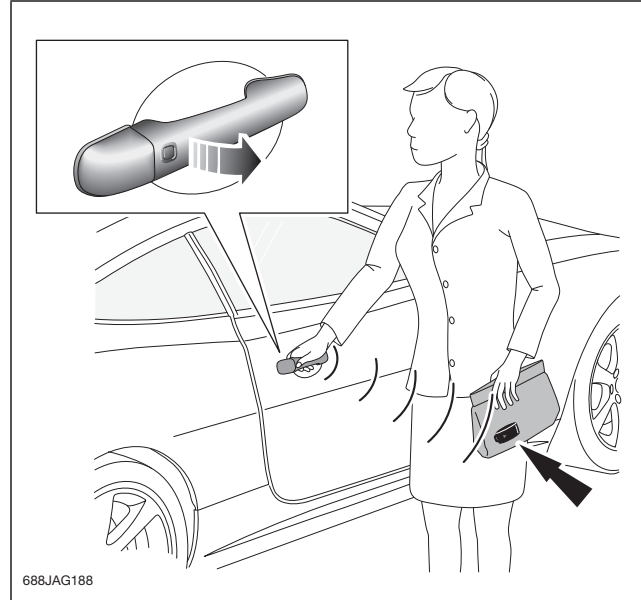


X150 / X250 PASSIVE ENTRY SYSTEM

The passive (keyless) entry system is based around the Jaguar SmartKey. Each Jaguar SmartKey for a given vehicle is programmed uniquely to that vehicle. Passive entry and the associated passive start system allow the driver to unlock and start the vehicle without using a vehicle key in a door lock or ignition switch. The passive entry system is a standard feature on X150 and optional on X250 (the passive start system is a standard feature on all vehicles).

The passive entry system has an active transmission zone of 1.0m (3.3 ft.). Provided the Jaguar SmartKey is within range of the desired point of entry (vehicle door, trunk), it need only be on the driver's person (in a pocket, handbag, or briefcase, for example) to provide access to the vehicle. The driver simply pulls any door handle (or presses the trunk release button); no further driver intervention is required. The vehicle unlocks according to the current security setting (either single-point or multi-point entry).

Placing the Jaguar SmartKey in a metallic container or metal briefcase may hinder its operation.



688JAG188

Passive Entry Components

The passive entry system consists of:

- Keyless vehicle module (KVM)
- Low-frequency (LF) transmitting antennas
 - 3 antennas for X150
 - 5 antennas for X250
- Radio frequency (RF) receiver antenna
- Jaguar SmartKey

Keyless Vehicle Module

The KVM interfaces with the central locking RF receiver and collects RF signal information which is transmitted from the Jaguar SmartKey.

This information is translated into commands which are passed on the medium speed CAN bus to the:

- CJB
- AJB/RJB
- Front door modules and onto the rear door modules via a LIN bus connection
- Instrument cluster

The KVM also monitors:

- 2 interior antennas (passive start)
- 1 trunk antenna (passive start)
- Rear bumper antenna (passive entry, if equipped)
- Door handle antennas (passive entry, if equipped)

On vehicles with passive entry, additional fast latch motors (auto latch release motors) are located within each latch assembly to provide smooth door release operation. These fast latch motors are also controlled via the KVM. The fast latch status is passed to the CJB on the medium speed CAN bus.

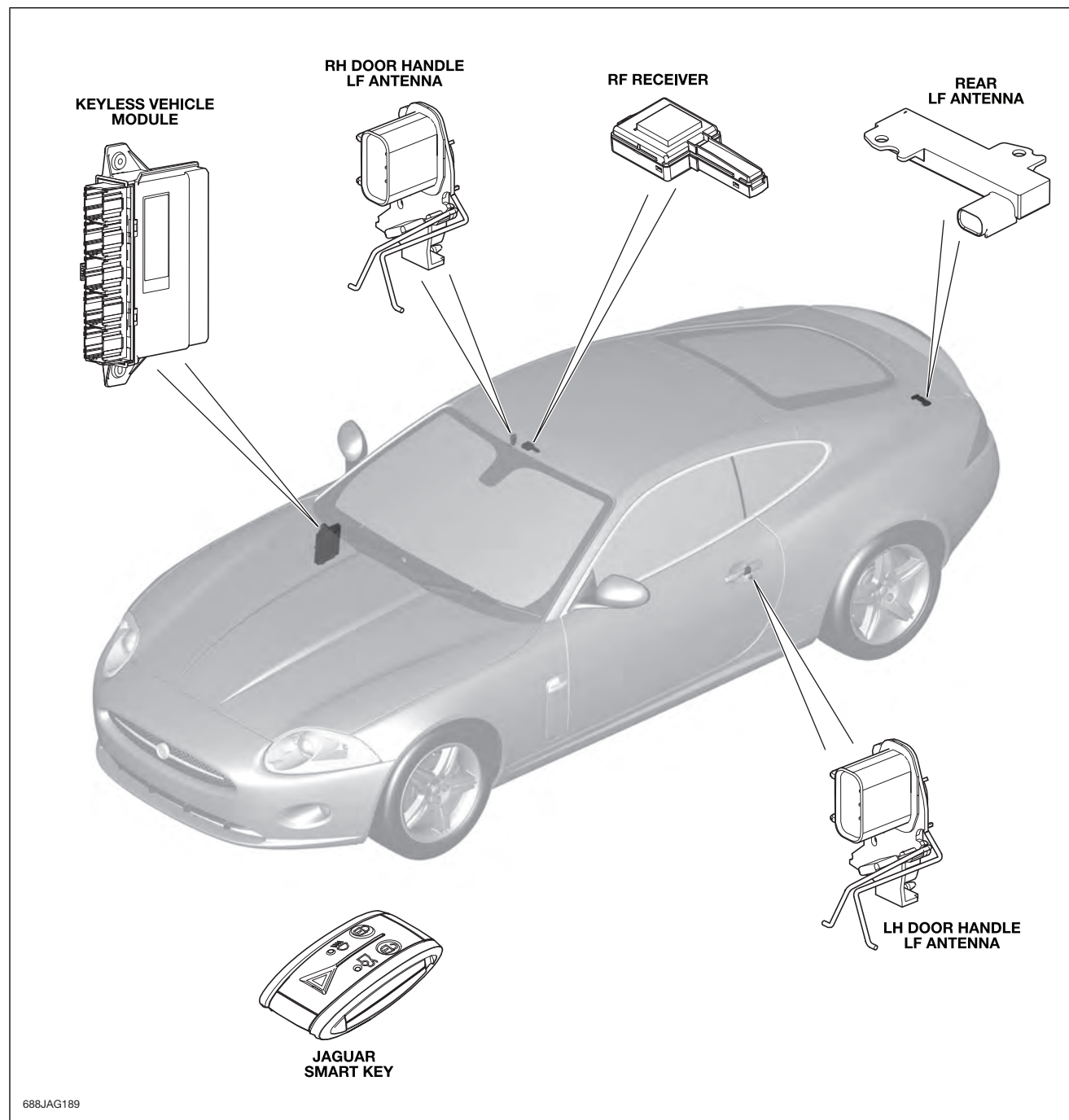
RF Receiver

The RF receiver is installed above the headlining – to the rear of the vehicle on X250 and above the center console on X150. The receiver provides functionality for the remote central locking and passive entry systems.

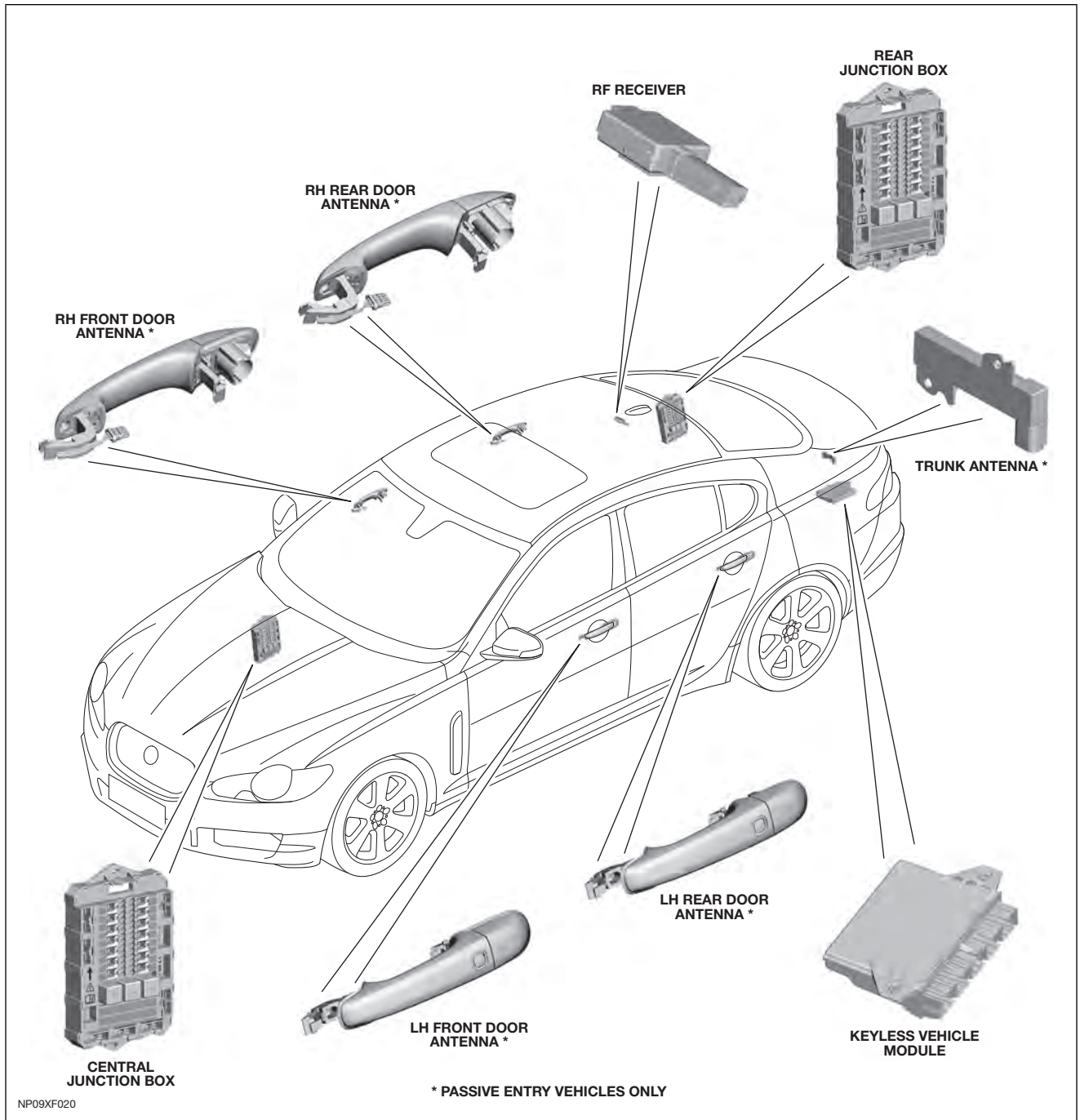
The operating frequency of the RF receiver is 315 MHz.

The RF receiver converts the signals transmitted by the Jaguar SmartKey into digital messages, and then transmits the message on a serial data line to the KVM for Jaguar SmartKey authorization. The CJB provides a permanent power feed to the RF receiver.

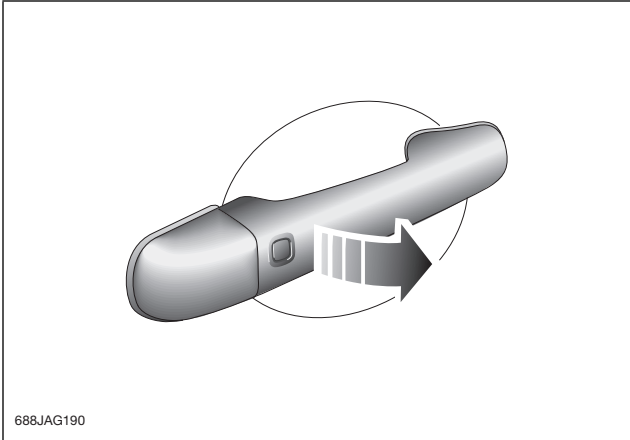
X150 Passive Entry System Components



X250 Passive Entry System Components



Passive Entry System Operation



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On vehicles equipped with the passive entry system, the vehicle can be unlocked / locked without the use of a key or pressing buttons on the Jaguar SmartKey. The Jaguar SmartKey is a functional component of the passive entry system in addition to the passive start system.

The passive entry system is controlled by the KVM and several LF antennas (3 for X150; 5 for X250). There is one antenna located in each door handle and one antenna located behind the rear bumper cover.

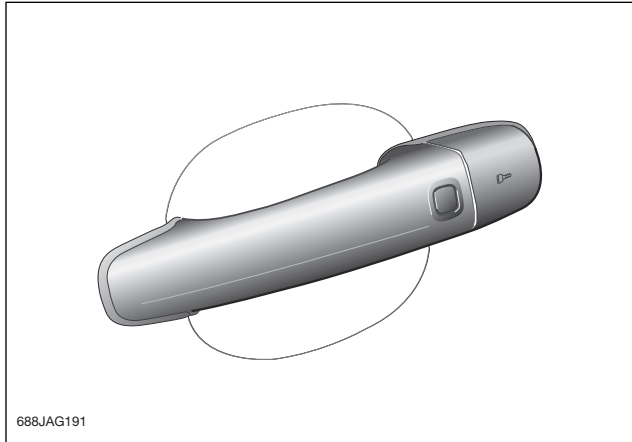
Vehicle Unlocking Sequence:

- With the Jaguar SmartKey within 1.0m (3.3 ft.) of the approached door, the handle is pulled to the first 10 percent of its travel. This action closes and grounds the unlock pull switch (within the operated handle) sending a hardwired switched signal to the KVM which responds with the following simultaneous actions:
 - The KVM energizes the low frequency antenna in the door handle, which transmits a 125KHz signal to the Jaguar SmartKey.
- On receipt of the LF signal the Jaguar SmartKey transmits a 315 MHz RF signal containing its authorization code to the RF receiver.
- The RF receiver relays the code, via a serial data line, to the KVM which checks and approves the code as valid. The KVM will only respond if the RF signal produced is from a valid Jaguar SmartKey for the vehicle.
- The KVM transmits the unlock request to the CJB via the medium speed CAN bus.
- The CJB confirms and sends the request, via the medium speed CAN bus, to the front door modules.
- The front door modules respond with the following simultaneous actions:
 - The front door modules drive the motors to unlock the **front** doors.
 - The front door modules transmit the door unlock request via a LIN to the rear door modules.
- The rear door modules drive the motors to unlock the **rear** doors.
- When the door handle reaches 80 percent of its travel the handle clutch switch is closed and grounded, sending a hardwired switched signal to the KVM.
- The KVM drives the fast latch (auto) release motors in the door latch assemblies releasing the door latches.

As the approached door handle is pulled through its full travel, the applicable door can be opened.

Passive Locking and Arming

There is no automatic passive locking of the vehicle. To 'passively' lock the vehicle, press the button on the exterior door handle once with the SmartKey within a 1.0 meter (3.3 ft.) of the handle being operated.



When the exterior door handle button is pressed:

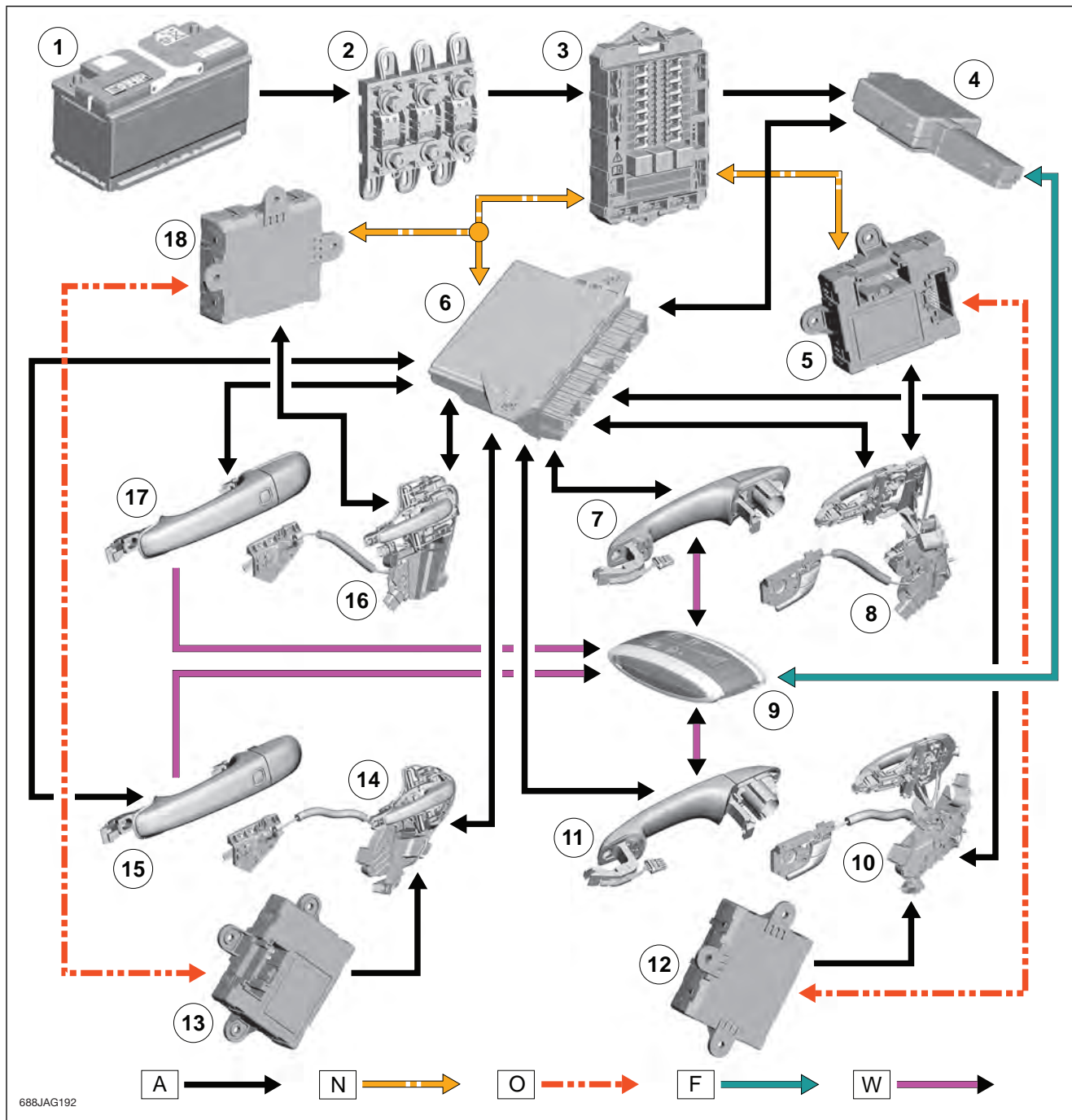
- A hardwired 'lock request' input signal is sent to the keyless vehicle module (KVM).
- Once the KVM receives the hardwired 'lock request' input signal, the KVM transmits an LF signal to the driver door handle antenna, which activates any SmartKey transmitter within one meter of the handle antenna.
- The activated SmartKey transmits an RF 'security code' signal to the RF Receiver.
- The RF Receiver transmits the 'security code' signal via a dedicated serial data line to the KVM, which checks and validates the security code.
- Once the security code has been validated by the KVM, the KVM sends the 'lock request' signal to the CJB via the MS CAN bus.
- Upon receiving the 'lock request' signal, the CJB confirms that none of the latches are 'ajar' by monitoring the aperture 'ajar' switch signals, which are a direct hardwired input to the CJB.
- Once it has confirmed that none of the latches are 'ajar', the CJB sends a 'lock request' followed by a 'security request' over the MS CAN bus.

Locking and Security Request Results:

- The front door modules receive the 'lock request' signal via MS CAN. The front doors lock.
- The front door modules transmit the 'lock request' signal to the rear door modules via LIN bus to lock the rear doors.
- The AJB/RJB receives the 'lock request' signal and inhibits the trunk and fuel door release.
- Once the vehicle is locked, the CJB automatically enters security mode and sends a 'security request' signal over the MS CAN bus, and flashes the front side lights.
- The front door modules receive the 'security request' signal via MS CAN and flash the side view mirror turn signal and approach lights.
- The AJB/RJB receives the 'security request' signal and inhibits fuel pump driver module operation and flashes the tail lights.
- The instrument cluster receives the 'security request' signal and activates the security LED in the sunload/light sensor on the dashboard.

If a door, hood or the trunk lid is ajar when an attempt to lock the vehicle is made, an error tone is emitted and no locking action will occur.

Passive Entry System Control Diagram



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- | | | | | | |
|---|-----------------|----|---|----|---|
| A | Hardwired | 4 | RF receiver | 12 | RH rear door module |
| N | MS CAN bus | 5 | Passenger door module | 13 | LH rear door module |
| O | LIN bus | 6 | Keyless vehicle module | 14 | LH rear door latch – fast latch |
| F | RF transmission | 7 | Passenger door handle, lock/unlock switch and antenna | 15 | LH rear door handle, lock/unlock switch and antenna |
| W | LF transmission | 8 | Passenger door latch — fast latch | 16 | Driver door latch – fast latch |
| 1 | Battery | 9 | Jaguar Smart Key | 17 | Driver door handle, lock/unlock switch and antenna |
| 2 | Megafuse (250A) | 10 | RH rear door latch — fast latch | 18 | Driver door module |
| 3 | CJB | 11 | RH rear door handle, lock/unlock switch and antenna | | |

Passive Trunk Opening

Trunk release switch from lid switch, vehicle locked with Jaguar SmartKey within range (passive entry vehicles only):

- The switch is hardwired directly to the KVM (as well as the AJB/RJB).
- On receipt of the release signal request from the switch the KVM energizes the LF antenna in the trunk, which transmits a 125KHz signal to the Jaguar SmartKey.
- On receipt of the LF signal the Jaguar SmartKey transmits a 315 MHz RF signal containing its authorization code to the RF receiver.
- The RF receiver relays the code, via a serial data line, to the KVM which checks and approves the code as valid. The KVM will only respond if the RF signal produced is from a valid Jaguar SmartKey for the vehicle.
- The KVM transmits the release request to the CJB via the medium speed CAN bus.
- The signal is passed from the CJB to the RJB via medium speed CAN.
- On receipt of the signal the RJB drives the latch motor, releasing the latch and opening the trunk lid.

When opening the trunk lid while the vehicle is locked and armed, all doors remain locked and the security system remains armed.

When the trunk is closed, the hazard warning lights will flash after a few seconds to confirm that the vehicle has rearmed the full alarm system.

NOTE: The SmartKey is monitored for position external to the vehicle. If the trunk lid is closed with the SmartKey inside it, the system will not re-arm: the trunk lid will re-open automatically and a warning tone will sound.

X150 / X250 ACTIVE ANTI-THEFT SYSTEM

The active anti-theft (alarm) system is a perimeter monitoring system that also verifies the Jaguar SmartKey validity. The system is controlled by software in the CJB and AJB/RJB.

When perimeter mode is active, the CJB monitors the panel ajar switches in the latch mechanisms of the hinged panels, which include:

- All doors
- Trunk lid
- Engine compartment lid

If the security systems detect a fault with one of the security sensors, two error tones will sound from the passive sounder after the vehicle is unlocked and disarmed.

The passive sounder takes the form of a horn located in the engine compartment RH side on X150, rear LH side on X250.

Principles of Operation

The engine is passively (automatically) immobilized when the Jaguar SmartKey is removed from the vehicle. The alarm system is armed when the lock button on the Jaguar SmartKey is pressed or the button on the exterior door handle is pressed (passive entry system) with a valid Jaguar SmartKey in close proximity. The hazard lights flash to indicate that the alarm is armed.

An alarm trigger is indicated:

- Audibly, via the vehicle horn and a passive sounder
- Visually, via flashing of the direction indicators

Monitoring of front door lock status is carried out using switches located in the door latch mechanisms. The condition of the switches is monitored by the front door modules and transmitted to the CJB over the MS CAN bus.

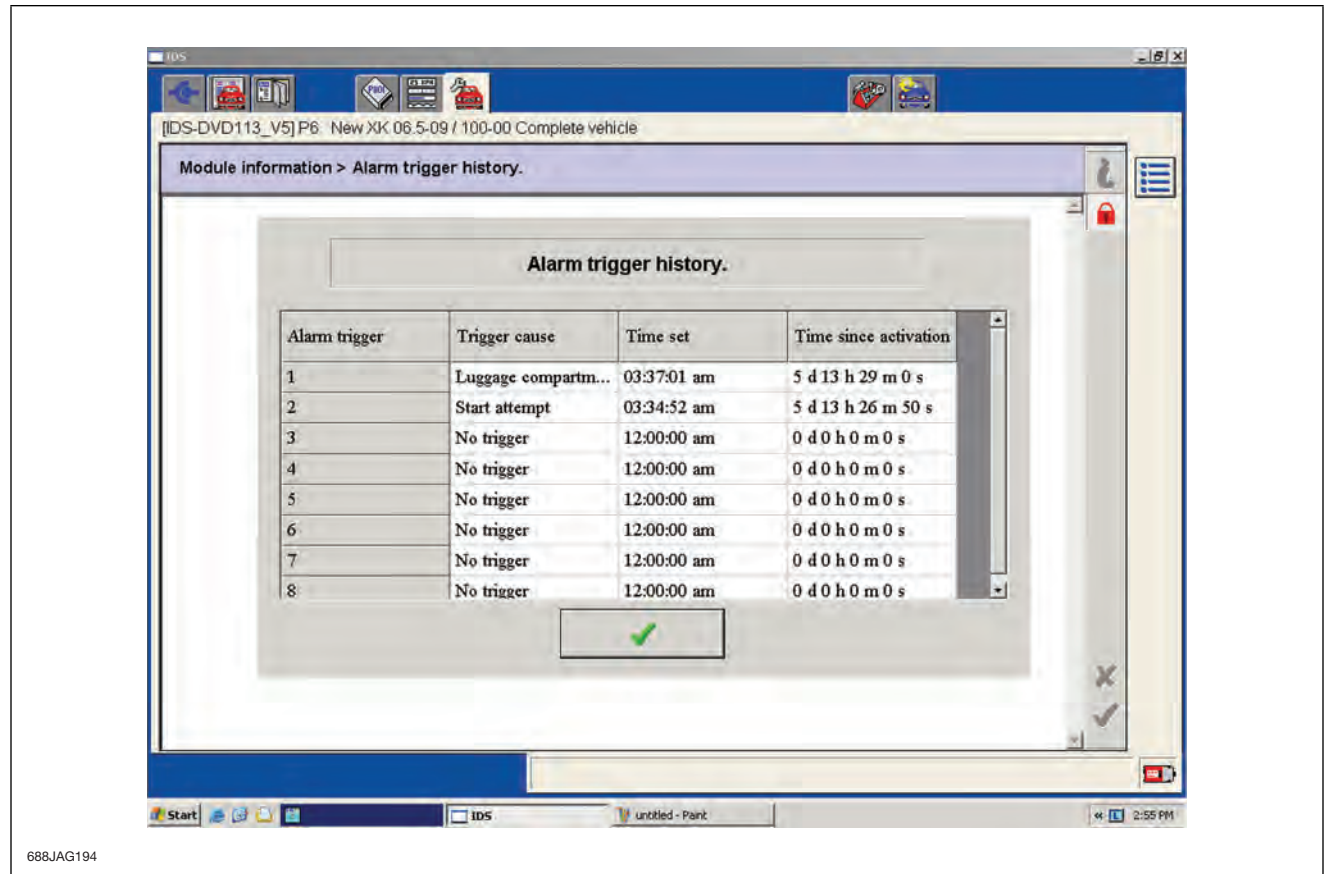
When armed, the active anti-theft system can be triggered in one of the following ways:

- Door ajar switch indicates a door has been opened
- Hood or trunk lid ajar switches indicate that either hood or trunk has been opened
- Either front door latch mechanism indicates a door has been unlocked
- Emergency key blade is used to open either the driver door or the trunk
- CJB or RJB are disconnected (this may result in only a partial trigger)
- Attempt to start the engine without a valid signal from the SmartKey

Alarm Trigger History

Alarm trigger activations can be viewed via touch screen display within the 'Security' menu. Only the most recent trigger will be displayed.

Detailed alarm trigger history with activation time stamps can be viewed and cleared via IDS within Set Up and Configuration: Module information tab.



Disarming the Alarm

When the vehicle is unlocked using the Jaguar SmartKey or by valid passive entry, the alarm is automatically disabled. The hazard lights flash twice to indicate that the alarm is disabled.

If the unlocking function fails to operate, the vehicle can be unlocked as follows:

- Unlock the driver door using the emergency key blade
- Dock the Jaguar SmartKey into the start control unit (SCU)

NOTE: When the driver door is unlocked using the key blade, the alarm will sound until the Jaguar SmartKey is docked.

If the alarm has been triggered, it can be deactivated using one of the following methods:

- Press the unlock button on the Jaguar SmartKey
- Dock the Jaguar SmartKey into the SCU
- Open a door using passive (keyless) entry
- Press the Start/Stop button with a valid Jaguar SmartKey present

Passive Arming (X250 only)

The vehicle is fitted with a passive arming feature that will, if enabled, automatically arm the anti-theft system. Passive arming will automatically arm the system 30 seconds after the driver's door is closed, provided all doors, hood and trunk are closed, the ignition is switched off and there are no valid Jaguar SmartKeys inside the vehicle.

Passive arming does not lock the vehicle, although access to the trunk via the interior or exterior release buttons is inhibited and the fuel filler flap is locked. The passive arming function is enabled using the Touch-screen.

Automatic Relocking and Re-Arming of the Alarm

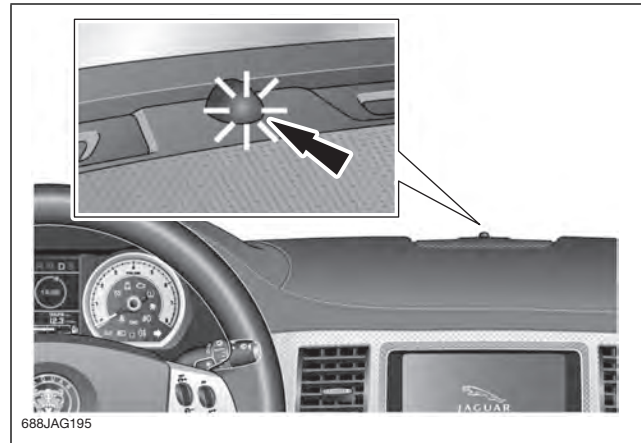
The automatic relock and re-arm feature will, if enabled, automatically relock the vehicle and arm the anti-theft system.

If the vehicle is in a locked and armed state and the Jaguar SmartKey UNLOCK button is pressed, but none of the doors or the trunk are opened within 45 seconds, the vehicle automatically relocks all the doors and the trunk and re-arms the alarm system.

This function relocks the vehicle to a centrally locked state and arms the alarm. This function is enabled using the Touch-screen on X250 and can only be enabled on X150 via IDS.

Alarm Indicator LED

The alarm indicator is an LED located in the body of the sunload/light sensor. When the ignition is off, the LED gives a visual indication that the alarm system is active or not active. Operation of the alarm indicator is controlled by the instrument cluster which varies the flash rate of the LED to indicate the system status of the alarm and the immobilization systems.



Alarm status is indicated by the LED as follows:

- LED off: alarm disarmed
- LED flashes once per second: alarm is armed and engine immobilized.

When the ignition is on, the LED gives a visual indication of the status of the passive anti-theft (engine immobilization) system. If the immobilization system is operating correctly, the LED will be illuminated for 3 seconds at ignition on and then extinguish. If a fault exists in the immobilization system, the LED will either be permanently illuminated or flashing for 60 seconds. This indicates that a fault exists and a fault code has been recorded. After the 60-second period, the LED will flash at different frequencies to indicate the nature of the fault.

X150 / X250 PASSIVE ANTI-THEFT SYSTEM

The passive anti-theft system (PATS) prevents unauthorized starting of the vehicle by immobilization of the:

- Engine cranking system
- Fuel system
- Ignition system

Immobilization is achieved through the use of a uniquely coded Jaguar SmartKey and an encoded data exchange between multiple control modules. The system is automatic and requires no input from the driver. The engine start system is initiated when the encoded data between the Jaguar SmartKey and vehicle control modules is verified. The engine can be started when the JaguarDrive selector is in the 'Park' position and the start/stop switch and brake pedal are pressed simultaneously.

The system relies on the Jaguar SmartKey for vehicle access and starting. If a valid Jaguar SmartKey is not detected, starting is inhibited. If replacement Jaguar SmartKeys are required, they must be programmed to the vehicle using IDS. Any module involved in the Jaguar SmartKey authorization process will require programming if replaced.

System Components

The PATS system uses the following components:

- Jaguar SmartKey
- LF keyless antennas
- RF receiver
- KVM
- Start control unit
- JaguarDrive selector module / engine Start/Stop switch
- TCM
- CJB
- Alarm LED indicator
- Instrument cluster
- AJB/RJB
- ECM
- ABS module

Keyless Vehicle Module (controls Passive Starting)

The keyless vehicle module (KVM) controls signal transmissions to and from the Jaguar SmartKey and provides authorization to allow the vehicle to be started passively. The module has a medium speed CAN connection to the CJB for authorizing the security code and a data connection hardwire for communication with the RF receiver.

The KVM energizes the interior low frequency antennas on receipt of either 'driver door closed' or 'start button pressed' signals from the CJB.

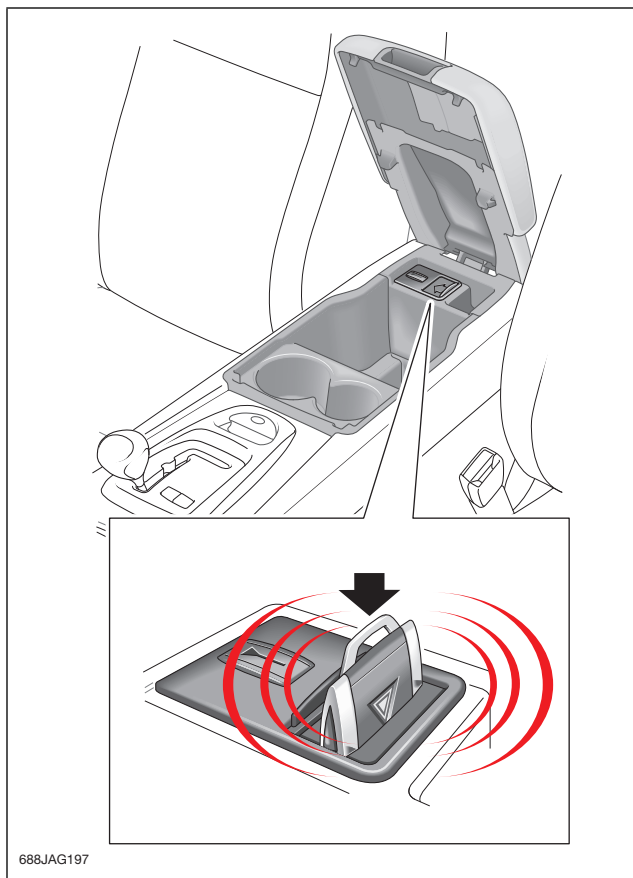
NOTE: The LF antennas are activated after driver door closed signal entry in anticipation of start request.

Start Control Unit (controls Active Starting)

The start control unit (SCU) is used if the KVM is unable to authorize the Jaguar SmartKey.

If the KVM is unable to identify the Jaguar SmartKey – for example, if the Jaguar SmartKey battery voltage is low or there is local RF interference – the transponder within the Jaguar SmartKey can be read in the conventional manner. The driver will be alerted to this by a chime and a message in the instrument cluster message center 'SMART KEY NOT FOUND PLEASE INSERT IN SLOT'.

The Jaguar SmartKey is inserted into the SCU with the key fob loop trailing. The start control module is motorized and will draw the remote handset into the slot once inserted.

X150 Start Control Unit**X250 Start Control Unit**

After inserting the Jaguar SmartKey:

- SCU energizes the transponder within the Jaguar SmartKey
- Transponder information is read by the SCU and the key identity (security code) is passed to the instrument cluster over the LIN bus.
- The instrument cluster checks the key identity and compares it with the identity of the keys stored within the instrument cluster.
- If the key identity is valid, the instrument cluster initiates a challenge response to the key.
- If the response from the key is correct, the key will be classed as a valid key and start authorization will be allowed.
- The instrument cluster also initiates a challenge response to the SCU to confirm it is correct for the vehicle. If it is not, then start authorization will not proceed.

NOTE: If the Jaguar SmartKey is not valid, the SmartKey will be ejected from the start control unit.


NOTE: Inserting the Jaguar SmartKey into the start control unit will not charge the Jaguar SmartKey battery. The battery is not rechargeable and must be replaced if run down or defective.

A message 'REMOVE SMART KEY' will be displayed if the Jaguar SmartKey is still in the start control unit and the driver's door is opened.

The Jaguar SmartKey can be removed by pushing down or in on the key fob loop and releasing. The start control unit motor will drive the Jaguar SmartKey out from the slot (if the ignition is off and 'Park' is selected).

CAUTION:

 **Do not use force to remove the Jaguar SmartKey as this may cause damage to the start control unit.**

 **Do not attempt to hold an invalid key in the start control unit in an attempt to prevent it from being ejected.**

JaguarDrive Selector Module (X250)

Prior to start authorization, the JaguarDrive selector module outputs a hardwired Park/Neutral signal to the CJB and ECM. This information is determined from its own selector position and information from the TCM.

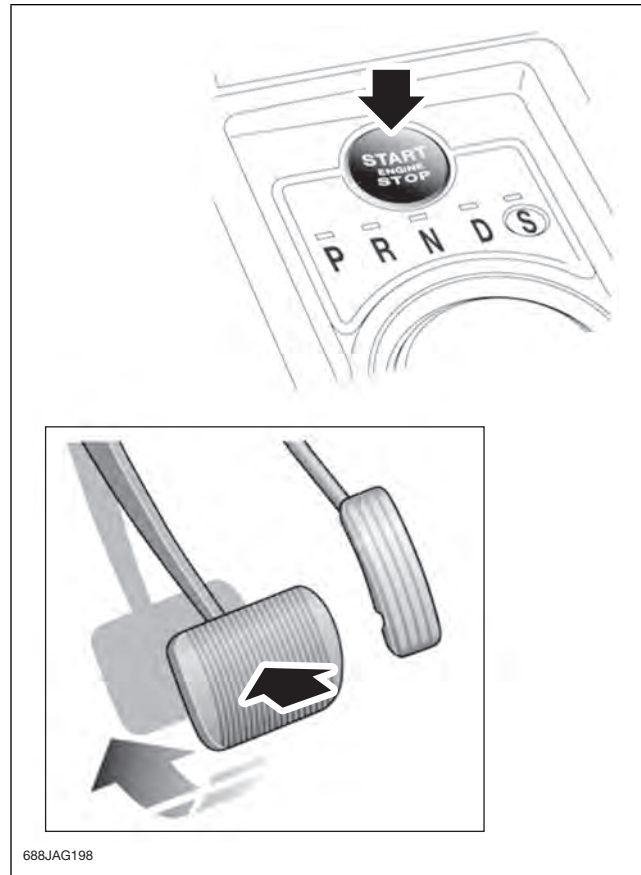
The X250 Start/Stop switch is integrated into the JaguarDrive selector module.

NOTE: The X150 Start/Stop switch is separate from the L-Gate and is hardwired directly to the CJB and AJB.

The switch contains two analog circuits, both outputs from the JaguarDrive selector module to the CJB. Either output can trigger a Jaguar SmartKey search resulting in one of two options:

- Ignition on / engine start
- Ignition off / engine off

The two analog circuits provide diagnostic and redundancy features. For example, if a circuit fails (open circuit, etc.), a warning is triggered to the vehicle user and a DTC is logged. With one circuit intact the vehicle will function as normal. One of the Start/Stop switch analog circuits provides an input to the AJB/RJB. This feature is required to support a hardwired reset from limp home mode: for example, if the AJB/RJB loses a CAN bus communication, certain functions are maintained. Pressing the Start/Stop switch will allow the hardware to be reset.



Transmission Control Module

The transmission control module (TCM) provides a hardwired 'Park Position Only' signal to the JaguarDrive selector module. The signal is activated by the TCM when 'Park Position' is confirmed (parking pawl locked in place). This information has back up data via the HS CAN bus, providing TCM selector position display and / or TCM start enable. Additionally the TCM and JaguarDrive selector modules have a private LIN bus to exchange data.

Central Junction Box

The CJB has the following PATS functions:

- Medium speed CAN communication with the instrument cluster and KVM providing start authorization data exchange
- Inputs from:
 - JaguarDrive selector module: Start/Stop switch status and Park/Neutral signals
 - Driver's door latch assembly: door closed signal
- Power outputs to:
 - Start control unit (transponder operation)
 - PATS LED indicator

Instrument Cluster

The instrument cluster has the following PATS functions:

- Medium speed CAN communication with the following:
 - CJB (start authorization data exchange)
 - AJB/RJB (start authorization data exchange)
- High speed CAN communication with the following:
 - ECM (start authorization data exchange)
 - ABS (brake pressure signal)
 - JaguarDrive Selector module and TCM (gear selector position back up data)
- LIN communication with the SCU (transponder operation)
- Operation of the security LED indicator is controlled by the instrument cluster, which varies the flash rate of the LED to indicate system status of the immobilization system

Auxiliary Junction Box/Rear Junction Box

The AJB/RJB:

- Controls the power output to the fuel pump driver module (FPDM) on receipt of a start authorization signal from the instrument cluster.
- Receives a hardwired Start/Stop status signal – from the JaguarDrive selector module (X250) or Start/Stop switch (X150) – to support a hardwired reset from limp home mode

Engine Control Module


After confirmation of start authorization data exchange with the instrument cluster, the ECM controls the cranking, ignition and fuelling functions.

ABS Control Module

The ABS control module provides a brake pressure signal to the instrument cluster via the high speed CAN.

Principles of Operation

The vehicle starting sequence proceeds as follows:

- When the CJB receives a hardwired ‘start button pressed’ signal, a valid key request message is sent from the CJB to the KVM via the MS CAN bus.
- The KVM activates all 3 interior LF antennas to output LF signals, which activates the Jaguar SmartKey (in the vehicle).
- The activated Jaguar SmartKey transmits an RF security code signal to the RF receiver.
- The RF receiver transmits the security code signal via dedicated serial data line to the KVM.
- The KVM checks and validates the security code and communicates a ‘SmartKey validated’ message to the CJB via MS CAN.
- The CJB sends an immobilization deactivation request to the instrument cluster via MS CAN.
- The instrument cluster deactivates immobilization and simultaneously performs an encrypted data exchange with:
 - The ECM via HS CAN to authorize Fueling and Ignition
 - The AJB/RJB via MS CAN to activate the B+ power supply to the FPDM 

Before the CJB can send a ‘crank request’ signal to the ECM, it requires:

- A ‘brake pressure rise’ signal from the ABS control module via MS CAN from the instrument cluster (which receives the HS CAN signal from the ABSCM)
- A hardwired ‘Park/Neutral’ signal

Once the required signals are received, the CJB outputs a hardwired ‘crank request’ signal to the ECM

Before the ECM can authorize ‘OK to Start’, it requires:

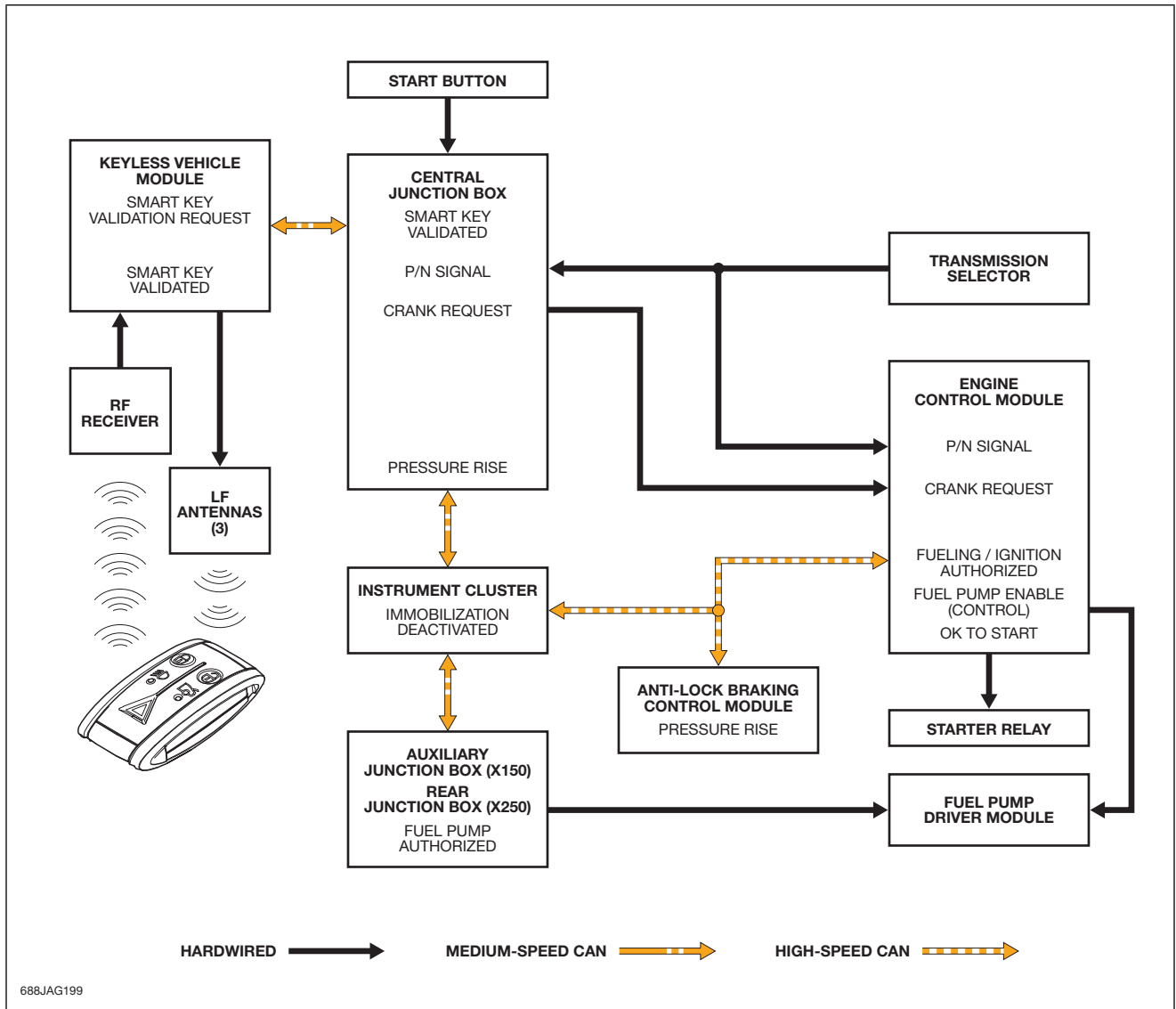
- A hardwired ‘Park/Neutral’ signal:
 - from the TCM (X150), or
 - from the JaguarDrive selector (X250)
- An ‘Immobilization Disabled’ message (encrypted data exchange with instrument cluster)

NOTE: the ECM also uses an HS CAN TCM ‘Start Enable’ signal as a redundancy in case the hardwired ‘Park/Neutral’ signal is missing.

Once the required signals are received, the ECM activates the starter relay and enables fuel pump driver.

NOTE: When the vehicle is delivered from the factory, the passive start (and entry) function is inhibited. In this condition, the vehicle can only be started by placing the Jaguar SmartKey in the start control unit. The system should be switched on during the PDI (pre-delivery inspection) using IDS.

Passive Starting Sequence



Diagnostics

Checking the operation of the PATS LED confirms the operating status of the system.

If the PATS is operating correctly, the LED will be illuminated for 3 seconds at ignition on and then extinguish. This check validates that all PATS functions were successful (including the Jaguar SmartKey key code matching and the challenge/response authorization sequence between system modules), resulting in the ECM being enabled.

The following examples are a guide to possible fault scenarios and basic checks/tests:

Ignition Fails to Operate

- Check that the Jaguar SmartKey is located within the vehicle interior, and is a valid key for the vehicle. Insert the Jaguar SmartKey into the SCU, as this is an alternative method to allow Ignition On/Engine Start.
- Check that the CAN bus is not malfunctioning (open or short circuit, for example), as this would inhibit communication between the KVM, CJB and instrument cluster.
- Check that the start button circuit(s) to the CJB are not open circuit or short circuit to battery positive.

Engine Fails to Crank

- If a PATS fault is detected, the LED will flash for 60 seconds at 4Hz with a 50% duty cycle. At the end of this period, the LED will flash a 2-digit code; the code is repeated 10 times. As a general rule a fault code of 16 or less will cause the vehicle not to crank. This indicates that a fault exists and a DTC has been recorded. IDS should be used to check for DTCs stored in the instrument cluster, CJB and ECM.
- One potential cause for the engine failing to crank could be that the Not in Park switch input to the CJB, or the P/N start switch input to the ECM, is not present.
- Check that the HS CAN bus is not malfunctioning (open or short circuit, for example), which could inhibit communication between the instrument cluster and ECM – resulting in no challenge/response authorization sequence being performed to enable the ECM. A DTC is stored in the instrument cluster, supported by the LED permanently illuminated for 60 seconds followed by fault code 24 flashing 10 times.
- Check that the engine crank request output from the CJB to the ECM is not open circuit or short circuit to ground.
- Check the starter circuit relay operation. It is important to note that, due to the smart start function, both sides of the relay coil are switched directly from the ECM.

Engine Cranks, No Start

The engine cranking confirms the ECM has passed the authorization required for mobilization from the required modules. If the authorization had failed, the ECM would not engage the starter relay.

Passive vs. Active Functionality Review

There are many functions that are associated with either ‘passive’ or ‘active’ key functions. For diagnostic purposes, it is important to understand the differences of between passive and active starting (as well as passive and active entry to the vehicle), as they are two independent systems that work together. Some components are

only linked to the vehicle immobilization strategy, while other components serve as agents in more than one of these processes. The table below is an overview of these modules and their relationship to SmartKey entry, starting and immobilization functions.

Module / Component	Remote Entry	Passive Entry	Passive Start	Active Start	Immobilization
SmartKey	Y	Y	Y	Y	N*
RF Antenna	Y	Y	Y	N	N*
External LF Antennas	N	Y	N	N	N*
Internal LF Antennas	N	N	Y	N	N*
Door Handle Switch	N	Y	N	N	N
Door Ajar Switch	N	N	Y	N	N
Start Control Unit	N	N	N	Y	Y
Instrument Cluster	N	N	N	Y	Y
KVM	Y	Y	Y	N	Y
ECM	N	N	N	N	Y
CJB	Y	Y	Y	Y	Y
AJB/RJB	N	N	N	N	Y
ABS Module	N	N	Y*	Y*	N
TCM	N	N	Y*	Y*	N

N* These components are only involved with key validation, NOT vehicle immobilization.

Y* These components only provide brake pressure and gear position status to CJB via CAN bus messages to enable engine cranking independent of any security /immobilization requirements.

