assist sensor.

Installation

1. Install the park assist sensor.
2. Connect the electrical connector.
3. Secure the wheel arch liner.
4. Install the front wheel.

Refer to: **Wheel and Tire** (Installation).

Article GUID: A00834055