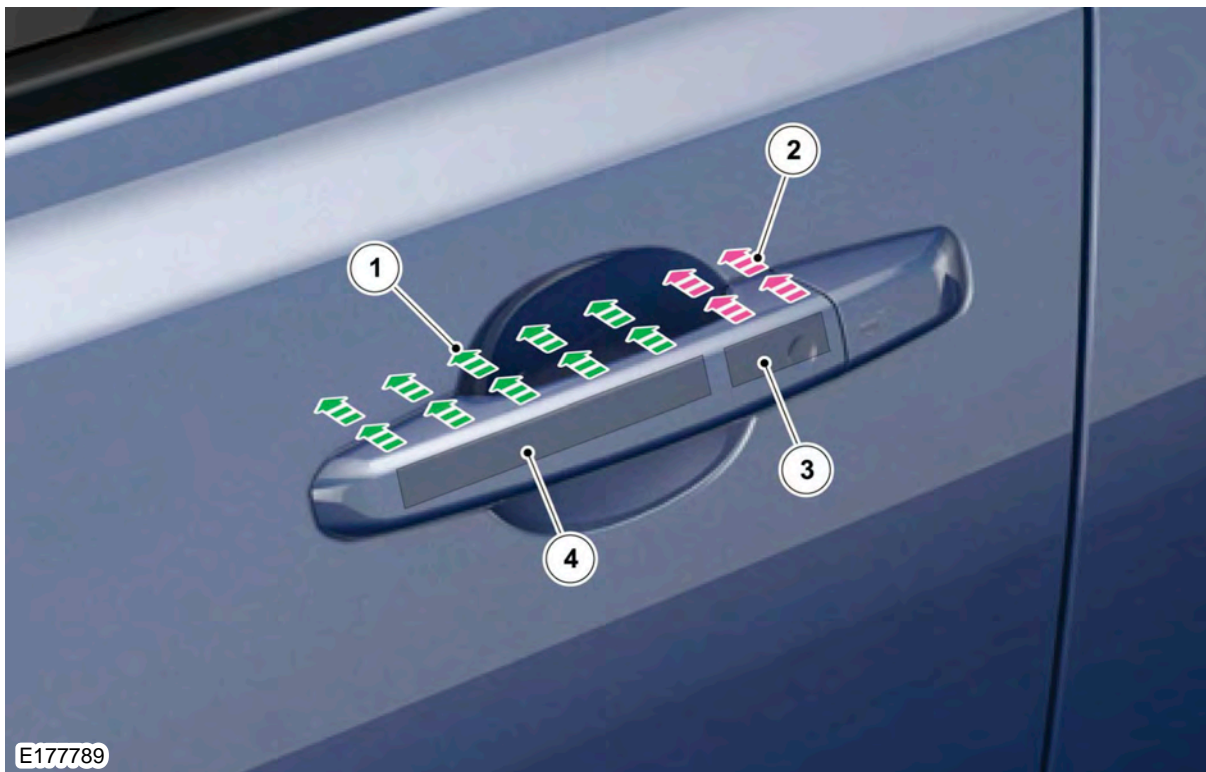


## Passive Entry

Passive Entry vehicles can be locked/unlocked without the physical use of a key blade or Smart key buttons. However, the Smart key is a functional component of the Passive Entry system.

### Passive Entry Door Handle



Item	Description	Item	Description
1	Unlock capacitive element	3	Lock contact
2	Lock capacitive element	4	Unlock contact

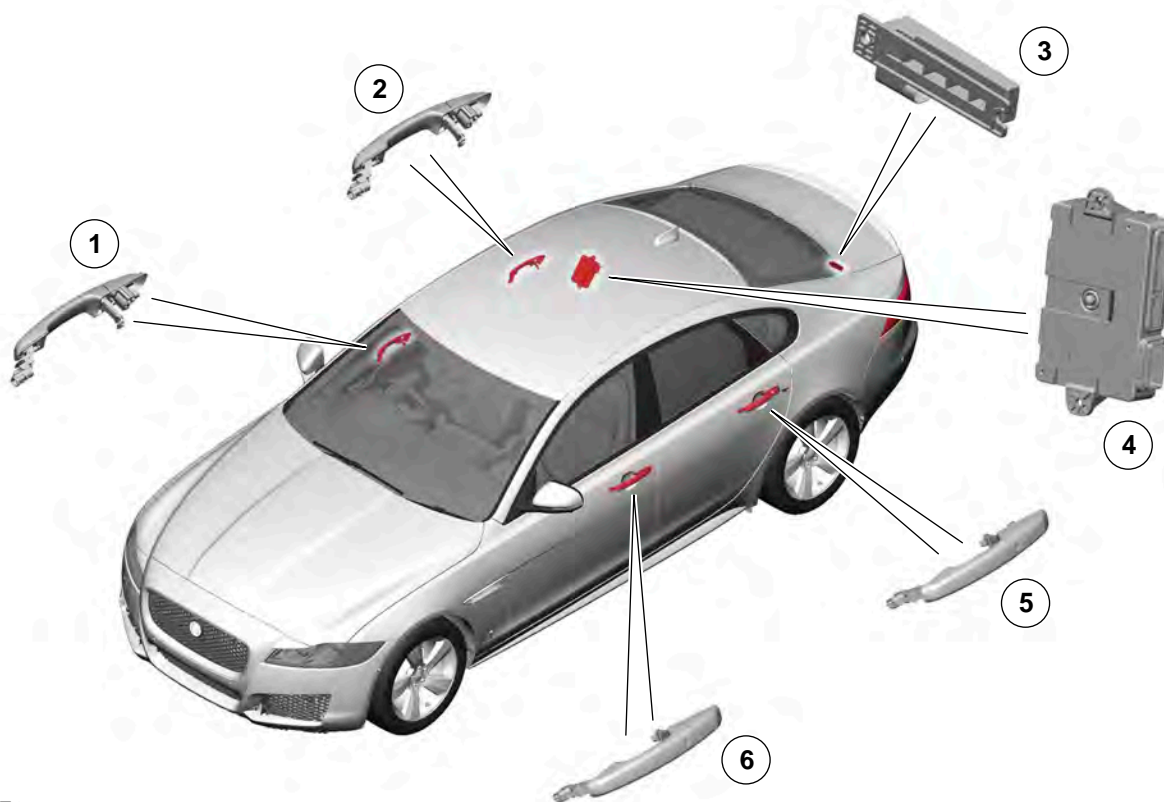
**NOTE:** If preferred, the system can be used as a remote central locking system, using the buttons on the Smart key to lock/unlock the vehicle.

The Passive Entry system is based around the Jaguar Smart key. Each Smart key for a given vehicle is programmed uniquely to that vehicle. The system will not function without a suitably charged battery within the body of the key.

The main functional components of the Passive Entry system are as follows:

- Door handle and latch assemblies
- KVM
- Low frequency (LF) door antennas
- Smart key
- Radio frequency (RF) receiver
- Body Control Module/Gateway Module Assembly (BCM/GWM)
- Driver's door module (DDM)
- Passenger door module (PDM)
- Rear door modules (RDM)

The Passive Entry system is initially controlled by the Keyless Vehicle Module (KVM), Smart key and LF antennas: one antenna located in each of the door handles and one antenna located behind the rear bumper cover.



E177255

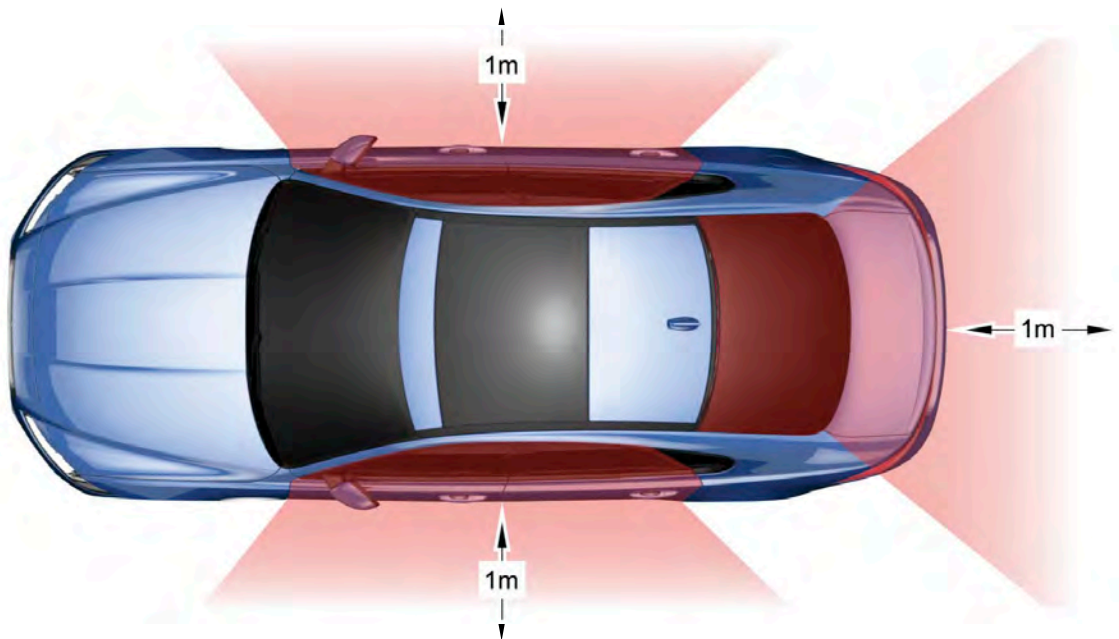
Item	Description	Item	Description
1	Right front LF antenna	4	KVM
2	Right rear LF antenna	5	Left rear LF antenna
3	Luggage compartment LF antenna	6	Left front LF antenna

To initiate the unlock process, the capacitive door handle is simply grasped. A new addition to the Passive Entry system is the capacitive door handle locking function. The traditional door handle locking button is replaced by a capacitive 'button'; in the place of the button are two embossed lines molded into the handle. Placing a finger or thumb to this area activates the capacitive 'locking' function.

Low frequency (LF) signals (125KHz) from the door antennas are received by the key, followed by radio frequency (RF) signals (433/315 MHz) transmitted by the key, which are received and verified by the KVM. Once verified, the Passive Entry system locks/unlocks the vehicle.

## Passive Entry

The LF antenna transmission zone is approximately 1.0 m (3.3 ft). The Smart key only needs to be within this range of the desired point of entry to provide access to the vehicle; on driver's person, in a pocket, or in a handbag or briefcase for example.



E177256

The system is equipped with capacitive door handles and, to unlock the vehicle, the driver simply grasps the door handle (or presses the luggage compartment release button). The vehicle unlocks according to the current security setting (either single-point or multi-point entry).

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**NOTE:** Placing the key in a metallic container, such as a metal briefcase, may hinder the system's operation.

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If single-point entry is the current security setting, and a door other than the driver's door is opened first with the key in range of that door, then all doors will be unlocked. If the driver's door is opened, only the driver's door will be unlocked. All other doors and the luggage compartment will remain locked.

## Capacitive Door Handle

The capacitive sensor consists of three capacitor plates. The first capacitor plate is the vehicle body, including the vehicle surrounding. The other two capacitor plates are located in the outer door handle. One of the door handle capacitor plates is located in the door handle 'pull' area; the other capacitor plate is behind two embossed lines on the outer door handle. The air space between the capacitor plates and the vehicle body (the dielectric) acts as an insulator.

The functional principle of the capacitive sensor is based on the change in the electrical field between the capacitor plates and therefore the capacitance of the capacitor. The control electronics within the door handle evaluate the capacitance of the circuit.

The capacitive sensor only responds to rapid changes in its capacitance. Changes in its environment, such as soiling of the outer door handle or rain, have no influence on the function of the capacitive sensor.

### Unlocking Function – Capacitive Sensor 1

A capacitive plate is molded internally within the handle; the vehicle exterior body acts as a second capacitive plate. The air space between the two acts as an insulator.

The control electronics within the door handle evaluate the capacitance of the circuit. When a hand interrupts the insulator, the space between the capacitive plates, the electrical field, is altered, therefore affecting the capacitance of the capacitor.

This signal is used to trigger the KVM, initiating the unlock process. This signal is calibrated so as not to detect false activations, for example, rain water or soiling.

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**NOTE:** Extreme water levels can trigger an unlock signal, such as washing a locked vehicle with a hose or high powered jet nozzle (providing the key is in the detection zone).

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### Locking Function – Capacitive Sensor 2

There are two types of lock button in use. The first is the button type and the other is a capacitive touch button, similar in operation to the capacitive unlock handle. To centrally lock the vehicle, press or touch the lock button area on the door handle once.

The hazard warning lamps will flash once as confirmation. To double lock the vehicle, press or touch the button twice within three seconds.

The hazard warning lamps will flash twice (with a long second flash). The vehicle will only lock if all hinged panels are closed. If a lock attempt is made with an open aperture, the vehicle will not lock and two audible error warnings will sound.

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**NOTE:** Passive locking will only activate if the key is outside the vehicle. If no key is present, two audible error warnings will sound.

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To globally close the vehicle, press and hold the button on the door handle. This locks the vehicle, arms the alarm and closes all open windows except the sunroof. The windows will stop closing when the button is released.

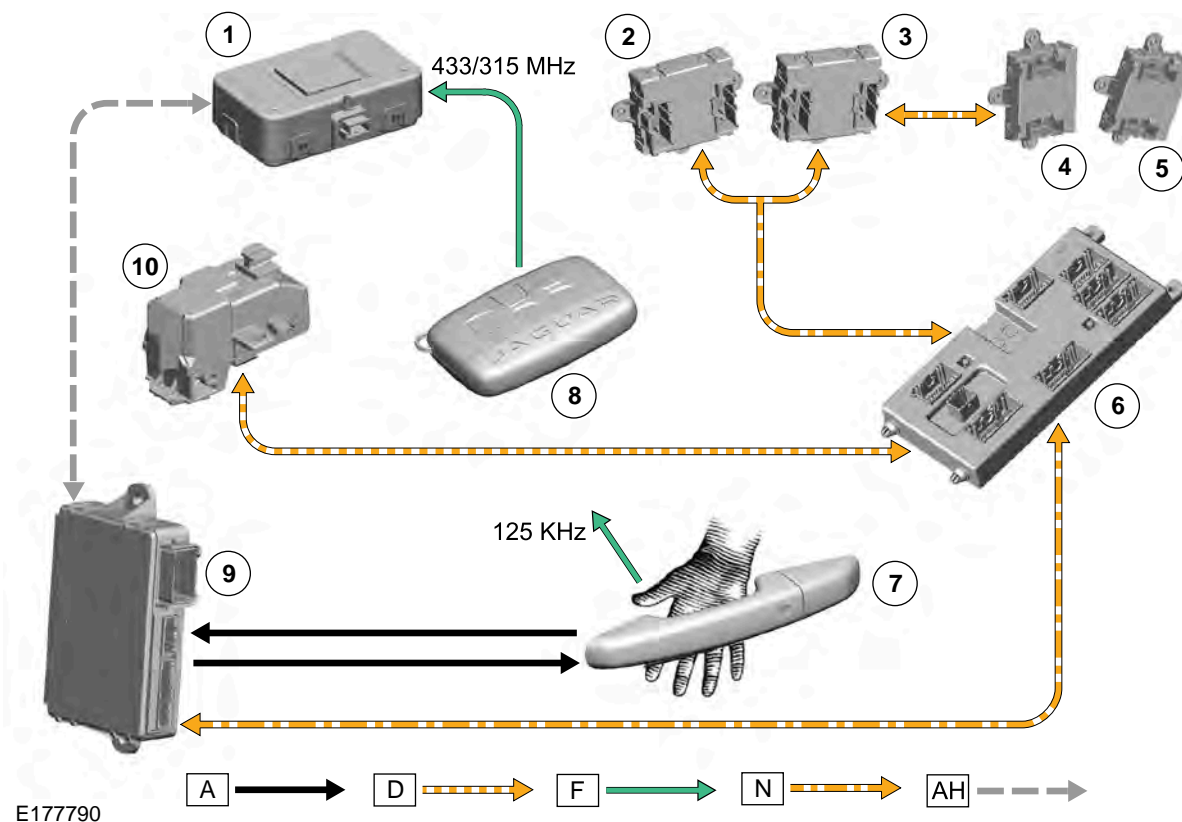
There is a natural instinct to check that the vehicle has locked after the exterior button has been pressed. This is possible during a three second period after the lock command. Even if the key is detected externally, the vehicle will not unlock during this time.

**Principles of Operation**

Vehicle unlocking proceeds as follows:

1. When a capacitive door handle is grasped, it sends a signal to the KVM informing it which door is about to be opened.
2. The KVM energizes the low frequency antenna in the relevant door handle, transmitting an LF (125KHz) signal to the Smart key.
3. If the Smart key is within one meter of the relevant door, the LF signal informs the Smart key to transmit a UHF (433 MHz, Europe; 315 MHz, NAS and ROW) radio frequency (RF) signal back to the RF receiver, containing its authorization code.
4. The RF receiver relays the code, via a serial communication line, to the KVM, checking the code is valid. The KVM will only respond to a valid Smart key for the vehicle.
5. If the key code is valid, the KVM transmits the unlock request to the GWM/BCM via the medium speed CAN bus. The central junction box (CJB) confirms the request.
6. The GWM/BCM then transmits the following simultaneous signals:
  - An unlock request/authorization to the steering column module on the high speed CAN bus. The steering column unlocking function is powered by the GWM/BCM, and grounded via the instrument cluster.
  - A door unlock request, via the medium speed CAN bus, is sent to the front door modules, then sent on to the rear door modules via MS CAN. All modules then drive the motors to unlock the doors.
7. When any door handle is pulled open and reaches 80% of its travel, the handle clutch switch is closed. This sends a hardwired switched signal to the KVM.
8. The KVM will then drive the fast latch release motor in the relevant door latch assembly, releasing the door latches, allowing the door to be opened.
9. The vehicle locking procedure is as follows:
  - With the Smart key that opened the vehicle outside and within a one meter range of the vehicle, the locking procedure is carried out by pressing, or touching, the button located on the exterior door handle.
  - This action sends a switched signal to the KVM.
  - Thereafter, the system procedure is similar to steps 2 onwards, but locks the vehicle and sets immobilizer and alarm.

Passive Entry Control Diagram



Item	Description	Item	Description
1	RF Receiver	9	KVM
2	Front left door module	10	Steering lock
3	Front right door module	A	Hard wire connection
4	Rear left door module	D	Powertrain HS CAN
5	Rear right door module	F	RF Transmission
6	GWM/BCM	N	Body MS CAN
7	Passive door handle	AH	Serial communication line
8	Passive key		