Anti-theft alarm system (DWA)

Introduction

The anti-theft alarm system (DWA) has the task of indicating attempts to break into the vehicle, or to tamper with it and to issue acoustic and visual alarms.

The anti-theft alarm system must be differentiated from the electronic immobilizer. The purpose of the anti-theft alarm system is to deter a potential intruder or thief and to alert passers-by to the crime.

The new system consists of the following components:

- Interior sensor with integrated DWA logic
- Emergency siren with integrated tilt sensor
- DWA LED under the rear view mirror
- External switches, e.g. bonnet or door contacts

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System overview

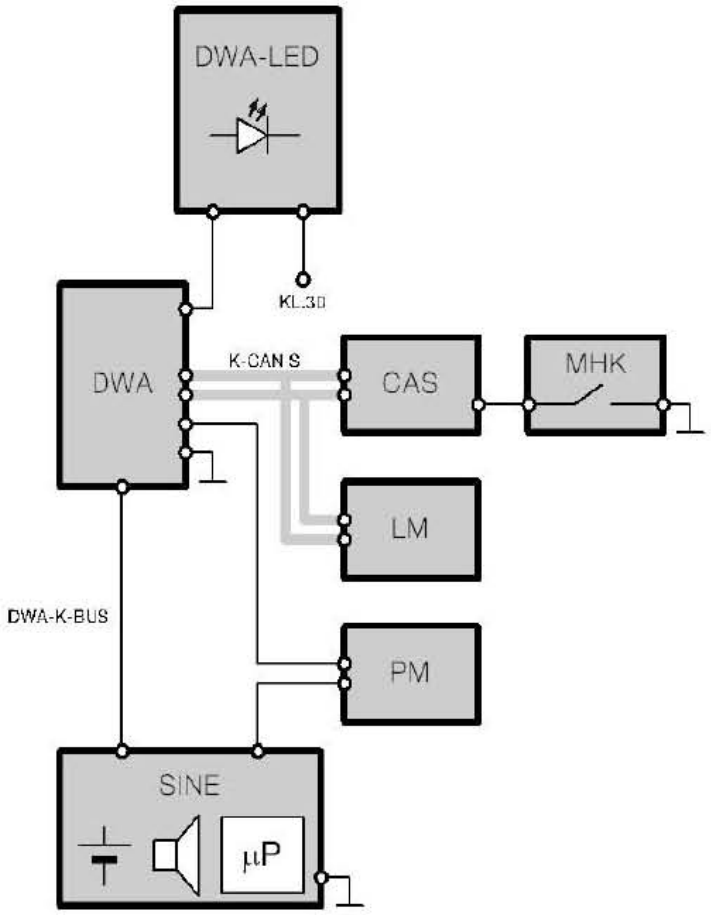

Fig. 15: Overview of the DWA system

Index	Description	Index	Description
MHK	Bonnet contact	DWA	Anti-theft alarm system
CAS	Car Access System	DWA-K-BUS	Local data bus of DWA
LM	Light module		
K-CAN S	K-CAN SYSTEM	SINE	Emergency siren with integrated tilt sensor
DWA-LED	DWA LED		

Installed posistion

The DWA interior sensor is located at the centre of the headlining. This central location allows the entire vehicle interior to be monitored very effectively.

The emergency siren with integrated tilt sensor is installed in the left rear wheel arch where good protection is provided against tampering with the emergency siren or DWA K bus.

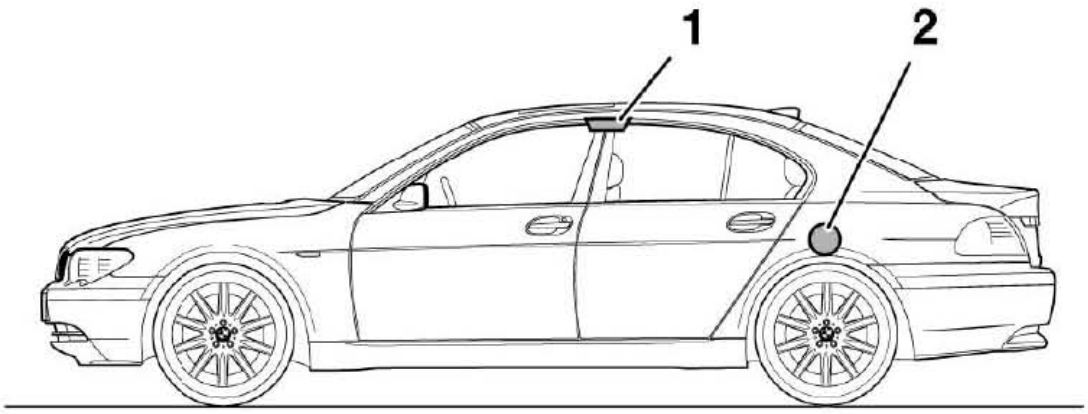

Fig. 16: Installed position of DWA

Index	Description
1	DWA interior sensor
2	Emergency siren with integrated tilt sensor

Components of the DWA

- Interior sensor with integrated DWA logic

The interior sensor is an ultrasound-based motion detector which detects all movements inside the vehicle interior and evaluates them via the DWA logic. The DWA issues an alarm if the interior sensor detects a movement which satisfies the triggering criteria, or if alarm triggers are indicated via the K-CAN SYSTEM or DWA K bus.

- Emergency siren with integrated tilt sensor

If the alarm is triggered, the emergency siren issues an acoustic signal. In certain countries, an acoustic signal may also be triggered by changes of state (locking/unlocking).

The emergency siren communicates with the DWA passenger-compartment sensor along a bidirectional line (DWA K bus). The emergency siren is encodable and has diagnostic capability.

Detected alarm triggers are initially indicated to the DWA passenger-compartment sensor, which then activates the alarm. However, the independent alarm is an exception. The emergency siren has an independent voltage supply and additionally monitors the voltage supplied by the vehicle battery. It also monitors tampering with any leads.

Tilt sensor

The tilt sensor monitors the horizontal position of the vehicle and also has the task of detecting and indicating tyre theft and wheel theft as well as attempts to tow away the whole vehicle.

The current parked position of the vehicle is stored together with the components "longitudinal angle" and "transverse angle." If a defined change of angle is exceeded in the longitudinal direction and/or the transverse direction, an alarm telegram is sent to the DWA passenger-compartment sensor.

- DWA LED

The DWA LED is activated directly by the DWA.

- DWA K bus

The DWA K bus is a local sub-bus to K bus specification. The DWA communicates with the emergency siren or the tilt sensor via the DWA bus.

Functional description

- Basic functions

The anti-theft alarm system has the task of identifying and indicating attempts to break into or tamper with the vehicle. The alarm telegram is encoded in a country-specific manner.

The DWA monitors the following signals:

- Door and lid signals (tailgate and engine-bonnet contact)
- Vehicle interior (USIS)
- Vehicle inclination
- DWA bus line leading to emergency siren (SINE)
- Voltage supply for vehicle electrical system (SINE)
- Voltage level at the emergency siren (SINE)

SINE (emergency siren with tilt sensor)

Sensitivity-influencing states

The DWA continues to evaluate the following vehicle operatin states so that it can adapt its sensitivity level to increase false alarm safety.

- Status of independent heating
- Status of independent ventilation
- Location of power windows
- Location of slide/tilt sunroof

Open windows, for example, lower the sensitivity of the operating threshold.

Arming the DWA

The DWA is armed from the driver's door or by the remote control when the vehicle is centrally double-locked. The DWA is armed as soon as the vehicle goes into "thiefproofed" state.

Deactivation of the tilt sensor and interior sensor

The interior sensor and the tilt sensor can be deactivated to prevent the alarm being triggered by the tilt sensor in duplex garages and during transportation by ship or train when the anti-theft alarm system is armed and to prevent persons or animals left in the vehicle triggering the alarm via the interior sensor.

This can be done by again centrally double-locking the vehicle within 10 seconds of centrally double-locking or auto-remote closing the vehicle.

The LED comes on for 1 s by way of acknowledgement.

It is possible to generally deactivate the tilt sensor and the interior sensor via personalization.

Disarming the DWA

The DWA is disarmed in the central locking system states "locked," "unlocked" and "selectively unlocked."

The emergency siren with tilt sensor is disarmed. In some countries, acoustic and visual feedback is provided to the driver.

Unlocking the luggage compartment

If the luggage compartment in a thiefproofed vehicle is unlocked and opened, the tilt sensor and the passenger-compartment sensor are deleted from the alarm table (the tilt sensor is deactivated via the DWA K bus by telegram).

Forced disarming

The DWA is automatically disarmed if a person located in the vehicle centrally double-locks the vehicle and then inserts the key into the ignition and steering wheel lock. The CAS evaluates this action and transmits a "locked" telegram. The DWA is thus disarmed.

Hotel setting

The vehicle can be thiefproofed with "hotel setting active" status. If the vehicle is unlocked with "hotel setting active" status, the DWA is not disarmed completely. Only the triggers tailgate, engine-bonnet contact and line monitoring for the emergency siren are evaluated in this case. As the DWA is not disarmed completely, no acknowledgment is given.

Deletion of non-combined operation

Where non-combined operation is deleted, the alarm is triggered if the DWA is armed by the remote control and disarmed by the door lock.

- Feedback to the vehicle user

All types of feedback described in the following are intended to provide the vehicle user with confirmation of the state of the vehicle.

DWA LED

DWA state	DWA LED
Disarmed	OFF
Armed	ON
Armed, input is not in the rest position	Flashes rapidly for max. 10 s and then remains on
Interior sensor / tilt sensor OFF	Lights up for 1 s and then remains on
Alarm triggered	Flashes rapidly for 5 min and then remains on
Disarm	Goes off
Disarm after alarm	Flashes for 5 min (interrupted by "key inserted" signal)

Arm/disarm acknowledgment via lights

The visual acknowledgment which is given via the lights when the DWA is armed and disarmed serves as feedback for the vehicle user and is encoded in a country-specific manner.

DWA state	Hazard-warning lights
Arm	The hazard-warning lights flash once
Disarm	The hazard-warning lights flash twice
Arm with "trigger open" warning	The hazard-warning lights do not flash until the last door or tailgate has been locked
Disarm with pre-alarm	The hazard-warning lights flash 4 times at double frequency
Deactivation of passenger-compartment sensor / tilt sensor	The hazard-warning lights are lit continuously for 2 s

- Alarm triggers

Door contact signals

The status of the door contacts is evaluated by the CAS and indicated by telegram.
The status of the individual door contacts is included in the alarm table 3 s after the status signal "door closed" is issued. In other words, it is possible to trigger an alarm via a closed door even if another door contact is still open.

Tailgate/rear window

The status of the tailgate contact is evaluated by the CAS and indicated by telegram.
If the tailgate is unlocked when the DWA is armed, or if the tailgate for armed DWA is unlocked via the remote control, then signals from the tailgate contact, interior sensor and tilt sensor are initially deleted from the alarm table.

Engine bonnet

The status of the engine-bonnet contact is evaluated by the CAS and indicated by telegram.
The status of the engine-bonnet contact is included in the alarm table 3 s after the status signal "bonnet closed" is issued. If an engine-bonnet contact is not latched, the CAS assumes that the contact is closed.

Interior sensor

The interior sensor registers and evaluates movements in the passenger compartment of the vehicle.

The referencing phase of the interior sensor begins 3 seconds after locking the last doors and lids. The interior sensor is ready 20 seconds after the referencing period begins.

Tilt sensor

The tilt sensor registers the rest position of the vehicle when the DWA is armed and recognizes changes in position, e.g. jacking up the vehicle. The tilt sensor is integrated in the emergency siren.

The referencing phase of the tilt sensor is started by a telegram from the DWA 3 seconds after locking the last doors and lids.

The tilt sensor is ready 30 seconds after commencement of the referencing period and indicates this to the DWA.

To prevent a false alarm being activated by rocking motion of the vehicle, the angular data for the longitudinal and transversal axes are determined every 90 ms.

An alarm is only triggered if the vehicle remains at a certain inclination for a sustained period of time (approx. 1.5 s).

Line monitoring of the DWA K bus

The DWA communicates with the emergency siren and the tilt sensor via the DWA K bus. Line monitoring is started as soon as the DWA is armed.

- DWA alarm

If a triggering criterion is met when the DWA is armed, the alarm is issued both acoustically and visually as per country code.

Acoustic alarm

After a triggering criterion is met, the DWA sends the telegram to the DWA K bus.

The emergency siren acknowledges the alarm telegram. If the DWA receives no confirmation from the SINE, it repeats the alarm telegram up to 8 times. If it receives no reply, the emergency running horn function is activated.

Visual alarm

After a triggering criterion is met, the DWA outputs the telegram to the K-CAN SYSTEM. This triggers a visual alarm at the same time as the acoustic alarm for a period of 5 minutes. The visual alarm is indicated by the hazard-warning lights (flashing with low beam or flashing with high beam) as per country-specific coding.

Independent alarm

If an attempt to tamper with one of the emergency siren wires is detected, an independent alarm is triggered by the emergency siren.

Panic alarm

The panic alarm enables the vehicle user to draw attention to a threat outside the vehicle or to an accident by issuing an alarm.

The panic alarm can be activated by pressing the special function button on the remote control key irrespective of the state the DWA (armed/disarmed).

- Functions in the vehicle electrical system

Terminal 30 / terminal R / terminal 15

The DWA is supplied via the power module (terminal 30).

For reasons of manipulation safety, terminal 30 is not disconnected for the DWA by the power module.

Arming of the DWA must not be possible at terminal R or terminal 15.

Diagnosis

Supplementary information is stored in the alarm and info memories in a nonvolatile form. However, an entry into either of the two memories is not enough to trigger repair measures. For this reason, this content is not described in greater detail.

The alarm memory of the USIS stores all alarms except the independent alarm. The alarm memory contains information on initial triggers, as well as subsequent triggers, date, time and environment related conditions (ambient temperature, window and slide/tilt sunroof location, heating system).

Notes for Service

A special DWA quick test is possible; it takes 2 seconds and is executed at a reduced volume.

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