

**Service.**



## **Self-Study Programme 251**

# **The Passat, Model Year 2001**



# The Passat, Model Year 2001



This Self-Study Programme summarises the design features of the Passat 2001. It provides you with information about the various engines and gearboxes, the front and rear axle configurations, the electronics and the modifications to the convenience system. The design and function of the various components and modules will not be explained in depth in this SSP.

Descriptions of modifications always refer to the predecessor model. A number of the technologies cited in this Self-Study Programme

have previously been described in other Self-Study Programmes. To enable you to brush up your knowledge of specific technologies, we have enclosed an index at the back of this SSP. It refers you to the relevant Self-Study Programmes by keywords such as "TUMBLE INTAKE PORT". (In the case of the "tumble intake port" you are referred to SSP 195 - the SSP in which this technical feature is described.)



Keywords are always given in SMALL CAPITALS.

New



Important Note

# At a glance



**Concisely** ..... 4



**Environmental protection** ..... 10



**Safety** ..... 12



**Body** ..... 16



**The engines** ..... 18



**Power transmission** ..... 27



**Running gear** ..... 30



**The electrics** ..... 36



**Index** ..... 60



# Concisely

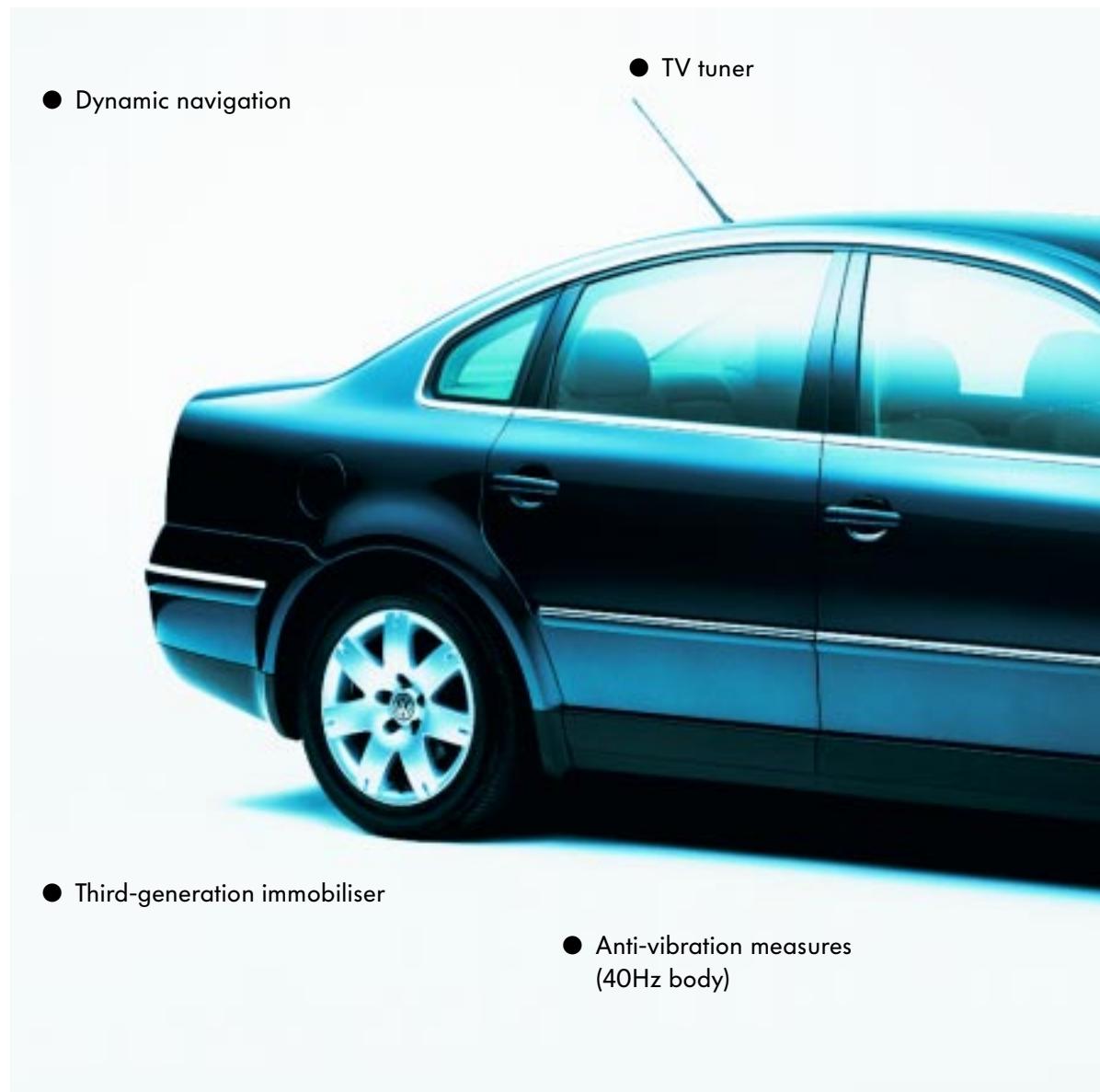
## Saloon

### Brief description of vehicle

The Passat 2001 is based on the highly successful predecessor model. In revising the vehicle, Volkswagen's designers retained the characteristic basic shape of the saloon, with its distinctive dome roof.

The front end of the Passat has been redesigned, and particularly the bonnet, the wings and the radiator grille. The bumpers now have full-length rubbing strips.

### New features of the Passat, model year 2001





The rear end has been revised also, including the rear lights.

The headlights have clear lenses and the indicator lights are built into the headlights. Bi-xenon headlights with dynamic headlight range control are also available.

- Solar roof



- Improved crash concept

# Concisely

## Variant

The Variant has been revised, too. In addition to the new front-end design, which is identical in the Variant and saloon, the rear end and the rear lights have been redesigned in the Variant.



- New locking concept with radio wave folding key (fob) built into the driver's door.



The Passat has a new locking concept. All models come with radio wave folding keys. There is no lock cylinder on the front passenger's door and the tailgate is separately released.



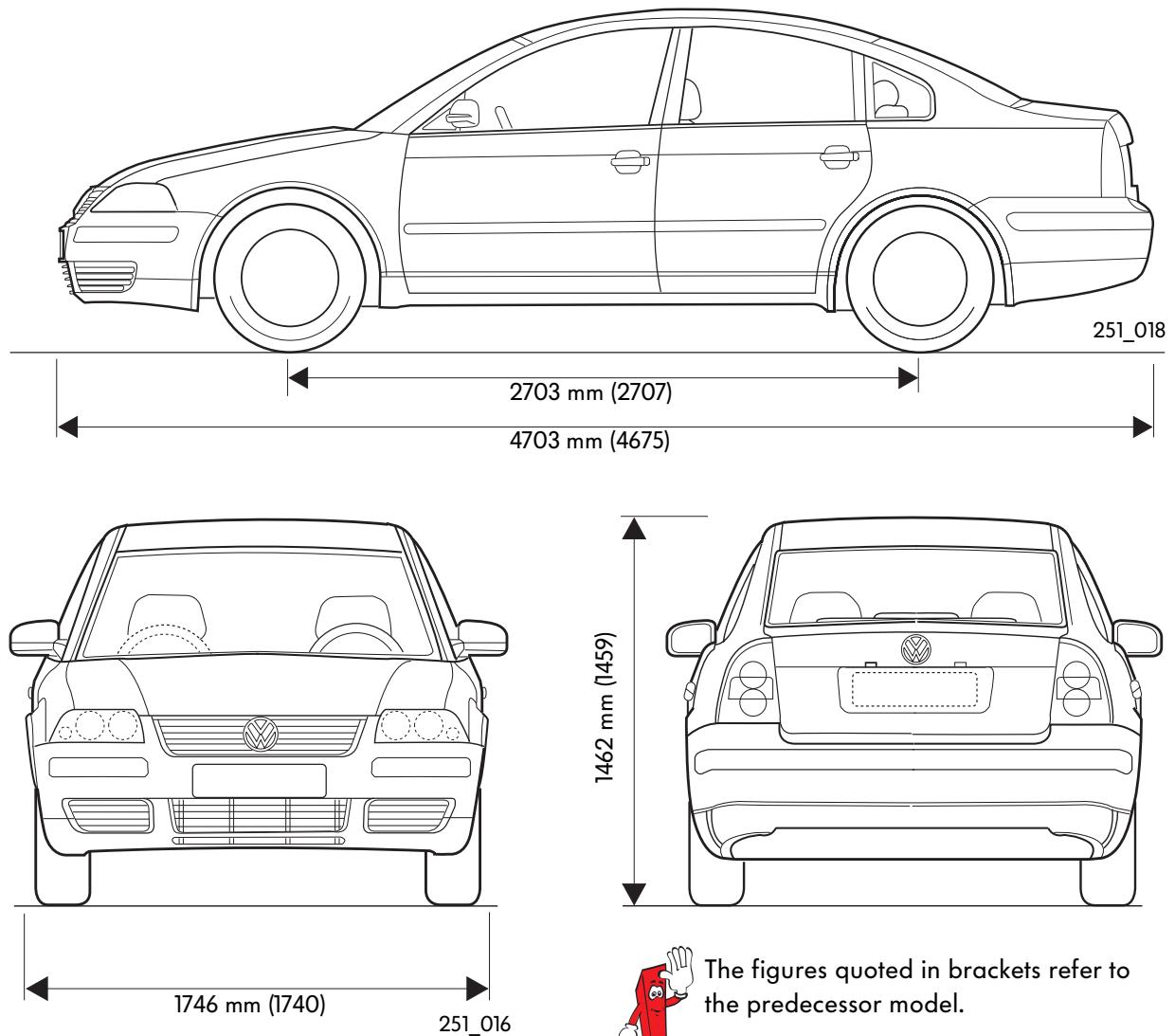
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All technical modifications apply to saloon and Variant.

# Concisely

## Saloon



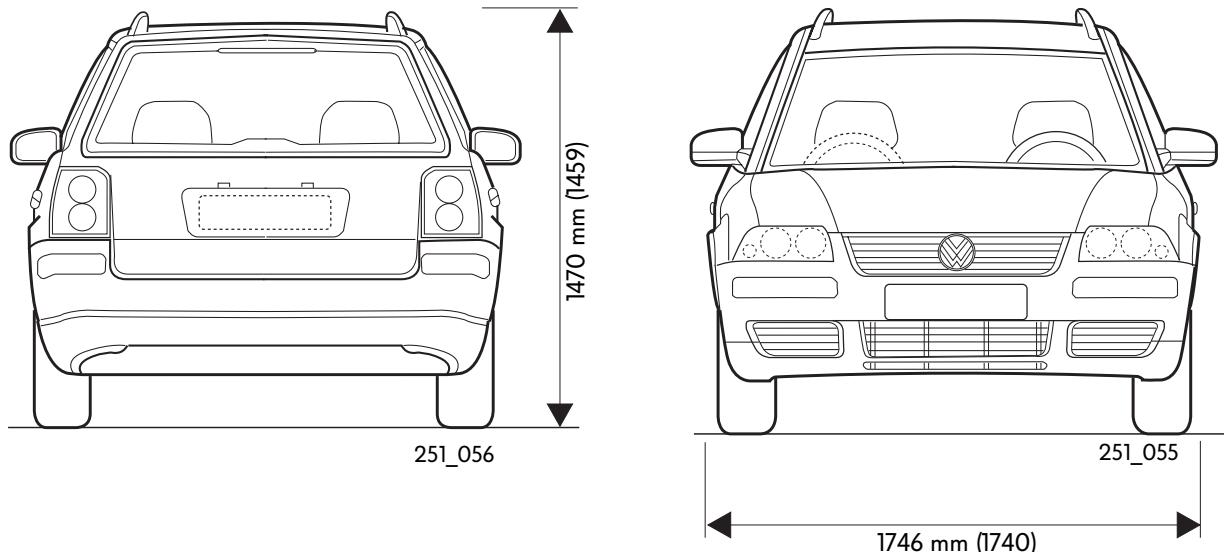
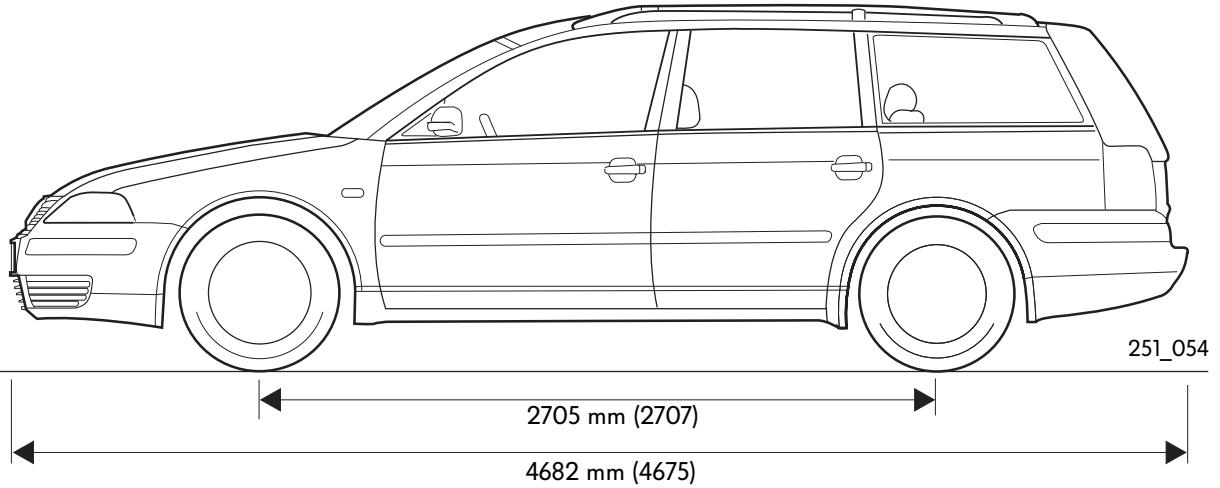
## Dimensions and weights

Model	MY 2001	MY 1997
Length	4703 mm	4675 mm
Width	1746 mm	1740 mm
Height	1462 mm	1459 mm
Wheelbase	2703 mm	2707 mm
Turning circle	11.4 m	11.4 m
Tank capacity	62 l	62 l
Drag coefficient	0.27 $c_w$	0.27 $c_w$
Weight (unladen)	1277 kg	1233 kg



The figures quoted in brackets refer to the predecessor model.

## Variant



### Dimensions and weights

Model	MY 2001	MY 1997
Length	4682 mm	4675 mm
Width	1746 mm	1740 mm
Height	1470 mm	1459 mm
Wheelbase	2705 mm	2707 mm
Turning circle	11.4 m	11.4 m
Tank capacity	62 l	62 l
Drag coefficient	0.27 $c_w$	0.27 $c_w$
Weight (unladen)	1319 kg	1282 kg

# Environmental Protection

## The water management plan

Environmental protection is a matter of fundamental importance. Each and everyone of us should strive to protect the environment wherever possible, day by day. You are required to think pro-environmentally when you repair and service vehicles. And we must do likewise in vehicle manufacture.

To demonstrate our commitment to in-plant environmental protection throughout all stages of the vehicle production process through to delivery of the finished product, we will be dealing time and again with the topic of environmental protection in the next Self-Study Programmes.

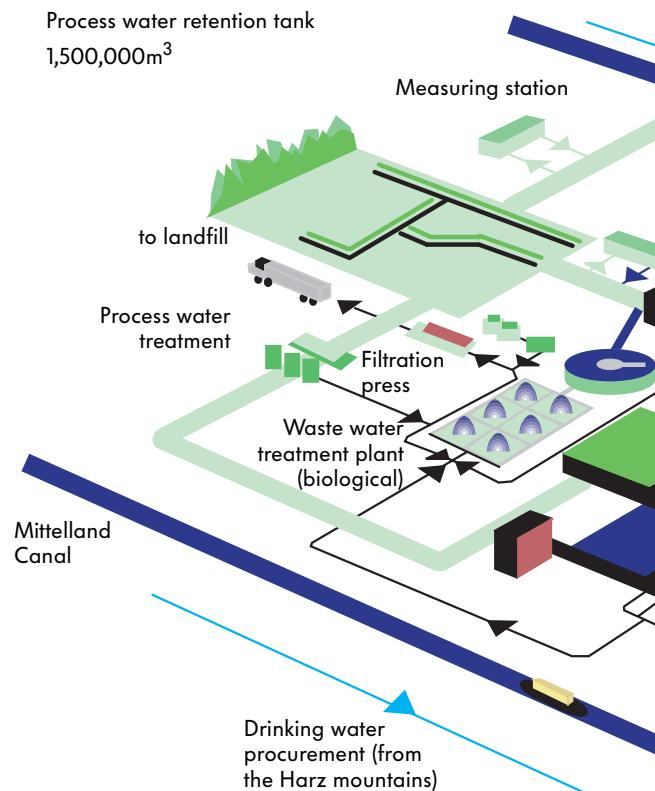
Our customer have high expectations of our products in several respects: reliability, convenience, quality and, not least, environmental compatibility. Firstly, the vehicle itself should pollute the environment as little as possible. This means raising fuel economy, reducing pollutant emissions in exhaust gases and ensuring a high degree of recyclability of the individual components of a car at the end of its life cycle. Secondly, our customers also expect their vehicles to be made in a production facility that meets stringent environmental protection standards.

Volkswagen can look back on a long tradition of protecting the environment. When it built its first - and, to date, largest - plant in Wolfsburg, Volkswagen even then thought about ways of using the natural resource of water as economically as possible for example.

Volkswagen currently circulates and reprocesses more than 95 percent of process water within the plant.

The amount of fresh potable water which Volkswagen annually feeds into its circulation system from external sources accounts for less than five percent of total volume.

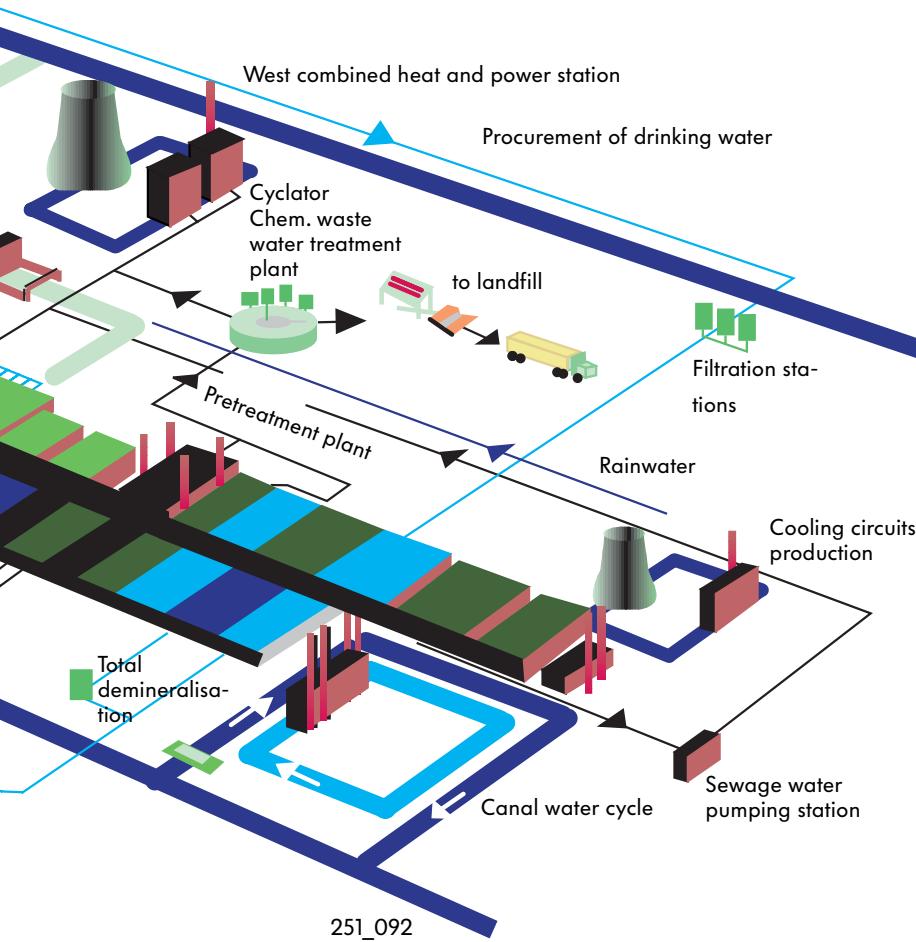
## The water management plan for Wolfsburg plant



# Environmental Protection

## The Emden plant

The Emden plant, where the majority of Passat models are built, was the first automobile manufacturing plant in Europe to be certified (in September 1995). The plant was re-audited and re-certified in September 1998.



To ensure that we maintain high standards in environmental protection, our plants are audited and certified by an independent expert. Our European plants were certified according to the EU eco audit regulations while our non-European plants were certified according to the international ISO 14001 standard.

# Safety

## Occupant protection

### The front airbags

Full-size airbags are fitted in the Passat 2001 on the driver's and front passenger's sides. As in the predecessor model, the airbags have filling volumes of approximately 64 and 120 litres respectively.

The central airbag control unit is located behind the central console, above the tunnel.



251\_082

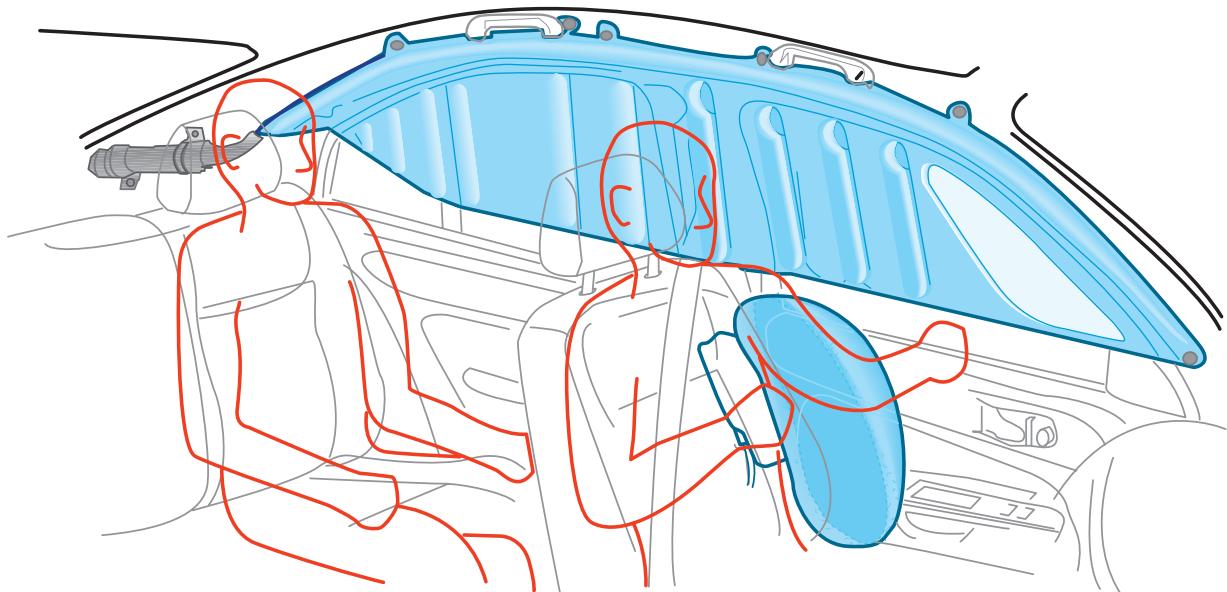
### The side and head airbags

The side and head airbags afford excellent side impact protection. The two side airbags, integrated in the front seats, have a filling volume of approximately 12 litres.

The head airbag has a filling volume of approximately 26 litres and is integrated in the vehicle headlining, above the doors.

As before, the system has two lateral acceleration sensors, located beneath the seats. The lateral acceleration sensors are programmed with a vehicle-specific parameter when they are replaced.

Where repair or replacement of defective parts is needed, it is important to specify the correct SP-number.



251\_069



The complete part number of the airbag control unit, together with the index (colour code) must be quoted when ordering side impact sensors because these sensors are not labelled with a parameter index. The part number and the colour index can only be read out, or reproduced, from the production data (VIN, year of manufacture, list of PR numbers) by using the workshop tester.

# Safety

## The belt tensioner/belts

Belts and BELT TENSIONERS round off the restraint system. Standard belt tensioner systems are used in the outer seat positions, front and rear. These systems deploy mechanically and pyrotechnically.



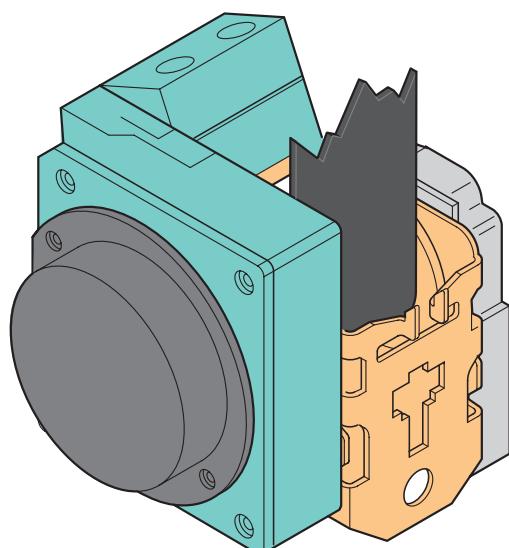
Ball-type tensioners are used in the front seating positions. In comparison with the predecessor model, they are rotated through 180°. The rear seating positions have rotary belt tensioners.

Ball-type tensioner



251\_075

Rotary belt tensioner

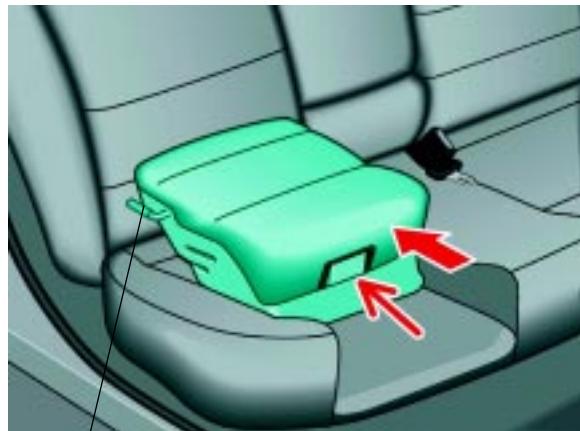


251\_066



The upper part of the belt buckles in the new Passat is flexible. The lower part is rigidly bolted to the bracket.

## Child restraint systems

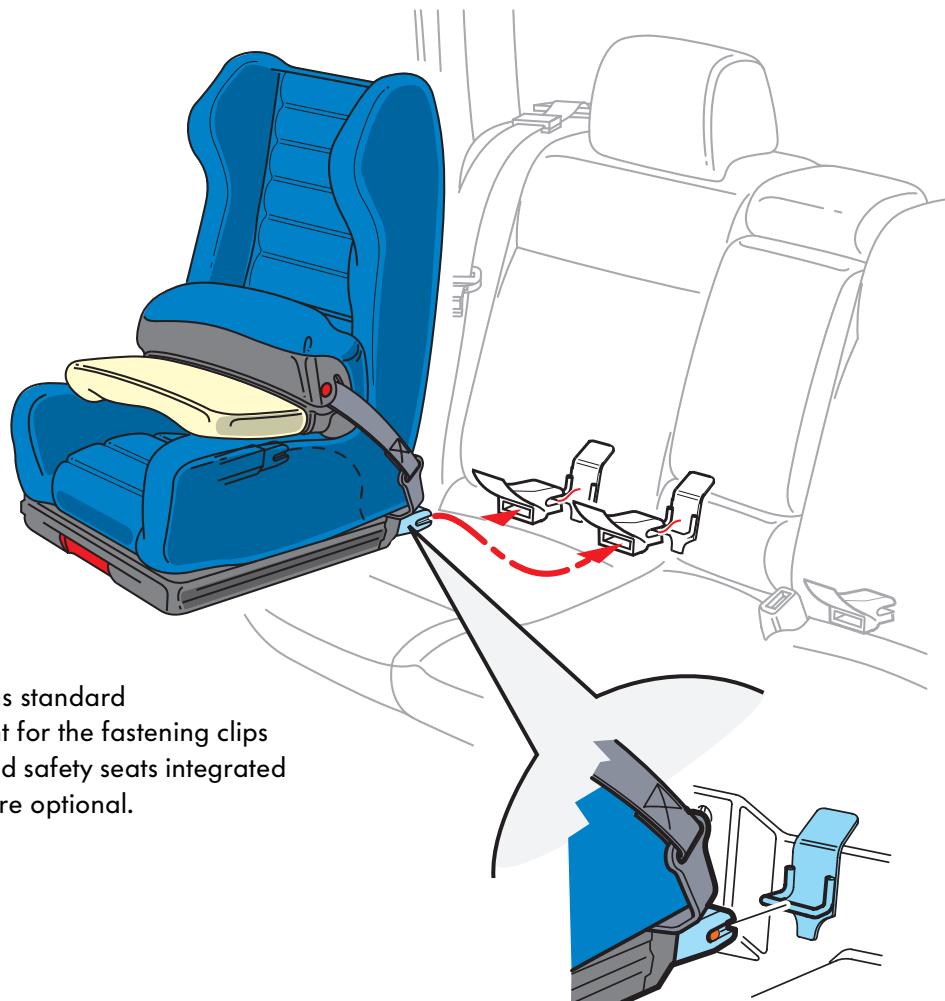


Belt guide hook

251\_011

### Integrated child safety seats

To make use of the integrated child safety seats, the elements of the seat cushion have to be raised and locked in place. An additional shoulder belt guide corrects the belt position for children with a height from 1.3m - 1.5m. A belt guide hook on the booster cushion ensures an ideal belt position around the child's pelvis.



**The Isofix system**

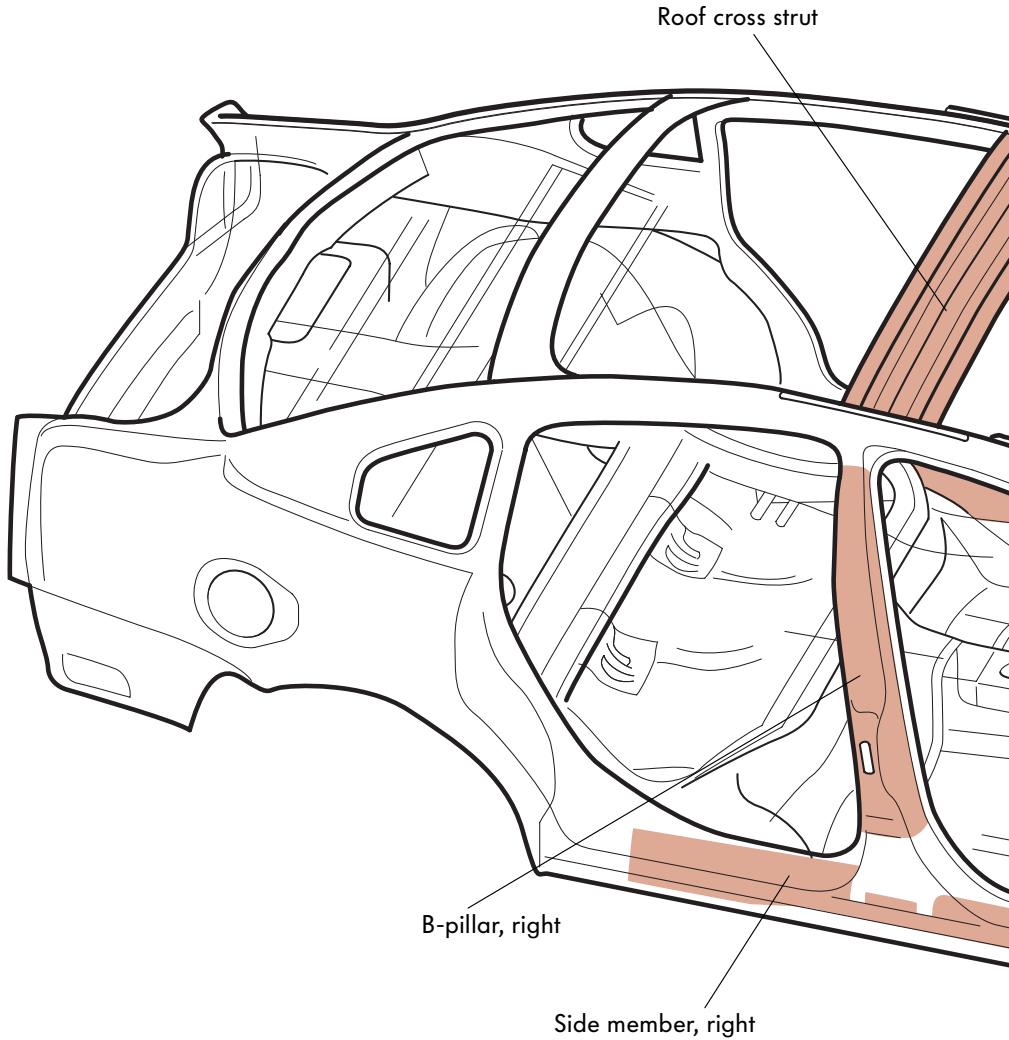
The new Passat comes as standard with an attachment point for the fastening clips of the ISOFIX system. Child safety seats integrated in the rear bench seat are optional.

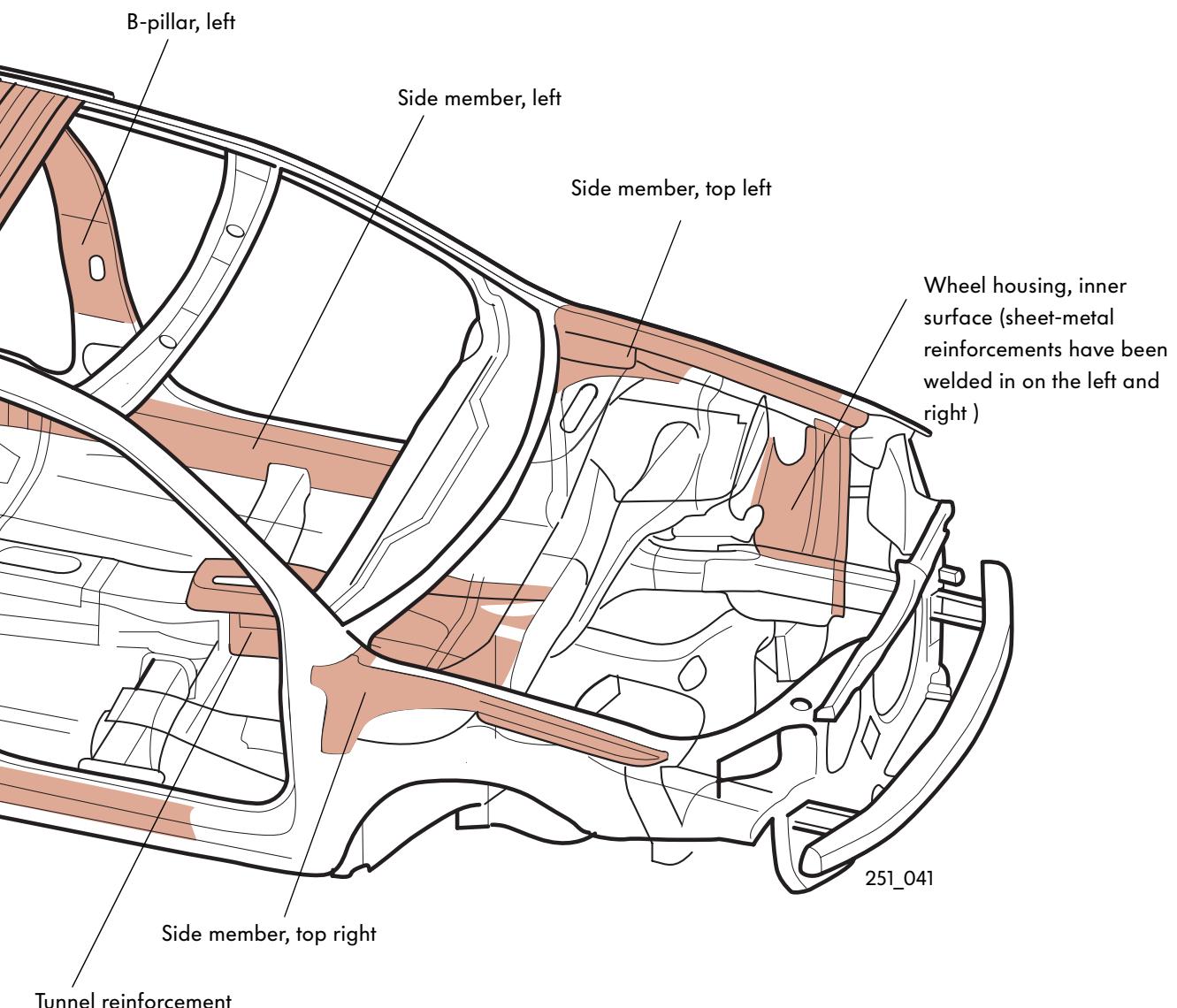
251\_010

# Body

## Body reinforcements

The body of the Passat 2001 was reinforced in the zones described below. In other words, the body panels have been thickened and the spot welds have been supplemented with laser-welded seams.





Vehicle safety and natural body vibration (40 Hz) have been greatly improved as a result of these modifications.

# The engines

## Engines in general

On the following pages, you will find descriptions of the engines to be used in the new Passat. They include specifications, torque and performance curves, as well as details of technical features and engine modifications.

In developing all engines, special emphasis was put on raising fuel economy and reducing exhaust emissions.

These engines now meet the following standards:

- all petrol engines conform to the EU 4 exhaust emission standard and
- all diesel engines conform to the EU 3 exhaust emission standard.

All engines have an electrical throttle control. For more effective antitheft protection, the engine-control unit communicates with the immobiliser control unit via CAN databus (3rd generation immobiliser).

A self-diagnosis fault warning lamp is now integrated in the dash panel insert in all petrol-engined vehicles.



251\_044

If a component with a bearing on exhaust emissions fails while the vehicle is in operation (e.g. misfiring), the self-diagnosis fault warning lamp begins to flash. If a component is identified as being defective while the vehicle is in operation, the self-diagnosis fault warning lamp lights up continuously. In both cases, the engine must be inspected immediately.

## 1.6-litre 75 kW petrol engine

The engine is an improved version of the 1.6-litre petrol engine developing 74kW.

The following components were optimised with regard to friction work and mass for higher fuel economy:

- the conrods (TRAPEZOIDAL CONRODS) were optimised for mass
- the piston lands were lowered to reduce piston mass
- ALUMINIUM CYLINDER HEAD WITH ROLLER CAM FOLLOWERS



251\_070



### Specifications



251\_022

Engine code	ALZ
Displacement	1595 cm <sup>3</sup>
Type	Row
Number of cylinders	4
Number of valves per cylinder	2
Compression ratio	10.3:1
Bore	81.0 mm
Stroke	77.4 mm
Max. power	75 kW/102 bhp @ 5600 rpm
Max. torque	148 Nm @ 3800 rpm
Engine management system	Simos 4
Fuel grades	RON 95 unleaded petrol (the Passat also operates on RON 91 unleaded petrol, with reduced engine power)

# The Engines

## 1.8-litre 110 kW petrol engine with 5 valves per cylinder and turbocharger

The engine was adopted from the predecessor model and adapted to meet the applicable exhaust emissions regulations, as outlined below.

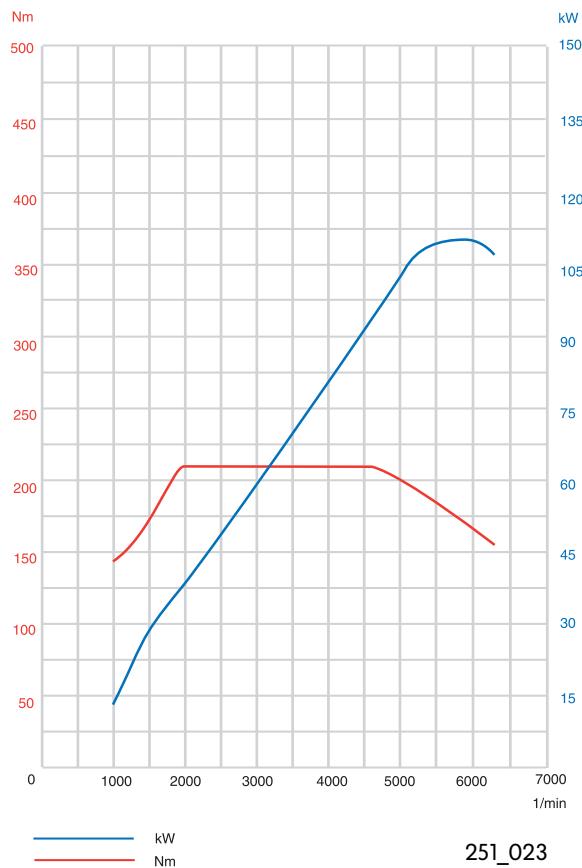
- No intermediate shaft
- Oil pump is chain driven
- Piston crown cooling via oil spray jet
- Rod-type ignition coils with integrated output stage
- PLANAR PROBE BEFORE CATALYST
- Camshaft timing control - timing chain adjuster, inlet camshaft only
- The water pump is driven by a toothed belt



251\_071



### Specifications



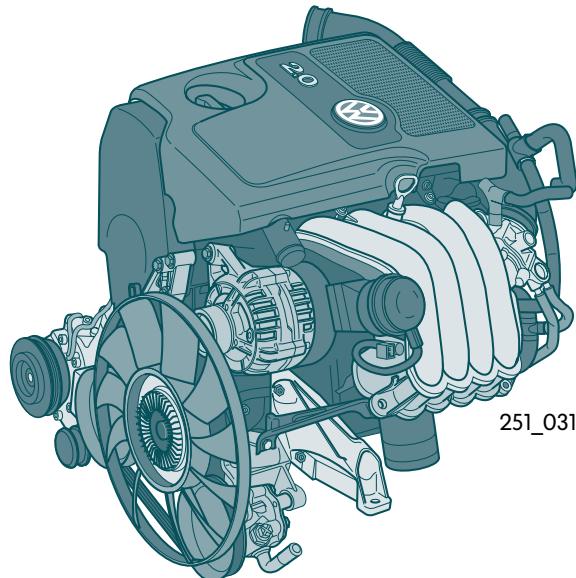
Engine code	AWT
Displacement	1780 cm <sup>3</sup>
Type	Row
Number of cylinders	4
Number of valves per cylinder	5
Compression ratio	9.3:1
Bore	81.0 mm
Stroke	86.4 mm
Max. power	110 kW/150 bhp @ 5700 rpm
Max. torque	210 Nm @ 1750-4600 rpm
Engine management system	Bosch Motronic ME 7.5
Fuel grades	RON 95 unleaded petrol (the Passat also operates on RON 91 unleaded petrol, with reduced engine power)

# The Engines

## 2.0-litre 85 kW petrol engine

The 2.0-litre engine was adopted from the predecessor model.

In vehicles which have automatic transmission, an electrical vacuum pump produces the vacuum required for the brake booster (see page 43).



### Specifications



251\_026

Engine code	AZM
Displacement	1984 cm <sup>3</sup>
Type	Row
Number of cylinders	4
Number of valves per cylinder	2
Compression ratio	10.3:1
Bore	82.5 mm
Stroke	92.8 mm
Max. power	85 kW/110 bhp @ 5000 rpm
Max. torque	172 Nm @ 3500 rpm
Engine management system	Simos 3.2
Fuel grades	RON 95 unleaded petrol (the Passat also operates on RON 91 unleaded petrol, with reduced engine power)

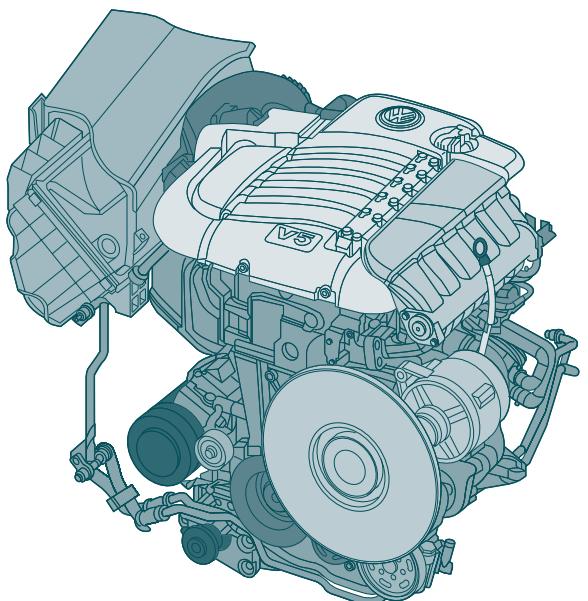
# The Engines

## The 2.3-litre 125 kW V-5 petrol engine with 4 valves per cylinder

The following modifications have been made to this engine:

- 4 valves per cylinder
- ROLLER CAM FOLLOWER valve gear
- BUILT-UP CAMSHAFT
- CAMSHAFT TIMING CONTROL intake and exhaust camshafts
- Plastic twin-path intake manifold
- ELECTRIC THROTTLE DRIVE
- "TUMBLE" INTAKE PORT

These modifications provide higher power output and torque, and hence better driving performance.



251\_030



### Specifications

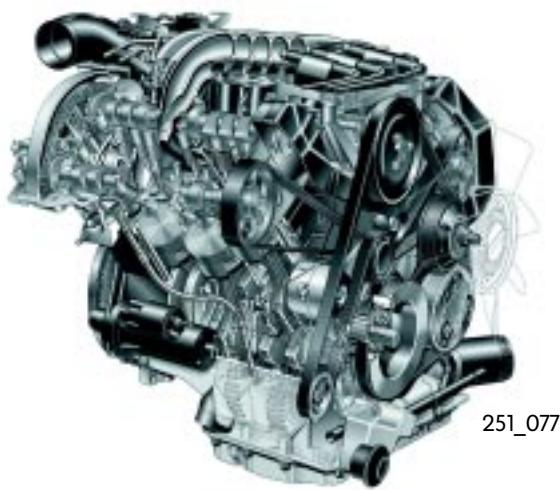
Engine code	AZX
Type	VR
Number of cylinders	5
Number of valves per cylinder	4
Compression ratio	10.75:1
Displacement	2326 cm <sup>3</sup>
Bore	81.0 mm
Stroke	90.3 mm
Max. power	125 kW/170 bhp @ 6200 rpm
Max. torque	225 Nm @ 3200 rpm
Engine management system	Bosch Motronic ME 7.1
Fuel grades	RON 98 unleaded petrol (the Passat also operates on RON 95 unleaded petrol, with reduced power output)

## 2.8-litre 142 KW V-6 petrol engine with 5 valves per cylinder

The Passat is still powered by the high-performance 2.8-litre V-6 petrol engine. The following improvements were made to this engine:

- 2 lambda probes were integrated in the exhaust line before the catalyst and after the catalyst.

These modifications allow the engine to meet the stringent EU 4 exhaust emission standard.



251\_077



251\_029

## Specifications

Engine code	AMX
Type	V
Number of cylinders	6
Number of valves per cylinder	5
Compression ratio	10.6:1
Displacement	2771 cm <sup>3</sup>
Bore	82.5 mm
Stroke	86.4 mm
Max. power	142 kW/193 bhp @ 6000 rpm
Max. torque	280 Nm @ 3200 rpm
Engine management system	Bosch Motronic ME 7.1
Fuel grades	RON 98 unleaded petrol (the Passat also operates on RON 95 unleaded petrol, with reduced power output)

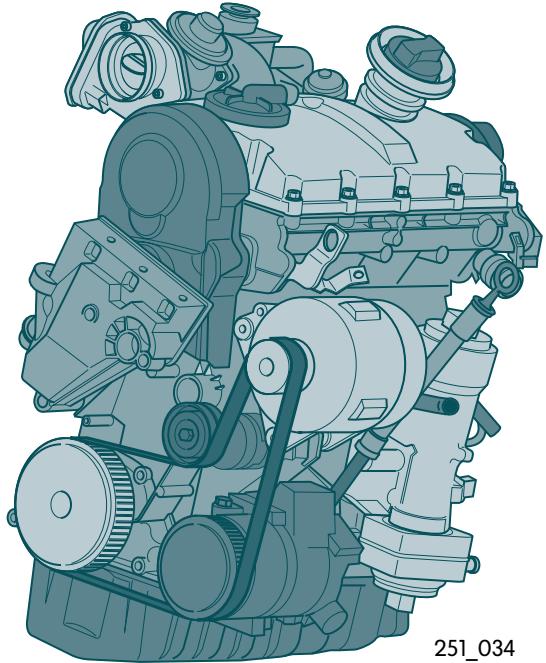
# The Engines

## 1.9-litre 74 kW TDI engine with pump injection system

The 1.9-litre 74 kW TDI engine is based on the 1.9-litre TDI engine developing 85 kW.

It differs from the basic engine in the following respects:

- The software used in the engine control unit was adapted to the lower engine power.
- The injectors have smaller nozzle holes.



251\_034



### Specifications

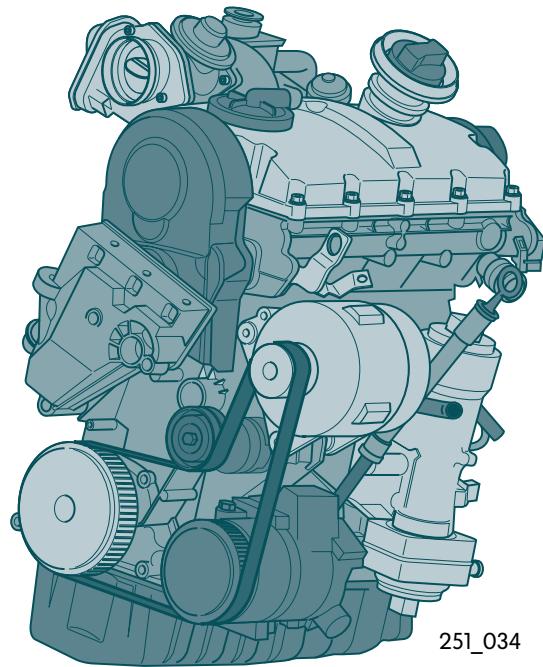


Engine code	AVB
Type	In-line engine
Number of cylinders	4
Number of valves per cylinder	2
Compression ratio	19:1
Displacement	1896 cm <sup>3</sup>
Bore	79.5 mm
Stroke	95.5 mm
Max. power	74 kW/100 bhp 4000 rpm
Max. torque	250 Nm @ 1900 rpm
Engine management system	BOSCH EDC 15 P
Mixture preparation	Direct injection by pump injection system
Fuel grades	49 CN diesel, biodiesel

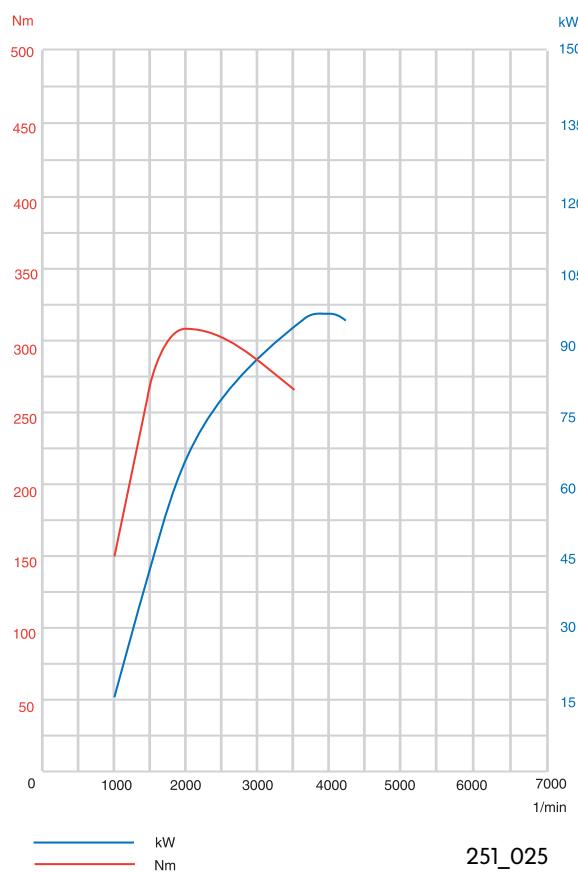
## The 1.9-litre 96 kW TDI engine with pump injection system

The 1.9-litre 96 kW TDI engine differs from 1.9-litre 74kW TDI engine with pump injection system in the following respects:

- The software used in the engine control unit was adapted to the higher engine power.
- The injectors have larger nozzle holes.
- The TURBOCHARGER is larger.
- The crankcase is made of stronger material.
- The crank pin diameter of the crankshaft has been enlarged.
- The conrods are made of stronger material.



251\_034



## Specifications

Engine code	AVF
Type	In-line engine
Number of cylinders	4
Number of valves per cylinder	2
Displacement	1896 cm <sup>3</sup>
Bore	79.5 mm
Stroke	95.5 mm
Compression ratio	19:1
Max. power	96 kW /130 bhp 4000 rpm
Max. torque	310 Nm @ 1900 rpm
Engine management system	BOSCH EDC 15 P
Mixture preparation	Direct injection by pump injection system
Fuel grades	49 CN diesel, biodiesel

# The Engines

## The 2.5-litre V-6 TDI engine developing 110 kW

The 2.5l V-6 ENGINE DEVELOPING 110 kW has demonstrated its success in the predecessor model and will also be used in the Passat 2001

The following technical innovations were employed to improve mixture preparation and reduce exhaust emissions:

- The number of pump pistons in the radial-piston distributor injection pump was increased by 1, thereby raising the maximum INJECTION PRESSURE.
- The 5-hole injector has been replaced by a 6-hole injector
- Improved CRANKCASE VENTILATION



251\_078



251\_028

## Specifications

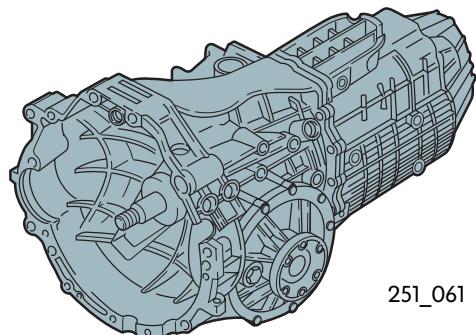
Engine code	AKN
Type	V-engine
Number of cylinders	6
Number of valves per cylinder	4
Displacement	2496 cm <sup>3</sup>
Bore	78.3 mm
Stroke	86.4 mm
Compression ratio	19.5 : 1
Max. power	110kW/150 bhp 4000 rpm
Max. torque	310 Nm @ 1500-3200 rpm
Engine management system	Bosch EDC 14 M
Mixture preparation	Direct injection by electronically controlled distributor injection pump
Fuel grades	49 CN diesel, biodiesel

## Manual gearboxes

### 5-speed manual gearbox 012/01W

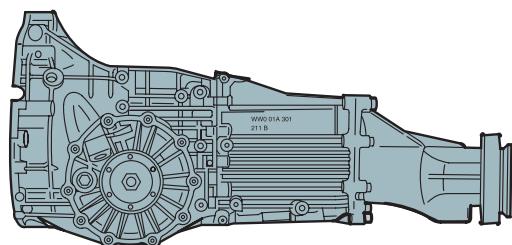
The 012 or 01W manual gearbox has a proven service record in the predecessor model.

It will be installed as a 5-speed gearbox in combination with all petrol engines and also in the 74 kW diesel engine.



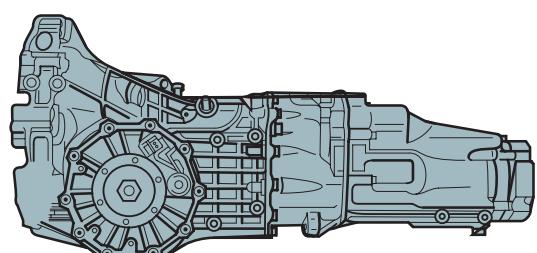
### 5-speed manual gearbox 01A

The 01A four-wheel drive manual gearbox from the predecessor model will be installed as a 5-speed gearbox in combination with the 2.0-litre, 2.3-litre and 2.8-litre petrol engines.



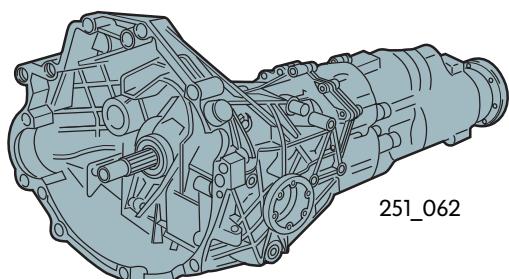
### 5- and 6-speed manual gearbox 01E

The 01E manual gearbox will be installed as a 5- or 6-speed manual gearbox in combination with the turbodiesel engines developing 96 kW and in the V-6 TDI.



### The 01E four-wheel drive manual gearbox (4 Motion)

will be installed in the Passat 2001 as a 6-speed gearbox in combination 4- and 6-cylinder turbodiesel engines from 96 kW.



# Power Transmission

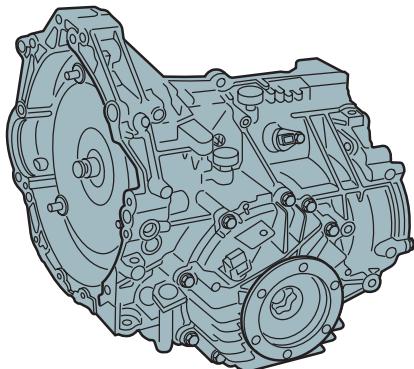
## Automatic gearbox

The new Passat is available with the same automatic transmission as in the predecessor model. The design and function of both automatic transmissions have been adopted without change.

### 4-speed automatic gearbox 01N

The 01N four-speed automatic gearbox is notable for:

- driver- and situation-dependent driving programs, fuzzy logic controlled
- a drag-dependent driving program
- a torque converter with lock-up clutch



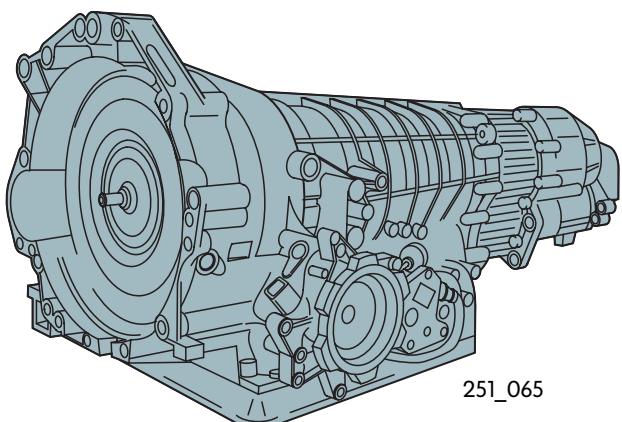
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### 5-speed automatic gearbox 01V

The five-speed automatic transmission 01V has:

- a dynamic shift program (DSP)
- Tiptronic
- a torque converter with torque converter lock-up clutch

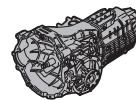
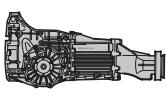
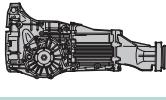
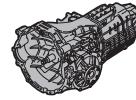
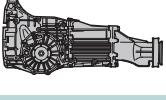
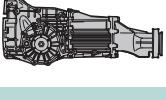
The 5-speed automatic gearbox is also available as a 4 Motion gearbox.



251\_065

# Power Transmission

## Engine/gearbox combinations

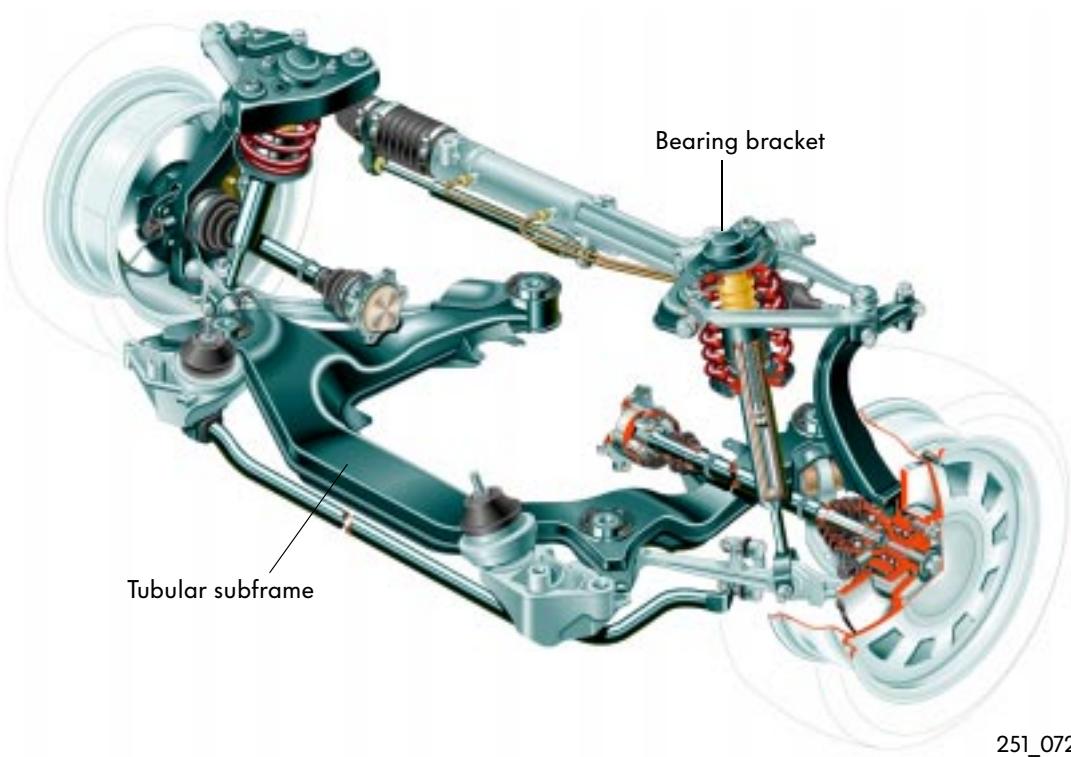
	Front		4 Motion	
	012 / 01W	01N	01 A	01 V
1.6-litre ALZ				
1.8-litre AWT				
2.0-litre AZM				
2.3-litre AZX				
2.8-litre AMX				
1.9-litre AVB				
1.9-litre AVF				
2.5-litre AKN				



# Running Gear

## The four-link front suspension

The FRONT AXLE is a four-link front suspension. It has been accommodated to the modified vehicle dimensions and axle loads, as compared to the previous Passat.



251\_072

## The rack-and-pinion steering system

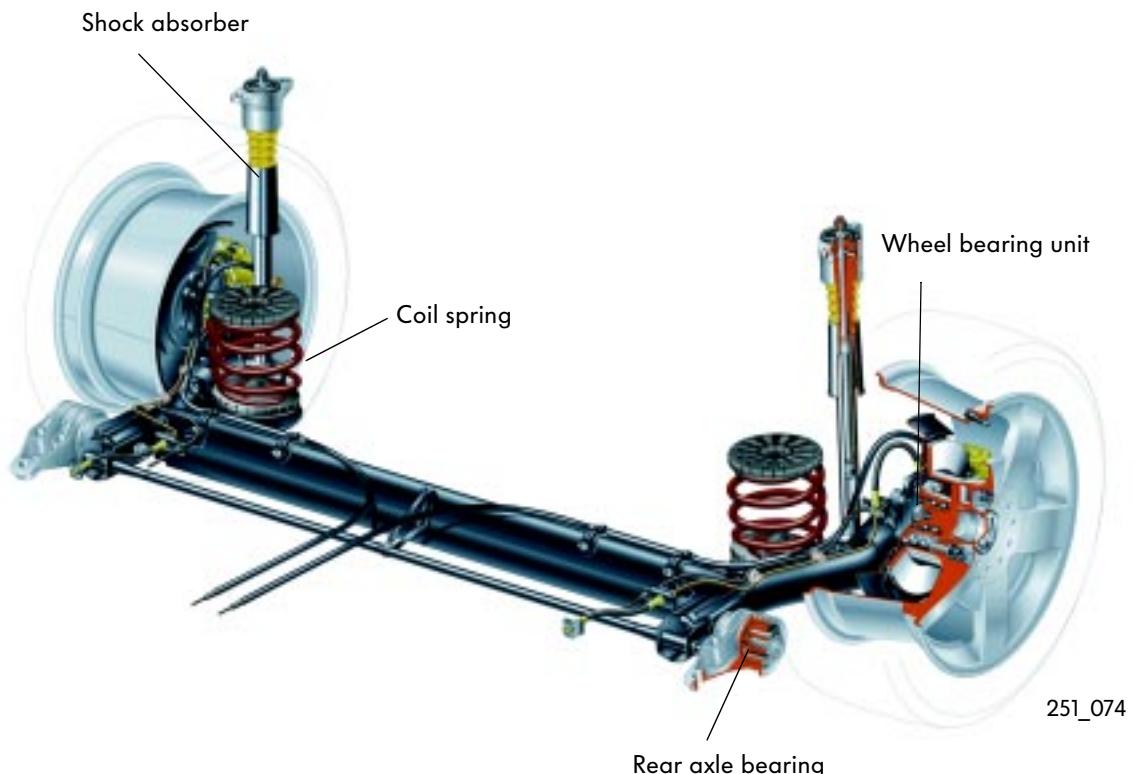
The new Passat has  
HYDRAULIC POWER STEERING as standard.



251\_101

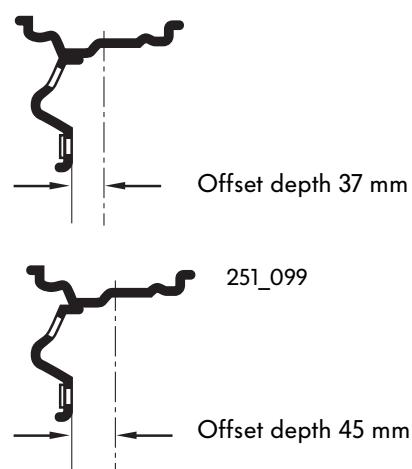
## The torsion beam rear axle

In the TORSION BEAM REAR AXLE, the spring/damper settings have been adapted to the modified axle loads.



## Modified offset depth

Rim offset depth was reduced to 37 mm from 45 mm, with the result that the wheel is now flush with the body exterior. Wheels fitted with winter tyres with ET45 offset depth can still be used, except on the Passat 2001 with large brake discs. This model has a wheel fitted with a winter tyre in size 6Jx16 ET40.



# Running Gear

## The brakes

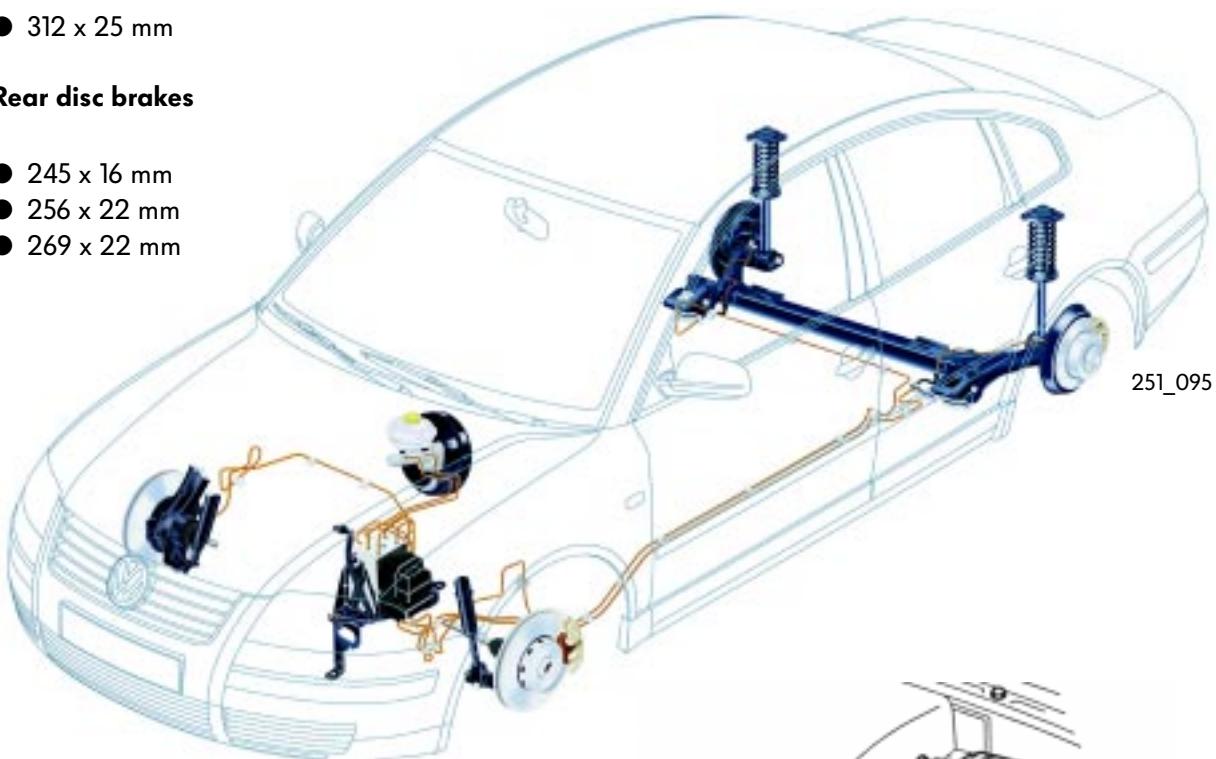
The front and rear disc brakes are configured for excellent deceleration under braking. New, larger brakes will therefore be used in the new Passat depending on engine type.

### Front disc brakes

- 280 x 22 mm
- 288 x 25 mm
- 312 x 25 mm

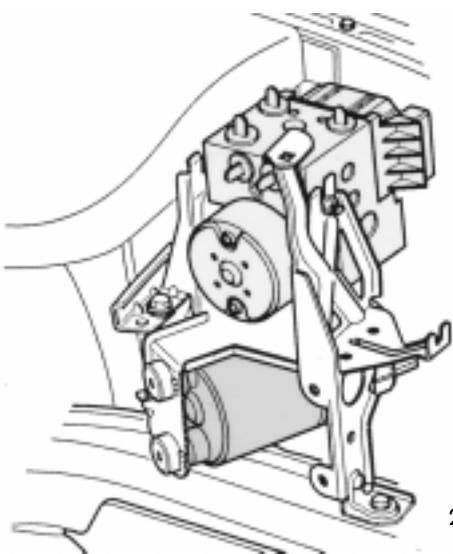
### Rear disc brakes

- 245 x 16 mm
- 256 x 22 mm
- 269 x 22 mm



### Bosch 5.3 anti-lock braking system

The new Passat still has a Bosch 5.3 anti-lock braking system with ESP. This system allows the driver to maintain control over the vehicle at all times, even in critical driving situations.

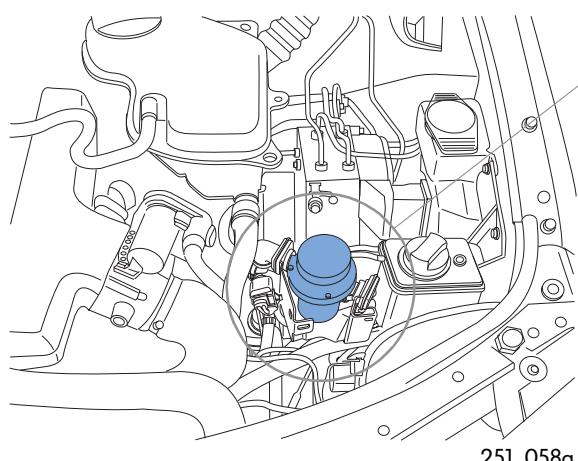


## The electronic vacuum pump

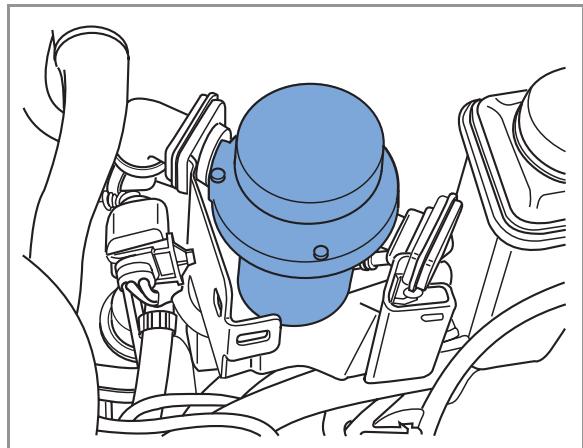
All petrol engines which have automatic transmission conforming to exhaust emission standard EU4 will have an electrical vacuum pump for brake servos.

### This pump is required:

because not enough vacuum is provided for the brake booster via the intake manifold during the cold-starting phase.



251\_058a



251\_058b



The electrical vacuum pump makes for reliable pneumatic brake boosting.

It is activated by the engine control unit as required.



For more detailed information, refer to the separate SSP on the electrical vacuum pump.

# Running Gear

## Four-wheel drive

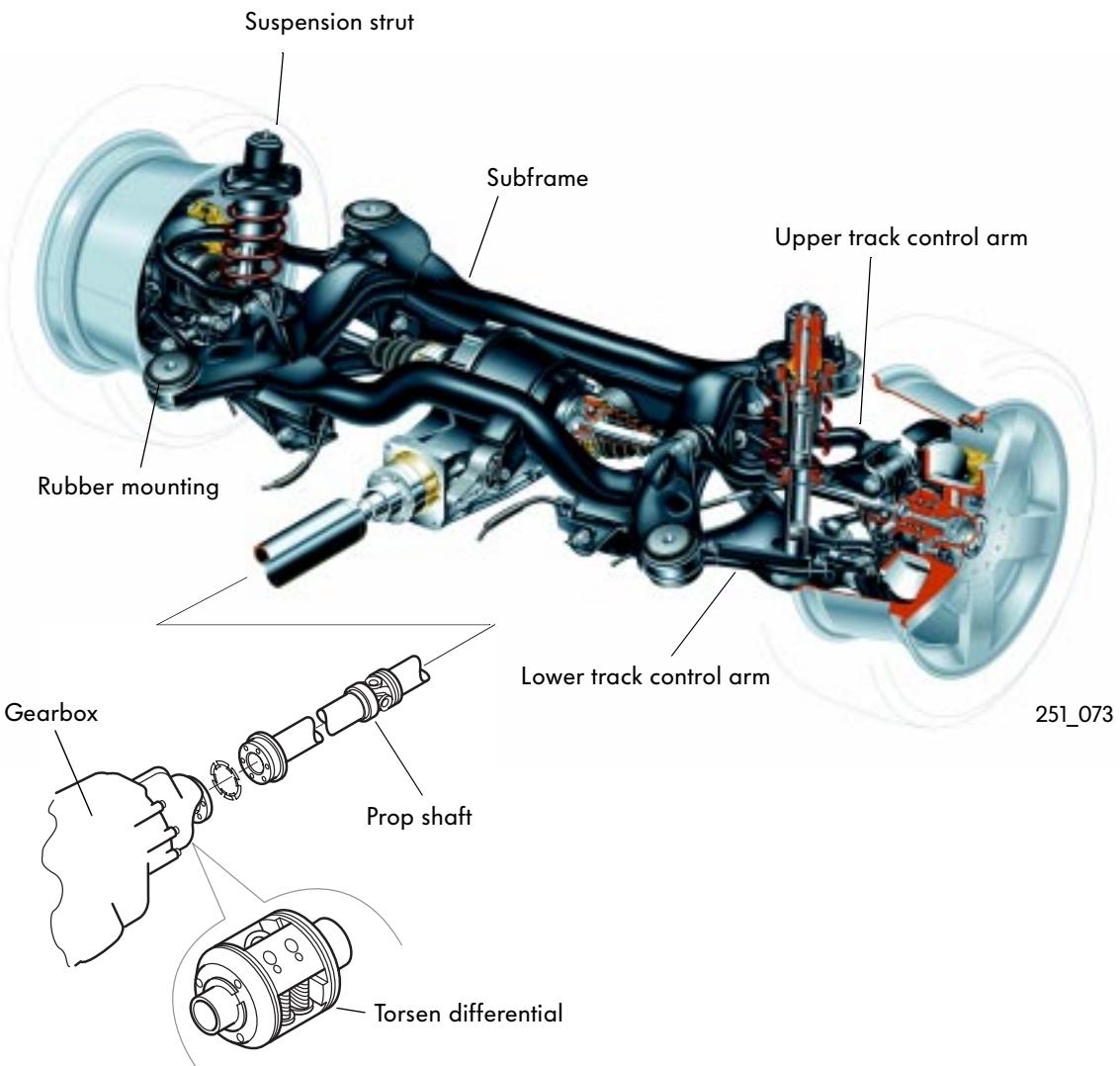
### The double wishbone rear suspension

The 4-wheel-drive version of the Passat has a double wishbone rear suspension with a closed tubular subframe attached to which are the track control arms for wheel location and the differential.

Insulating bonded rubber bushes provide good acoustic isolation from the vehicle body.

The flat-type construction of the rear axle provides a spacious interior.

This type of construction proved successful in the predecessor model.



251\_073

251\_093

## **Running Gear**

## Notes



# The Electrics

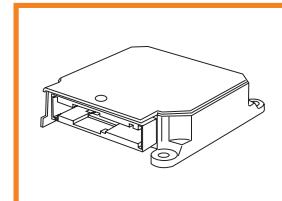
## The vehicle electrical system

is distributed, as in the Passat 97.

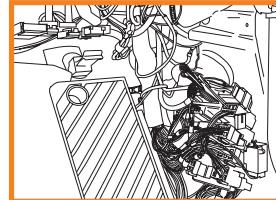
The fitting locations of the fuse holders, relay carriers, auxiliary relay carriers and connector stations have been adopted without change.

Airbag control unit  
(in gearbox tunnel)

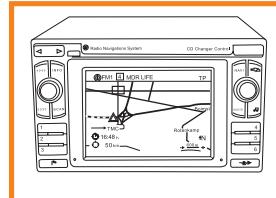
The wiring harnesses have been extended to include new systems (solar roof, distance control, dynamic navigation with TV etc.) and the connector stations have been reorganised accordingly.



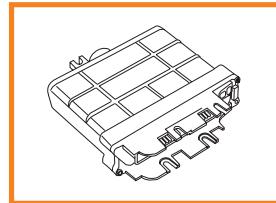
Connector station in right A-pillar



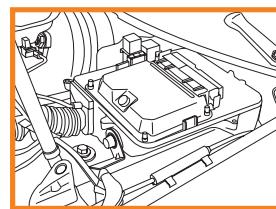
RNS-D radio with dynamic navigation



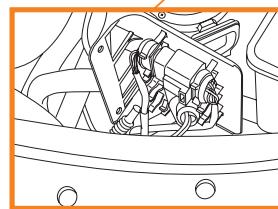
Automatic gearbox control unit (in footwell on right)



Electronics box in the plenum chamber  
- Engine control unit  
- Relay station  
- Connector station  
- Fuses

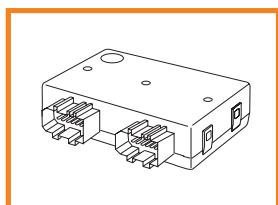
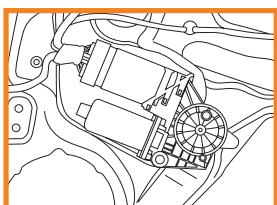


Front-end connection

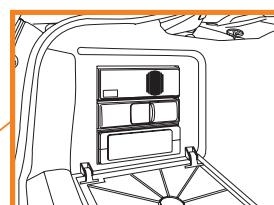
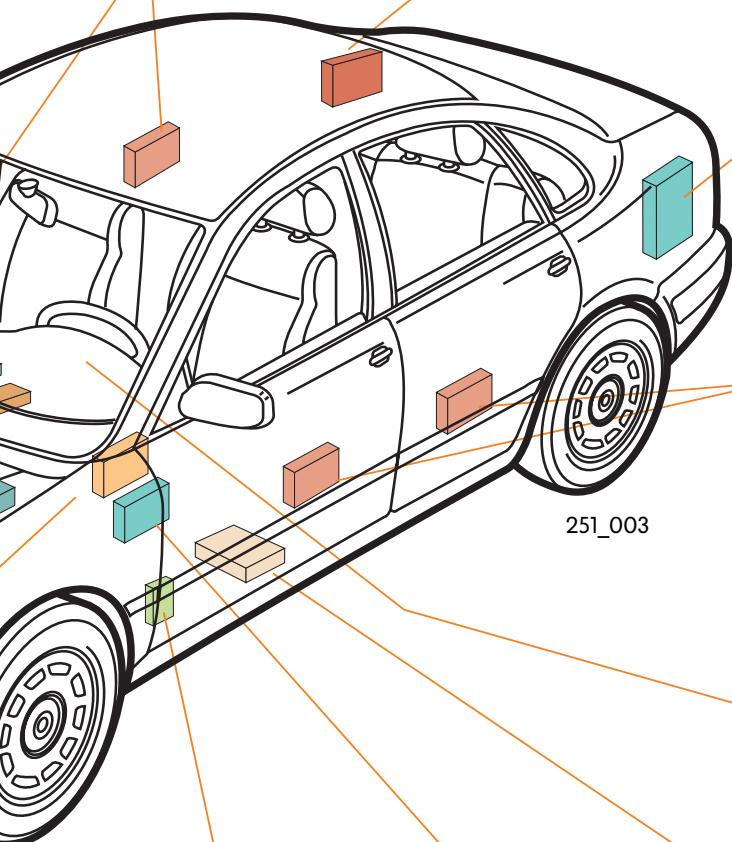


# The Electrics

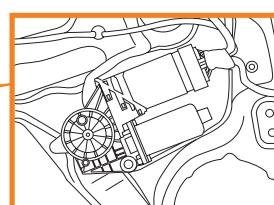
Window lifter motor  
with integrated  
door control unit



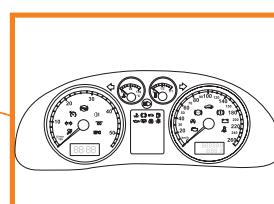
Control unit for distance control  
(in luggage compartment on right)



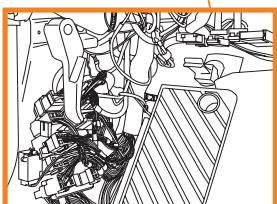
TV tuner  
CD changer  
DSP



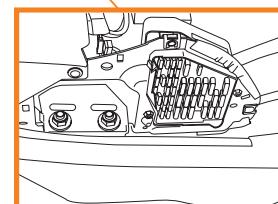
Window lifter motor  
with integrated  
door control unit



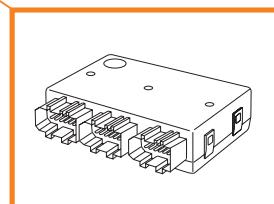
Dash panel insert with  
immobiliser control unit  
and diagnosis interface  
(Gateway)



Connector station  
in left A-pillar



Fuse holder dash panel  
left



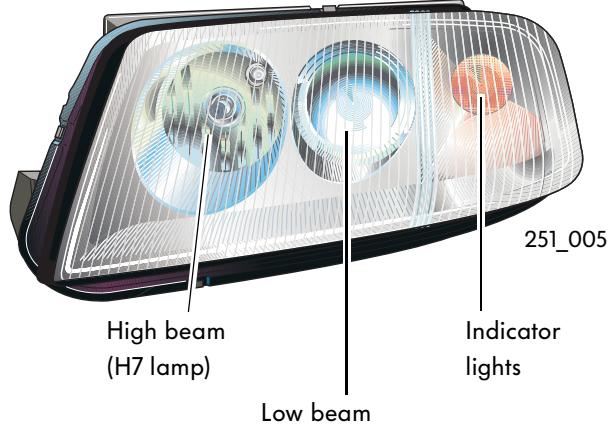
Convenience control  
unit in the footwell left

# The Electrics

## Headlights

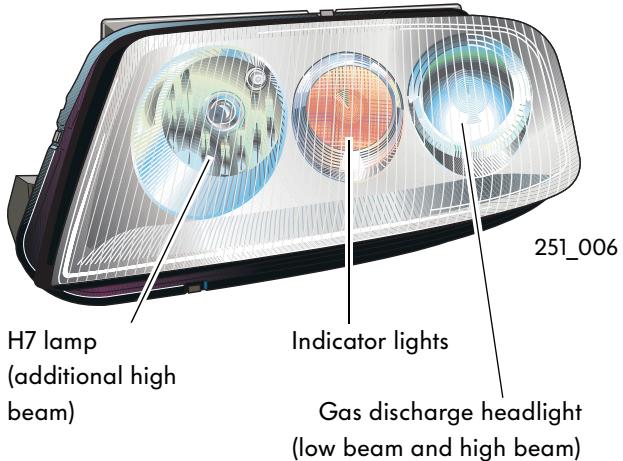
### Standard headlights

Two types of headlights are available for the new Passat. The basic specification consists of a clear glass triaxial ellipsoid headlight with a H7 bulb as a high beam headlight.



### Gas discharge lamp (GDL) with BI-xenon bulb

A BI-xenon headlight is available as an optional extra in place of the standard triaxial ellipsoid headlight. In this headlight module, a gas discharge lamp produces both the low and high beams. The high beam is intensified by a H7 lamp which also bridges the period until the gas discharge lamp has reached its full luminous intensity. The H7 lamp is also used for the flasher function.



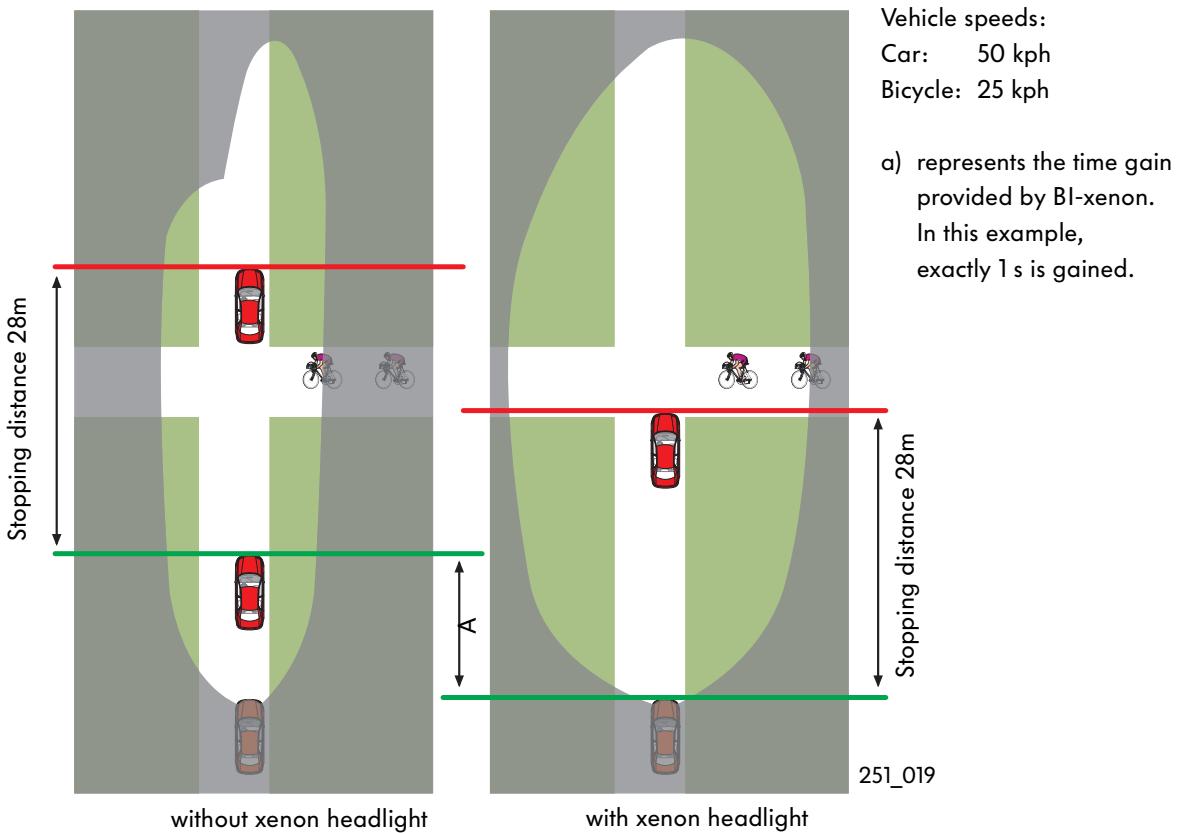
For trips in countries where vehicles drive on the left-hand side of the road, both these headlights can be adjusted from asymmetrical low beam to symmetrical low beam.

Please note the information given in the Workshop Manual.

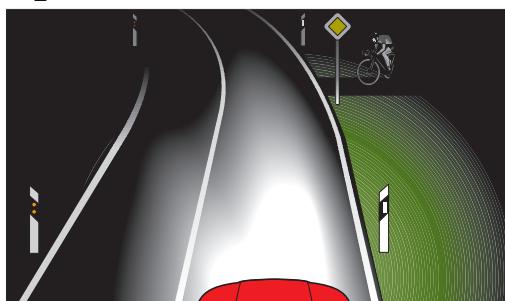
## More light means more safety

The Passat, model year 2001, uses the Bi-xenon headlight system. The system's improved luminous efficiency provides higher active driving safety, because hazards can now be recognised sooner.

The wider range and increased brightness of the light beam enable the driver to recognise hazards and reduce speed earlier. Provided the driver reacts in time, he will be able to stop the vehicle ahead of the hazard and thereby avoid a collision.

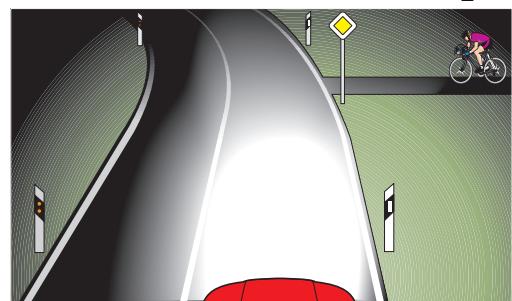


251\_020



Without xenon headlights, the driver does not see the cyclist until much later.

251\_021



With xenon headlights, the driver sees the cyclist earlier and still has enough time to reduce speed.

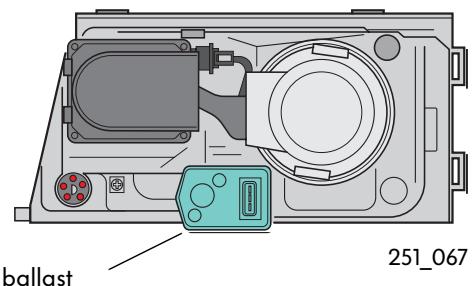


# The Electrics

## Design of a BI-xenon headlight module

The headlight module comprises:

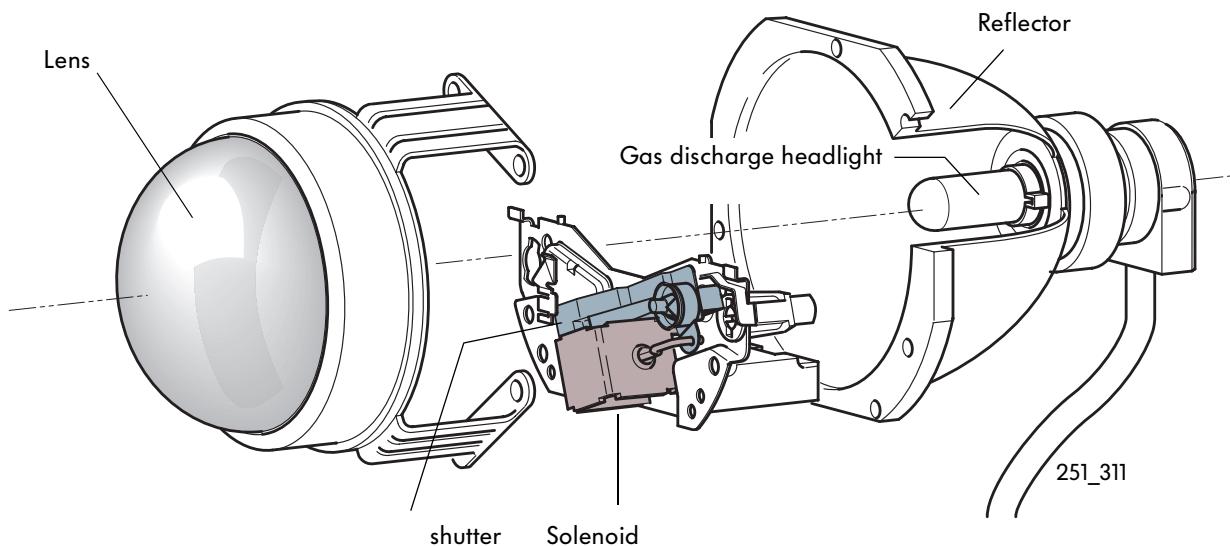
- electronic ballast (EVG)
- headlight range control motor
- conventional light bulbs
- gas discharge headlight module
- housing with bonded clear glass lens

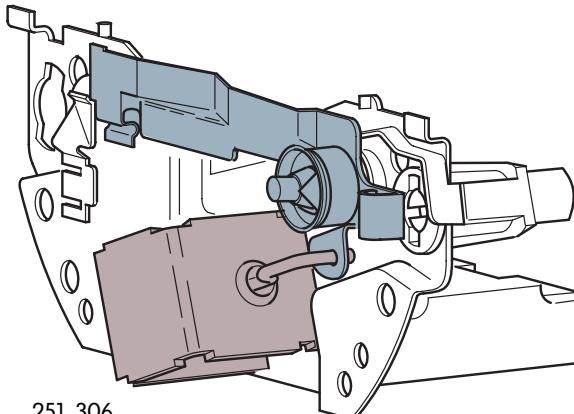


Until now, no single gas discharge headlight has been capable of producing both low and high beams. Hence, it was not possible to adjust the light/dark boundary while driving.

A solenoid-operated mechanical shutter is used to produce the xenon low and high beams.

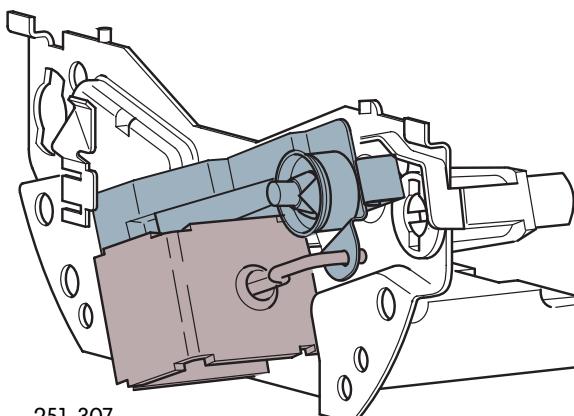
 This mechanism screens off a portion of the light generated in the lamp to produce the low beam.





The shutter screens off part of the light cone generated.

(light/dark boundary)



The shutter is electromagnetically adjusted to produce the high beam. The entire light cone now becomes effective. The H7 lamp is also switched on.



## Statutory requirements

Where gas discharge headlights are used in a vehicle, the following auxiliary equipment is required to be installed to avoid dazzling other road users:

- a headlight cleaning system
- automatic headlight range control

# The Electrics

## Automatic dynamic headlight range control (LWR)

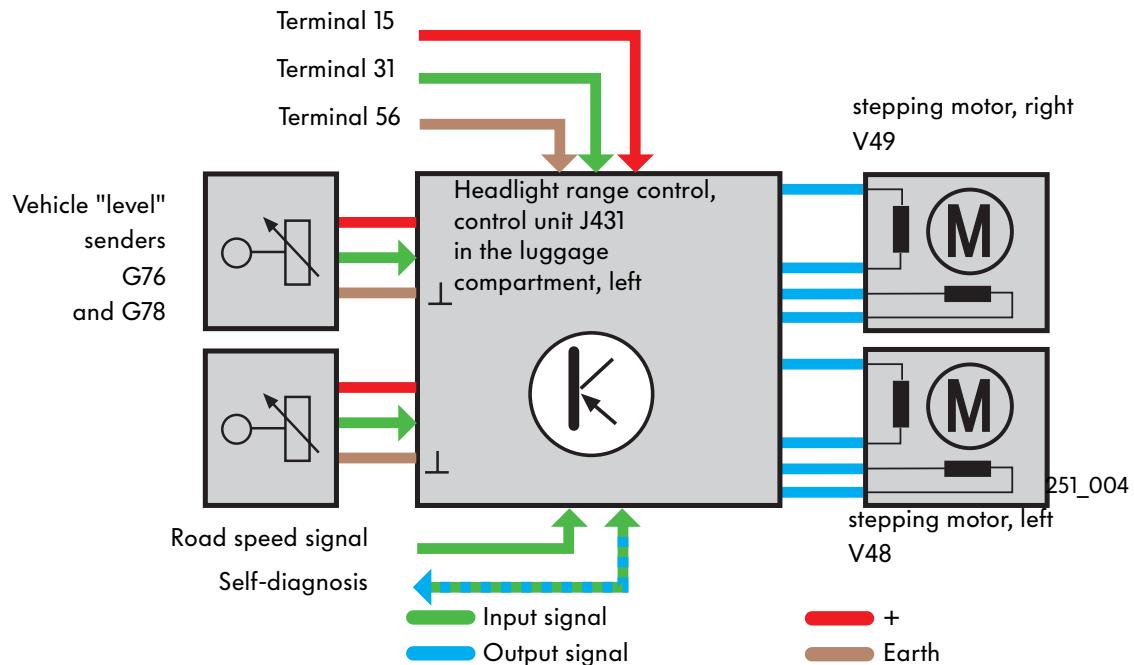
The Passat 2001 with BI-xenon headlights has automatic headlight range control.

### Task

The task of the automatic headlight range control is to adjust the headlights to compensate for variation in ride height as a function of payload.

The automatic headlight range control also compensates for variation in headlight range caused by dynamic effects under braking and acceleration, for example.

The headlight range control system comprises:



### Function:

Headlight range control, control unit J431 receives signals from two level sensors (one on the front axle and one on the rear axle) and the road speed signal. Having evaluated the signals, the system activates the control motors in the headlights and thereby compensates for variation in vehicle level.

The headlight control motors are configured as stepping motors. They can perform the full range of headlight adjustments within approximately 1 second.

The control unit has self-diagnostic capability and can be addressed with address word 55.

## The dash panel insert

The dash panel insert is the Group dash panel insert with blue backlighting and translucent red dials.

The modified design and chrome-bezeled instruments stand out. The instruments are now operated by stepping motors.

The dash panel insert is available in three versions. They mainly differ with regard to the display options in the central display.



251\_049

## New functions

- Integrated third-generation immobiliser control unit (see Immobiliser)
- The interface to the CAN databus, i.e. the dash panel insert, is connected to the drivetrain CAN databus and convenience CAN databus. The rev counter is activated by signals from the drivetrain CAN bus, for example, and the status of the doors/tailgate can be displayed in the dash panel insert via the convenience CAN bus.
- The diagnosis interface (Gateway) in the dash panel insert is necessary for communication between the various CAN databases. Diagnosis data is also transferred via CAN through this interface to the K-wires (see CAN networking).



# The Electrics

## New warning lamps:

Designation	Symbol	Function
Selector lever lock K169		serves to remind the driver to depress the brake. The selector lever lock on automatic transmissions is released in this way
Door/tailgate open warning lamps (K116/K123-K127)		indicates open doors/tailgate. In vehicles with a multifunctional display, this warning is issued as a symbol.
Cruise control system warning lamp K31		comes on when the cruise control system (CCS) is switched on. For vehicles with cruise control system only.
Exhaust emissions warning lamp K83		If a fault detrimental to exhaust gas quality occurs in the vehicle, the fault is saved to fault memory and the exhaust emissions warning lamp is activated.  The exhaust emissions warning lamp begins to flash if there is a danger of the catalyst becoming damaged due to misfiring.

## Third-generation immobilisation

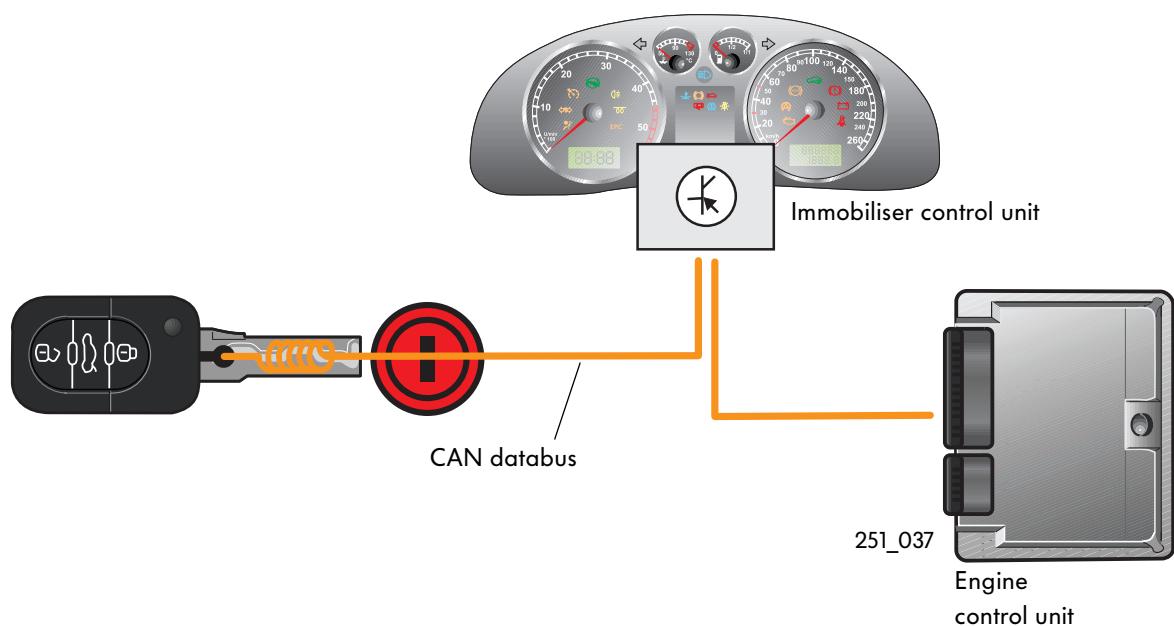
### Function

The first phase (key recognition) is identical to that of function immobiliser II. However, the mode of communication between the engine control unit and the immobiliser control unit has changed.

The engine control unit generates a number (variable code) by means of a random-number generator.

The engine control unit and the immobiliser control unit each calculate a result based on a table of formulae. The engine control unit compares the result returned by the immobiliser control unit with its own result. This process of communication takes place along the CAN databus.

If the results match up, the immobiliser control unit allows the engine to be started.

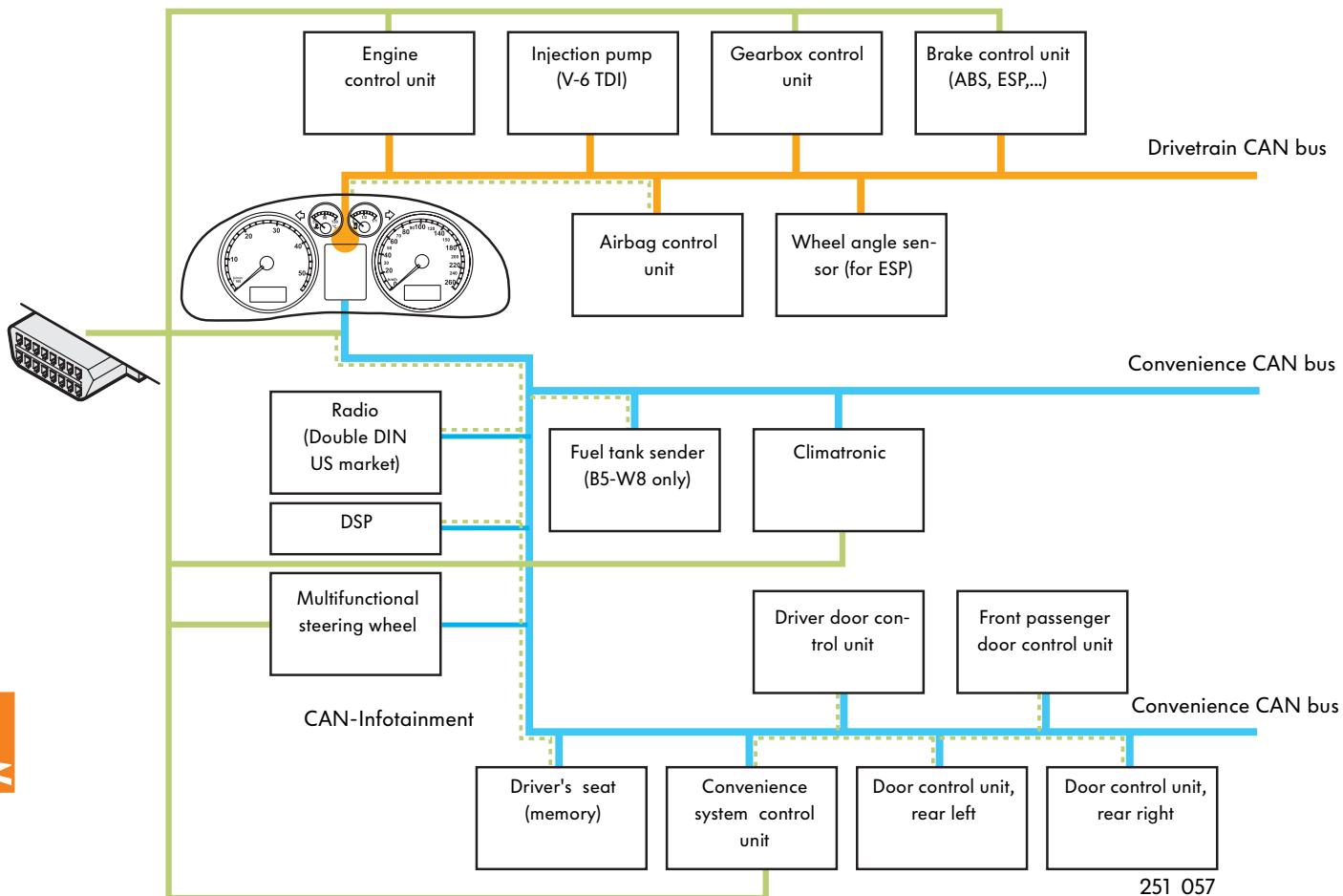


### General notes:

- The keys are marked W3.
- For service personnel, the key adaption procedure is unchanged. The keys are electronically locked while being adapted. As a result, they cannot be used to open any other vehicle.
- The adaptation procedure in case of component parts replacement has changed.

# The Electrics

## Networking of CAN systems



The diagnosis interface (Gateway) is integrated in the dash panel insert and has the following tasks:

- To transfer diagnosis data from the drivetrain CAN bus and convenience CAN databus to the K-wire so that they can be used by the self-diagnosis. This is a basic requirement for self-diagnosis of certain systems (the memory seat does not have its own K-wire, for example).
- To facilitate communication/data exchange between users of a databus and between users of different databus systems.

The Gateway must be informed of the CAN users by means of the "Encode control units" function.

The address word for the Gateway control unit is 19.

All control units from the drive train are connected to the drivetrain CAN bus (highspeed).

All control units for convenience systems are connected to the convenience CAN bus and infotainment CAN bus (physically one databus = low-speed).

The transmission rates of CAN High-speed and Low-speed are 500 kBaud and 100 kBaud respectively, i.e. 500 000 bits or 100 000 bits are transmitted per second.



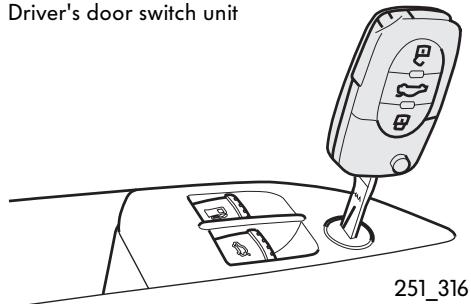
# The Electrics

## Convenience system

The convenience system was modified as follows:

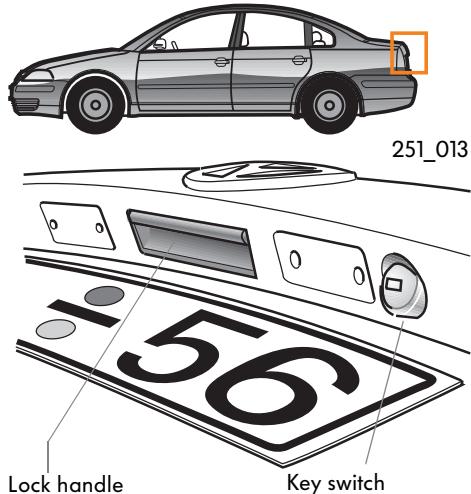
- Standard radio wave remote control with additional button for tailgate remote release (RLR)
- The lock cylinder on the front passenger's side has been deleted.
- New tailgate locking concept  
The tailgate can be released:
  - by pressing the button in the new driver's door switch unit. This function can be disabled by key switch.
  - by means of the handle switch in the tailgate.  
This function can be disabled by the key switch in the tailgate.
  - The radio wave remote control.

Driver's door switch unit



251\_316

Tailgate locking concept



251\_013

 The key switch in the non-visible part of the tailgate has three tasks:



### 1. Basic position

The tailgate can be opened by means of the lock handle.



### 2. Service position

In this position, the tailgate cannot be opened by the lock handle.



### 3. Mechanical emergency opening

251\_038

The CAN databus introduced in the convenience system (Low-speed) of the Passat '97 has been modified as follows:

- the transmission rate has been increased to 100 kBaud from 62.5 kBaud.
- Interface to convenience CAN databus and connection to dash panel insert. This allows an open door to be represented symbolically in the dash panel insert, for example .

## Memory seat

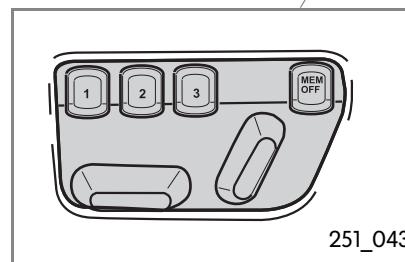
The electronic seat adjustment was improved in the following areas:

- The memory control unit now has a nonvolatile memory which retains stored seating positions while the battery terminals are disconnected.
- It is no longer necessary to initialise the seat after having disconnected a battery.
- The tone generator emits an acknowledgement signal after the seating position is stored.

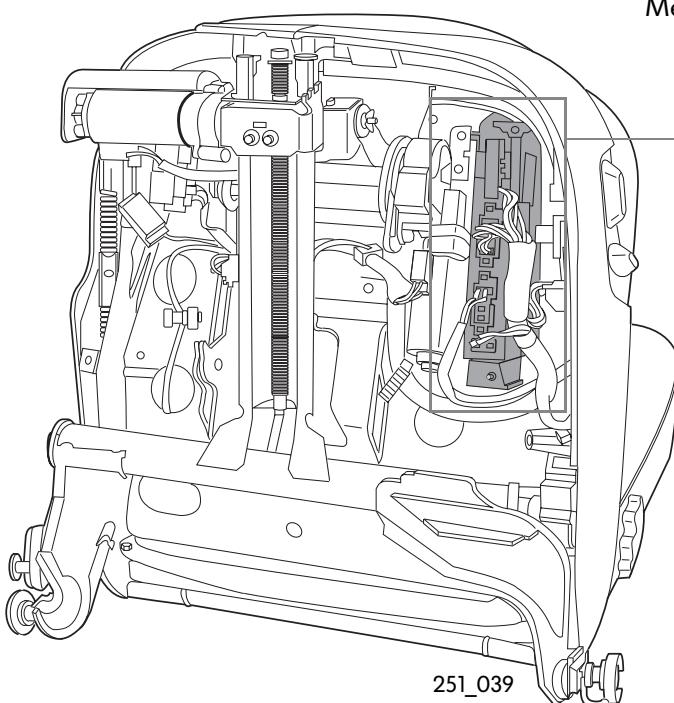
The tone generator is no longer built into the memory control unit, rather it is activated via CAN databus in the dash panel insert.



251\_086



Operator switches for seat adjustment and Memory



Seat/mirror position control unit, driver's side J394

251\_039

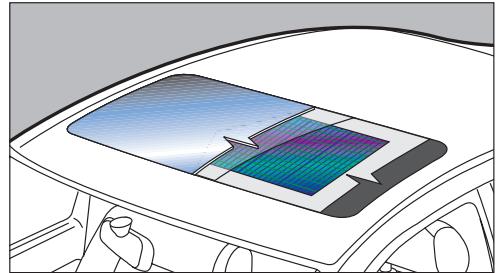
# The Electrics

## Sliding roof/solar roof

The solar roof generates electric current via integrated solar cells. This powers the fresh air blower, which cools down the vehicle interior to approx. 20°C. The system operates when the ignition is off and when the sliding roof is open or tilted.

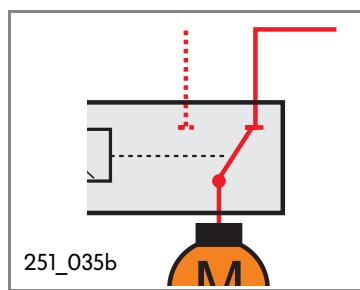
A DC/DC converter is mounted on the underside of the sliding roof.

The DC/DC converter serves the purpose of current/voltage adaptation between the solar generator (solar module) and the blower. It converts the high voltage and low current intensity which the solar module supplies into a low voltage and high current intensity since the blower motor requires a very high starting current.



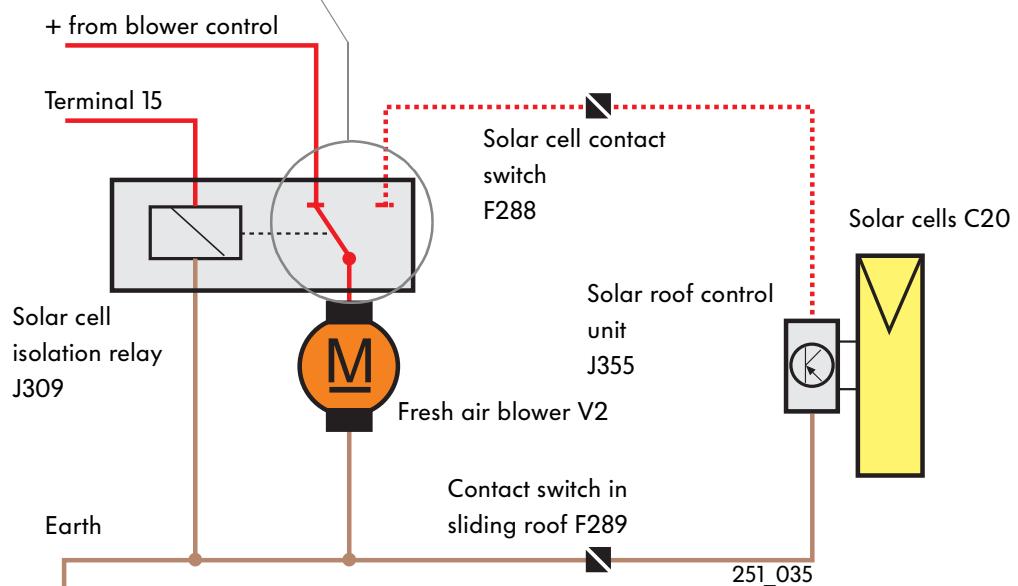
251\_040

An electronic circuit in the DC/DC converter only enables the fresh air blower motor if the voltage is above a threshold value of 2 V. This avoids damage to the blower bearings.



251\_035b

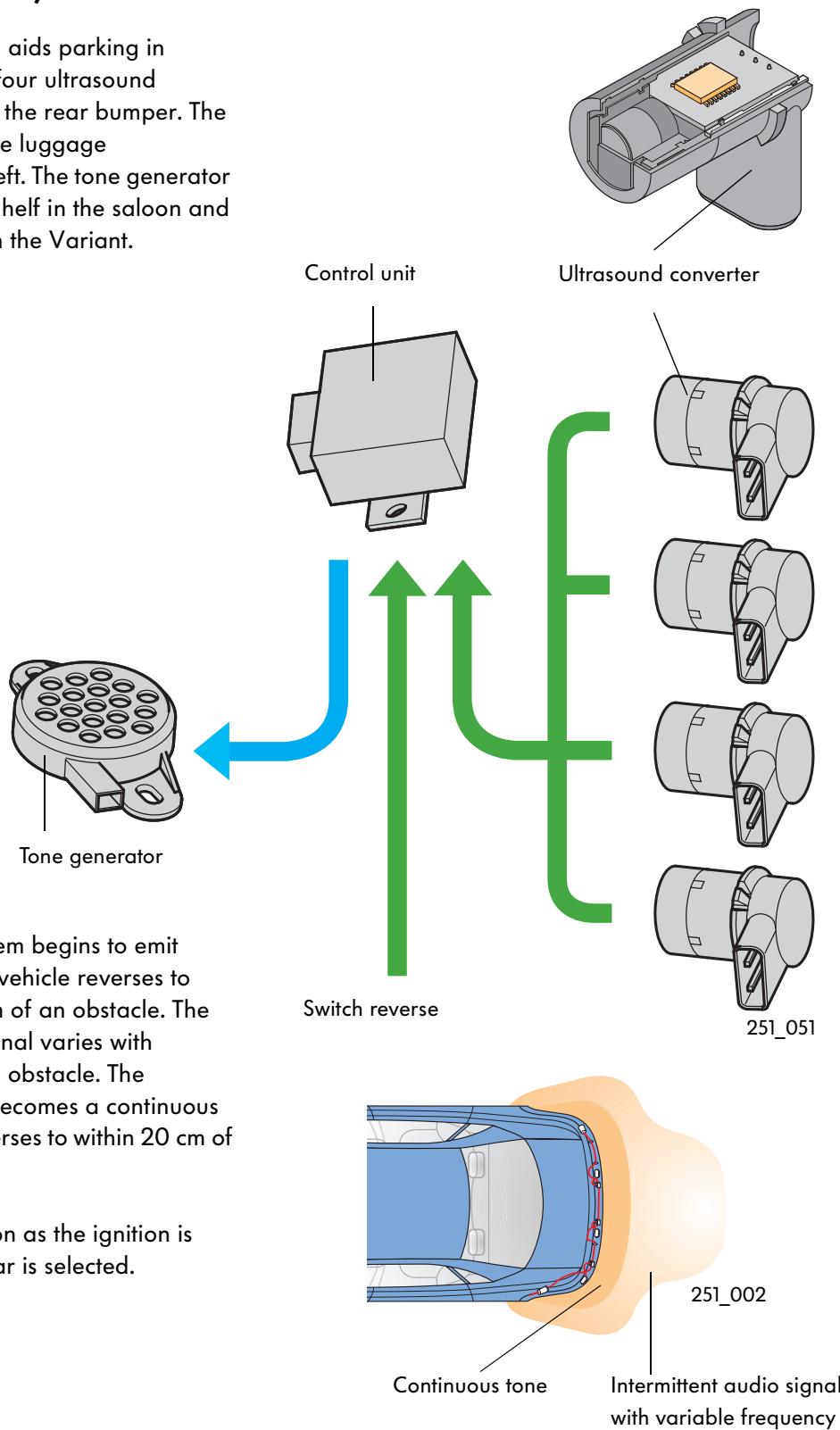
When the ignition is off, the contact is in this position. This allows the fresh air blower to receive its voltage supply from the solar roof.



251\_035

## Distance control (ADK)

The distance control (ADK) aids parking in reverse. For this purpose, four ultrasound converters are built into the rear bumper. The control unit is located in the luggage compartment on the rear left. The tone generator is under the rear window shelf in the saloon and built into the control unit in the Variant.



The distance warning system begins to emit acoustic signals when the vehicle reverses to within a distance of 1.60 m of an obstacle. The frequency of the audio signal varies with decreasing distance to the obstacle. The intermittent audio signal becomes a continuous tone when the vehicle reverses to within 20 cm of the obstacle.

The system is active as soon as the ignition is turned on and reverse gear is selected.



# The Electrics

## The radio navigation system

### MFD radio navigation system with dynamic route guidance

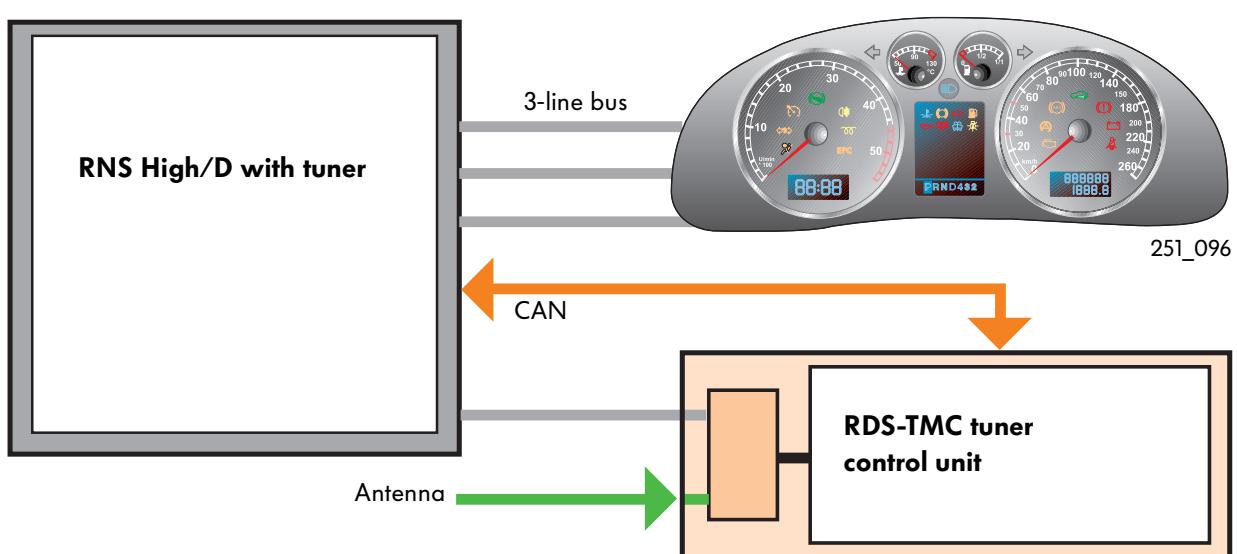
The traffic data used by the system is based on the RDS TMC service which is supported by radio stations and soon to be available throughout Europe. Use of a RDS-TMC control unit allows the driver to freely select a radio station for data reception. This means that TMC data and normal radio are received with different receivers.

All traffic information available within a radius of approx. 200 km is utilised. If the dynamisation function is activated by traffic conditions, the driver is informed of this by the announcement: „The route is being recalculated on the basis of traffic information!“

Traffic delays (road closures, traffic jams and slow-moving traffic) are visualised in the map and are displayed as text messages.

### Glossary

- MFD = multifunctional display
- RDS = Radio Data System
- RNS - High/D = radio navigation with 5" screen and D for dynamic navigation
- TMC = Traffic Message Channel
- CAN = CAN bus with proprietary protocol, incompatible with the CAN databus protocol to VW<sup>1</sup> specification
- GPS = Global Positioning System



A radio navigation system with dynamic route guidance is also available as two-colour display (low-end). In this system the RDS-TMC tuner is integrated in the radio navigation system.

## Radio navigation with dynamic route guidance

### Dynamic route guidance

- Automatic rerouting to avoid traffic delays
- The system assesses traffic delays (road closure in both directions, traffic jam, slow-moving traffic) on the basis of the driving time remaining to destination
- No driver intervention is necessary and the driver can concentrate fully on the road ahead.

In comparison to older systems, which can only display the position of the vehicle on the planned route (static route guidance), the new navigation system also displays information on traffic conditions and updates the planned route to a destination in the event of traffic delays (dynamic route guidance).

To facilitate vehicle navigation, a GPS receiver and a direction sensor are fitted in the vehicle. The system determines and displays the exact location of the vehicle based on acquired data and a digital map. The route guidance function permits navigation to pre-entered destination. By processing digital traffic information broadcast by radio stations the system can reroute the vehicle to avoid traffic delays. The driver is only required to enter his destination. The system takes care of the rest.

The system constantly collects traffic data, even when the ignition is off. The system therefore offers the driver up-to-the-minute traffic information, which can be retrieved when needed. Traffic information is provided in text, graphic or audio form. Since received traffic data first has to be converted into voice in the system, traffic information is available in a range of languages.

The dynamic navigation system is addressed with the same address word as the standard navigation system (37).



# The Electrics

## TMC services

### What is a TMC service?

A TMC (Traffic Message Channel) service is the net result of the activities undertaken by a service provider to broadcast traffic information. To make use of these services, the road user only requires an RDS-TMC receiver.

### Public and private

TMC services for broadcasting general traffic information are freely available in all European countries.

These messages relate to road safety and various traffic delays. Europe's free and public services are collectively known as the "ALERT Service". Other TMC services will not be provided free of charge.

These services relate to value-added information or messages intended for special user groups.

### Services provided in Europe

European TMC services - public and private - are already available. A network providing European-wide coverage was in place by early 2000. Each service relates to a country in which it provides either regional or nationwide coverage. By agreement, all national or international service providers provide cross-border traffic information for long-distance drivers.



### How TMC services work

- Code numbers (TMC Location) have been assigned to all sections of motorways and major trunk roads.
- Traffic events (road closure, traffic jam, slow-moving traffic) have event codes (TMC Events) corresponding to the extent of the traffic delay (e.g. length of tailback).
- The navigation computer can refer the TMC Locations and Events to the maps which it uses for navigation purposes by means of a conversion table.
- All data are broadcast nationwide in the same form.
- As soon as the system receives information on traffic delays on sections of the planned route, it reevaluates their viability. If the system deems recalculating the route necessary, it may include a detour where required.

## Radio navigation system with TV

The TV function is an extended function of the navigation system. All terrestrial programs can be received with the TV tuner.

Terrestrial programs are all programs that can be received using a normal antenna, and not programs that can only be received by satellite.

The TV tuner is compatible with all current broadcasting standards such as PAL, NTSC or Secam. The broadcasting standard used for TV reception in the country of delivery is preset at the factory. Teletext is also possible.

Currently available stations are identified automatically. The system automatically tunes into the frequency band which provides optimal reception. When the vehicle leaves a broadcasting area and enters, for example, an area with no radio reception or a silent zone, it enters automute mode.

The equipment includes a preinstalled wiring harness for connecting external equipment such as a video recorder or a notebook. However, this connection is currently unavailable to the user.

The TV is inactive while the vehicle is running.

The TV tuner has a self-diagnosis function which is activated by address word 57.

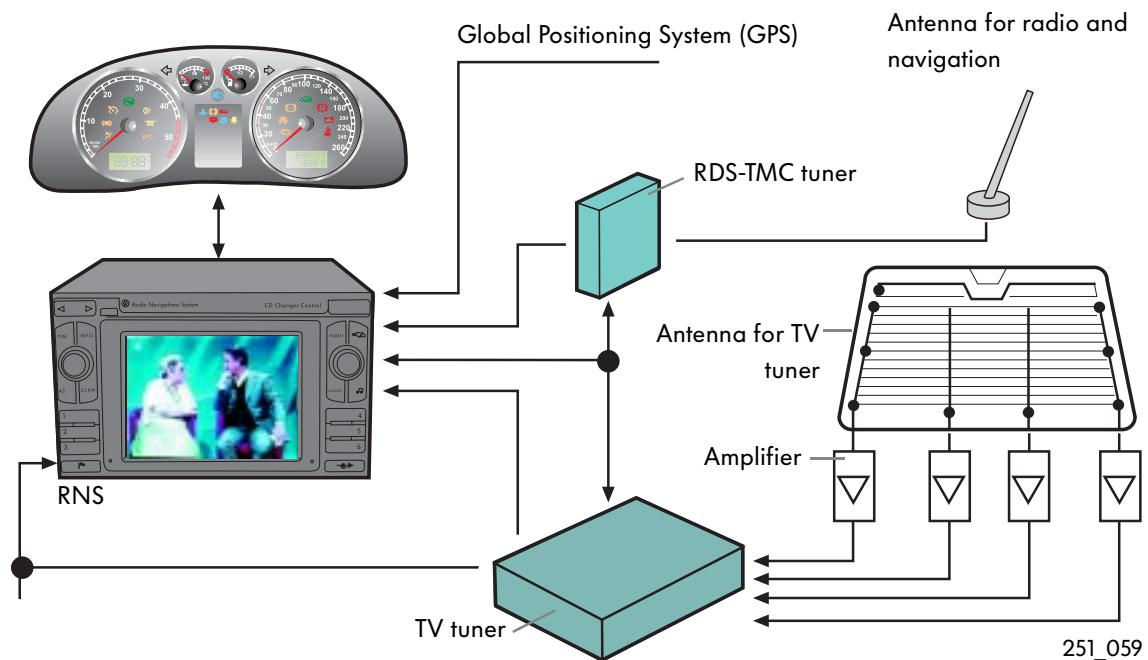


# The Electrics

## Dynamic navigation with TV tuner

The system which provides dynamic navigation and TV tuner includes the following components:

- radio navigation system (RNS) with multifunctional display
- window aerial with amplifier
- TV tuner with control unit in the luggage compartment on the left



251\_059



The antenna for the TV tuner is integrated in the rear window in the saloon and in the two rear side windows in the Variant.

## Pre-installed wiring harness for telephone installation

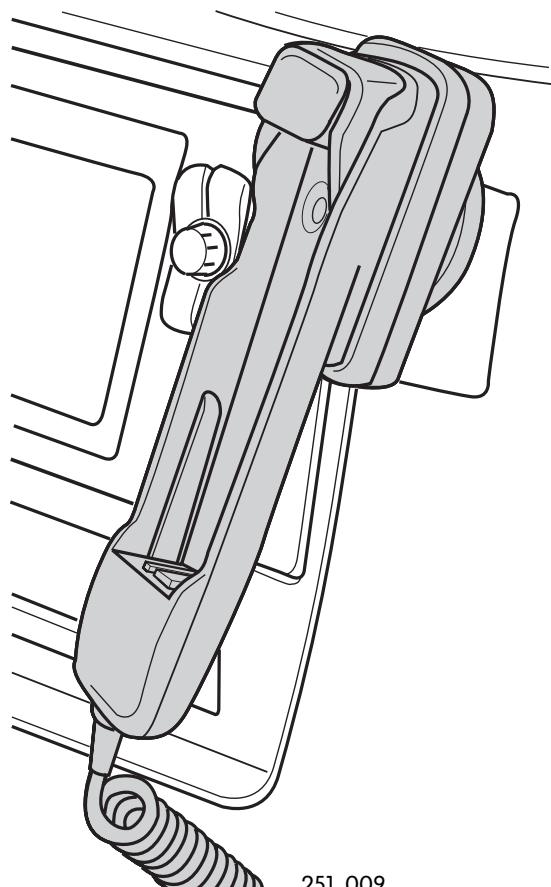
A wiring harness for connecting a mobile phone is available for the Passat 2001. The mobile phone rest is attached to the dash panel. The mobile phone is connected to an interface box fitted below the armrest.

The interface box is the interface between the mobile phone, the vehicle electrical system and the antenna.

When the mobile phone is placed in the rest, the driver can make a telephone call using the hands-free facility. The radio enters automute mode while a phone call is being conducted.

The telephone number can be dialled on the mobile phone. Voice dialling is also possible if the mobile phone provides this facility.

The mobile phone rest is available in two versions.



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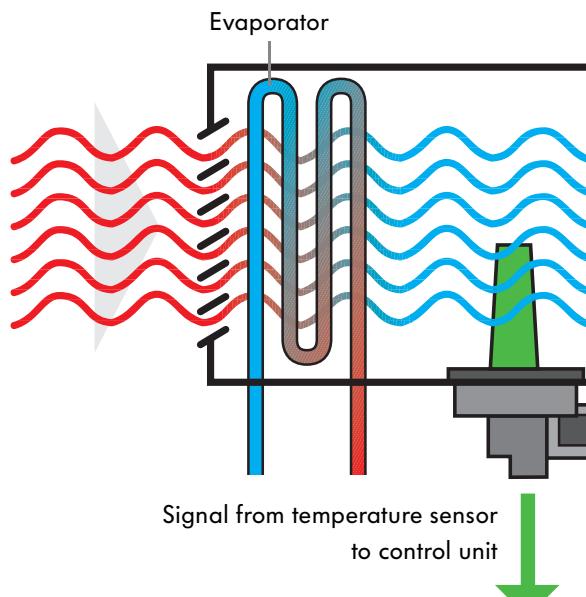


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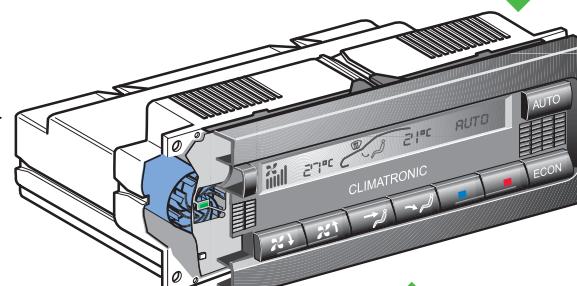
## The heating and air conditioning system

The Climatronic air conditioning system has been provided with an additional temperature sensor, as compared to the previous model.

The temperature sensor is built in the air duct on the outlet side of the evaporator. It is designated "Evaporator vent temperature sender G263". This sensor provides the Climatronic control unit with a continuous stream of data on the air temperature on the outlet side of the evaporator.



Climatronic control unit  
(behind the operating unit)



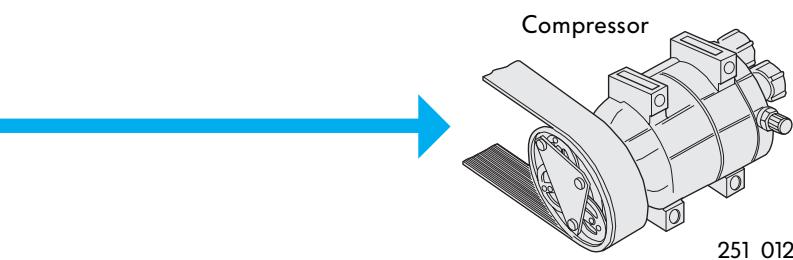
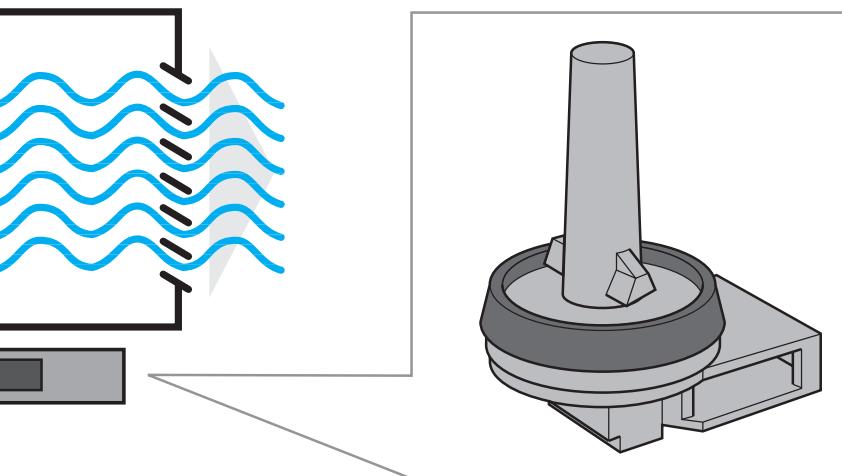
Climatronic has an additional new feature:

The Climatronic control unit receives a signal from the wiper motor. When the wiper motor is running, blower output and temperature are raised slightly so as to avoid windscreens fogging.



Windscreen wiper system

This allows the ambient temperature (G17 and G89) and the air outlet temperature on the outlet side of the evaporator to be checked and the control unit to control compressor shutoff more precisely. Dehumidification of the vehicle interior is improved because the air is dried more quickly. Windscreen fogging is thereby largely eliminated.



## Self-diagnosis

A fault in the temperature sensor is entered in the control unit's fault memory. The signal from the sensor can be checked in the self-diagnosis data block.

# Index

## Index

### A

ALUMINIUM CYLINDER HEAD WITH ROLLER CAM FOLLOWER (RSH) - SSP 196

### B

BELT TENSIONERS/BELTS - SSP 192

BUILT-UP CAMSHAFT - SSP 243

### C

CAMSHAFT TIMING CONTROL - SSP 246

CRANKCASE VENTILATION - SSP 241

### D

DOUBLE WISHBONE REAR SUSPENSION - SSP 194

### E

ELECTRIC THROTTLE DRIVE - SSP 210

### F

FIVE- AND SIX-HOLE INJECTORS - SSP 241

FRONT AIRBAGS - SSP 192

FRONT AXLE- SSP 167

### G

### H

HYDRAULIC POWER STEERING - SSP 191

### I

INJECTION PRESSURE - SSP 241

INJECTOR - SSP 241

ISOFIX - SSP 192

### J

### K

KNOCK SENSORS - SSP 233

### L

### M

### N

### O

### P

PLANAR PROBE BEFORE CATALYST - SSP 231

### Q

### R

RACK-AND-PINION STEERING - SSP 191

RADIAL-PISTON DISTRIBUTOR INJECTION PUMP - SSP 241

ROLLER CAM FOLLOWER VALVE GEAR - SSP 196

# **Index**

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## **Index**

### **S**

### **T**

TORSION BEAM REAR SUSPENSION - SSP 102

TRAPEZOIDAL CONROD - SSP 209

TUMBLE INTAKE PORT - SSP 198

TURBOCHARGER - SSP 190

### **U**

### **V**

V-6 TDI ENGINE - SSP 183

### **W**

### **X**

### **Y**

### **Z**



# Notes

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## Notes

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