
VEHICLE IMMOBILISATION AND ALARM SYSTEM

A sophisticated engine immobilisation and anti-theft alarm system is offered on the Land Rover Defender 300 Tdi vehicle range, which incorporates the following features:

Perimeter protection

This part of the alarm system protects side doors, bonnet and rear door against unauthorised entry - alarm sounding if any one of these apertures is opened without alarm first being disarmed.

Interior protection

Also known as volumetric protection, this part of the system protects space inside the vehicle. Once armed, the alarm will sound if a door is opened, or if movement is detected inside the vehicle.

Engine immobilisation

The engine is immobilised electronically whenever the alarm system is armed. Even if the alarm has not been armed, engine immobilisation will occur automatically thirty seconds after the driver's door is opened, or five minutes after the starter switch is turned to position '0'.

ALARM SYSTEM COMPONENTS

Electronic control unit (ECU)

The ECU is the alarm system brain and controls all vehicle immobilisation and alarm functions. It responds to the inputs received, by supplying suitable outputs to indicate status of the alarm system or activating relevant warning devices. unit is located under fascia behind instrument binnacle.

Handset and key

The handset is the primary source of control for the alarm system i.e. it arms and disarms the alarm components. The key can be used to override engine immobilisation if the handset is lost or fails to operate, see **Engine immobilisation override**.

The handset battery should last for approximately three years dependent upon use. The following symptoms will be noticed when the battery requires replacement:

1. The handset will only work every other operation while disarming.
2. The direction indicator lamps will not flash when the alarm is disarmed.

For battery replacement procedure, see **Handset Battery**.

Passive coil

The passive coil is fitted on the starter switch and activates a receiving coil in the handset, causing it to automatically transmit a remobilisation signal to the ECU.

Aerial

The aerial is integral within the alarm system harness and supplies the ECU with the signal received from handset.

Immobilisation spider

The immobilisation spider provides an interface between ECU and immobilised areas of the vehicle. This is installed in a sealed (safe) box inside the vehicle battery box.

Digital diesel shut-off valve - 97 MY

When fitted, the digital diesel shut-off valve immobilises the fuel injection pump by preventing power reaching the fuel shut-off solenoid, **See Immobilisation and alarm system circuit diagram - with DDS**.



Door and bonnet switches

Perimetric protection for the vehicle is provided by ECU inputs connected to the starter switch, bonnet switch and door switches.

Ultrasonic sensor

The ultrasonic sensor operates by emitting an air pressure carrier wave which is subsequently received by the sensor as it bounces back from objects inside the vehicle. Once armed, the alarm will sound if wave is disturbed by a door opening, or if movement is detected inside the vehicle.

When the volumetric sensor is activated it monitors movement within the vehicle for 15 seconds before detecting and responding to intrusions. If the sensor detects movement it delays arming until a quiet period has lapsed; if continuous movement is detected, the alarm will not arm volumetrically.



NOTE: Interior protection will not operate until 15 seconds after alarm is set.

The ultrasonic sensor is positioned in a different location, according to vehicle type, as follows:

- 90/110 Station Wagon - RH cantrail trim
- 90/110 Pick-up - On headlining, between interior lamp and rear view mirror
- 130 Crewcab - On headlining above RH door

Alarm sounder

Two types of alarm sounder can be fitted, one with a battery back-up facility and or without battery back-up, both providing an audible warning whenever the alarm is triggered. The vehicle horn will also operate if the alarm sounds.

The alarm sounder is fitted to LH inner front wing in the engine compartment.



NOTE: Disconnecting the battery on vehicles fitted with the battery backed-up facility will result in the alarm sounding, if correct procedure has not been followed.

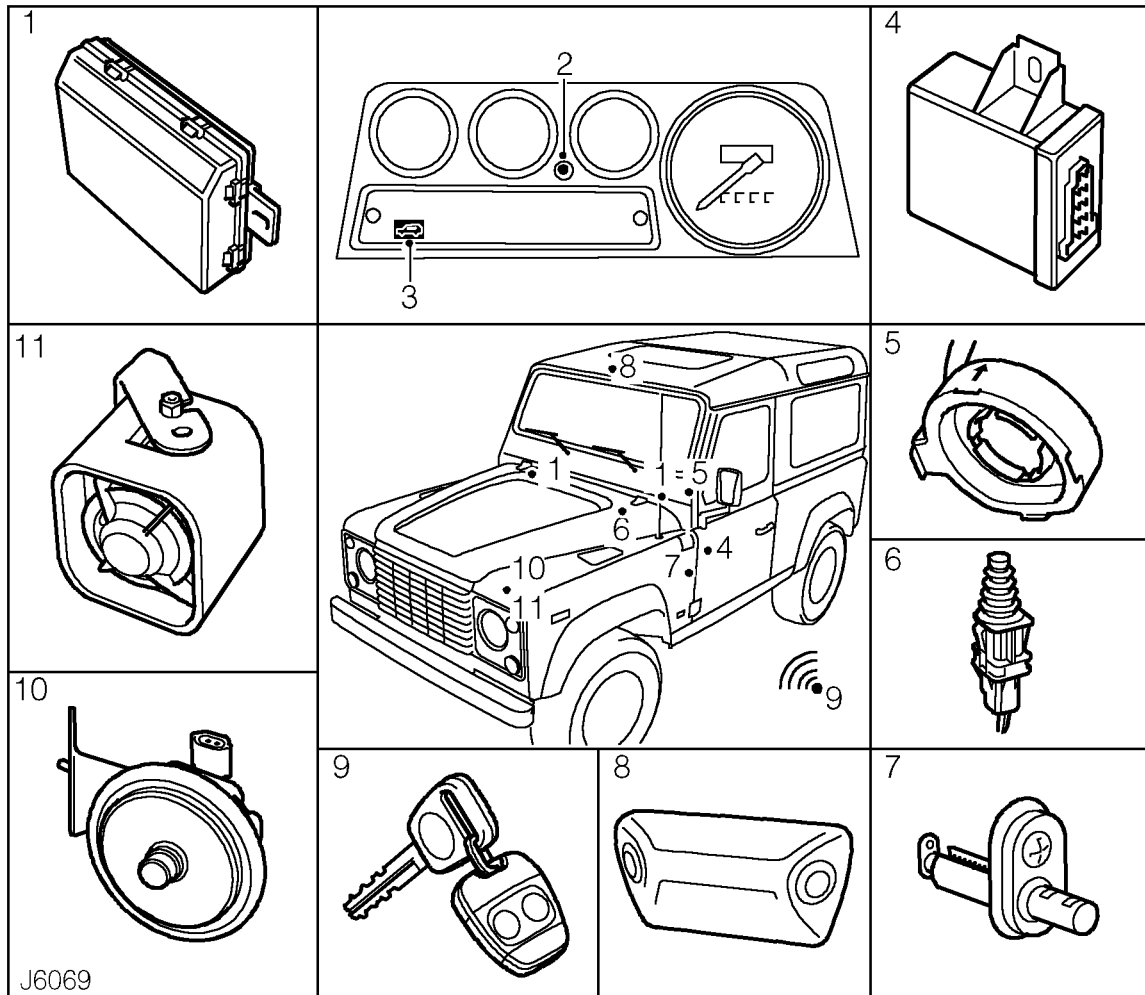
Engine immobilisation warning light

The engine immobilisation warning light is located on the instrument panel, and provides a visual indication that the engine is immobilised.

Anti-theft alarm indicator light

The anti-theft alarm indicator light is located on the instrument panel, between the fuel and coolant temperature indicators, and provides a visual indication of the alarm/ immobiliser status.

ALARM SYSTEM COMPONENT LOCATION



COMPONENT

LOCATION

- | | | |
|-----|---|-------------------------------------|
| 1. | Electronic control unit (ECU) | Under dash, LH and RH drive |
| 2. | Anti-theft alarm indicator light | Instrument panel |
| 3. | Engine immobilisation warning light | Instrument panel |
| 4. | Immobilisation spider* | Inside vehicle battery box |
| 5. | Passive coil | Over starter switch barrel |
| 6. | Bonnet switch | Engine compartment, LH and RH drive |
| 7. | Door switches | |
| 8. | Ultrasonic sensor | Varies according to vehicle type |
| 9. | Handset and key | |
| 10. | Alarm sounder (without battery back-up) | LH inner front wing |
| 11. | Alarm sounder (with battery back-up) | LH inner front wing |

* Replaced in some markets by a digital diesel shut-off valve (DDS), secured directly to fuel shut-off solenoid on injection pump.



ALARM SYSTEM OPERATION

Arming alarm

To arm the alarm, aim handset at vehicle and press the RH button (Padlock symbol). Provided all doors and or apertures are closed, the direction indicator lamps will flash three times to confirm that the alarm is armed. All security features previously described will be active.

Once armed, the alarm will sound if a door or the bonnet is opened, or if movement is detected inside the vehicle.

Disarming alarm

Within range of the vehicle, briefly press the LH (Plain) button on the handset; the direction indicator lamps will flash once to indicate that the alarm has been disarmed and the engine re-mobilised.



NOTE: In some territories, the interior lamps will illuminate when the alarm is disarmed.

If the direction indicators fail to flash when the alarm is armed:

This indicates that a door or the bonnet is not fully closed, in which case the alarm will be partially armed and engine immobilised, but interior protection will not be active.

Once the open door or bonnet is closed, the direction indicators will flash three times and the alarm will fully arm as described previously.

If the alarm sounds:

The vehicle horn and alarm sounder will operate continuously for 30 seconds when the alarm is triggered. The horn and alarm sounder can be triggered up to three times.

To silence the alarm, press either handset button. If the handset is inoperative, the alarm can only be disarmed by entering the emergency key access code, see **Engine immobilisation override**.

Anti-theft alarm indicator light

A RED indicator light on the instrument panel indicates the status of the alarm system. When the alarm is armed successfully, the light flashes rapidly. After 10 seconds, the light adjusts to a slower frequency and continues flashing as an anti-theft deterrent.

If the light fails to illuminate during the rapid flash phase, this indicates a 'mislock' (door or the bonnet not fully closed or key in starter switch). If this occurs, the indicator light will still flash at slower frequency as an anti-theft deterrent.

The indicator light will illuminate continuously under the following conditions:

1. Alarm system armed and immobilised with ignition 'on' or driver's door open.
2. Engine immobilised with ignition 'on' or driver's door open.

Interior protection

Interior protection is activated automatically when the alarm system is armed; twin sensors inside the vehicle monitor interior space and will activate the alarm if an intrusion is detected.

However, if passengers or animals are to be left inside the vehicle, or if a window or sunroof is to be left open, the alarm must be armed with the interior protection DISABLED as follows:

To disable interior protection:

1. Open the driver's door.
2. Use the handset to arm the alarm in normal way.
3. Close the driver's door (the direction indicator lamps will flash three times and the anti-theft indicator light commences flashing rapidly). The alarm system is now armed with the interior protection disabled.



NOTE: Interior protection will not operate until 15 seconds after the alarm is set.

ENGINE IMMOBILISATION

Engine immobilisation is an important aspect of the vehicle's security system, and occurs automatically whenever the alarm system is armed.

The system also includes a feature known as 'passive immobilisation', which is designed to safeguard the vehicle from theft should the driver forget to arm the alarm.

Passive immobilisation occurs automatically as follows:

- Thirty seconds after the starter switch has been turned off and the driver's door opened.
- Five minutes after the starter switch is turned off or the alarm system is disarmed.

If the engine has immobilised passively, re-mobilisation will occur when the starter switch is turned to position 'II', provided the handset is on the same ring as key and in close proximity to the switch.

ALWAYS keep the handset on the same ring as the key.

NEVER attach both handsets to the same key ring.

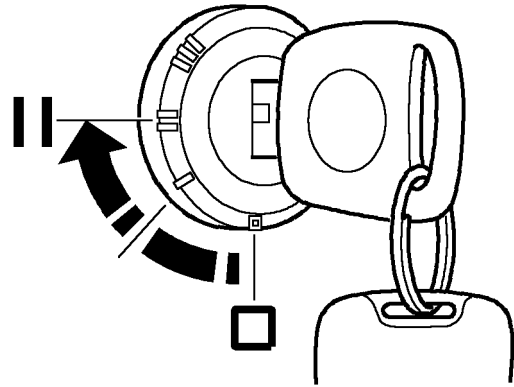
Any attempt to start the engine while it is immobilised will cause the engine immobilisation warning light to flash.

Engine immobilisation override

If the handset is lost or fails to operate, the engine immobilisation can be overridden by using the starter key to enter the four digit emergency access code. The procedure for entering the code is described after the following note:



NOTE: If the handset is lost or inoperative, it is impossible to disarm the alarm. As soon as the door is opened, the alarm will sound (continuously for up to three 30 second periods), and continue while the code is being entered.



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1. With the driver's door closed, insert the key into the starter switch.
2. Turn the switch to position 'II' the required number of times to enter first digit of code (if first digit is 4, turn key to position 'II' and then back to '0' four times).
3. Open the driver's door (to enter first digit) and then close the door again.
4. Turn the starter switch to position 'II' and back to '0' the required number of times to enter SECOND digit of code.
5. Open the driver's door (to enter second digit) and then close the door again.
6. Turn the starter switch to position 'II' and back to '0' the required number of times to enter THIRD digit of code.
7. Open the driver's door (to enter third digit) and then close door again.
8. Turn the starter switch to position 'II' and back to '0' the required number of times to enter FOURTH digit of code.
9. Finally, open and close the driver's door. If the code has been entered correctly, the anti-theft indicator light will extinguish, the engine can be started and the alarm will disarm.

If an incorrect code has been entered:

If the code is entered incorrectly, the anti-theft indicator light will continue to illuminate and the engine will fail to start. Before entering the code again, turn the starter switch to position 'II', hold in this position for 5 seconds and then switch off.

After three failed attempts, the security system invokes a delay period of thirty minutes during which the system will not accept any further codes.



ALARM SYSTEM FUSES

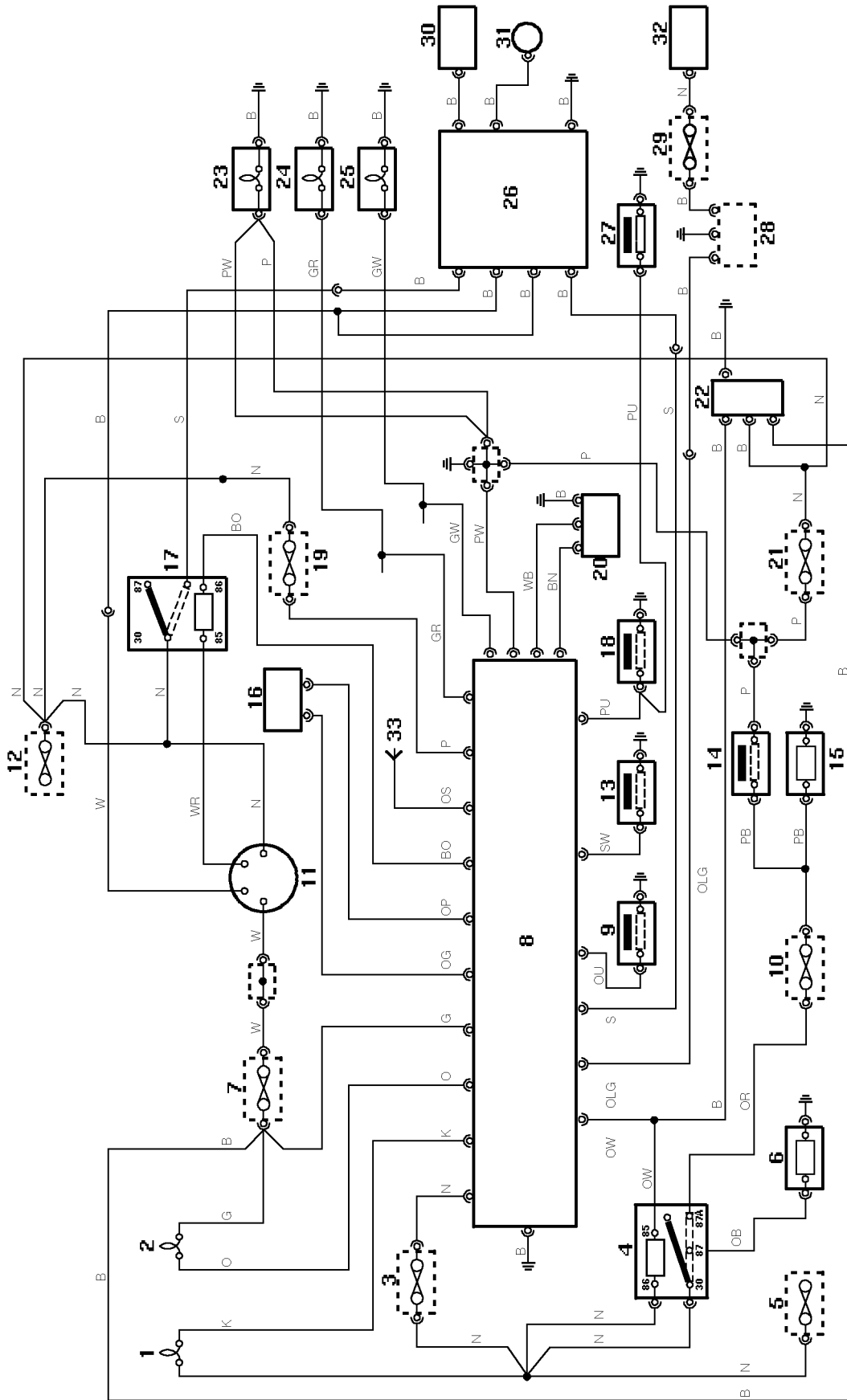
When the vehicle immobilisation and alarm system is fitted, three fuses are used to protect the circuit:

- Alarm system 15 amp fuse, main harness, located behind instrument binnacle.
- Alarm sounder 20 amp fuse No.10, located in main fuse box.
- Alarm system 5 amp fuse No.20, located in main fuse box.

The main fuse box is positioned in the centre of the fascia, in front of the main gear lever. A label in the fuse box cover shows the circuits protected, the fuse rating and their locations. They are also listed below.

MAIN FUSE BOX

| Fuse No. | Value (amps) | Electrical circuit |
|----------|--------------|----------------------------|
| 1 | 15 | Hazard warning lights |
| 2 | 20 | Interior lamp, horn |
| 3 | 15 | Wipers & washers - rear |
| 4 | 10 | Wipers & washers - front |
| 5 | 15 | Heater |
| 6 | 7.5 | Rear fog guard lamps |
| 7 | 5 | Radio/cassette player |
| 8 | 15 | Heated rear window |
| 9 | 10 | Cigar lighter |
| 10 | 20 | Alarm sounder |
| 11 | 7.5 | Headlamp - RH, dipped beam |
| 12 | 7.5 | Headlamp - LH, dipped beam |
| 13 | 7.5 | Headlamp - RH, main beam |
| 14 | 7.5 | Headlamp - LH, main beam |
| 15 | 5 | Side lamps - LH |
| 16 | 5 | Side lamps - RH |
| 17 | 15 | Stop & reverse lamps |
| 18 | 20 | Air conditioning |
| 19 | 5 | Air conditioning |
| 20 | 5 | Alarm system |



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IMMOBILISATION AND ALARM SYSTEM CIRCUIT DIAGRAM

1. Anti-theft alarm indicator light (LED)
2. Engine immobilisation warning light
3. Alarm system fuse - 15 amp
4. Alarm sounder relay
5. Under bonnet lighting fuse
6. Alarm sounder (without battery back-up)
7. Alarm system fuse - 5 amp (position 20)
8. Electronic control unit (ECU)
9. Bonnet switch
10. Alarm sounder protection fuse - 20 amp (position 10)
11. Starter switch
12. Under bonnet ignition fuse
13. Driver's door switch
14. Vehicle horn switch
15. Vehicle horn
16. Passive coil
17. Starter switch relay
18. Front passenger door switch
19. Hazard warning light fuse - 15 amp (position 1)
20. Ultrasonic sensor
21. Interior lamp and horn fuse - 20 amp (position 3)
22. Alarm sounder (with battery back-up)
23. LH direction indicator lamps
24. RH direction indicator lamps
25. Interior lamp
26. Immobilisation spider
27. Rear side doors and rear door switches
28. Diagnostic connector
29. Diagnostic fuse - 7.5 amp
30. Starter solenoid
31. Fuel switch-off solenoid (injection pump)
32. Generator
33. Aerial

Key to cable colours

- B-Black
- G-Green
- K-Pink
- LG-Light Green
- N-Brown
- O-Orange
- P-Purple
- R-Red
- S-Slate
- U-Blue
- W-White
- Y-Yellow

The last letter of a colour code denotes the tracer colour



IMMOBILISATION AND ALARM SYSTEM CIRCUIT DIAGRAM - WITH DDS

1. Anti-theft alarm indicator light (LED)
2. Engine immobilisation warning light
3. Alarm system fuse - 15 amp
4. Alarm sounder relay
5. Under bonnet lighting fuse
6. Alarm sounder (without battery back-up)
7. Alarm system fuse - 5 amp (position 20)
8. Electronic control unit (ECU)
9. Bonnet switch
10. Alarm sounder protection fuse - 20 amp (position 10)
11. Starter switch
12. Under bonnet ignition fuse
13. Driver's door switch
14. Vehicle horn switch
15. Vehicle horn
16. Passive coil
17. Starter switch relay
18. Front passenger door switch
19. Hazard warning light fuse - 15 amp (position 1)
20. Ultrasonic sensor
21. Interior lamp and horn fuse - 20 amp (position 3)
22. Alarm sounder (with battery back-up)
23. LH direction indicator lamps
24. RH direction indicator lamps
25. Interior lamp
26. Digital diesel shut-off valve (DDS)
27. Rear side doors and rear door switches
28. Diagnostic connector
29. Diagnostic fuse - 7.5 amp
30. Starter solenoid
31. Fuel shut-off solenoid (injection pump)
32. Generator
33. Aerial

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VEHICLE ALARM SYSTEM BUILT-IN TEST



NOTE: The handset should be detached from the key to allow perimetric testing of the alarm system. The system will automatically switch to volumetric testing if the handset is in close proximity to the starter switch.

The built-in test procedure can be accessed providing the following conditions exist:

**Alarm disarmed.
Ignition 'off'.
Doors unlocked.
Bonnet closed.**

With assistance, the test mode can be entered by completing the following instructions within 5 seconds:

1. Open bonnet.
2. Turn starter switch 'on'.
3. Open driver's door (far enough to activate door switch).
4. Turn starter switch 'off'.
5. Turn starter switch 'on'.

If the test mode has been correctly accessed, the alarm sounder/horn will operate briefly and the anti-theft alarm indicator and direction indicator lamps will flash.

Perimetric tests

The anti-theft alarm indicator light and direction indicator lamps will flash when:

1. Door switches are activated.
2. The bonnet is opened.
3. Key switches are activated.

Volumetric tests

Press the LH (unlock) button or move the handset close to the starter switch to disable perimetric testing and enable volumetric testing. If movement is detected within the vehicle by the ultrasonic sensor the anti-theft alarm indicator and direction indicator lamps will illuminate.



NOTE: Exit the anti-theft alarm built-in test by turning the starter switch to the 'off' position.

If the previously described conditions are not achieved during the built-in test procedure, this would indicate a fault in the alarm system. Before undertaking detailed fault diagnosis procedures, first make visual checks of components such as a faulty door switch or blown alarm system fuse.