Service Training

Self-study Programme 543

The Passat 2015
Driver Assist Systems
Design and Function

Driver assist systems – the best co-drivers

According to statistics, almost one in six accidents involving personal injury in Germany is a rear-end collision with the vehicle in front or with parked vehicles. Also in one in six accidents, the car left its lane without any outside influence. Modern driver assist systems provide all road users with a high level of safety and help prevent up to 50% of serious accidents.
Driver assist systems are almost invisible, but are constantly alert. That makes them the best co-drivers.
Constantly improving surround sensor systems, like radar, video and ultrasound, monitor the area surrounding the vehicle. They support the driver in many driving situations and also increase the driving comfort.
This Self-study Programme will inform you about the driver assist systems available for the Passat 2015 and how they work.

The display screens correspond with the dash panel insert or the MIB operating and display units with German system settings and serve purely as examples.

This Self-study Programme describes 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.

Important note

Contents

Speed-controlling driver assist systems

CCS cruise control system with speed limiter

s543_103

Task

The speed limiter has the task of limiting the speed of the vehicle to a preset maximum speed even when the driver is trying to drive faster by pressing the accelerator. This makes it easier, for example, to observe set speed limits.

System design

The speed limiter requires the cruise control system (CCS) or adaptive cruise control (ACC).

Function

The speed limiter functions by intervening in the engine management system. Automatic braking invention is not carried out by the speed limiter. The preset speed limit can be temporarily suspended via the accelerator pedal only when a kick-down has been detected. Braking and depressing the clutch will not deactivate the system.

Operation

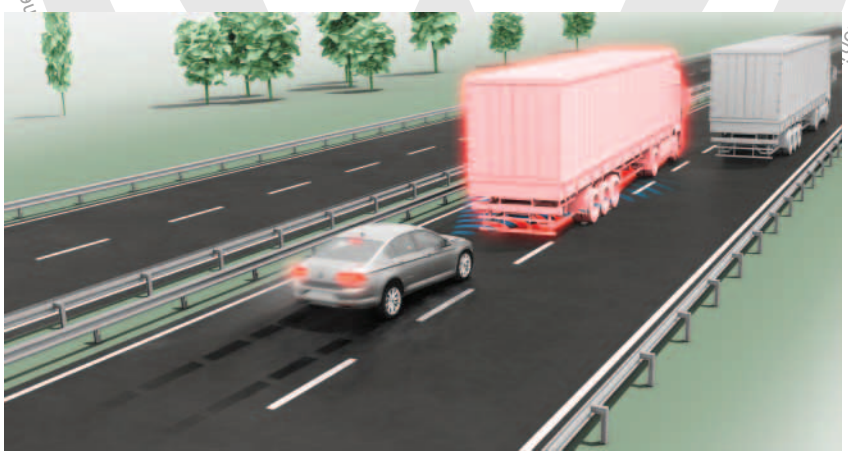
The speed limiter can be switched on and off and operated with the left-hand steering column switch or by using the buttons on the multifunction steering wheel.

You will find further information on the cruise control system with speed limiter in Self-study Programme no. 516 “The Golf 2013 – Driver Assist Systems”.

Area monitoring system – Front Assist

Task

The “Front Assist” area monitoring system monitors the distance from the vehicle in front and recognises situations where the distance is too close. It is a system for warning and automatic braking when there is a risk of a collision. If there is a risk of a rear-end collision, it can help (within the limits of the system) to reduce the severity of the accident or, in an ideal case, prevent the accident.



s543_013

The City Emergency Brake function and pedestrian detection are system components of Front Assist.
Whereas, Front Assist is used at higher speeds to warn drivers if they are too close to the vehicle in front, to warn about possible collisions and to automatically brake the vehicle if necessary, the City Emergency Braking system performs this task in city traffic. Front Assist with the City Emergency Brake function previously only recognised vehicles. For the first time, the enhanced system now also reacts to pedestrians.

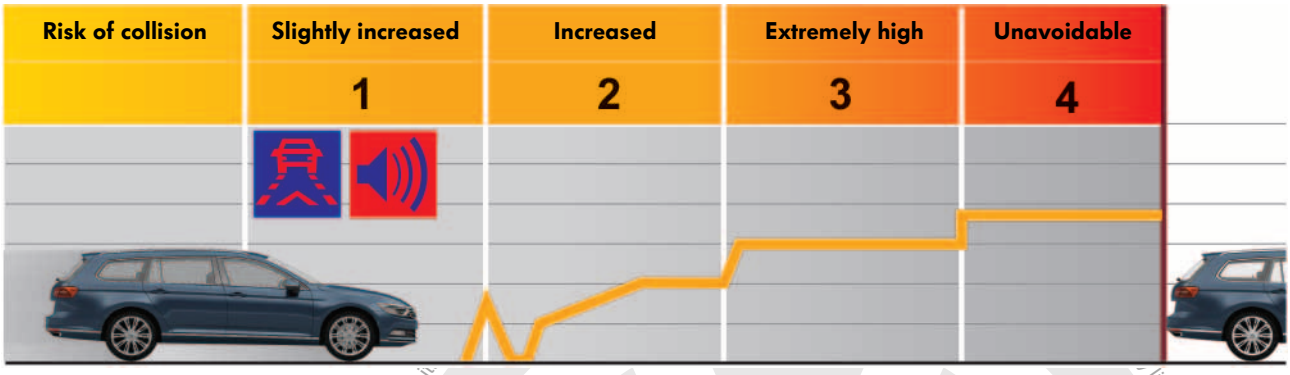
s543_011

Distance-controlling driver assist systems

Function

- **Monitoring:** Front Assist continuously monitors the distance from the traffic in front using the radar sensor fitted at the front of the vehicle in the radiator grille.
- **Warning:** Front Assist supports drivers in critical situations by preparing the brake system and alerting them to necessary action with visual and acoustic warnings and, in a second stage, with a brake jolt.
- **Automatic braking:** if the driver brakes too lightly, Front Assist generates as much braking pressure as necessary to avoid a collision. If the driver does not brake at all, Front Assist will brake the vehicle automatically.
- **Automatic emergency braking:** if the driver does not react to these warnings, emergency braking is automatically initiated.

Time frame of a critical approach (Front Assist)



Conditions
- Stopped and moving vehicles – other traffic
- Speed range 30–250 km/h

1. Preliminary warning
- Visual and acoustic warning
- Prefill of brakes and switching of brake assist system threshold to increased sensitivity

2. Main warning/automatic partial braking
- Brake assist system threshold switched to increased sensitivity
- Brake jolt
- Automatic braking at max. 3.5 m/s^2

3. Advanced automatic partial braking
- Automatic braking at 6.0–8.0 m/s^2

4. Targeted braking
- Full braking to avoid a collision

You will find further information on the prefill and changeover functions of the hydraulic brake assist system in Self-study Programme no. 374 "Traction Control and Assist Systems" on page 81.

City Emergency Braking function

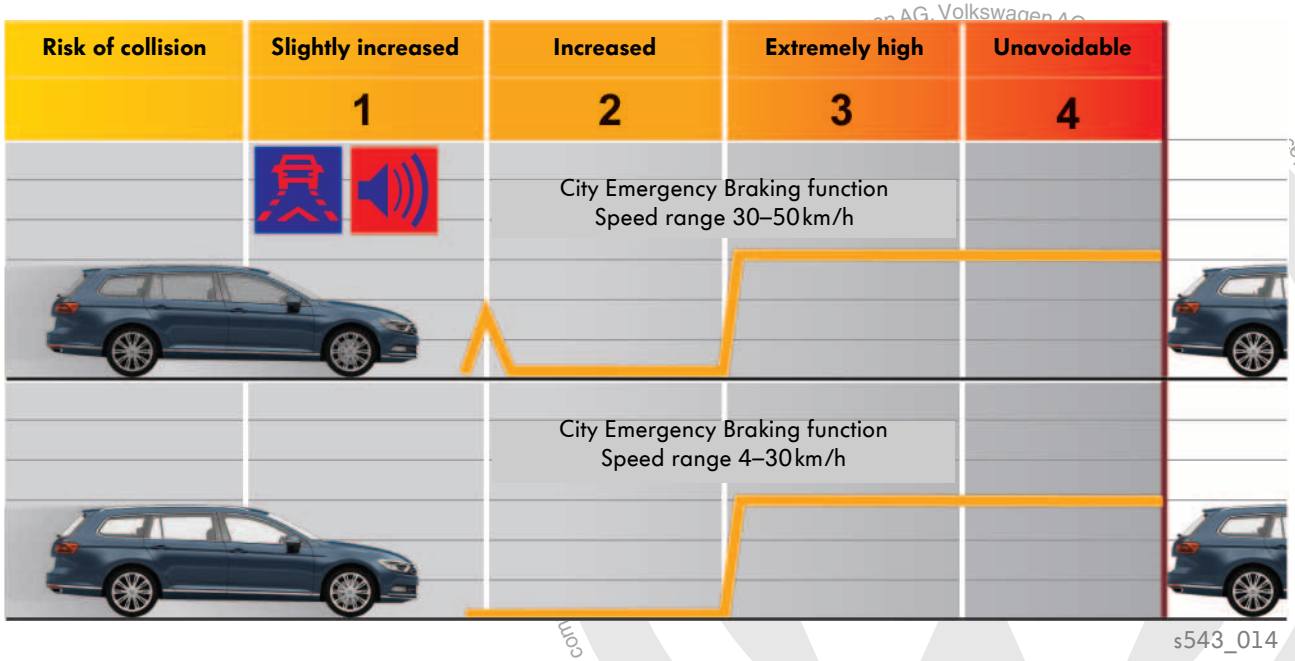
Task

The City Emergency Braking function is an enhancement of the Front Assist system and monitors the area in front of the vehicle at low speeds.

Function

- **Monitoring:** the City Emergency Braking function continuously monitors the distance from the traffic in front.
- **Warning:** the driver is first warned visually and acoustically and then with a brake jolt (at 30–50 km/h).
- **Automatic braking:** if the driver brakes too lightly in critical situations, the system generates as much braking pressure as necessary to avoid a collision. If the driver does not brake at all, Front Assist will brake the vehicle automatically.

Time frame of a critical approach (City Emergency Braking)



Conditions

- Stopped, moving and standing vehicles

1. Preliminary warning

- Visual and acoustic warning (at 30–50 km/h)
- Prefill of brakes and switching of brake assist system threshold to increased sensitivity

2. Main warning

- Brake assist system threshold switched to increased sensitivity
- Brake jolt (only at 30–50 km/h)

3. + 4. Automatic partial braking

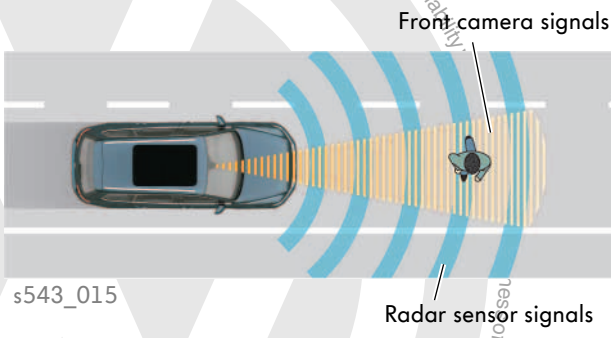
- Automatic braking 8.0 m/s^2

Distance-controlling driver assist systems

Pedestrian detection

Task

The Front Assist function with pedestrian detection combines the information from the radar sensor and the signals from the front camera to detect pedestrians at the side of the road and on the road. If a pedestrian is identified, the system initiates a visual and acoustic warning and, if necessary, a braking action.

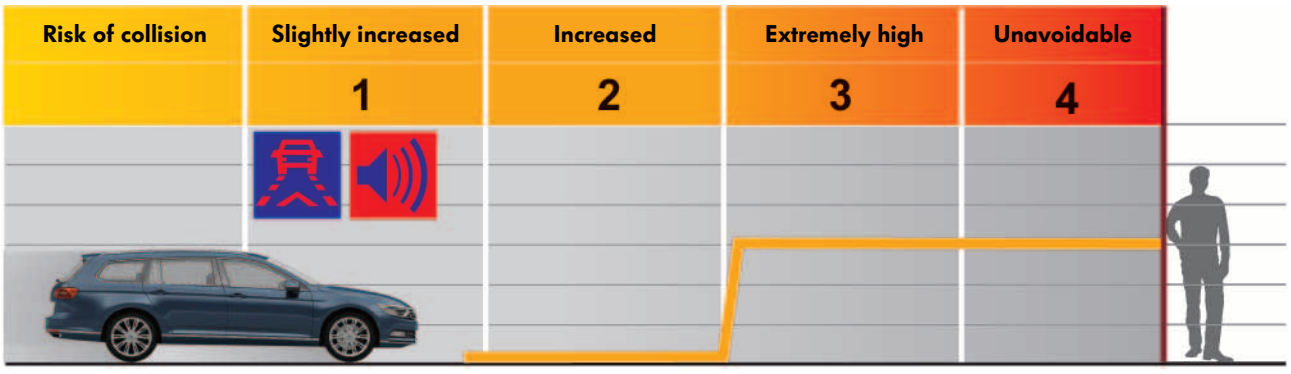


s543_015

Function

- **Monitoring:** the system can detect a possible collision with a pedestrian.
- **Warning:** the warning is triggered by the front camera. The driver receives visual and acoustic warnings.
- **Automatic braking:** if the driver brakes too lightly, the system generates as much braking pressure as necessary to avoid a collision. If the driver does not brake at all, the vehicle is braked automatically.

Time frame of a critical approach (pedestrian detection)



s543_018

Conditions
- Recognition of persons taller than 95 cm
- Speed range 4–65 km/h

1. Preliminary warning
- Visual and acoustic warning
- Prefill of brakes and switching of brake assist system threshold to increased sensitivity

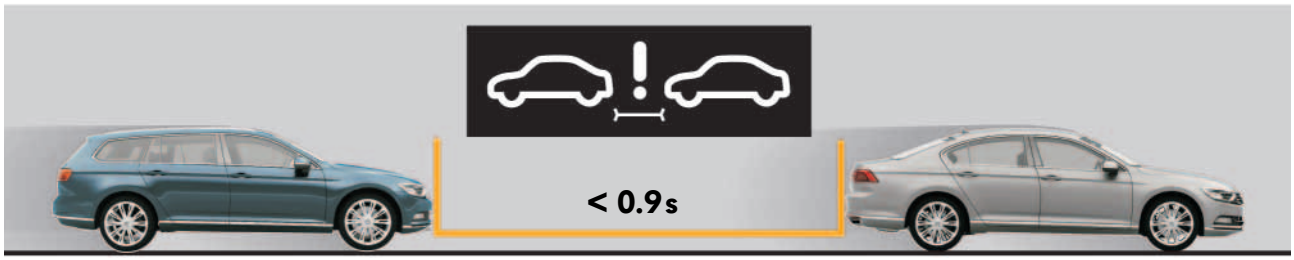
2. Main warning
- Brake assist system threshold switched to increased sensitivity

3. + 4. Automatic partial braking
- Automatic braking 8.0 m/s^2

Distance warning

Task

The distance warning system issues a visual alert to drivers when they are following a vehicle in front at a distance less than 0.9 s. The distance from a vehicle driving in front should be large enough so you can stop behind it without causing a collision if it suddenly brakes.



s543_102

Function

The distance warning system also uses the radar sensor at the front of the car to measure the distance to the vehicle in front. The distance warning software contains tables of values that determine the critical distance in relation to the speed.

If the system identifies a safety risk because you are driving too close to the vehicle in front, you will be warned by a corresponding display.
This preliminary warning can be switched on or off via the MIB operating and display units.

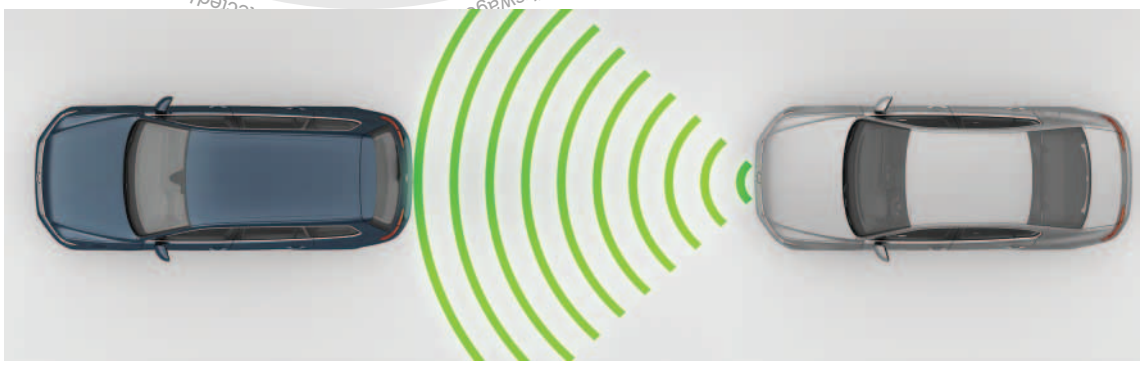
Adaptive cruise control (ACC)

Task

ACC (adaptive cruise control) is a cruise control system. It helps maintain the speed and the distance from the vehicle in front by intervening in the engine and braking system controls.
When combined with a DSG gearbox, the ACC Stop&Go function enables the Passat to come to a stop and drive off again automatically.
Two ACC systems are available for the Passat 2015:

- Adaptive cruise control (ACC) up to 160 km/h
- Adaptive cruise control (ACC) up to 210 km/h

Both systems work with the same components. The only difference is in the speed ranges. The different speeds have been configured by adapting the software.



s543_017

Technical data

- Speed 0–160km/h and 0–210km/h
- Can be activated > 30 km/h
- Range 150 m
- Mid-range radar sensor with a frequency of 77 GHz

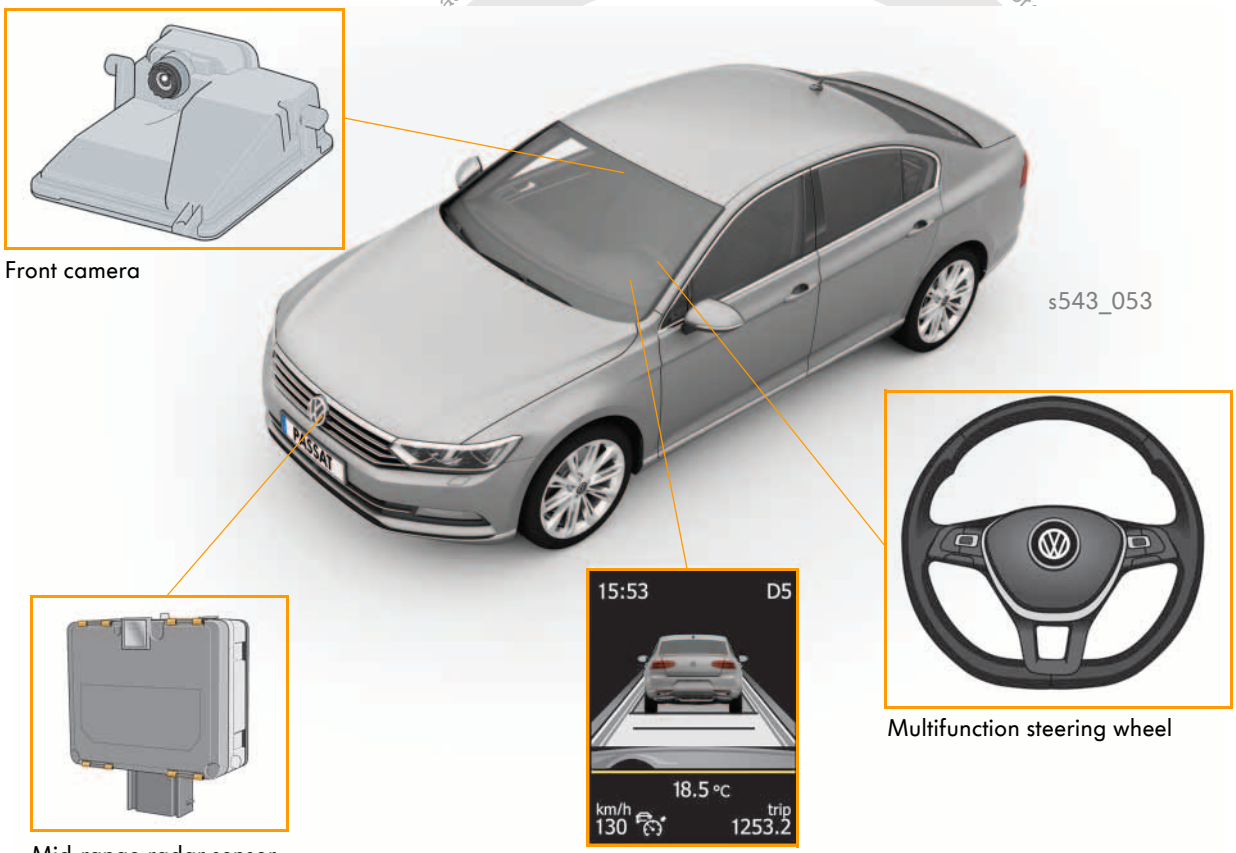
The distance and speed adjustments are made in the same way as in the Golf 2013. You will find further information on the adaptive cruise control system (ACC) in Self-study Programme no. 516 “The Golf 2013 – Driver Assist Systems”.

Design and function

The radar sensor installed at the front of the vehicle allows the distance to the vehicle in front and its speed to be constantly monitored. The ACC controls on the multifunction steering wheel allow you to activate and deactivate the system as well as set the desired speed and the distance to the vehicle in front. In the dash panel insert multifunction display, all relevant information on the system, like desired speed and warning messages are displayed.

You can set the ACC driving mode (Normal, Eco, Sport) and the distance to the vehicle in front on the infotainment system once the vehicle has been started. The adaptive cruise control unit J428 sends the acceleration target value that is required to maintain the set speed and the distance from the vehicle in front to the engine control unit. The engine control unit takes charge of coordinating the acceleration and braking.

If the car is equipped with a front camera, the camera object data are checked against the objects detected and mapped by the radar in the adaptive cruise control unit J428.



Front camera

Mid-range radar sensor, installed at the front behind the VW badge

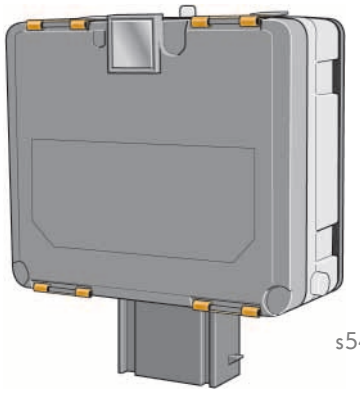
Multifunction display in the dash panel insert

Multifunction steering wheel

Distance-controlling driver assist systems

Mid-range radar sensor

The enhanced radar sensor in the adaptive cruise control unit J428 has been further optimised in terms of aerial performance and the evaluation of input and output signals. Obstructions are now detected more effectively and with greater accuracy.
The design of the sensor is identical to the radar sensor installed in the Golf.



s543_036

If the radar sensor is replaced or has a malfunction, it will need to be recalibrated. You will find information on the procedure in ElsaPro.

You will find further information on the adaptive cruise control unit J428 in Self-study Programme no. 516 "The Golf 2013 – Driver Assist Systems".

Inside Overtaking Prevention System

For the first time, the adaptive cruise control system (ACC) in the Passat 2015 features an Inside Overtaking Prevention System.
If a vehicle is travelling at a lower speed on the outside lane, it will be indicated on the multifunction display.
Your vehicle will be braked gently to avoid "inside overtaking". The Inside Overtaking Prevention System is active at speeds above 80 km/h and can be overridden by the driver at any time.

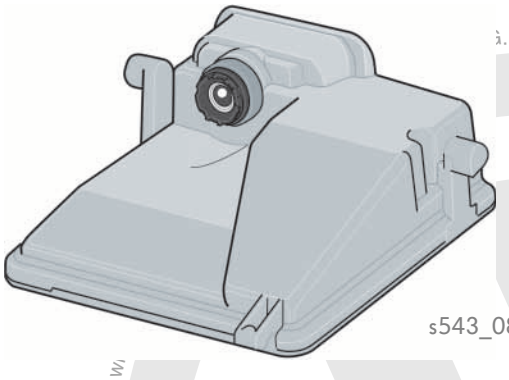
s543_059

Front camera

Fitting location

The front camera is installed on the inside of the windscreen above the rear view mirror.

Task



The camera R242 supplies image information to the following driver assist systems:

- Lane departure warning (Lane Assist)
  - Emergency Assist
  - Traffic Jam Assist
- Dynamic Road Sign Display
- Adaptive cruise control (ACC) with Front Assist
- Pedestrian detection
- Dynamic Light Assist
- Main beam assist MBA

Function

The front camera supplies a grey scale image with an additional red filter to improve the contrast. A special exposure control system also provides sharp pictures of the area in front of the vehicle – even when the vehicle is moving.
The object recognition system that uses image processing and an object list runs completely internally in the front camera for driver assist systems R242.
The position data for detected objects are captured in the camera and then transferred to the adaptive cruise control unit J428. The adaptive cruise control unit compares (merges) the camera object data with the data of objects detected and mapped using radar.

The front camera can detect a variety of objects, such as lane markers, contrasting lane boundaries, road signs, other vehicles and street lighting. The same applies to road users, for example, cyclists and pedestrians. At night, only road users with lights or reflective surfaces are recognised.

The front camera has its own heating unit. The windscreen heater for front sensor Z113 prevents the part of the windscreen directly in front of the camera from misting up or icing over.

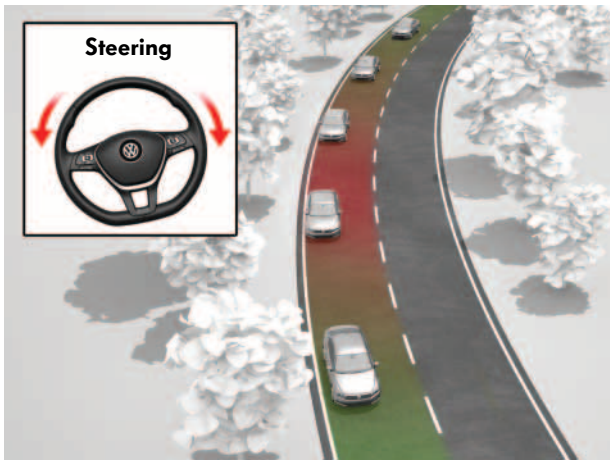
You will find further information on the front camera in Self-study Programme no. 417 “The Golf 2013 – Electrical System”.

Lane Assist — lane departure warning system

Task

The lane departure warning system helps the vehicle to stay in its lane in many different traffic situations by making corrections to the steering.

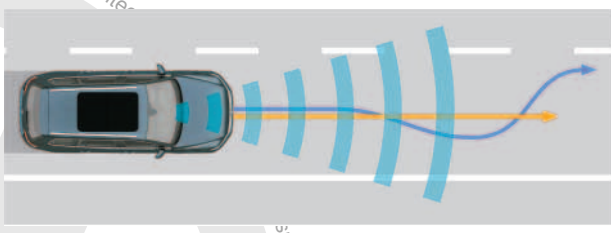
The driver is not, of course, relieved of his responsibility to pay attention to driving by the Lane Assist system.



s543_023

Function

The path of the lane markings is recognised by the front camera. If the vehicle appears to be leaving the lane without the driver making an active steering movement, then the system will automatically counteract this. The electromechanical power steering countersteers continuously and smoothly, but can be overridden by the driver at any time.



s543_021

Lane Guidance

In “adaptive lane guidance” mode, the lane departure warning system will assist not only in the event of imminent departure from the lane. If the lane is defined by two markings to the left and right of the vehicle, the function will provide constant assistance during driving. The function adapts to the ideal position within the lane in which you are travelling.

You will find further information on the lane departure warning system in Self-study Programmes no. 418 “The Lane Departure Warning System” and no. 516 “The Golf 2013 – Driver Assist Systems”.

Emergency Assist

Task

Emergency Assist is an enhancement of the Lane Assist system. In medical emergencies, i.e. if the driver becomes unable to drive, this system takes over

- control of the vehicle,
- warns other roads users and
- brakes the vehicle to a stop.

s543_055

s543_057

Function

If no driver steering activity is detected for a certain period of time, the driver is requested to resume control of the steering by means of visual warnings, acoustic warnings and brake jolts. If there is still no reaction from the driver, the system assumes there is an emergency situation.

The lane departure warning system (Lane Assist) remains active and keeps the vehicle in the lane.
In order to avoid a collision with the traffic in front, the adaptive cruise control also needs to be activated.

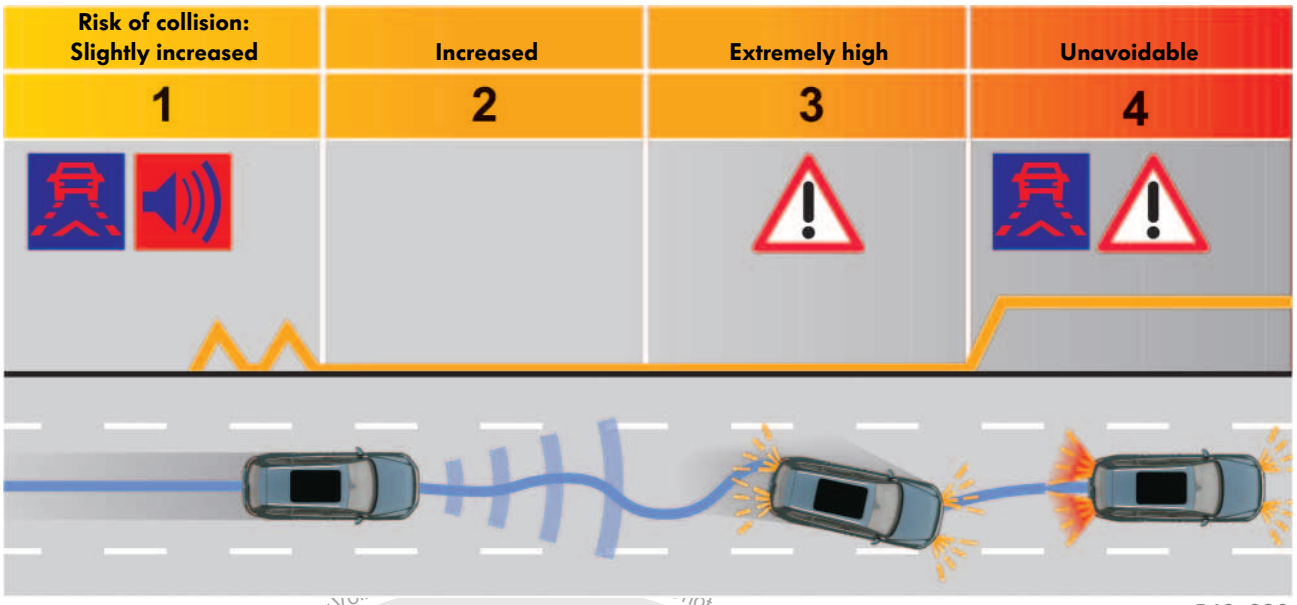
The hazard warning lights are automatically switched on at approximately 80 km/h and the vehicle weaves in the lane to alert the other traffic.

In addition to this warning, the vehicle is braked to a stop.

Emergency Assist is available only in vehicles that are equipped with the ACC Stop&Go function and a DSG gearbox.

Front camera-supported driver assist systems

Time frame for Emergency Assist



s543_020

1. Driver warning
- Acoustic and visual warning
- Brake jolts

2. Safety
- Vehicle kept in lane by activated Lane Assist
- Distance from traffic in front maintained by activated adaptive cruise control

3. Warning of other road users
- Hazard warning lights at approx. 80 km/h
- Vehicle weaves in the lane

4. Targeted braking
- The vehicle is brought to a standstill within the lane in which it is travelling.

Traffic Jam Assist

Task

s543_035

When equipped with Traffic Jam Assist, the car can react to the vehicle in front in congestion. The car brakes, accelerates and steers semi-automatically and thus increases driving comfort in stop-and-go traffic.

Requirements

- Lane Assist is switched on.
- Adaptive lane guidance is activated.
- Two markings to the left and right of the vehicle must be detected.
- Adaptive cruise control (ACC) is active.

Function

Traffic Jam Assist combines the Lane Assist and ACC Stop&Go functions. It is an extension of Lane Assist with activated “adaptive lane guidance” and provides the driver with steering assistance at speeds below 60 km/h.

When combined with the ACC system, Traffic Jam Assist will help the driver by keeping a constant distance from the vehicle in front in particular in “stop-and-go” and slow-moving traffic. This function can brake the vehicle until it is stationary and, after a brief stop, pull away again. The vehicle is constantly kept in its lane during this process.

Traffic Jam Assist is subject to the same system limitations as Lane Assist and adaptive cruise control (ACC).

Traffic Jam Assist is designed for motorways and trunk roads. Lane Assist takes over “adaptive lane guidance” above the speed threshold of 65 km/h.

Dynamic Road Sign Display (generation 2)

Task

This traffic sign recognition system informs the driver about the traffic signs that currently apply. Up to now, it recognised and displayed traffic signs like speed limits, overtaking restrictions and several additional signs.
The second generation of the traffic sign recognition system can now recognise the following road signs and be used to check their plausibility:

- Town signs
- Start and end of a motorway
- Stop signs
- No entry signs
- Give way signs
- End of all restrictions
- Play streets

These signs are not displayed, however.

s543_105

Function

The system detects road signs with the front camera. They are displayed on the multifunction display and/ or on the MIB operating and display unit.
For optimum display, the traffic sign recognition system processes three different pieces of information: “recognised road signs”, “information from the navigation system” and “current vehicle data”.

The road signs recognised by the camera are assessed according to plausibility, relevance and validity. At the same time, the system analyses the vehicle data. Finally it assesses the situation and displays the currently valid road signs, which have been recognised within the limits of the system, to the driver.

In some cases, the system will only recognise road signs to a limited extent if they happen to be covered or soiled.

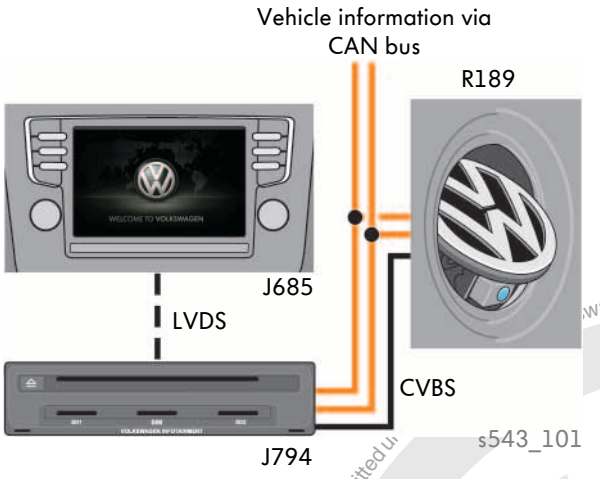
Dynamic Road Sign Display 2.0 issues an additional warning message when you exceed the recognised speed limit. The warning is given in the dash panel insert. The speed warning can be switched on and off on the infotainment system screen. It can also be selected in steps of 5 up to 15 km/h.

Reversing camera

Two versions of the reversing camera system are available for the Passat:

- the compact reversing camera and
- the compact plus reversing camera with an extension of the function for the trailer manoeuvring system (Trailer Assist).

The hardware for both versions is installed in the pivoted badge at the rear. The sole difference is in the software and thus in the part number. The software for Trailer Assist is consequently more complex.



Key

J685	Display unit for front information display and operating unit control unit
J794	Control unit 1 for information electronics
R189	Reversing camera
LVDS	Low-voltage differential signalling
CVBS	Colour video blanking signal
	CAN bus wire

The control unit electronics have been integrated into the camera housing. This allows the driver to see a real and undistorted picture of the situation. In addition, various static and dynamic helper lines are superimposed over the real image depending on the activated view function. As you can see in the schematic diagram, the camera is connected to the vehicle network via the CAN data bus. The camera control unit exchanges data with relevant control units, such as the central MIB control unit J794 (control unit 1 for information electronics) and the steering angle sensor, via the network.

The image information with the calculated helper lines is transferred from R189 via a video cable (CVBS) to J794. J794, then, displays it via a fast LVDS connection to J685.

If the reversing camera is repaired or renewed, it will need to be calibrated. Please refer to the current workshop manual for information on this.

You will find further information on the reversing camera in Self-study Programme no. 545 “The Passat 2015 – Electrical System”.

Overhead view cameras – Area View

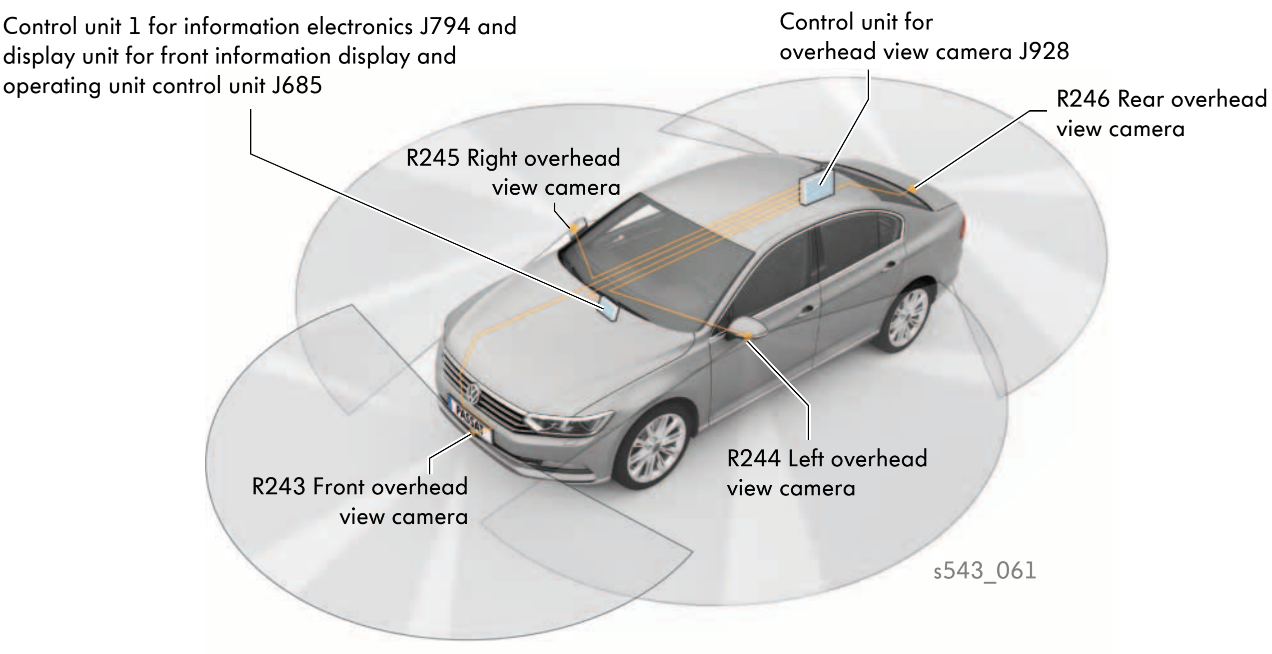
Task

Area View is a camera-based surround monitoring system that allows the driver to see the complete area around the vehicle. It offers drivers a variety of views and configurations that can be specifically selected according to the traffic situation and the information they require.
Area View 2.0 is an enhancement of the system with:

- Additional functions
- Obstacle recognition
- Detailed depiction of the vehicle's surroundings by higher resolution cameras (megapixel HDR)
- Full-screen and split-screen views
- Optimised OPS display
- New 3D bird's eye views
- Calibration during production and in customer service has been simplified considerably

Design of overhead view camera system

An overhead view of the vehicle's surroundings is created by using four cameras.
The front overhead view camera is above the number plate, the rear overhead view camera is installed in the VW pivoting badge on the rear lid. The right and left overhead view cameras are located on the underside of the exterior mirrors. Each camera has an aperture angle of 190 degrees allowing Area View to cover the whole area around the vehicle including "blind spots". The picture is then shown on the MIB operating and display unit. Since the camera viewing areas overlap, a more precise and realistic optical transition between the viewing areas of neighbouring cameras can be achieved.



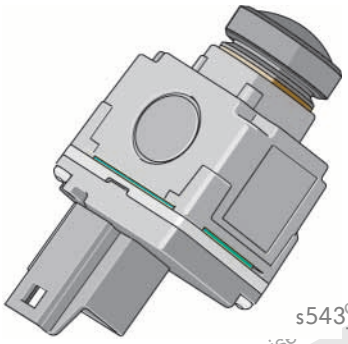
Technical data

Overhead view camera

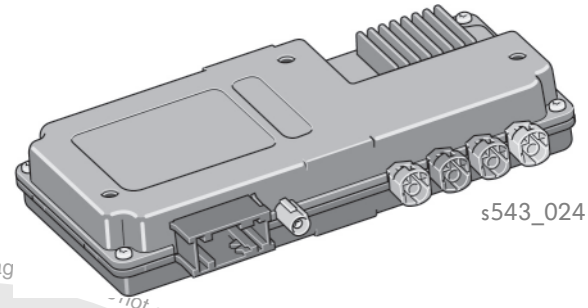
- Manufacturer: Valeo
- High dynamic range (HDR) colour camera
- 190° horizontal aperture angle
- Weight approx. 32g
- Current consumption of the camera approx. 120mA

Control unit for overhead view camera J928

- Manufacturer: Valeo
- 4 cameras coupled via Ethernet
- Weight approx. 427g
- Current consumption approx. 900mA



s543_026



s543_024

Function

Area View works at speeds from 0 to 15 km/h. The system is activated and deactivated via the parking aid button E266.

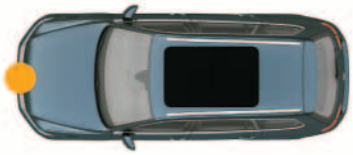
The cameras monitor the vehicle's surroundings upon activation. The images taken are rectified by the control unit for overhead view camera because the raw images from the wide-angle cameras are greatly distorted. The viewing angle is then adjusted to the desired view – also by means of image processing. Finally, depending on the selected view, helper lines are superimposed over this corrected image to display distances and predict the path of the vehicle. This processed picture is then shown on the MIB operating and display unit screen.

Static and dynamic helper lines are added depending on which view is selected.
These helper lines allow you to judge distances better and indicate the possible vehicle path in relation to the steering angle.

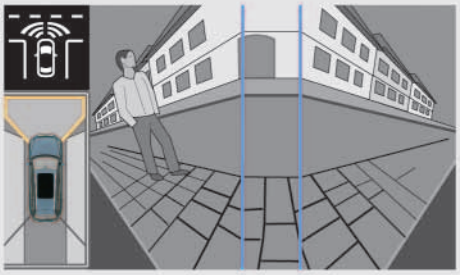
Rear camera-supported driver assist systems

Views on display

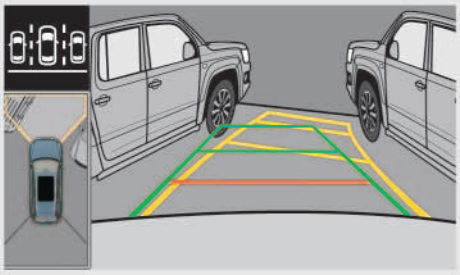
Front camera



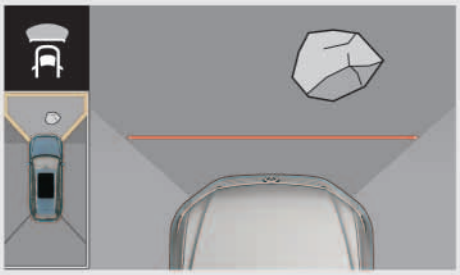
Cross traffic



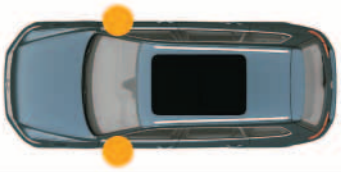
Parking space



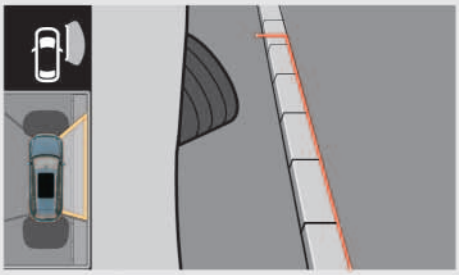
Area in front



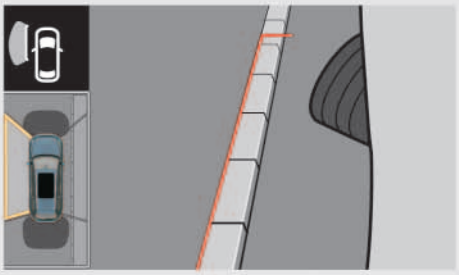
Side camera



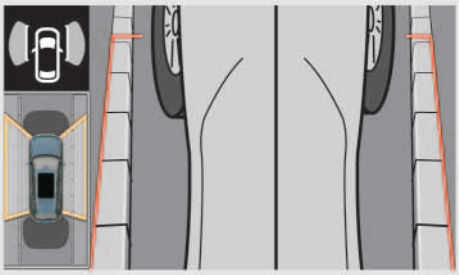
Right



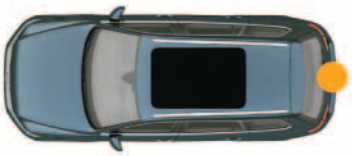
Left



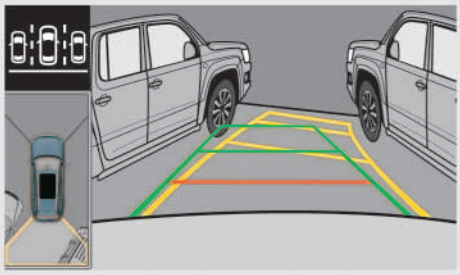
Right and left



Rear camera

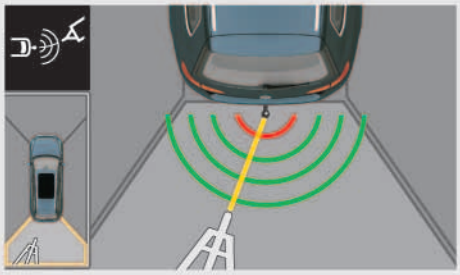


Parking space

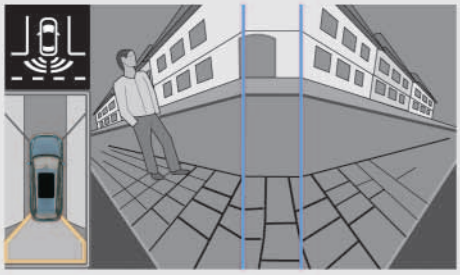


Parallel parking

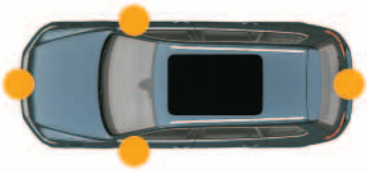
Trailer support



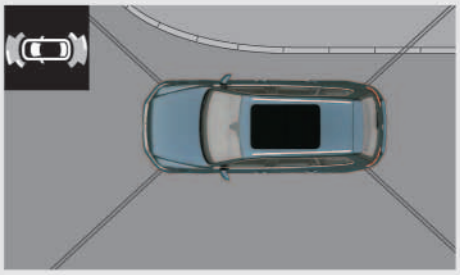
Cross traffic



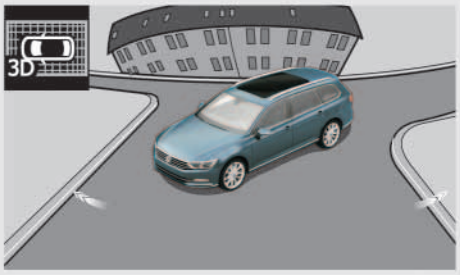
All cameras



Bird’s eye view



3D bird’s eye view



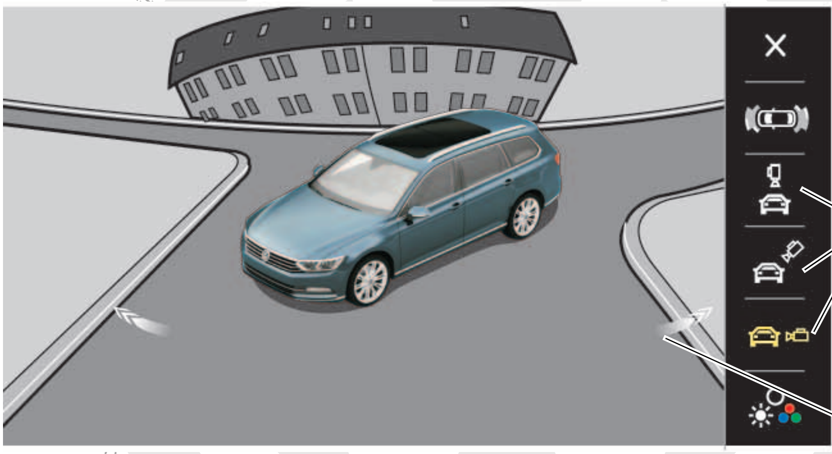
s543_022

Rear camera-supported driver assist systems

3D bird's eye view

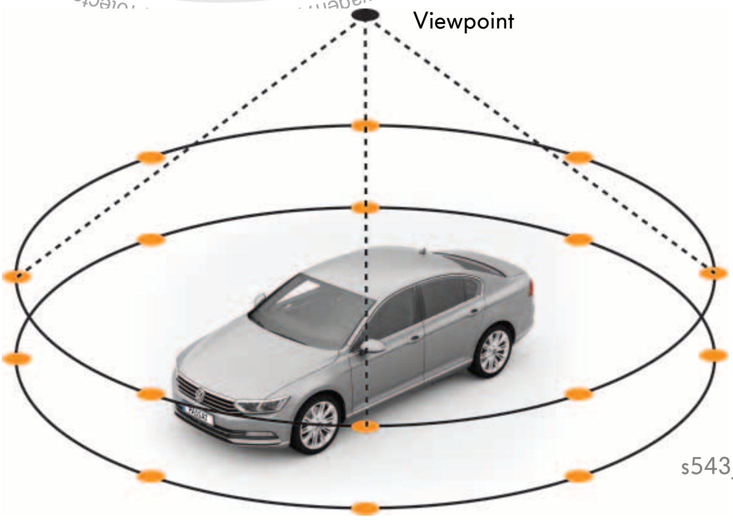
The new 3D bird's eye view allows the four camera perspectives to be projected onto a hemisphere. This creates a 360° view all around the vehicle from which numerous detailed views can be produced.

Furthermore a view into the hemisphere is possible from a number of virtual camera positions (viewpoints).



s543_037

17 different viewpoints are possible. Eight viewpoints are arranged around the vehicle at intervals of 45° on two concentric circles and one further viewpoint is directly above the vehicle.



s543_041

The 3D bird's eye view is only possible in conjunction with the Discover Pro from the second generation modular infotainment matrix (MIB).

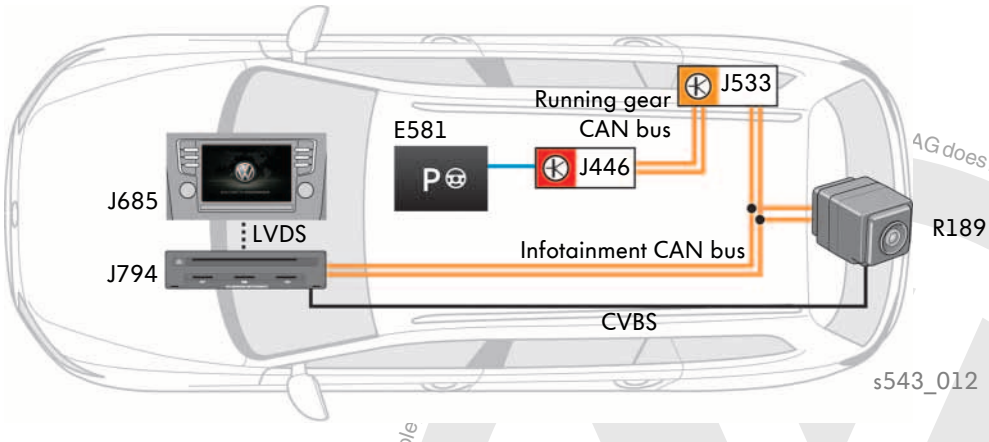
Trailer manoeuvring system - Trailer Assist

Task

s543_045

The Trailer Assist system simplifies reversing manoeuvres with a trailer. The system takes over the steering once you enter the direction and the turning angle. The vehicle and the trailer are steered precisely while the driver only has to operate the accelerator and brakes.

System design



s543_012

Key

E581	Park assist steering button	LVDS	Low-voltage differential signalling
J685	Display unit for front information display and operating unit control unit	CVBS	Colour video blanking signal
J794	Control unit 1 for information electronics		CAN bus wire
R189	Reversing camera		Discrete wire

Trailer Assist will react with automatic braking intervention if the speed rises above 7 km/h. If the driver takes hold of the steering wheel or presses the park assist steering button during the manoeuvre, the system will be deactivated.

The Trailer Assist system controls the vehicle by using a software algorithm that has been integrated into the Park Assist 3.0 control unit.

Rear camera-supported driver assist systems

Function

You first need to select reverse gear to manoeuvre a trailer backwards. Press the park assist steering button to activate the “Trailer Assist” system.

s543_047

The current and the possible driving angles are displayed in the dash panel insert. This is achieved on the basis of image processing algorithms using the data from the reversing camera, which monitors and evaluates the trailer turning angle.
The steering angle is calculated by optically measuring the trailer turning angle.
The system automatically learns the distance between the ball coupling on the towing bracket and the trailer body.
The maximum trailer turning angle to both the left and right is 45°.

s543_049

Using the mirror adjustment switch, which in this case works like a joystick, you can set the direction of travel of the car and trailer to a continuously variable angle.

s543_051

The trailer manoeuvring system steers the trailer automatically in the set direction. The driver operates the accelerator and brake pedals. The system steers the trailer by automatically operating the electromechanical power steering. Corrections can be made at any time using the mirror adjustment switch.

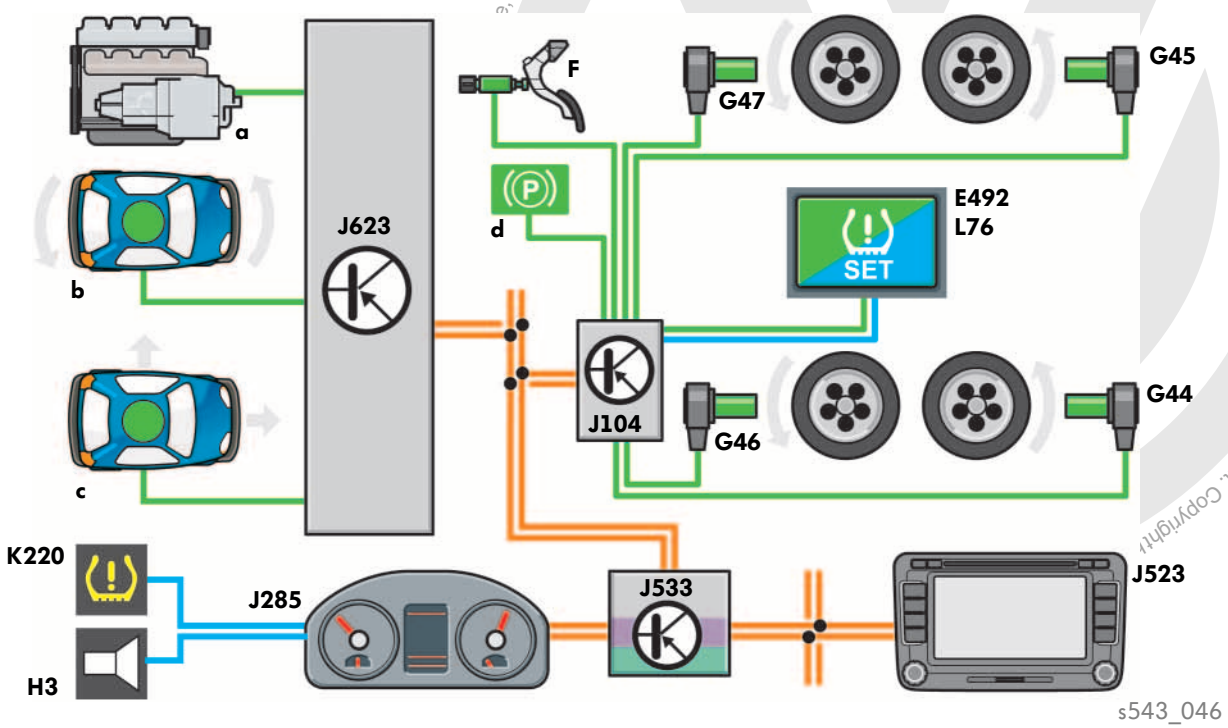
s543_065

Tyre Pressure Loss Indicator (TPLI Plus)

Task

The Tyre Pressure Loss Indicator (TPLI Plus) is a tyre pressure monitoring system that measures indirectly. It is an enhanced version of the TPLI system. Until now, the system recognised pressure losses by means of the rolling circumference of the tyre at one wheel position. Like the TPLI system, the Tyre Pressure Loss Indicator (TPLI Plus) is a software module in the ABS control unit J104. It can now also detect slow to creeping tyre pressure losses in addition to severe and sudden pressure losses. If the tyre pressure changes at one or more wheels, visual warnings are issued via the Tyre Pressure Loss Indicator warning lamp K220 in the dash panel insert and on the multifunction display in the dash panel insert. A gong also sounds as an acoustic warning.

System overview



Key

E492 Tyre Pressure Loss Indicator button
F Brake light switch
G44 - G47 Speed sensor
H3 Buzzer and gong
K220 Tyre Pressure Loss Indicator warning lamp
J104 ABS control unit
J285 Control unit in dash panel insert
J523 Control unit for front display and information control panel
J533 Data bus diagnosis interface
J623 Engine control unit
L76 Button illumination bulb
a Engine load/engine torque signal
b Yaw rate signal
c Lateral and longitudinal acceleration signal
d Handbrake/electromechanical parking brake signal

Tyre monitoring systems

Operation

TPLI Plus is operated using the Tyre Pressure Loss Indicator button E492, the steering column switch, the multifunction steering wheel or a virtual Set button in the Car menu of the MIB operating and display unit.

s543_067

Function

In its basic function, TPLI Plus evaluates the speed signals from the ABS wheel sensors (speed sensors) and compares them with reference data. Using the speed information, TPLI Plus can determine the vibration behaviour of the tyres by using additional signals like, for example, the engine torque, the longitudinal acceleration and the yaw rate.
When any tyre rolls, it will vibrate with a characteristic vibration pattern consisting of natural frequency and amplitude, which both influence the speed signal. If the tyre pressure changes, the vibration pattern will also change. By comparing the vibration patterns of the individual tyres (spectral analysis), TPLI Plus can detect a slight tyre pressure loss in the tyres. This allows creeping tyre pressure losses to be detected. They can occur on any tyre and cannot be detected by the conventional TPLI system.

Comparison

TPLI Plus differs from TPLI as follows:

- Spectral analysis
  - several wheel positions shown simultaneously
  - fast detection of pressure losses and diffusion losses
- Individual wheel position recognition
  (any combination of individual wheels with pressure loss can be evaluated)
- Pressure loss detection during the adapting phase (calibration)
- Snow chain detection (TPLI Plus is not active if snow chains are detected)

You will find further information on the TPLI Plus Tyre Pressure Loss Indicator in Self-study Programme no. 541 “Tyre Pressure Monitoring Systems 2014”.

Tyre Pressure Monitoring System (TPMS)

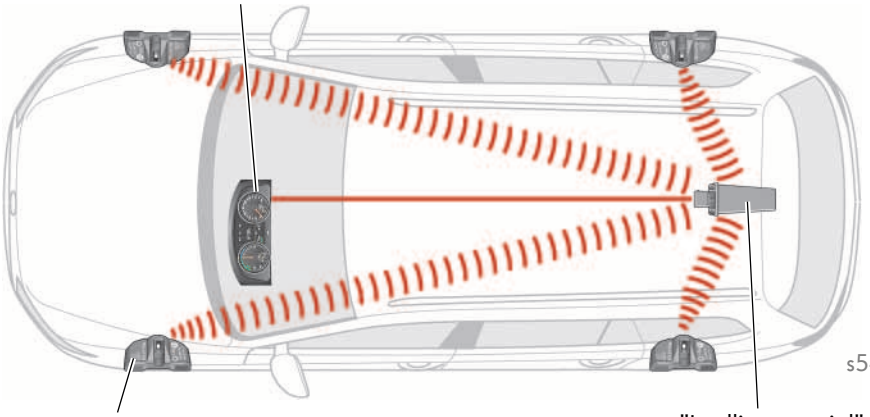
Task

s543_069

The Tyre Pressure Monitoring System can detect slight, severe and sudden pressure losses at each tyre (incl. a spare wheel with tyre pressure sensor). It is a direct measuring system, i.e. the tyre pressure, the internal tyre temperature and the tyre acceleration are measured directly in the tyre by the tyre pressure sensor.

A change in tyre pressure is indicated by the Tyre Pressure Loss Indicator warning lamp K220 in the dash panel insert as well as by warning messages and actual tyre pressures in the dash panel insert or on the MIB operating and display units.

System design



Tyre monitoring systems

Function

The tyre pressure sensors measure the pressure and the temperature of the air in the tyre as well as the acceleration of the tyre. They transmit this information in the form of an HF telegram via a central reception aerial to the control unit with the TPMS software.
The pressure and temperature values are converted into an actual pressure value for each tyre by the software and compared with the set target pressure value. If the values differ from each other, a warning message will be issued.
The transmitted signal strength is used to assign the signals from the tyre pressure sensors to the tyre positions.

Comparison

The TPMS differs from the TPLI Plus as follows:

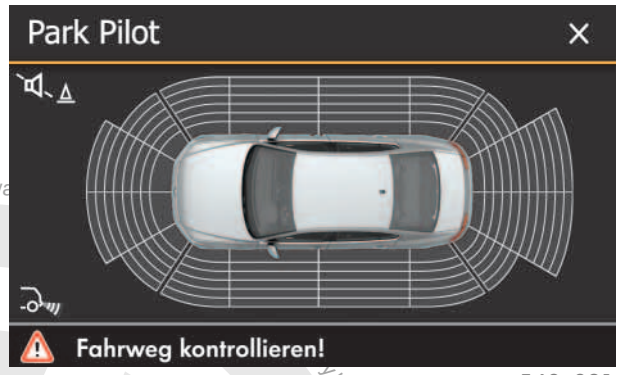
- Direct pressure measurement in the tyres
- Automatic adapting of new sensors
- Automatic position assignment (autolocation) with position-associated pressure display in MIB
- Sensors transmit data:
  - at speeds > 20 km/h
  - for pressure losses > 0.2 bar/min
- Intelligent operation
  - load level only if required
  - tyre dimensions only if required
- No temperature compensation

You will find further information on the TPMS Tyre Pressure Monitoring System in Self-study Programme no. 541 “Tyre Pressure Monitoring Systems 2014”.

Optical parking system (OPS)

Task

The optical parking system (OPS), which is a software extension for ParkPilot, supports the driver not only acoustically, but also visually. Like the Golf 2013, the Passat 2015 also has the 360° OPS.



s543_091

Function

The 360° OPS is able to monitor and display the sides of the vehicle in addition to the front and rear areas. The system is activated and deactivated:

- using the parking aid button E266 or
- by engaging reverse gear or
- when the vehicle rolls backwards or
- when the system detects an obstacle in the front area at speeds below 10km/h, for example, when driving slowly into a garage.

The display of the side areas is not exclusively based on the directly measured values from the outer PDC sensors as their scanning areas do not include the vehicle sides. In addition to the signals about potential obstacles at the side that are detected and stored when you drive forwards or reverse, the signals from the steering angle sensor system (steering angle) and the ABS system (distance) are factored into the calculations.

You will find further information on the OPS optical parking system in Self-study Programme no. 517 “The Golf 2013”.

Park assist steering – Park Assist (3.0)

Task

Park Assist 3.0 sees the functions of Park Assist 2.0 expanded further. The system is now also capable of parking forwards in perpendicular parking spaces. It automatically detects the appropriate parking scenario (parallel or perpendicular parking).

The system takes over the steering during the parking manoeuvre (as before).
The driver remains responsible for operating the accelerator, brake and clutch.

Operation

The Park Assist system is activated via the park assist steering button E581. The warning light for park assist steering K241 in the button is illuminated when the function is active.

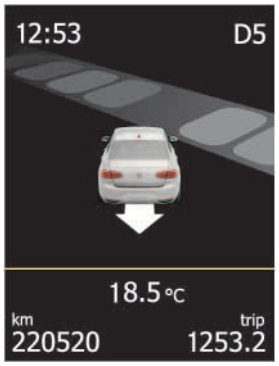
The driver may select alternative parking scenarios using the park assist steering button. The alternatives are shown on the dash panel insert display.

Park assist steering button E581

s543_093

Due to the numerous types of parking space in which the system can now park, the displays on the dash panel insert display have been optimised.

Forwards perpendicular parking



s543_095

Reverse perpendicular parking

s543_096

Parallel parking

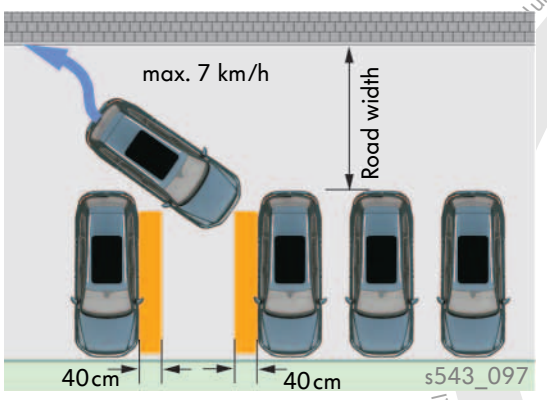
s543_098

Parking space measurement

Before the driver can be provided with steering assistance by the Park Assist system, a suitable parking space needs to be measured and the position of the vehicle in relation to the parking space needs to be established. The ultrasound sensors have been optimised and can now detect and select parking spaces with greater accuracy. The PDC sensors have a range of 2 m and the outer park assist sensors have a range of 4 m.

Parking forwards in perpendicular parking spaces without driving past beforehand

The parking space is recognised when you edge the front of the vehicle into the parking space. After activating the Park Assist system, the parking procedure can be performed with several manoeuvres (up to 10 manoeuvres).

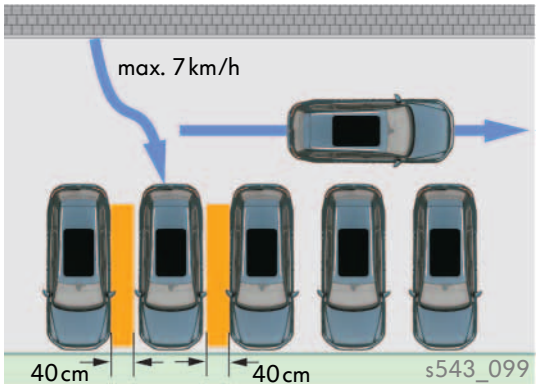


Requirements:

- The width of the parking space needs to be at least the width of your vehicle plus 80 cm.
- The road width needs to be at least the length of your vehicle plus 1 m.
- The maximum parking manoeuvre speed is 7 km/h.

Parking forwards in perpendicular parking spaces after driving past

The parking space is detected when you drive past. After activating the Park Assist system, the parking procedure can be performed with several manoeuvres.



Requirements:

- The width of the parking space needs to be at least the width of your vehicle plus 80 cm.
- You can drive past the parking space at a speed of up to 20 km/h.
- The maximum parking manoeuvre speed is 7 km/h.

Brake support

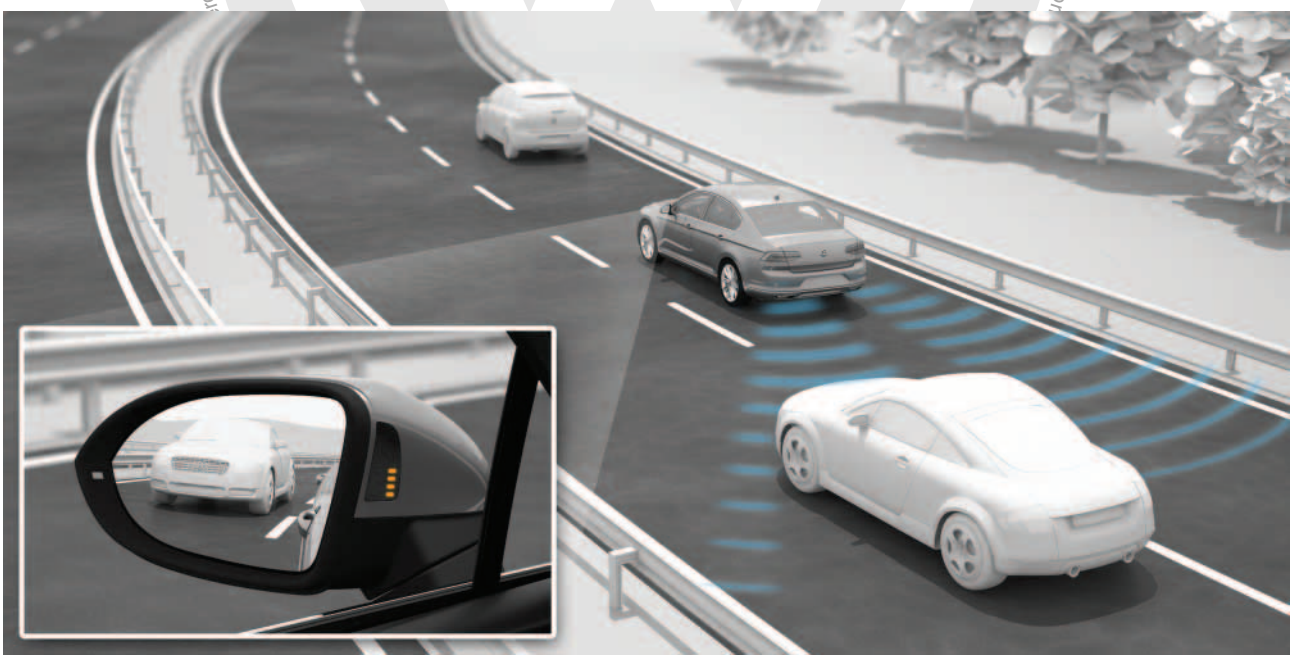
The brake support system has two functions:

- **Braking intervention if the parking speed is exceeded**
  A brake jolt is given as a warning when the permitted parking speed of 7 km/h is exceeded. This occurs once per manoeuvre. Exceeding the speed a second time will lead to the Park Assist system being deactivated.
- **Braking to a stop**
  If a risk of collision with an obstacle is recognised, the vehicle will be braked to a stop. The Park Assist system is then deactivated.

Lane change assist – Side Assist

Task

The “Side Assist” lane change assist system helps drivers when overtaking or changing lane by warning them about vehicles that are approaching from behind within a detectable range. It therefore helps prevent accidents during lane change manoeuvres on motorways and dual carriageways.



s543_085

Technical data

- Two radar sensors at the rear of the vehicle
- 77 GHz radar sensors are being used for the first time resulting in improved performance with less interference from false targets
- Speed range > 10km/h
- Scanning range approx. 70 m
- The scanning angle of the radar sensors is approx. 110°
- The system remains active when you switch the ignition off and on.
- The system is deactivated in trailer mode.
- The brightness of the warning lamps installed in the mirror base can be adjusted.

If a fault occurs and/or one of the radar sensors is replaced, the system will need to be calibrated.

Function

Information

s543_079

The two radar sensors installed behind the bumper monitor the traffic next to and up to 70 m to the right and left behind your vehicle.

The system is activated at speeds above 10 km/h. It has an information stage and a warning stage.

If the system detects a potential risk without a lane change being indicated (turn signal not activated), the driver will be informed by the warning lamp in the corresponding exterior mirror housing being faded in.

Warning

s543_081

The warning stage is activated if there is a potentially hazardous situation and the driver indicates a lane change by switching on the corresponding turn signal.

If the car is equipped with the Lane Assist system, the warning stage is also activated if the driver turns the steering wheel to the side where the hazard has been detected (even without the turn signal being switched on). If the vehicle leaves the lane, it will be automatically steered in the opposite direction.

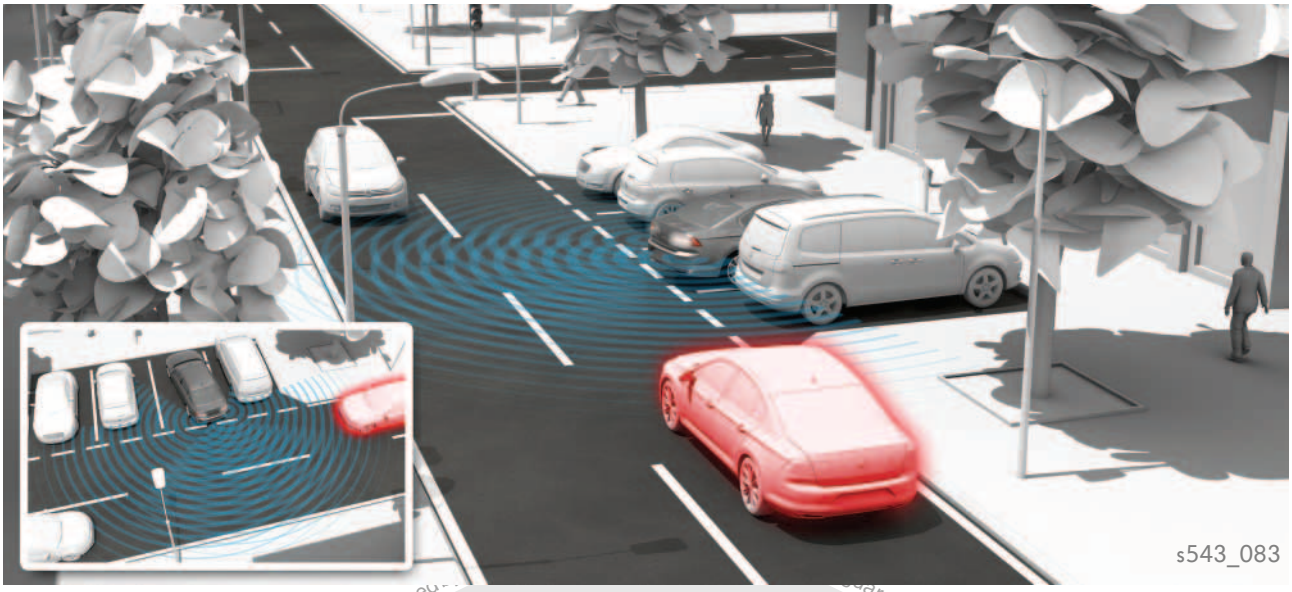
You will find further information on the lane change assist system in Self-study Programmes no. 396 “Lane Change Assist” and no. 536 “The Golf SV”.

Further driver assist systems

Rear Traffic Alert

Task

The Rear Traffic Alert system warns you about moving objects in the area behind the vehicle when you reverse out of a perpendicular parking space.



Function

The radar sensors for the lane change assist system are also used by the Rear Traffic Alert system.
They measure the distance from an approaching object and its speed. This information is used to determine the time until a possible collision.

The Rear Traffic Alert system has three escalation stages:

- information stage
- warning stage and
- braking intervention.

If a collision is likely, the vehicle will be braked to a standstill with maximum braking force.

Warnings

- Visual display in the dash panel insert multifunction display (text and gong if the car is not equipped with the PDC parking distance warning system)
- Acoustic warning if PDC is fitted
- Automatic braking intervention approx. 0.8 s before the potential collision

System limitations

- The scanning angle of the radar sensors is approx. 180°
- Scanning range approx. 50 m
- Speed range of own vehicle from 1 km/h to 12 km/h
- Speed range of the detected vehicles/objects greater than 4 km/h
- Reverse gear must be engaged

Driver Alert System

Task

The Driver Alert System encourages drivers to take a break if their driving behaviour suggests that they are tired. The system detects deviations from normal driving behaviour and thus promotes safety-conscious driving on motorways and on trunk roads.

s543_074

Function

The system is activated and deactivated on the MIB operating and display unit via the “Driver Alert System Active” entry.
The system becomes active after approximately 15 minutes driving time – this is the time required to evaluate the driving behaviour.
At speeds of 65 km/h and above, the system continuously monitors driving behaviour and draws conclusions regarding the driver’s fitness to drive.

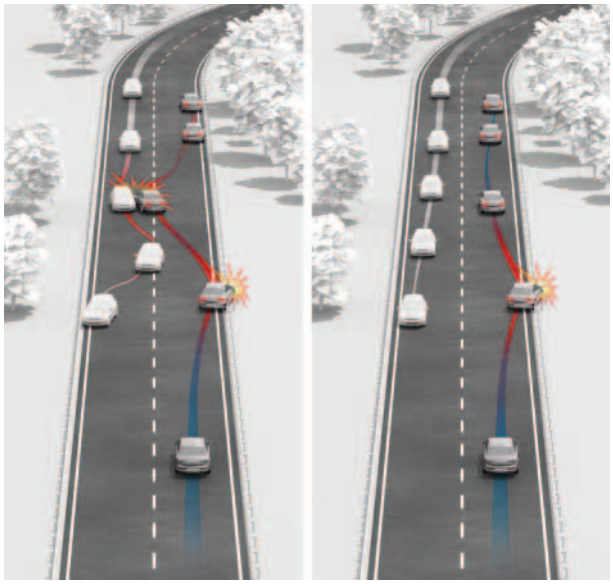
s543_076

Along with the way the vehicle is being steered, data about the driving situation (vehicle speed, accelerator pedal use, turn signals, time of day, duration of journey etc.) and the buttons pressed by the driver for the settings and convenience functions (air conditioning system, telephone controls etc.) are registered and sent via the CAN bus to the diagnostic interface for data bus where they are analysed. If the system detects that the driver is tired, it will recommend a break with a visual and acoustic signal.
A request to take a break is displayed as text in the dash panel insert multifunction display for five seconds and a gong sounds. This message is repeated once every 15 minutes.

Automatic Post-Collision Braking System

Task

22% of all accidents are multicollisions, i.e. multiple collisions in which further collisions, for example, with crash barriers or oncoming traffic, follow the initial impact. This system uses braking intervention to prevent subsequent collisions or to reduce the impact energy of a subsequent collision.



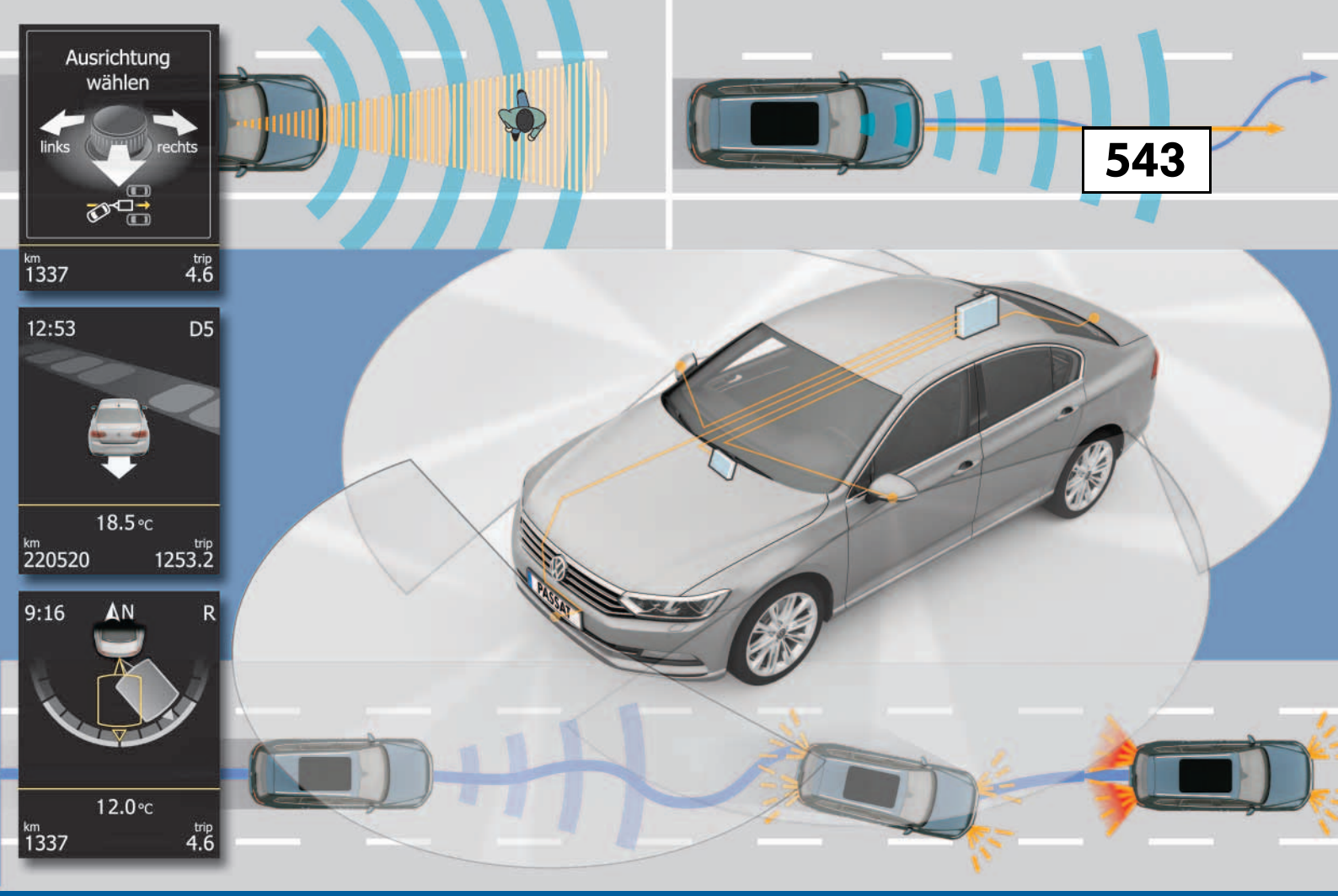
s543_087

Function

The Automatic Post-Collision Braking System automatically initiates braking when it identifies an initial collision. The automatic application of the brakes aims to prevent subsequent collisions or, at least, reduce the impact energy of a subsequent collision. The Automatic Post-Collision Braking System decelerates the vehicle by a maximum of 6 m/s^2 and simultaneously activates the emergency brake light and the hazard warning lights.
The ESP lamp in the dash panel insert informs the driver about the braking intervention. The Automatic Post-Collision Braking System always brakes the vehicle to a speed of 10 km/h. This allows the driver to keep control of the vehicle even after a collision depending on the accident situation.

The airbag control unit sends a corresponding message to the brake control unit in order to activate the Automatic Post-Collision Braking System. Only the sensors in the airbag control unit are used to activate the Automatic Post-Collision Braking System.

The Automatic Post-Collision Braking System can be overridden by the driver at any time. If the driver accelerates or initiates full braking to decelerate faster, the system will be overridden.



000.2813.00.20 Technical status 02/2015

Volkswagen AG
After Sales Qualification
Service Training VSQ-2
Brieffach 1995
D-38436 Wolfsburg

❀ This paper was manufactured from pulp that was bleached without the use of chlorine.