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Anti-Theft - Active -

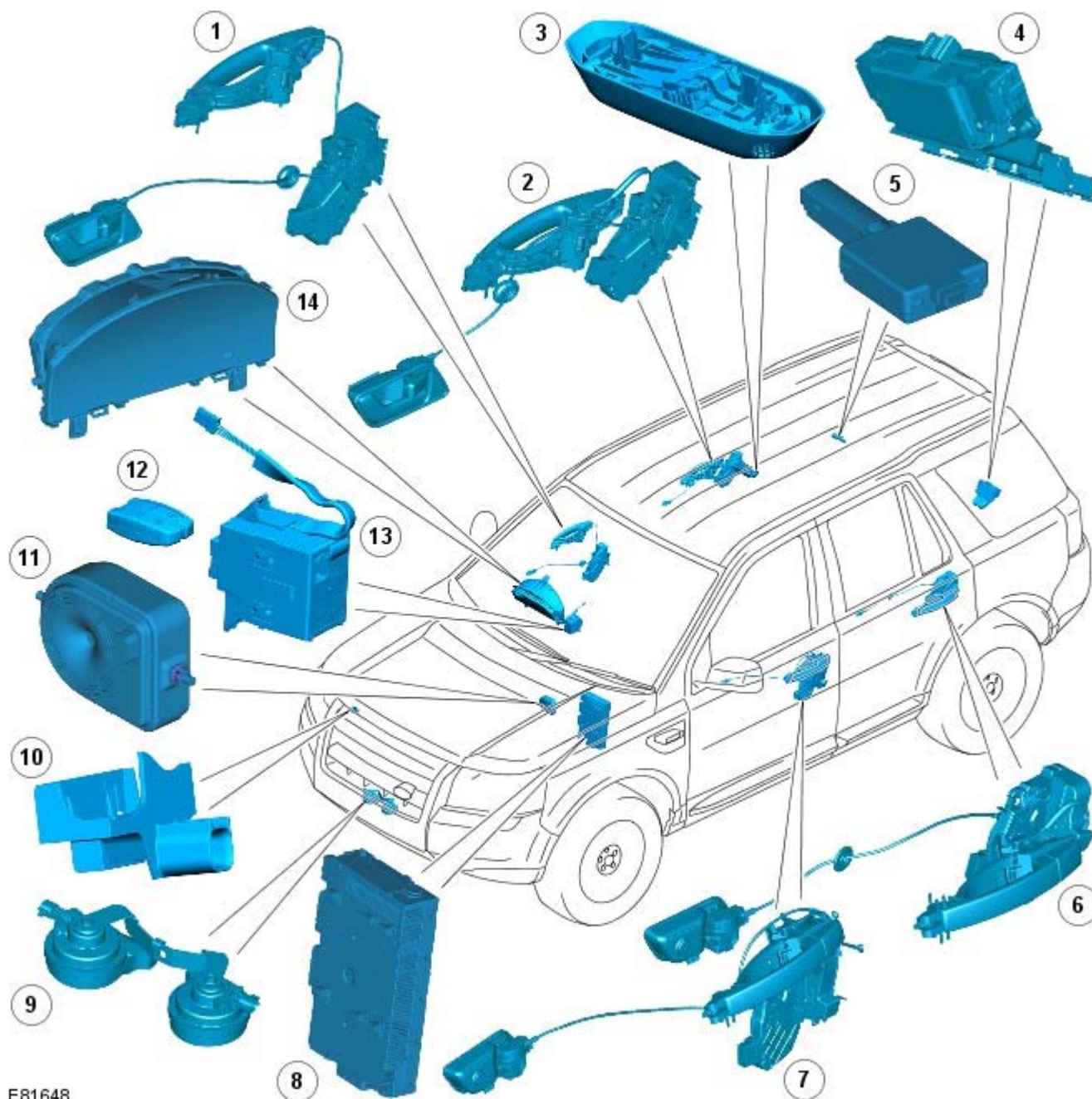
Torque Specifications

Description	Nm	lb-ft
Anti-theft alarm horn with integral battery	10	7
Hood switch	10	7

Part Number
Anti-Theft - Active - Anti-Theft - Active
 Description and Operation

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COMPONENT LOCATION



E81648

Item	Part Number	Description
1	-	Right Hand (RH) front door latch microswitch
2	-	RH rear door latch microswitch
3	-	Intrusion detection module
4	-	Liftgate latch microswitch
5	-	Radio Frequency (RF) receiver
6	-	Left Hand (LH) rear door latch microswitch
7	-	LH front door latch microswitch
8	-	Central Junction Box (CJB)
9	-	Vehicle horns
10	-	Hood microswitch
11	-	Battery backed sounder (incorporates tilt sensor in certain markets)

12		Remote handset
13		Start control module
14		Instrument cluster - Alarm Light Emitting Diode (LED)

OVERVIEW

The active anti-theft system monitors the hinged panels for unauthorized opening. In some markets the anti-theft system also incorporates monitoring of the vehicle interior and vehicle tilt sensing.

The active anti-theft alarm system is controlled by the following body system control modules:

- CJB
- Left Hand (LH) and Right Hand (RH) front and rear door modules
- Instrument cluster.

The CJB is the main controller in the system. The CJB controls the following security functions, in addition to other vehicle functions:

- Locking, double locking and unlocking
- Monitoring of hinged panel microswitches and panel ajar states
- Intrusion detection module
- Battery backed sounder or vehicle horns
- Passive arming and disarming
- Panic alarm function
- Remote handset transponder reading
- Interior lighting.

Two levels of vehicle anti-theft alarm are available; perimeter mode monitors all opening panels and volumetric mode (if fitted) monitors the vehicle interior for intrusion and, in certain markets, it also incorporates a tilt sensor to monitor if the vehicle is being moved.

NOTE: Volumetric mode and tilt sensing are not available in certain markets.

NOTE: Volumetric mode is cancelled if the vehicle is locked with any window or roof opening panel not closed to avoid inadvertent alarm activation.

The remote handset provides the following functionality:

- Unlock (central unlock or single point entry)
- Lock and double lock
- Liftgate release
- Approach lighting
- Panic alarm.

The unlock and lock buttons also control a 'lazy' lock and unlock feature which will automatically close or open the windows with an extended press of the applicable button. This feature is only available in certain markets and is controlled in conjunction with the door modules.



WARNING: Never double lock the vehicle with any person or animal inside.

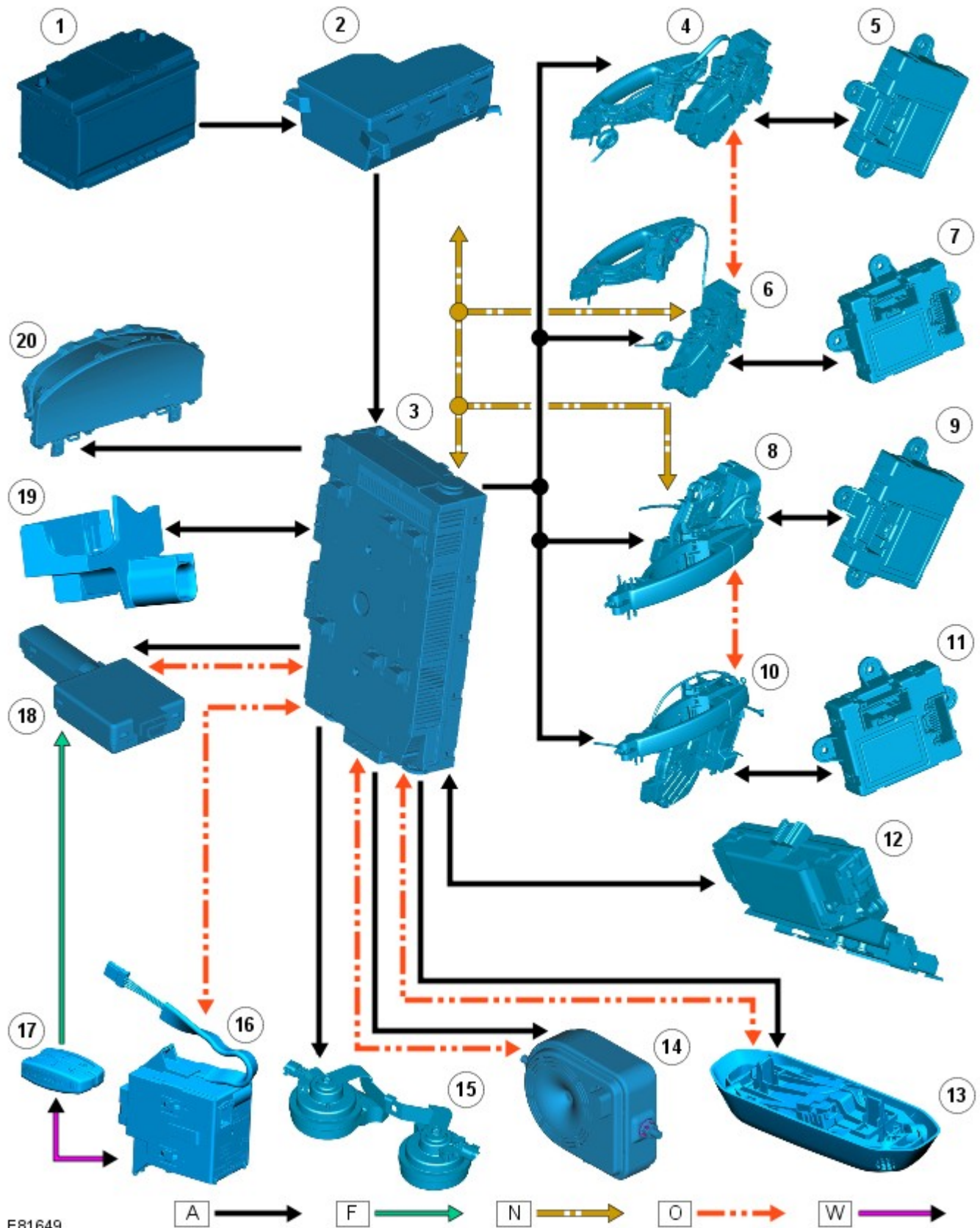
NOTE: Double locking is only available in certain markets.

The remote handset contains an emergency access key. This can be used in the event of failure of the remote handset or the vehicle battery to unlock the vehicle. The LH door handle contains a concealed mechanical key barrel which can be used with the emergency key to access the vehicle. This will not disable the perimeter or interior alarm systems which will be activated when the door is opened. To cancel the alarm, the remote handset must be inserted in the slot in the start control module and the stop/start button must be pressed.

The remote handset is fitted with an integral vanadium lithium rechargeable battery. The battery is charged when it is inserted into the slot in the start control module.

CONTROL DIAGRAM

NOTE: **A** = Hardwired; **F** = RF Transmission; **N** = Medium Speed CAN bus; **O** = LIN bus; **W** = LF Transmission



E81649

Item		Description
1		Battery
2		Battery junction box
3		CJB
4		RH rear door latch microswitch
5		RH rear door module
6		RH front door latch microswitch
7		RH front door module

8		LH rear door latch microswitch
9		LH rear door module
10		LH front door latch microswitch
11		LH front door module
12		Liftgate latch microswitch
13		Intrusion detection module
14		Battery backed sounder and tilt sensor (certain markets only) (if fitted)
15		Vehicle horns
16		Remote handset
17		RF receiver
18		Start control module
19		Hood microswitch
20		Instrument cluster alarm LED

DOOR MODULES

The door modules provide the interface between the door latch motors, the door and latch switches and the CJB. The door modules provide door microswitch status information and enable the door motors on request from the CJB.

The rear door modules are controlled via the front door modules on the Local Interconnect Network (LIN) bus. Additionally, the front door modules also control the exterior mirror functions.

CENTRAL JUNCTION BOX

The CJB controls the following functions:

- the horns
- the liftgate latch motor and microswitches (including the liftgate external release switch)
- the liftgate ajar switch
- the turn signal indicators
- fuel filler flap operation.

The CJB also has a connection to the Restraints Control Module (RCM) for automatic operation of the interior lights and the turn signal indicators in the event of an accident.

NOTE: If the CJB is replaced, the new module will require configuring to the master car configuration using a Land Rover approved diagnostic system.

The CJB automatically arms and disarms the active anti-theft system when the vehicle is locked and unlocked after successful confirmation that a valid remote handset has been used.

INSTRUMENT CLUSTER

The instrument cluster controls the alarm indicator which is incorporated in the main display in the instrument cluster.

The instrument cluster also controls, in conjunction with the CJB, the Engine Control Module (ECM) and the Anti-lock Brake System (ABS) module, the engine immobilization. The ECM controls the engine crank and fuel functions and the ABS module controls the tilt function. The EMS and ABS module communicate to each other after the CJB processes the valid remote handset information.

Alarm Indicator

The alarm indicator is a Light Emitting Diode (LED) located in the instrument cluster. When the ignition is off, the indicator gives a visual indication of the active anti-theft system to show if the alarm system is set or unset.

When the ignition is on, the indicator provides 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 be either 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 which indicate the nature of the fault.



E84906

Item		Description
1		Alarm indicator

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/Immobilization Status	Alarm Indicator Status	Alarm Indicator Function
UNSET	No flash	LED is off
SET - with perimeter alarm	Flashing	LED will flash twice quickly with a long interval between and is repeated 10 times. Slow 'active' flash then follows.
SET - with volumetric alarm	Flashing	LED will flash three times quickly with a long interval in between and is repeated 10 times. Slow 'active' flash then follows.
ACTIVE	Flashing	Slow flash once alarm is activated at a frequency of 100ms on and 200ms off.
UNSET - alarm activated during previous SET cycle	Flashing rapidly	LED will flash rapidly until the CJB receives an accessory power mode 4 signal.

VEHICLE HORNS



E84907

The vehicle horns are located in the front bumper armature. The horns are connected directly to the CJB which activates the horns when the alarm is triggered.

BATTERY BACKED SOUNDER (if fitted)



E84908

The battery backed sounder (or battery backed sounder with tilt function) is located in the LH rear corner of the engine compartment and is attached to the fire shield. The sounder is only fitted in certain markets.

On vehicles with a battery backed sounder, a tilt sensor can be incorporated which monitors the vehicle attitude. The CJB monitors the tilt sensor and can detect if the vehicle is being moved, towed or raised and activate the alarm. The type of battery backed sounder can be identified by a suffix change to the part number; sounders without a tilt sensor have the suffix 'A' and sounders with a tilt sensor have the suffix 'B'.

Operation of the sounder is controlled by the CJB on a LIN bus. The sounder is also connected with a permanent battery supply via the CJB. An integral, rechargeable battery powers the sounder if the vehicle battery supply from the CJB is interrupted.

INTRUSION DETECTION MODULE



E84909

The intrusion detection module is an optional fitment in some markets and is not available in other markets. The intrusion detection module comprises four sensors which allow the interior of the vehicle to be monitored. The module is located in a central position on the vehicle headliner.

The intrusion detection modules are activated with the volumetric mode which in turn is enabled when the vehicle is double locked. The vehicle can be locked and alarmed with the module deactivated if a pet is to be left in the vehicle for example, by single locking the active anti-theft system.

When volumetric mode is active, if the vehicle battery voltage falls to below 9 volts, the CJB will ignore any inputs from the module to prevent false alarm activation.

PRINCIPLES OF OPERATION

The CJB automatically arms and disarms the active anti-theft system when it operates the Central Locking System (CLS).

On vehicles without an intrusion detection module, only the perimeter mode is available to monitor the hinged panels and the validity of the remote handset.

When perimeter mode is active, the CJB monitors panel ajar switches located in the latch mechanisms of the front and rear doors and the liftgate. A separate hood ajar microswitch, located in RH hood latch mechanism in the engine compartment, monitors the hood status.

When volumetric mode is active, the CJB monitors the interior of the vehicle for movement using an intrusion detection module located in the centre of the headliner.

Arming

On vehicles without an intrusion detection module and a tilt sensor, the active anti-theft system is armed in the perimeter mode when the vehicle is either locked or double locked.

On vehicles fitted with an intrusion detection module, the system has 2 modes of operation; perimeter mode and volumetric mode.

Perimeter mode

Perimeter mode only monitors the hinged panels and validity of the remote handset in the start control module. Perimeter mode is activated by a single press of the lock button on the remote handset.

Volumetric Mode

Volumetric mode monitors the vehicle interior for intrusion. If the vehicle is fitted with a battery backed sounder, which incorporates a tilt sensor, the vehicle attitude is also monitored when volumetric mode is active. Volumetric mode is activated by a second press of the lock button on the remote handset. The second press of the button must occur within 3 seconds of the first press. The second press of the lock button also activates the perimeter mode double locking feature.

The CJB arms the active anti-theft system when it locks or double locks the vehicle, providing all the following conditions are met:

- All doors, liftgate and hood are closed
- The CJB is not in transit mode.

When the vehicle has successfully completed its locking routine, confirmation will be given by a single flash of the turn signal indicators to indicate the locked condition. If double locking is activated, then the confirmation will be given by a double flash of the turn signal indicators; one flash for locked and one long flash for double locked.

Mislock

If any doors, liftgate or hood is open when a lock or double lock request is received, the active anti-theft alarm system remains disarmed and the CJB generates a short mislock sound from the vehicle horns or battery backed sounder and the turn signal indicators will not flash. Each attempt to lock will be confirmed by an audible chime being emitted.

When the CJB arms the active anti-theft system, it first enables perimeter mode and monitors the status of the hinged panels. If the vehicle is fitted with a battery backed sounder, an arming signal is sent from the CJB to enable the sounder. If the vehicle is double locked and fitted with an intrusion detection module, the CJB then sends an arming signal to the module and the tilt sensor when double locked. The CJB ignores the signals from the intrusion detection module for the first 30 seconds to allow time for the vehicle interior to settle and prevent false alarm activation.

If the liftgate is opened via the remote handset, the intrusion detection module and the tilt sensor are inhibited until the liftgate is closed.

Disarming

The CJB will disarm the active anti-theft system to prevent false alarm activation under certain conditions as follows:

- When the active anti-theft system is armed in volumetric mode, if the vehicle battery voltage decreases to less than 9 volts, the CJB will disable the volumetric mode and remain in perimeter mode only. This prevents false alarm activation because the intrusion detection module cannot operate correctly below 9 volts.
- On vehicles fitted with a battery backed sounder, if the vehicle battery voltage decreases from 9.5 to 9 volts in more than a 30 minute period, the CJB de-activates the battery backed sounder and, if required, will use the vehicle horns to sound an audible alarm trigger warning. This prevents false alarm activation. At voltages below 9 volts, the CJB will not generate the 'heartbeat' signal to the battery backed sounder. The battery backed sounder interprets this as the CJB has been tampered with and activates its sounder. If the battery voltage subsequently rises to more than 9.5 volts, the CJB will re-arm the battery backed sounder.
- If the vehicle is unlocked using the unlock button on the remote handset and, within 60 seconds a hinged panel is not opened, the CJB automatically re-locks the vehicle and re-arms the active anti-theft system (if the 'auto re-lock' feature is enabled). This prevents leaving the vehicle unlocked and disarmed by accidental operation of the remote handset unlock button.

Alarm

When the alarm is triggered, the CJB activates audible and visual warnings. The audible warnings are produced by the vehicle's horns or the battery backed sounder. Visible indications are produced using the turn signal indicators.

The CJB activates the vehicle horns or battery backed sounder and the visual indications for 30 seconds. The activation is stopped for 5 seconds and, if the alarm trigger is still present, the CJB will cycle again for 30 seconds (60 seconds in certain markets). This will be repeated for up to a maximum of 10 cycles (3 cycles in certain markets) of 30 seconds (60 seconds in certain markets) for any one arming period. The CJB will de-activate the alarm if the 10 cycles (3 cycles in certain markets) have been completed and the alarm trigger is still present or until it receives a disarm signal.

NOTE: If the battery backed sounder is triggered due to tamper detection, the visual indication using the turn signal indicators is not activated.

The alarm can be triggered by any of the hinged panels being opened, the intrusion detection module detects a movement inside the vehicle, the tilt sensor detects vehicle movement or an ignition tamper is detected (invalid remote handset).

Battery Backed Sounder

When the CJB arms the active anti-theft system, in either the perimeter mode or the volumetric mode, the CJB sends an arming signal to the battery backed sounder on the LIN bus. When the system is armed in the volumetric mode, the CJB also sends an arming signal to the tilt sensor (if fitted).

NOTE: If a battery backed sounder is fitted, it is also armed with the perimeter mode lock request.

On receipt of the arming signals, the sounder and the tilt sensor respond with a status message. If the CJB does not receive the status signals within 12 seconds, the CJB assumes there is a fault and responds with a disarm signal to either the sounder and/or the tilt sensor and stores a related fault code. If the sounder is disarmed when the active anti-theft system is armed and the system is subsequently triggered, the CJB energizes the horn relay and uses the vehicle horns to sound the audible warning in place of the sounder.

When the sounder is armed, the CJB sends a periodic (heartbeat) signal to the sounder which prompts the sounder to monitor the vehicle battery supply and the LIN bus link with the CJB. The sounder will operate if:

- it receives an alarm signal from the CJB or the tilt sensor
- the power supply or the LIN bus link to the CJB is disrupted.

The tilt sensor measures the longitudinal and lateral angle of the vehicle over a range of ± 16 degrees from the horizontal. When the active anti-theft system is armed in volumetric mode, the tilt sensor stores the current vehicle angles in its memory and monitors the tilt sensor readings. If the vehicle angle changes in either direction by more than the alarm limit, the tilt sensor activates the sounder.

If the alarm system is active and the battery or the battery backed sounder is disconnected, the sounder will operate without the visual indication of the turn signal indicators flashing.

Global Open/Close

The global open/close feature allows the user to fully raise/lower the windows with a single press of a remote handset button. The button must be pressed and held for more than 2 seconds. Either or both global open/close functions can be disabled using a Land Rover approved diagnostic system.

NOTE: Remote global close is not available in certain markets, North American Specification (NAS) for example.

Single Point Entry

The single point entry feature only unlocks the driver's door and the liftgate, all other doors remain locked. A single press of the unlock button on the remote handset will unlock only the driver's door and the liftgate, a second press is required to unlock the remaining doors.

If the vehicle is double locked, the first press of the unlock button on the remote handset unlocks the driver's door and the liftgate. The remaining doors revert to the single locked state and can therefore be unlocked using the interior door handles, the remote handset unlock button or the unlock switch on the instrument panel switchpack.

Changing from central locking to single point entry can be carried out by pressing the lock and unlock buttons on the remote handset simultaneously. The turn signal indicators will flash to confirm that the function change has been performed.

Drive Away Locking

The drive away door locking feature locks the doors and the liftgate if they are unlocked when the vehicle reaches a certain speed.

On vehicles with automatic transmission, with all the doors, liftgate and hood closed and the gear selector not in 'P' Park or 'N' Neutral position, if the CJB detects, via a high speed CAN message from the Anti-lock Brake System (ABS) module, that the vehicle speed is more than 7 km/h (5 mph), the doors will automatically lock.

On vehicles with manual transmission, with all the doors, liftgate and hood closed, if the CJB detects, via a high speed CAN message from the ABS module, that the vehicle speed is more than 7 km/h (5 mph), the doors will automatically lock.

Remote Handset Additional Features

The remote handset has convenience buttons in addition to the lock and unlock buttons.

Panic Alarm

The panic alarm feature allows the user to activate the vehicle alarm system using the remote handset. The 'panic button', identified by a triangle symbol, can be pressed 3 times within 3 seconds or pressed and held for more than 3 seconds to activate the panic alarm.

Global Open/Close

A global open and close feature can be operated from the remote handset. This feature allows the vehicle windows to be opened/closed by a single press of the lock or unlock button. The button must be pressed and held for more than 2 seconds to activate the global open/close feature. The global open/close feature is not available in all markets.

Liftgate Release

A liftgate release button can be pressed to unlock and release the liftgate latch only. This will operate with the vehicle locked and

alarmed or unlocked. If the vehicle is locked and alarmed, when the liftgate release button is pressed, the liftgate can be opened without triggering the alarm system. When the liftgate is subsequently closed, the alarm will be re-activated.

Headlamp Convenience

A headlamp convenience button can be pressed to operate the headlamps to assist departure or approach to the vehicle. A single press of the button will operate the headlamps for approximately 25 seconds, after which time they will automatically turn off. A second press of the button will turn off the headlamps if the 25 second period has not been reached. Pressing the stop/start button within the 25 second period will also turn off the headlamp convenience feature.

Convenience mode

When the vehicle is unlocked using the unlock button on the remote handset, the vehicle's electrical system initiates convenience mode. The following systems become active:

- Memory - seat adjustment and mirror position
- Interior and exterior lighting
- Audio system
- Instrument cluster message centre
- Horn
- Cigar lighter/power socket.

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Anti-Theft - Active - Anti-Theft - Active

Diagnosis and Testing

The complexity of the electronics involved with the anti-theft system, and the multiplexed communication network which are connected to it, preclude the use of workshop general electrical test equipment. Therefore, reference should be made to the manufacturer approved diagnostic system for detailed instructions on testing the anti-theft system.

The manufacturer approved diagnostic system systematically tests and analyses all functions and the various systems affected by it.

Where a fault is indicated, some basic diagnostic methods may be necessary to confirm that connections are good and that wiring is not damaged before installing a new component.

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Anti-Theft - Active - Anti-Theft Alarm Horn with Integral Battery

Removal and Installation

Removal

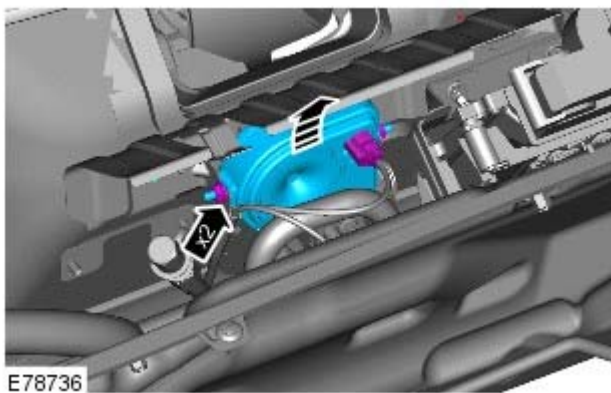
NOTE: Removal steps in this procedure may contain installation details.

1. Disconnect the battery ground cable.

Refer to: [Specifications](#) (414-00 Battery and Charging System - General Information, Specifications).

2. Remove the plenum chamber panel.

Refer to: [Plenum Chamber](#) (412-01 Climate Control, Removal and Installation).



3. *Torque:* 10 Nm

Installation

1. To install, reverse the removal procedure.

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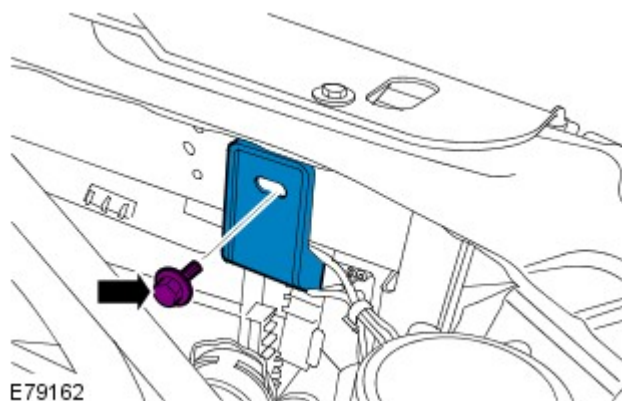
Anti-Theft - Active - Hood Switch

Removal and Installation

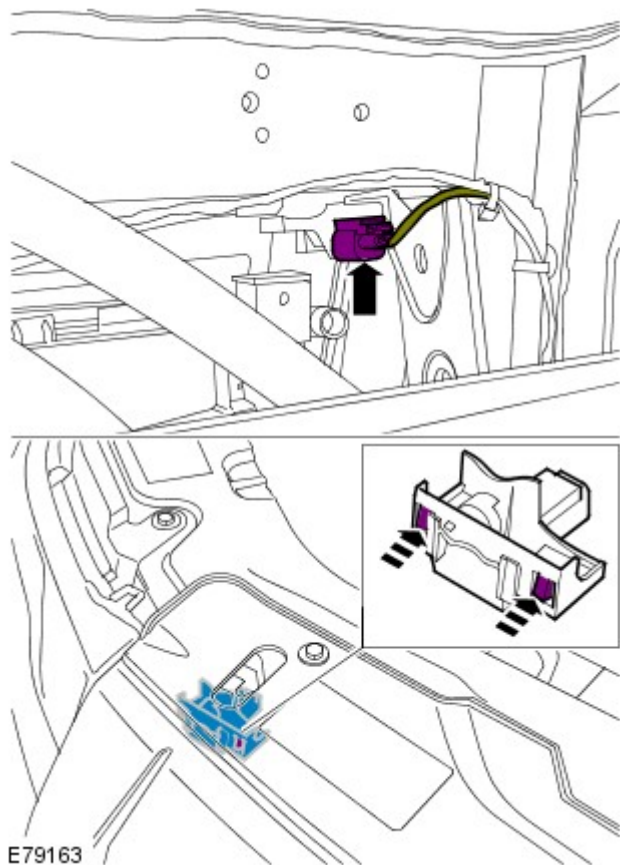
Removal

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

1. Torque: 10 Nm



- 2.



Installation

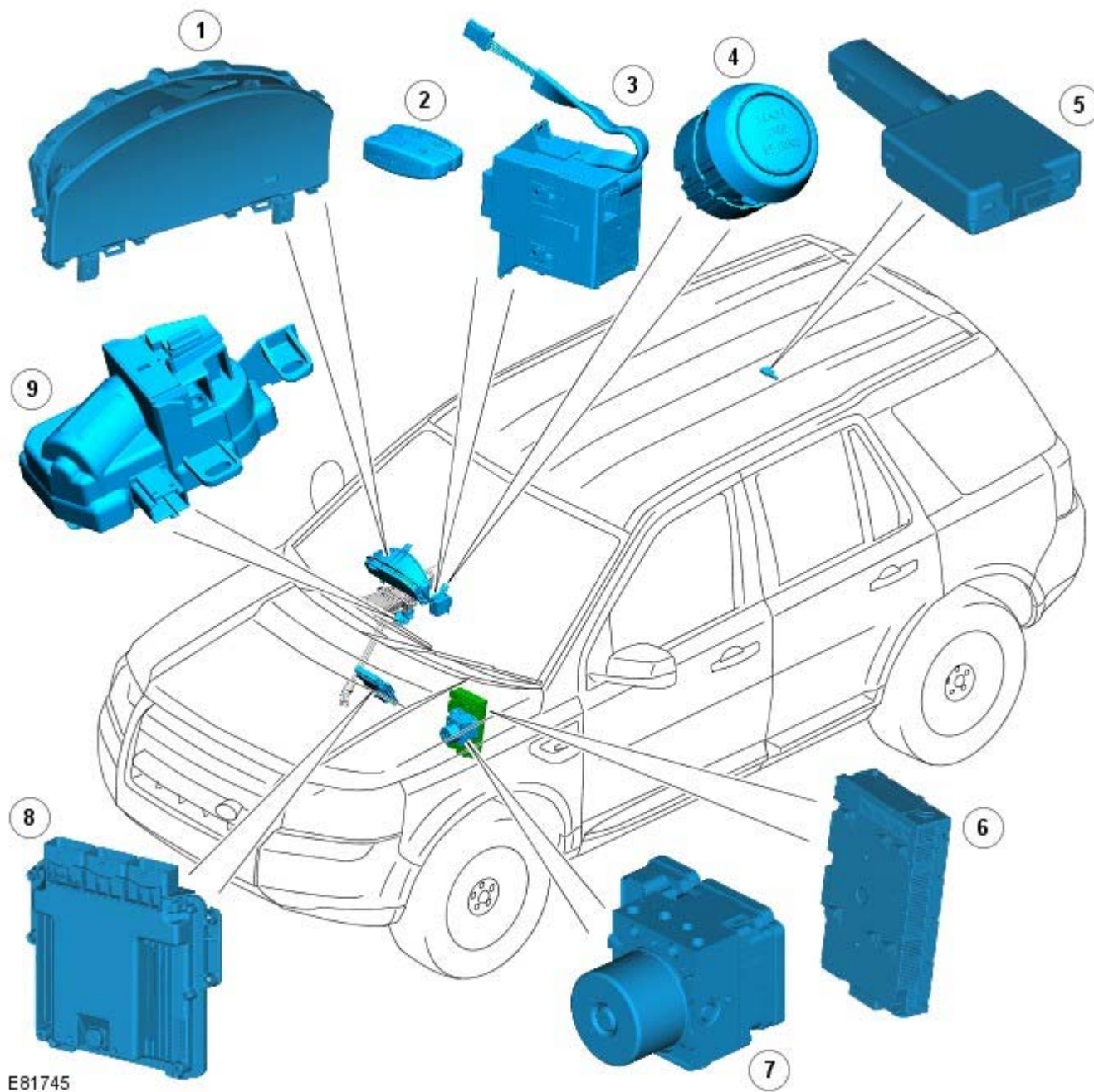
1. To install, reverse the removal procedure.

Part Number

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Anti-Theft - Passive - Anti-Theft - Passive

Description and Operation

COMPONENT LOCATION

E81745

Item	Part Number	Description
1	-	Instrument cluster
2	-	Remote handset
3	-	Start control module
4	-	Stop/Start switch
5	-	Radio Frequency (RF) receiver
6	-	Central Junction Box (CJB)
7	-	Anti-lock Brake System (ABS) module
8	-	Engine Control Module (ECM)
9	-	Electric steering column lock

OVERVIEW

The Passive Anti-Theft System (PATS - immobilization) provides a secure interface between the CJB , ECM and ABS module to prevent unauthorized starting of the vehicle. This is achieved by having uniquely coded remote handset and encoded data exchange between modules.

Unauthorized starting prevention is achieved by immobilization of the engine crank system, fuel system and ignition system.

The passive anti-theft system uses the following components:

- Remote handset transponder
- CJB
- ECM
- Start control module
- Instrument cluster
- ABS module
- Electric steering column lock (if enabled).

NOTE: On North American Specification (NAS) vehicles, a running change was introduced during 2008 Model Year (MY) to disable the electric steering column lock. Under the change, the internal electronics (printed circuit board (PCB), motor, etc.) of the lock have been removed and the lock has been disabled in the car configuration file. The change is incorporated on VIN (vehicle identification number) 082896, 085531, 085622, 085685, 085832, 085891, 085942, 085987, 086049, 086081, 086123, 086178, 086276, 086287, 086309, 086363, 086383, 086389, 086398, 086403 and 091770 onwards.

The system is automatic and requires no input from the driver. The engine management system will only allow engine crank when an authorization data message is received from the CJB. The engine start system is initiated when the start/stop switch and the brake pedal (automatic transmission) or the clutch pedal (manual transmission) are pressed simultaneously.

The engine management system (ECM) will only allow engine crank, spark (petrol models only) and injector functions when the following conditions are met:

- A hardwired Park/Neutral signal is received from the Transmission Control Module (TCM) (automatic transmission only)
- A hardwired ignition signal is received from the CJB
- A hardwired crank request signal is received from the CJB
- Encrypted data exchange between the instrument cluster and the ECM is verified.

Before the CJB will send the hardwired ignition signal, it must satisfactorily complete the following:

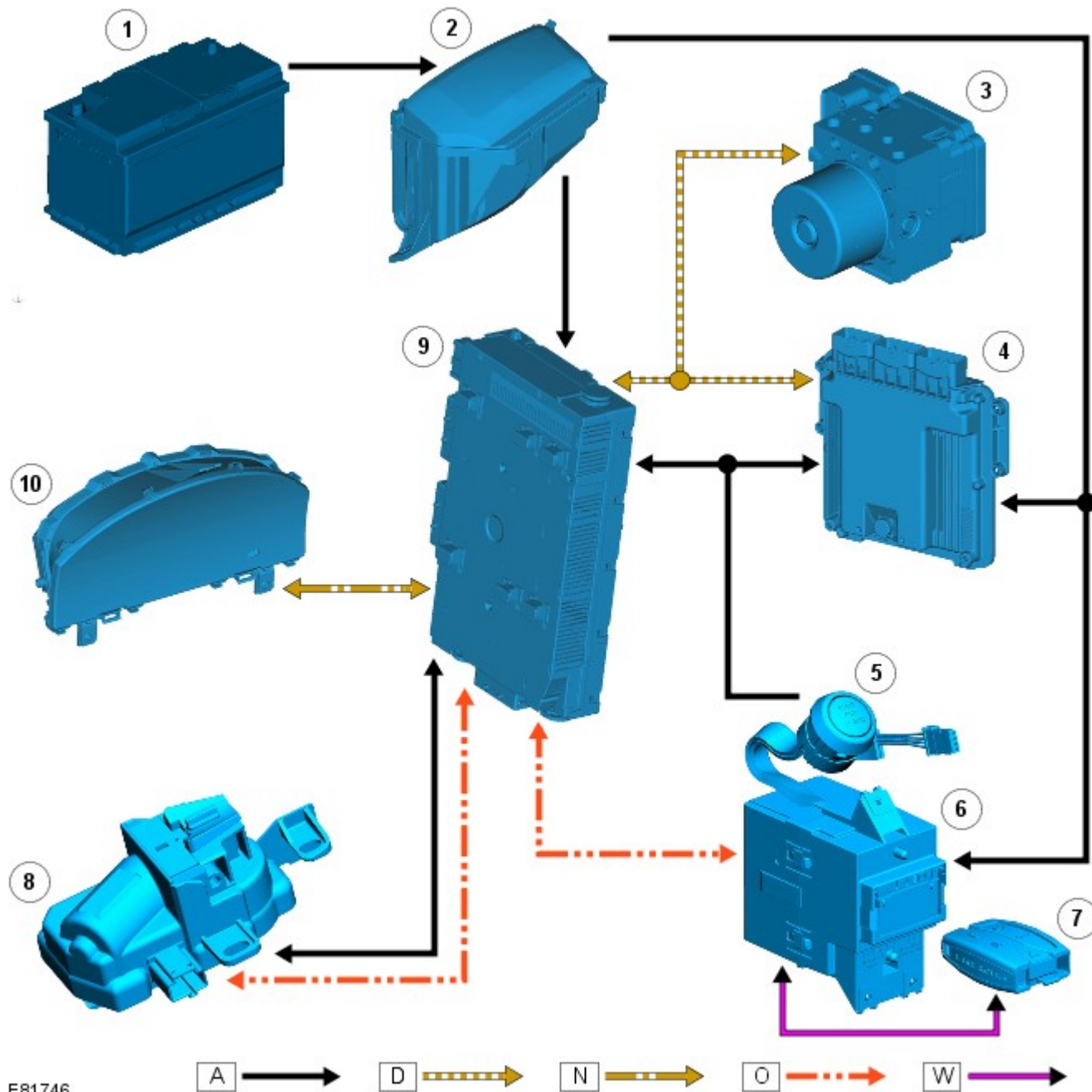
- Exchanged encrypted data with the start control module to validate the remote handset.

Additionally, before the CJB will send the hardwired crank request signal it must receive the following signals:

- Brake signal from the brake switch (automatic transmission) or clutch signal from the clutch switch (manual transmission)
- Hardwired transmission in Park (P) signal from the selector lever assembly (automatic transmission only).

CONTROL DIAGRAM

NOTE: **A** = Hardwired; **D** = High speed CAN bus; **N** = Medium speed CAN bus; **O** = LIN bus; **W** = LF transmission



E81746

Item		Description
1		Battery
2		Battery Junction Box (BJB)
3		ABS module
4		ECM
5		Stop/Start switch
6		Start control module
7		Remote handset
8		Electric steering column lock (if enabled)
9		CJB
10		Instrument cluster

START CONTROL MODULE

The start control module is located in the instrument panel, adjacent to the steering column. The start control module is used as a primary method to authorize the remote handset.

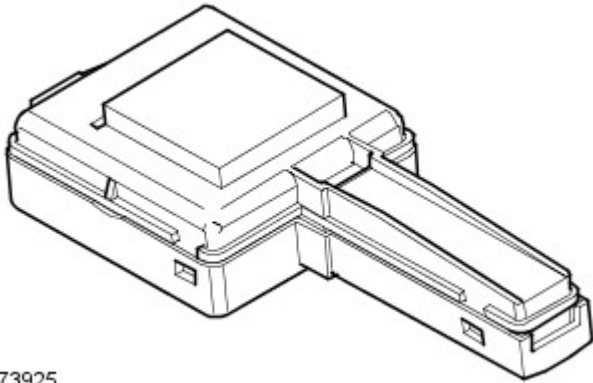
The remote handset is inserted into the start control module slot with the key fob loop trailing. The start control module is motorized and will draw the remote handset into the slot once inserted.

The start control module will then read the transponder within the remote handset and, if the transponder identification is valid, pass the identification data to the CJB to be processed.

Five seconds after the remote handset is inserted in the start control module, the module will start to charge the remote handset battery.

A message 'KEY IN' will be displayed if the remote handset is still in the start control module and the driver's door is opened. The remote handset is removed from the start control module by gently pushing the remote handset into the start control module and releasing. The start control module motor will then drive the remote handset out from the slot as long as the ignition is off.

RF RECEIVER



E73925

The Radio Frequency (RF) antenna is located in a central position behind the head liner. The receiver is available in two variants; 315 MHz or 433 MHz depending on market requirements. Transmissions are received from the remote handset for key identification and remote lock/unlock requests or requests for operation of the additional driver convenience features.

PRINCIPLES OF OPERATION

The remote handset is validated via the start control module and the CJB. If the remote handset is valid the CJB initiates the unlocking of the electric steering column lock (if enabled). Once the electric steering column lock is unlocked and power has been removed, then the CJB enables the Fuel Pump Driver Module (FPDM) on petrol vehicles or the fuel pump relay on diesel vehicles.

The CJB also controls the engine crank request. On vehicles with automatic transmission, if the transmission selector lever is in the Park 'P' position and the driver presses the brake pedal or on manual transmission vehicles if the driver presses the clutch pedal and simultaneously presses the start/stop switch, the CJB interprets this as an engine crank request. Before the engine crank request is allowed, the CJB checks for the brake or clutch switch signal. If the signal is correct then the CJB sends a crank request signal to the ECM on the high speed Controller Area Network (CAN) bus.

If a replacement remote handset is required, then a Land Rover approved diagnostic system must be used to synchronize the remote handsets. If any module, which is involved in the remote handset authorization process, require replacement, a Land Rover approved diagnostic system procedure is also required to synchronize the replacement module into the system.

Anti-Theft - Passive - Anti-Theft - Passive

Diagnosis and Testing

Principles of Operation

For a detailed description of the Passive Anti-Theft System (PATS), refer to the relevant Description and Operation section in the workshop manual.

REFER to: [Anti-Theft - Passive](#) (419-01B Anti-Theft - Passive, Description and Operation).

Inspection and Verification

The best method to confirm the correct operation of the Passive Anti-Theft System (PATS) is to check the LED (located in the center of the instrument panel). The LED should illuminate solid for 3 seconds, when the ignition status is set to ON, and then extinguish. This validates all PATS functions (i.e. the key transponder matches a stored key code, the challenge/response sequence between the respective modules was successful resulting in the EMS being enabled).

Ignition Fails to Operate

Check that the key is correctly inserted into the start control unit (SCU) and that it is the correct key for the vehicle (Key will be ejected from the SCU if it is not programmed or from another vehicle). If the vehicle is an automatic, ensure that the Park position is selected and if manual, ensure it is in the Neutral position.

Check that the start button circuit to the Central Junction Box (CJB) is not open circuit or short to ground.

Check that the CAN network is not malfunctioning, i.e. open circuit or short circuit. This would mean that the CJB, ECM and Instrument Cluster would be unable to communicate. Check these modules for related DTCs and refer to relevant DTC Index.

Engine Fails to Crank

The immobilizer status indication LED is displayed in the bottom left of the instrument pack. When the key is inserted into the SCU, the LED will be turned on for 3 seconds and then turned off. The LED will flash slowly (once every 2 seconds) if the vehicle is immobilised (transponder not approved). Additionally the diagnostic system should be used to check for Diagnostic Trouble Codes (DTCs) from the CJB, instrument cluster, ECM and the ABS module.

One potential occurrence for the vehicle failing to crank on an Automatic Transmission could be due to the Locked in park switch.

Check the Crank request circuit from the CJB to ECM for short circuit or open circuit.

Check the Starter Relay Circuit.

Check that the Steering Column Lock (SCL) is operating correctly. Inserting the key should drive the SCL to un-lock and steering wheel should move freely.

Check the CAN network is not malfunctioning, i.e. the CAN circuit is open or short circuit. This would mean that the CJB, instrument cluster, ECM or ABS module would not be able to communicate resulting in no challenge being made from the modules for the Immobilisation data.

Also on an Automatic, check the CAN network between the CJB and the Transmission Control Module (TCM). The CJB uses the "LockedInP" signal transmitted by the TCM to determine if the transmission is in Park before allowing crank, the CJB uses a value of 0x01, if the CJB sees a value less than this it will not allow crank, and key will not be ejected from SCU.

For a manual gearbox the clutch pedal has to be de-pressed, hence check the CAN network between the CJB and the ECM to ensure the clutch is depressed, ClutchPedalSwitch75pct = TRUE and ClutchPedalPressed2 = True. The Vehicle will not crank until these signals are set.

On an Automatic vehicle, check the CAN network between the ABS module and the CJB. The CJB uses a signal "BrakePedalActive" to determine if the brake pedal has been depressed in order to allow the engine to crank. The CJB uses a value = TRUE if the CJB does not receive this signal, it will not allow the crank request output.

Engine Cranks But Will Not Start

If the engine is cranking it means that the EMS has passed the authorisation required with the CJB. If this authorisation failed, the ECM would not engage the starter relay. This could be confirmed by verifying the LED in the left of the Instrument pack being illuminated for 3 seconds on Key insertion, or by reading DTCs from the CJB or the ECM.

In all cases of suspected non-start issues, the most logical failure modes should be eliminated first. i.e.

- 1. Check all relevant supplies and grounds to the relevant modules are ok.
- 2. Note any unusual behaviour from other systems/functionality.
- 3. Note any functions that are not operating as expected.

Fault Codes/DTCs

For the various PATS modes of operation/failures listed in the table, the CJB will store a DTC which will not be shown to the

customer.

When the Key is inserted and ignition status ON is achieved, if the start authorisation passes, the LED in the bottom left of the instrument cluster will illuminate for 3 seconds then go off. If start authorisation fails, the LED will continue to flash every 2 seconds. Please see table below for a list of fault codes that will be stored under certain conditions. For additional information.

REFER to: [Starting System](#) (303-06A Starting System - I6 3.2L Petrol, Diagnosis and Testing) /

[Electronic Engine Controls](#) (303-14A Electronic Engine Controls - I6 3.2L Petrol, Diagnosis and Testing) /

[Electronic Engine Controls](#) (303-14B Electronic Engine Controls - TD4 2.2L Diesel, Diagnosis and Testing).

Mode of Operation/ Failure	When Logged	Ignition Status	DTC	Indication
Prove out	N/A	Transition from OFF to ON	N/A	3 Seconds of LED illumination
SCU internal failure	Key insert	Any	B102496	Warning message displayed
Lost communication with SCU (SCU no response)	Key insert	Any	B102487	Warning message displayed
SCU incorrect response	Key insert	Any	B102481	Warning message displayed
SCU not programmed	Key insert	Any	B102451	Warning message displayed
Key transponder no response	Key insert	Any	B102408	Warning message displayed
Transponder incorrect response	Key insert	Any	B102581	Warning message displayed
TP communication error	Key insert	Any	B102408	Warning message displayed
Number of keys programmed below minimum	Manufacturer/Dealer	Any	B10D800	No indication
Key not programmed	Manufacturer/Dealer	Any	B10D751	No indication
SCL not programmed	Manufacturer/Dealer	Transition from OFF to ON	B102651	Warning message displayed
Lost communication with ECM	N/A	Any	U010000	Warning message displayed

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Multifunction Electronic Modules -

Torque Specifications

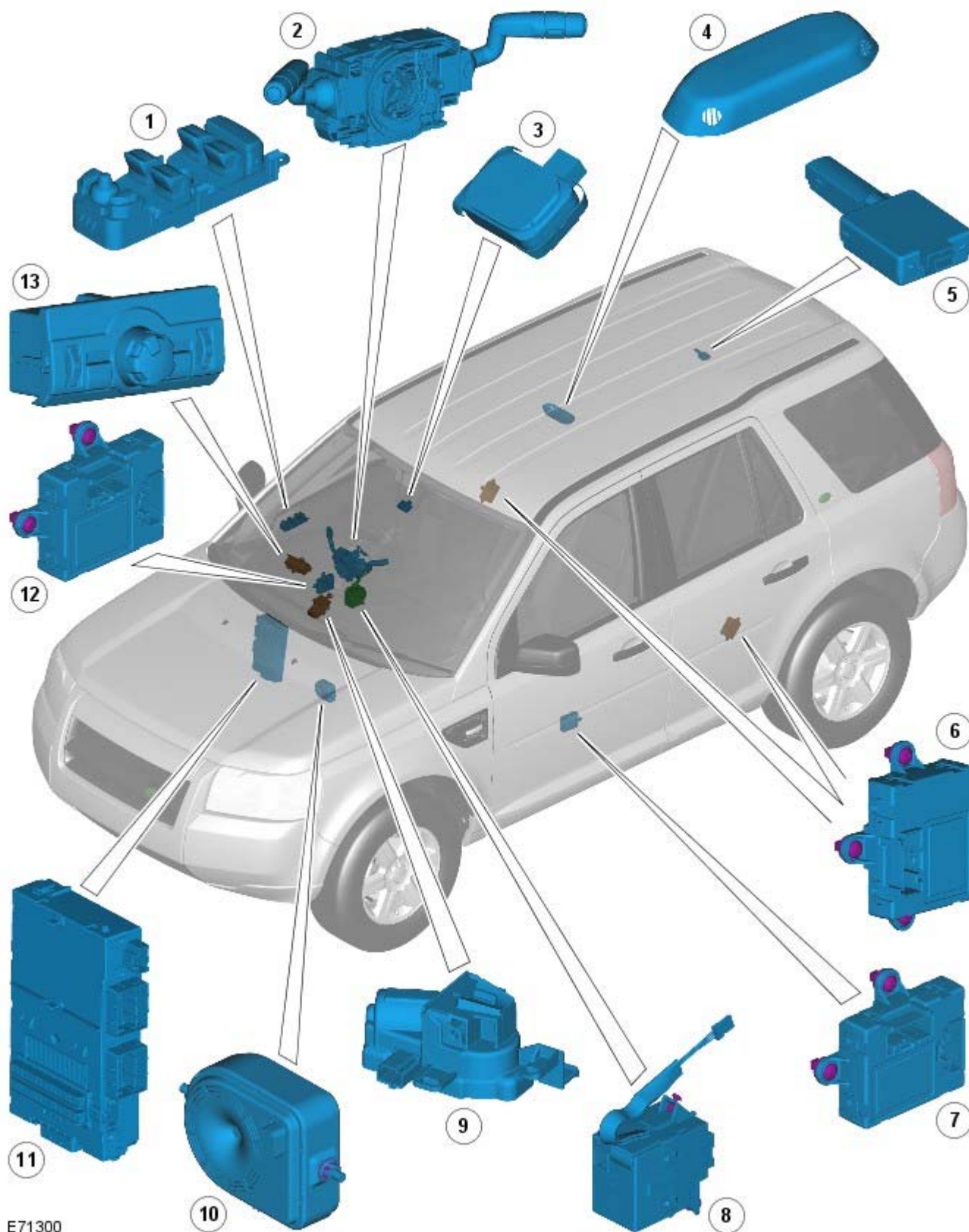
Description	Nm	lb-ft
Cellular phone antenna Torx screw	10	7
Front door module	1	1
Rear door module	1	1

Part Number

Published: 11-May-2011

Multifunction Electronic Modules - Module Controlled Functions

Description and Operation

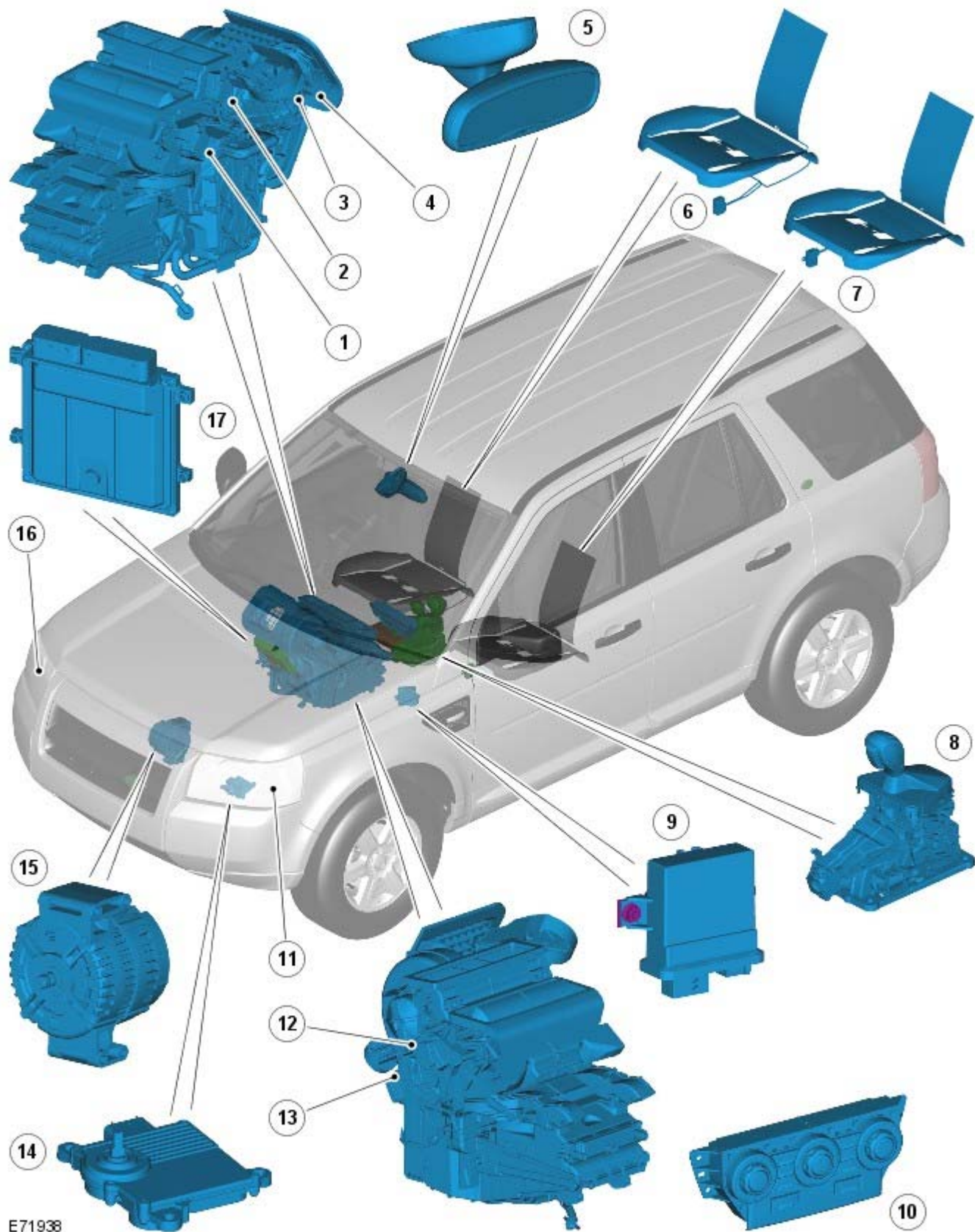
COMPONENT LOCATION - LIN BUS (SHEET 1 OF 2)

E71300

Item	Part Number	Description
1	-	Driver's door switchpack
2	-	Steering wheel module

3		Rain sensor
4		Volumetric sensor
5		RF receiver
6		Left Hand (LH) / Right Hand (RH) rear door modules
7		Passenger door module
8		Start control module
9		Electronic steering column lock
10		Battery Backed-Up Sounder (BBUS)
11		Central Junction Box (CJB)
12		Driver's door module
13		Light switch module

COMPONENT LOCATION - LIN BUS (SHEET 2 OF 2)



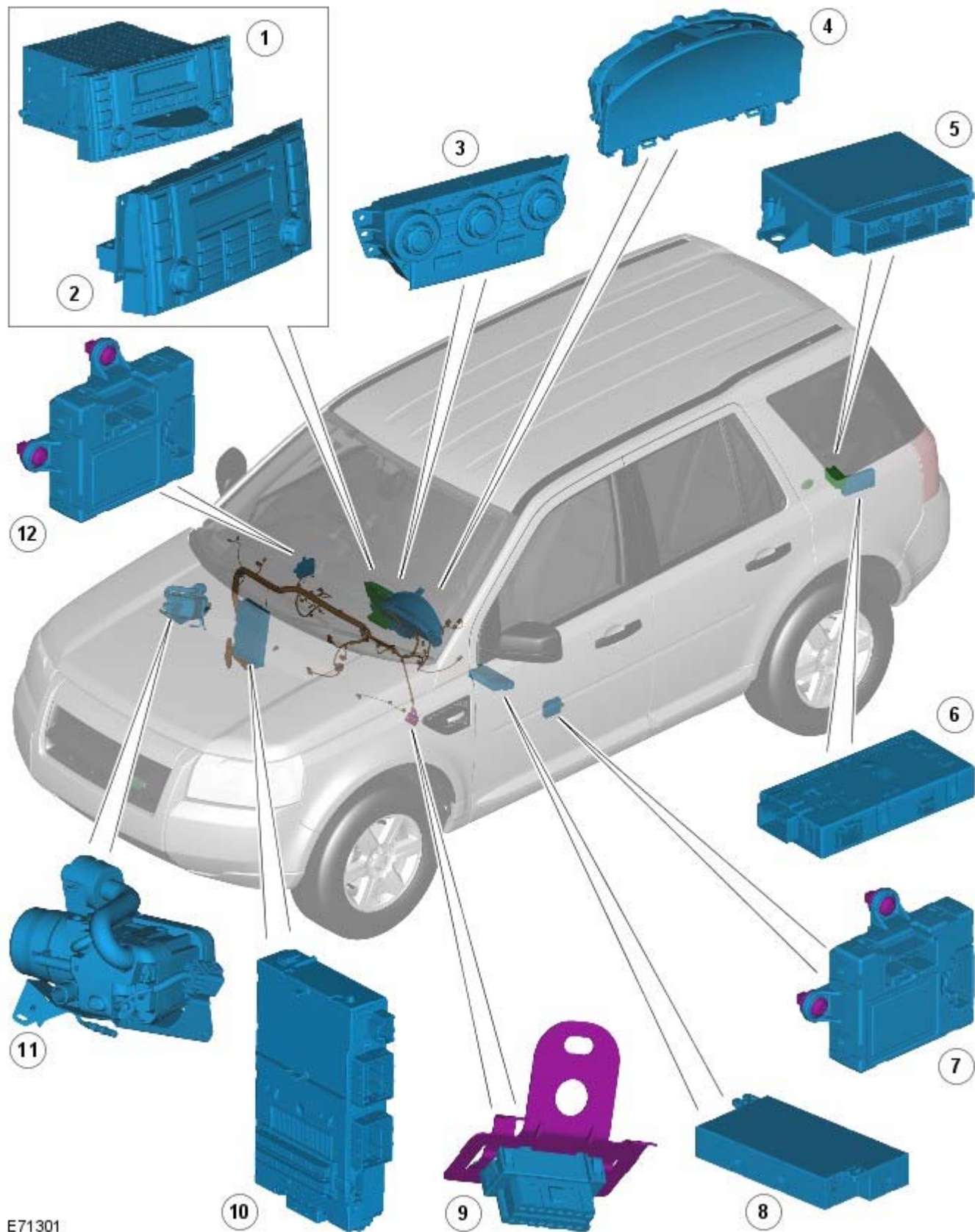
E71938

Item		Description
1		Flap actuator module 1
2		Flap actuator module 2
3		Flap actuator module 3
4		Air quality sensor
5		Humidity sensor
6		RH seat heat module
7		LH seat heat module

8		Selector lever module
9		Headlamp levelling control module
10		Automatic Temperature Control (ATC) module
11		LH headlamp control unit
12		Flap actuator module 4
13		Flap actuator module 5
14		Transmission Control Module (TCM)
15		Generator control module
16		RH headlamp control unit
17		Engine Control Module (ECM)

COMPONENT LOCATION - MEDIUM SPEED CAN BUS

NOTE: NOTE: Left hand drive vehicle shown

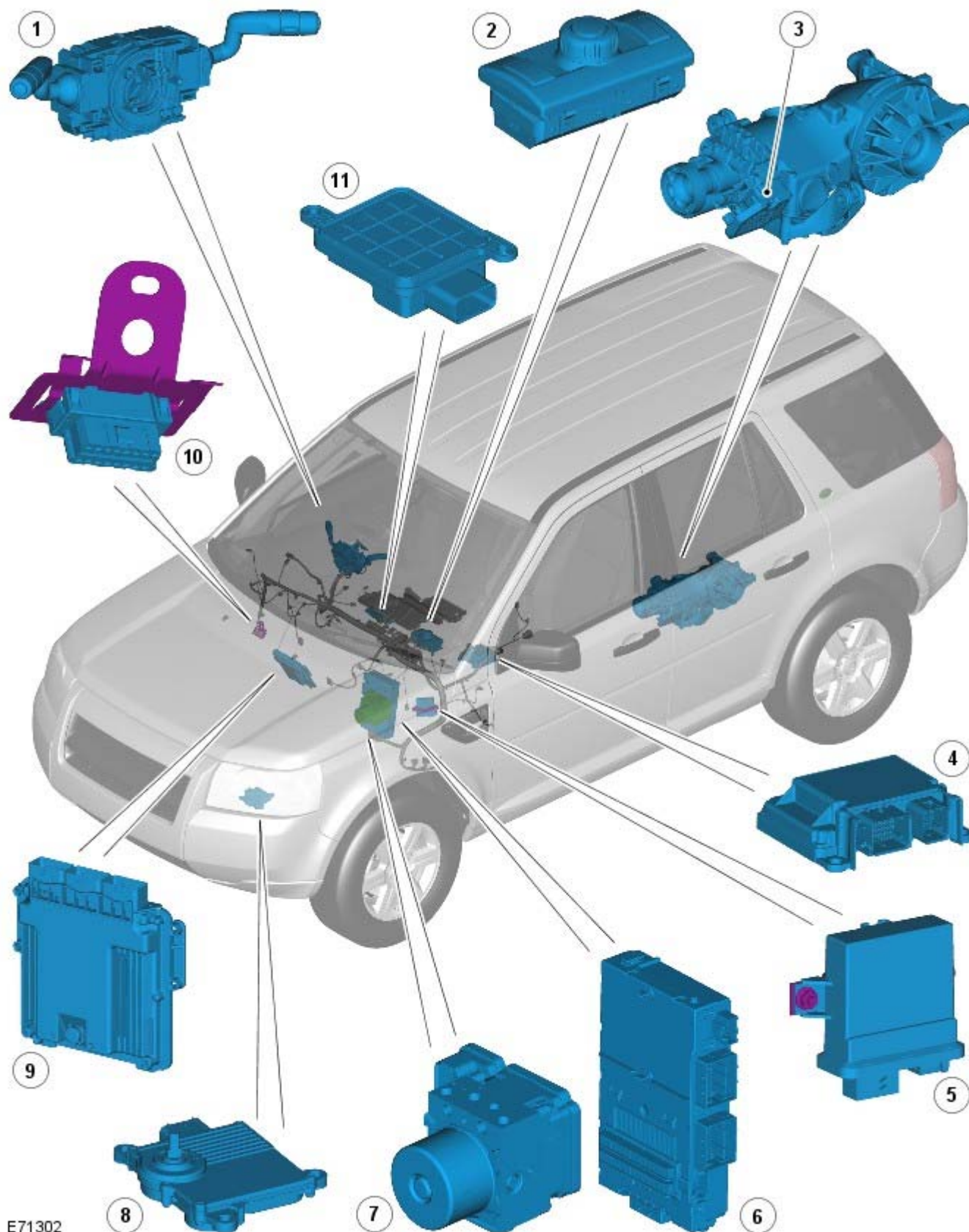


E71301

Item		Description
1		Integrated Control Module (ICM) - Lo-Line audio system
2		Integrated Control Module (ICM) - Hi-Line audio system
3		ATC module
4		Instrument cluster
5		Parking aid module
6		Trailer module
7		Driver's door module

8		Seat memory module
9		Diagnostic socket
10		CJB
11		Fuel fired heater module
12		Passenger door module

COMPONENT LOCATION - HIGH SPEED CAN BUS



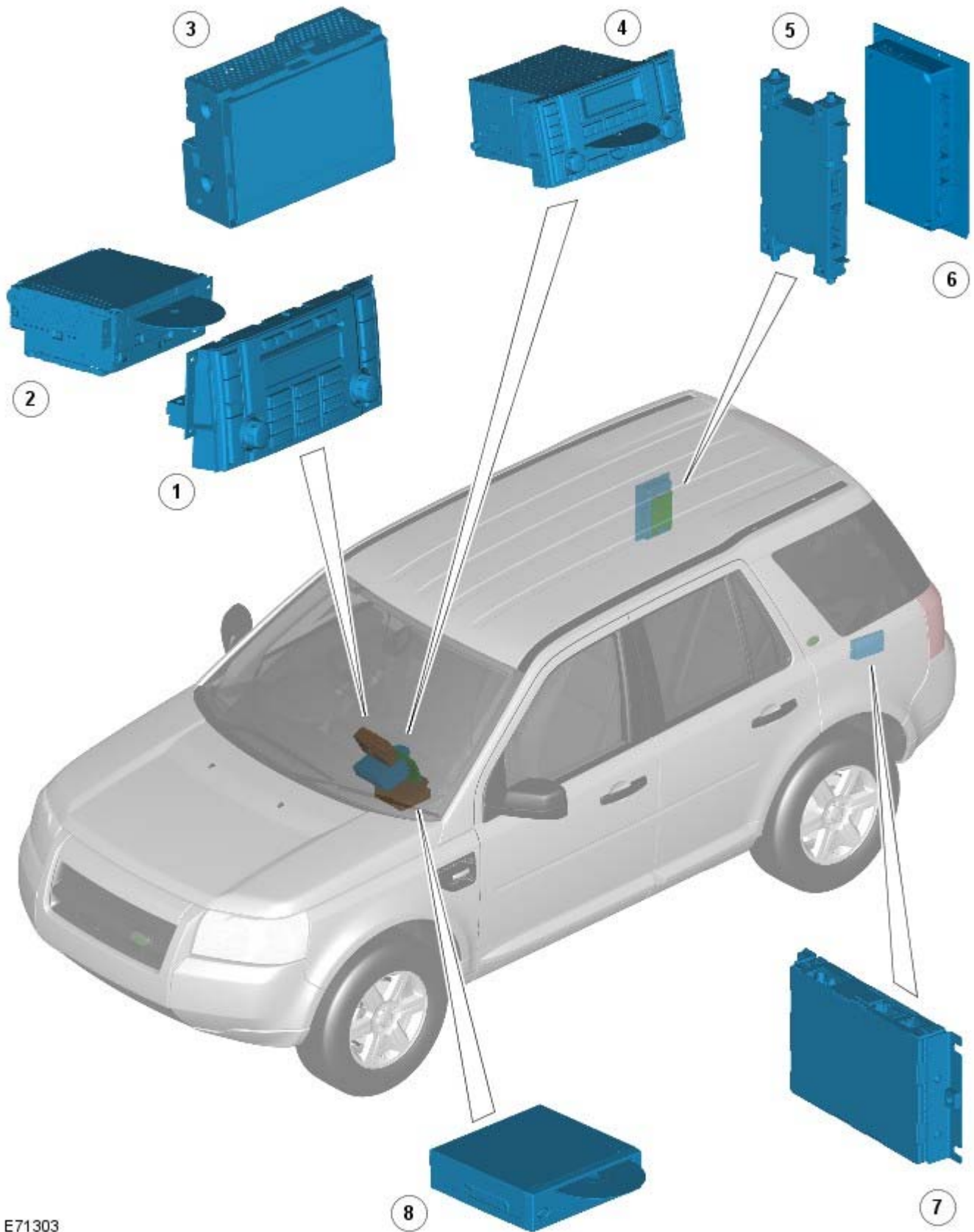
E71302

Item	Description
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1		Steering angle sensor
2		Terrain Response control module
3		Electronic rear differential control module
4		Restraints Control Module (RCM)
5		Headlamp levelling control module
6		CJB
7		Anti-lock Brake System module
8		TCM
9		Engine Control Module (ECM)
10		Diagnostic socket
11		Occupant Classification Sensor (OCS - NAS only)

COMPONENT LOCATION - MOST

E71303



Item	Description
1	Integrated control Module (ICM) - Face plate

2		Integrated Head Unit (IHU) - Hi-Line
3		Touch Screen Display (TAD)
4		Integrated Head Unit (IHU) - Hi-Line
5		Bluetooth phone module
6		Amplifier/tuner
7		Digital Audio Broadcast (DAB) receiver
8		Navigation computer

OVERVIEW

The vehicle electrical system comprises a number of control modules which are interconnected via several network systems.

The following network systems are used on the vehicle:

- High Speed Controller Area Network bus
- Medium speed CAN bus
- Local Interconnect Network (LIN) bus
- Media Orientated Systems Transport (MOST) system.

The CJB is the 'gateway' for the network systems which allows information to be exchanged between networks.

The entertainment system components are connected on a fiber optic MOST system. The MOST system can send and receive information to/from the other network systems via a 'gateway' in the Integrated Control Module.

The following table shows each vehicle control module, the network system to which it is connected, its function and location in the vehicle.

Module	Network System	Function	Vehicle Location
CJB	High speed CAN bus	Controls body functions and power distribution	Passenger footwell, behind glovebox
Steering angle sensor	High speed CAN bus	Transmits steering positional information	Integral with the steering wheel clockspring
Diagnostic socket	High speed CAN bus	Allows the transfer of vehicle information using IDS or other diagnostic tool	Driver's footwell on underside of instrument panel
RCM	High speed CAN bus	Controls deployment of supplementary restraint components	Rear of centre console, below arm rest
TCM	High speed CAN bus	Controls automatic transmission operation	Mounted on the top of the transmission housing
ECM	High speed CAN bus	Controls engine management and fuel system operation	Mounted between the bulkheads in the engine compartment
ABS module	High speed CAN bus	Controls all aspects of the braking system	Mounted between the bulkheads on LH side of engine compartment
Headlamp levelling module	High speed CAN bus	Controls the dynamic headlamp levelling function	Passenger footwell, behind the glovebox
Occupant classification sensor (NAS only)	High speed CAN bus	Detects when a passenger is in the front passenger seat	Underside of passenger seat
Terrain Response module	High speed CAN bus	Controls the Terrain Response system using data from other vehicle systems	Integral with Terrain Response rotary control
Electronic differential control module	High speed CAN bus	Controls the operation of the electronic differential	Mounted on front of rear differential
CJB	Medium speed CAN bus	Controls body functions and power distribution	Passenger footwell, behind glovebox
Fuel fired heater module	Medium speed CAN bus	Controls operation of the fuel fired heater	Integrated with the ATC module
Diagnostic socket	Medium speed CAN bus	Allows the transfer of vehicle information using IDS or other diagnostic tool	Driver's footwell on underside of instrument panel
Passenger door module	Medium speed CAN bus	Controls window and locking functions	Mounted in passenger door
Parking aid module	Medium speed CAN bus	Controls parking aid system	Mounted on LH rear suspension turret
Seat memory module	Medium speed CAN bus	Controls driver seat positioning and also memory functions of other driver personalised functions	Under driver's seat

Module	Network System	Function	Vehicle Location
Trailer module	Medium speed CAN bus	Controls operation of trailer lamps and also informs CJB that trailer connected	LH side of luggage compartment, behind suspension turret
Instrument cluster/Driver Information Module	Medium speed CAN bus	Receives data from other systems to provide driver information	Instrument panel
Driver's door module	Medium speed CAN bus	Controls window and locking functions	Mounted in driver's door
ATC module	Medium speed CAN bus	Contains controls for the heating and air conditioning systems	Mounted in centre console
Integrated Control Module	Medium speed CAN bus	Contains controls for the entertainment system and gateway between audio system and other vehicle systems	Integral part of head unit, located in centre console
Integrated Head Unit (IHU)	Medium speed CAN bus	Contains controls for the entertainment system	Integral part of head unit, located in centre console
RH rear door module	LIN	Controls window and locking operation	Mounted in RH rear door
LH rear door module	LIN	Controls window and locking operation	Mounted in LH rear door
Generator	LIN	Provide load signal to ECM	Located in engine compartment. Location on engine dependent on engine fitment.
RH front seat heat module	LIN	Used by ATC to control seat heater temperature	Underside of seat
LH front seat heat module	LIN	Used by ATC to control seat heater temperature	Underside of seat
Air quality sensor	LIN	Measures air quality in the vehicle interior	Fitted to the heater assembly
Flap actuator module 1	LIN	Moves flaps within the heater assembly to direct air flow to different parts of the interior	Part of the heater assembly
Flap actuator module 2	LIN	Moves flaps within the heater assembly to direct air flow to different parts of the interior	Part of the heater assembly
Flap actuator module 3	LIN	Moves flaps within the heater assembly to direct air flow to different parts of the interior	Part of the heater assembly
Flap actuator module 4	LIN	Moves flaps within the heater assembly to direct air flow to different parts of the interior	Part of the heater assembly
Flap actuator module 5	LIN	Moves flaps within the heater assembly to direct air flow to different parts of the interior	Part of the heater assembly
Humidity sensor	LIN	Measures air quality in the vehicle interior	Integral with the interior rear view mirror
HVAC control module	LIN	Controls operation of the HVAC system functions	Integral with HVAC controls panel in centre console
Steering wheel module	LIN	Converts analogue signals from steering wheel switches into digital messages	Behind steering wheel clockspring
Battery backed sounder	LIN	Activated by CJB when alarm trigger is received	Mounted in a central position between the bulkheads in the engine compartment
Electric steering column lock	LIN	Controls the locking and unlocking of the steering column	On underside of steering column, under lower column shroud
CJB	LIN	Control body functions and power distribution	Passenger footwell, behind glovebox
Light switch module	LIN	Control of headlamp operation and levelling	Driver's side of instrument panel
Volumetric sensor	LIN	Detects movement in vehicle interior and activates anti-theft alarm system	In housing in centre of headlining
Rain sensor module	LIN	Detects moisture on the windshield	At top of windshield
Start control unit	LIN	Used to identify the remote handset - component of the keyless start system	In instrument panel, adjacent to the steering column
RF receiver	LIN	Receives RF transmissions from the TPMS system and the remote handset	Positioned adjacent to the rear interior lamp, behind the headlining
Headlamp levelling module	LIN	Controls the dynamic headlamp levelling functions	Passenger footwell, behind glovebox, integral with headlamp levelling module
RH headlamp	LIN	Provides positional information to the headlamp levelling module	Attached to the headlamp assembly
LH headlamp	LIN	Provides positional data to the headlamp levelling module	Attached to the headlamp assembly
Driver's window switch	LIN	Controls operation of the driver's window	Mounted in driver's door

Module	Network System	Function	Vehicle Location
Driver's door module	LIN	Controls window and locking functions	Mounted in driver's door
Passenger door module	LIN	Controls window and locking functions	Mounted in passenger door
Transmission selector lever module	LIN	Sends selector lever position to the TCM	Located below centre console
TCM	LIN	Receives selector lever position information to control transmission operation	Mounted on the top of the transmission housing
Integrated Control Module	MOST	Contains controls for the entertainment system and gateway between audio system and other vehicle systems	Integral part of head unit, located in centre console
Integrated Head Unit	MOST	Contains controls for the entertainment system	Integral part of head unit, located in centre console
Digital Audio Broadcast (DAB) receiver	MOST	Receives digital radio broadcasts	Mounted in LH side of the luggage compartment
Bluetooth phone module	MOST	Controls the operation of the Bluetooth phone system	Mounted in RH side of the luggage compartment
Amplifier/Tuner	MOST	Provides amplification for the entertainment systems and reception of radio RF broadcasts	Mounted in RH side of the luggage compartment
Navigation computer	MOST	Reads map data from a DVD to calculate and display visual route guidance information via the TAD and audible guidance via the amplifier to the driver	Below the IHU in the centre console
Touch Screen Display (TAD)	MOST	Provides the driver interface to the entertainment, navigation and driver personalisation functions	Above the IHU in the centre console

Multifunction Electronic Modules - Multifunction Electronic Module

Diagnosis and Testing

Description and Operation

For a detailed description of the multifunction electronic control modules, refer to the relevant Description and Operation section in the workshop manual.

REFER to: [Module Controlled Functions](#) (419-10 Multifunction Electronic Modules, Description and Operation).

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.

1. Verify the customer concern.
2. Visually inspect for obvious signs of electrical damage.

Visual Inspection

Electrical
<ul style="list-style-type: none"> ● Fuse(s) ● Electrical connector(s) ● Wiring Harness

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, check for Diagnostic Trouble Codes (DTCs) and refer to the DTC Index.

DTC Index

NOTE: If the control module 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.

NOTE: The DTC Index in this section shows information for DTCs that could be logged in the Driver Door Module (DDM) or Passenger Door Module (PDM). For diagnosis and testing information for: Driver Seat module.

REFER to: [Seats](#) (501-10 Seating, Diagnosis and Testing).

Information and Entertainment module.

REFER to: [Information and Entertainment System](#) (415-01 Information and Entertainment System, Diagnosis and Testing).

NOTE: Generic scan tools may not read the codes listed, or may read only five digit codes. Match the five digits from the scan tool to the first five digits of the seven digit code listed to identify the fault (the last two digits give additional information read by the manufacturer approved diagnostic system).

NOTE: When performing electrical voltage or resistance tests, always use a digital multimeter (DMM) accurate to three decimal places, and with an up-to-date calibration certificate. When testing resistance, always take the resistance of the DMM leads into account.

NOTE: Check and rectify basic faults before beginning diagnostic routines involving pinpoint tests.

NOTE: Inspect connectors for signs of water ingress, and pins for damage and/or corrosion.

NOTE: If DTCs are recorded and, after performing the pinpoint tests, a fault is not present, an intermittent concern may be the cause. Always check for loose connections and corroded terminals.

DTC	Description	Possible Cause	Action
B108F23	Cabin Lock/Unlock Switch	<ul style="list-style-type: none"> ● Signal stuck low 	Carry out the pinpoint test associated with this DTC using the manufacturer approved diagnostic system
B109C15	Front Courtesy Light	<ul style="list-style-type: none"> ● Short to power or open circuit 	Refer to the electrical circuit diagrams and test front courtesy light circuit for short to power or open circuit
B109D11	Front Courtesy Light	<ul style="list-style-type: none"> ● Short to ground 	Refer to the electrical circuit diagrams and test front courtesy light circuit for short ground
B10EB11	Driver door double locking motor	<ul style="list-style-type: none"> ● Short to ground 	Refer to the electrical circuit diagrams and test driver door double locking motor circuit for short ground
B10EB15	Driver door double locking motor	<ul style="list-style-type: none"> ● Short to power or open circuit 	Refer to the electrical circuit diagrams and test driver door double locking motor circuit for short to power or open circuit
B10EC11	Passenger door double locking motor	<ul style="list-style-type: none"> ● Short to ground 	Refer to the electrical circuit diagrams and test passenger door double locking motor circuit for short ground

DTC	Description	Possible Cause	Action
B10EC15	Passenger door double locking motor	<ul style="list-style-type: none"> Short to power or open circuit 	Refer to the electrical circuit diagrams and test passenger door double locking motor circuit for short to power or open circuit
B10ED11	Rear door driver side double locking motor	<ul style="list-style-type: none"> Circuit short to ground 	Refer to the electrical circuit diagrams and check rear door driver side double locking motor control circuit for short to ground
B10ED15	Rear door driver side double locking motor	<ul style="list-style-type: none"> Circuit short to power or open 	Refer to the electrical circuit diagrams and check rear door driver side double locking motor control circuit for short to power, open circuit
B10EE11	Rear door passenger side double locking motor	<ul style="list-style-type: none"> Circuit short to ground 	Refer to the electrical circuit diagrams and check rear door passenger side double locking motor control circuit for short to ground
B10EE15	Rear door passenger side double locking motor	<ul style="list-style-type: none"> Circuit short to power or open 	Refer to the electrical circuit diagrams and check rear door passenger side double locking motor control circuit for short to power, open circuit
B110811	Driver door central locking motor	<ul style="list-style-type: none"> Short to ground 	Refer to the electrical circuit diagrams and test driver door central locking motor circuit for short ground
B110815	Driver door central locking motor	<ul style="list-style-type: none"> Short to power or open circuit 	Refer to the electrical circuit diagrams and test driver door central locking motor circuit for short to power or open circuit
B110911	Passenger door central locking motor	<ul style="list-style-type: none"> Short to ground 	Refer to the electrical circuit diagrams and test passenger door central locking motor circuit for short ground
B110915	Passenger door central locking motor	<ul style="list-style-type: none"> Short to power or open circuit 	Refer to the electrical circuit diagrams and test passenger door central locking motor circuit for short to power or open circuit
B110A11	Rear door driver side central locking motor	<ul style="list-style-type: none"> Circuit short to ground 	Refer to electrical circuit diagrams and check rear door driver side central locking motor control circuit for short to ground
B110A15	Rear door driver side central locking motor	<ul style="list-style-type: none"> Circuit short to power or open 	Refer to electrical circuit diagrams and check rear door driver side central locking motor control circuit for short to power, open circuit
B110B11	Rear door passenger side central locking motor	<ul style="list-style-type: none"> Circuit short to ground 	Refer to electrical circuit diagrams and check rear door passenger side central locking motor control circuit for short to ground
B110B15	Rear door passenger side central locking motor	<ul style="list-style-type: none"> Circuit short to power or open 	Refer to electrical circuit diagrams and check rear door passenger side central locking motor control circuit for short to power, open circuit
B116311	Left Mirror Heater Output short to ground	<ul style="list-style-type: none"> Short to ground 	Refer to the electrical circuit diagrams and test left mirror heater output circuit for short to ground
B116315	Left Mirror Heater Output short to power	<ul style="list-style-type: none"> Short to power or open circuit 	Refer to the electrical circuit diagrams and test left mirror heater output circuit for short to power or open circuit
B116411	Right Mirror Heater Output short to ground	<ul style="list-style-type: none"> Short to ground 	Refer to the electrical circuit diagrams and test right mirror heater output circuit for short to ground
B116415	Right Mirror Heater Output short to power	<ul style="list-style-type: none"> Short to power or open circuit 	Refer to the electrical circuit diagrams and test right mirror heater output circuit for short to power or open circuit
B116511	Left Front Puddle Lamp Output short to ground	<ul style="list-style-type: none"> Short to ground 	Refer to the electrical circuit diagrams and test left front puddle lamp output circuit for short to ground
B116515	Left Front Puddle Lamp Output open load or short to power	<ul style="list-style-type: none"> Short to power or open circuit 	Refer to the electrical circuit diagrams and test left front puddle lamp output circuit for short to power or open circuit
B116611	Right Front Puddle Lamp Output short to ground	<ul style="list-style-type: none"> Short to ground 	Refer to the electrical circuit diagrams and test right front puddle lamp output circuit for short to ground
B116615	Right Front Puddle Lamp Output open load or short to power	<ul style="list-style-type: none"> Short to power or open circuit 	Refer to the electrical circuit diagrams and test right front puddle lamp output circuit for short to power or open circuit
B117C07	Rear Power Window up	<ul style="list-style-type: none"> Mechanical Failure 	Check for mechanical failure of rear window mechanism
B117C72	Rear Power Window up	<ul style="list-style-type: none"> Actuator Stuck Open 	Clear DTC and re-test. If DTC returns, install a new rear door module, refer to the new module installation note at the top of the DTC Index

DTC	Description	Possible Cause	Action
B117C73	Rear Power Window up	<ul style="list-style-type: none"> ● Actuator Stuck Closed 	Clear DTC and re-test. If DTC returns, install a new rear door module, refer to the new module installation note at the top of the DTC Index
B117C92	Rear Power Window up	<ul style="list-style-type: none"> ● Performance or incorrect operation 	Refer to electrical circuit diagrams and check power and ground supplies to rear door module
B117D72	Rear Power Window down	<ul style="list-style-type: none"> ● Actuator Stuck Open 	Clear DTC and re-test. If DTC returns, install a new rear door module, refer to the new module installation note at the top of the DTC Index
B117D73	Rear Power Window down	<ul style="list-style-type: none"> ● Actuator Stuck Closed 	Clear DTC and re-test. If DTC returns, install a new rear door module, refer to the new module installation note at the top of the DTC Index
B117E07	Front Power Window up	<ul style="list-style-type: none"> ● Mechanical failure 	Check for mechanical failure of front window mechanism
B117E72	Front Power Window up	<ul style="list-style-type: none"> ● Actuator stuck open 	Clear DTC and re-test. If DTC returns, install a new DDM/PDM, refer to the new module installation note at the top of the DTC Index
B117E73	Front Power Window up	<ul style="list-style-type: none"> ● Actuator stuck closed 	Clear DTC and re-test. If DTC returns, install a new DDM/PDM, refer to the new module installation note at the top of the DTC Index
B117F72	Front Power Window down	<ul style="list-style-type: none"> ● Actuator stuck open 	Clear DTC and re-test. If DTC returns, install a new DDM/PDM, refer to the new module installation note at the top of the DTC Index
B117F73	Front Power Window down	<ul style="list-style-type: none"> ● Actuator stuck closed 	Clear DTC and re-test. If DTC returns, install a new DDM/PDM, refer to the new module installation note at the top of the DTC Index
B118929	Front Window Position Sensor	<ul style="list-style-type: none"> ● Signal invalid 	Carry out pinpoint tests associated with this DTC using the manufacturer approved diagnostic system
B118A29	Rear Window Position Sensor	<ul style="list-style-type: none"> ● Signal invalid 	Carry out pinpoint tests associated with this DTC using the manufacturer approved diagnostic system
B11D183	LIN Bus Circuit "C"	<ul style="list-style-type: none"> ● Value of signal protection calculation incorrect 	Refer to the electrical circuit diagrams and test LIN circuit between driver switch pack and DDM for short/open circuits, clear DTC and re-test. If DTC remains install a new switch pack. REFER to: Driver Door Window Control Switch (501-11 Glass, Frames and Mechanisms, Removal and Installation).
B11D186	LIN Bus Circuit "C"	<ul style="list-style-type: none"> ● Signal Invalid 	Refer to the electrical circuit diagrams and test LIN circuit between driver switch pack and DDM for short/open circuits, clear DTC and re-test. If DTC remains install a new switch pack. REFER to: Driver Door Window Control Switch (501-11 Glass, Frames and Mechanisms, Removal and Installation).
B11D187	LIN Bus Circuit "C"	<ul style="list-style-type: none"> ● Missing Message 	Refer to the electrical circuit diagrams and test LIN circuit between driver switch pack and DDM for short/open circuits, clear DTC and re-test. If DTC remains install a new switch pack. REFER to: Driver Door Window Control Switch (501-11 Glass, Frames and Mechanisms, Removal and Installation).
B11F611	Driver Folding Mirror Motor	<ul style="list-style-type: none"> ● Short To Ground 	Refer to electrical circuit diagrams and check driver folding mirror motor for short to ground
B11F615	Driver Folding Mirror Motor	<ul style="list-style-type: none"> ● Short to power or open 	Refer to electrical circuit diagrams and check driver folding mirror motor for short to power, open circuit
B11F711	Passenger Folding Mirror Motor	<ul style="list-style-type: none"> ● Short To Ground 	Refer to electrical circuit diagrams and check passenger folding mirror motor for short to ground
B11F715	Passenger Folding Mirror Motor	<ul style="list-style-type: none"> ● Short to power or open 	Refer to electrical circuit diagrams and check passenger folding mirror motor for short to power, open circuit
B1A9411	Driver Mirror	<ul style="list-style-type: none"> ● Short to ground 	Refer to the electrical circuit diagrams and test driver mirror fold motor circuit for short to ground
B1A9415	Driver Mirror	<ul style="list-style-type: none"> ● Short to power or open circuit 	Refer to the electrical circuit diagrams and test driver mirror fold motor circuit for short to power or open circuit
B1A9511	Passenger Mirror	<ul style="list-style-type: none"> ● Short to ground 	Refer to the electrical circuit diagrams and test passenger mirror fold motor circuit for short to ground
B1A9515	Passenger Mirror	<ul style="list-style-type: none"> ● Short to power or open circuit 	Refer to the electrical circuit diagrams and test passenger mirror fold motor circuit for short to power or open circuit

DTC	Description	Possible Cause	Action
B1A9883	LIN Bus Circuit #1	<ul style="list-style-type: none"> Value of signal protection calculation incorrect 	Carry out the pinpoint test associated with this DTC using the manufacturer approved diagnostic system. Refer to the electrical circuit diagrams and test LIN circuit between driver side rear door module and DDM for short/open circuits, clear DTC and re-test. If DTC remains install a new switch pack. REFER to: Driver Door Window Control Switch (501-11 Glass, Frames and Mechanisms, Removal and Installation).
B1A9886	LIN Bus Circuit #1	<ul style="list-style-type: none"> Signal Invalid 	Refer to the electrical circuit diagrams and test LIN circuit between driver side rear door module and DDM for short/open circuits, clear DTC and re-test. If DTC remains install a new switch pack. REFER to: Driver Door Window Control Switch (501-11 Glass, Frames and Mechanisms, Removal and Installation).
B1A9887	LIN Bus Circuit #1	<ul style="list-style-type: none"> Missing Message 	Refer to the electrical circuit diagrams and test LIN circuit between driver side rear door module and DDM for short/open circuits, clear DTC and re-test. If DTC remains install a new switch pack. REFER to: Driver Door Window Control Switch (501-11 Glass, Frames and Mechanisms, Removal and Installation).
B1C0911	Driver Left/Right Mirror Motor Circuit	<ul style="list-style-type: none"> Short to ground 	Refer to the electrical circuit diagrams and test driver left/right mirror motor circuit for short to ground
B1C0915	Driver Left/Right Mirror Motor Circuit	<ul style="list-style-type: none"> Short to power or open circuit 	Refer to the electrical circuit diagrams and test driver left/right mirror motor circuit for short to power or open circuit
B1C1011	Driver Up/Down Mirror Motor Circuit	<ul style="list-style-type: none"> Short to ground 	Refer to the electrical circuit diagrams and test driver up/down mirror motor circuit for short to ground
B1C1015	Driver Up/Down Mirror Motor Circuit	<ul style="list-style-type: none"> Short to power or open circuit 	Refer to the electrical circuit diagrams and test driver up/down mirror motor circuit for short to power or open circuit
B1C1111	Passenger Left/Right Mirror Motor Circuit	<ul style="list-style-type: none"> Short to ground 	Refer to the electrical circuit diagrams and test passenger left/right mirror motor circuit for short to ground
B1C1115	Passenger Left/Right Mirror Motor Circuit	<ul style="list-style-type: none"> Short to power or open circuit 	Refer to the electrical circuit diagrams and test passenger left/right mirror motor circuit for short to power or open circuit
B1C1211	Passenger Up/Down Mirror Motor Circuit	<ul style="list-style-type: none"> Short to ground 	Refer to the electrical circuit diagrams and test passenger up/down mirror motor circuit for short to ground
B1C1215	Passenger Up/Down Mirror Motor Circuit	<ul style="list-style-type: none"> Short to power or open circuit 	Refer to the electrical circuit diagrams and test passenger up/down mirror motor circuit for short to power or open circuit
B1C1311	Driver Up/Down Mirror Motor Feedback Circuit	<ul style="list-style-type: none"> Short to ground 	Refer to the electrical circuit diagrams and test driver up/down mirror motor feedback circuit for short to ground
B1C1315	Driver Up/Down Mirror Motor Feedback Circuit	<ul style="list-style-type: none"> Short to power or open circuit 	Refer to the electrical circuit diagrams and test driver up/down mirror motor feedback circuit for short to power or open circuit
B1C1411	Driver Left/Right Mirror Motor Feedback Circuit	<ul style="list-style-type: none"> Short to ground 	Refer to the electrical circuit diagrams and test driver left/right mirror motor feedback circuit for short to ground
B1C1415	Driver Left/Right Mirror Motor Feedback Circuit	<ul style="list-style-type: none"> Short to power or open circuit 	Refer to the electrical circuit diagrams and test driver left/right mirror motor feedback circuit for short to power or open circuit
B1C1511	Passenger Up/Down Mirror Motor Feedback Circuit	<ul style="list-style-type: none"> Short to ground 	Refer to the electrical circuit diagrams and test passenger up/down mirror motor feedback circuit for short to ground
B1C1515	Passenger Up/Down Mirror Motor Feedback Circuit	<ul style="list-style-type: none"> Short to power or open circuit 	Refer to the electrical circuit diagrams and test passenger up/down mirror motor feedback circuit for short to power or open circuit
B1C1611	Passenger Left/Right Mirror Motor Feedback Circuit	<ul style="list-style-type: none"> Short to ground 	Refer to the electrical circuit diagrams and test passenger left/right mirror motor feedback circuit for short to ground
B1C1615	Passenger Left/Right Mirror Motor Feedback Circuit	<ul style="list-style-type: none"> Short to power or open circuit 	Refer to the electrical circuit diagrams and test passenger left/right mirror motor feedback circuit for short to power or open circuit

DTC	Description	Possible Cause	Action
B1C3929	Key Lock Switch	<ul style="list-style-type: none"> Signal invalid 	Carry out the associated pinpoint tests associated with this DTC using the manufacturer approved diagnostic system
C1B1411	Sensor Supply #1	<ul style="list-style-type: none"> Short to ground 	Refer to the electrical circuit diagrams and test front window sensor supply circuit for short to ground
C1B1415	Sensor Supply #1	<ul style="list-style-type: none"> Short to power or open circuit 	Refer to the electrical circuit diagrams and test front window sensor supply circuit for short to power or open circuit
C1B1511	Sensor Supply #2	<ul style="list-style-type: none"> Short to ground 	Refer to the electrical circuit diagrams and test rear window sensor supply circuit for short to ground
C1B1515	Sensor Supply #2	<ul style="list-style-type: none"> Short to power or open circuit 	Refer to the electrical circuit diagrams and test rear window sensor supply circuit for short to power or open circuit
U001000	Medium speed CAN communication Bus	<ul style="list-style-type: none"> Medium speed CAN communication Bus 	Carry out pinpoint tests associated with this DTC using the manufacturer approved diagnostic system
U014000	Lost communication with CJB	<ul style="list-style-type: none"> Logged when subscribed CAN message missing from CJB 	Carry out pinpoint tests associated with this DTC using the manufacturer approved diagnostic system
U020800	Lost communication With Driver Seat Module (DSM)	<ul style="list-style-type: none"> Missing message 	Carry out pinpoint tests associated with this DTC using the manufacturer approved diagnostic system
U030000	Internal control module software incompatibility	<ul style="list-style-type: none"> Invalid configuration message is received 	Re-configure the CJB using the manufacturer approved diagnostic system. Clear the DTC and retest. If the DTC is still logged suspect the DDM/PDM, refer to the new module installation note at the top of the DTC Index
U200224	Switch	<ul style="list-style-type: none"> Signal stuck high 	Clear DTC and re-test. If DTC remains, install a new passenger side window switch
U200424	Auxiliary Switch Pack	<ul style="list-style-type: none"> Signal stuck high 	Carry out the pinpoint tests associated with this DTC using the manufacturer approved diagnostic system
U201011	Switch illumination	<ul style="list-style-type: none"> Circuit short to ground 	Carry out CAN network tests using the manufacturer approved diagnostic system
U201012	Switch illumination	<ul style="list-style-type: none"> Circuit short to power 	Carry out CAN network tests using the manufacturer approved diagnostic system
U201208	Car Configuration Parameter(s)	<ul style="list-style-type: none"> Bus signal/message failures 	Cycle the ignition status and re-test. If DTC remains, re-configure the RJB using the manufacturer approved diagnostic system
U201324	Switch Pack	<ul style="list-style-type: none"> Signal stuck high 	Carry out the pinpoint tests associated with this DTC using the manufacturer approved diagnostic system. Clear DTC and re-test. If DTC remains, install a new driver side window switch pack. REFER to: Driver Door Window Control Switch (501-11 Glass, Frames and Mechanisms, Removal and Installation).
U201444	Control module hardware	<ul style="list-style-type: none"> Data Memory Failure 	Install a new DDM/PDM, refer to the new module installation note at the top of the DTC Index
U210000	Initial configuration not complete	<ul style="list-style-type: none"> No sub type information 	Re-configure the DDM/PDM using the manufacturer approved diagnostic system
U300049	Control module	<ul style="list-style-type: none"> Internal electronic failure 	Install a new DDM/PDM, refer to the new module installation note at the top of the DTC Index
U300255	Vehicle Identification Number (VIN)	<ul style="list-style-type: none"> Not configured 	Re-configure the relevant module as new using the manufacturer approved diagnostic system and re-test. If DTC remains install a new module, refer to the new module installation note at the top of the DTC Index
U300281	Vehicle Identification Number (VIN)	<ul style="list-style-type: none"> Vehicle/component mis-match. Corrupt VIN data being transmitted, module previously installed to other vehicle 	Install original module, check for DTCs and refer to relevant DTC Index
U300362	power voltage	<ul style="list-style-type: none"> Mis-match of power voltage, of 2 volts or lower, between DDM/PDM and CJB 	Carry out pinpoint tests associated with this DTC using the manufacturer approved diagnostic system

Multifunction Electronic Modules - Front Door Module (FDM)

Removal and Installation

Removal

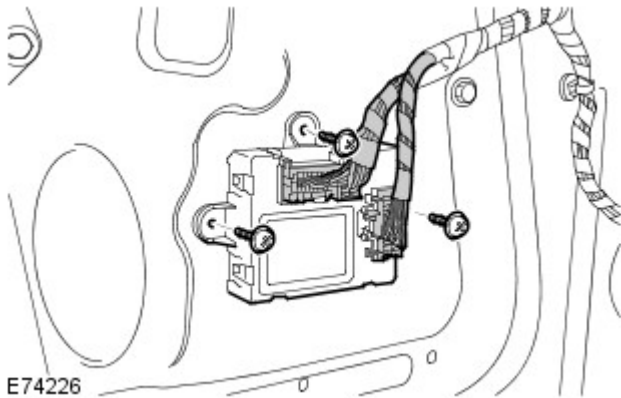
1. Disconnect the battery ground cable.

Refer to: [Specifications](#) (414-00 Battery and Charging System - General Information, Specifications).

2. Remove the front door trim panel.

Refer to: [Rear Door Trim Panel](#) (501-05 Interior Trim and Ornamentation, Removal and Installation).

- 3.



Installation

1. To install, reverse the removal procedure.

2. Connect the battery ground cable.

Refer to: [Specifications](#) (414-00 Battery and Charging System - General Information, Specifications).

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

Multifunction Electronic Modules - Rear Door Module (RDM)

Removal and Installation

Removal

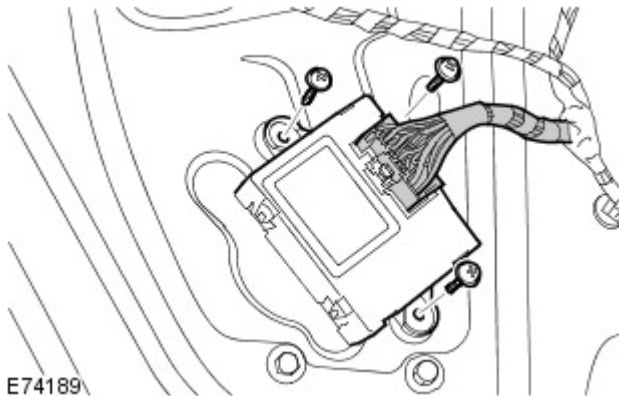
1. Disconnect the battery ground cable.

Refer to: [Specifications](#) (414-00 Battery and Charging System - General Information, Specifications).

2. Remove the rear door trim panel.

Refer to: [Rear Door Trim Panel](#) (501-05 Interior Trim and Ornamentation, Removal and Installation).

- 3.



Installation

1. To install, reverse the removal procedure.

2. Connect the battery ground cable.

Refer to: [Specifications](#) (414-00 Battery and Charging System - General Information, Specifications).

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

Multifunction Electronic Modules - Driver Seat Module (DSM)

Removal and Installation

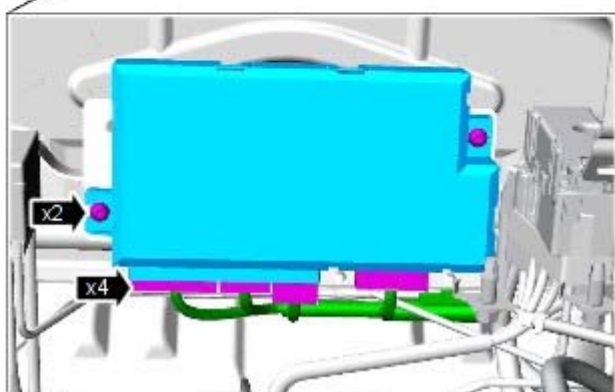
Removal

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

1. Remove the cover and disconnect the battery ground cable.

Refer to: [Specifications](#) (414-00 Battery and Charging System - General Information, Specifications).

2. Torque: 7 Nm



E89130

Installation

1. To install, reverse the removal procedure.
2. Using the Land Rover approved diagnostic system, calibrate a new module.