Service Training

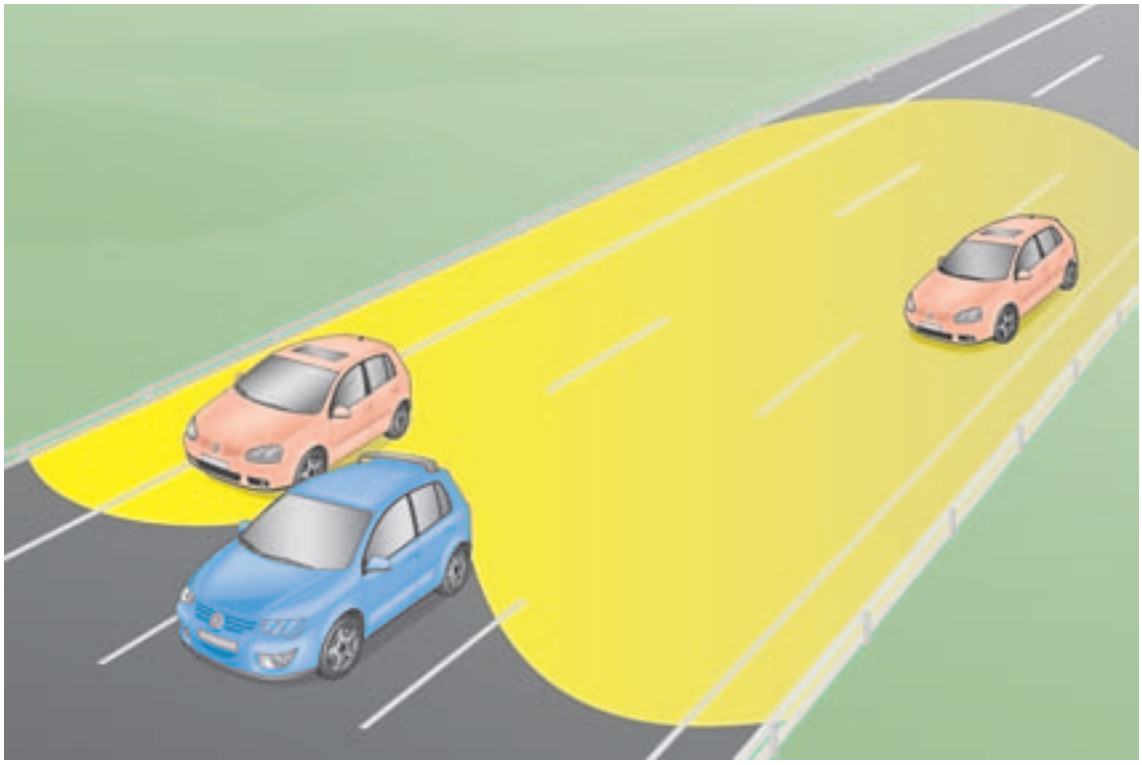
Self-study Programme 396

Lane Change Assist

Design and function

Lane change assist is a further technical innovation in driver assistance systems. This system is designed to prevent accidents.

This self-study programme explains how this kind of driver assistance system works in Volkswagen vehicles. The system informs and warns the driver about hazards when changing lane on motorways and dual-carriageways.



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NEW

Important Note

The self-study programme shows the design and function of new developments.
The contents will not be updated.

For current testing, adjustment and repair instructions, refer to the relevant service literature.

Contents

Introduction

General description

Situation

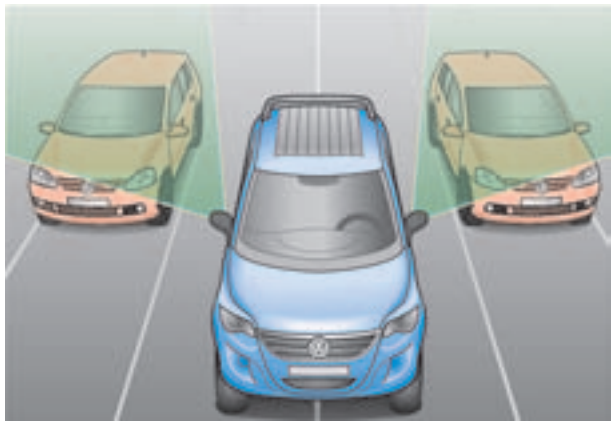
A frequent cause of accidents is failing to see vehicles when changing lanes on multi-lane roads. In 2005, there were approx. 5000 accidents involving personal injury and property damage that were caused partly by mistakes when changing lane.

Driver assistance systems can contribute to reducing accidents in these traffic situations and warn the driver about possible dangers in good time.

Dangers when changing lane

Blind spot

If a vehicle is travelling in the lane next to you, there is a danger that it is in the blind spot of the rear-view mirrors and you will therefore not see it when you change lane.



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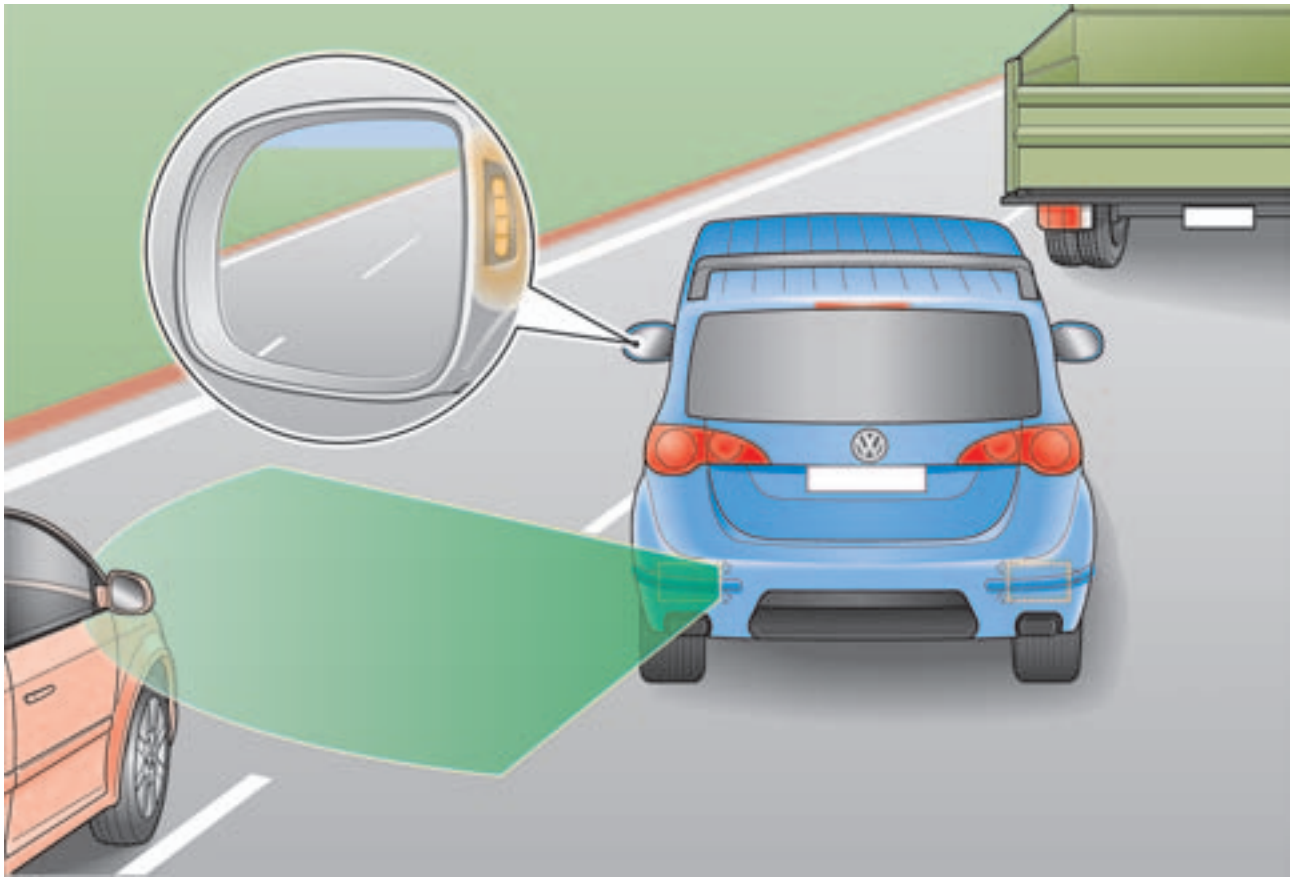
Reducing risks when changing lane

The lane change assist monitors the space next to and behind the vehicle with the aid of radar beams. The driver will be informed if there is a vehicle in the monitored area or if a vehicle is approaching at a higher speed.

If the driver is planning to change lane in this situation and indicates this by activating the turn signal, the system will issue a warning.

The risk of accident is thus reduced by the lane change assist and therefore contributes to safety.



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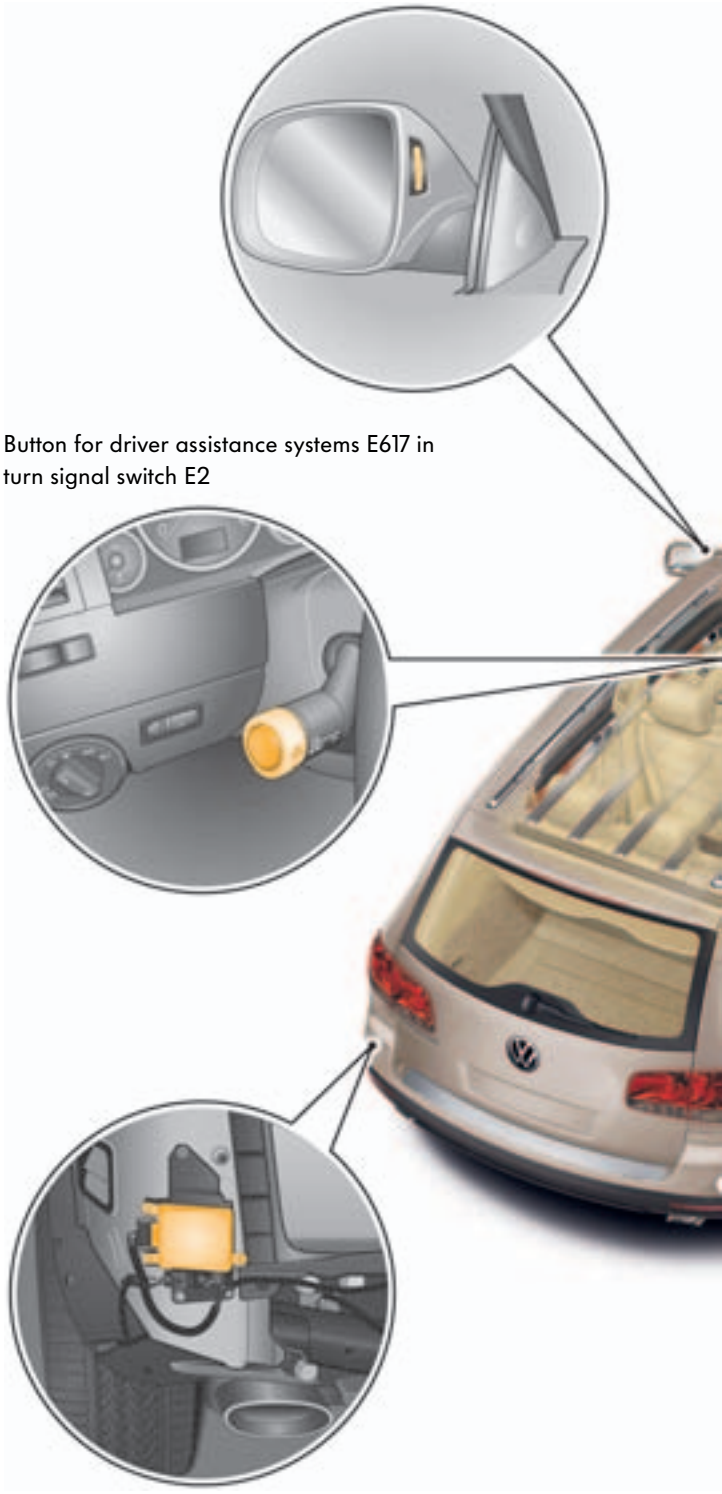
Design

Components and their locations

The components of the lane change assist and their locations are shown here using the Volkswagen Touareg as an example.

- Lane change assist warning lamp in driver side exterior mirror K233
- Lane change assist warning lamp in front passenger side exterior mirror K234
- Lane change assist control unit J769 is on the left-hand side behind the rear bumper.
- Lane change assist control unit 2 J770 is on the right-hand side behind the rear bumper.
- The button for driver assistance systems E617 is on the end of turn signal switch E2.

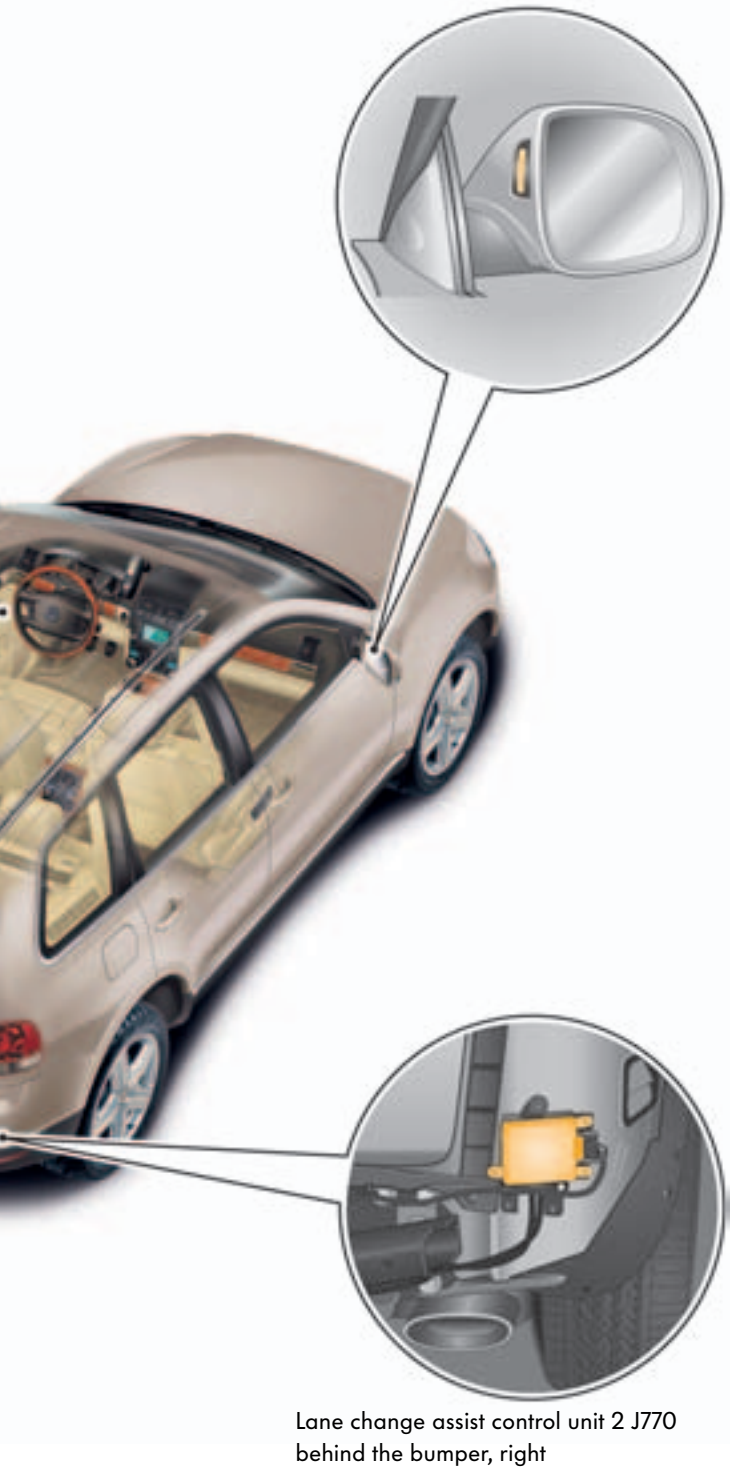
Lane change assist warning lamp in driver side exterior mirror K233.



Button for driver assistance systems E617 in turn signal switch E2

Lane change assist control unit J769 behind the bumper, left

Lane change assist warning lamp in
front passenger side exterior mirror K234



Lane change assist control unit 2 J770
behind the bumper, right

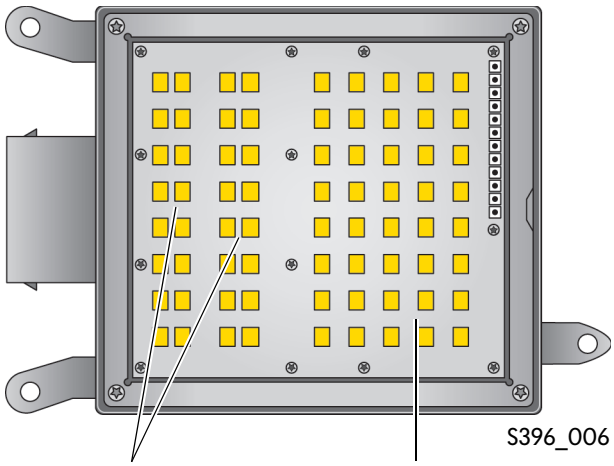
S396_009

Design

Components

Radar sensors

The radar sensors are configured as transmitter and receiver aerials which are in the control unit under a radome plastic cover.



Button for driver assistance systems

The button for driver assistance systems E617 can be used to switch off the lane change assist.
The icon on the button indicates the driver assistance systems.

Displays

Highline dash panel insert

The lane change assist warning lamp K232 in the dash panel insert indicates that the lane change assist is active. The warning lamp is in the speedometer G21.

The systems status is indicated by the colour of the warning light:

- Green
  Lane change assist switched on and active
  (at speeds above 60 km/h)
- Yellow
  Lane change assist switched on and passive
  (at speeds below 50 km/h)

Lane change assist warning lamp K232

S396_013

Premium dash panel insert

The lane change assist warning lamp K232 in the dash panel insert indicates that the lane change assist is active. The warning lamp is located in the multifunction display.

The activation state is indicated by the colour of the warning light:

- Green
  Lane change assist switched on and active
  (at speeds above 60 km/h)
- Grey
  Lane change assist switched on and passive
  (at speeds below 50 km/h)

Lane change assist warning lamp K232

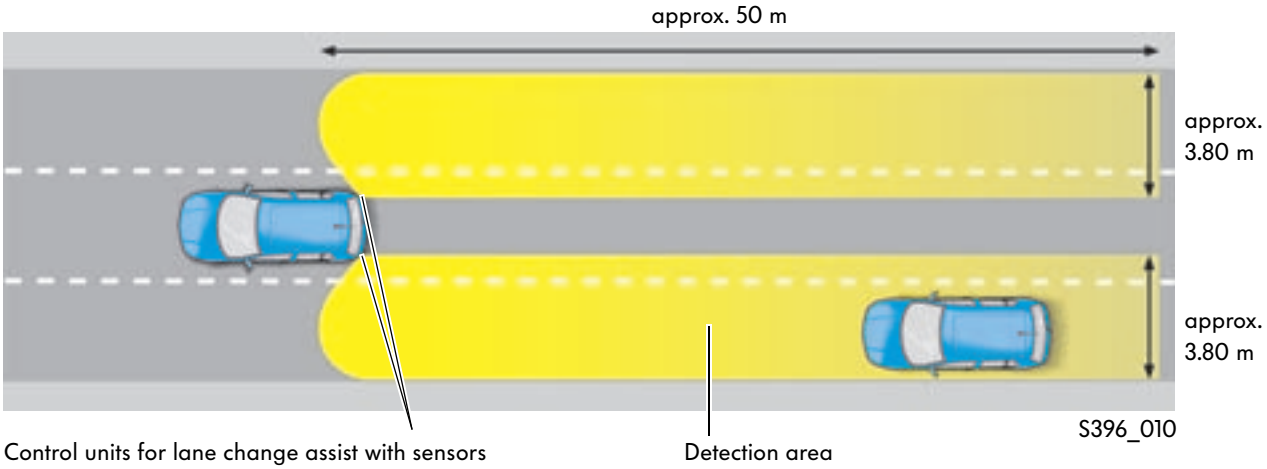
S396_014

Function

Monitoring procedure

Scanning area

The system detects dangers next to and behind the vehicle. The scanning area reaches from the B-pillar to approximately 50 m to the rear of the vehicle. The width of the scanning area is approx. 3.8 m.



How it works:

The sensors in the control units monitor the scanning area and recognise objects that are in this area using radar waves. These objects are recognised by the respective lane change assist control unit (J769 or J770) and the time to a possible collision is calculated. The control unit calculates whether the object in the blind spot is at the same speed, is slowly dropping back or getting closer. If the calculated time falls below a set value, the driver is informed or warned when the turn signal is active.

Information and warning

The information or warning that there is an object in the scanning area is provided by the lane change assist warning lamps in the exterior mirrors.

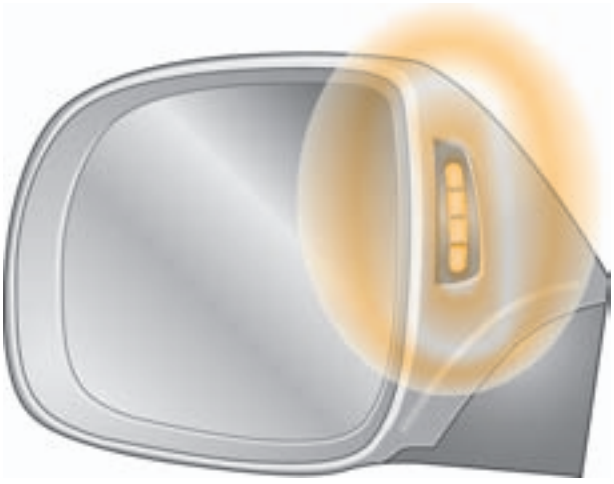
Information

Information is provided when there is a danger, the lane change assist warning lamp on the corresponding side illuminates. It remains illuminated until the object leaves the scanning area.

S396_011

Warning

A warning is issued when the driver indicates his intention to change lanes by activating the turn signal in the direction of a detected object.
This causes the lane change assist warning light on the corresponding side to start flashing.
The warning is limited to a set time and then the system returns to information level.
If the turn signal is left active after the original object poses no further danger and another object is detected another warning is issued.
The warning is activated again if you switch the turn signal off and on again.

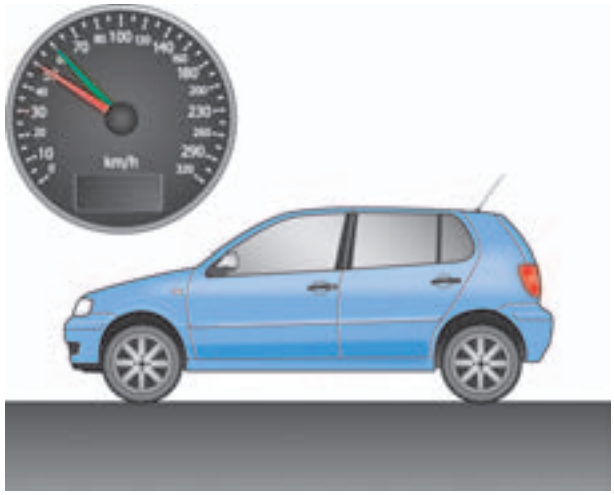


S396_012

Function

Activation speed

The lane change assist is active at speeds above 60 km/h. Vehicles in the monitored area are recognised. The requirement for this is that the system is switched on with the button for driver assistance systems. If the speed falls below 50 km/h, the lane change assist switches to passive mode.

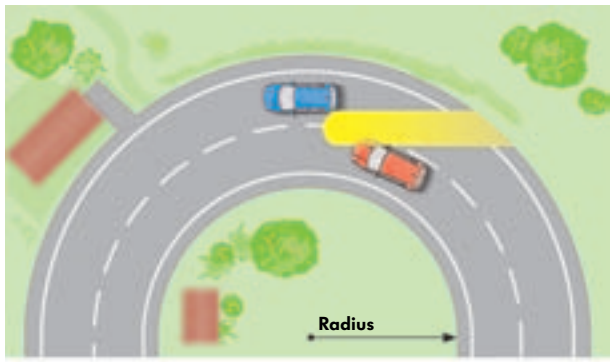


S396_029

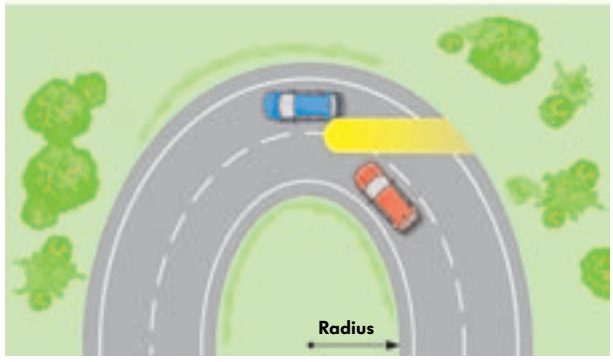
Cornering

Vehicles are recognised on curves with over 200 m radius. On curves with smaller radii, the lane change assist switches to passive mode.

Radius > 200m



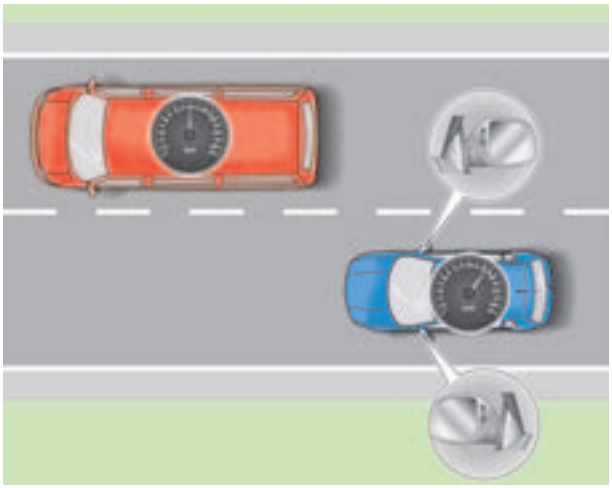
Radius < 200m



S396_030

Overtaking

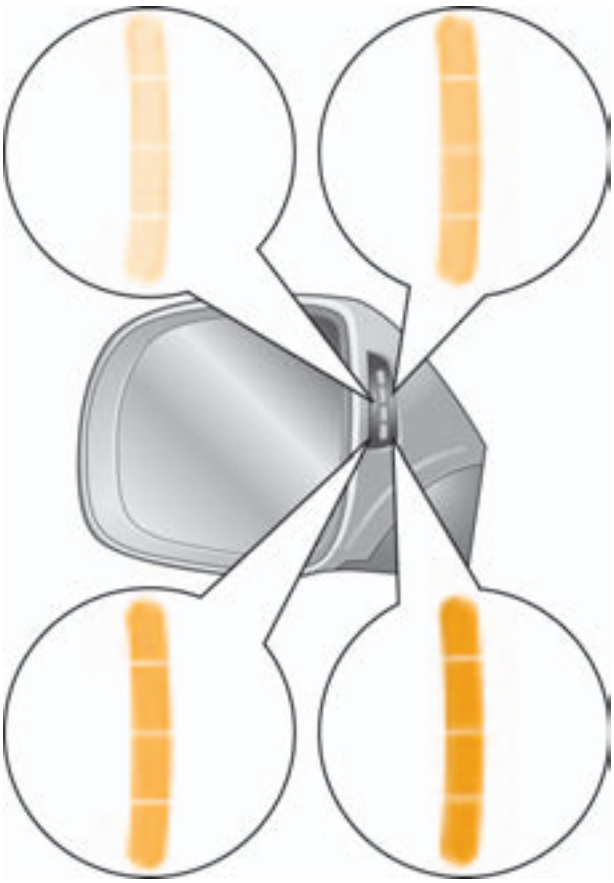
When you overtake vehicles or they are falling behind, information or a warning is provided up to a speed difference of approximately 15 km/h. Above that no information on the object is displayed.



S396_031

Brightness of warning lamps

The driver can adjust the brightness of the lane change assist warning lamps using the customisation options. Furthermore the brightness is automatically adapted to the ambient light.
The information for this is supplied by the rain and light sensor G397.



S396_032

Networking

Incorporation in the vehicle networking concept

Control units

The lane change assist consists of two control units:
- lane change assist control unit J769 and
- lane change assist control unit 2 J770.

The lane change assist control unit J769 is configured as the master control unit. The lane change assist control unit 2 J770 is the slave control unit. Both control units are linked to each other for data exchange via their own lane change assist private CAN data bus. The data transfer speed is 500 kbit/s.

The lane change assist control unit J769 is still a subscriber on the powertrain CAN data bus and can therefor receive all necessary CAN data bus messages for its functions.

When the ignition is switched off, the connection between the powertrain CAN data bus and the lane change assist control unit is disconnected by the cut-off relay for safety reasons.

CAN data bus messages

The following CAN data bus messages are required for trouble-free operation of the lane change assist:

Message

- Airbag control unit J234
  Storage of warning lamp statuses

- ABS control unit J104
  Provision of speed and yaw rate signal

- Control unit with display in dash panel insert J285 and data bus diagnostic interface J533
  Display of activation statuses
  Forwarding all CAN data bus messages

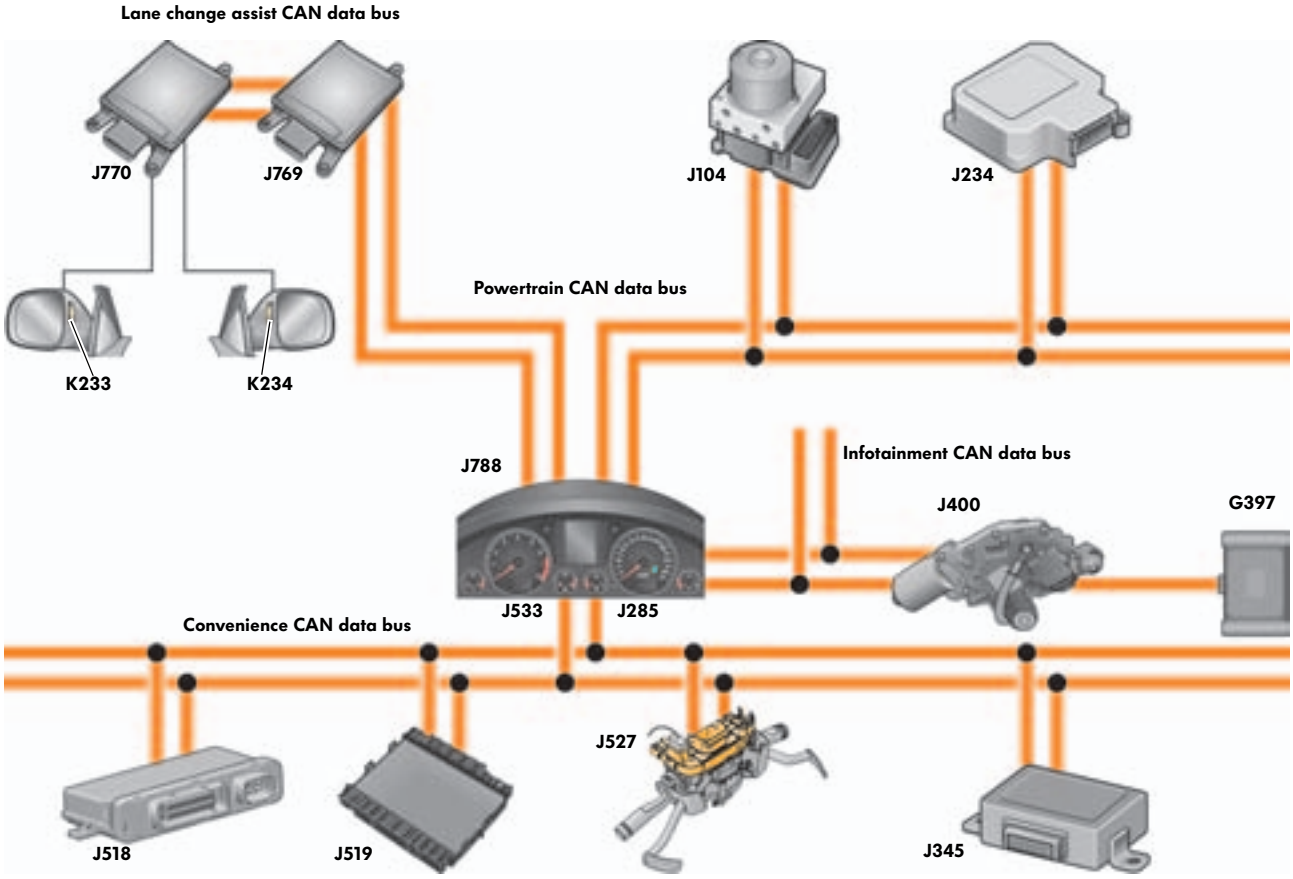
- Onboard supply control unit J519
  Provision of turn signals

- Trailer detector control unit J345
  Indication of whether a trailer is attached and, if necessary, deactivation of the lane change assist

- Wiper motor control unit J400
  Provision of the signal from the rain and light sensor G397 and adjustment of the brightness of the lane change assist warning lamps

- Entry and start authorisation control unit J518
  Provision of the remote key signal for customisation

Overview of network

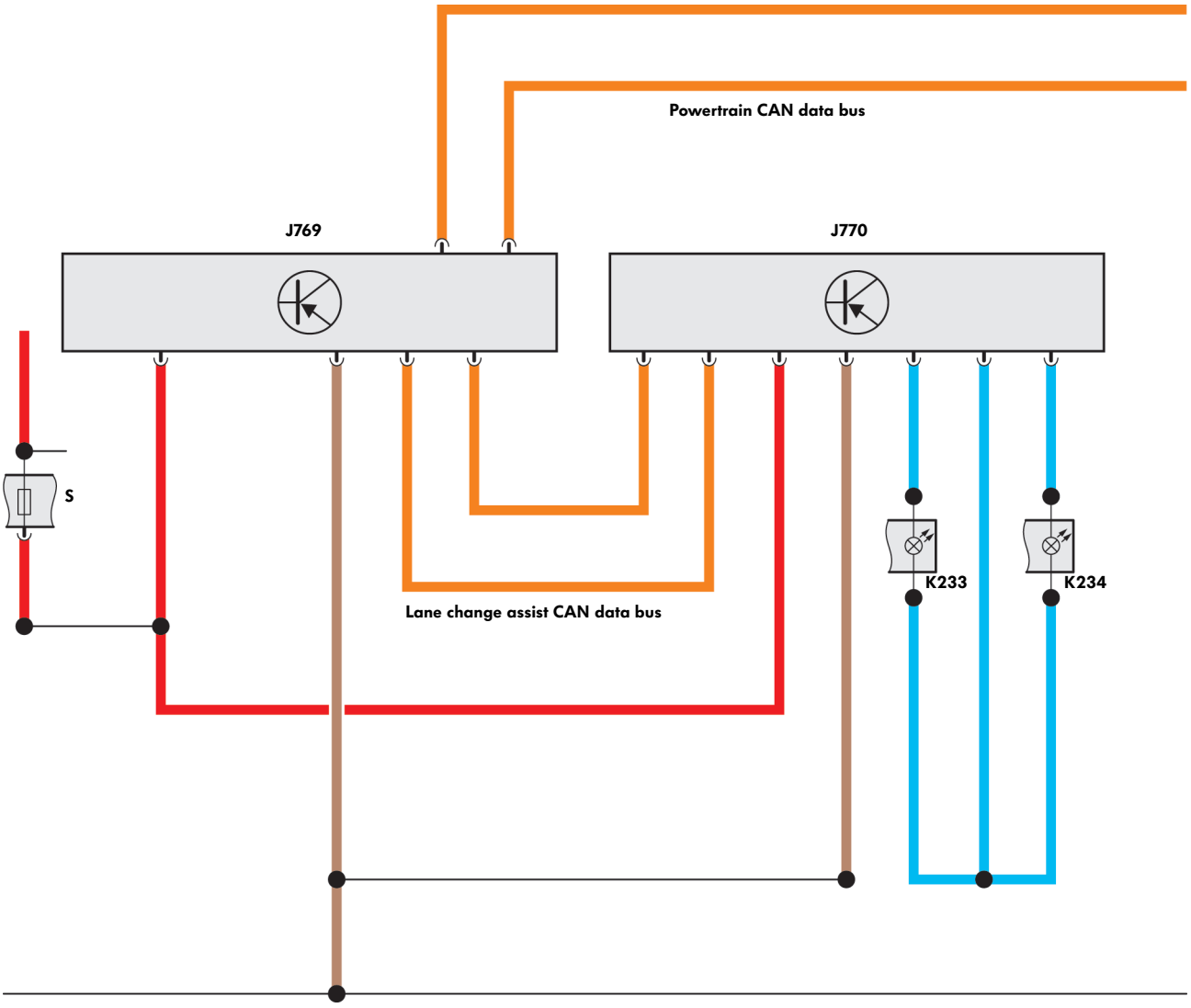


S396_015

Legend

G397	Rain and light sensor
J104	ABS control unit
J234	Airbag control unit
J285	Control unit with display in dash panel insert
J345	Trailer detector control unit
J400	Wiper motor control unit
J518	Entry and start authorisation control unit
J519	Onboard supply control unit
J527	Steering column electronics control unit
J533	Data bus diagnostic interface
J769	Lane change assist control unit
J770	Lane change assist control unit 2
J788	Cut-off relay for CAN powertrain bus
K233	Lane change assist w arning lamp in driver side exterior mirror
K234	Lane change assist warning lamp in front passenger side exterior mirror

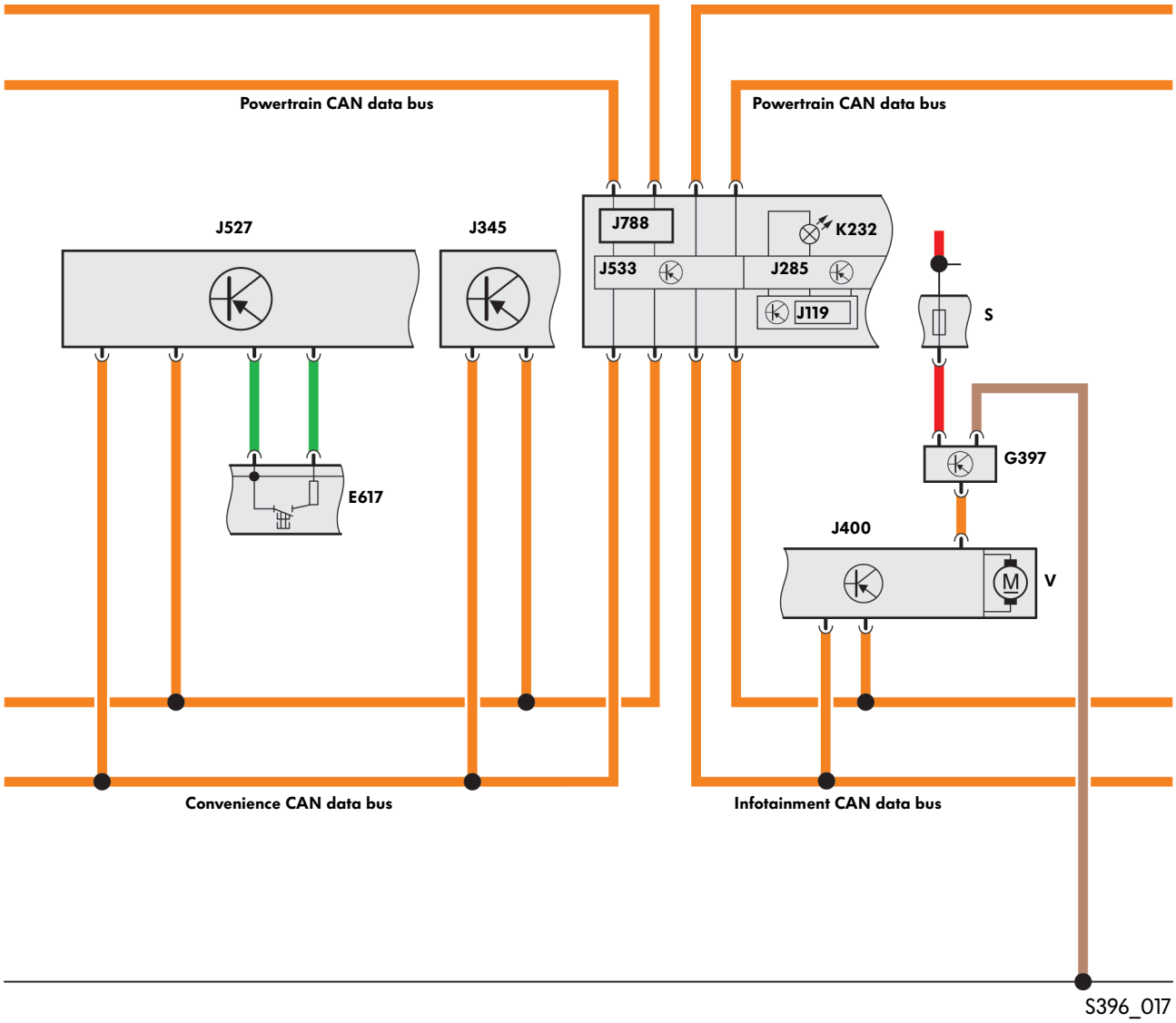
Functional Diagram



S396_016

Legend

J769	Lane change assist control unit
J770	Lane change assist control unit 2
K233	Lane change assist warning lamp in driver side exterior mirror
K234	Lane change assist warning lamp in front passenger side exterior mirror
S	Fuse



Legend

E617	Button for driver assistance systems
G397	Rain and light sensor
J119	Multifunction display
J285	Control unit with display in dash panel insert
J345	Trailer detector control unit
J400	Wiper motor control unit
J527	Steering column electronics control unit
J533	Data bus diagnostic interface
J788	Cut-off relay for CAN powertrain bus
K232	Lane change assist warning lamp
S	Fuse
V	Windscreen wiper motor

Diagnosis

Diagnosis functions

The following diagnosis functions are possible with the VAS diagnosis testers:

- Identification of control units
- Query fault memory
- Delete fault memory
- Read data blocks
- Control element test
- Basic setting
- Customisation
- Code

The individual diagnosis functions are available via the guided fault finding system or the guided functions.

VAS 5051B

S396_018

VAS 5052

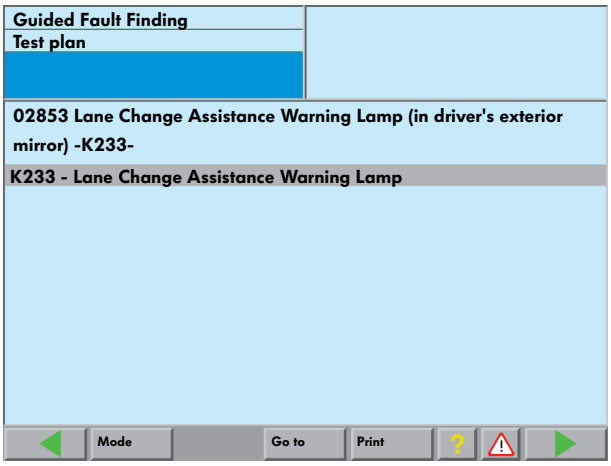
S396_024

VAS 5053

S396_025

Fault finding

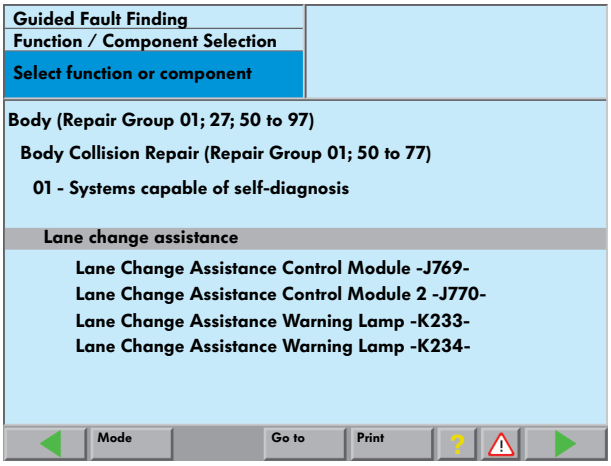
Fault-finding programs are available in the guided fault finding system for use with the lane change assist.



S396_027

Testing individual components

Individual component tests can be called up via the function and component selection in the guided fault finding system.



S396_028

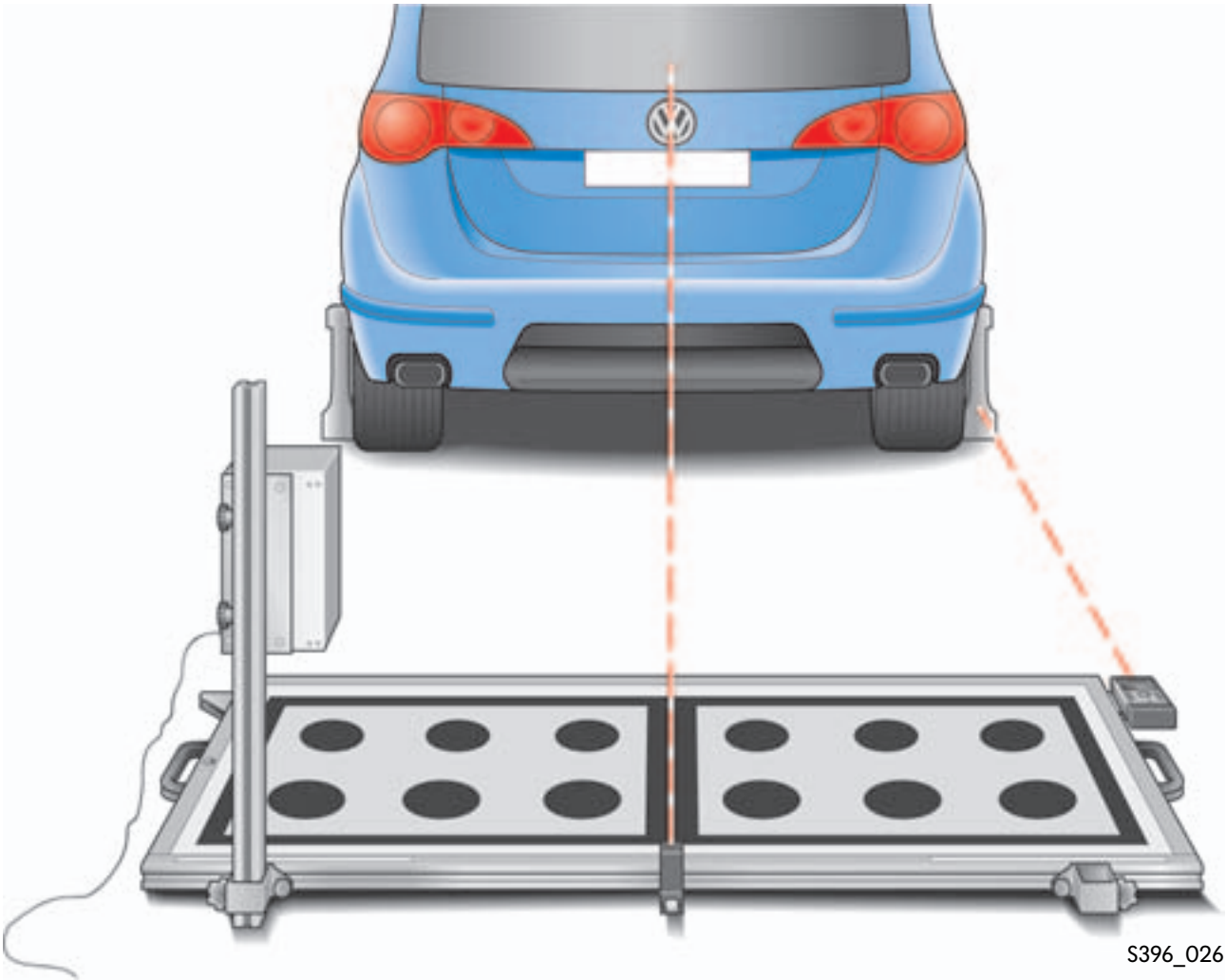
Calibration

To work correctly, the lane change assist needs to be calibrated after the following work on the vehicle:

- One of the two lane change assist control units is replaced
- The location of one of the two lane change assist control units is changed
- Body repairs are performed at the rear
- Removal or repositioning of the rear bumper

The calibration procedure is described in the workshop manual in ElsaWin.

During calibration, radar beams are emitted that are reflected by the Doppler simulator. This simulates a vehicle. Since the Doppler simulator has a defined position, a certain number of radar beams are expected in a set time.
Deviations indicate that the control units are not in the correct position.
These deviations are displayed on the VAS diagnosis tester.



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Required special tools

Calibration unit

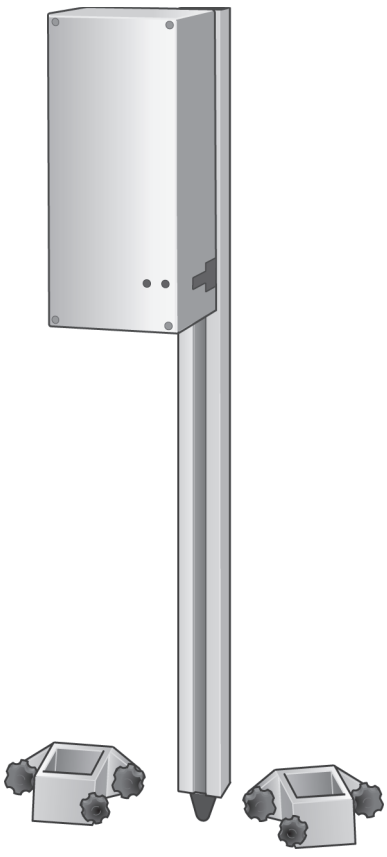
The calibration unit is part of the VAS 6350 tool set and is also required to calibrate the reversing camera.

S396_019

Doppler simulator

The VAS 6350/4 Doppler simulator is equipped with reflector plates. This simulates a driving vehicle. The system is powered with mains voltage.

The package includes:
- a Doppler simulator VAS 6350/4
- a holding post VAS 6350/4-1
- a post mounting, left VAS 6350/4-2
- a post mounting, right VAS 6350/4-3



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The VAS 6350 tool set still includes the wheel centre mountings, the spacing laser and the linear laser.

Test Yourself

1. Which statement about the lane change assist control units is correct?

- ☐ a) The lane change assist control unit J769 is used as a slave control unit.
- ☐ b) The lane change assist control unit 2 J770 is used as a slave control unit.
- ☐ c) The lane change assist control units are identical.
- ☐ d) The lane change assist control unit 2 J770 forms the interface with the convenience CAN data bus.

2. Which statement is correct?

The lane change assist is active at

- ☐ a) speeds above 60 km/h.
- ☐ b) speeds above 50 km/h.
- ☐ c) speeds above 60 km/h if the system has been switched on by the driver with the button for driver assistance systems.
- ☐ d) speeds above 50 km/h if the system has been switched on by the driver with the button for driver assistance systems.

3. When do the lane change assist control units need to be calibrated?

- ☐ a) during every inspection service
- ☐ b) during every regular service
- ☐ c) when the rear bumper is removed
- ☐ d) when one of the two control units is replaced

4. Where are the transmitter and reception aerials for the lane change assist?

- ☐ a) in the exterior mirrors
- ☐ b) in the lane change assist control unit J769 on the left-hand side
- ☐ c) in the lane change assist control unit J770 on the right-hand side
- ☐ d) in the rear parking aid senders (G203 - G206)

5. How is the passive mode of the lane change assist indicated in the Highline dash panel insert?

- ☐ a) The lane change assist warning lamp K232 is green.
- ☐ b) The lane change assist warning lamp K232 is grey.
- ☐ c) The lane change assist warning lamp K232 is yellow.
- ☐ d) The lane change assist warning lamps K233 and K234 are constantly illuminated.

Answers:
1 b; 2 c; 3 c, d; 4 b, c; 5 c

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