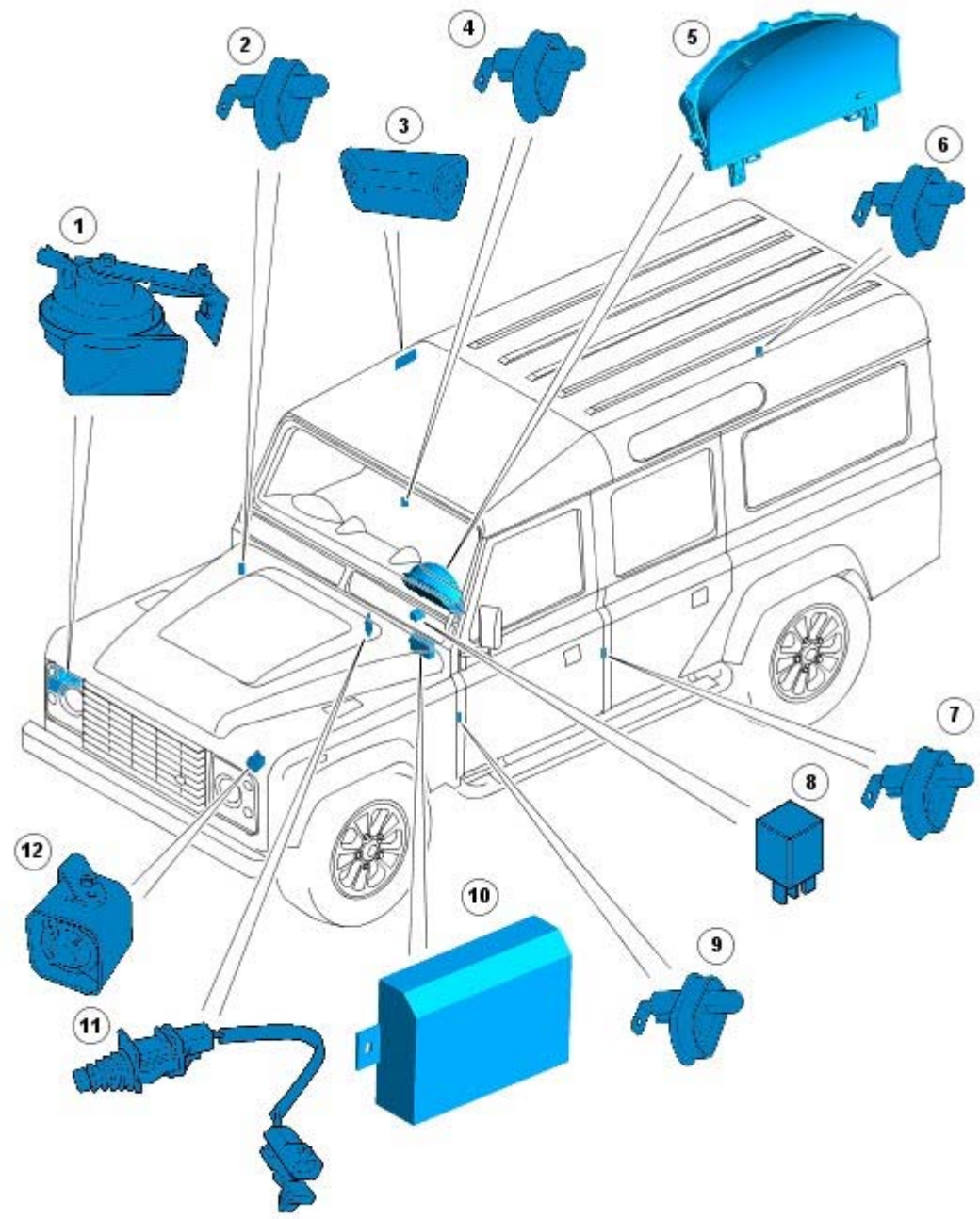
Published: Nov 12, 2008

Anti-Theft - Active

COMPONENT LOCATION



Item	Part Number	Description
1		Anti-theft alarm horn (if fitted)
2		RH (right-hand) front door switch
3		Intrusion detection module (90/110 station wagon shown)
4		RH (right-hand) rear door switch (if fitted)
5		Instrument cluster
6		Tail door switch
7		LH (left-hand) rear door switch (if fitted)
8		Anti-theft alarm horn relay (if fitted)

9		LH (left-hand) front door switch
10		Anti-theft system module
11		Hood switch
12		Battery backed sounder (if fitted)

OVERVIEW

The 10AS anti-theft system monitors the hinged panels for unauthorized opening. The system also monitors intrusion within the cabin. Depending on market specification, the vehicle may be fitted with either a battery backed sounder or an anti-theft alarm horn.

The controlling software for the active anti-theft system is contained within the anti-theft system module. The anti-theft system module also controls;

- the passive anti-theft system (engine immobilization). For additional information, refer to Anti-Theft - Passive (419-01B)
- the central locking system. For additional information, refer to Handles, Locks, Latches and Entry Systems (501-14)
- interior lighting. For additional information, refer to Interior Lighting (417-02)
- the hazard flashers. For additional information, refer to Exterior Lighting (417-01)

The active anti-theft system is armed by pressing the lock button on the remote handset or using the vehicle key in the drivers door lock. Using the remote handset will arm both the perimetric and volumetric anti-theft systems. Using the vehicle key will only arm the perimetric anti-theft system.

ANTI-THEFT SYSTEM MODULE

The anti-theft system module is located behind the instrument cluster and receives a permanent battery supply from the BJB (battery junction box) . The control module incorporates a radio frequency (RF) receiver and antenna to receive signals transmitted from the remote handset.

Depending on market specification, the module will operate at one of two frequencies. This is identified by a label mounted on the module casing. The table below shows the frequencies available for each market.

Frequency	Markets
433 MHz	Europe, Gulf States, South Africa
315 MHz	North America, South East Asia, Japan, Australia

The anti-theft system module also incorporates an internal inertia switch. In the event of an impact of sufficient severity to trigger the inertia switch when the ignition switch is in position II, the anti-theft system module will unlock all doors and operate the hazard flashers. The anti-theft system module will remain in this mode of operation for 2 minutes. To de-activate the hazard flashers and restore the anti-theft system module to its normal mode of operation, the ignition switch should be turned to position 0 and back to position II after the 2 minute period has expired.

REMOTE HANDSET

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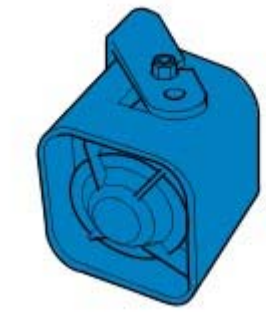
The remote handset is used to arm and disarm the anti-theft alarm system. The handset comprises a lock and unlock button. Internally, the handset contains a printed circuit board capable of transmitting RF signals, and a battery.

The remote handset RF code comprises 2 parts. The first part is a fixed code that is unique to the handset. The second part is a rolling code which changes in accordance with a pre-determined pattern. The code is received by the anti-theft system module, which is able to store information on up to 4 different handsets.

If the remote handset battery falls below a pre-determined level, the handset will transmit an additional RF signal code to the anti-theft system module. This signal is relayed to the instrument cluster indicator which emits 2 rapid flashes every 0.5 seconds to inform the driver that the remote handset battery needs replacing.

BATTERY BACKED SOUNDER



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Depending on market specification, the vehicle may be fitted with a battery backed sounder. The battery backed sounder is located in the LH (left-hand) front fender, behind the headlamp. The battery backed sounder is tamper proof and as the name suggests contains its own power supply. This allows it to operate even if it is disconnected from the vehicle power supply. For added security all wires leading to and from the battery backed sounder are colored black.

If the battery backed sounder is disconnected without first being disarmed it will sound for 4 minutes 30 seconds, if not reset in the interim. The alarm cycle in this period will be made up of a 30 second continuous tone, followed by a 5 second silent interval.

To disarm the battery backed sounder, to allow for its disconnection, the following sequence must be carried out:

- Turn the ignition switch to position II then back to position 0,
- Disconnect the vehicle battery within 17 seconds of switching off the ignition,
- Disconnect the battery backed sounder.

If the battery backed sounder is triggered by a battery disconnection it can be reset by turning the starter switch to position II provided the remote control is on the same key ring as the key, or is in close proximity to the ignition switch.

If the battery backed sounder is triggered by the perimetric or volumetric anti-theft systems, it can be reset by either:

- pressing a button on the remote handset, or
- by turning the starter switch to position II provided the remote control is on the same key ring as the key, or is in close proximity to the ignition switch.

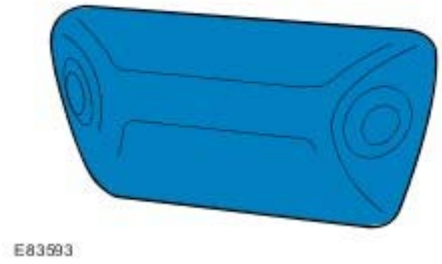
ANTI-THEFT ALARM HORN

E83592

Vehicles not fitted with a battery backed sounder are fitted with an anti-theft alarm horn. The anti-theft alarm horn is located in the RH (right-hand) front fender, behind the headlamp. Power supply to the anti-theft alarm horn is controlled by the anti-theft system module via a relay located beneath the drivers seat.

If the anti-theft system is triggered, the anti-theft alarm horn will emit either a pulsed or continuous tone depending on market legislation.

INTRUSION DETECTION MODULE



E83593

The intrusion detection module monitors movement within the vehicle cabin. The module is located;

- at the top of the RH (right-hand) B pillar on 90/110 station wagons
- on the front of the headlining, adjacent the interior mirror on 90/110 pick-ups
- on the RH (right-hand) side of the headlining, above the front door on 130 crew cabs.

The intrusion detection module emits a series of ultrasonic sound waves. By measuring the returned sound wave the intrusion detection module can first determine a 'foot print' of the vehicle cabin, and then determine if movement has taken place within this area.

The intrusion detection module is connected directly to the anti-theft system module. If movement is detected in the cabin, the intrusion detection module provides a pulsed voltage signal to the anti-theft module, triggering the alarm.

INSTRUMENT CLUSTER

E83594

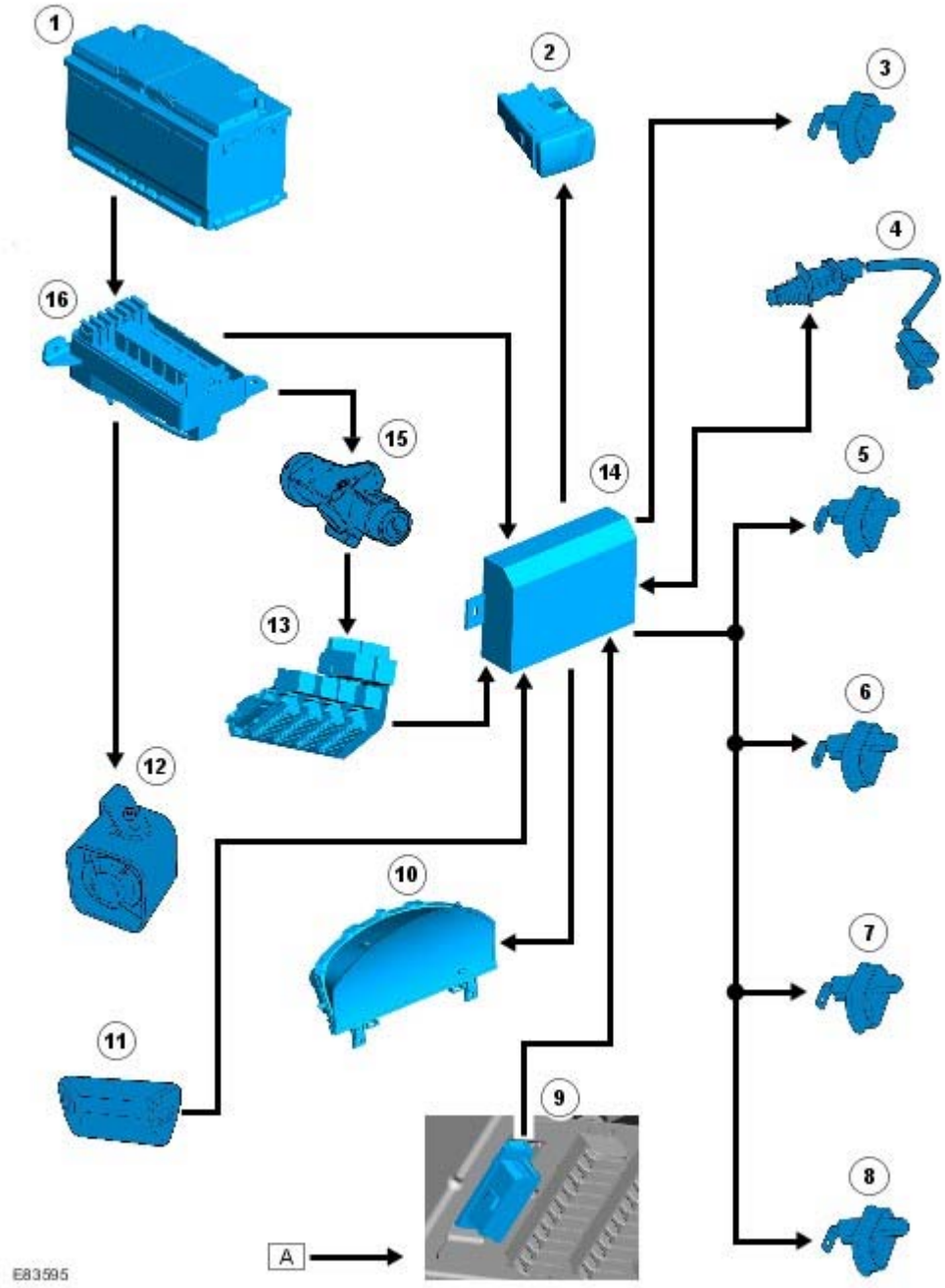
Item	Part Number	Description
1		Anti-theft indicator

The instrument cluster contains the anti-theft indicator. The indicator provides a visual anti-theft system status. When the anti-theft system is armed, the indicator will flash quickly (8 Hz) for a 10 second period. During this period, the anti-theft system module will arm the system. After the 10 second period, the indicator will flash slowly (1 Hz), acting as a deterrent to thieves. Illumination of the anti-theft indicator is controlled by the anti-theft system module.

CONTROL DIAGRAM - BATTERY BACKED SOUNDER

NOTE:

A = Hardwired



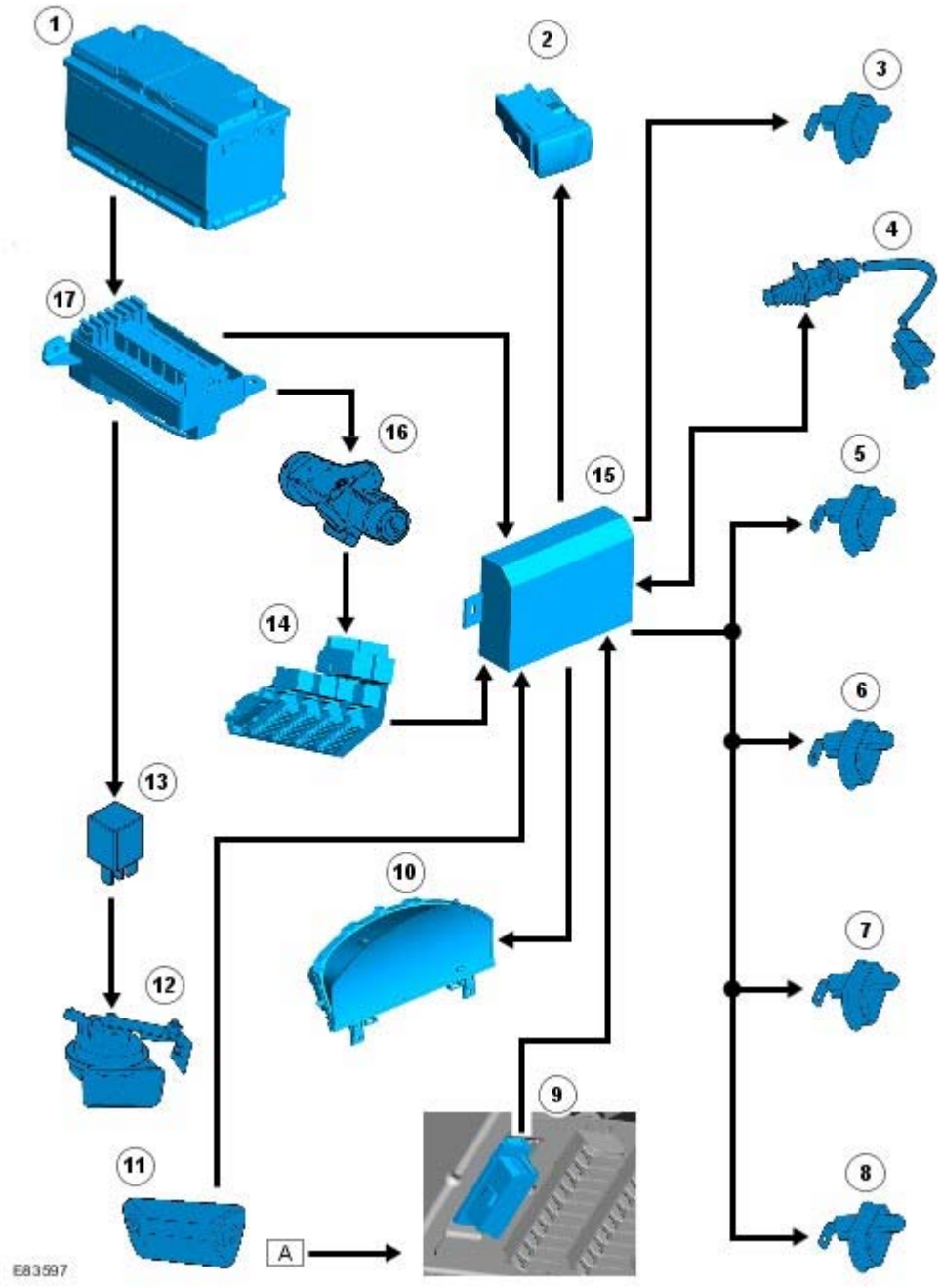
Item	Part Number	Description
1		Battery
2		Hazard flasher switch

3		Driver's door switch
4		Hood switch
5		Front passenger door switch
6		RH (right-hand) rear door switch (if fitted)
7		LH (left-hand) rear door switch (if fitted)
8		Tail door switch
9		Diagnostic socket
10		Instrument cluster
11		Intrusion detection module
12		Battery backed sounder
13		CJB (central junction box)
14		Anti-theft system module
15		Ignition switch
16		BJB (battery junction box)

CONTROL DIAGRAM - ANTI-THEFT ALARM HORN

NOTE:

A = Hardwired



Item	Part Number	Description
1		Battery
2		Hazard flasher switch
3		Driver's door switch
4		Hood switch
5		Front passenger door switch
6		RH (right-hand) rear door switch (if fitted)
7		LH (left-hand) rear door switch (if fitted)
8		Tail door switch
9		Diagnostic socket
10		Instrument cluster
11		Intrusion detection module
12		Anti-theft alarm horn
13		Anti-theft alarm horn relay

14		CJB (central junction box)
15		Anti-theft system module
16		Ignition switch
17		BJB (battery junction box)

PRINCIPLES OF OPERATION

On receipt of a valid code from the remote RF handset, the anti-theft system module will arm both the perimetric and volumetric anti-theft systems. The anti-theft system module will also arm the passive immobilization system. For additional information, refer to Anti-Theft - Passive (419-01B)
Once armed, the anti-theft system can be triggered up to 3 times in any one arming cycle.

Perimetric Protection

Perimetric protection is the monitoring of each hinged panel, namely the doors, tail door and hood, for unauthorized entry. The anti-theft system module monitors the condition of each hinged panel through a series of hardwired connections.

The driver's door switch and the hood switch are connected to the anti-theft system module on individual wires. The remaining hinged panels are wired in parallel and connected to the anti-theft system module on a single wire.

All the switches are open circuit. If a hinged panel is opened, the switch contacts close and a ground path is generated. The switch ground paths are through the vehicle body, except for the hood switch which is provided a ground path via the anti-theft system module. When the anti-theft system module registers a ground path it determines a hinged panel has been opened and triggers the alarm.

Volumetric Protection

Volumetric protection monitors movement within the cabin. When the system is first armed, the anti-theft module suspends volumetric protection for 15 seconds. This allows air in the cabin to settle and prevents nuisance triggers. The anti-theft system module monitors movement in the vehicle cabin using the intrusion detection module. The anti-theft system module will not initiate volumetric protection unless the intrusion detection module detects no disturbances for 15 seconds. If, during the 15 second arming period movement is detected, the 15 second period will re-start from 0.

Volumetric protection can be disabled in one of two ways:

- By locking the vehicle with the key in the driver's door rather than using the remote RF handset.
- By locking the vehicle with the remote RF handset while the driver's door is open. If the driver's door is subsequently shut, only the perimetric system will be armed.

Visual Indications

NOTE:

Visual and audible warnings are dependent on market legislation.

When the anti-theft system is armed the anti-theft system module will flash the hazard flashers 3 times. The hazard flashers are controlled by 2 outputs from the anti-theft system module; one for the LH (left-hand) lamps, one for the RH (right-hand) lamps. To illuminate the hazard flashers, the output from the anti-theft system module is at battery voltage. To extinguish the lamps, the output is driven to ground.

The anti-theft system module will also control operation of the instrument cluster indicator. The module will flash the indicator at a rate of 8 Hz for 10 seconds, followed by a 1 Hz flashing rate.

If the anti-theft system is triggered, the anti-theft system module will flash the hazard flashers for 30 seconds at 0.5 second intervals.

Audible Indications

If the anti-theft system is triggered, the anti-theft system module will activate the sounder. Depending on market legislation, the sounder is either an anti-theft alarm horn or a battery backed sounder. Again, depending on market legislation, the sounder may emit either a continuous or pulsed tone.

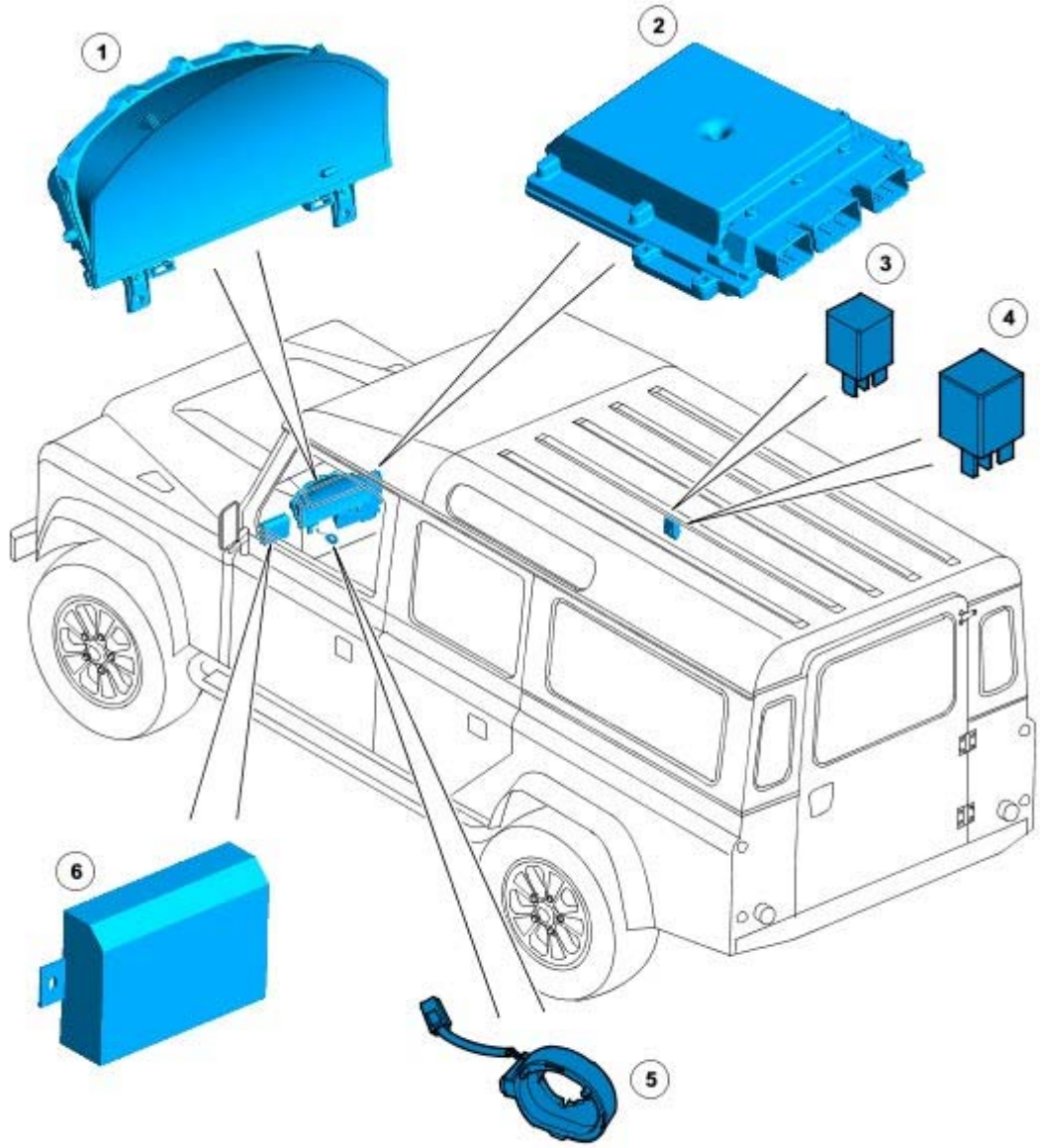
The anti-theft system module provides a battery voltage feed to, depending on vehicle specification, the battery

backed sounder or the anti-theft alarm horn relay. To power the sounder, the anti-theft system module removes the feed and provides a ground path.

Published: Jan 4, 2007

Anti-Theft - Passive

COMPONENT LOCATION



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Item	Part Number	Description
1		Instrument cluster
2		ECM (engine control module)
3		Starter relay
4		Glow plug relay
5		Transceiver coil
6		Anti-theft system module

OVERVIEW

The 10AS anti-theft system works in conjunction with the ECM (engine control module) to control the passive anti-theft system. The passive anti-theft system immobilizes the engine by inhibiting the starter relay and fuel injectors until a valid code is received from the remote Radio Frequency (RF) handset.

The passive anti-theft system features 2 levels of protection:

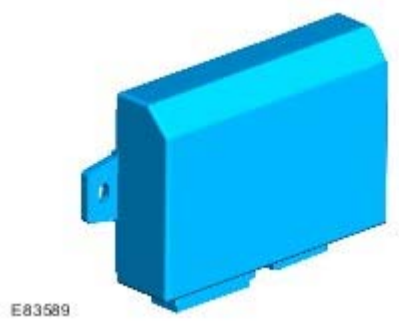
- Engine immobilization only
- Engine immobilization plus perimetric and volumetric anti-theft alarm protection. For additional information, refer to Anti-Theft - Active (419-01A)

The anti-theft system module activates the engine immobilization system 30 seconds after the key is removed from the ignition switch and the driver's door is opened. If the key is removed from the ignition switch and the drivers door isn't opened, the anti-theft system module will activate the engine immobilization system after a period of 5 minutes.

TRANSCEIVER COIL

The transceiver coil comprises a coil mounted around the ignition barrel. When the ignition switch is turned to position II, the anti-theft system module provides a permanent battery voltage feed and a pulsed voltage feed to the transceiver coil. This creates a magnetic field around the ignition barrel, which collapses and restores in relation to the pulsed power feed from the anti-theft system module. The fluctuating magnetic field activates the remote RF handset which transmits a mobilization signal.

ANTI-THEFT SYSTEM MODULE



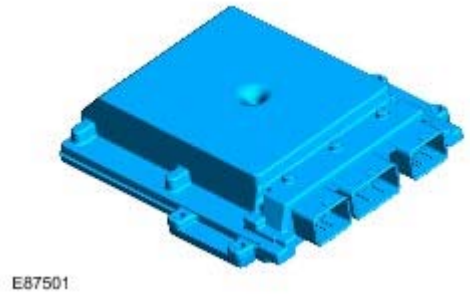
The anti-theft system module is located behind the instrument cluster and works in conjunction with the ECM (engine control module) to control the passive anti-theft system. The anti-theft system module receives a permanent battery supply from the BJB (battery junction box) and an ignition switch supply from the CJB (central junction box) . For additional information, refer to Battery and Cables (414-01)

A mobilization code is transmitted to the anti-theft system module by the remote RF handset. The mobilization code is received via the anti-theft system module antenna, which hangs below the module. The anti-theft system module determines if a valid code is received from the remote RF handset by comparing the received code with one stored in its memory.

The anti-theft system module also controls;

- the active anti-theft system. For additional information, refer to Anti-Theft - Active (419-01A)
- the central locking system. For additional information, refer to Handles, Locks, Latches and Entry Systems (501-14)
- interior lighting. For additional information, refer to Interior Lighting (417-02)
- the hazard flashers. For additional information, refer to Exterior Lighting (417-01)

ENGINE CONTROL MODULE

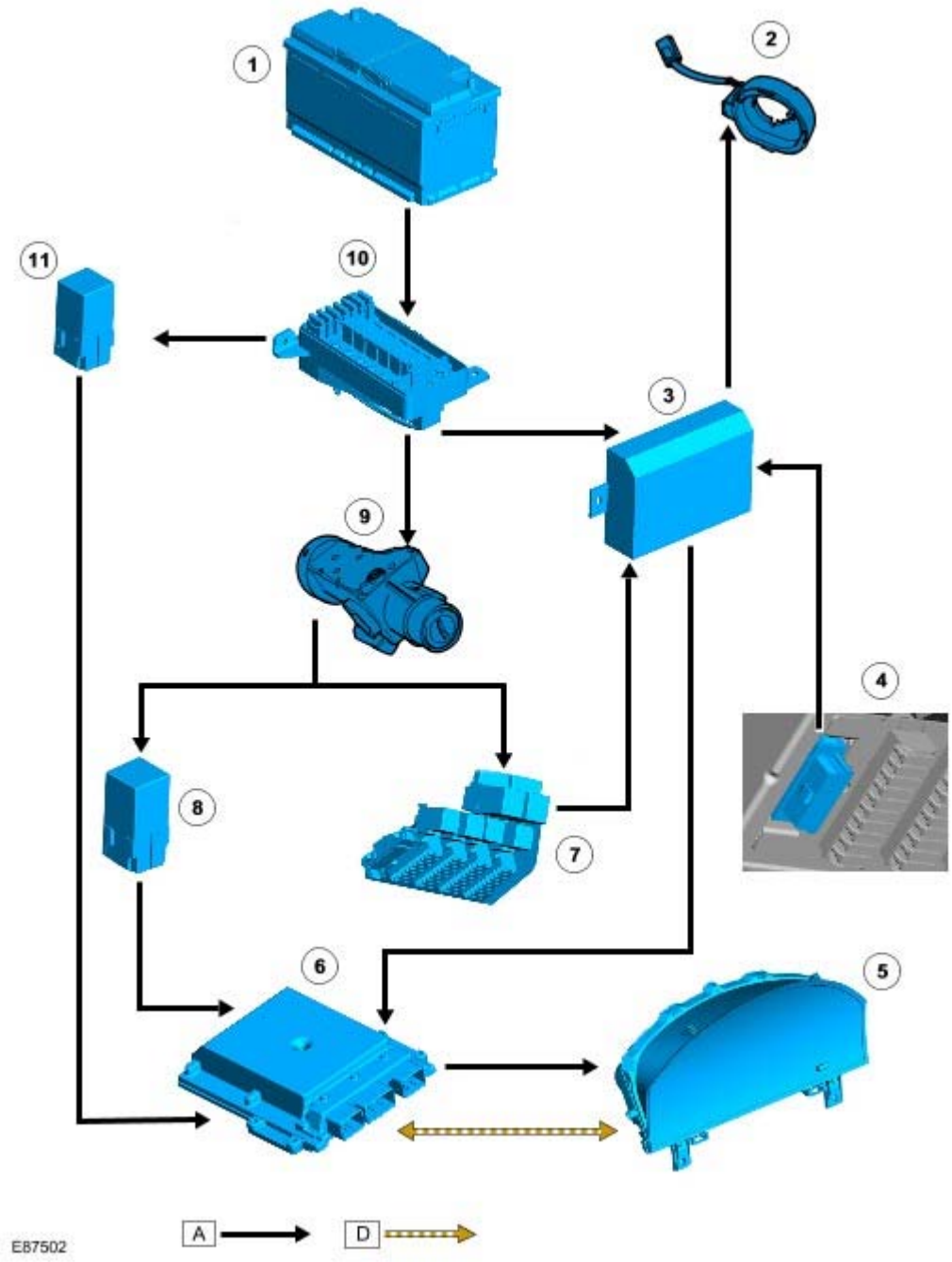


The ECM (engine control module) is mounted on the engine compartment bulkhead and works in conjunction with the anti-theft system module to control the passive anti-theft system. For additional information, refer to Electronic Engine Controls - 2.4L Duratorq-TDCi (Puma) Diesel (303-14)

CONTROL DIAGRAM

NOTE:

A = Hardwired; **D** = High speed CAN (controller area network) bus



Item	Part Number	Description
1		Battery
2		Transceiver coil
3		Anti-theft system module
4		Diagnostic socket
5		Instrument cluster
6		ECM (engine control module)
7		CJB (central junction box)
8		Starter relay
9		Ignition switch
10		BJB (battery junction box)
11		Glow plug relay

PRINCIPLES OF OPERATION

The anti-theft system module receives a permanent battery supply from fuse 7 in the BJB (battery junction box) . When the vehicle key is placed in the ignition barrel and turned to position II (ignition on), the anti-theft system module will also receive a power supply from fuse 8 of the CJB (central junction box) .

When the anti-theft system module receives the ignition switch feed it activates the transceiver coil by supplying a battery voltage feed from pin 12 of connector C0057, and a pulsed voltage signal from pin 7 of connector C0057.

The pulsed feed from the anti-theft system module causes the magnetic field created by the transceiver coil to collapse and restore. The fluctuating magnetic field activates the remote RF handset to transmit a mobilization code to the anti-theft system module.

The anti-theft system module receives the mobilization code via its antenna. This code is compared to a value in its memory. If the codes match, the anti-theft system module provides a mobilization signal to the instrument cluster. The instrument cluster acts as a gateway, converting the signal transmitted from the anti-theft system module into a signal that is recognizable by the ECM (engine control module) . This signal is then transmitted by the instrument cluster to the ECM (engine control module) which will energize the starter relay and the fuel injectors to allow the engine to be started.

Emergency Key Access

If the vehicle is immobilized and the remote RF handset is not available, the emergency key access procedure will allow the engine to be mobilized using the vehicle key. For information on the emergency key access feature, refer to the Owners Handbook.

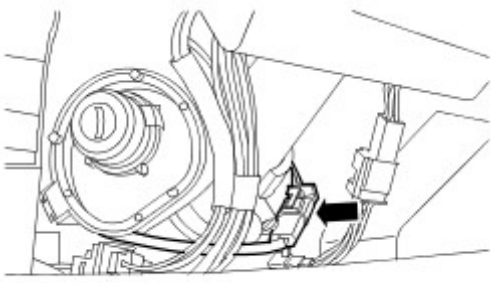
Published: Feb 1, 2007

Passive Anti-Theft System (PATS) Transceiver

Removal

1 . Remove the steering column shrouds.
For additional information, refer to Steering Column Shrouds (57.40.29)

2 . Disconnect the passive anti-theft system (PATS) transceiver electrical connector.



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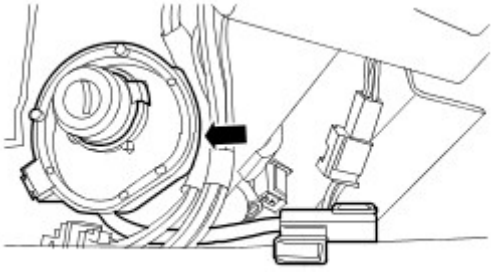
3 . Remove the PATS transceiver.



E90131

Installation

1 . To install, reverse the removal procedure.

Published: Jan 30, 2007

Steering Column Shrouds (57.40.29)

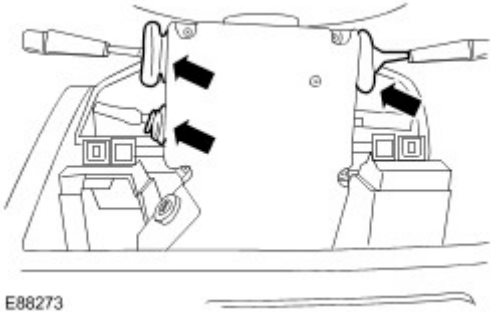
Removal

1 . Remove the steering wheel center pad.

2 . Remove the instrument cluster lower finisher.

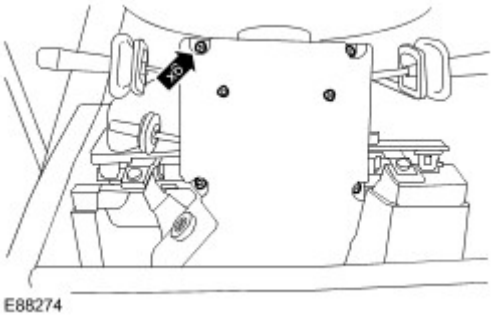
- Remove the 2 screws.

3 . Release the 3 grommets from the steering column shrouds.

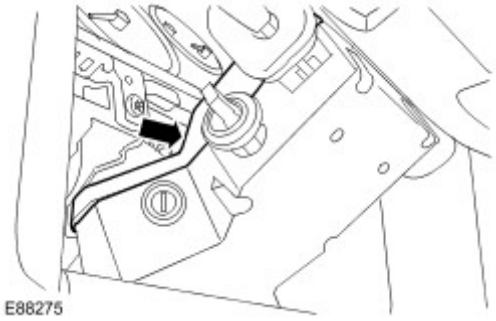


4 . Remove the grommet.

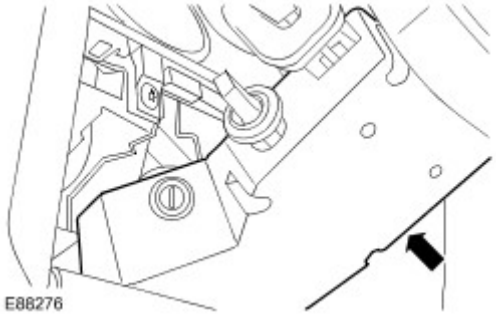
5 . Remove the 6 screws.



6 . Remove the upper steering column shroud.



7 . Remove the lower steering column shroud.



Installation

1 . To install, reverse the removal procedure.

Tighten to 2 Nm (1 lb.ft).