

The Passat '97

The Presentation

Construction and operation

Self Study Programme





The most remarkable features of the new Passat are its:

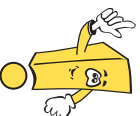
- High economy
- Dynamic body styling
- High-quality interior equipment designed with great attention to detail
- Pioneering safety engineering

In this booklet, we would like to provide you with an initial overview showing how we justify making these claims.

The Passat '97	_____	04
Environmental Protection and Recycling	_____	08
Body	_____	10
Vehicle Safety	_____	15
Engines and Gearboxes	_____	19
Running Gear	_____	26
Brakes	_____	29
Steering	_____	30
Electrics	_____	31
Extended Systems	_____	36



Important ! / Note



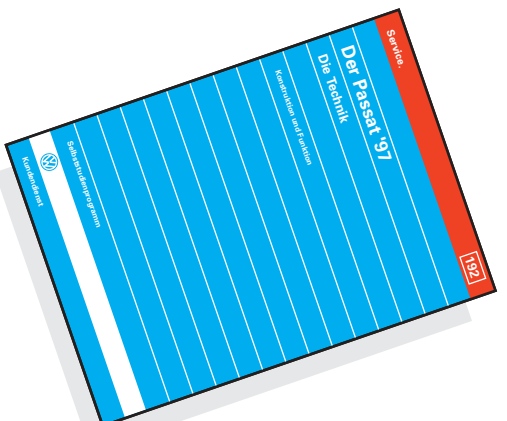
New

The Self Study Programme is not a Workshop Manual.
Please refer to the relevant Service Literature for all inspection, adjustment and repair instructions.

The Passat '97

To avoid confusion, concise examples are used to illustrate the various aspects of this all-embracing vehicle concept.

You can find detailed information in Self Study Programme No. 192 Passat '97 – The Engineering.

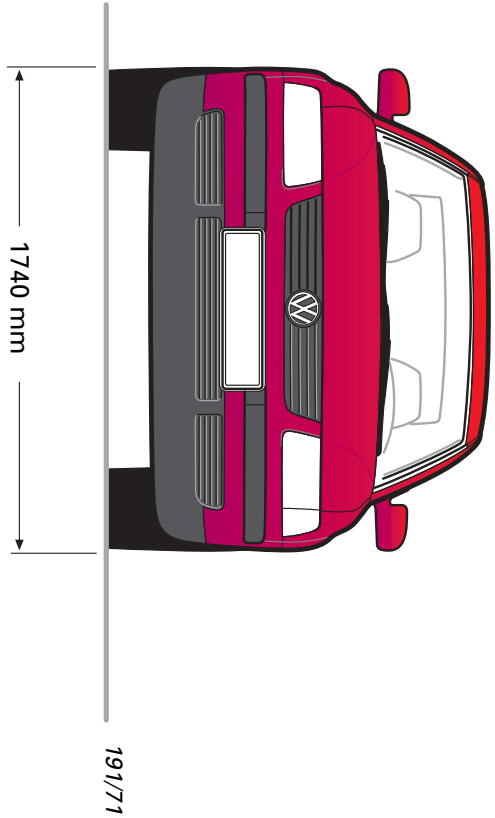
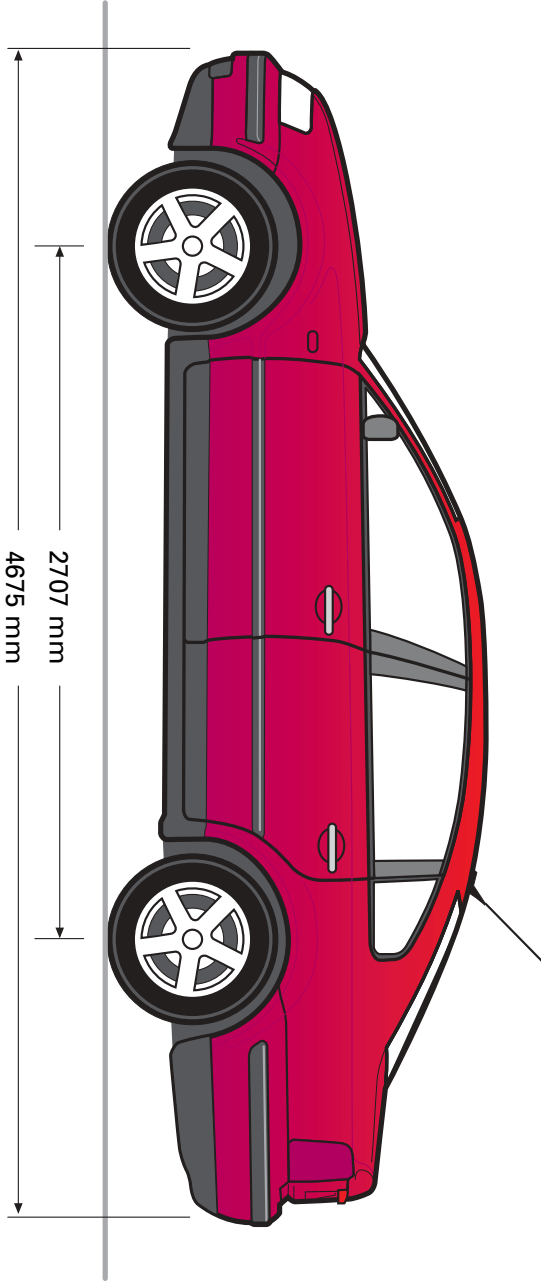


191/86



191/73

Dimensions and Weights



Track widths		Weights	
front	1498	Unladen weight	appr. 1200
rear	1500	Max. permissible weight	appr. 1805
	mm		kg

The Passat '97

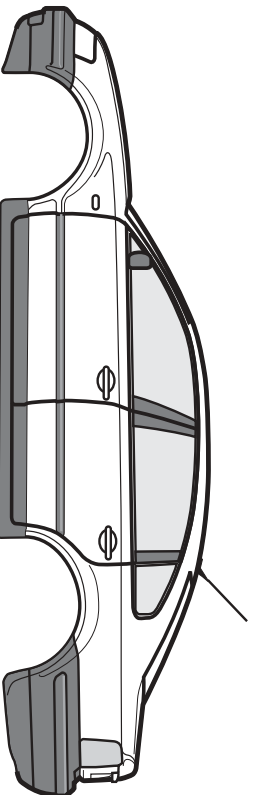
The Platform - an Advantage for Workshops

The term “platform” is frequently used in publications although its fundamental meaning is not explained. The result of this is that people are often unsure of what the term “platform” implies.

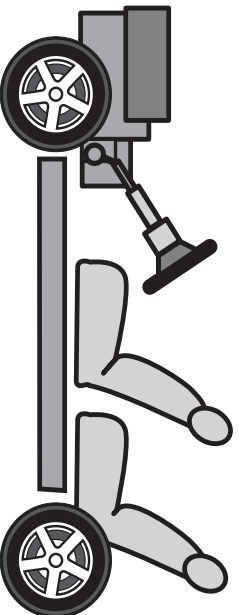
The vehicle consists of a) the platform and b) the body.

Design and vehicle characteristics dictate what form the body takes.

In the eyes of the customer, the body characterises the styling of the vehicle as a whole.

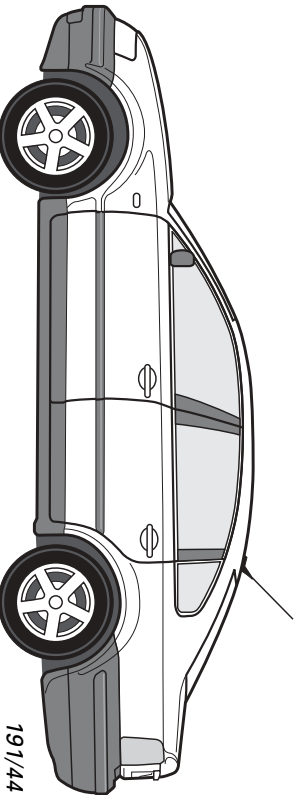


The body



191/76

The platform



191/44

The Passat '97

Platform

The platform comprises both common parts and system parts.

Common parts

e.g. sliding sunroof, steel rim

Common parts may only be used in platform vehicles without change.

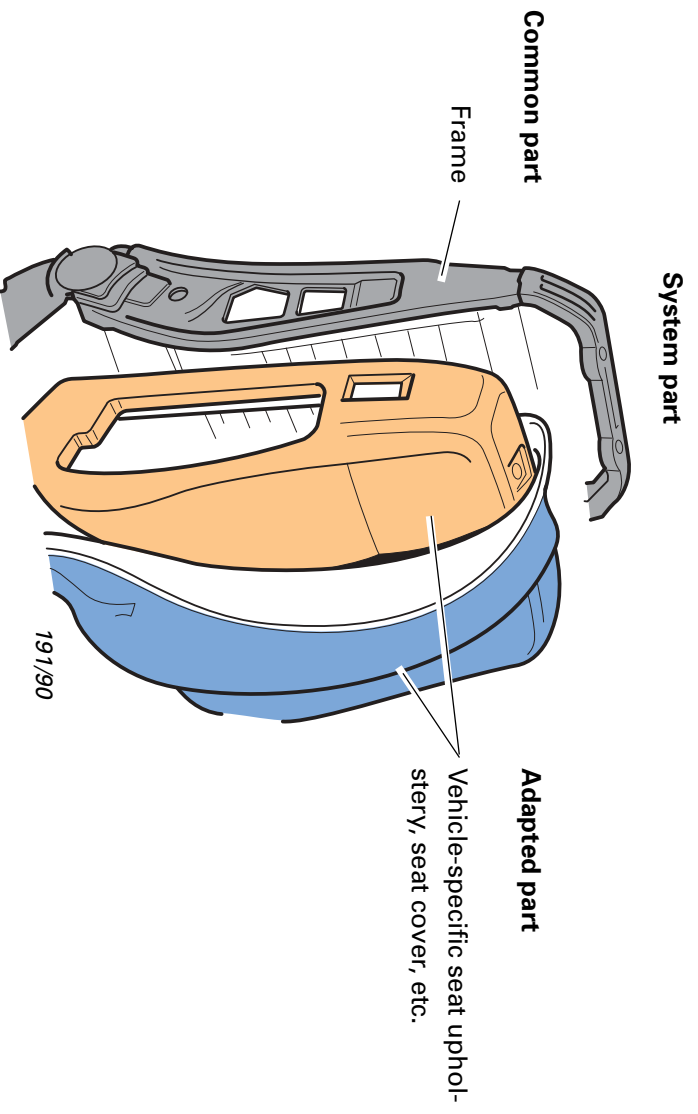
They do not influence the design of the vehicle.

System parts

e.g. seat

Some system parts are identical.

They have to be adapted since they are the interface between the platform and body.



The advantages for workshops like yourself are:

- More clarity as regards the spare parts situation
- Simplified inventory management
- Fewer different special tools and fixtures
- Easier assembly and repair

Environmental Protection and Recycling

The concept of eco-friendliness was pursued consistently throughout development of the new Passat.

We would now like to show you some aspects of this topic which are also of interest to workshops.

Recycling

Not least the recycling requirements present workshops with problems such as identifying, presorting and storing materials and waste operating media.

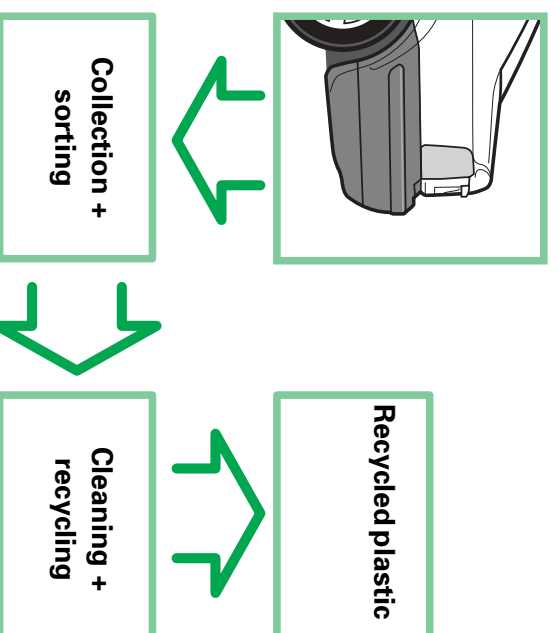
- To achieve this, the following measures were taken:**
- Identification of plastic part materials
 - Fewer composite materials
 - Reduction in fine sealing through the use of laser welding
 - No parts containing CFCs are used.

Take bumpers for example:

Bumpers were previously manufactured from composites. What the term "composite" means is that different materials are combined with one another in such a way that subsequent separation into clean material streams is no longer possible.

If a plastic is to be recovered for recycling, it should, if possible, be sorted according to type for recycling purposes. This means that different types of plastic, for example, must not be mixed with one another.

The bumpers on the Passat are recyclable because they do not contain composites.



191/67

Solvents

Even during production, every effort is made to keep environmental pollution to a minimum.

To achieve this, the following measures were taken:

- Full galvanisation means much less wax and PVC underseal
- Water-dilutable paints including water-based clear coat
- Stringent requirements for materials ensure lower emissions in the vehicle interior

Energy + Resources

Raw materials and energy are in limited supply on the planet Earth.
We must use them sparingly.

To achieve this, the following measures were taken:

- Less energy consumption during production through the use of new joining techniques (e.g. laser welding) and complete assemblies (e.g. side section of body),
- Full galvanisation and an 11-year warranty against corrosion perforation ensure high value retention and conservation of resources.

Take laser welding for example:

During laser welding, a highly concentrated light beam with a high energy content is used instead of a gas flame to join the components. No additional welding material is required, as is the case during MIG welding for example. Laser welded seams are extremely clean and do not need to be reworked.

Laser welding offers a more favourable energy balance than conventional welding techniques.



191/03

Body

The following will be of interest to you:

- The Passat in the wind tunnel
- Fully galvanised body
- Greater body rigidity
- Use of high-strength steel parts
- Strategy of using common platform for body parts
- Ease of repair demonstrated using door module as example
- Rear collision demonstrated using bumper as example

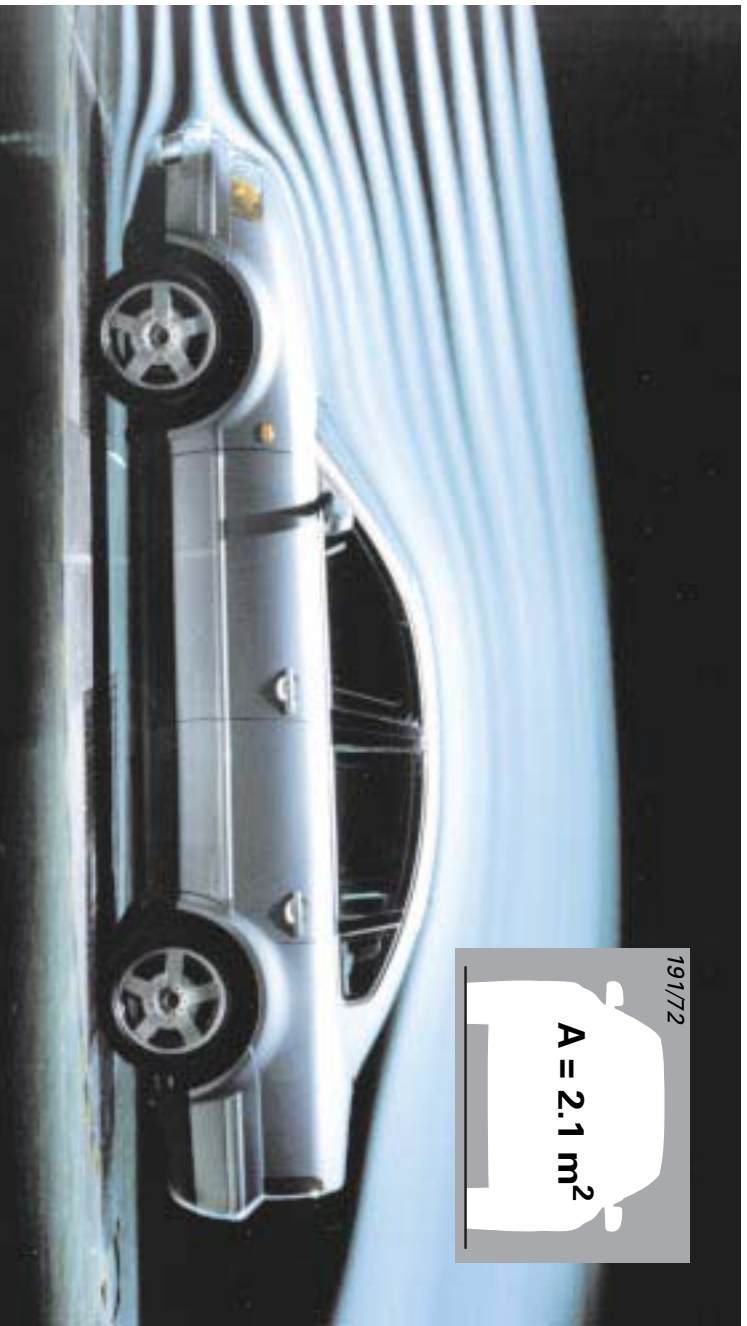
The Passat in the Wind Tunnel

As you can see from the streamlines, the body of the new Passat is very aerodynamic.

No turbulence, which increases aerodynamic drag, occurs.

The new Passat has a drag coefficient of $c_d = 0.27$, making it the best in its class.

Accounting for the projected vehicle area (A) of 2.1 m^2 , aerodynamic drag is ($C_d \times A$) $= 0.567 \text{ m}^2$.



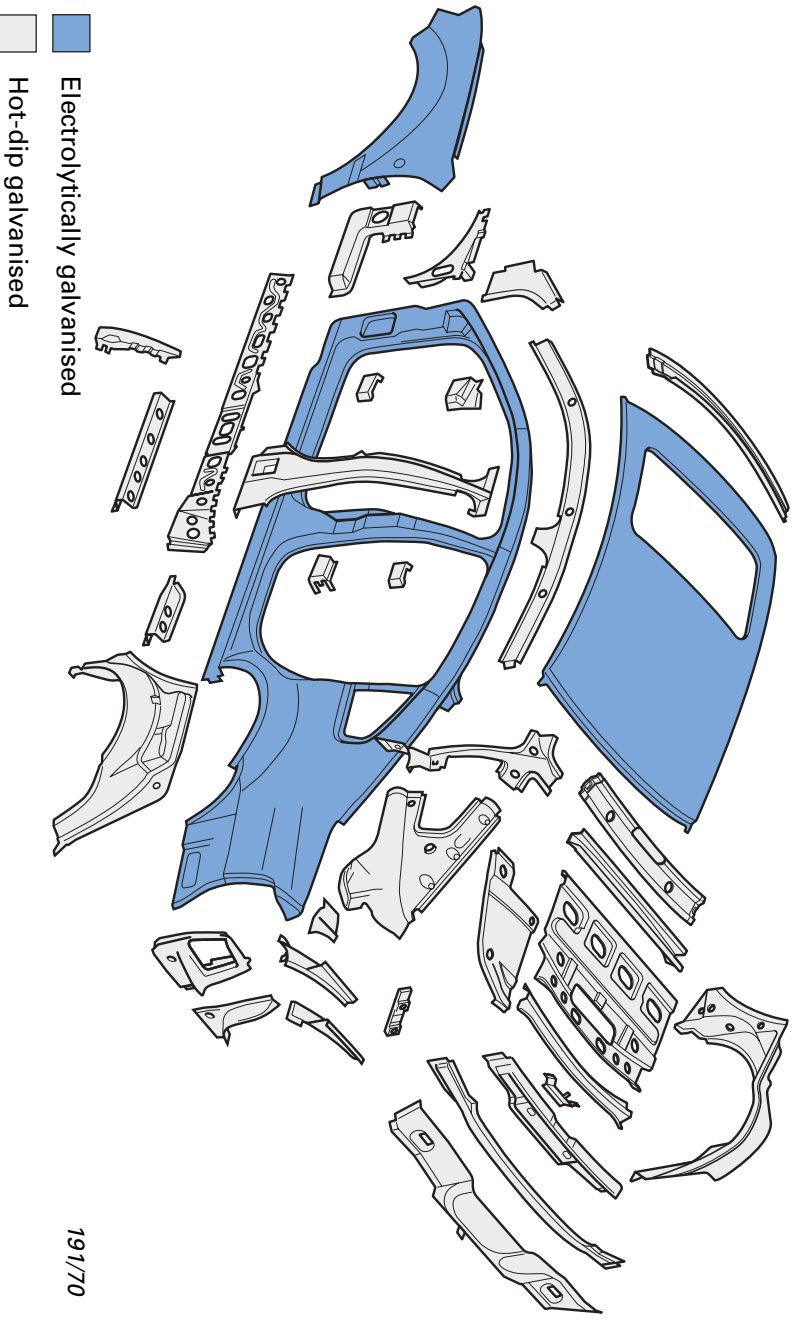
191/02

Fully-galvanised Body

For the first time, the Passat has a fully galvanised body which comes with an 11-year anti-corrosion perforation warranty.

The drawing below shows you the parts which are hot-dip galvanised and those which are electrolytically galvanised.

Surface patterns, which are also visible after painting, emerge during the hot-dip galvanisation process. That is why the outer skin of the body is electrolytically galvanised to produce a smooth finish.



Body

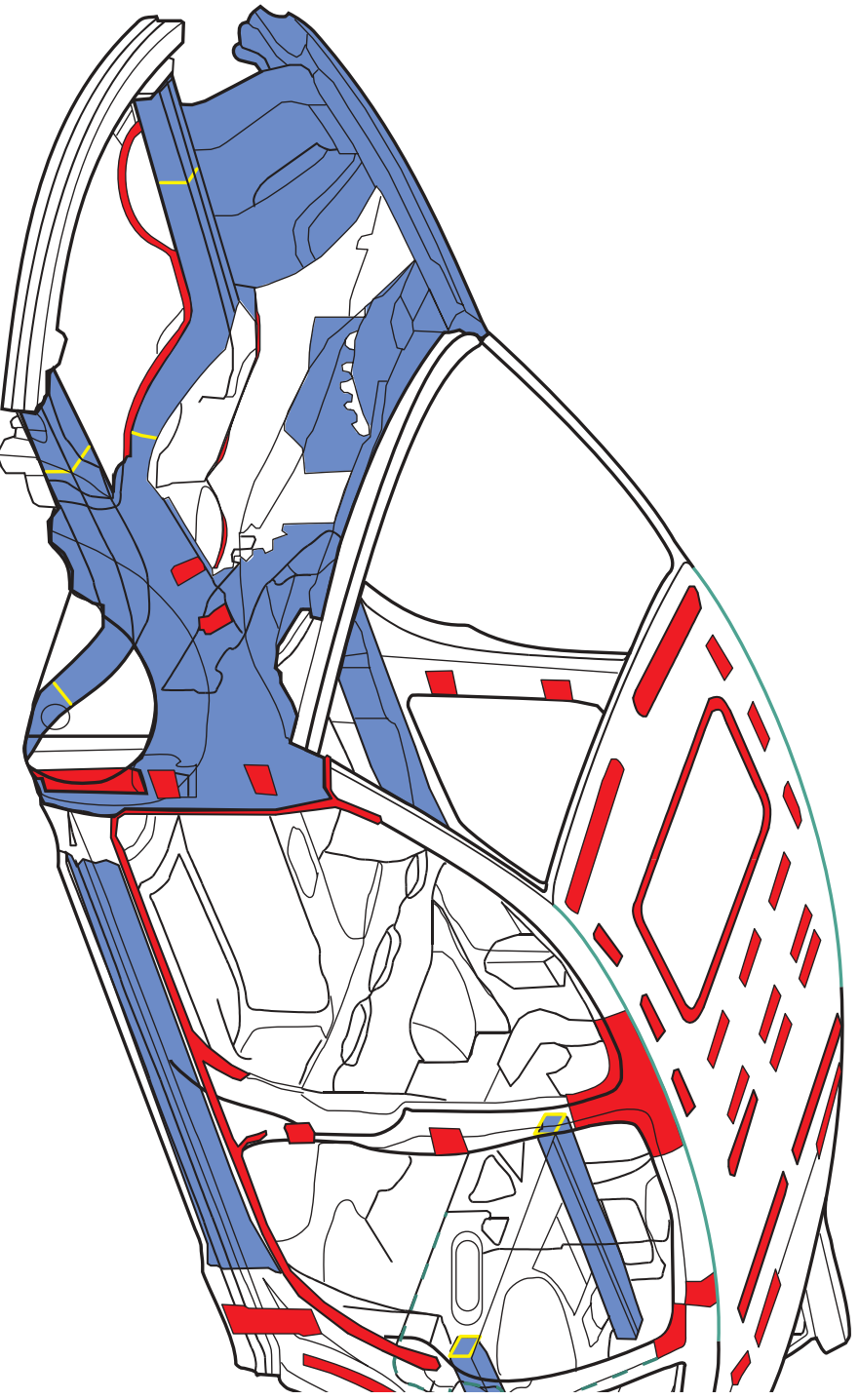
Stability and Structure

The Passat leads its class in terms of torsional rigidity.

This was achieved by using:

- high-strength panels
- different panel thicknesses
- improved adhesive bonding techniques (e.g. adhesive joints)

Adhesive joints increase rigidity and leakproofing while minimising noise levels.



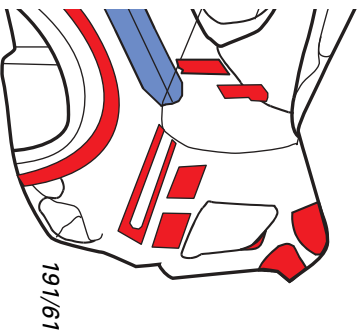
High-strength Panels

High-strength panels are used to produce a body with greater stability and strength and therefore to provide more safety for the vehicle occupants. They also substantially reduce the weight of the body-in-white.

As you can see, the high-strength steel components in the front section of the vehicle create a cage-type structure to protect the vehicle occupants. The wings are also manufactured from high-strength steel.

Advantages:

- Less weight
- Greater resistance to buckling
- Higher strength



High-strength panels

Adhesive joints

Laser-welded

Mash seam welded

The Rear Bumpers



Repairing damage to the rear bumpers previously involved expensive repair and welding work, even after minor accidents.



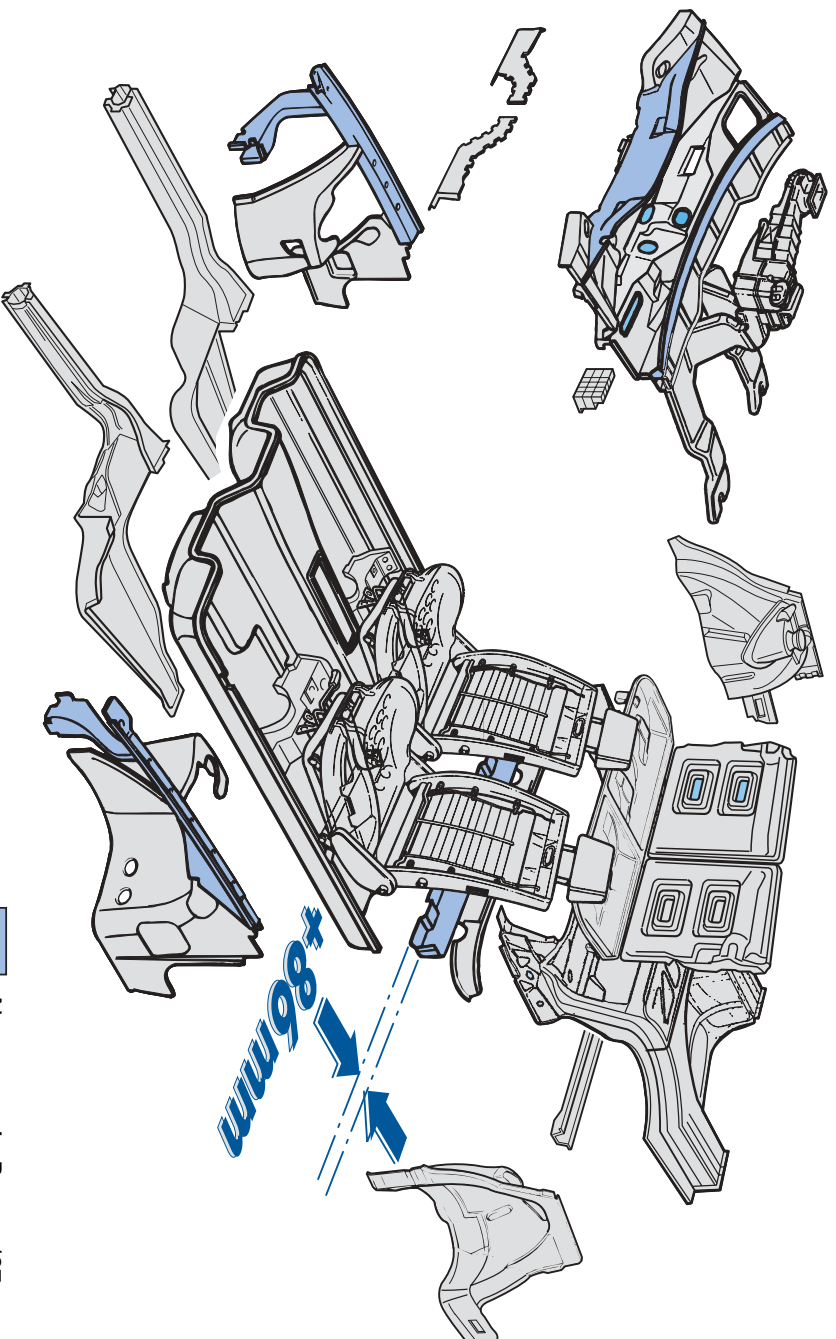
The bumpers on the Passat '97 have the capacity to absorb so much energy during a low-speed rear collision that only plastic parts have to be replaced. Time-consuming welding work is no longer necessary.

Body

Body Platform

The floorpan assembly, side members and luggage compartment floor assembly were adopted from the Audi A4 as a platform.

To enhance ride comfort for rear-seat passengers, a steel floor plate 86 mm wide was inserted.

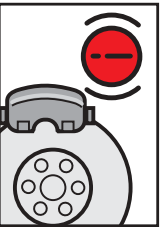
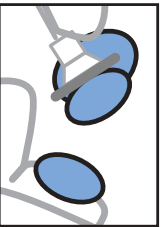
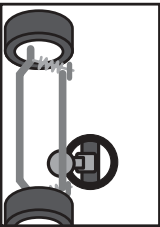
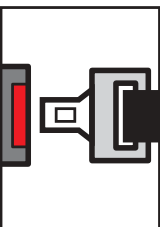
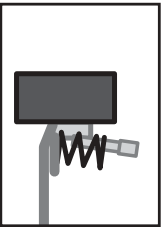
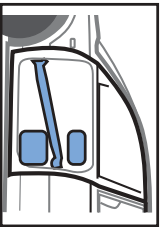
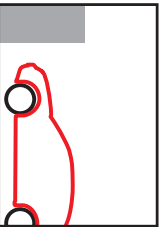
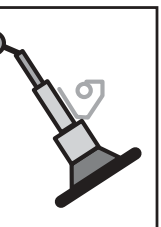


Vehicle Safety

The following features will be of interest to you:

- Active and passive safety
- ABS as standard
- The Passat already complies with the new European standard for crashworthiness
- Door module with enclosed subframe
- Driver, front passenger and side airbags as standard
- New seat belt tensioner with force limiter
- Inside door panels with pelvis paddings

As you will no doubt already know, we make a distinction between active and passive safety.

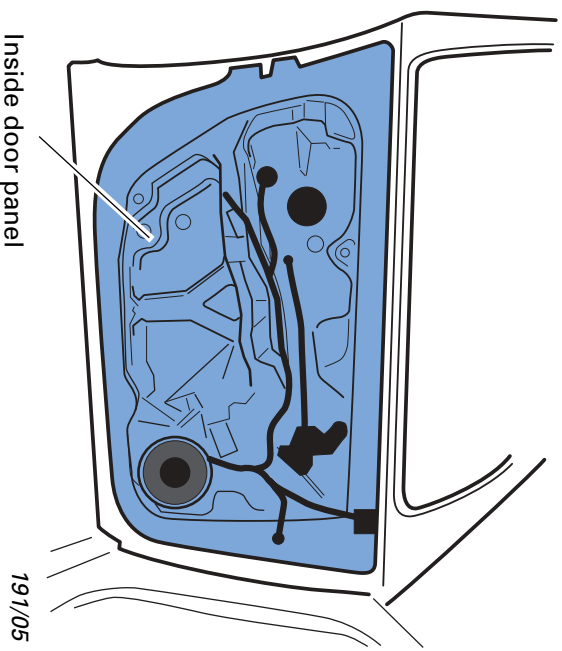
Active safety	Passive safety
 Braking systems	 Airbag systems
 Steering	 Restraint systems
 Running gear	 Inside door panels and side trims with integral pelvis paddings
	 Safety body
	 Steering column

Vehicle Safety

Crashworthiness

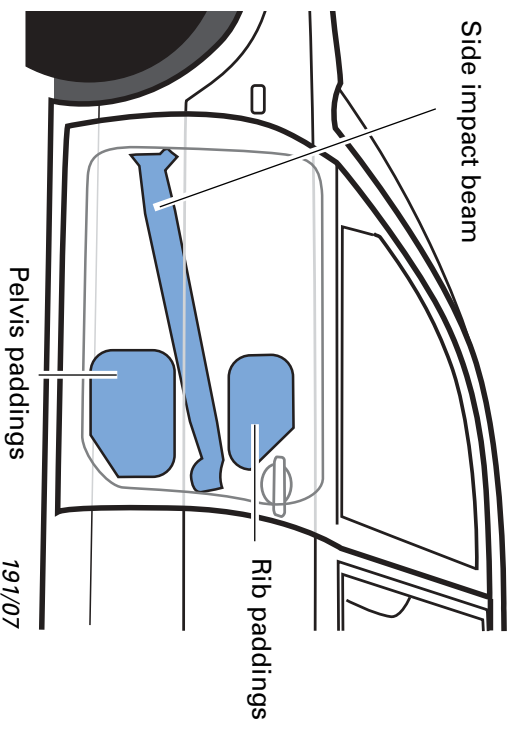
The new Passat offers the driver and front passenger more safety, particularly during a side impact.

The inside door panel, which is fitted complete with built-in door fittings, is bolted to the door. To protect the occupants, the inside door panel has an enclosed surface to prevent intrusion of the built-in door fittings into the interior of the vehicle.



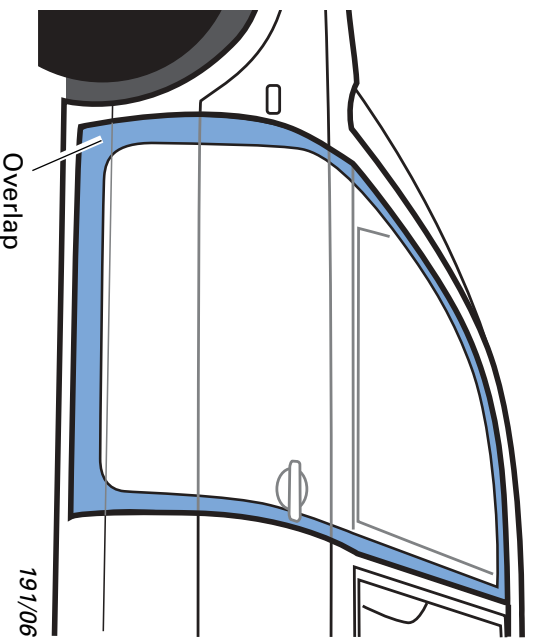
The side impact beams made of pressed sheet metal are arranged diagonally and glued to the outer panel to increase door rigidity.

Impact energy can therefore be better absorbed, distributed and converted. Pelvis and rib paddings give the vehicle occupants added protection.



The size of the overlap between the door and the sill, columns and side section has been increased.

Deformation strength is increased due to the larger contact surface.



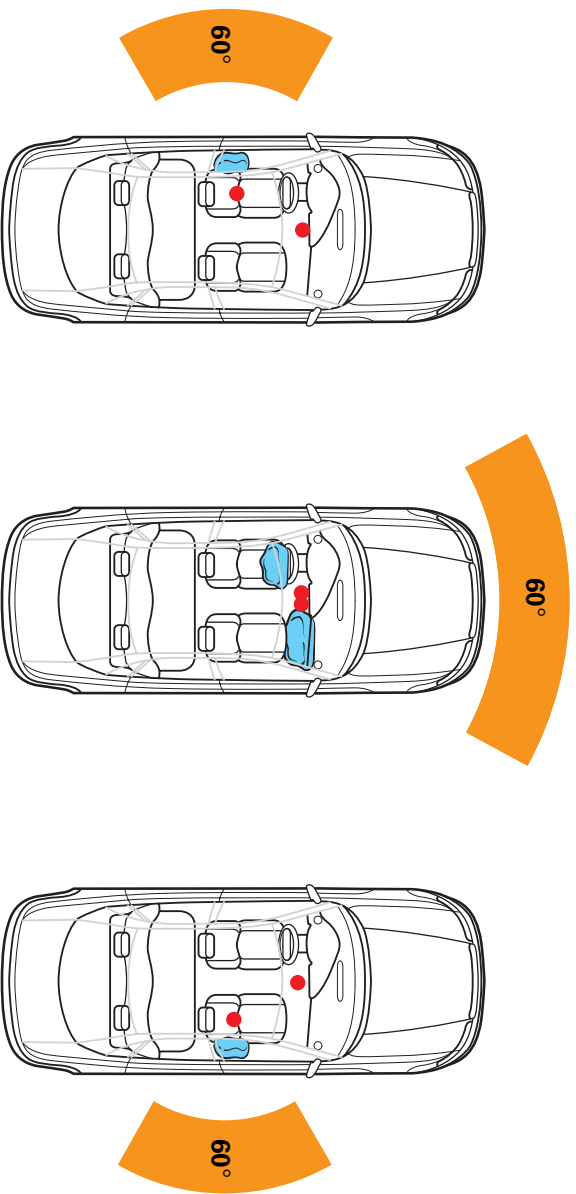
Airbag Systems

In addition to the driver and front passenger airbags, the Passat is equipped with side airbags as standard.

Depending on the side and angle of impact, only the airbags in the immediate vicinity of the danger zone are inflated.

Therefore, an uninflated airbag on the side facing away from the accident need not necessarily be defective.

The driver and front passenger airbags, which have filling volumes of roughly 65 ltr. and 120 ltr. respectively, conform to the new international-standard airbag sizes.
The volume of the standard side airbag is roughly 12 litres.



191/04

**Side impact,
left-hand side**

Head-on collision

**Side impact,
right-hand side**

Detected by:

crash sensor
located beneath the
left-hand seat and a
safety sensor
integrated in the airbag
control unit

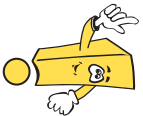
Detected by:

crash sensor and a
safety sensor
integrated in the airbag
control unit

Detected by:

crash sensor
located beneath the
right-hand seat and a
safety sensor
integrated in the airbag
control unit

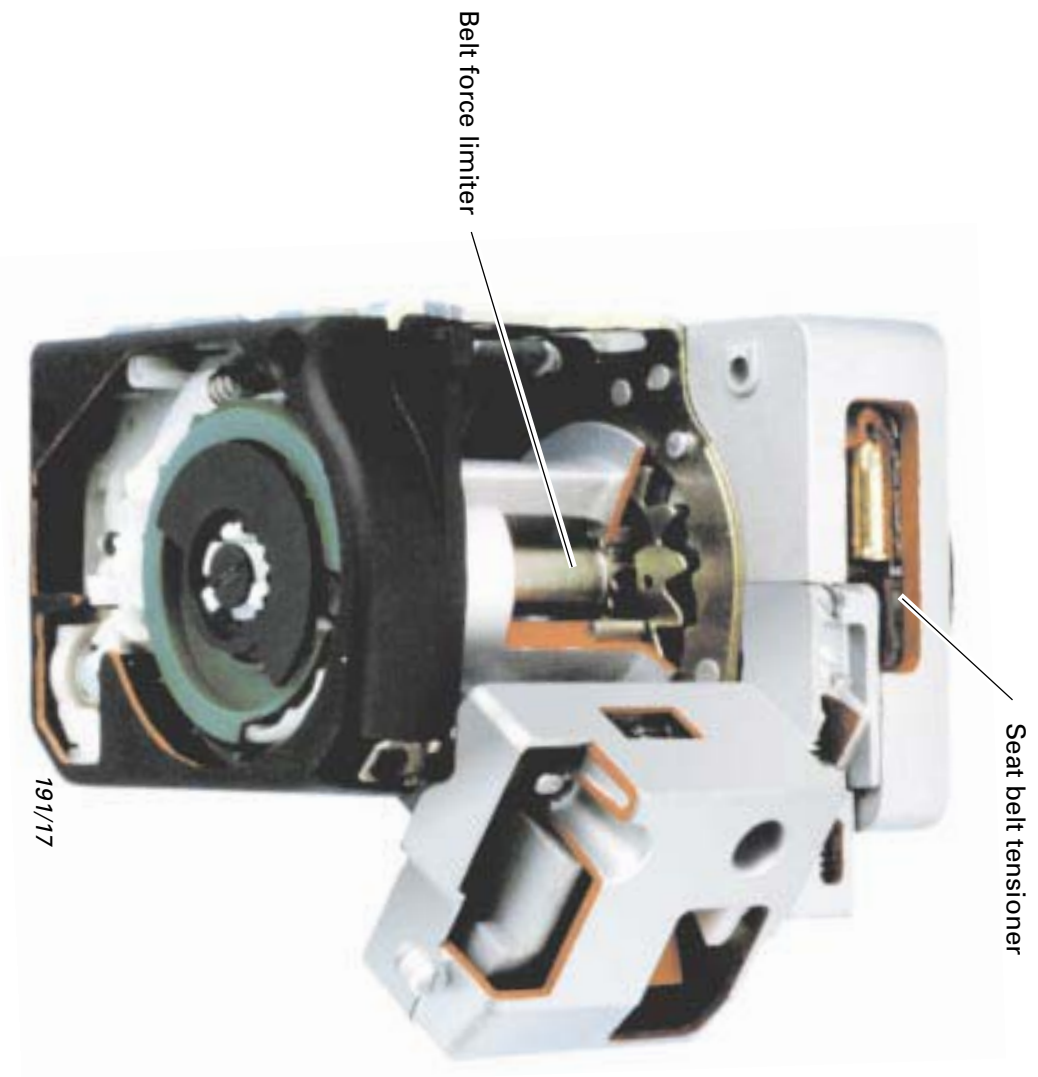
Vehicle Safety



The Seat Belt Tensioner

The pyrotechnical seat belt tensioner, together with the “belt fastened” sensor and belt force limiter, are combined in a single assembly. This compact design greatly simplifies replacement.

The “belt fastened” sensor prevents the seat belt tensioner from being activated when the seat belt is not worn.



191/17

Engines and Gearboxes

In addition to the six tried and tested engines listed below, the new VR5 unit will also be mounted in the Passat.

1.6-ltr. Engine AHL

Displacement	1595 cc
Compression ratio	10.3 : 1
Max. torque	140 Nm at 3800 rpm
Max. power output	74 kW at 5300 rpm
Engine management	Simos 2
Fuel	95 RON unleaded premium

This engine is also used in the Audi A3.
It is mounted in the Passat without a twin-path intake manifold.



191/85

1.8-ltr. 5V Engine ADR

Displacement	1781 cc
Compression ratio	10.3 : 1
Max. torque	173 Nm at 3950 rpm
Max. power output	92 kW at 5800 rpm
Engine management	Motronic M 3.8.2
Fuel	95 RON unleaded premium

This engine is also used in the Audi A6.



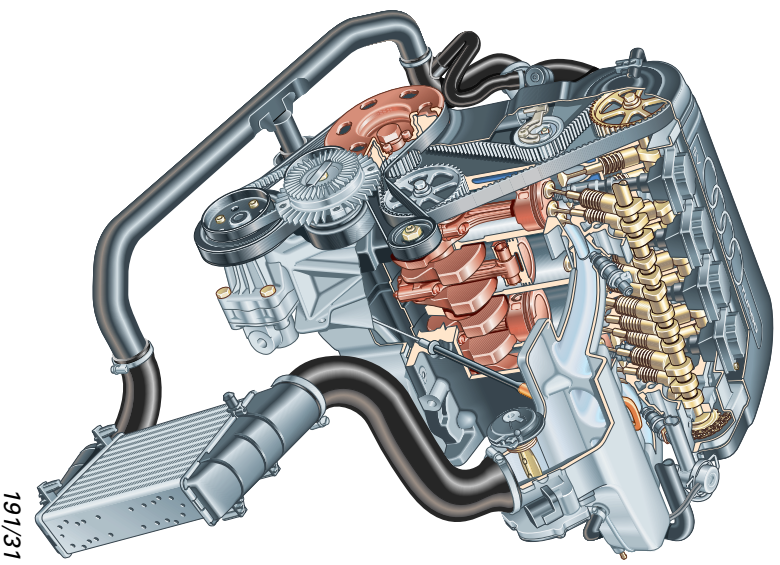
191/77

Engines and Gearboxes

1.8-ltr. 5V Turbo Engine AEB

Displacement	1781cc
Compression ratio	9.3 : 1
Max. torque	210 Nm at 1750-4600 rpm
Max. power output	110 kW at 5700 rpm
Engine management	Motronic M 3.8.2
Fuel	95 RON unleaded premium

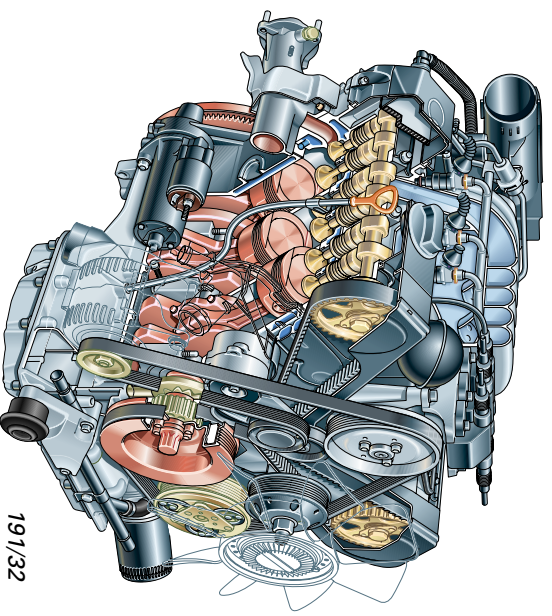
This engine is also used in the Audi A4.



2.8-ltr. V6 Engine ACK

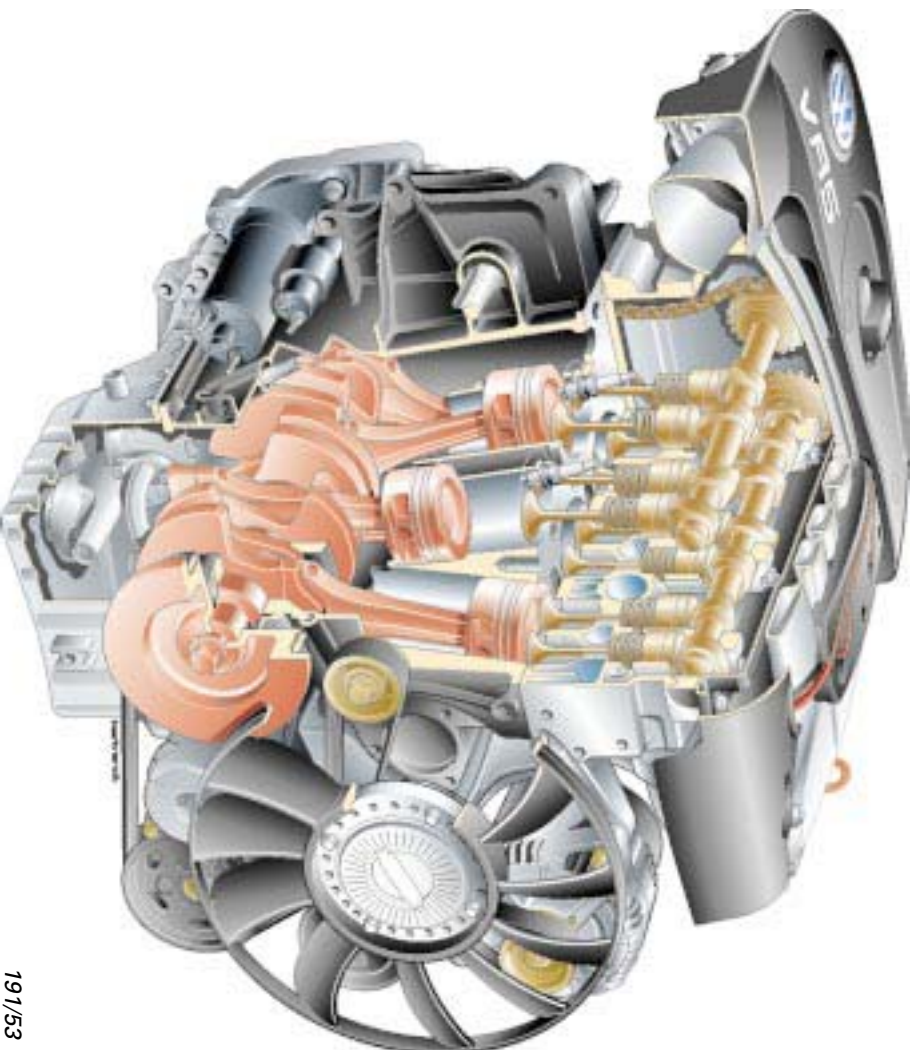
Displacement	2771cc
Compression ratio	10.3 : 1
Max. torque	280 Nm at 3200 rpm
Max. power output	142 kW at 6000 rpm
Engine management	Motronic M 3.8.2
Fuel	98 RON unleaded premium

This engine is also used in the Audi A6.



2.3-ltr. VR5 Engine AGZ

The new VR5 engine has a displacement of 2.3 litres. It is derived from the VR6 engine and is designed for in-line or transverse mounting. Power output is 110 kW.



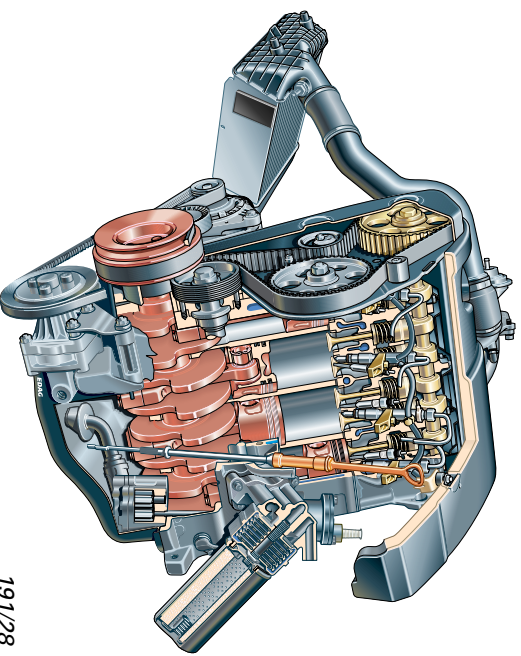
191/53

The engineering of the VR5 engine is explained in a separate Self Study Programme.

Engines and Gearboxes

1.9-ltr. TDI Engine AHU

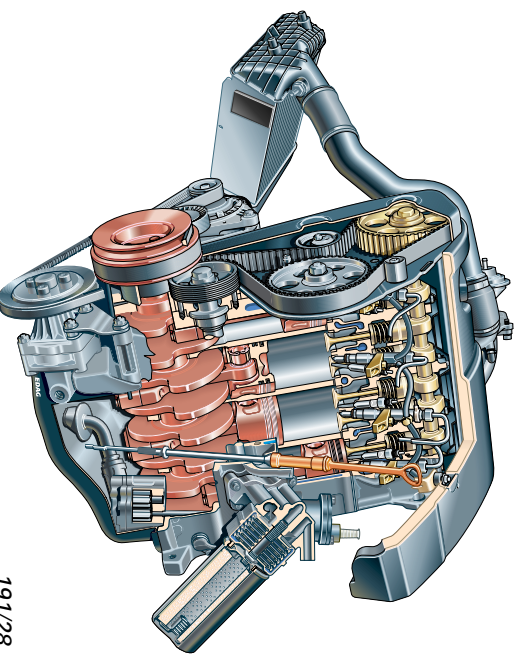
Displacement	1896 cc
Compression ratio	19.5 : 1
Max. torque	202 Nm at 1900 rpm
Max. power output	66 kW at 4000 rpm
Fuel	45 CN diesel
Mixture preparation	Direct injection with electronically controlled distributor injection pump



191/28

1.9-ltr. TDI Engine AFN

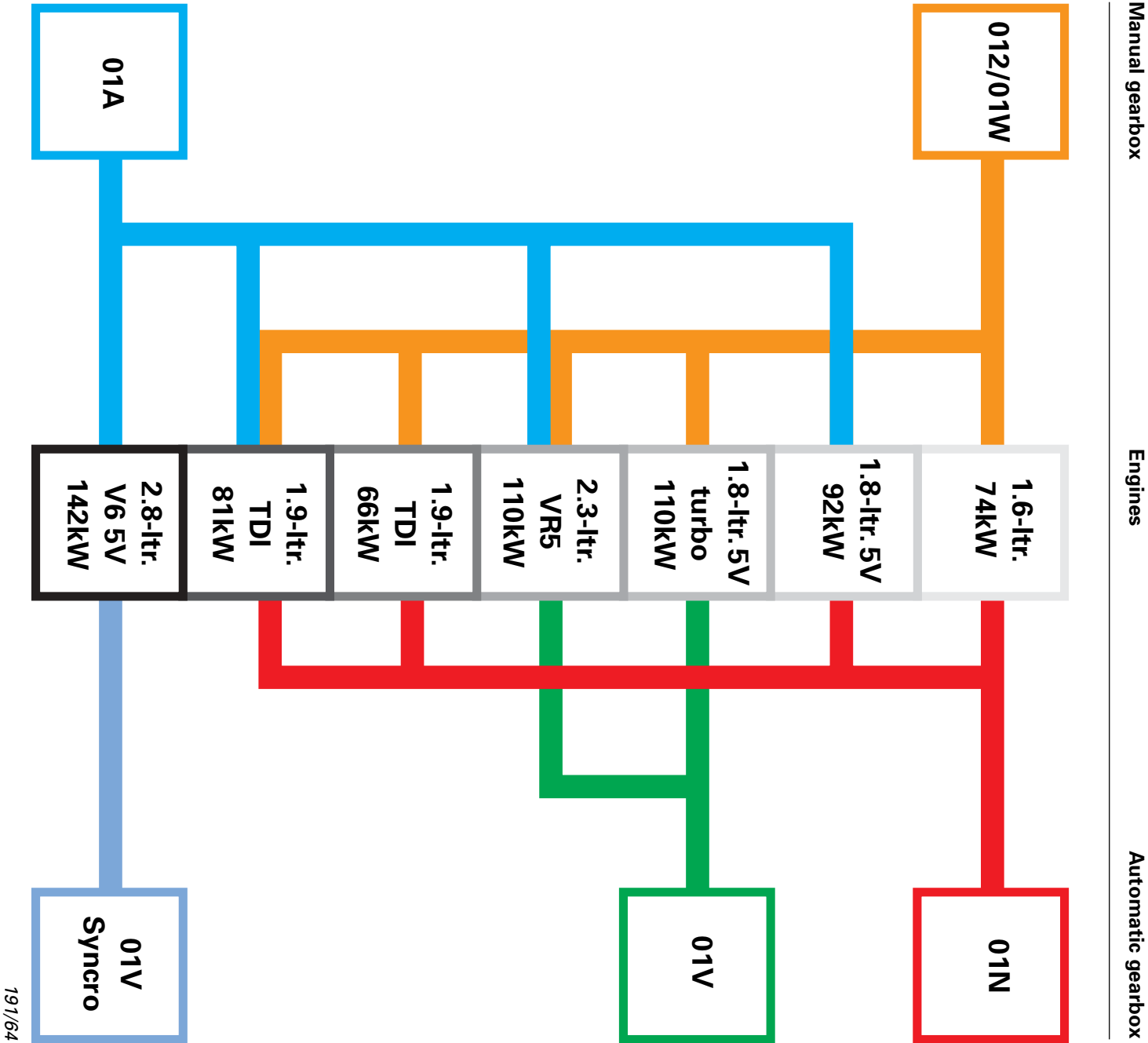
Displacement	1896 cc
Compression ratio	19.5 : 1
Max. torque	235 Nm at 1900 rpm
Max. power output	81 kW at 4150 rpm
Fuel	45 CN diesel
Mixture preparation	Direct injection with electronically controlled distributor injection pump



191/28

This engine features a variable-rate turbocharger. You will find further information on this engine in Self Study Programme SSP190.

Range of Engines and Gearboxes

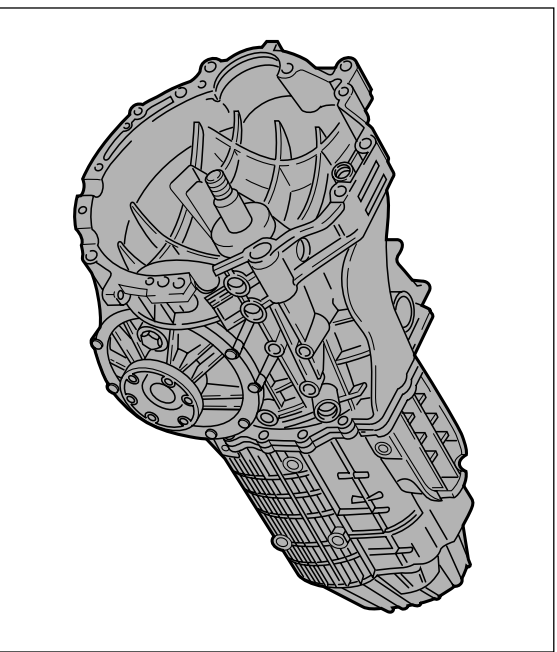


Engines and Gearboxes

5-speed Manual Gearbox 012/01W

The 012/01W is a manual gearbox as used in the Audi A4.

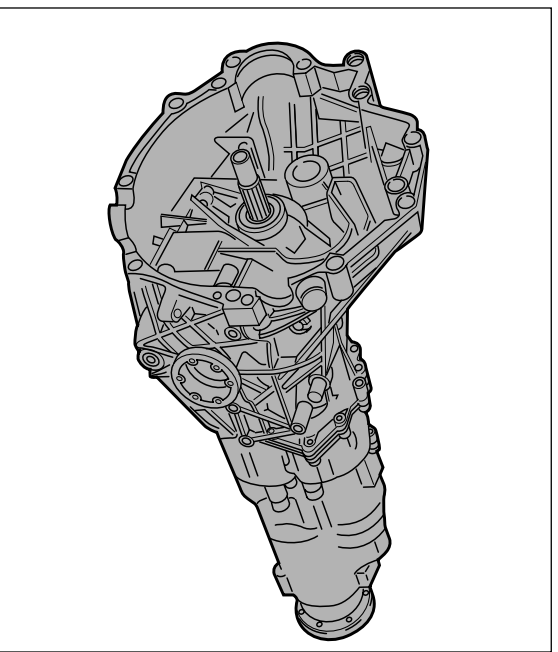
This gearbox has a magnesium housing for installation in the 1.6-ltr./74kW aluminium engine block.



191/34

5-speed Manual Gearbox 01A

The 01A is the manual gearbox for four-wheel drive vehicles as used in the Audi A4.

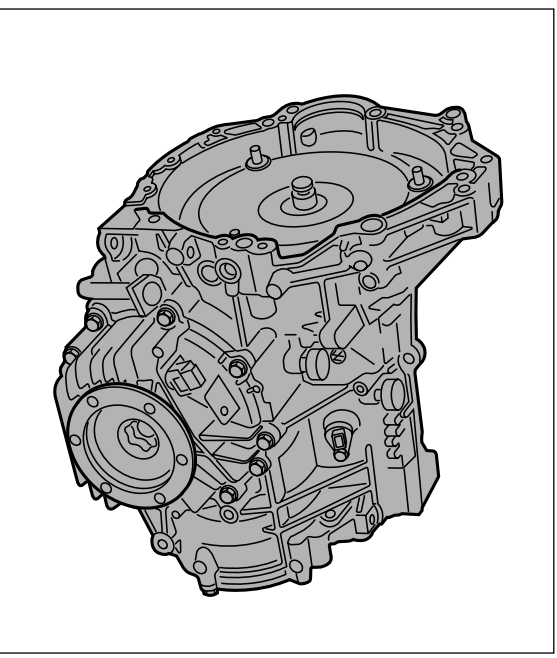


191/35

4-speed Automatic Gearbox 01N

The 01N is also installed in the Audi A6, for example.

You can find detailed information on this gearbox in Self Study Programme No. 172.



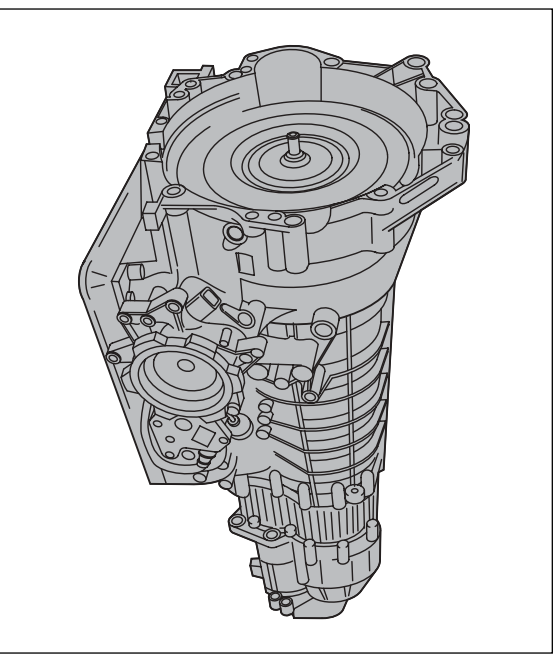
191/36

5-speed Automatic Gearbox 01V

You will also be familiar with the 01V from the Audi A4.

It is equipped with Tiptronic control as standard.

You can find detailed information on this gearbox in Self Study Programme No. 180.



191/78

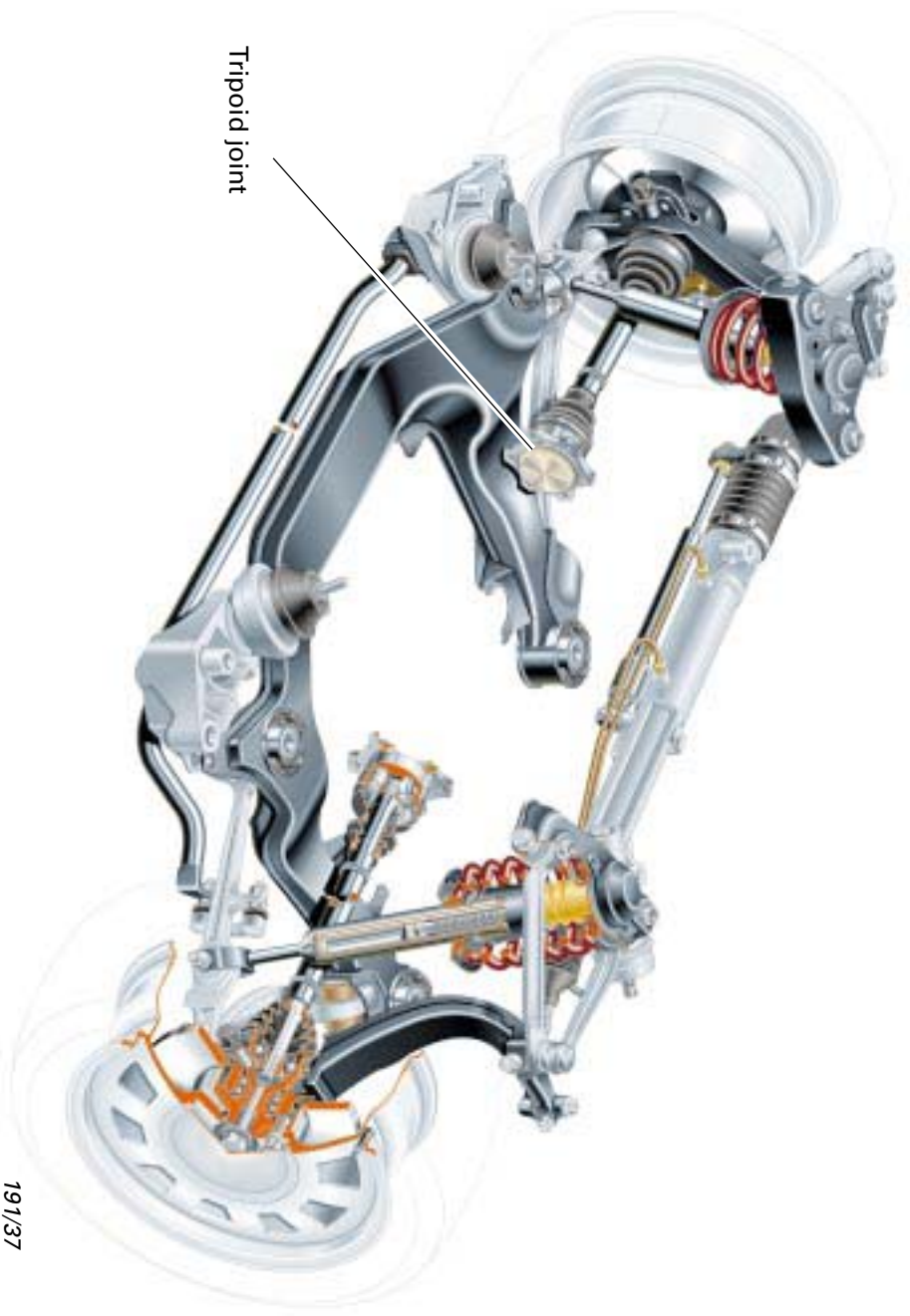
Running Gear

In addition to the four-link front suspension, we will show you on the following pages the newly developed torsion beam rear suspension as well as the new double-wishbone rear suspension unique to Syncro models.

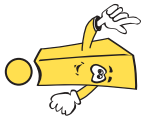
The Four-link Front Suspension

The four-link front suspension is standard in all front- and four-wheel drive vehicles.

In the case of vehicles with tripoid joints, these joints can be repaired.



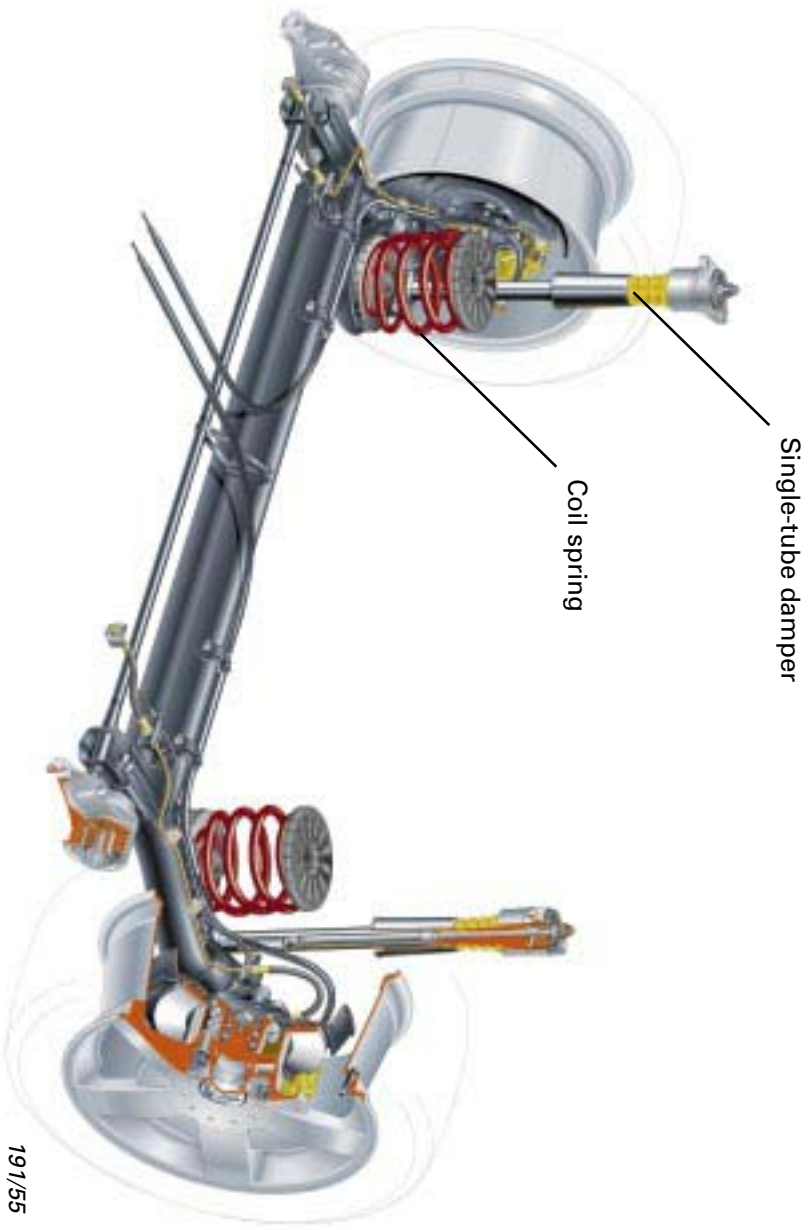
191/37



The Torsion Beam Rear Suspension

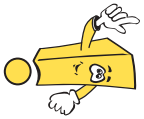
Advantages of torsion beam rear suspension:

- Larger through-loading width due to the fact that the coil springs and shock absorbers are kept physically apart
- Use of single-tube dampers
- Downward-facing V-section of axle beam
- Self-aligning twin-grooved oblique ball bearings act as wheel bearings



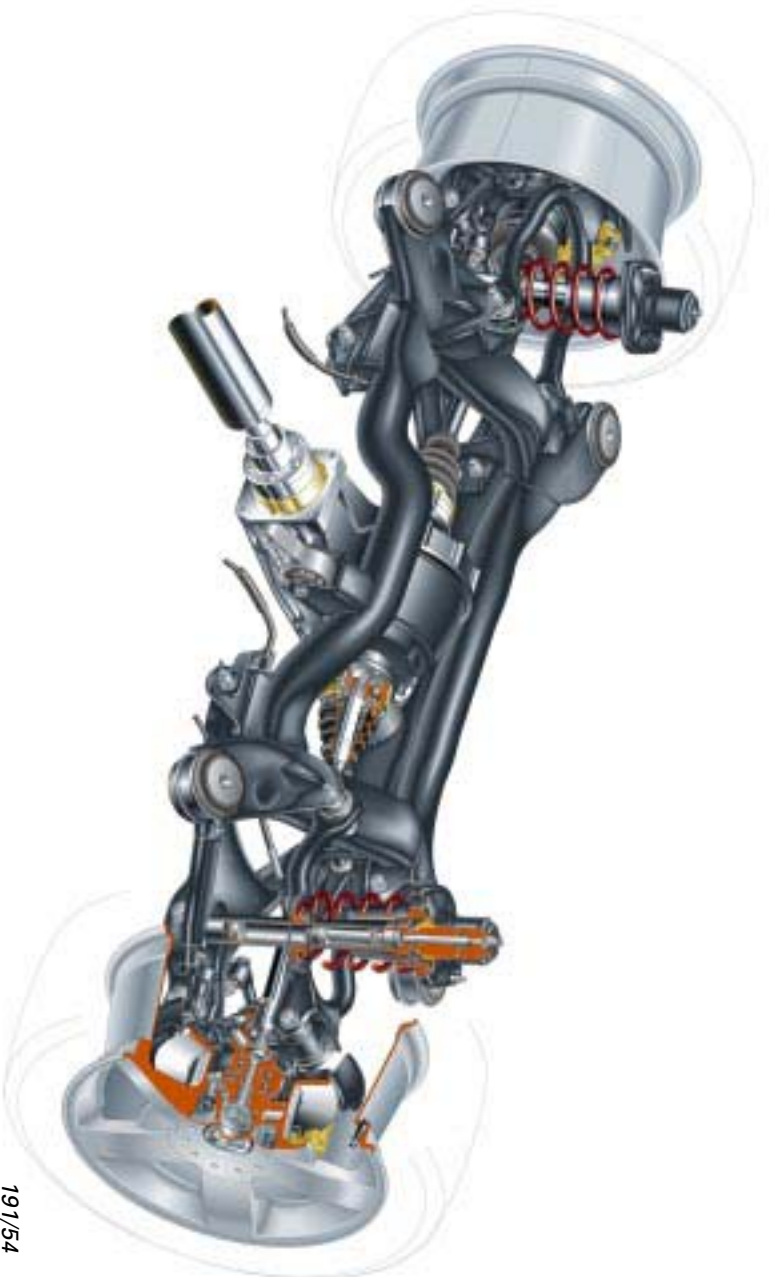
191/55

Running Gear



The Double-wishbone Rear Suspension

The double-wishbone rear suspension was developed in order to provide a through-loading width of over 1000 mm.



191/54



Engine power is transmitted to all four wheels by a Torsen differential.

Brakes

The Passat is equipped with the Bosch 5.3 anti-lock braking system as standard.

Two different sizes of brake disc are available for the front axle. The rear suspensions also have disc brakes as standard.

Disc brakes, front



Disc brakes, rear



280 x 22 mm brake disc	282.5 x 25 mm brake disc	Rear brake caliper
The front disc brakes are vented. The smaller disc diameter is based on a smaller vehicle mass and lower power output	This disc brake is vented and larger in size.	The Passat has rear disc brakes. The brake caliper is made of aluminium.

Steering

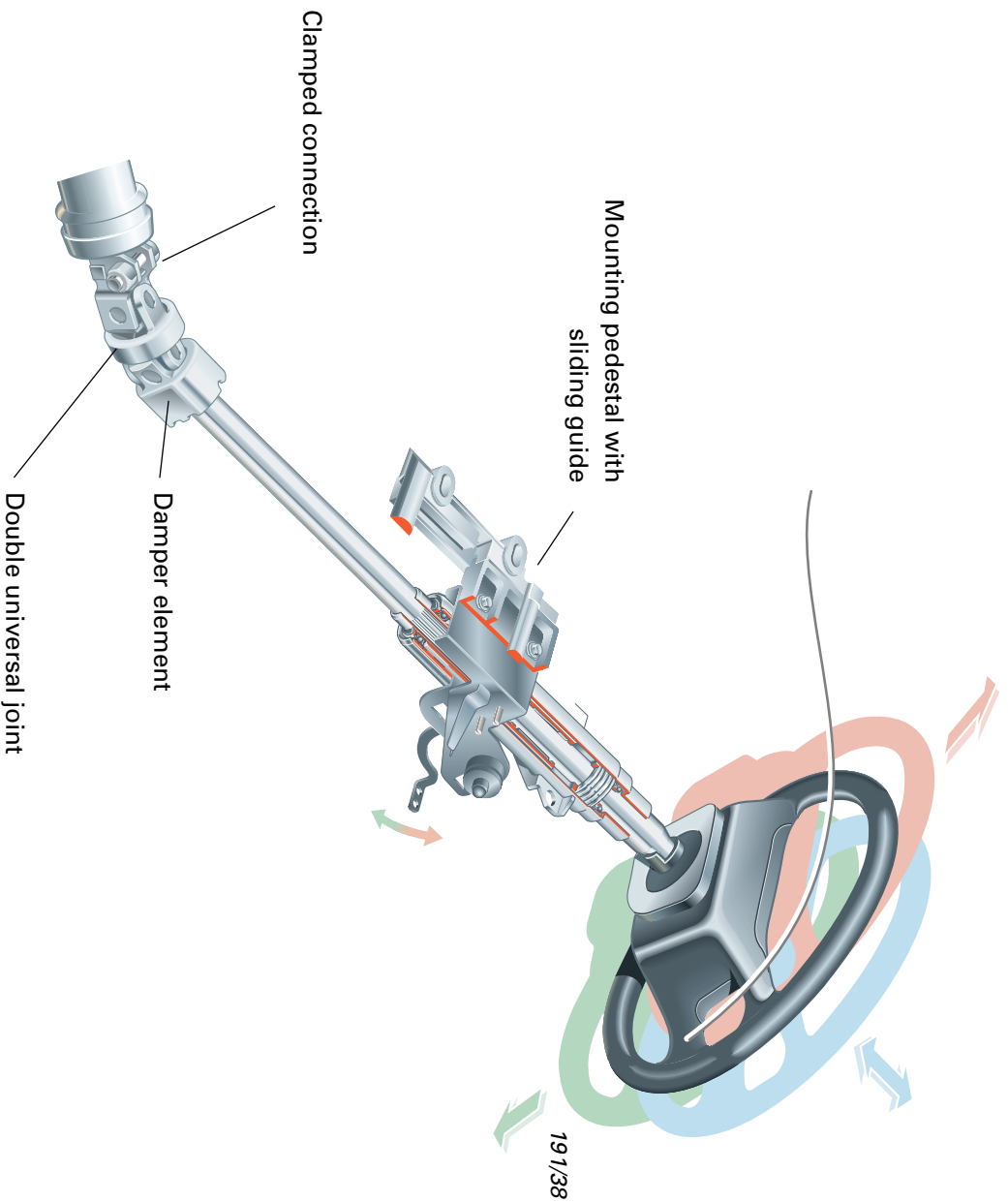
Height and Reach Adjustment of Steering Column

The Passat is equipped with power steering.

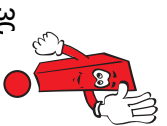
The steering column can be adjusted manually 50 mm fore and aft and 28 mm for height.

The steering column is attached to the body by a mounting pedestal with sliding guide.

A damper element located above the double universal joint prevents vibrations and noise from being transmitted to the body. A clamped connection links the steering column to the power steering gear.



You can find additional information on the steering in Self Study Programme SSP 167.



The following features will be of interest to you:

- Decentralised vehicle electrical system
- Dash panel insert
- Gas discharge headlights
- Washer jets

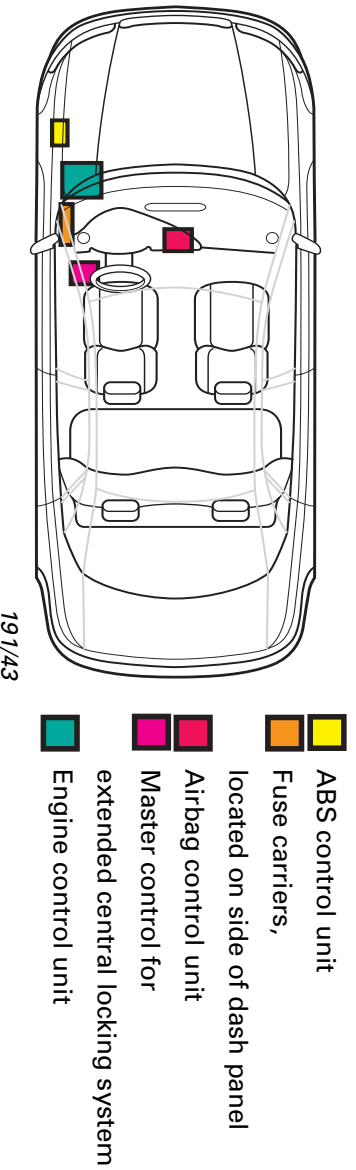
Decentralised Vehicle Electrical System

The main feature of the decentralised vehicle electrical system is that the central electrics are subdivided into separate connector stations, relay carriers and fuse carriers. These submodules are arranged locally. This means that they are located close to the assemblies and functional units to which they belong. The functions of the “car” as an integrated system are divided up among several control units with specific tasks.

Advantages:

- Short wiring harnesses make cable connections easier to find and assign.
- The short cables achieve substantial weight savings.
- Test points can be assigned more easily.
- The components of the vehicle electrical system are well protected against moisture.
- The decentralised vehicle electrical system results in easier servicing.

Example of the arrangement of control units



Repair work on the vehicle electrical system may only be carried out using Wiring Harness Repair Kit VAS1978.



Electrics

Dash panel insert

The following features will be of interest to you:

- Electronic immobiliser integrated in dash panel insert
- Capable of diagnosis
- Can be encoded
- Fuel gauge

The dash panel insert is available in two versions which differ from one another in terms of the displays in the centre of the dash panel insert.

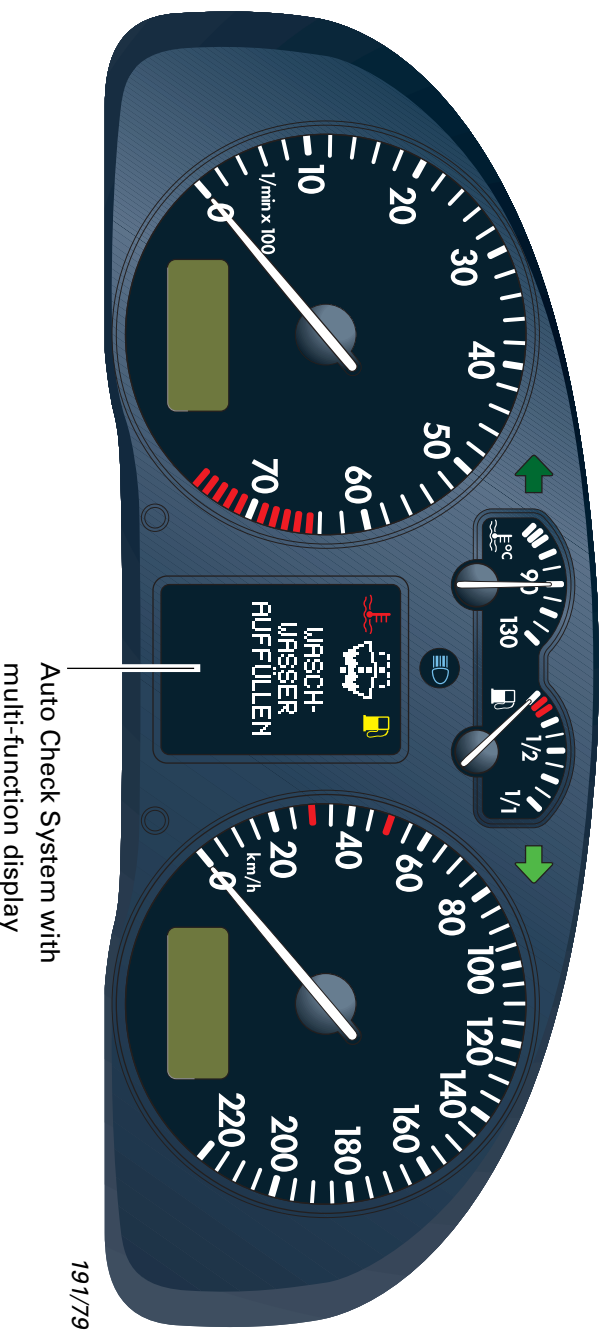
In vehicles equipped with a navigation system, this display is complemented by the Auto Check System with a multi-function display.

The immobiliser is an integral feature of the dash panel insert. However, the matching functions of the immobiliser have been left unchanged.

Self-diagnosis:

The diagnostic functions can be retrieved using address word "17".

Both instruments can be encoded. This means that the dash panel insert can be encoded depending on country and engine configuration. It is also possible to enter the current mileage when the dash panel insert is replaced.



Fuel gauge

In previous systems, the fuel gauge tended to fluctuate, e.g. when cornering. To counteract this, damping of the fuel gauge was increased using electronic devices. However, the drawback of this was that the fuel gauge took longer to display the correct fuel level after refueling.

The new fuel gauge eliminates this drawback. If the **ignition is switched off** and fuel tank capacity increases by four litres or more, the new fuel level is recalculated and displayed straight after the ignition is restarted.

If the **ignition is switched on** and the vehicle is stationary, the damping cuts out and the fuel level is displayed immediately.



Do not refuel the vehicle with the ignition switched on.

Fuel gauge when cornering (previously)	Fuel gauge when cornering (today)	Fuel gauge when refueling

Electrics

Gas Discharge Headlights

Gas discharge headlights, which are integrated into the headlights, are available for the Passat as an option.

However, the use of gas discharge technology is limited to the dipped beam headlight because it takes up to three seconds to achieve maximum luminous intensity. Therefore, H4 halogen lights will continue to be installed for the main beam headlight.

Advantage of gas discharge headlights:

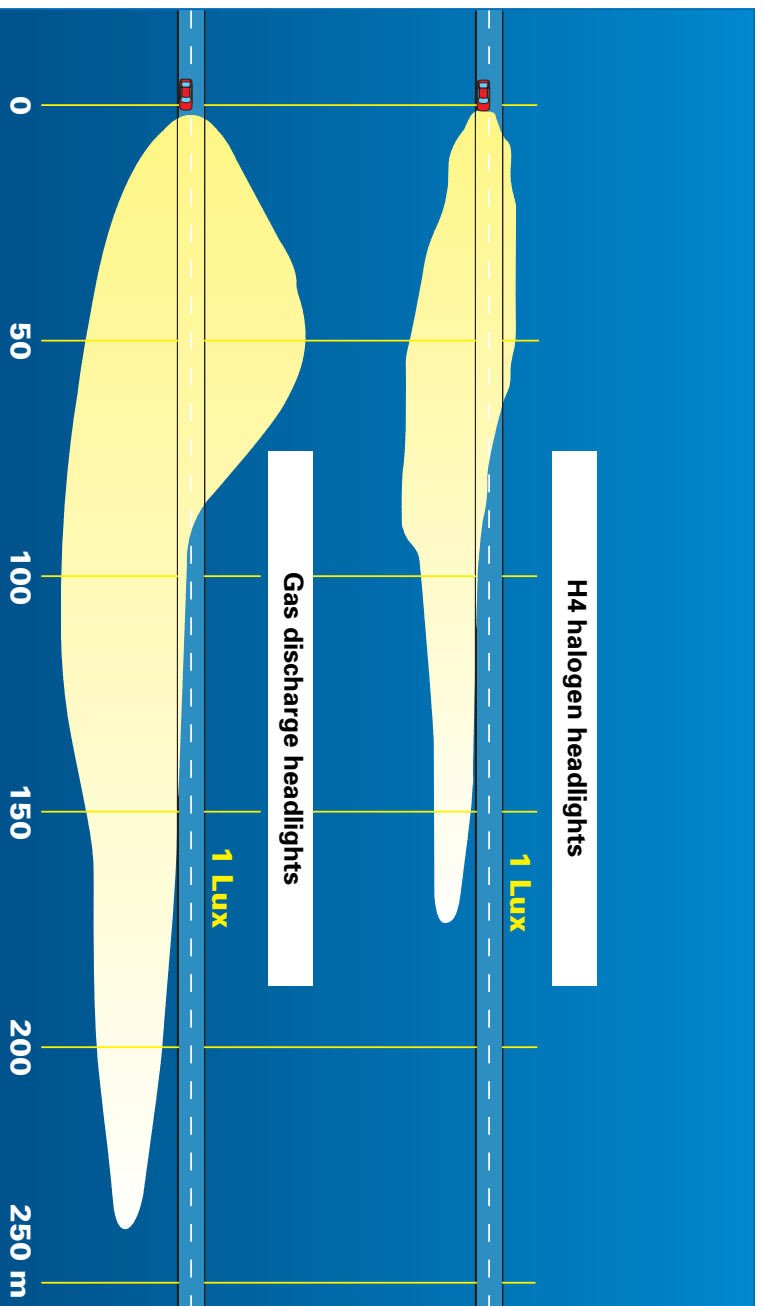
- Greater luminous efficiency than conventional headlights
- Better brightness distribution by virtue of a lens
- Fog light is no longer necessary

On account of the greater danger of dazzling oncoming traffic, vehicles with gas discharge headlights are equipped with dynamic headlight range control.

Consequently, the switch for the manual headlight range control is not required.

Electronic Headlight Range Control

This function gathers its information on body tilt angle relative to the vehicle axes from two sensors located inside the front and rear wheel housings on the left-hand side of vehicle.



Fan Jet Nozzle

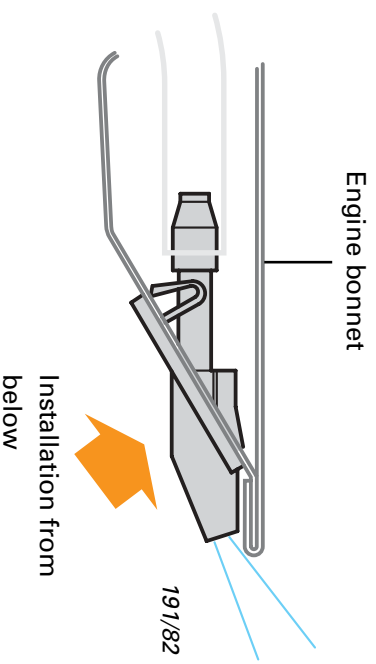
The Passat features new fan jet nozzles for washing the windscreens.

Advantages:

- Better fluid distribution over the entire surface of the windscreen
- Lower water consumption
- Better cleansing effect
- No adjustment required

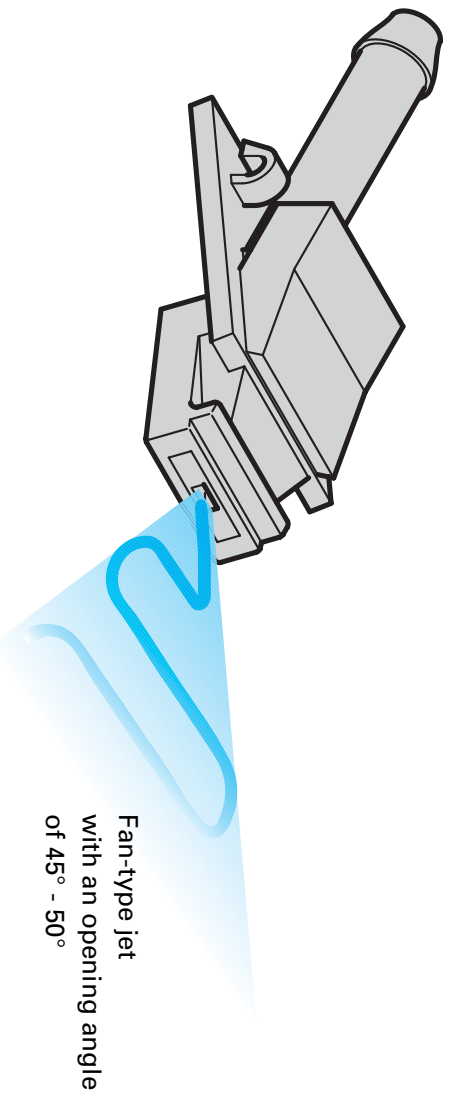
Mode of operation

For the sake of simplicity, the mode of operation can be compared to that of a garden hose when it is swung from side to side. Moving the garden hose quickly produces a fan jet.



A nozzle insert for producing the pendulum jet is integrated in the spray nozzle. It ensures a fan jet.

A heated version of the spray nozzle is also available.



191/81

Extended Systems

Various systems cater for ride comfort and ease of operation in the new Passat.

The following features will be of interest to you:

- **Extended central locking system**
 - Decentralised system concept
- **Heater/air-conditioning**
 - Innovations in the air-conditioning
- **Navigation + communications**
 - Preparation for mobile cellular phone

Extended Central Locking System

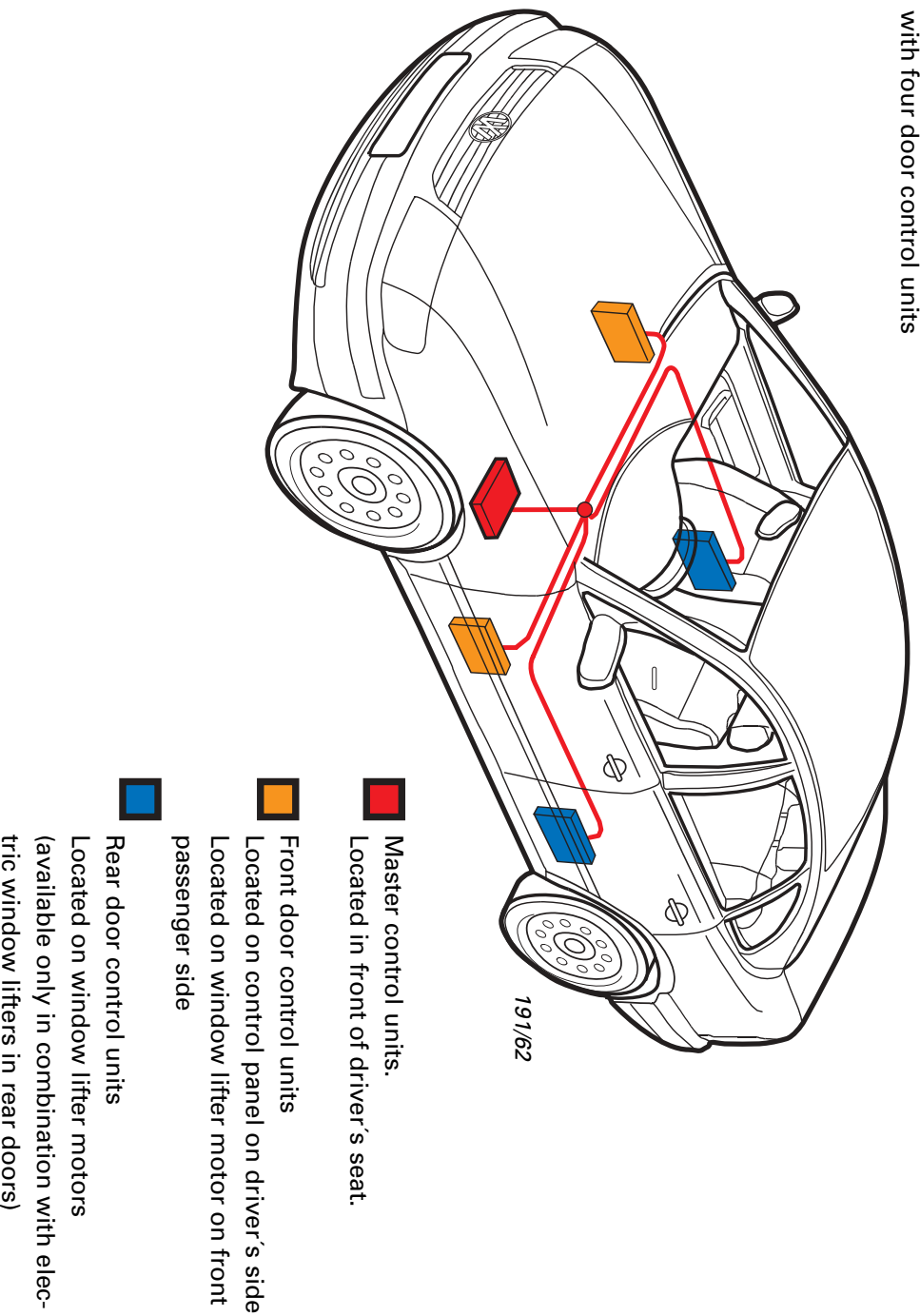
The extended central locking system is based on a decentralised system concept.

It has a central control unit and a separate door control unit with a control panel for every door.

Self-diagnosis:


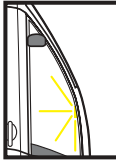

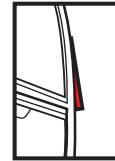
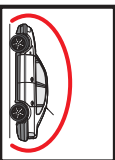
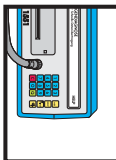
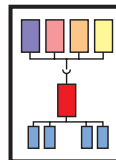
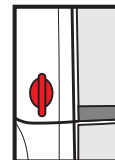
Diagnosis is initiated using the address word "46".

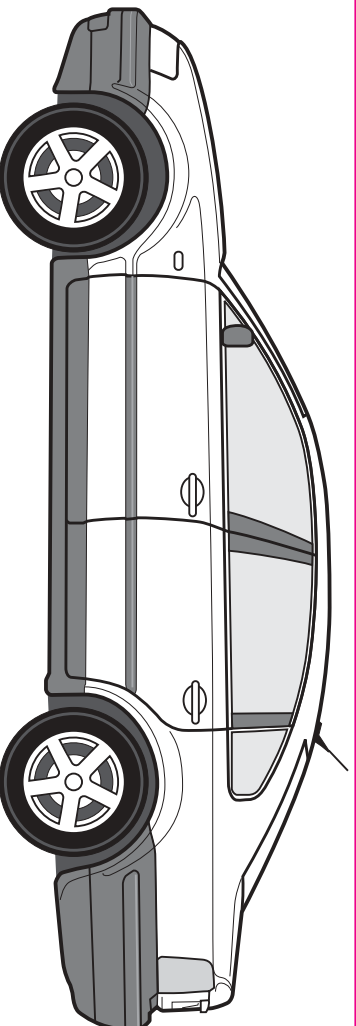
Extended central locking system
with four door control units



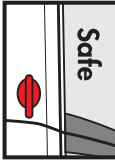
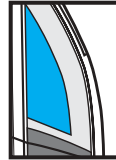

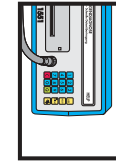
Functions of the Extended Central Locking System

The master control unit assumes the following functions

	Central locking of boot lid
	Interior light control
	Radio remote control
	Slide/tilt sunroof
	Anti-theft warning system with "interior monitor" function
	Diagnosis Address word „46"
	Interface to vehicle electrical system
	Central locking of rear doors (only in combination with mech. window lifters at rear)



The door control units assume the following functions

	Central locking of doors, with Safe mode
	Electric window lifters with excess power limitation
	Electrically adjustable, folding and heated door mirrors
	Diagnosis Address word „46"

191/45

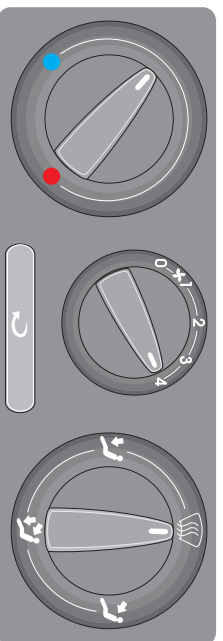
Extended Systems

The heater

Unlike predecessor models, the new heater is constructed in one piece.

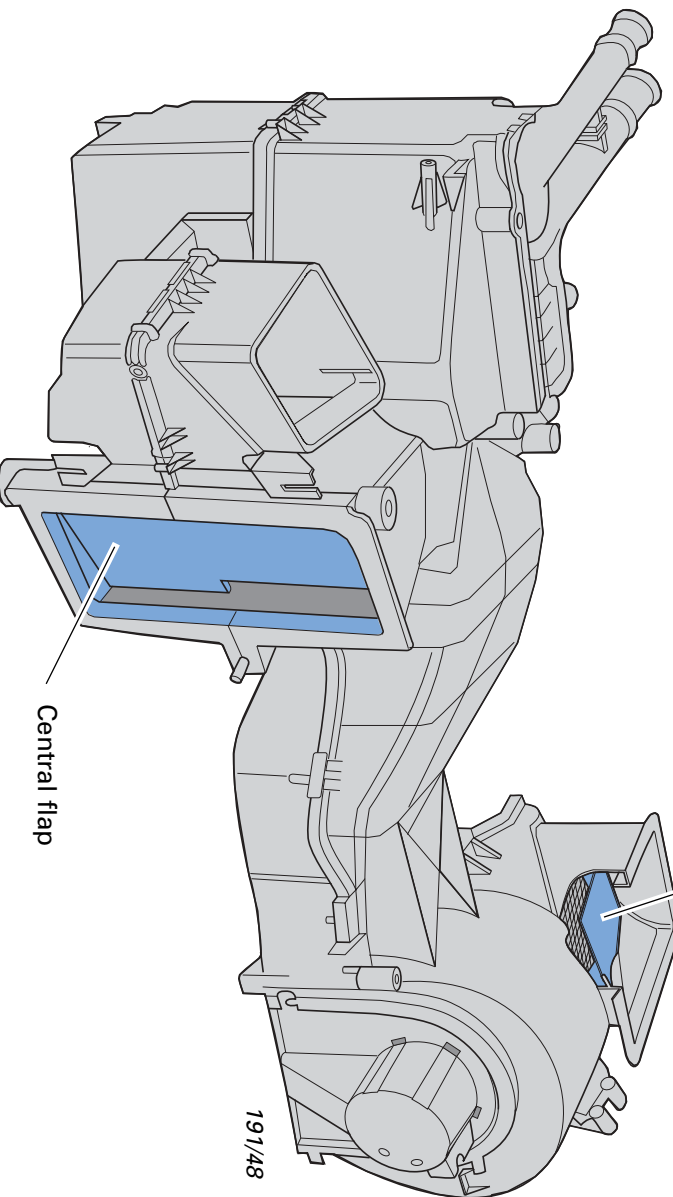
The air distributing housing and the air duct with shutoff flap are combined in a single component.

The heater, which is controlled at the air intake side, permits fresh-air and air-recirculation modes. A main shutoff flap is therefore no longer required.

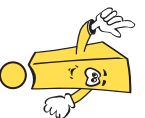


191/27

Fresh-air/air-recirculation flap

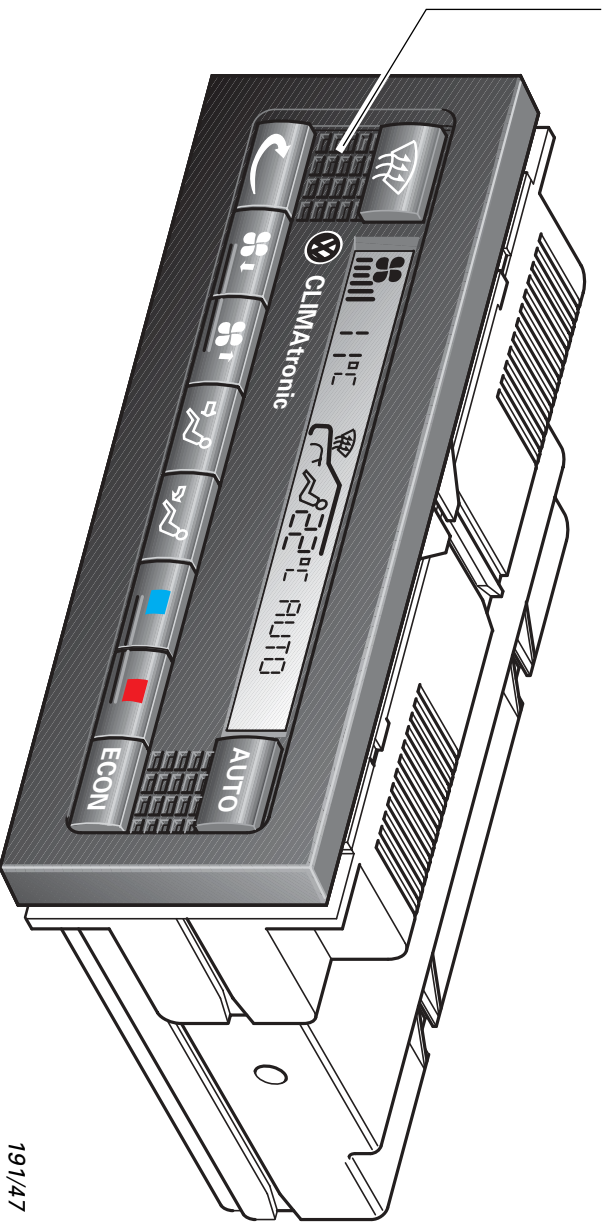


Central flap




- By virtue of the stepped form of the central flap, the central air vent is closed in defrost mode.
- An electric-motor-operated fresh-air/air-recirculation flap is integrated.
- In defrost mode, the air recycle function is switched off.

Temperature sensor

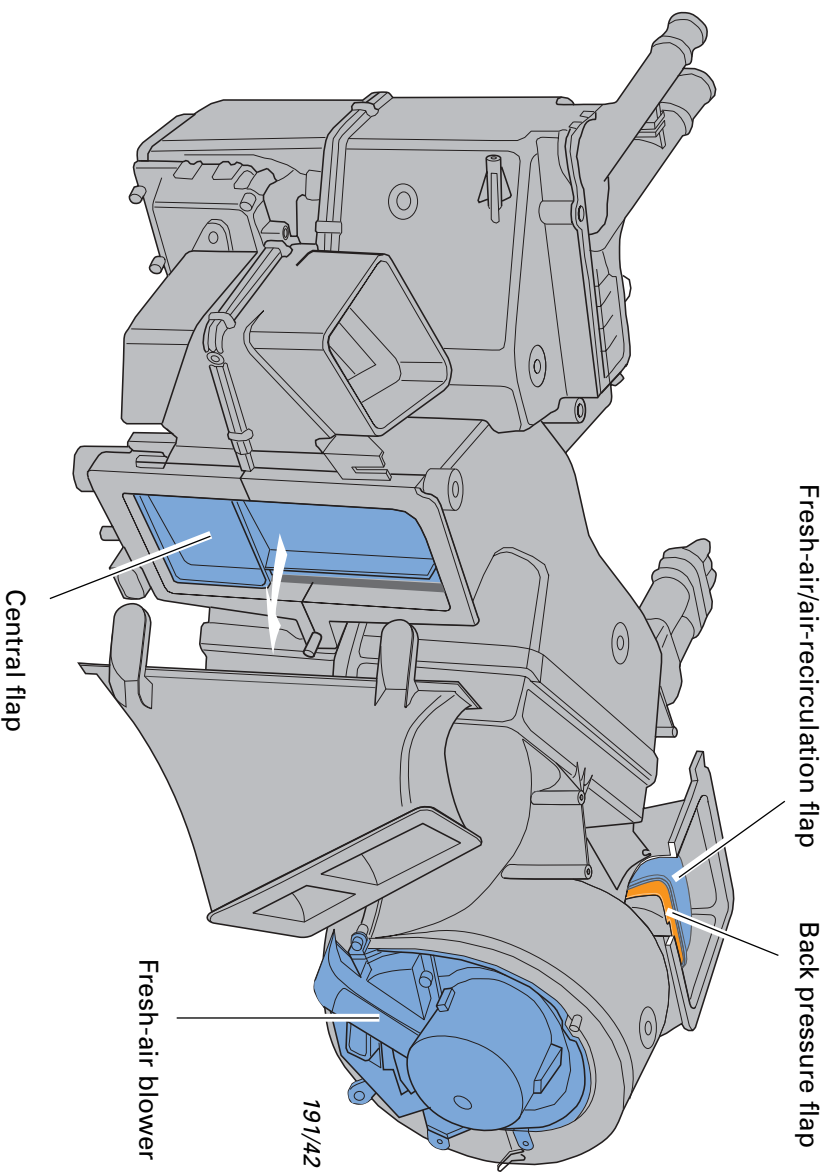


191/47

- 
- The controls have been rearranged.
 - The temperature sensor dash panel and blower is integrated in the operating and display unit.
 - The photosensor measures incident sunlight over a large area. There is greater sensitivity for controlling the interior climate.
 - Average outflow temperature is registered by a transmitter.

Extended Systems

The Air-conditioning



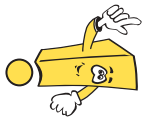
- The fresh-air/air-recirculation flap is combined with the back pressure flap.
- Fresh-air blower with integrated control unit.
- The shape of the central flap has been modified to allow separate airflow to the central and side vents.
- All flaps are electric-motor-operated.

The following components are integrated in the refrigeration circuit:

- Plate evaporator
- Controlled swash plate compressor
- Condenser
- Butterfly valve
- Collecting vessel



Air-conditioning without back pressure flap is installed in right-hand drive vehicles.



Navigation

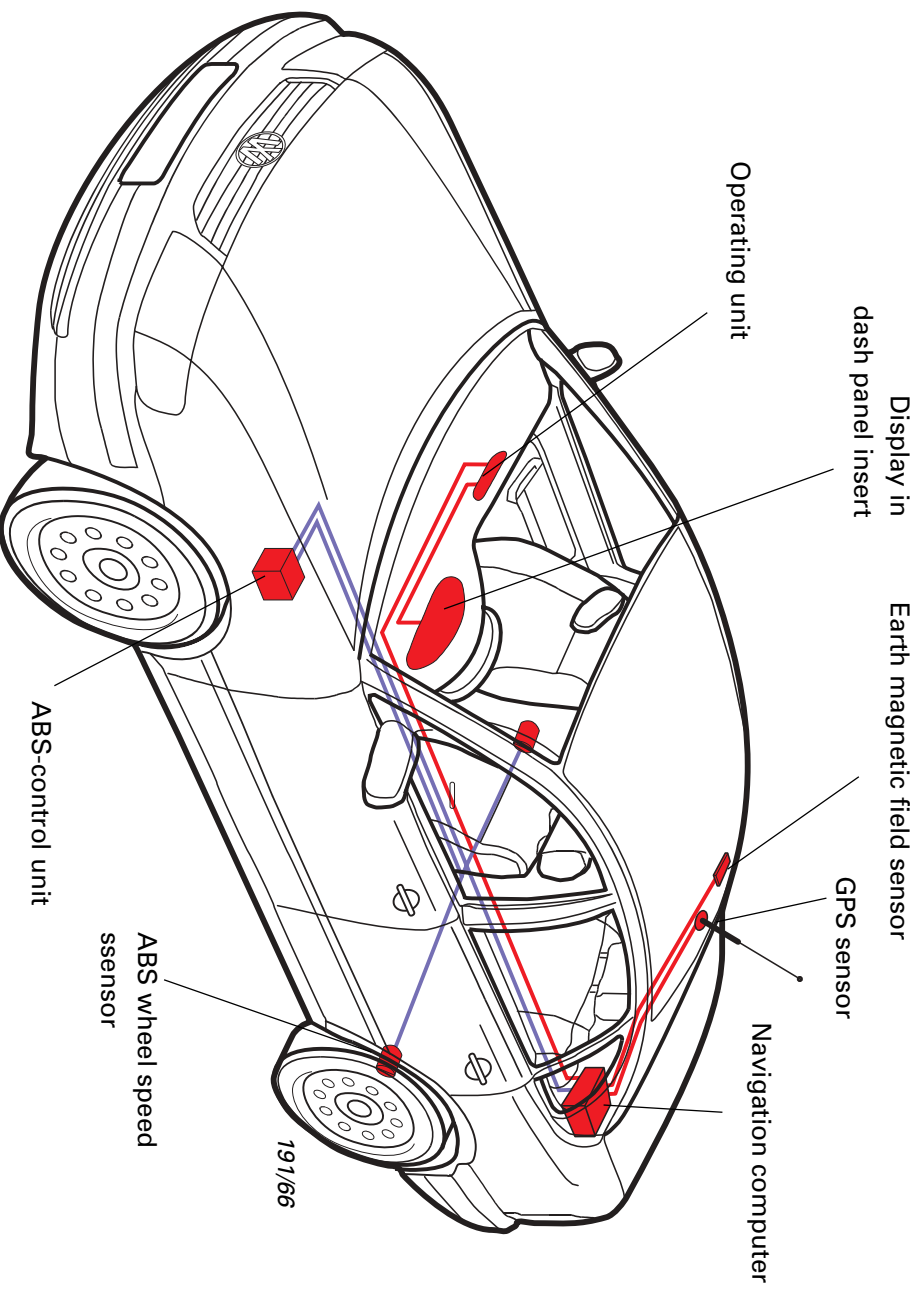
The navigation system enables the driver to reach his (her) destination easily and safely. It replaces the road map and enhances road safety.

This system employs a map stored on a CD-ROM. The driver can select his (her) destination on this map.

Directions for the driver are then given on the display in the dash panel insert and via the loudspeaker built into the control unit.

The system comprises the following elements:

- The navigation computer with integrated CD-ROM drive
- The control unit with control and loudspeaker
- The display integrated in the dash panel insert
- The earth magnetic field sensor
- ABS wheel speed sensor
- The sensor for the global positioning satellite system (GPS)
- The GPS satellite network



Extended Systems

Navigation computer with CD-ROM drive

The navigation computer determines the position of the vehicle by means of the above-mentioned sensors. It then compares the calculated position with the map stored on the CD-ROM and the chosen destination.

The computer then calculates directions for the driver from this comparison.



191/50

Control unit with control and loudspeaker

The control unit is the interface to the navigation computer. The system is switched on or off and the destination is entered by operating the control. In addition to the display integrated in the dash panel insert, a voice output can also be provided by means of the built-in loudspeaker.



191/49

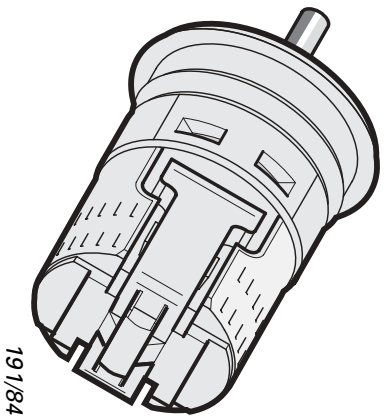
Display integrated in dash panel insert

The navigation system displays information visually via the display of the Auto Check System with multifunction display integrated in the dash panel insert.

Depending on selected function, the display shows a letter field for entering a destination or pictograms representing directions for the driver .

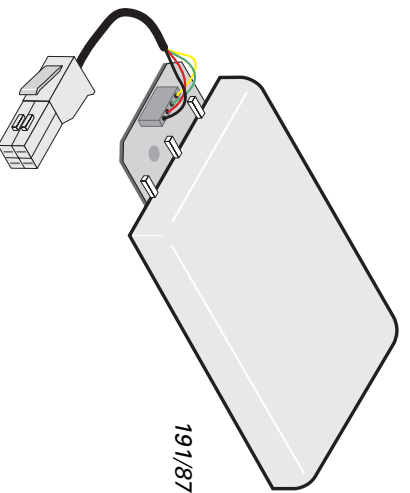


191/83



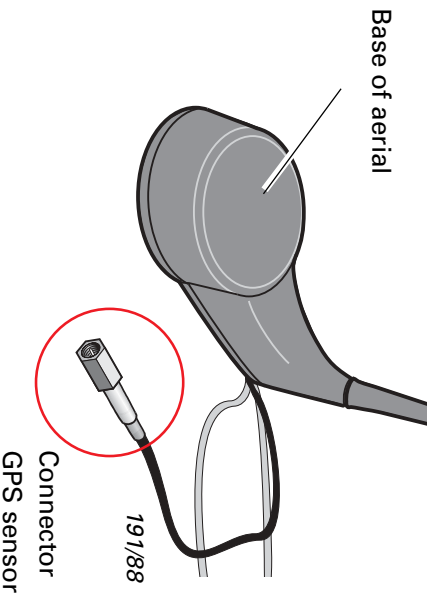
ABS wheel speed sensor

The wheel speed sensors of the rear suspension are used to provide the navigation computer with information on distance travelled.



Earth magnetic field sensor

The earth magnetic field sensor determines the direction of travel relative to the north pole for the navigation computer.



GPS sensor

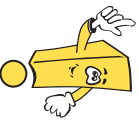
GPS stands for **G**lobal **P**ositioning **S**ystem, a global navigation system. The sensor is integrated in the roof aerial. The navigation computer uses the data supplied by the GPS sensor as a correction factor or when relocating the vehicle if the computer loses track of the current position (e.g. during rail transport).

However, this particular navigation system is not yet able to make allowance for traffic lights, one-way roads, building sites, traffic jams, etc.



Extended Systems

The Passat is available with a mobile phone or cellular phone provision as equipment variants.



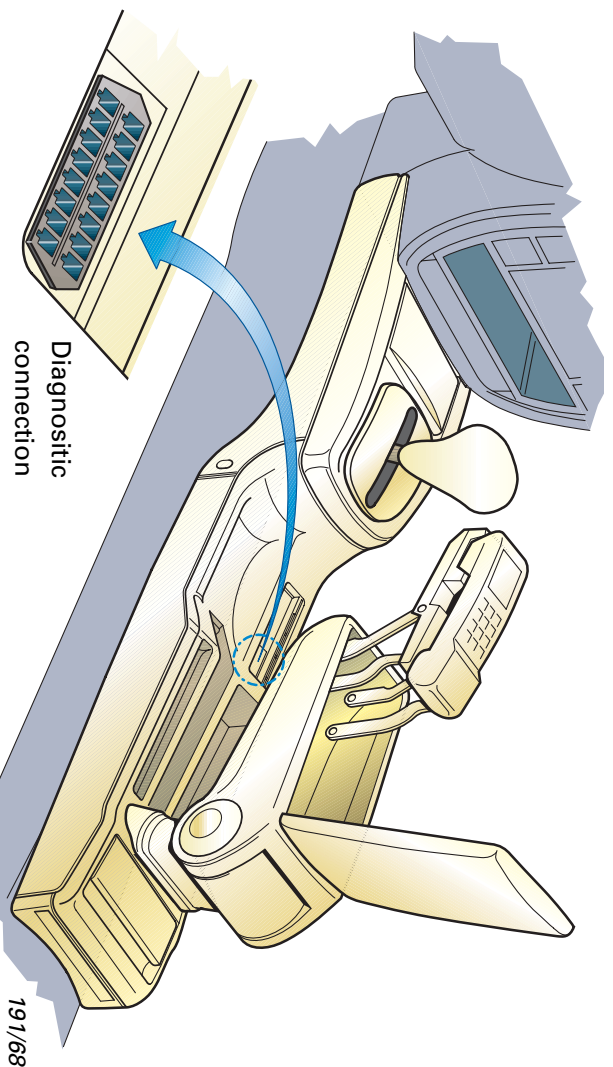
Cellular Phone Preparation

Advantage:

- Easy to install
 - No complex cable installation necessary
 - One roof aerial for all functions
- Depending on equipment specification of the vehicle, three types of aerial can be installed:
- Radio only
 - Radio and telephone
 - Radio, telephone and navigation (GPS)

Scope of cellular phone provision:

- Hands-free microphone integrated in left-hand A pillar
- VDA-standard cable (standard connection for mobile phone)
- Radio mute function
- Change-over relay for left-hand door loudspeaker
- Combined roof aerial with high-frequency line to mobile phone



With the cellular phone provision, only mobile phones with a VDA-standard connection can be operated.



