Service.

Audi A3 ’04 Running Gear

Self Study Programme 313

Development work for the A3 running gear focused on achieving sporty and agile performance, excellent handling, a high degree of road safety and outstanding comfort. These to some extent contradictory requirements were satisfied by introducing a wide range of new items whilst at the same time incorporating further improvements to existing features. Particular highlights in this respect are the new multiple-link rear axle and the electromechanical power steering.

The Self Study Programme contains information on design features and functions.

The Self Study Programme is not intended as a Workshop Manual.
Values given are only intended to help explain the subject matter and relate to the software version applicable when the SSP was compiled.

Use should always be made of the latest technical publications when performing maintenance and repair work.

Note

Attention

Contents




Axles

Front axle

Summary

Use is made of a newly developed MacPherson axle with triangular links.
The Audi A3 `04 is available with standard, sports and heavy duty running gear. There are differences with regard to springs, dampers, anti-roll bars and mounting elements.
The heavy duty running gear features additional covers to protect axle components exposed to possible stone impact.

Sports running gear
Vehicle body 15 mm lower than with standard running gear, dynamic tuning.

Heavy duty running gear
Vehicle body 20 mm higher than with standard running gear with appropriately adapted tuning.

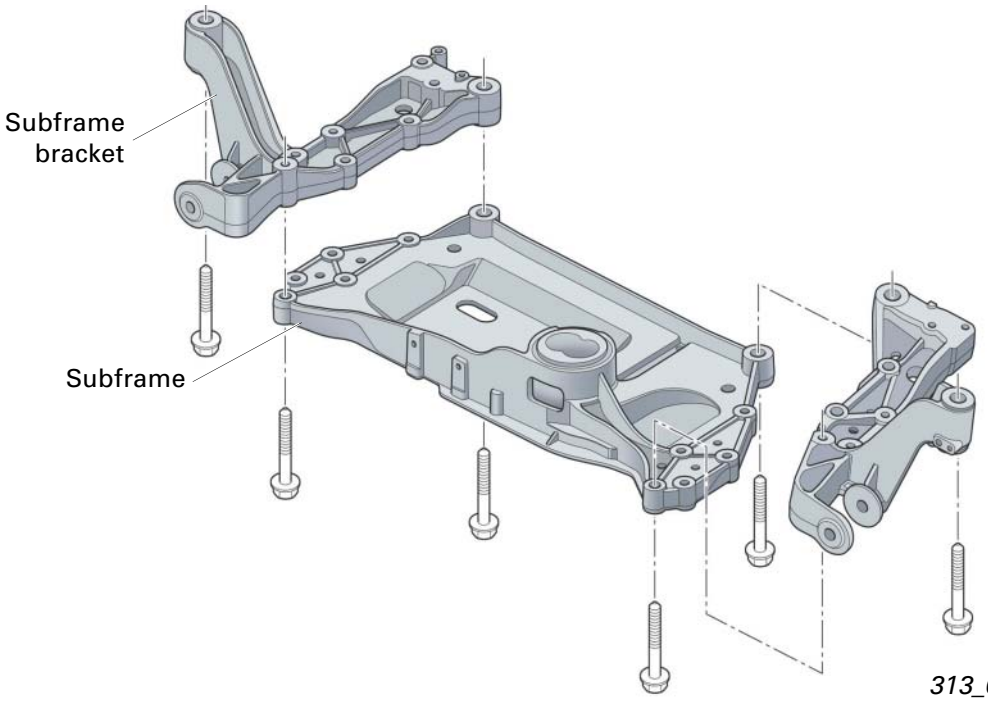
313_010

System components

Subframe

The 3-part aluminium subframe is designed to accommodate transverse link, anti-roll bar and steering box.

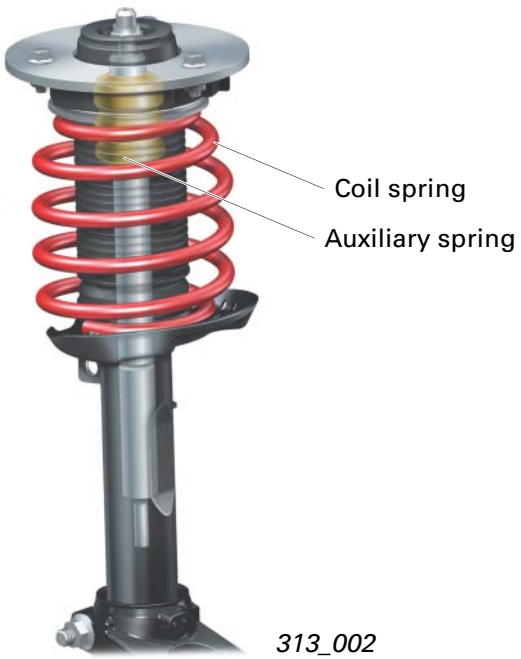
The solid 6-bolt joint with the body guarantees a high degree of rigidity and excellent vehicle dynamics.



313_001

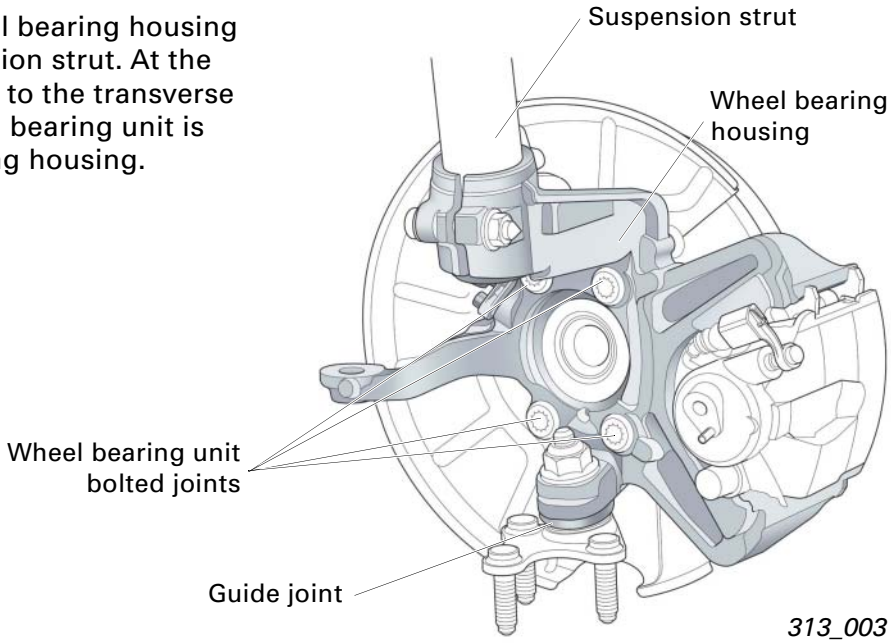
Suspension strut

Use is made of linear coil springs with progressive polyurethane auxiliary springs as suspension elements.



313_002

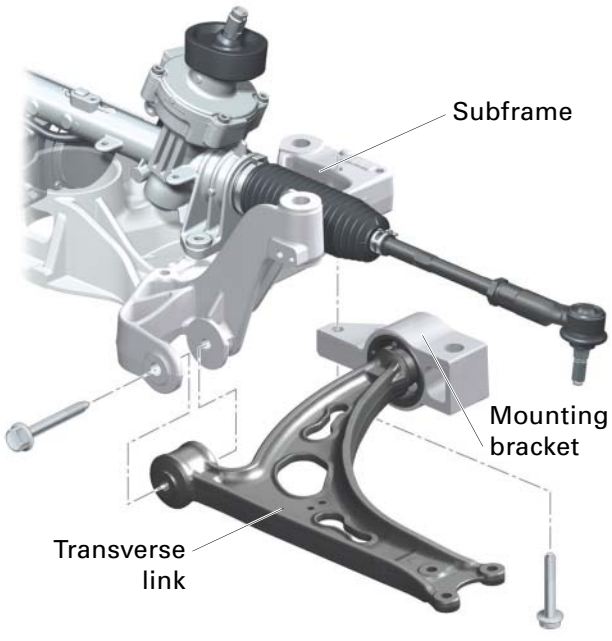
Wheel bearing housing
The ductile cast iron wheel bearing housing is clamped to the suspension strut. At the lower level it is connected to the transverse link guide joint. The wheel bearing unit is bolted to the wheel bearing housing.



313_003

Transverse link, guide joint and mounting bracket
The transverse link forms the lower connection between body and wheel bearing housing. The guide joint is bolted at three points to the transverse link.

At the front, the transverse link rests directly on the subframe, at the rear it is attached to the body by way of an aluminium mounting bracket.



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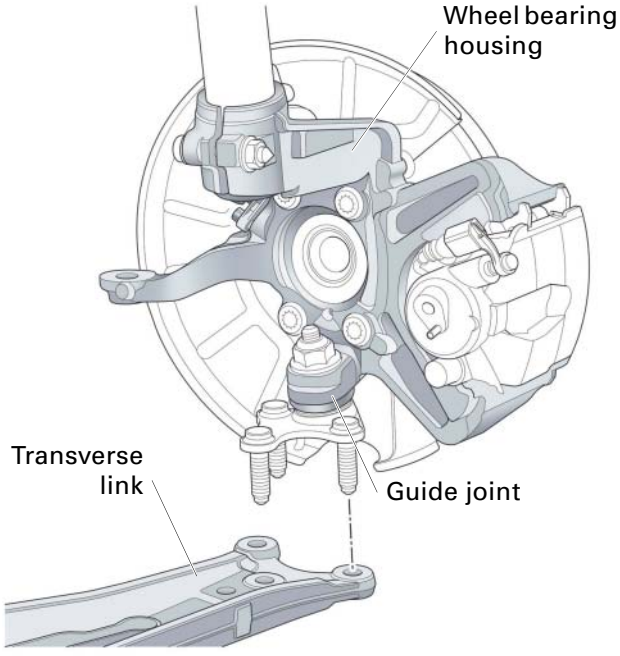
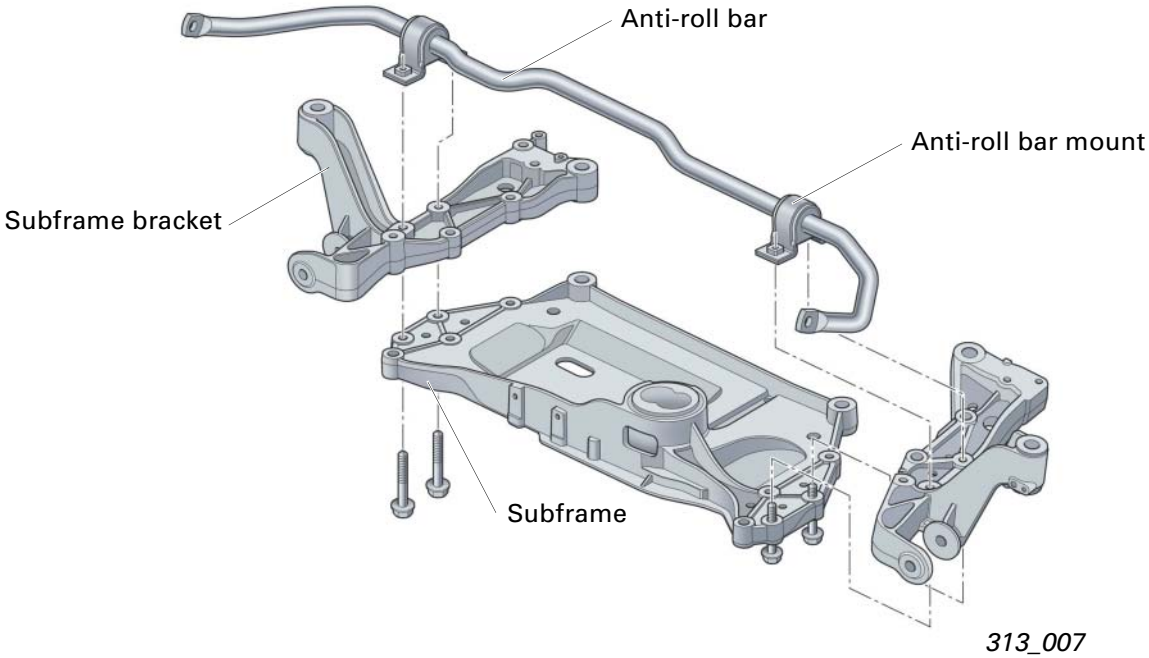


313_005

Anti-roll bar

Support is provided by two mounts at the subframe. The ends of the anti-roll bar are attached directly to the suspension struts by means of connecting links and ball joints. This achieves an optimum kinematic ratio of 1:1 (wheel travel = travel at end of anti-roll bar).

Sensitive anti-roll bar response is thus guaranteed. A smaller anti-roll bar cross section can be employed, helping to reduce weight. The additional use of tubular anti-roll bars permitted a further 0.9 kg weight saving at the front axle.



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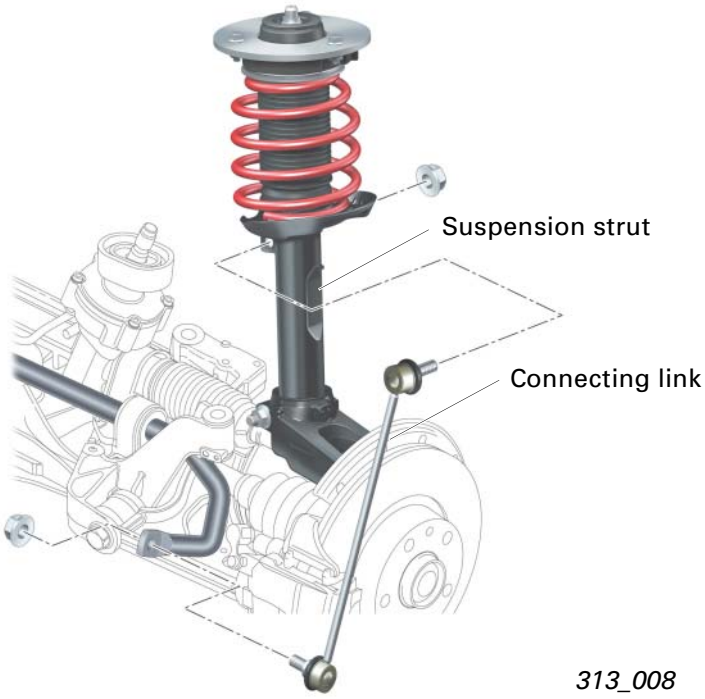
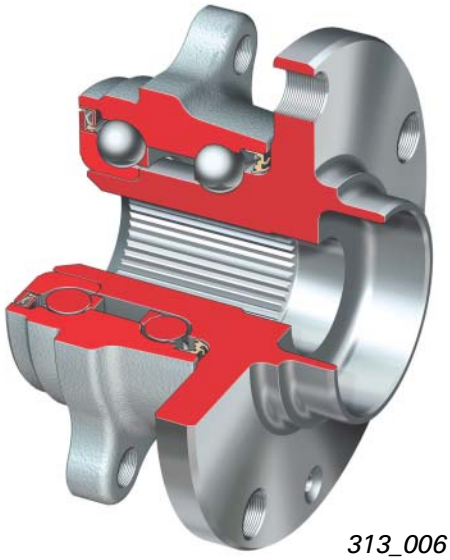


313_008

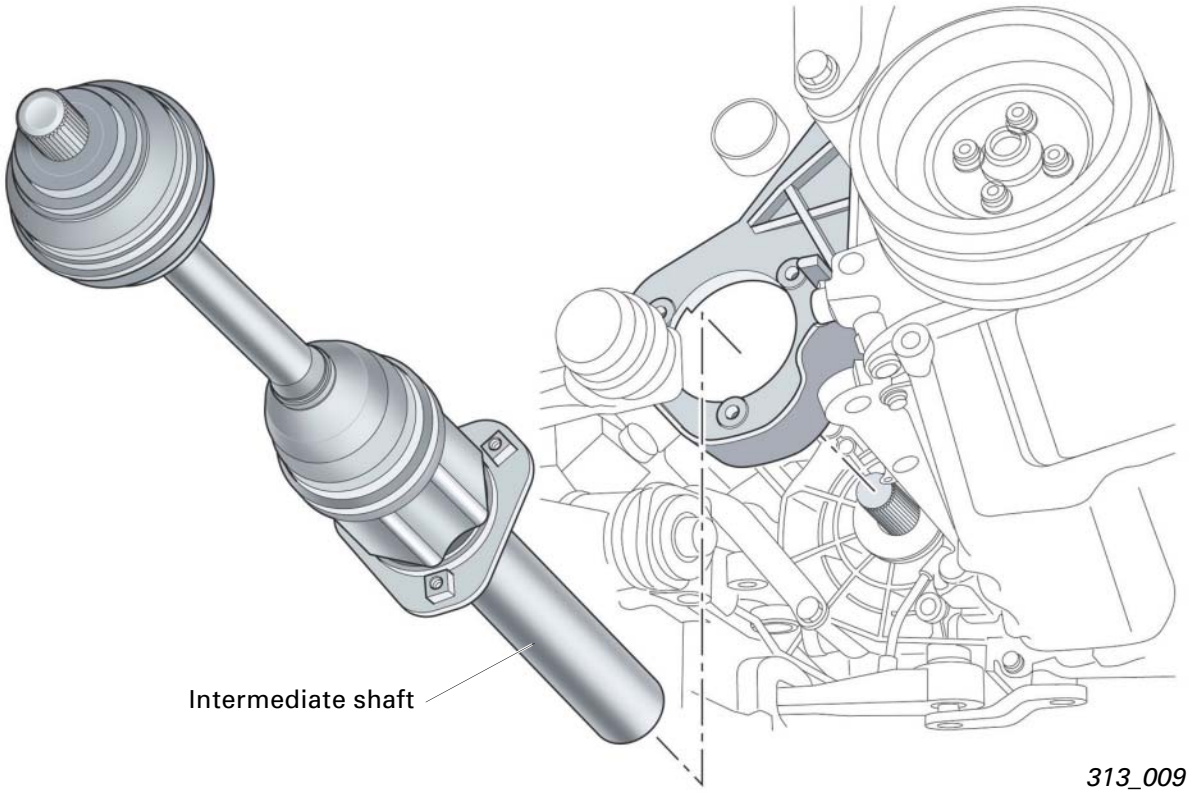
Wheel bearing unit
Use is made of a third generation wheel bearing unit. The wheel hub and wheel bearing form a structural unit which is bolted to the wheel bearing housing. The preload for setting the bearing clearance is no longer applied by the wheel bearing bolted joint. This ensures a longer service life as well as simplifying service fitting and removal operations.



313_006

Drive shaft
Vehicles with a high drive torque and front-wheel drive (2.0l TDI) are fitted with drive shafts of equal length to prevent steering interference by the drive system.

This requires the use of an intermediate shaft.
Employing monoblock drive shafts reduces weight whilst at the same time increasing torsional rigidity.



313_009

Rear axle

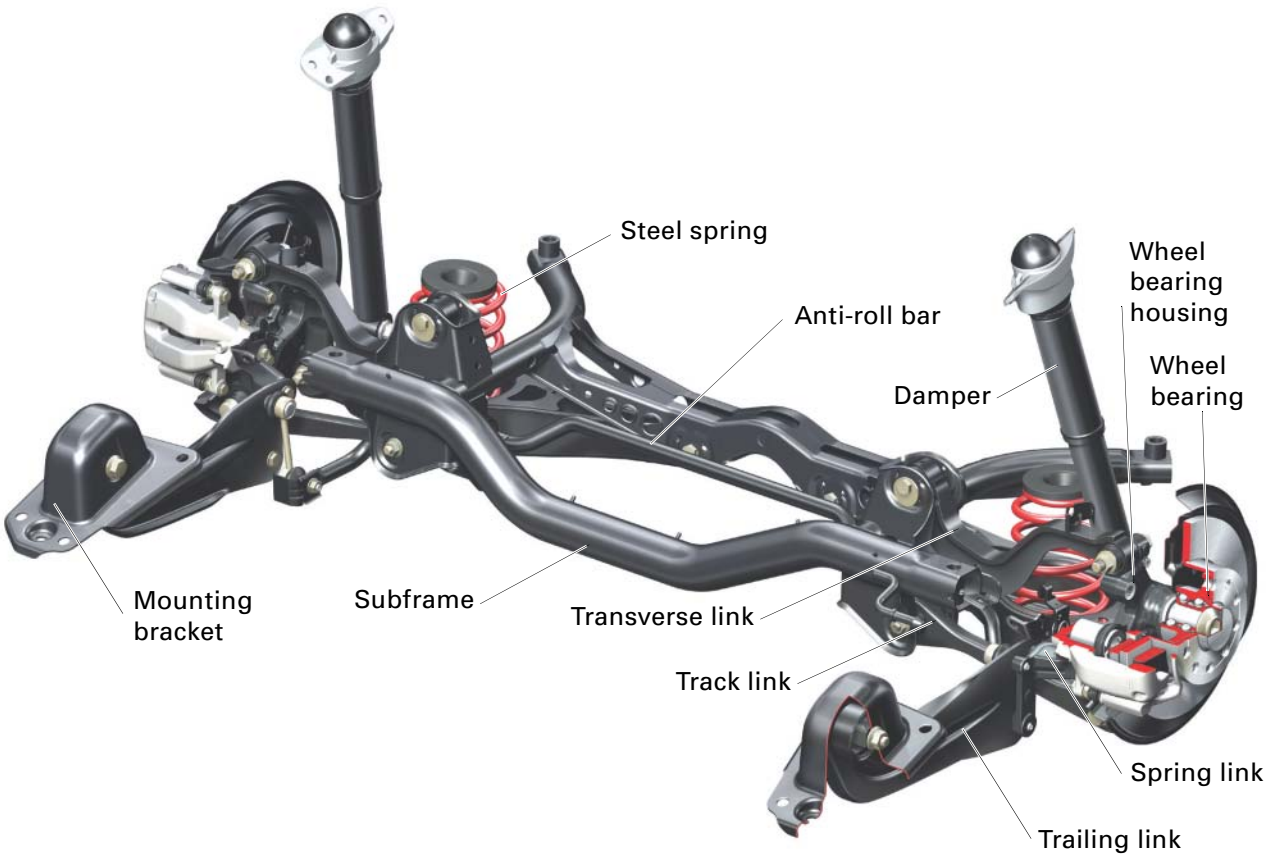
Summary

Use is made of a four-link rear axle. This is a completely new development characterised by compact design, good cost/weight ratio and optimum vehicle dynamics.

Numerous identical components make it suitable for use in both front-wheel drive and four-wheel drive vehicles. The main advantage of the drive concept employed lies in the separation of longitudinal and lateral force cushioning.

Front-wheel drive rear axle

Exploded view



313_011

System components

Subframe

The subframe is a welded steel structure which is rigidly bolted to the body. The body attachment points are the same for front-wheel drive and quattro drive.

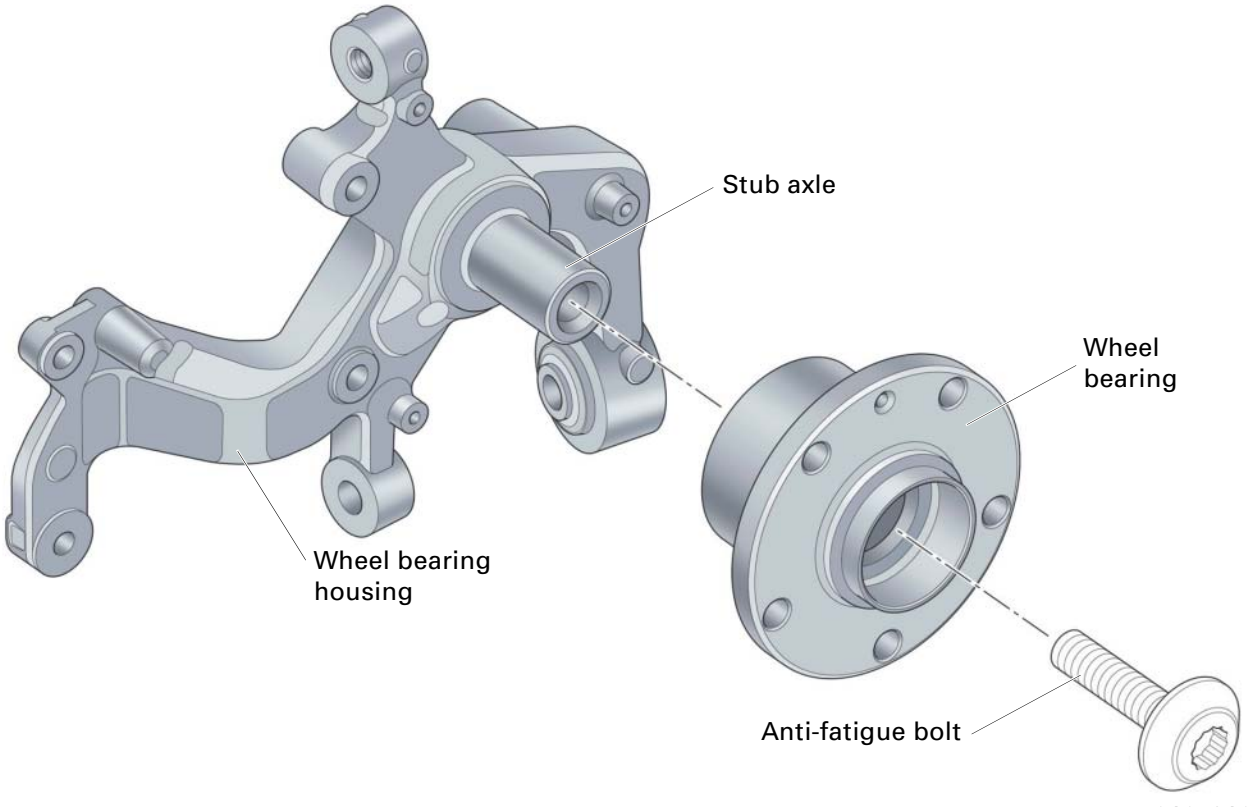
313_012

Wheel bearing housing

The wheel bearing housing is a forged steel component with moulded-on stub axle to hold the wheel bearing.

Wheel bearing

Wheel hub and wheel bearing form one structural unit. The wheel bearing is attached to the stub axle of the wheel bearing housing by means of an anti-fatigue bolt. This achieves the necessary bearing pre-load = 2nd generation wheel bearing). The wheel speed sensor ring forms part of the wheel bearing (refer to ESP, Page 48).



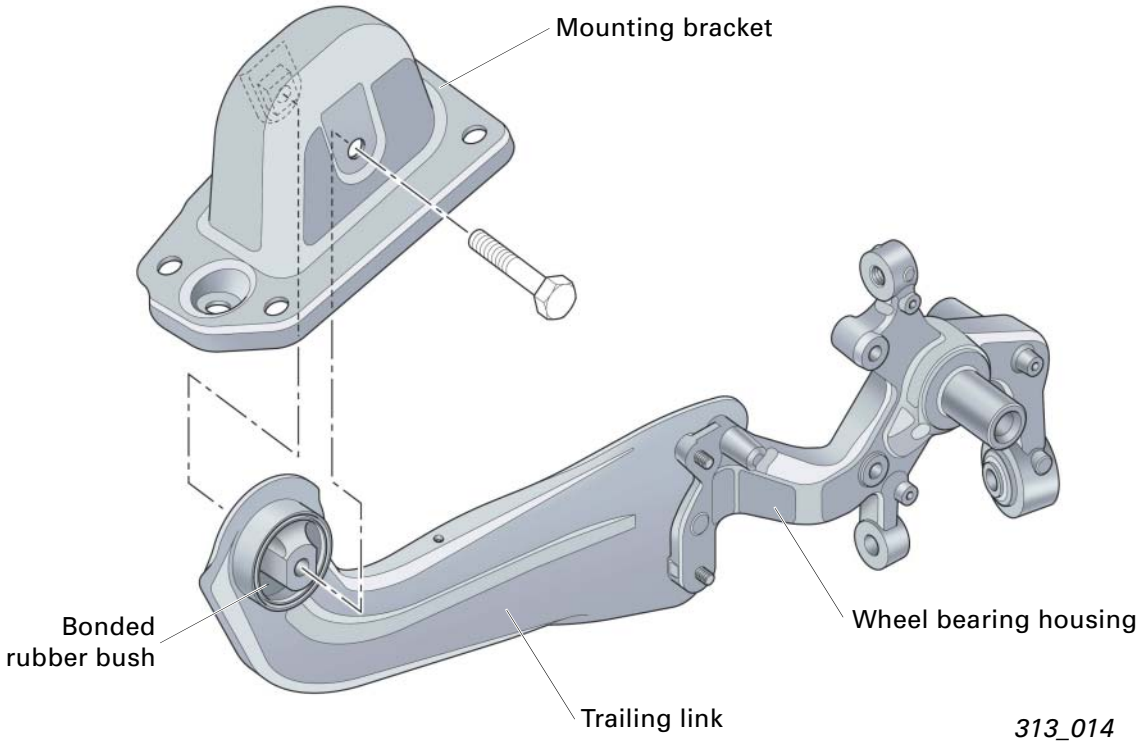
313_013

Trailing link
The trailing link is attached to the body by means of a bonded rubber bush in a sheet steel mounting bracket. The mounting bracket is rigidly bolted to the body. The amply dimensioned bonded rubber bush is largely responsible for the low level of road noise and tyre vibration.

The bonded rubber bush has a specified installation position (refer to Workshop Manual).

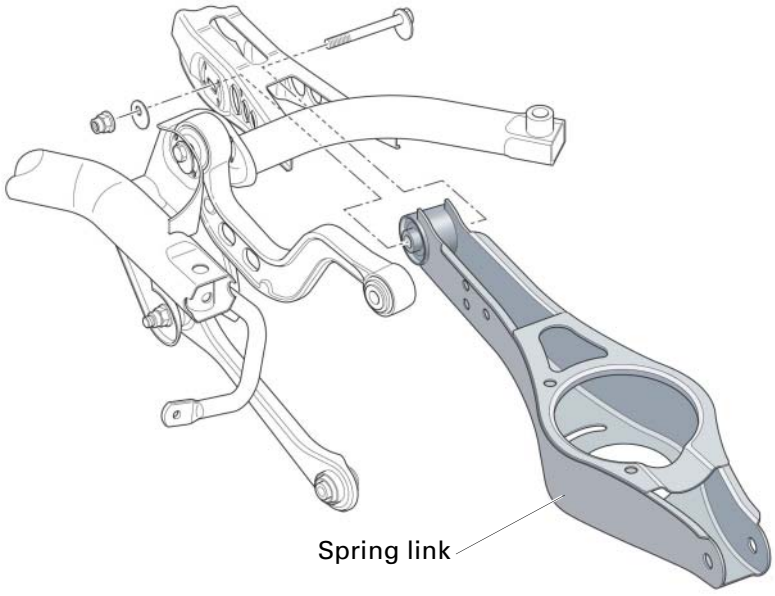
The link is bolted to the mounting bracket before the mounting bracket is bolted to the body (for relative positioning of components – refer to Workshop Manual).

The trailing link is rigidly bolted to the wheel bearing housing. It is vertically rigid and thus cushions the braking and driving-off torques.



Spring link
The body rests by way of the steel spring on the axle at the spring link, which is made of deep-drawn steel.
To guard against stone impact, the link is provided with an additional plastic cover on the heavy duty running gear version.

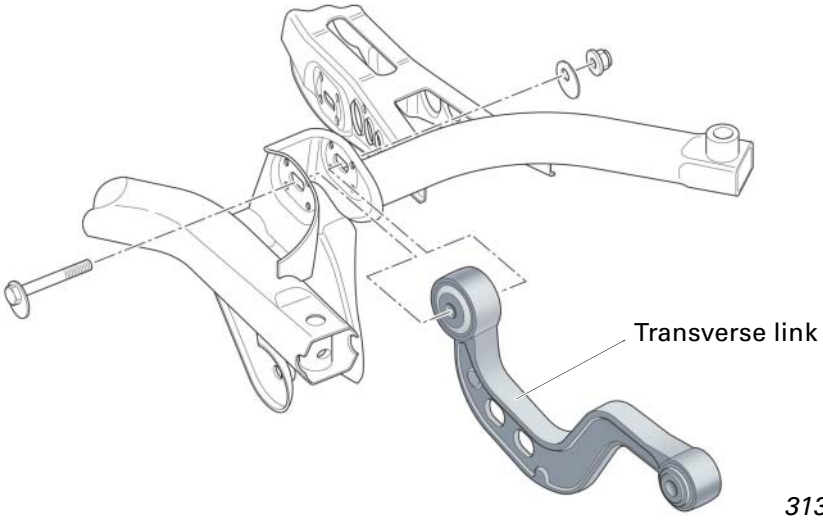
The linkage of the automatic headlight range control height sensor is connected to the left spring link.



313_015

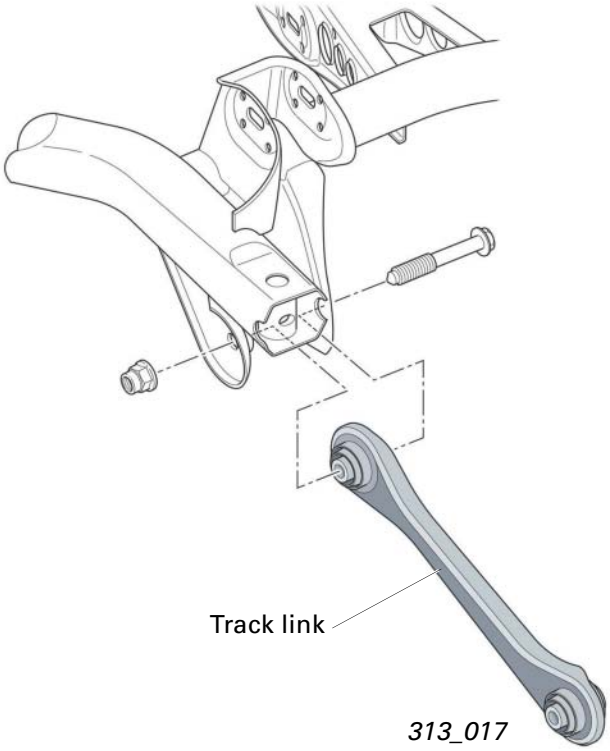
Transverse link
The transverse link forms the connection between subframe and wheel bearing housing at the upper level and is made of welded steel. Its T-shaped cross section is primarily designed to cushion lateral forces.

The use of aluminium cores and outer tubes for the mounting elements further helps to reduce weight.



313_016

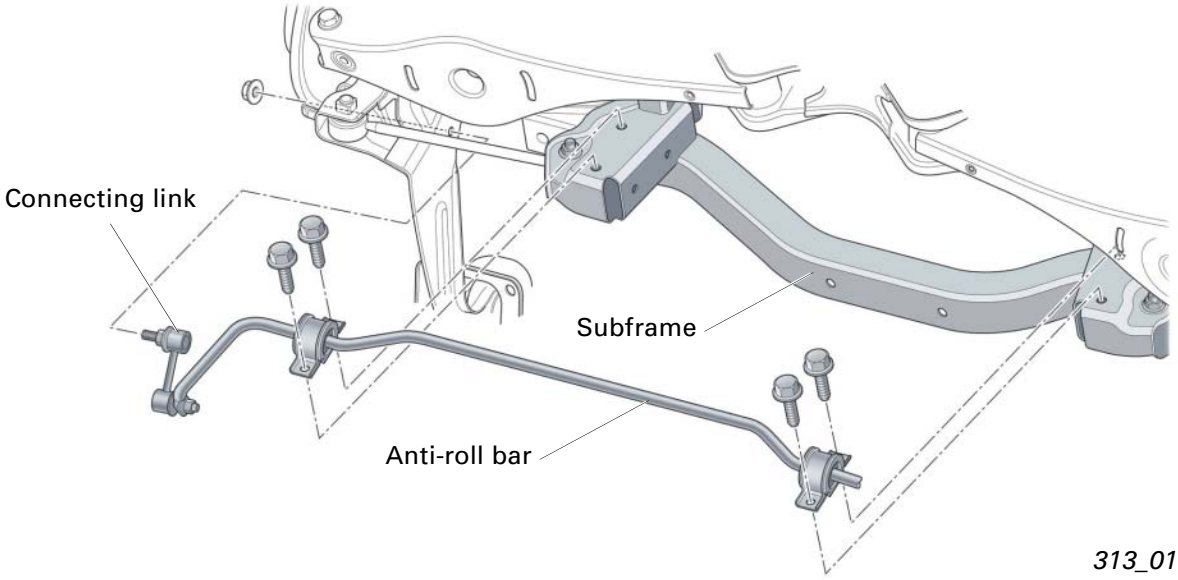
Track link
This link is made of sheet steel and essentially governs the toe-in curve.



313_017

Anti-roll bar
The standard and sports running gear versions feature the same tubular anti-roll bar. Use is made for the heavy-duty running gear of a tubular anti-roll bar with a lower spring rate.

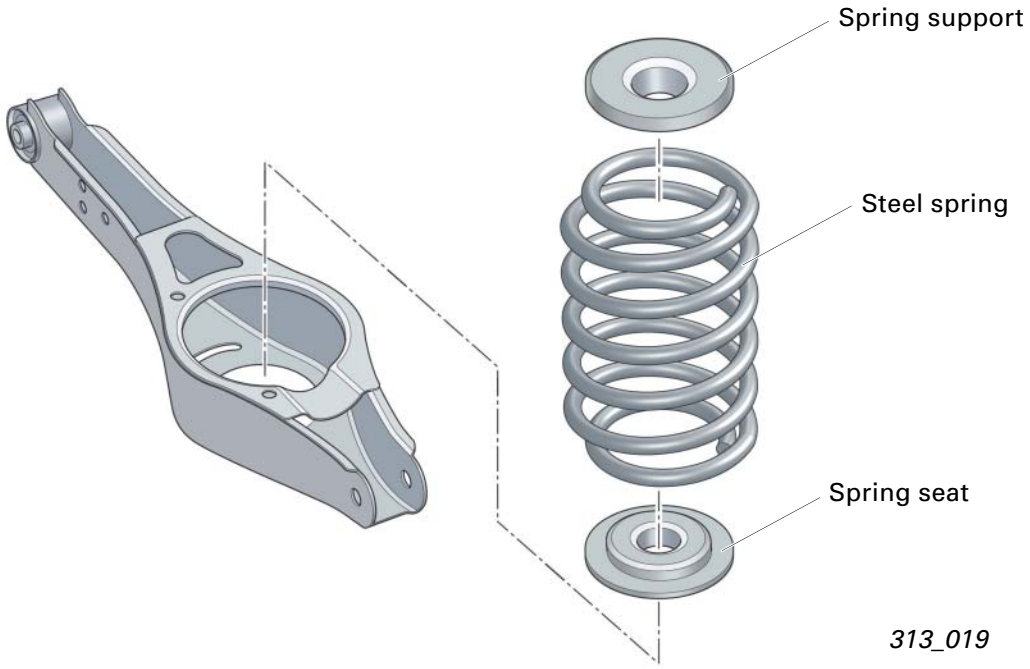
At the body end, the anti-roll bar is fitted in rubber elements at the subframe, whereas on the axle end support is provided by means of a connecting link at the wheel bearing housing.
The connecting link is made of steel with a rolled ball joint.



313_018

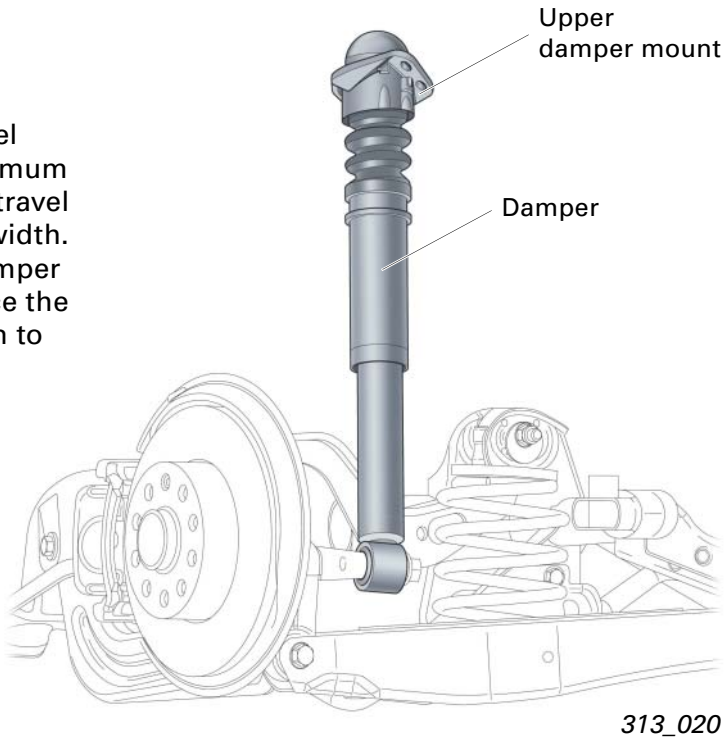
Steel spring
Use is made of a cylindrical high-strength steel spring with drawn-in ends and linear characteristics.
Support is provided by rubber spring mounts at the body and spring link.

The fitting location of the spring is governed by the spring seat (refer to Workshop Manual).



313_019

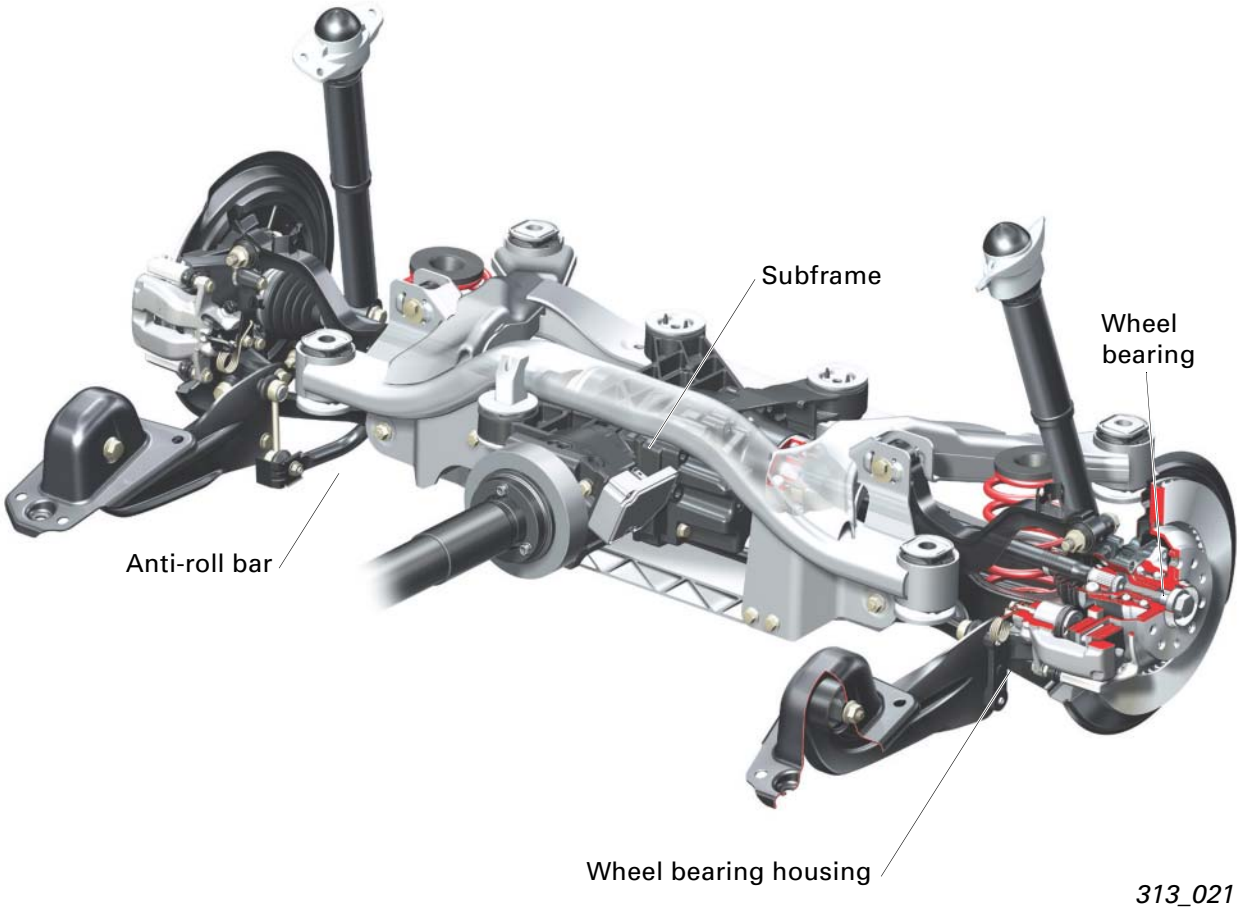
Damper
The twin-tube gas-filled dampers are mounted well to the outside at the wheel bearing housings. This achieves an optimum ratio between wheel travel and damper travel as well as a generous through-loading width. By increasing the dimensions of the damper tube and piston it was possible to reduce the internal damper pressure in comparison to the predecessor model, resulting in enhanced comfort.



313_020

quattro rear axle

Summary
The driven rear axle features modifications to the subframe, anti-roll bar, wheel bearing housing and wheel bearing.



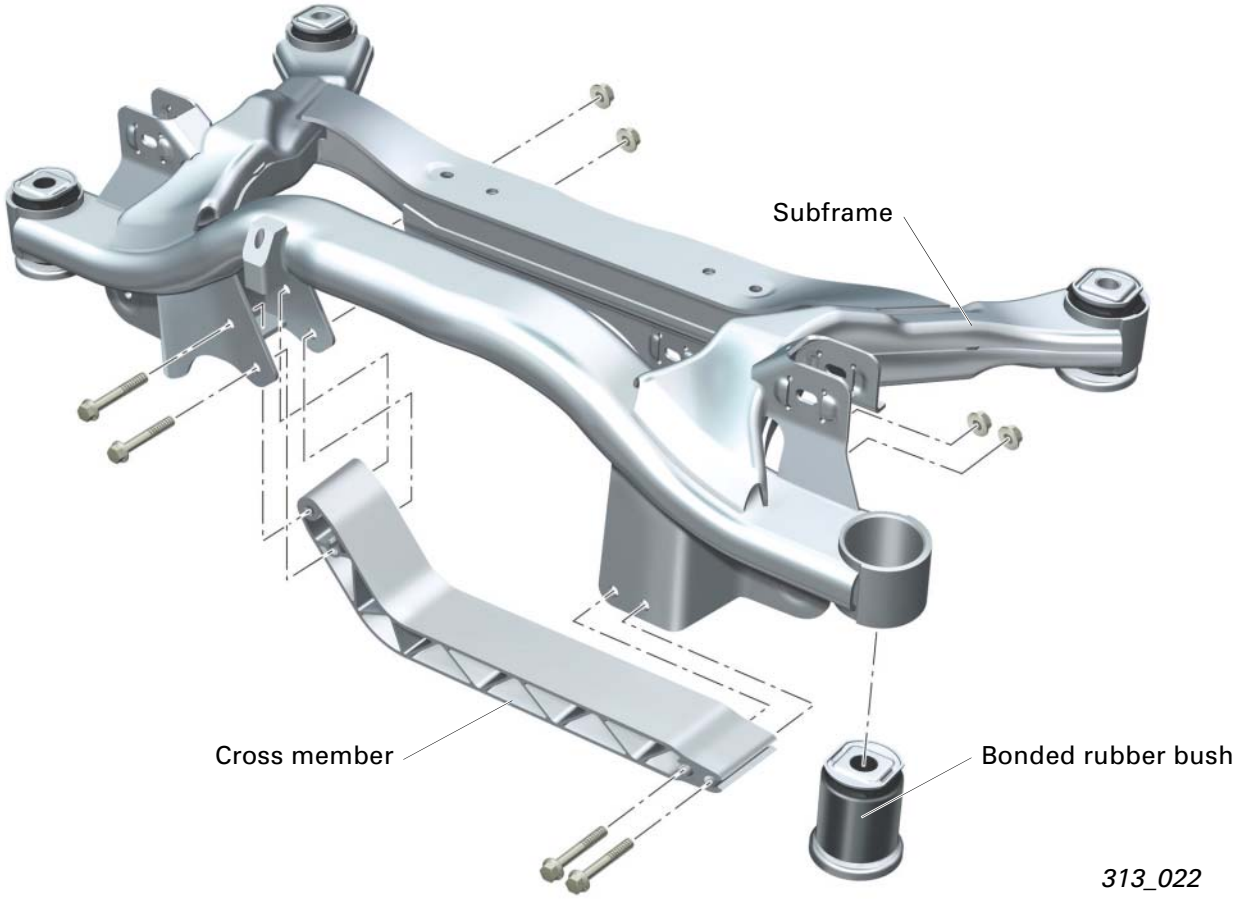
313_021

System components

Subframe

The subframe is a welded aluminium structure and additionally supports the rear final drive. It is bolted to the body by way of amply dimensioned bonded rubber bushes. This ensures good acoustic isolation with respect to the body.

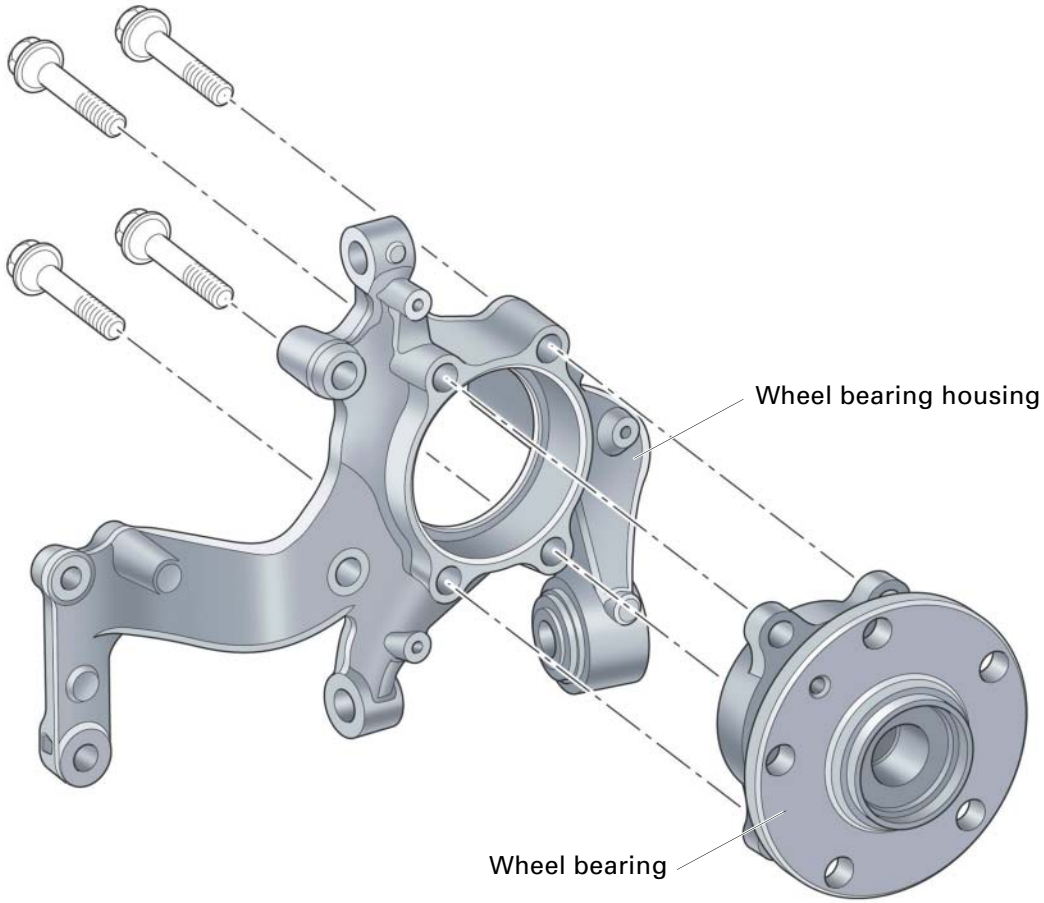
An additional bolted-on aluminium cross member enhances rigidity in the lower area by creating a closed subframe. The use of aluminium permitted a weight saving of approx. 7 kg.



313_022

Wheel bearing
Use is made of a 3rd generation wheel bearing (identical to front axle component).

Wheel bearing housing
The geometry of the wheel bearing housing was modified for rear axle drive (use of modified wheel bearing and drive shaft).



313_023

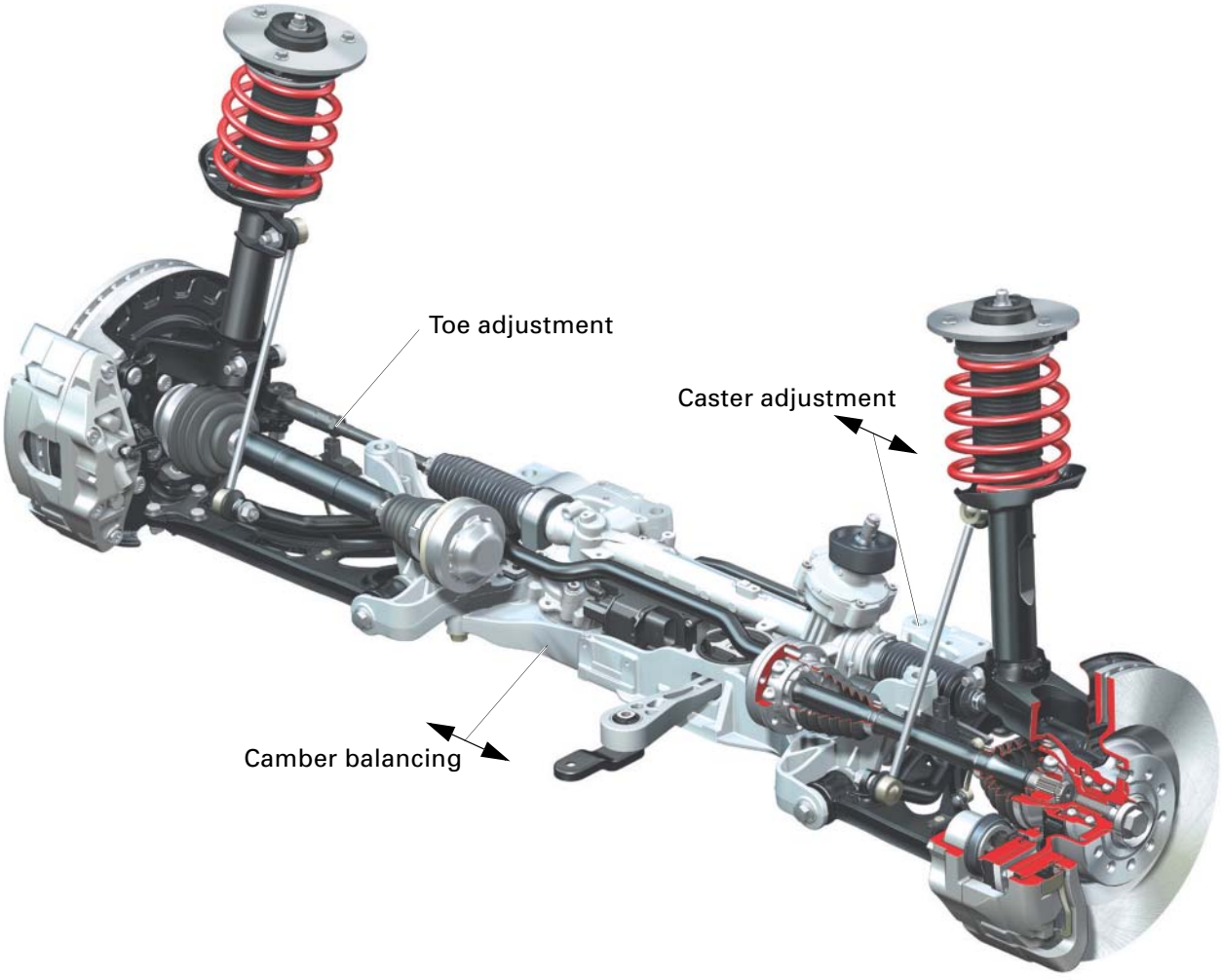
Anti-roll bar
The anti-roll bar geometry was modified to provide clearance from the rear final drive. The dimensions correspond to those of the front-wheel drive version.

Wheel alignment

Front axle
The front axle toe-in can be set at the track rods.

Limited balancing of the camber values can be achieved by way of lateral adjustment of the subframe.

Caster can be adjusted to a limited extent by moving the mounting bracket.

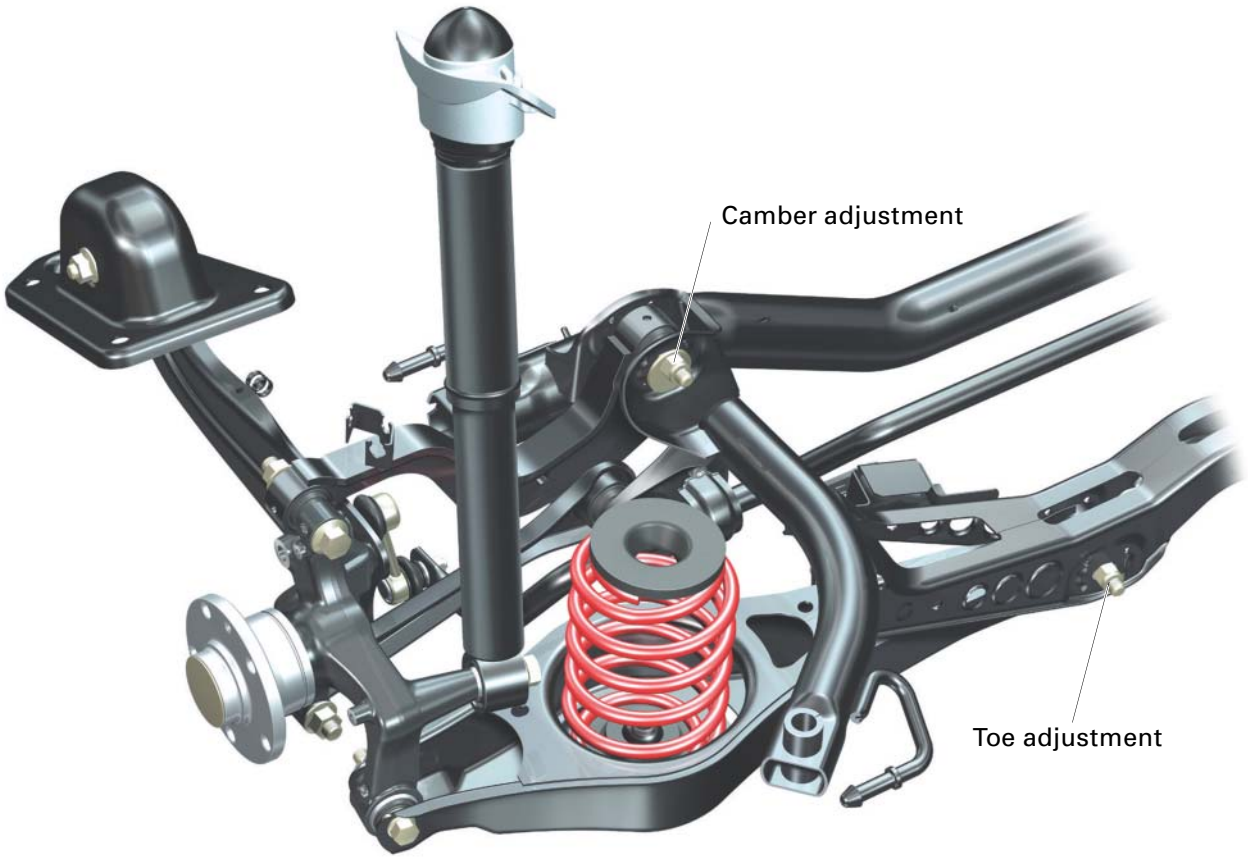


313_024

Rear axle

Toe-in and camber can be set separately for each wheel of the rear axle. Toe adjustment is made for both front-wheel drive and quattro drive at the bolted joint between spring link and subframe.

Camber adjustment is made at the bolted joint between transverse link and subframe.



313_025

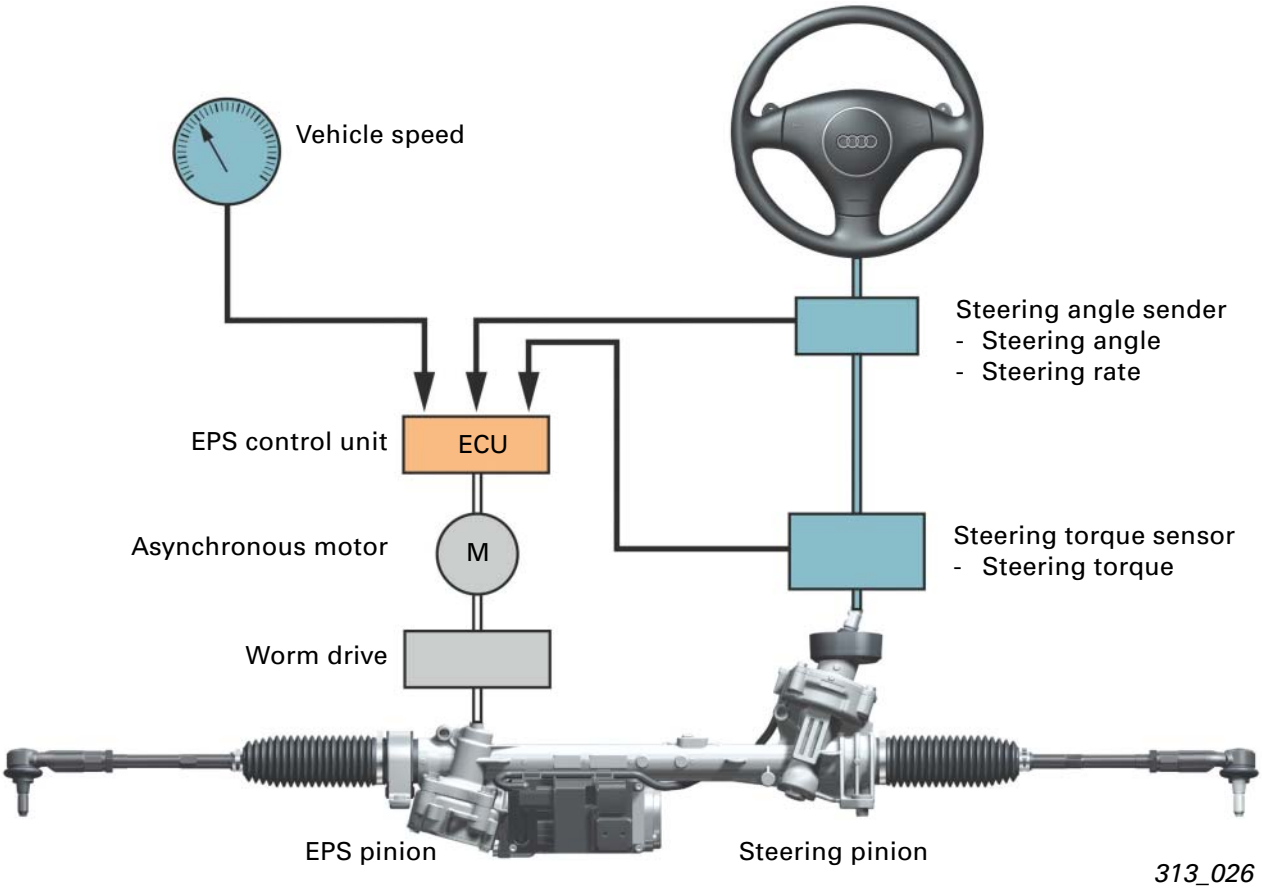
Electromechanical steering (EPS)

(EPS = electrical power steering)

Summary

Power steering systems have been the state of the art in passenger vehicles for some years. With such systems, the necessary steering force is applied by the driver and by an additional energy source. In the past use has been made of hydraulic systems and electrical systems combined with hydraulics to provide the additional energy.

Over the past few years, purely electrical power steering systems have been developed specially for smaller to medium-sized passenger vehicles. The A3 `04 is the first Audi model to feature such a steering system.



Use is made of a "double pinion" system. Steering assistance is provided by a second pinion acting in parallel on the rack and driven by an electric motor.

A torque sensor detects the torque at the steering pinion. The electronic control unit establishes the assistance torque required as a function of steering torque, vehicle speed, steering angle, steering rate and other input variables.

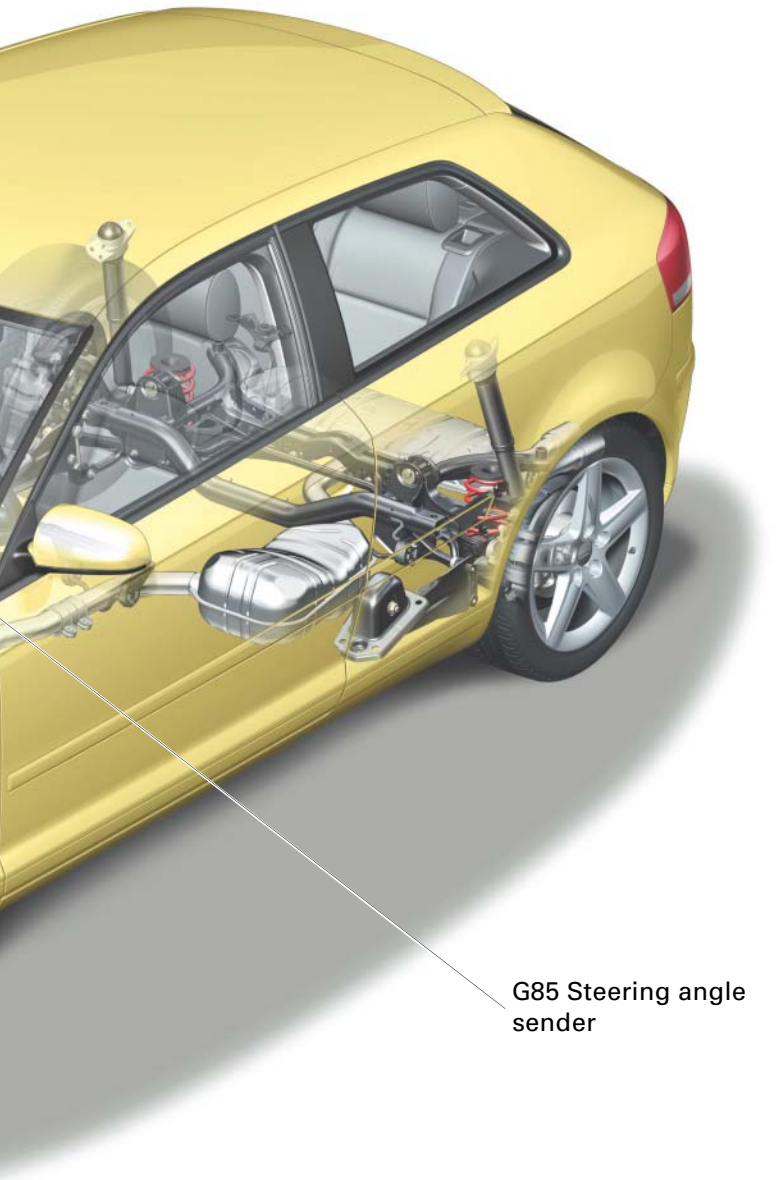
Advantages

- Reduction in fuel consumption by 0.1-0.2 l/100 km by way of requirement-specific power input
- Simple implementation of speed-dependent power assistance and damping and thus an optimum steering feel in all situations
- Reduced sensitivity to road surface irregularities
- Only two hardware versions are now required (LHD/RHD), as adaption is possible by way of software modifications
- Active re-positioning of wheels to straight ahead setting
- Minimal noise generation in passenger compartment

Steering

System components

System layout

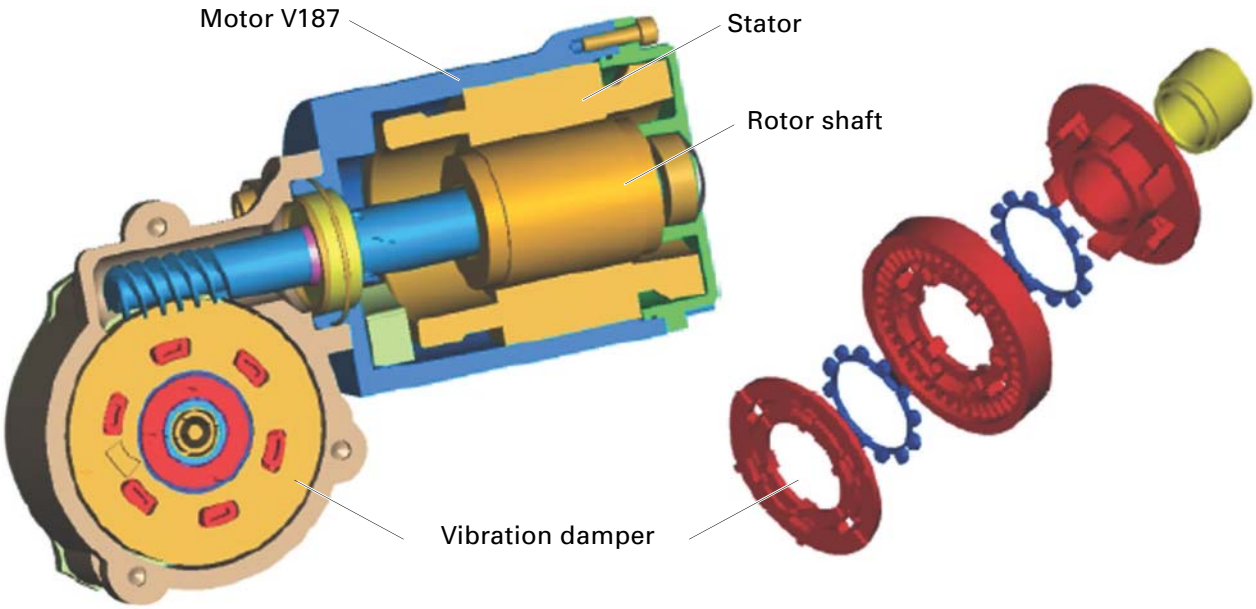


313_027

V187 Electromechanical power steering motor

Motor and gear unit are fitted in an aluminium housing. The rotor shaft takes the form of a worm on the output end.

The worm gear drives the power steering pinion. A vibration damper between drive gear and pinion ensures gentle, smooth meshing.



313_028

V187 is an asynchronous motor. Asynchronous motors are of simple design (no brushes) and are thus extremely reliable. They have a short response time and are thus suitable for extremely rapid steering action. The maximum assistance torque is 4.4 Nm. The motor supplies a torque even without rotation.

313_029

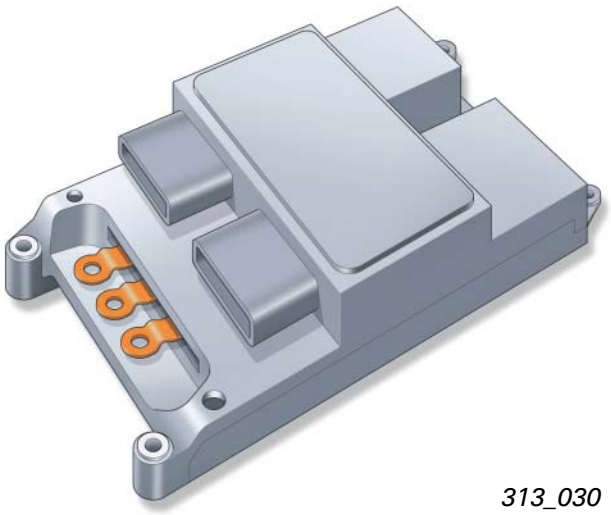
Rotor speed sender G28
The position (angle of rotation) of the rotor for the electric motor V187 is detected by a sender, operating on the basis of the magnetoresistive effect*. The sender forms part of the electric motor and is not accessible from outside.
The sender supplies one sinusoidal and one cosine signal each as angle output signals. Two signals are output to permit plausibility checking (function monitoring) by the control unit. The control unit J500 requires position data to calculate the necessary steering assistance.

Fault situations result in "soft" deactivation of the steering assistance. A steering rate signal is formed from the steering angle signal as substitute for this.

***Magnetoresistive effect:**
Use is made of the physical phenomenon that longitudinal and transverse conductor resistance changes as a function of the direction of an applied magnetic field.

Power steering control unit J500
The control unit is permanently connected to the motor and is of microhybrid design. The control unit determines the current assistance torque required on the basis of the input signals. The intensity of the excitation current is calculated and the motor V187 actuated.

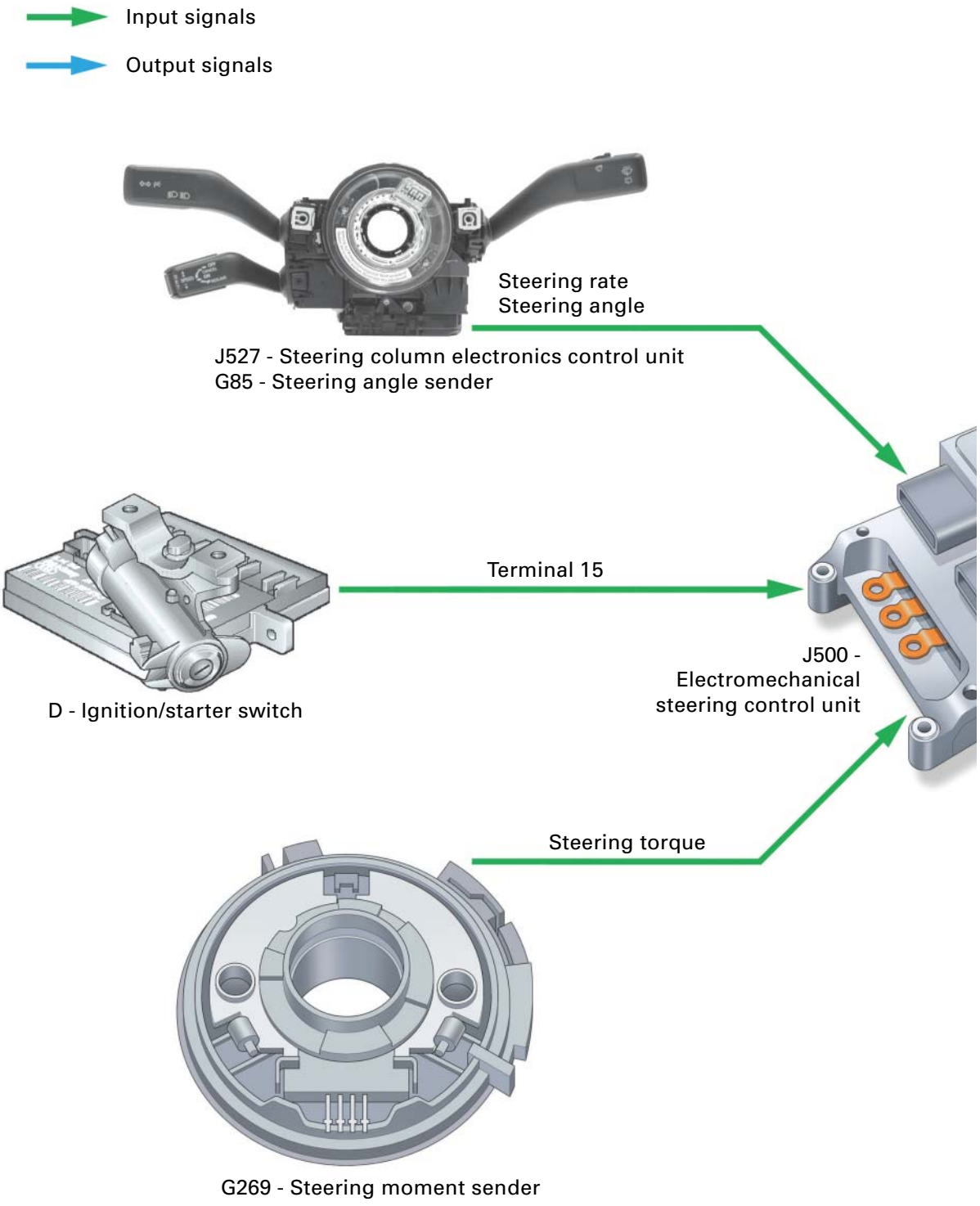
The control unit features a temperature sensor which measures the temperature of the output stages. Excessively high temperature results in reduced power output and thus reduced steering assistance.



313_030

Power steering control unit J500

Input and output signals

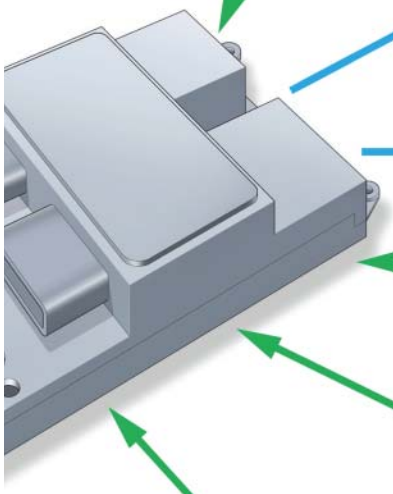


J285 - Control unit with display in dash panel insert

K161 - Warning lamp

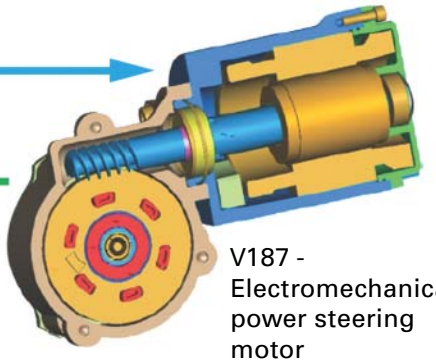
Vehicle speed

Warning lamp actuation



Motor actuation

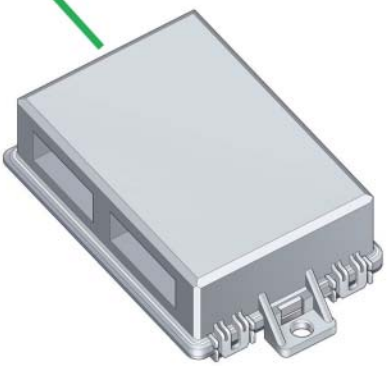
Rotor speed
Steering rate



V187 - Electromechanical power steering motor

Vehicle speed

Engine speed



J220 - Motronic control unit

J104 - ESP control unit

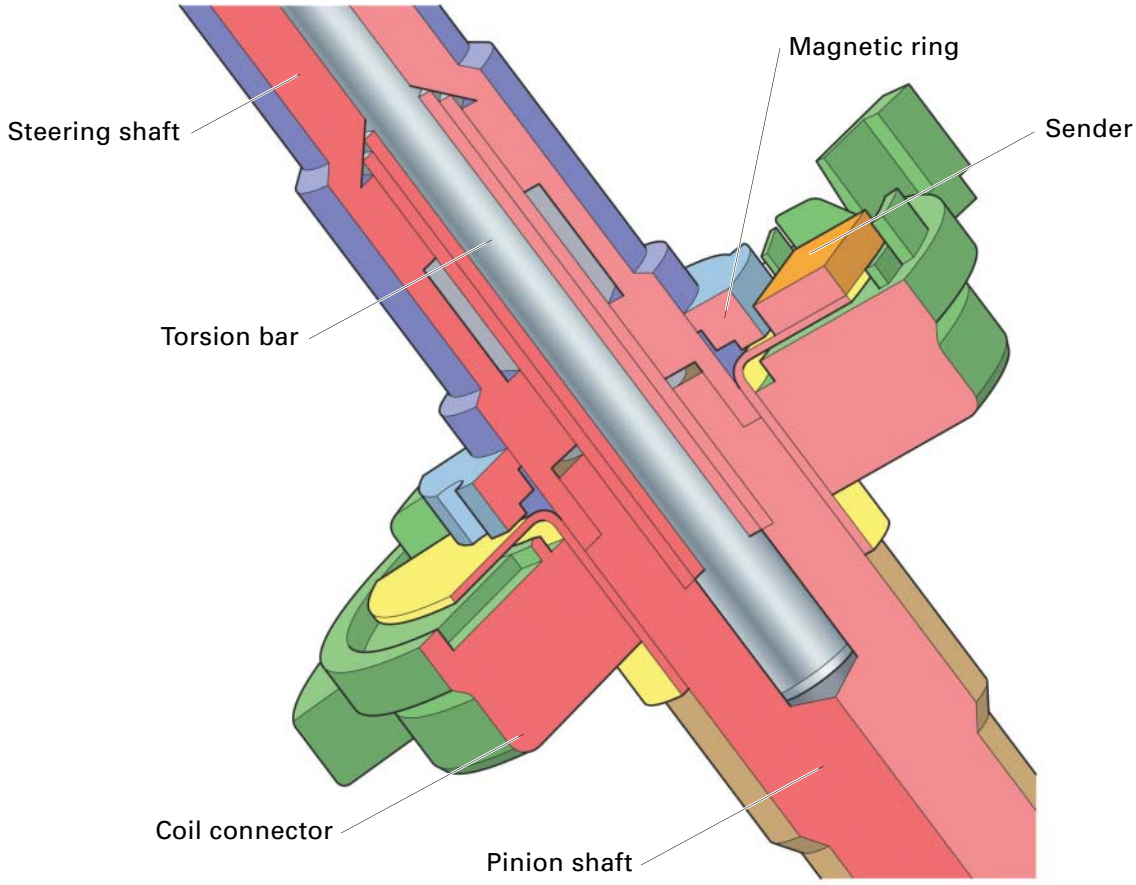
313_031

Steering

Steering moment sender G269

The sender operates on the principle of magnetoresistive sensors. A magnetic ring is permanently connected to the steering shaft and thus to the top part of the torsion bar. The sender is located on the pinion shaft, which is connected to the bottom part of the torsion bar.

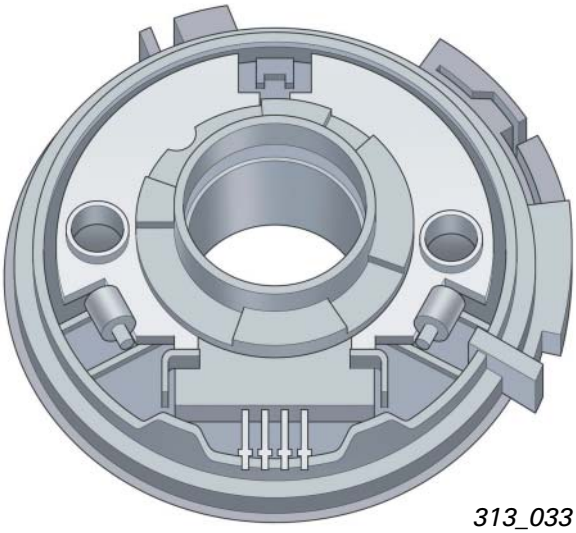
Contact is made by way of a coil connector. Defined turning of the torsion bar takes place depending on the force applied to the steering wheel. This produces relative motion between magnetic ring and sender. The change in resistance generated by the magnetoresistive effect is evaluated by the control unit.



313_032

The steering box must be replaced if the steering moment sender is defective.

Steering assistance is deactivated if a fault is detected.
Deactivation is "soft" rather than abrupt.
To ensure controlled soft deactivation, the control unit forms a steering torque substitute signal from steering angle and electric motor rotor speed.



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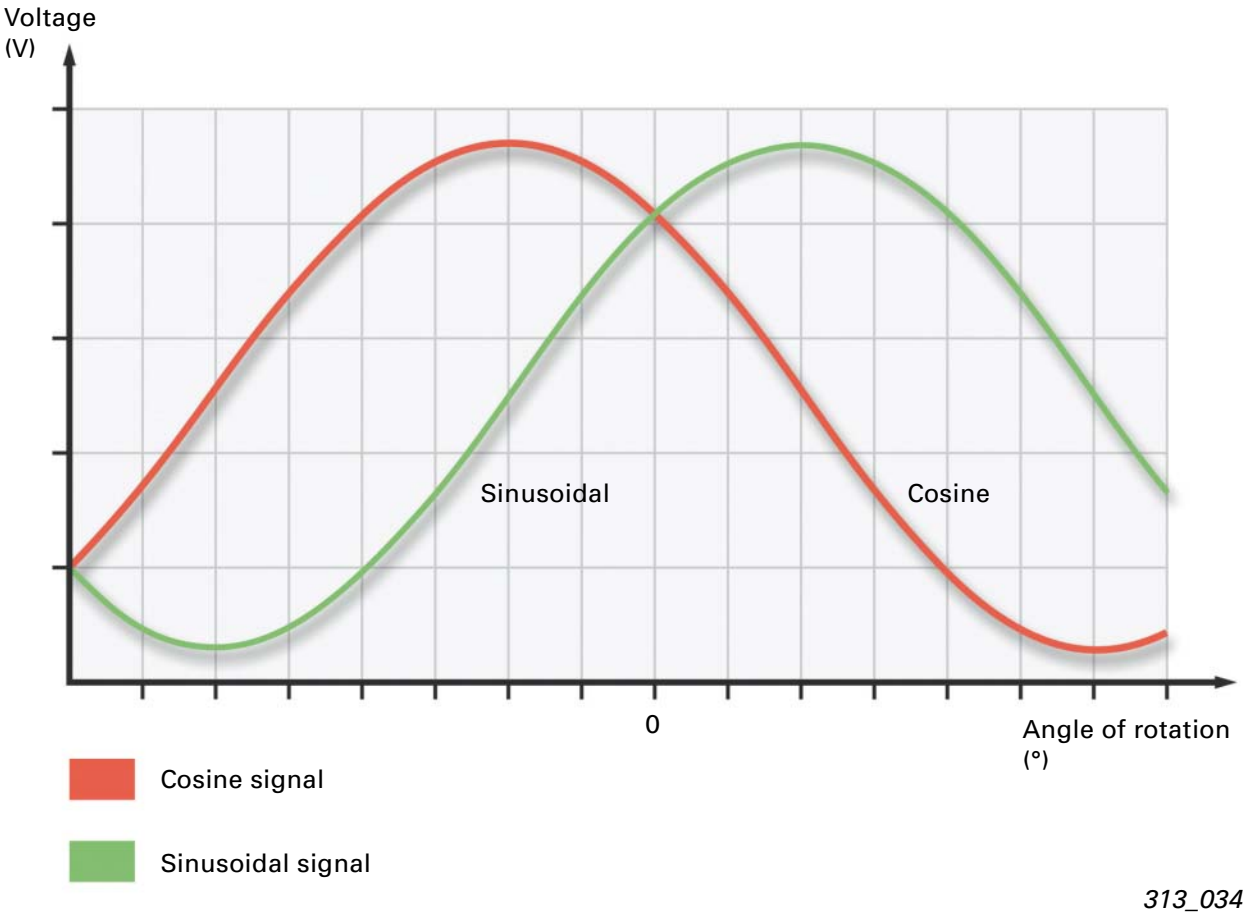


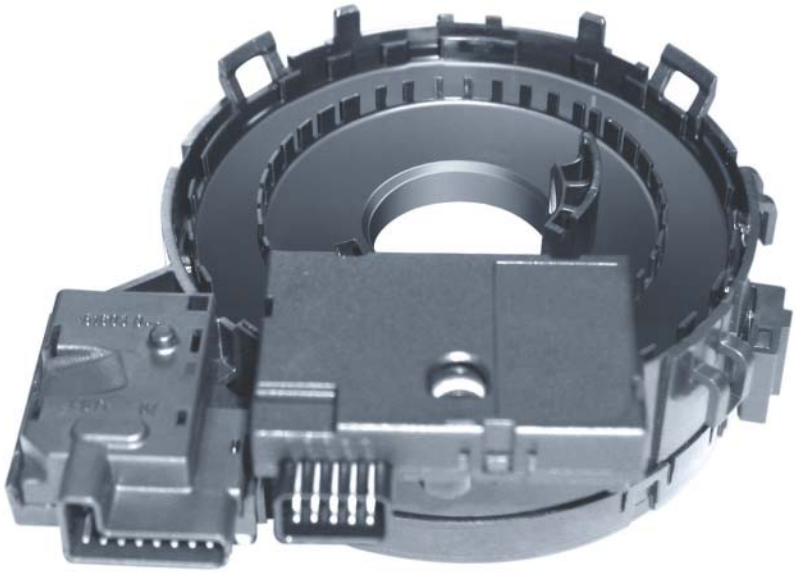
313_034

Steering

Steering angle sender G85

The sender detects the steering angle. The signal evaluation electronics are located in the steering column electronics control unit J527. In addition to steering angle, the control unit determines the steering rate for calculating the necessary steering assistance. Sender design and operation are essentially the same as for the Audi A4 (the basic mechanical design is described in SSP 204).

Replacement of the sender G85 and/or the ESP control unit J104 involves recalibration and initialisation of the sender and re-encoding of the control unit J104 (for details, refer to current Workshop Manual and Guided fault finding).



313_056

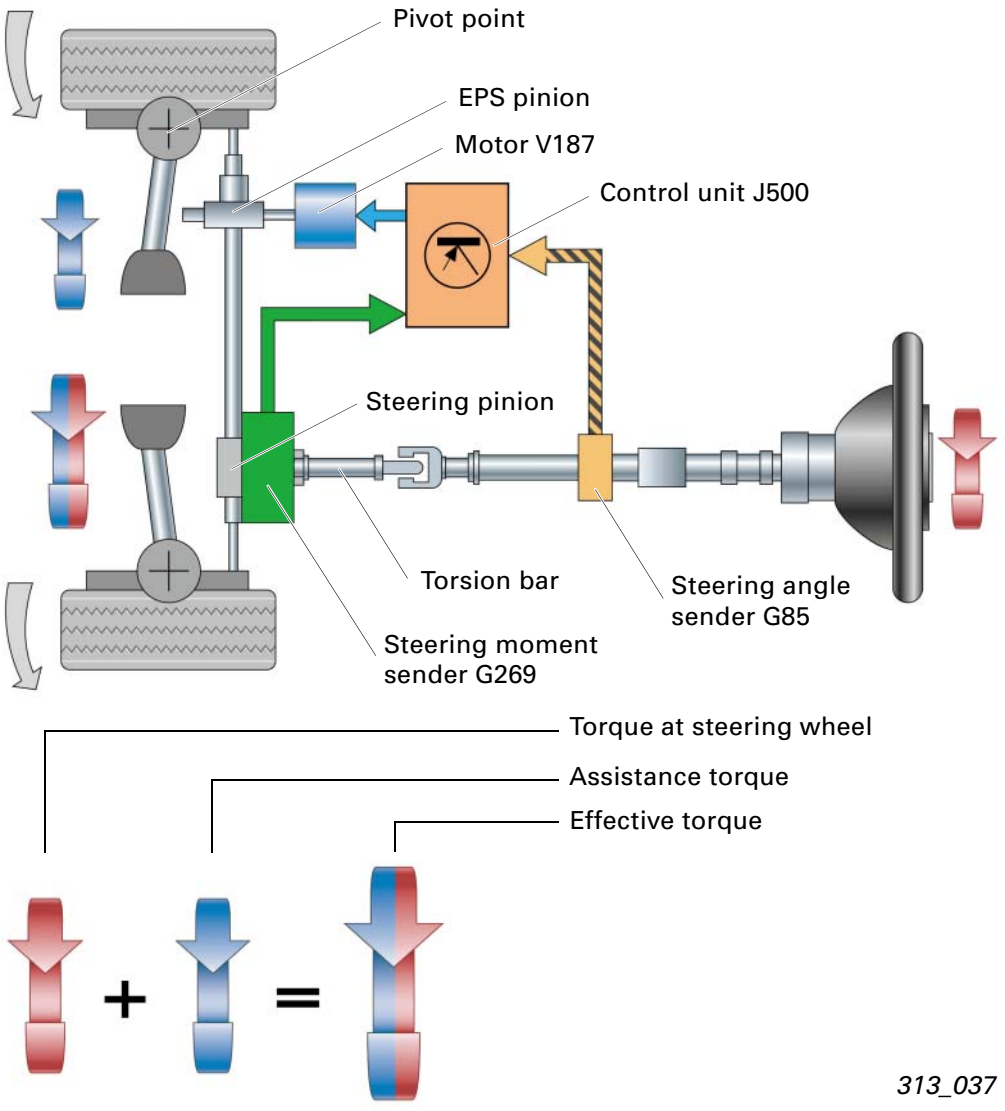
Warning lamp K161

The warning lamp is located in the dash panel insert and is designed to indicate system faults. Lighting of the warning lamp is accompanied by activation of a triple gong.

313_036

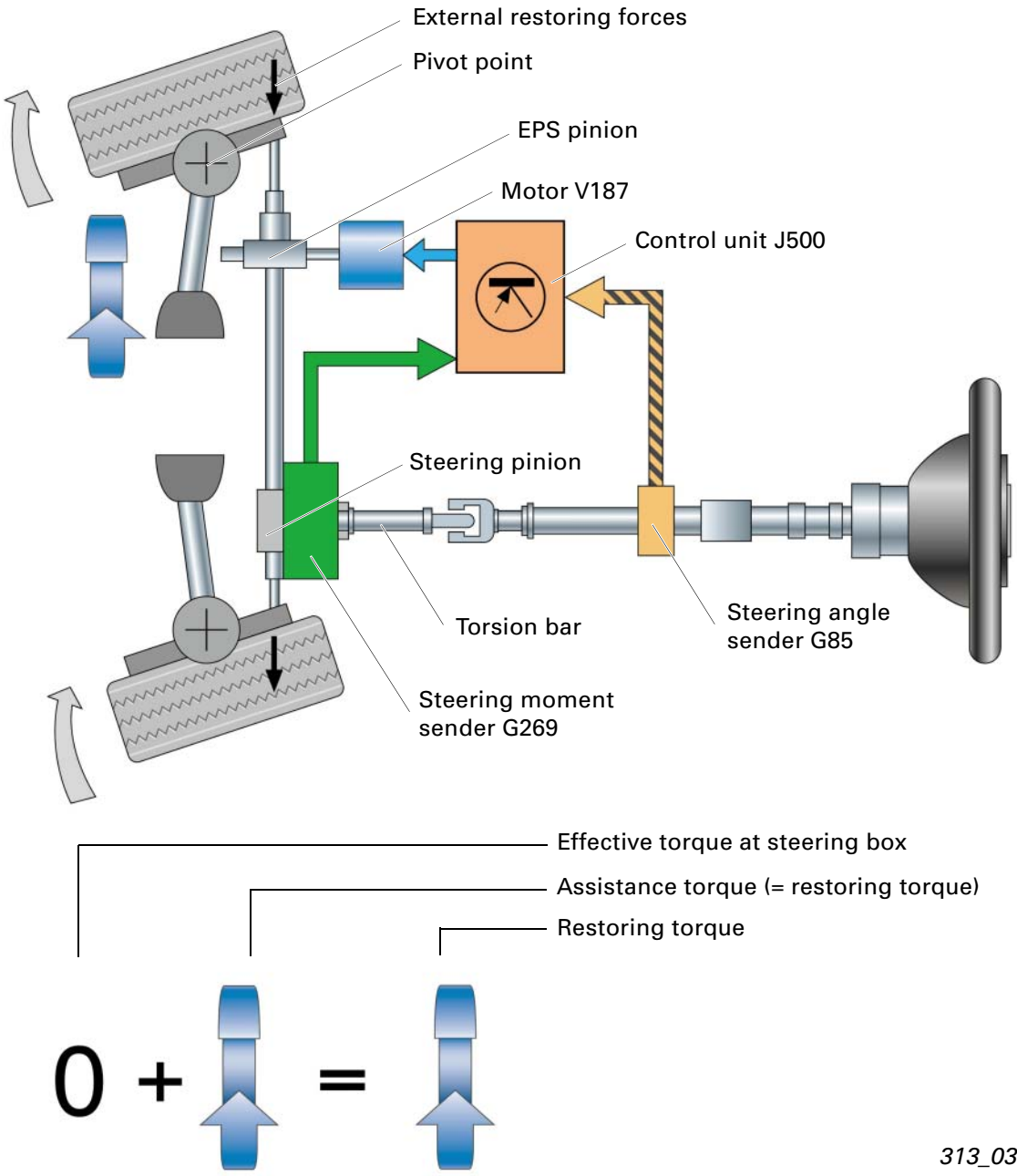
Mode of operation

The general mode of operation is explained in the following on the basis of typical steering action.



The driver starts to steer. The torque at the steering wheel turns the torsion bar. The steering moment sender G269 detects the rotation and signals the steering torque determined to the control unit J500. The steering angle sender G85 indicates the current steering angle and steering rate.

The control unit establishes the specified torque for actuation of the electric motor on the basis of steering torque, vehicle speed, engine speed, steering angle, steering rate and characteristic curves stored in the control unit. The sum total of the torque at the steering wheel and the assistance torque represents the effective torque at the steering box for movement of the rack.



If the driver stops exerting force on the steering wheel or releases it, the torsion bar is relieved of load. The steering torque drops to zero.

The axle geometry is such that restoring forces are produced at the turned wheels. Due to friction in the steering system, the restoring forces are often not sufficient to return the wheels to straight ahead position.

The control unit J500 recognises this from the steering angle values supplied by the steering angle sender G85.
The control unit calculates the electric motor torque required for repositioning by evaluating steering torque, vehicle speed, engine speed, steering angle, steering rate and characteristic curves stored in the control unit.

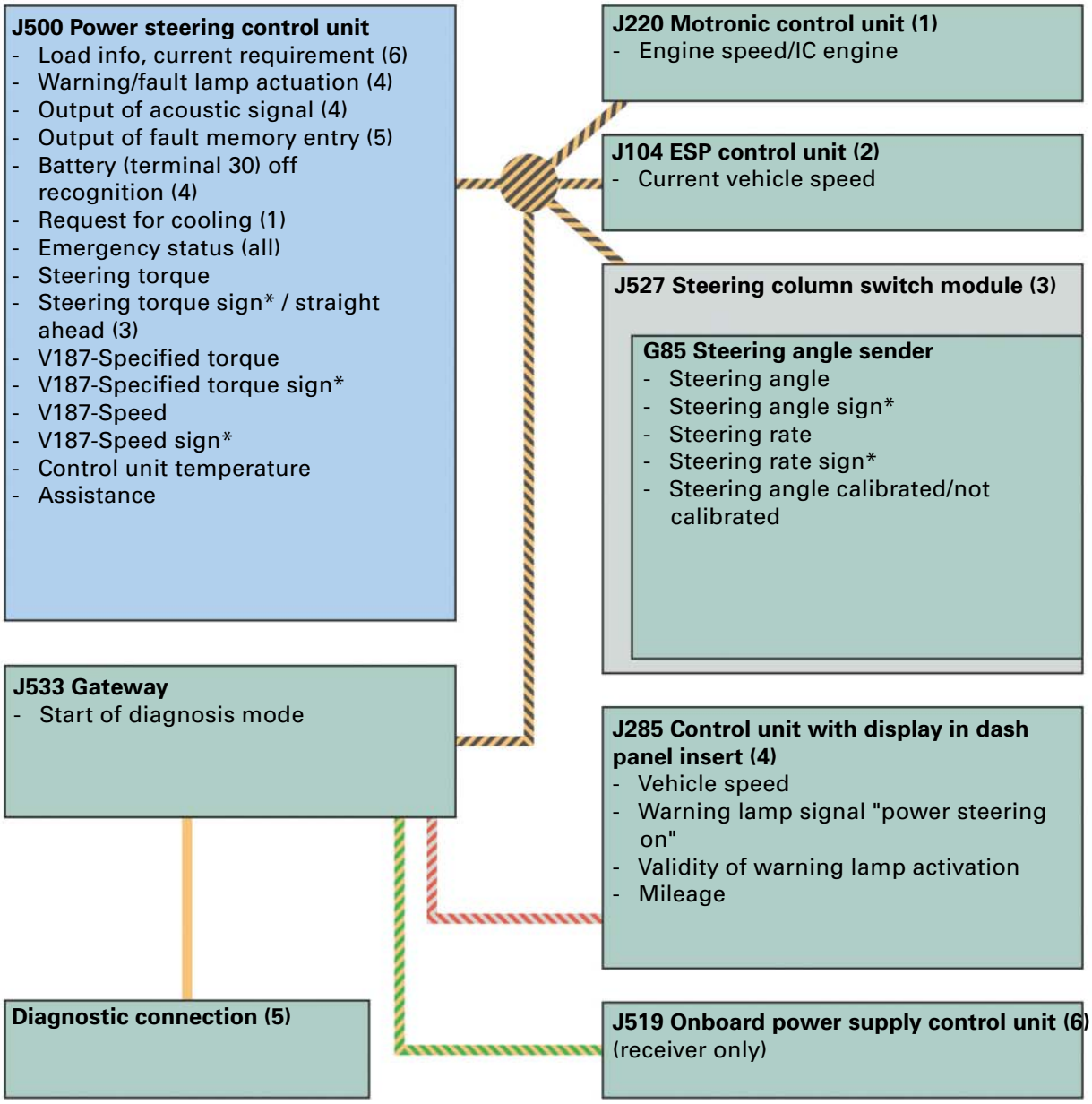
The motor is actuated and the wheels moved back to the straight ahead position. The maximum assistance torque for active repositioning is limited to 25 Nm at the rack.

Steering

System emergency operation
If the battery is disconnected or defective, the onboard power supply control unit ensures that sufficient current is available for the electromechanical steering system when the engine is running.

For this purpose, certain items of low-priority electrical equipment are deactivated if necessary. In the event of complete shutdown due to a system fault, the legal requirements are of course still satisfied and steering is not restricted in any way.

CAN data exchange

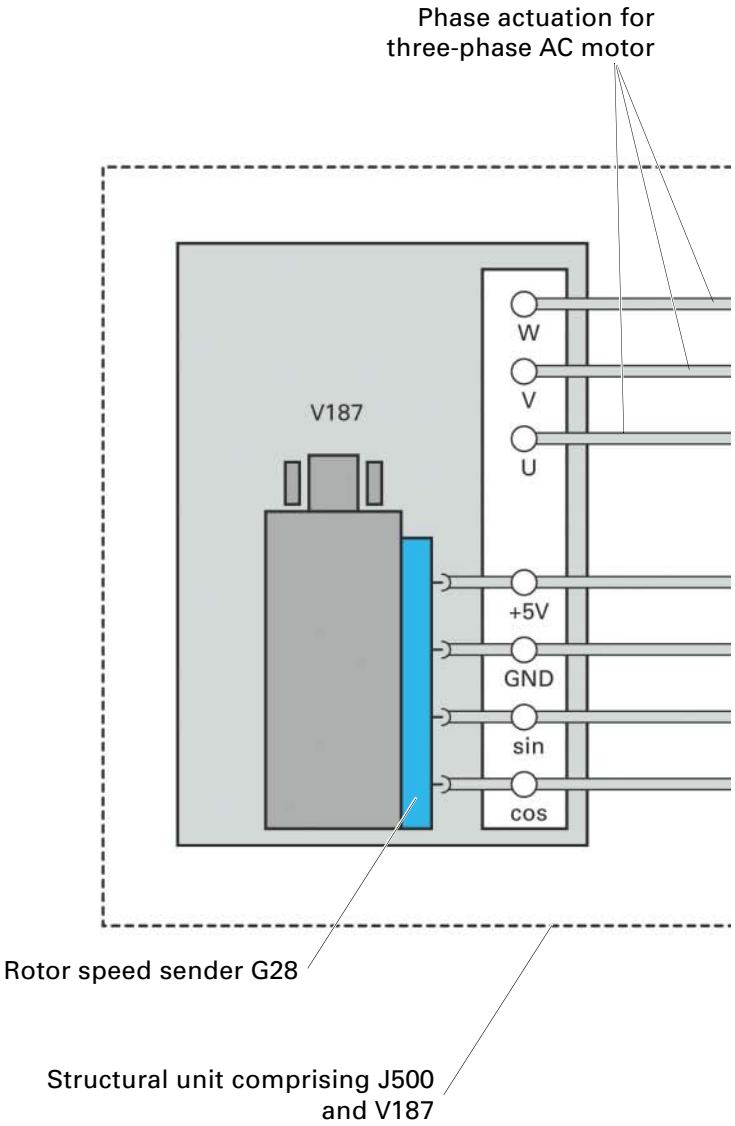


* Depending on direction of movement (right/left)

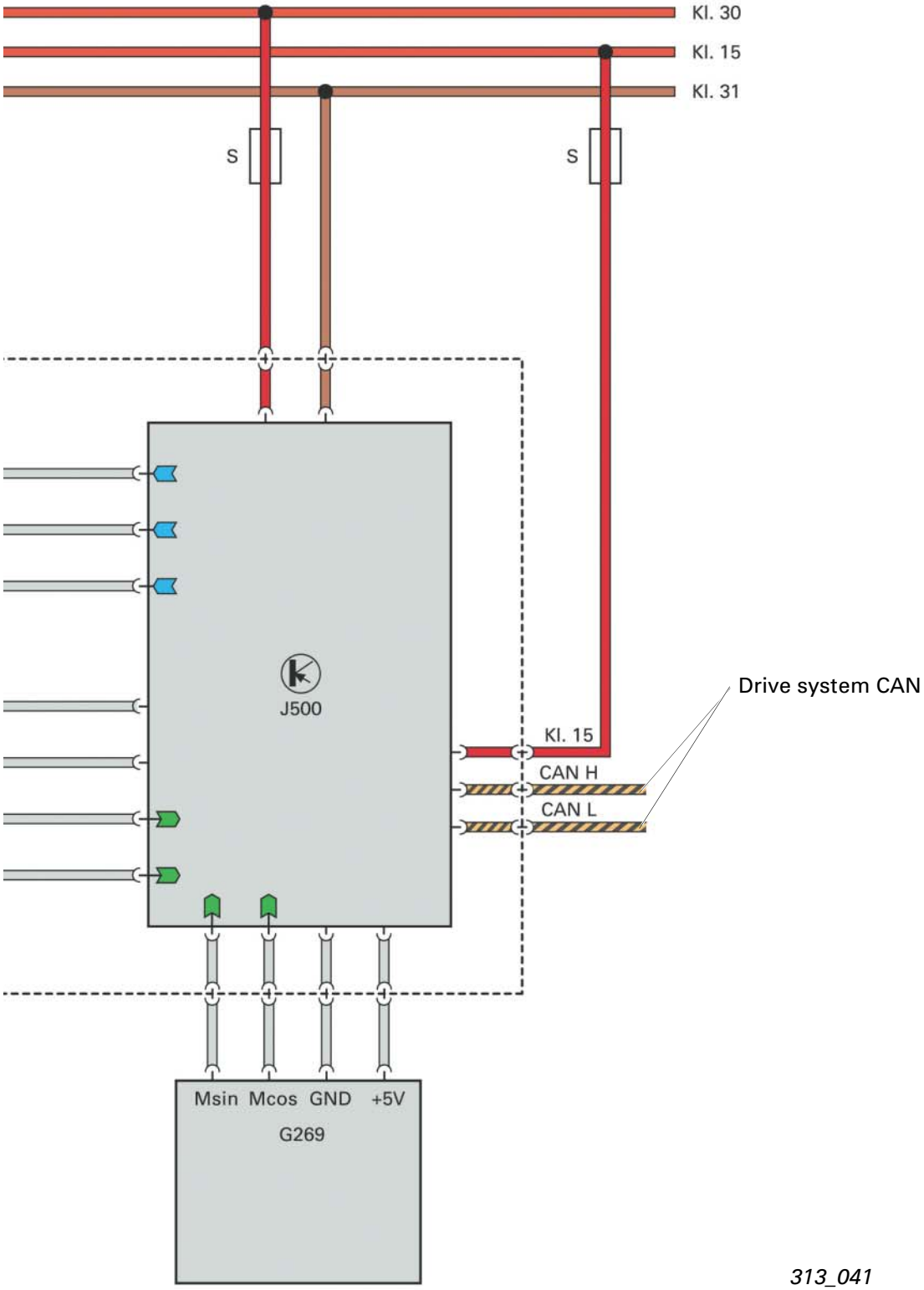
The numbers in brackets after the messages indicate which control units process the information concerned. For example: "Load info, current requirement" is processed by control unit no. 6, J519

313_040

Block diagram



J500	Power steering control unit
V187	Electromechanical power steering motor
G269	Steering moment sender
	Input signal
	Output signal
	Positive
	Earth
S	Fuse
	Drive system CAN

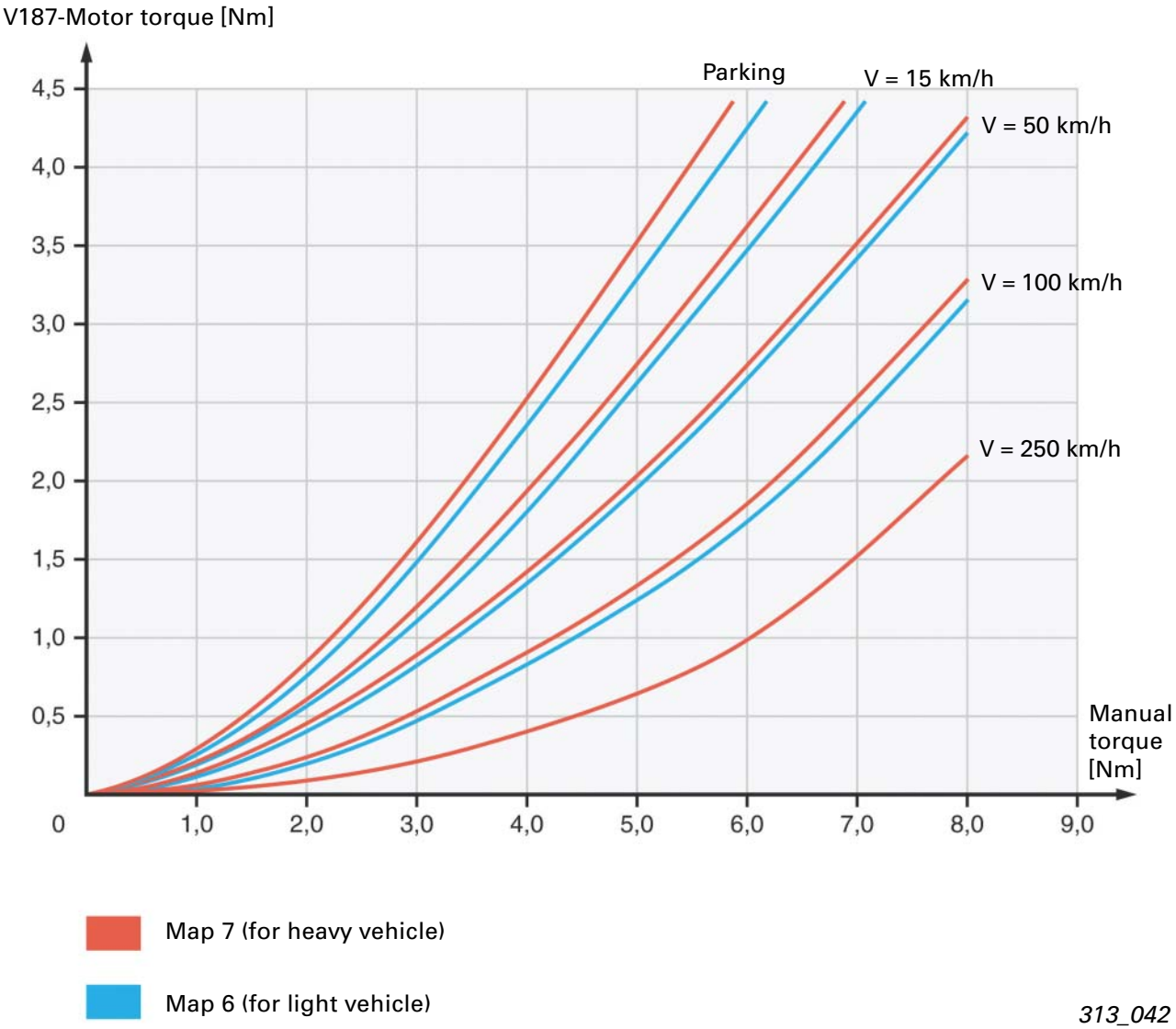

Kl. 30
Kl. 15
Kl. 31
S
S
J500
Kl. 15
CAN H
CAN L
Drive system CAN
Msin Mcos GND +5V
G269

313_041

Service
The electromechanical steering system components feature self-diagnosis capability.

Programming of characteristic curve for steering assistance
The various characteristic steering assistance curves are stored in the control unit.

Depending on the weight of the individual vehicle, use is made for the Audi A3 ´04 of characteristic curve 6 or 7.
The characteristic curve can be activated by service personnel with the tester VAS 5051 guided fault-finding routine or using vehicle self-diagnosis function 10 "Adaption".
This is necessary, for example, in the event of control unit replacement.



313_042

Adaption of steering stops
To avoid the hard mechanical steering stops, the steering angle is limited by the software. The "software stop" is activated at approx. 5° steering angle before the mechanical stop.

In this process the assistance torque is reduced as a function of steering angle. The angle positions for the stops are learnt with the tester VAS 5052 in the basic setting function.
(For details, refer to current Workshop Manual and guided fault-finding)

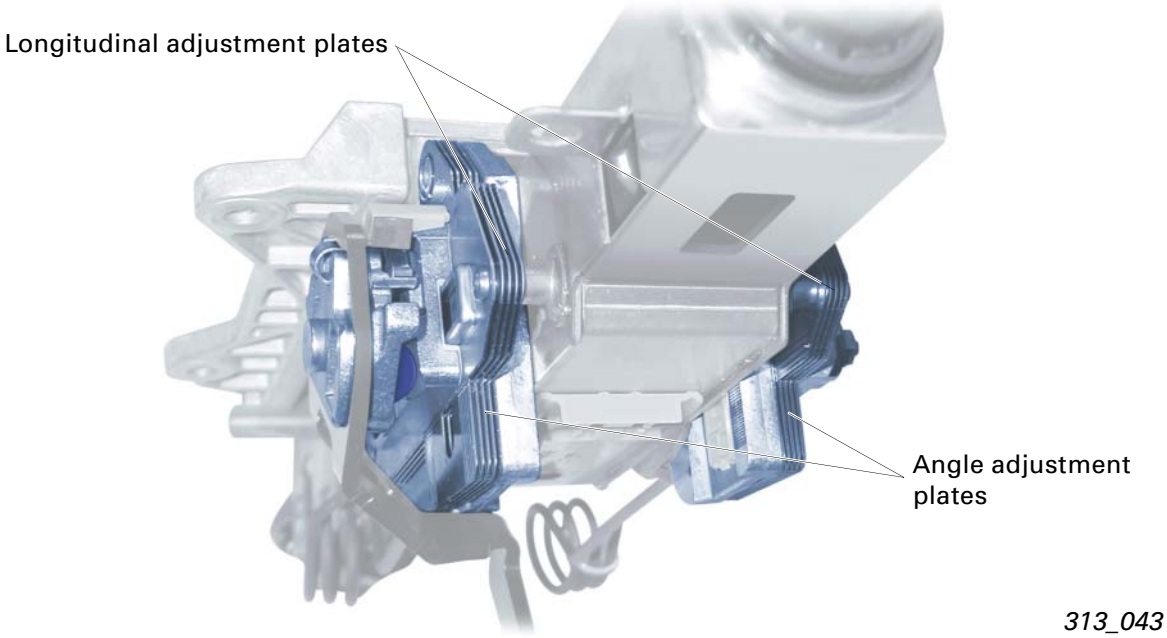
Calibration of steering angle sender G85
For all front-wheel drive vehicles, calibration is performed in the ESP control unit J104.

When quattro vehicles are introduced, calibration will take place in the electromechanical steering control unit J500.

Steering column

Use is made in the Audi A3 of a mechanically adjustable steering column. The longitudinal and vertical adjustment ranges are 45 mm and 40 mm respectively. The locking force is applied by steel plates. 5 plates each act on either side for longitudinal and angle adjustment.

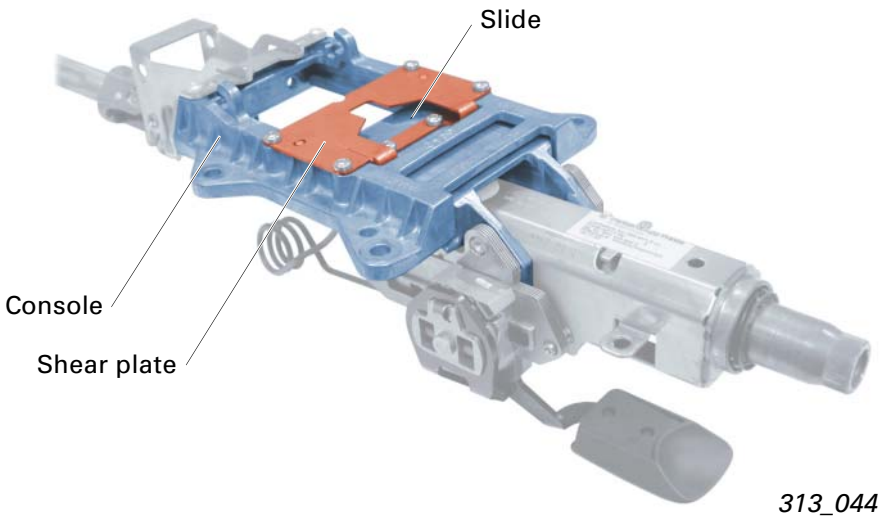
Actuation and operation of the clamping mechanism correspond to that in the Audi A4. Slide and console are made of aluminium. As of calendar week 25/03 magnesium components are to be introduced for slide and console, as well as a modified locking system.



313_043

The slide and console are connected by a shear plate. In the event of a crash, the shear plate exerts a defined force to counteract the movement of the slide caused by the driver impact.

The geometric design of the shear plate is such that a progressive force-travel characteristic is attained.



313_044

Notes

Brake System

Summary

Front axle

Engine	75 kW, 1.6l 77 kW, 1.9 TDI	103 kW, 2.0 TDI 110 kW, 2.0 FSI	177 kW upwards
Minimum wheel size	15“	15“	17“
Type of brake	FS III integrated pad guide in wheel bearing housing	FN3 – 54/25/14	FNR-G floating frame-type caliper
Number of pistons	1	1	1
Piston diameter (mm)	54	54	57
Brake disc diameter (mm)	280	288	345

313_061

Rear axle

Engine	75 kW, 1.6l 77 kW, 1.9 TDI	103 kW, 2.0 TDI 110 kW, 2.0 FSI	177 kW upwards
Minimum wheel size	15“	15“	17“
Type of brake	C 38 HR-A	C 38 HR-A	CII 41 HR-A
Number of pistons	1	1	1
Piston diameter (mm)	38	38	41
Brake disc diameter (mm)	255	255	310

313_061

New features

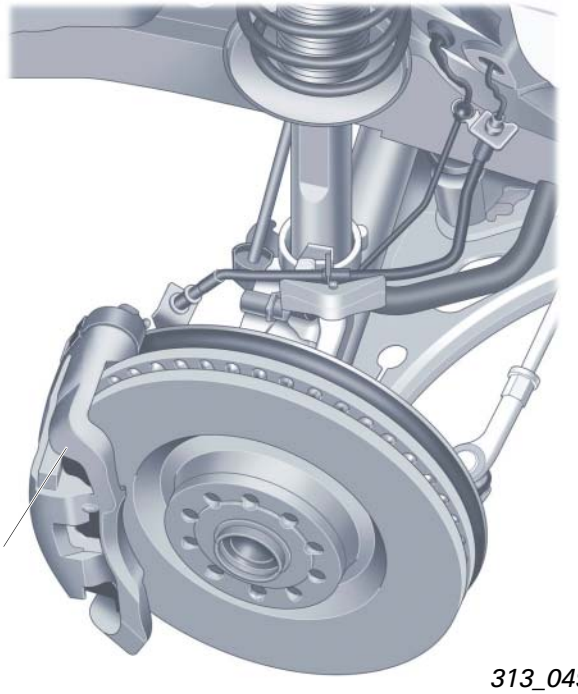
Brakes
In relation to the predecessor model, the brake dimensions have been increased by one inch for comparable engines.

All brake pads have been newly developed. Environmental requirements are satisfied by the exclusive use of pad materials not containing **a**ntimony, **l**ead and **c**admium.

The modified geometry of the front-axle brake cover plates provides improved protection against dirt and corrosion.

313_048

On vehicles with high-powered engines, use is made at the front axle of the new floating frame-type caliper concept already implemented in the Audi A8
(refer to SSP 285 for description).

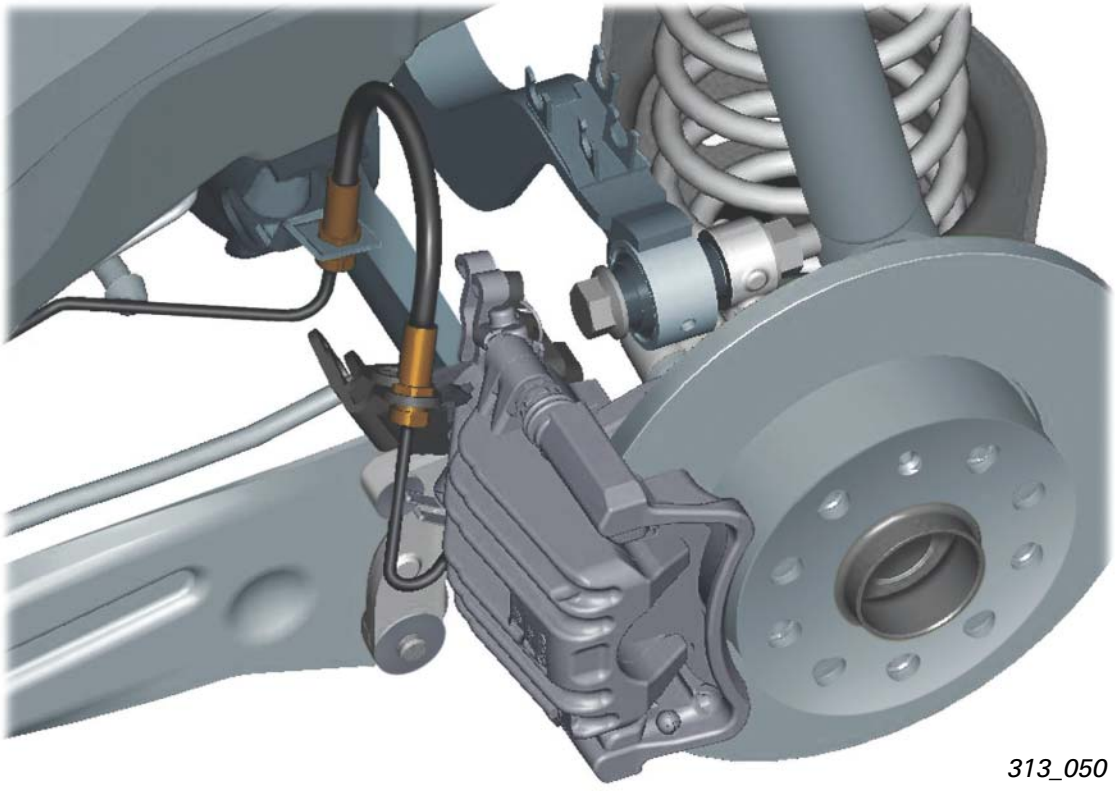


313_049

Brake System

The rear brakes are located in front of the axle.

To improve corrosion resistance and reduce leakage, there is no banjo union at the rear-axle brake calipers.

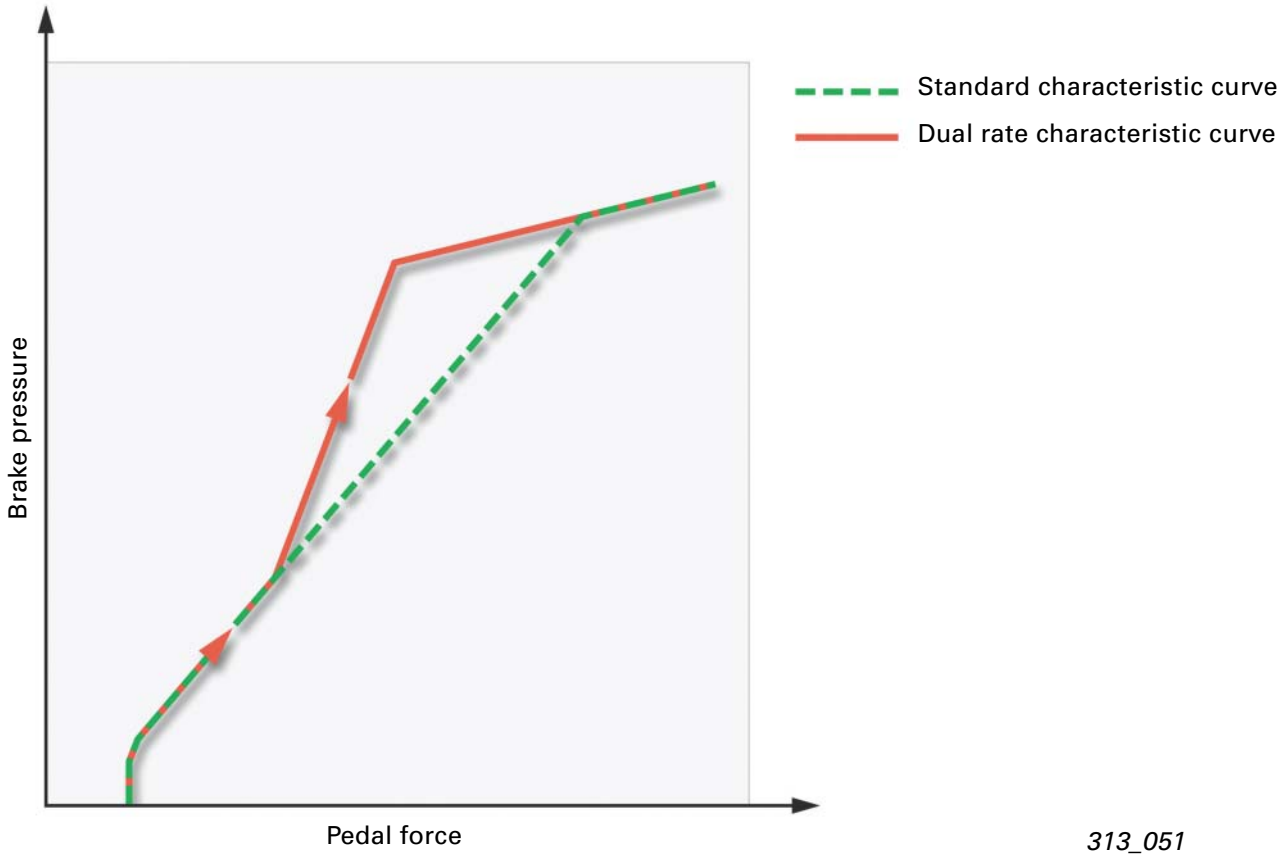


313_050

Brake servo
All left-hand drive vehicles feature a 10" brake servo. Right-hand drive vehicles are fitted with a tandem brake servo of size 7/8".

The main new feature is the "Dual rate characteristic".

A progressive characteristic is achieved thanks to the modified internal design of the brake servo.
As a result, higher brake pressures are available than with conventional brake servos even with low pedal force. Nevertheless, deceleration is still a smooth process given normal actuation.



313_051

New features

Use is made of a new ESP assembly from the Mk 60 product range. The major new features include:

- Integration of pressure sensor into ESP assembly
  To date, the sensor was located at the tandem brake master cylinder.
- Low dynamic function:
  On braking, ESP control is implemented at an earlier point than used to be the case. If necessary, the brake pressure is reduced at individual wheels. This function is designed to enhance directional stability, particularly when braking. Undesirable yaw motion is thus suppressed and straight ahead running stability improved.
- Use of analogised solenoid valves for the optimised hydraulic servo assistance function

313_052

Introduction to optimised hydraulic servo assistance

The most effective means of supplying vacuum to the brake servo is to utilise the intake manifold vacuum of the IC engine. On petrol engines with automatic gearboxes the intake manifold vacuum available may decrease under certain operating conditions, particularly during the cold start phase. This can have a negative effect on brake pedal operating comfort.

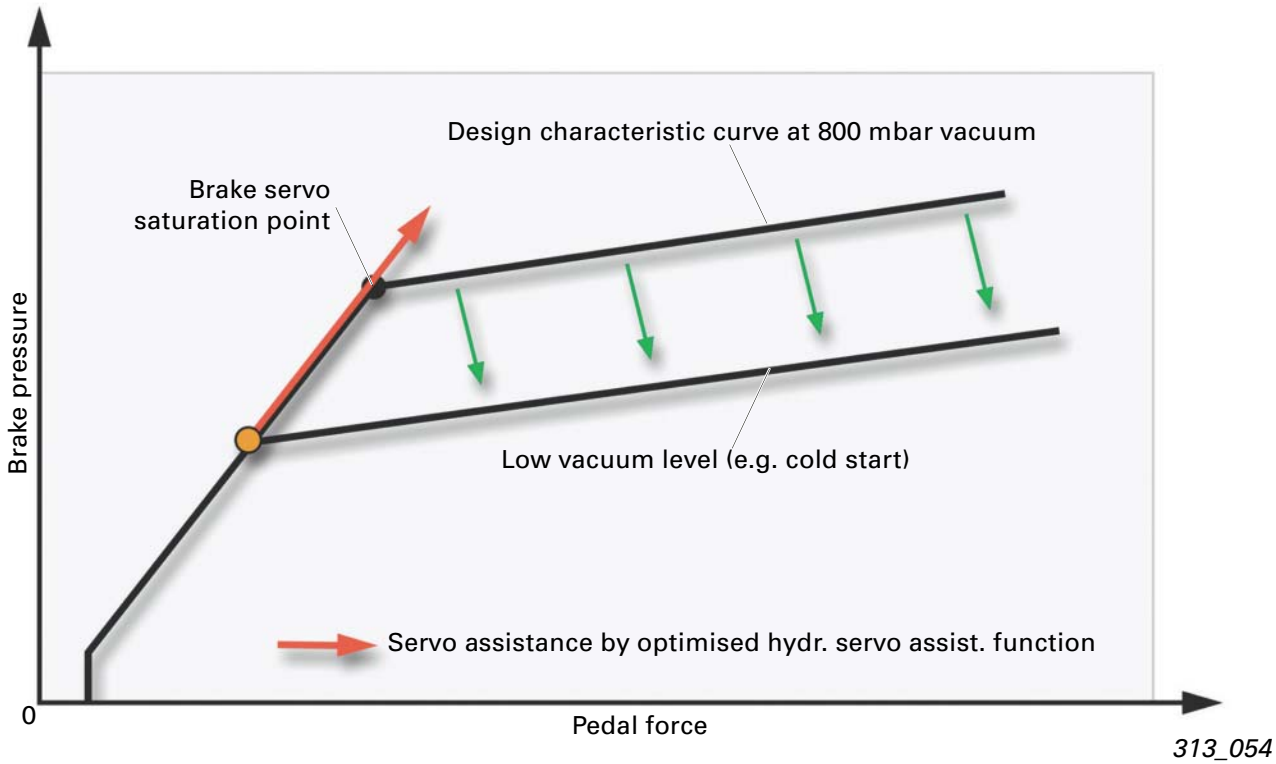
This is due to the fact that the throttle valve opens under load, thus considerably reducing the vacuum in the intake manifold. In the past, the necessary vacuum was made available in such situations from a separate source (e.g. electric vacuum pump).
A new approach is employed in the Audi A3.

Mode of operation of optimised hydraulic servo assistance

Compensation for the lack of servo assistance due to inadequate vacuum is provided by the ESP hydraulic system by way of metered active brake pressure build-up. Measurement of the pneumatic pressures in both chambers of the brake servo is required for such control action. The pressure difference is a direct indication of the potential servo assistance. If the pressure in both chambers is identical, the saturation point of the servo unit has been reached. A further increase in brake pressure is then only possible without additional servo assistance by increasing the pressure exerted on the brake pedal.

The specified characteristic curve for the brake pressure profile as a function of the difference in pressure in the two servo chambers is stored in the ESP control unit J104. If the intake manifold vacuum available is insufficient, the saturation point is already reached at brake pressures below the specified level.

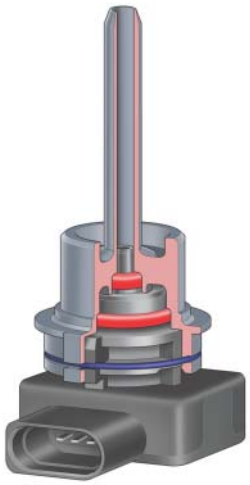
If this is the case, the ESP hydraulic system initiates metered brake pressure build-up. In terms of the force to be applied to the brake pedal and braking comfort, drivers do not notice any differences compared to conventional servo assistance.



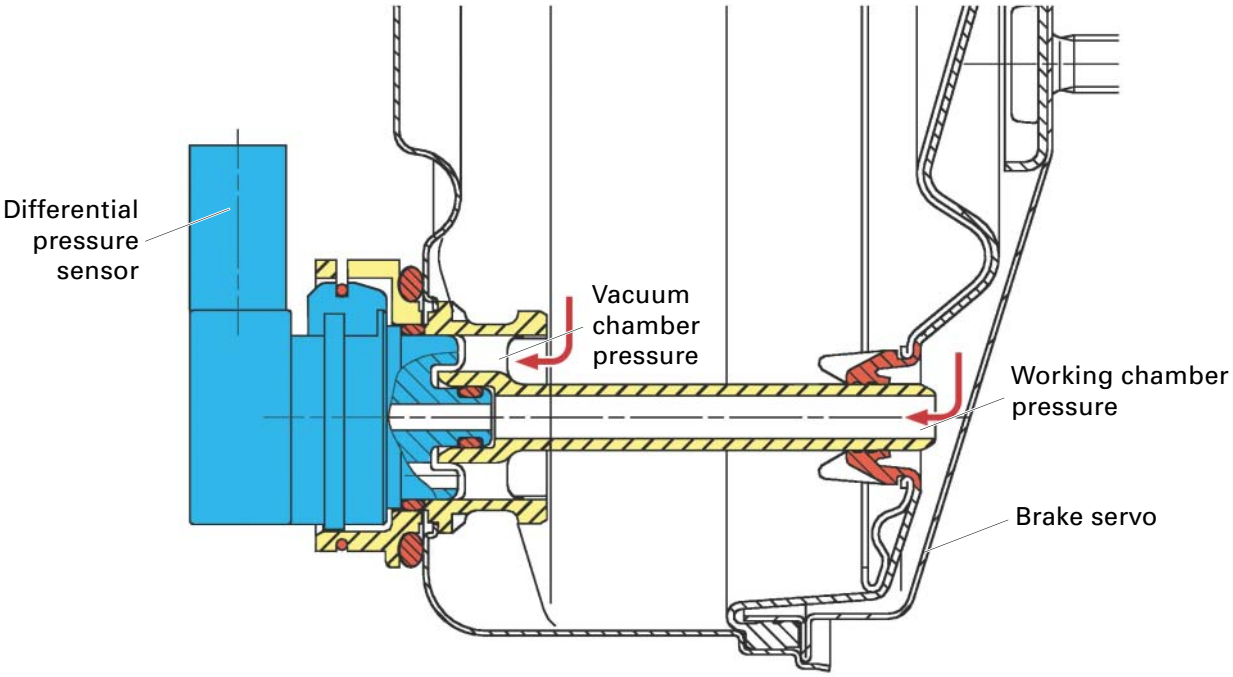
Use is made for implementation of metered pressure build-up of new solenoid valves for the changeover function to ESP control mode.

Timing control can be implemented for the opening cross section of these valves, permitting adaption of the pressure profiles to the given situation.

Differential pressure sensor
The sensor measures the pneumatic pressures in both chambers of the brake servo.



313_053



Sectional view of differential pressure sensor installation position

313_066

Speed sensors G44-47
In terms of design and operation, the active sensors essentially correspond to those familiar from the Audi A2.
The sensors operate on the multipole principle on the basis of the magnetoresistive effect.
The sensor ring is part of the wheel bearing seal. Its surface features alternate north-south polarisation.

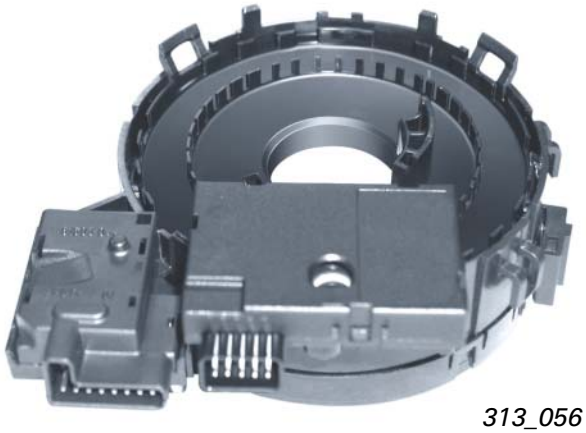
As the wheel turns, the direction of the magnetic lines of force passing through the sensor changes each time the polarity changes.
Every change in direction alters the sensor resistance. This produces square-wave pulses, which are received and evaluated by the control unit J104.
The number of pulses per time unit is a direct measure of wheel speed.

Advantages:

- Speed measurement already possible as of 0 km/h
- Space-saving design, extremely reliable
- Virtually constant air gap between sensor ring and sensor

313_055

Steering angle sender G85
Use is made of a new steering angle sender. The signal evaluation electronics are located in the steering column electronics control unit J527. In addition to steering angle, the control unit determines the steering rate, which is required by the electromechanical steering system for calculating the necessary steering assistance.



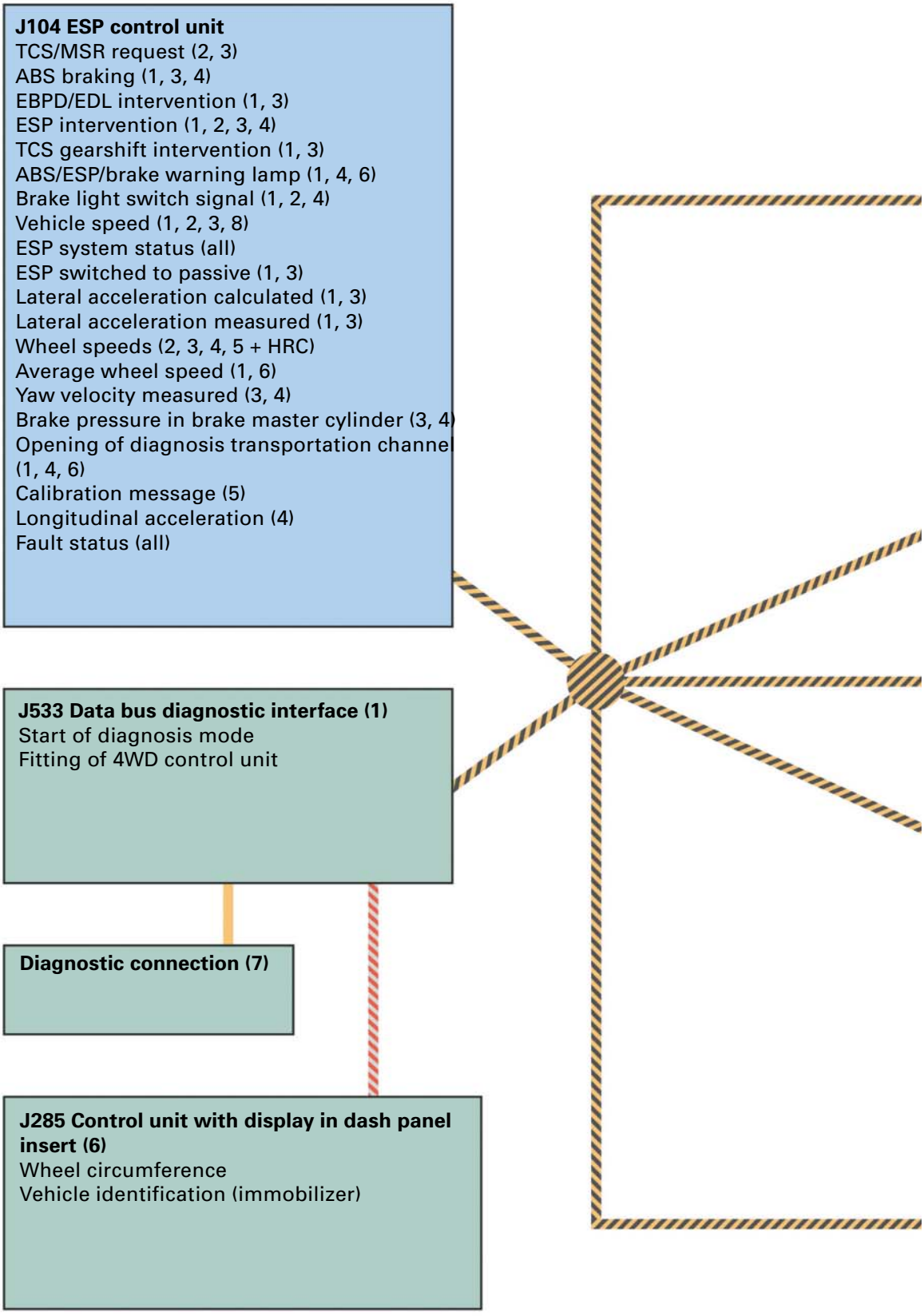
313_056

Sensor unit G419
The sensors:

G200 (lateral acceleration sender), G202 (yaw rate sender) and, for quattro vehicles, G251 (longitudinal acceleration sender) continue to be fitted in a joint sensor unit G419, which is located beneath the front passenger's seat.

313_057

CAN data exchange



J220 Motronic control unit (2)
Engine speed
Engine torque
Engine torque loss
Driver input torque
Accelerator pedal value
Closed throttle position info
Clutch switch
Engine encoding info
Gearbox encoding info
Max. torque transmission
Brake test switch
Normal operation status
Double torques

J217 Automatic gearbox control unit (3)
Gearshift active
Target gear/gear engaged

J492 Four-wheel drive control unit (4)
Clutch torque

J527 Steering column switch module (5)

G85 Steering angle sender
Steering wheel angle
Steering wheel angle sign
Steering angle ID (for calibration)
Battery (terminal 30) off recognition
Status G85

J500 Electromechanical steering control unit (8)
Receiver only

Information transmitted by ESP control unit

Information received and evaluated by ESP control unit

Drive system CAN

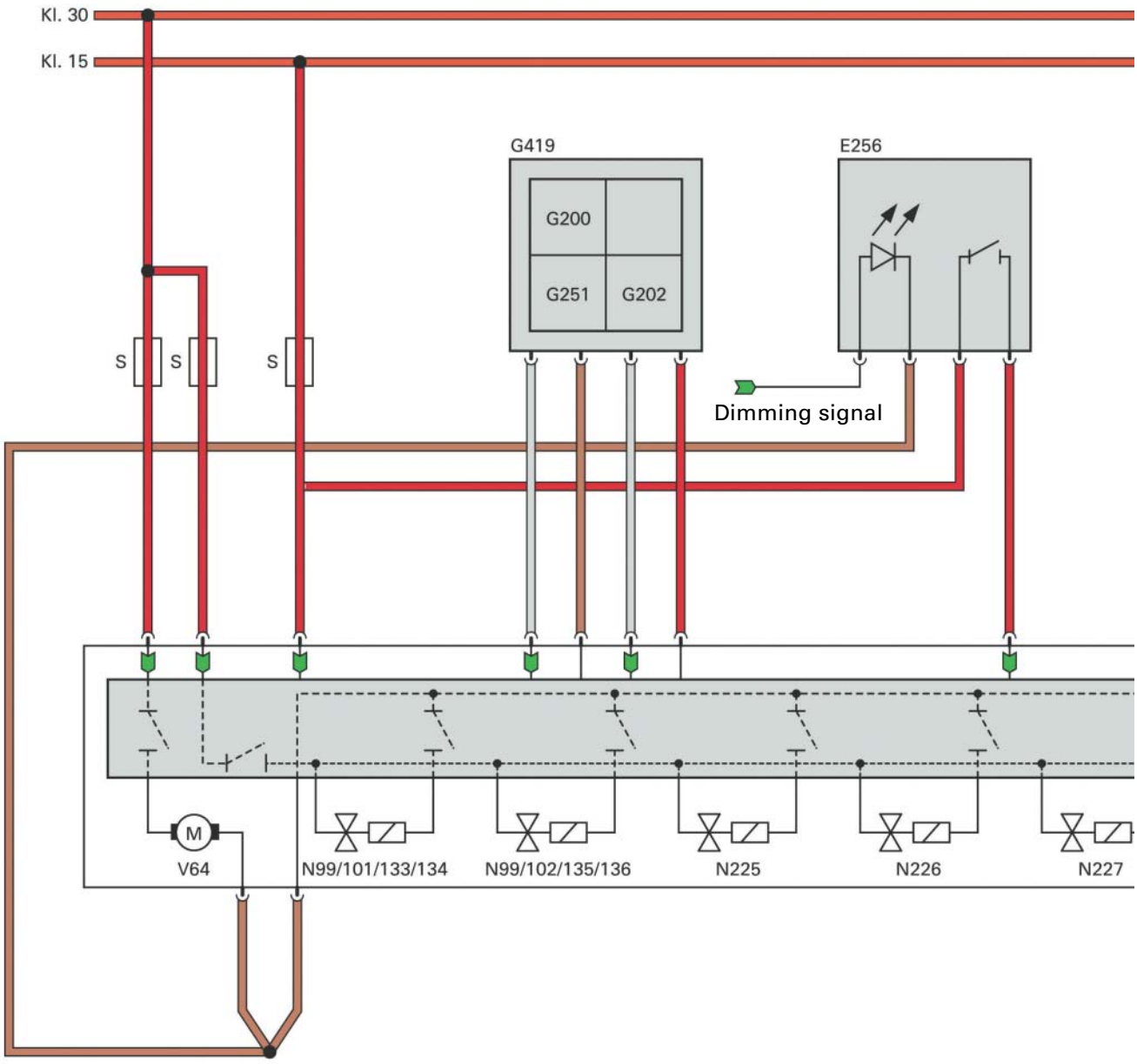
Dash panel insert CAN

Diagnosis CAN

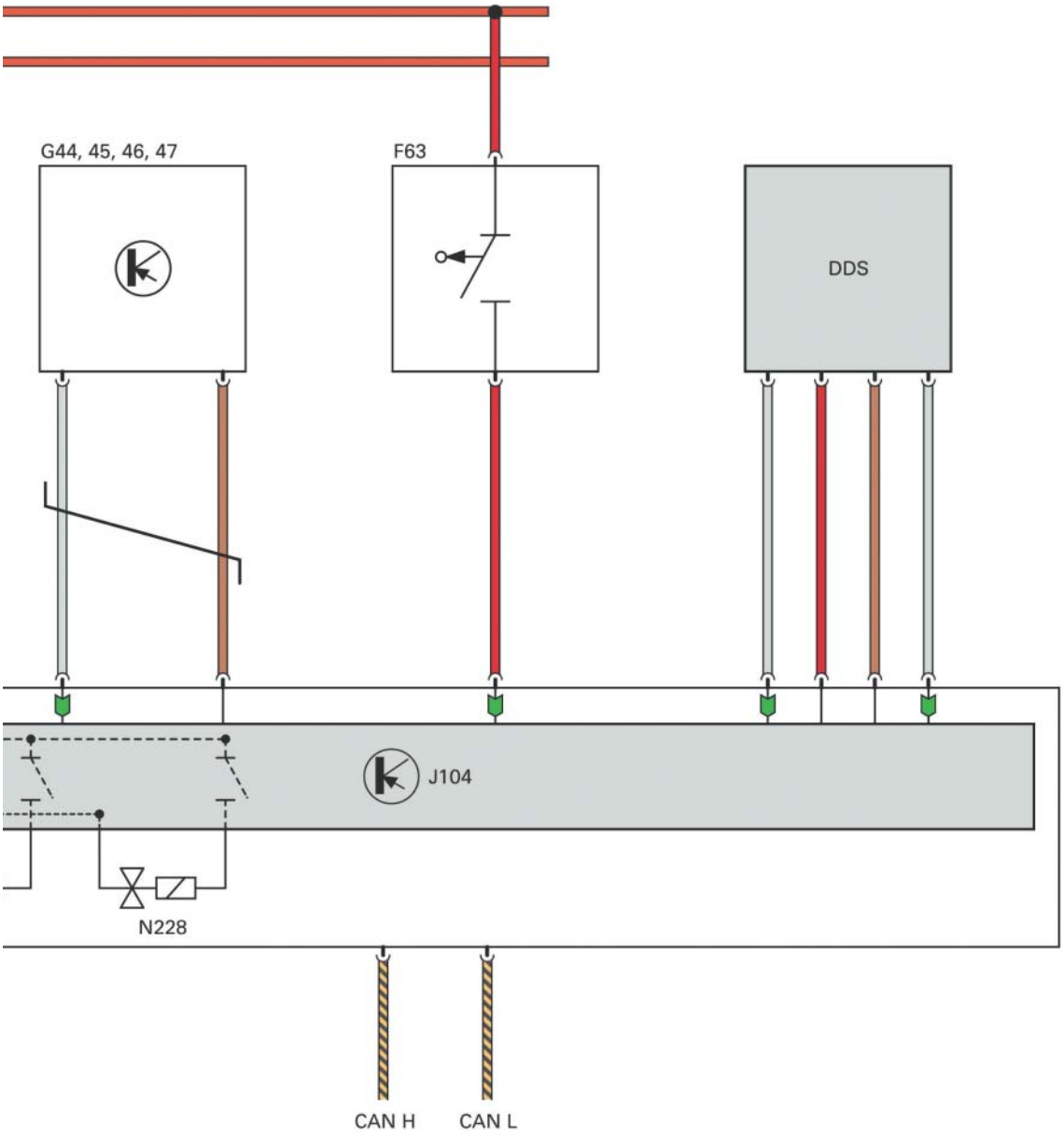
The numbers in brackets after the messages indicate which control units process the information concerned. For example: "TCS/ MSR request" is processed by control units no. 2 and no. 3, J220 and J217

313_058

Block diagram



J104	ABS with EDL/TCS/ESP control unit
G419	Sensor unit beneath front passenger's seat
G200	Lateral acceleration sender
G202	Yaw rate sender
G251	Longitudinal acceleration sender (quattro vehicles only)
E256	TCS/ESP button
F63	Brake pedal switch
S	Fuse

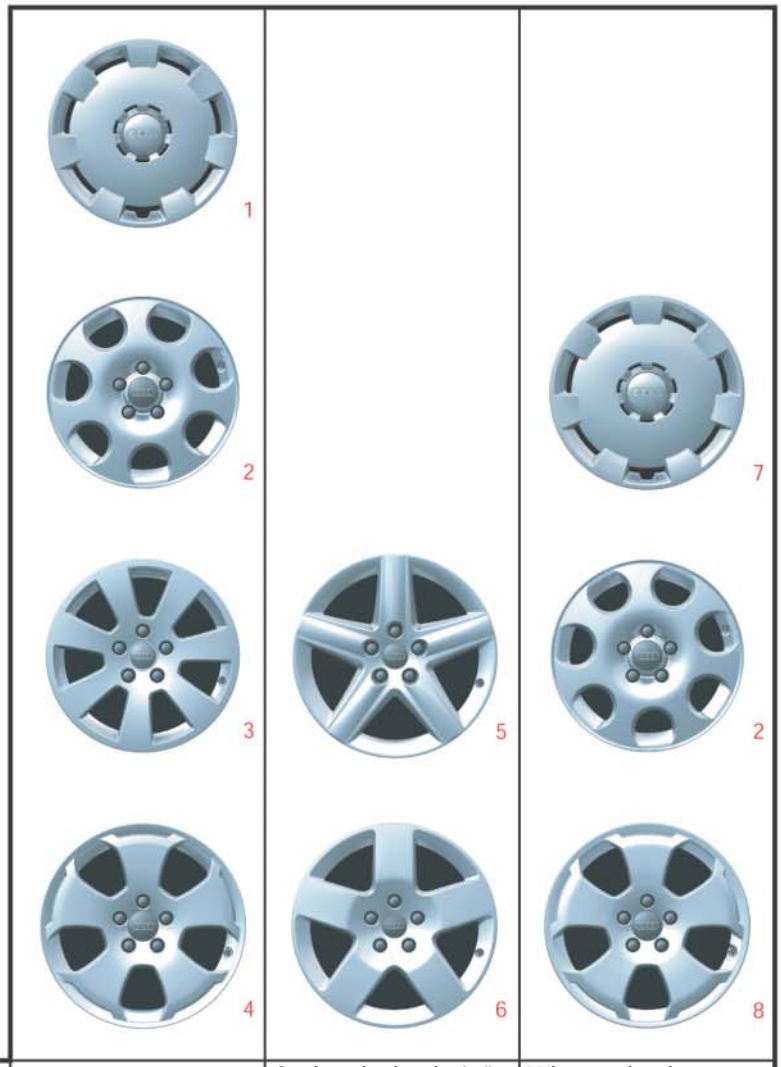


G44-47	Speed sensors
V64	ASP return pump
N99/101/133/134	ABS inlet valves
N100/102/135/136	ABS outlet valves
N225	Vehicle stabilising program switch valve -1-
N226	Vehicle stabilising program switch valve -2-
N227	Vehicle stabilising program high-pressure valve -1-
N228	Vehicle stabilising program high-pressure valve -2-
DDS	Differential pressure sensor at brake servo (with optimised hydraulic servo assistance only)

- Twisted wire
- Input signal
- Output signal
- Positive
- Earth
- Drive system CAN

313_059

Wheels/Tyres



Equipment ranges Engine	Basic wheels	Optional wheels 17"	Winter wheels
Attraction 1.6l (75 kW) 1.9l TDI (74 kW)	6.5x16 RO 50 (1) Steel wheel 205/55 R 16	7.5x17 RO 56 (6) Cast aluminium wheel 225/45 R 17	6x16 RO 50 (8) Steel wheel 205/55 R 16
2.0 TDI (100 kW) 2.0 FSI (110 kW)	6.5x16 RO 50 (2) Cast aluminium wheel 205/55 R 16	7.5x17 RO 56 (7) Cast aluminium wheel 225/45 R 17	6.5x16 RO 50 (2) Cast aluminium wheel 205/55 R 16
Ambiente	6.5x16 RO 50 (3) Cast aluminium wheel 205/55 R 16		
Ambition	7.5x17 RO 56 (4) Forged aluminium wheel 225/45 R 17		
3.2 V6 (177 kW)	7.5x17 RO 56 (4) Forged aluminium wheel 225/45 R 17		6x17 RO 48 (9) Cast aluminium wheel 205/50 R 17

313_063

Notes

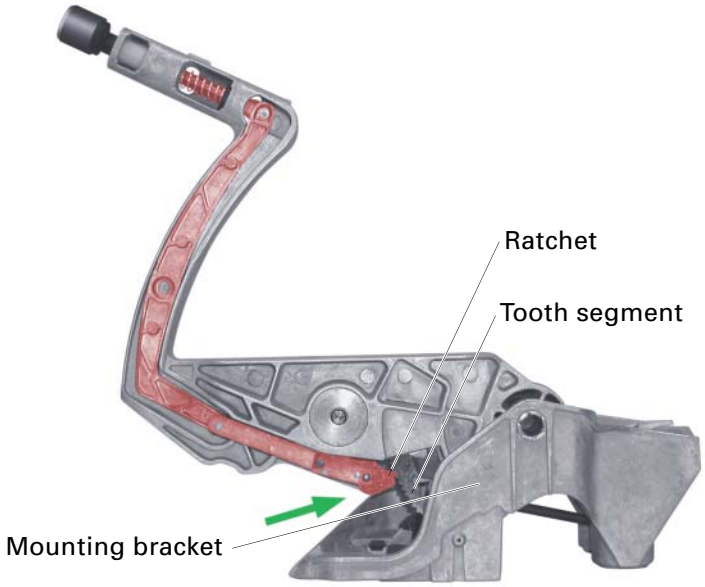
Handbrake Lever and Pedal Cluster

Handbrake lever

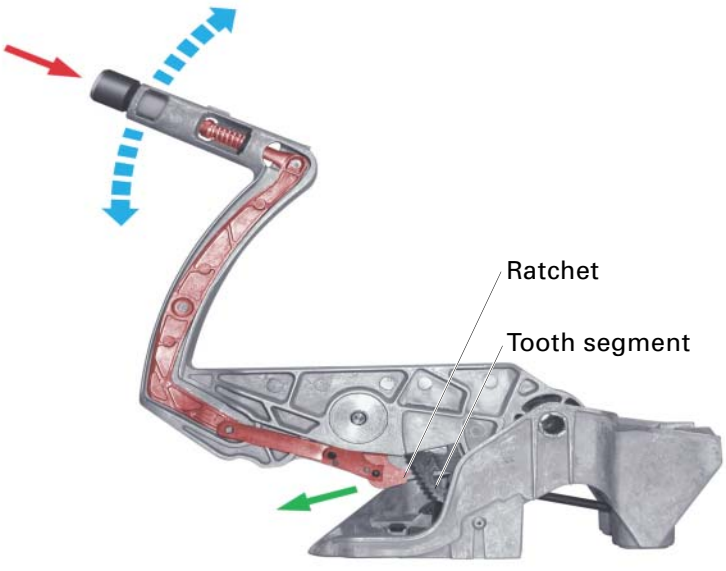
The new design minimises the space required in the centre console. This enabled additional storage facilities to be provided behind the handle.
The lever is made of die cast magnesium.

The tooth segment is permanently connected to the mounting bracket. In neutral position, the ratchet is engaged with the tooth segment and locks the brake lever in position.

On actuating the release button, the ratchet is pulled out of the tooth segment and the brake lever can be moved.



313_060a



313_060b

Pedal cluster

The accelerator, clutch and brake pedals are of modular design.

Use has been made for the first time at Audi of an upright accelerator pedal. The module is made of plastic. The accelerator pedal sender is of the non-contacting type.

313_064

Design and operation are described in Self Study Programme 293.

The clutch module is made of plastic. Two switching points picked off without contact in the master cylinder detect the pedal position for the engine management system.

313_065

The pedal bracket of the brake module is made of aluminium and the pedal of sheet steel.

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