Service.

The Audi allroad quattro with additional shift stage

Design and Function

Self-study programme 241

Audi allroad quattro - the best of both worlds

After a 20 year history of four-wheel drive, Audi presents the allroad quattro. For the first time, a production model with off-road capability.

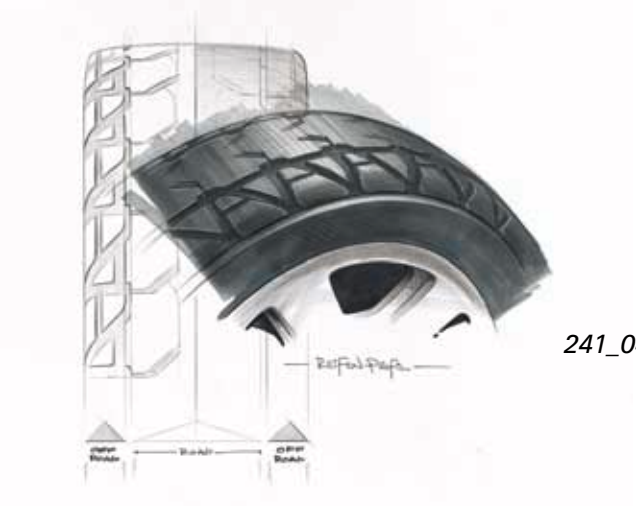
The Audi allroad quattro is the synthesis of the classic estate and the traditional off-road vehicle. It combines the outstanding driving dynamics of the Audi A6 with the off-road capability of a four-wheel drive.

The Audi allroad quattro is the embodiment of a new vehicle category, the so-called “allroader”.

241_041

Featuring the proven quattro drive, the improved running gear with ”4-level air suspension”, the optional ”low range” additional shift stage and the changes to the bodywork and the interior, the Audi allroad quattro combines two previously separate vehicle categories thereby offering

”the best of both worlds”.



241_042

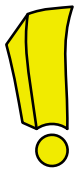
Contents

The self-study programme will provide you with information on the design and functions of the different assemblies/systems.

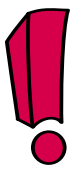
The self-study programme is not intended as a workshop manual.

For maintenance and repairs please refer to the current technical literature.
Mechanical components: Workshop Manual Audi A6 1998 >
6 speed manual gearbox 01E, four wheel drive TM 3
Self-diagnosis: Workshop Manual Audi A6 1998 >
6-speed manual gearbox 01E, four wheel drive self diagnosis.

New Note



Important: Note



Order No.: 507.5319.01.00
This figure can be ordered as a size A0 poster through Bertelsmann Distribution for a net price of DM 15.00 DM/7.50 EUR.
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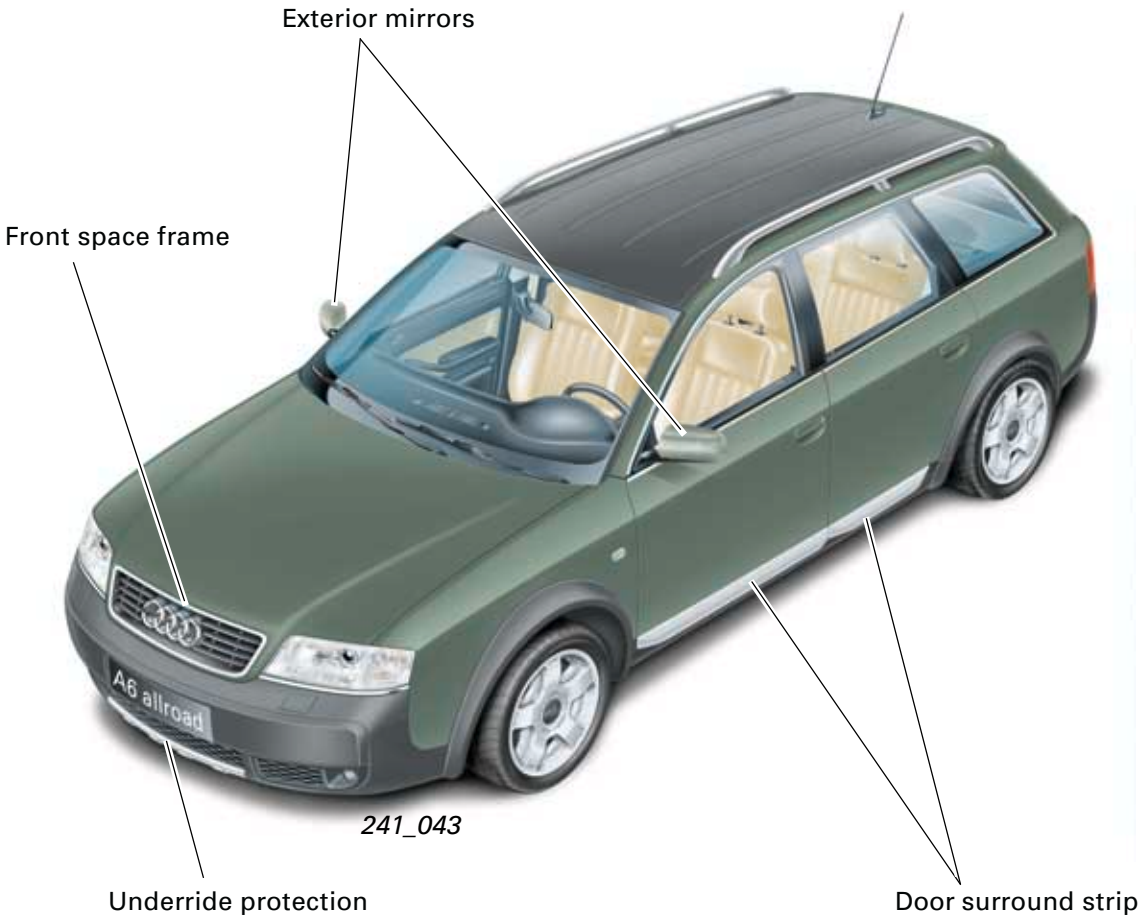
The design features

The roof has the same rib structure as the underride protection It forms an independent design element together with the paint work, which has been kept in the silk matt contrasting colour.

The chunky bumpers, also highlighted in a contrasting colour, and the prominent plastic wheel arches emphasise the off-road qualities of the allroad quattro and offer protection in minor collisions.

In the special aluminium finish option the roof rail, the trim strip on the tailgate and the door cladding strips in aluminium are silk matt and the side window surrounds are highly-polished aluminium (production: all in contrasting colour).

The integral stainless steel underride protection, in the front and rear bumpers, matches the aluminium finish and offers protection against ground contact. It is also reinforced on the inside with a plastic honeycomb structure. In terms of appearance, the underride protection is a design element which emphasises the off-road capabilities of the Audi allroad quattro.

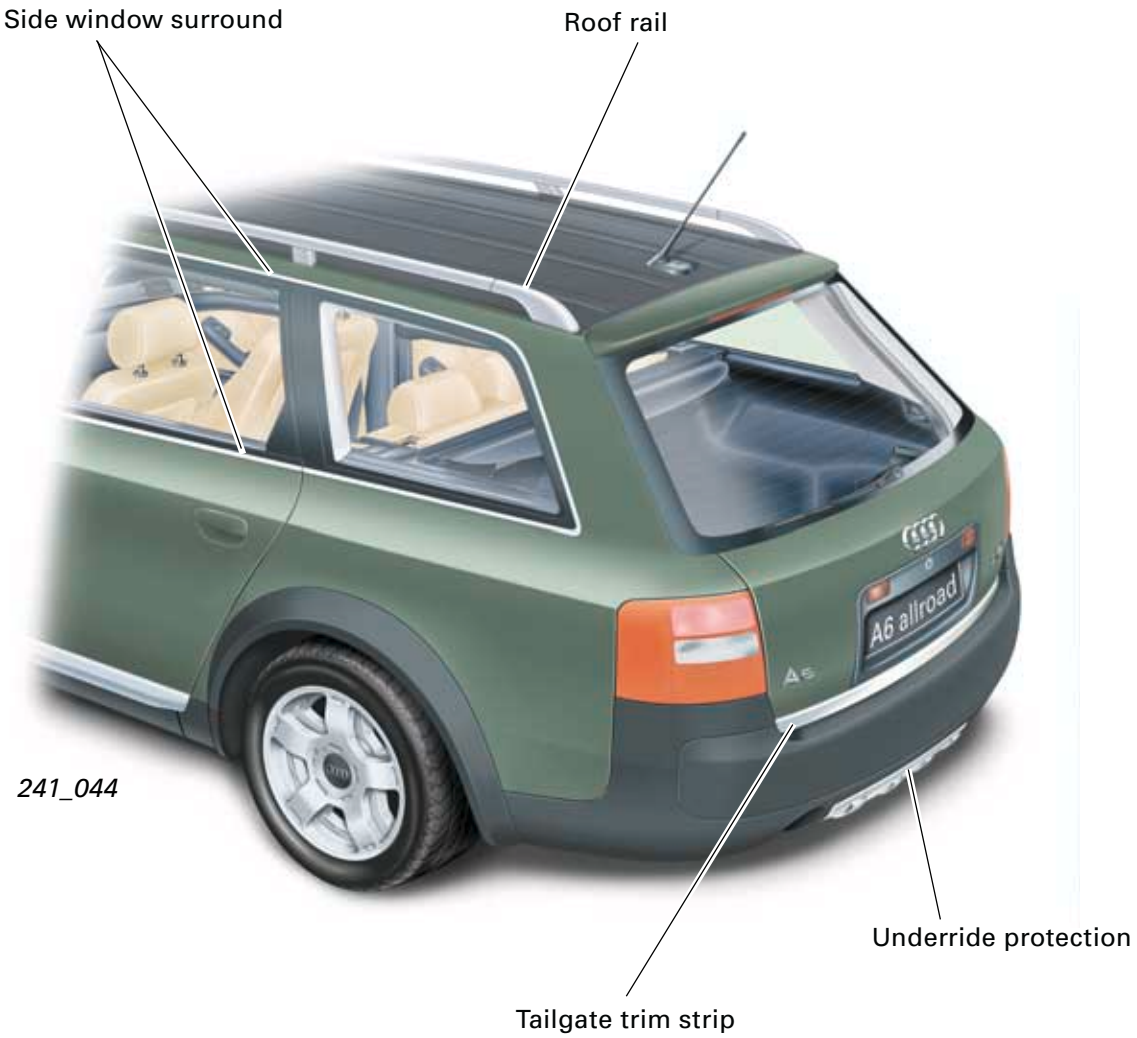


Extra large exterior mirrors on both sides ensure good all-round vision, particularly off road.

The aluminium wheels and tyres have also been newly developed, exclusively for the allroad quattro. Together with the other design features, they complement the strong, robust image of the allroad quattro.
Further information can be found under Wheels/ tires, from page 28 on.

A unique interior design has been created for the allroad quattro.
Attention should be drawn to the seats, which have been newly developed for off-road use. They combine great lateral stability with excellent seating comfort and offer the driver good support for sporty cornering or in heavy, off-road terrain.

The underride protection must be removed in order to access the rear towing lug. It is therefore fitted with quick-release screws.



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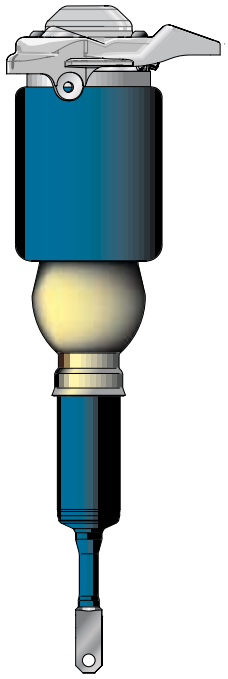
The vehicle design

What makes the **allroad quattro** an allrounder:

- quattro drive
- 4-level air suspension
- Optional activation of additional shift stage "low range"



Air spring/front axle

242_007

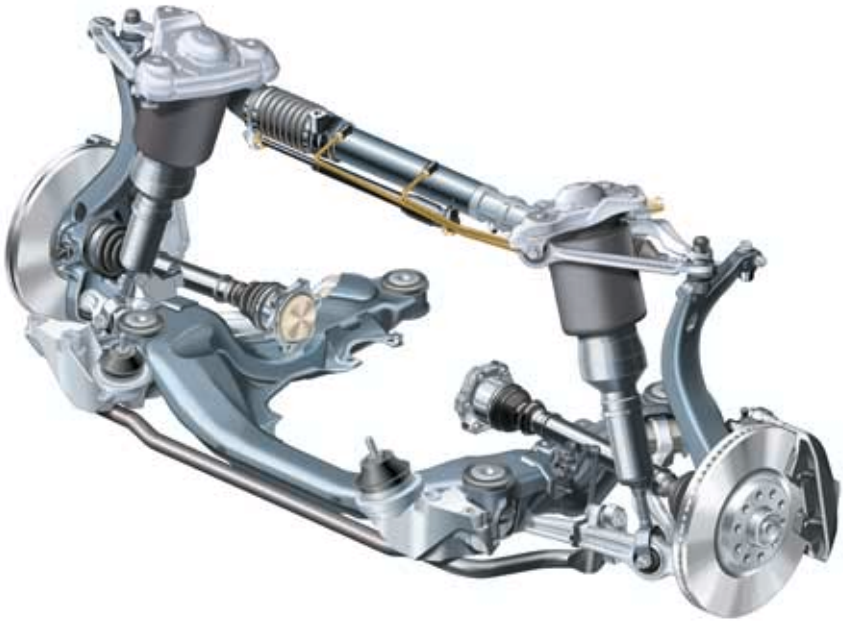
quattro drive

Audi has proved the superiority of the permanent four-wheel drive over two decades and in all types of terrain.

The allroad quattro is the result of twenty-years of quattro history.
As an all-new vehicle design, the "allroader" demonstrates this in a most impressive way.

The current quattro drive generation offers optimum driving dynamics and safety on all roads. However, the quattro drive also offers a high degree of traction and comfort off-road and on snow and ice.

Details of the quattro drive can be found from page 35 on.

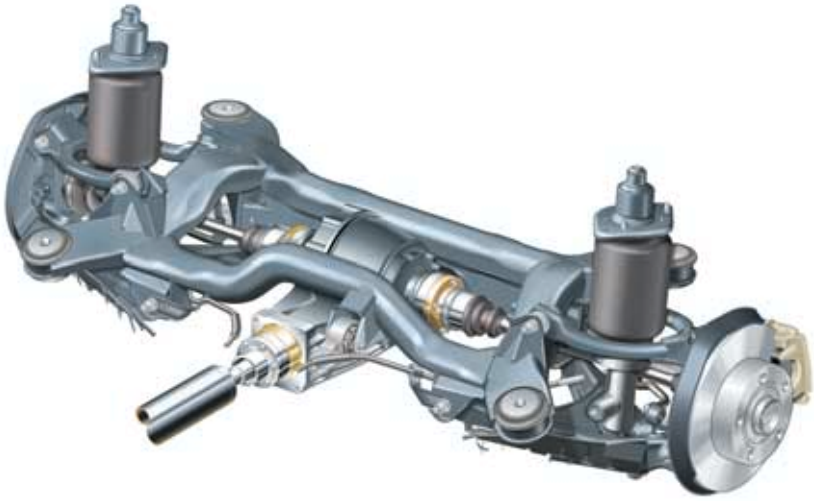


241_050

4-level air suspension

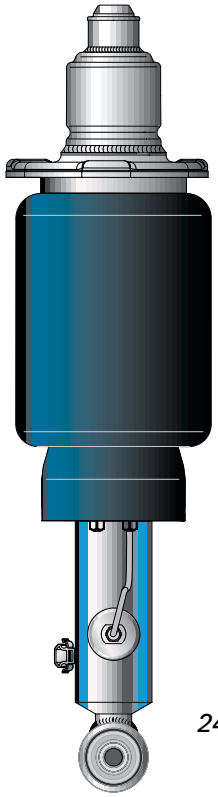
To design a vehicle which is ideal for on and off-road use, would appear to be impossible.
Usually, the strengths of the off-road vehicle are definite weaknesses with regard to road use.

Variable ground clearance is the solution for allroad use, in the form of 4-level air suspension.



241_051

Air spring/rear axle

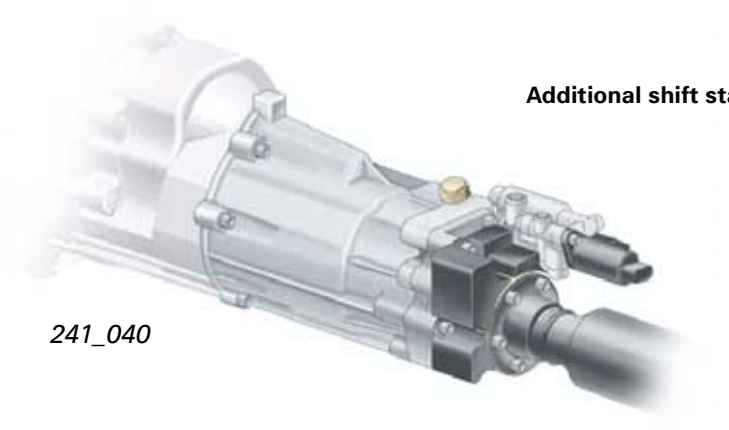


242_006

Additional shift stage ”low range“

With the help of the optional additional “low range” shift stage for the manual gearbox, the overall gear ratio is reduced by a factor of 1.54. This increases the traction of the allroad quattro and also reduces the speed by a factor of 1.54.

Additional shift stage



241_040

4-level air suspension

A high ground clearance, essential for uneven terrain, gives the vehicle a correspondingly high centre of gravity.
However, this is just as disadvantageous when cornering as it is for driving stability at higher speeds.
Additionally, this is increases air resistance, which significantly affects fuel consumption.

On the other hand, the reduced spring travel and the harder set-up version of a "road-running gear", result in inadequate off-road driving comfort.

The 4-level air suspension is a sophisticated electronically controlled air suspension system on both axles.
The system permits variation of the ground clearance by 66 mm and offers four defined ground clearance levels between 142 and 208 mm.
Depending on driving conditions and requirements, greater ground clearance or a lower vehicle centre of gravity can be selected.

The 4-level air suspension keeps the pre-set vehicle level constant, irrespective of load and weight distribution.

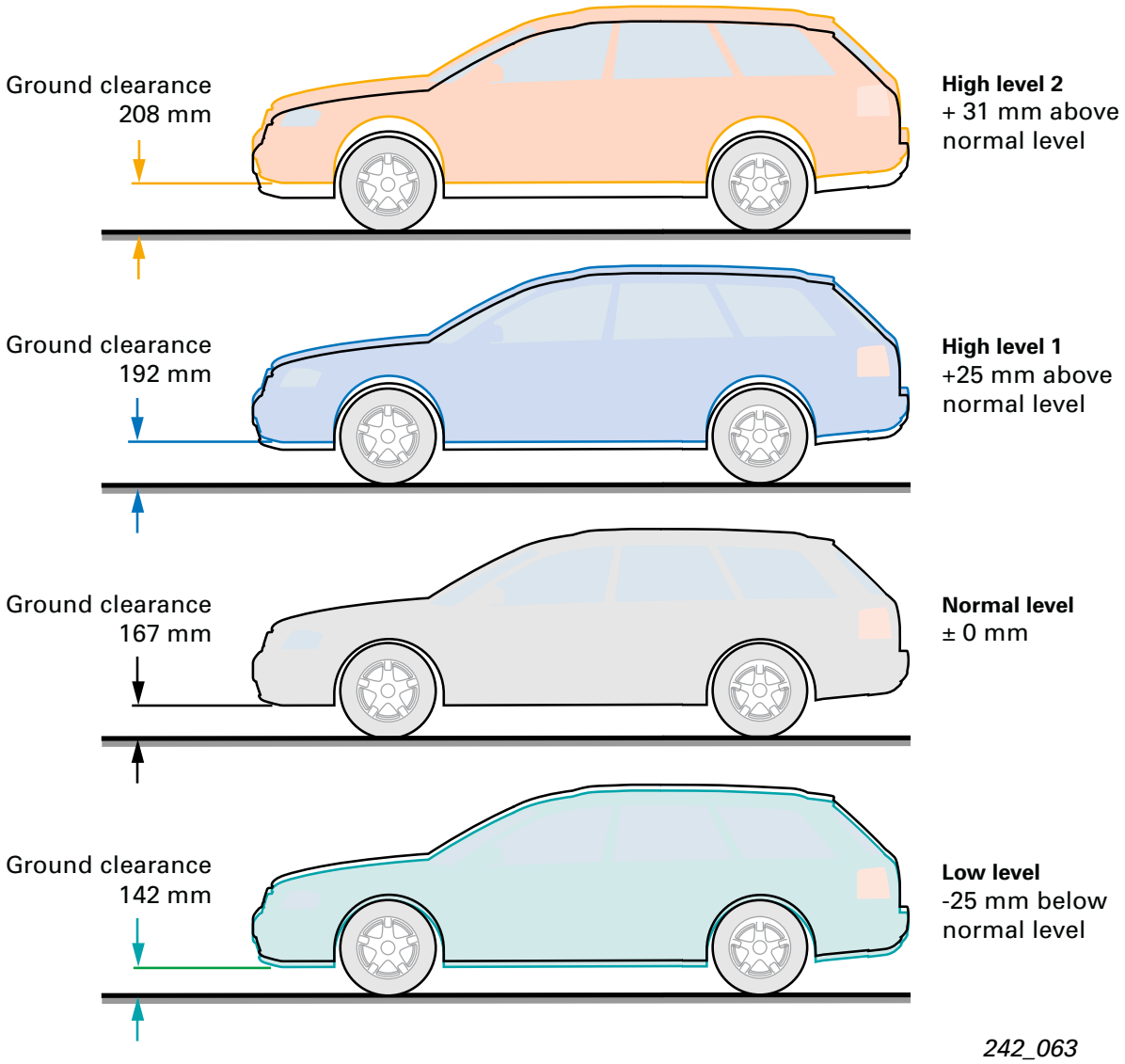
241_062

The driver can vary the ground clearance (the vehicle level) in four stages, by means of the operating unit in the centre console.

The four levels can be set manually or automatically within defined speed ranges. It is also possible to switch between manual and automatic mode and switch off the system using the operating unit.

LED displays in the operating unit indicate the operating status and the control process to the driver.

The operation, design and function of the 4-level air suspension is explained in full in SSP 243.



242_063

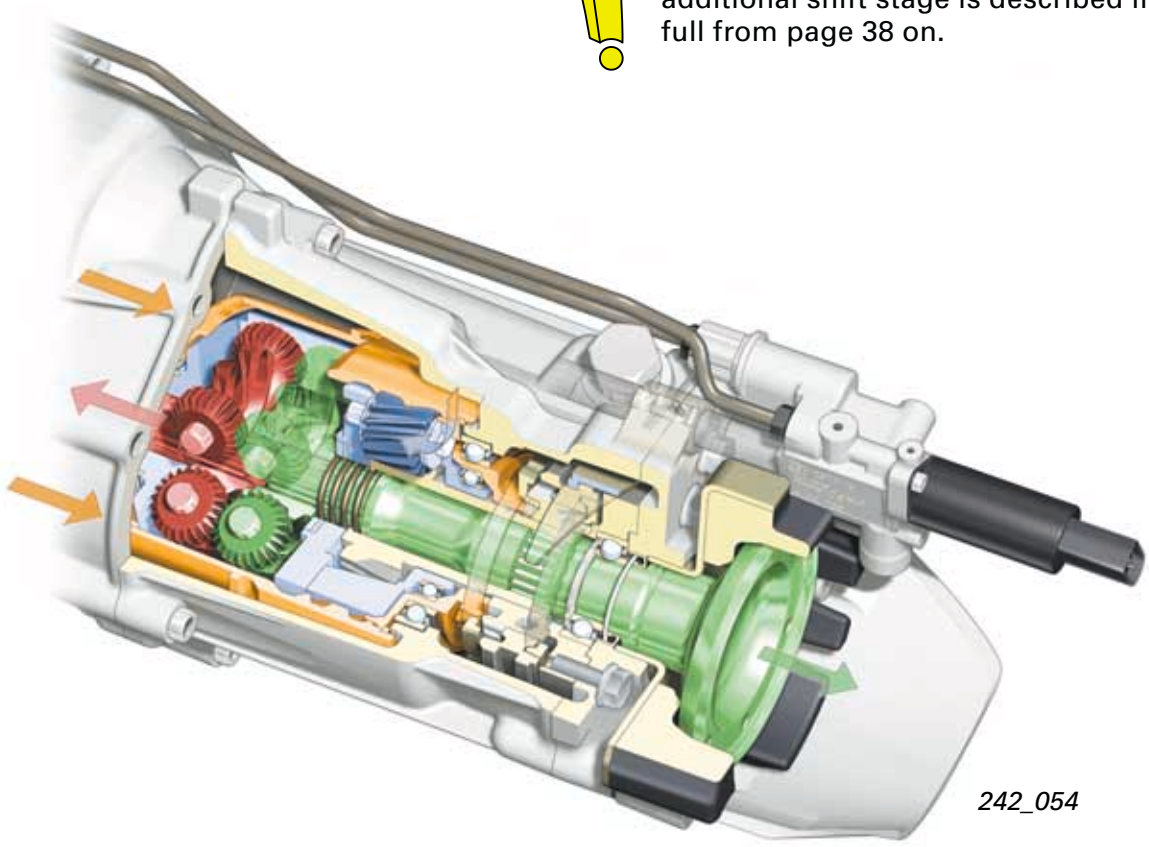
The ground clearance at the low level is 49 mm higher than that of the Audi A6.

Additional shift stage

The additional shift stage offers the following advantages:

- Additional advantage in heavy terrain on extreme uphill slopes via increased traction.
- Increased engine breaking effect on steep downhill slopes.
- Lower vehicle speeds in difficult terrain or manoeuvring with high trailer load (up to 2300 kg).
- The additional shift stage makes driving easier under difficult conditions (uphill slopes / high loads) and protects the clutch.
- Maximum operating comfort due to electrohydraulic control.
- Electronic monitoring of shifting process provides maximum protection against incorrect shift procedure.

The design and function of the additional shift stage is described in full from page 38 on.



242_054

Vehicle speeds in 1st gear at 1000 rpm (6-speed manual gearbox)

	A6	allroad quattro	allroad quattro with additional shift stage engaged
2.5-l-V6-TDI	8.0 km/h	7.6 km/h	4.9 km/h
2.7-l-V6-Biturbo	8.2 km/h	7.6 km/h	4.9 km/h

Engine

For every allroad quattro eventuality, ...

... two high-performance and high-torque engines are available.

The 2.7-l-V6-Biturbo

... is identical to the performance version installed in the Audi S4 and A6.

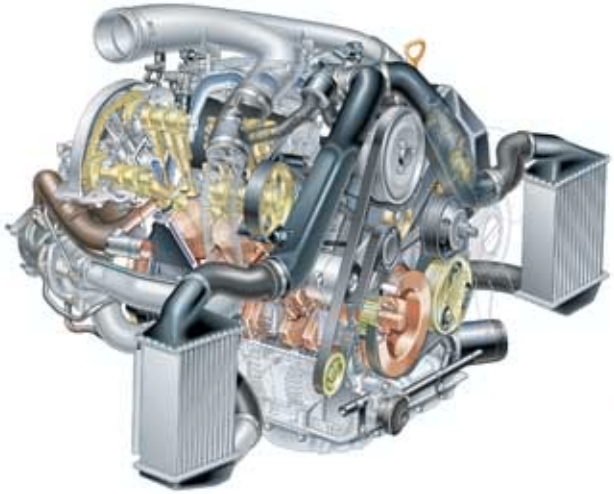
Performance and torque have been adapted for use in the allroad quattro.
Fuel grade: RON 95

In order to provide adequate fuel metering in low-range operation, the engine control provides a separate accelerator pedal map.

Power output diagram:

The maximum power output of 184 kW is achieved at 5800 rpm.

The maximum torque of 350 Nm is available between 1800 and 4500 rpm.



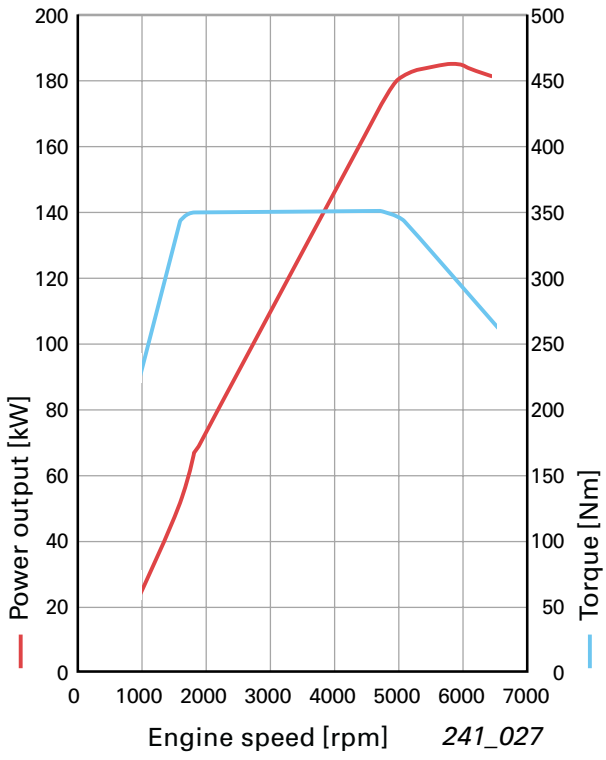
241_046

The design and function is described in SSP 198.

Technical data:

Fuel grade:	RON 95 (RON 91 with reduced performance)
Exhaust gas standard:	EU III
Flexible service interval:	up to 30,000 km, max. 2 years

Engine code: ARE



241_027

The 2.5-l-V6-Biturbo

... as increased-performance version of the 2.5-1-V6-TDI with 110 kW (150PS), whose function and design is described in SSP 183.

Power output diagram:

The increased maximum power output of 132 kW is achieved at 4000 rpm.

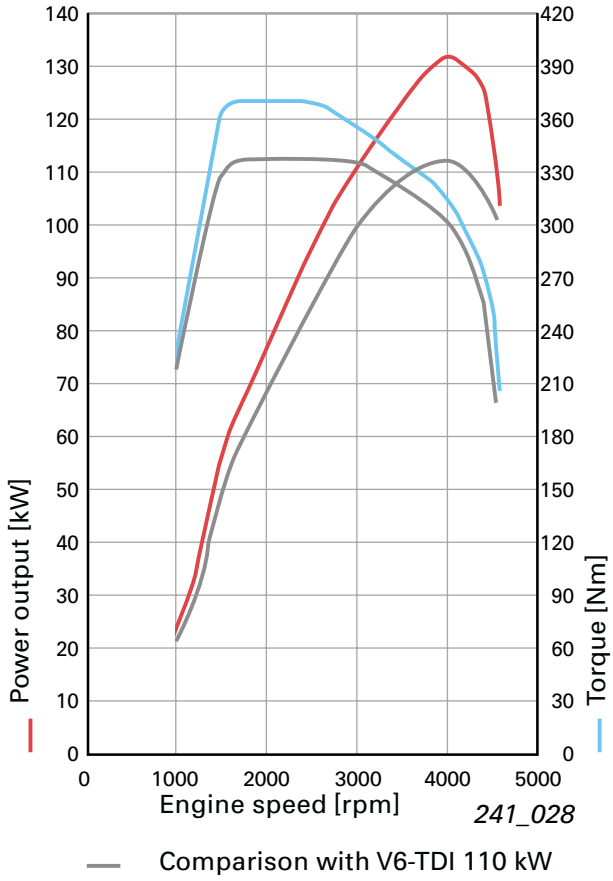
The maximum torque of 370 Nm is available between 1500 and 2500 rpm.

241_047

Technical data:

Capacity:	2496 cm^3
Bore x stroke:	78.3 mm x 86.4 mm
Compression ratio:	18.5 : 1
Fuel injection system:	Bosch EDC-15 M with pre-injection and dual-spring injector holder
Firing order:	1 - 4 - 3 - 6 - 2 - 5
Turbocharger:	VNT 20 with variable turbine geometry
Exhaust emissions control:	Exhaust gas recirculation system Primary catalytic converter, Main catalytic converter
Primary catalytic converter:	Ceramic 3.66" x 2.9" :
Main catalytic converter:	Ceramic, 5.66" x 6" and/or 2" x 5.69"/ 3.3" x 6.08" (quattro)
Emissions level:	EU III
Fuel grade:	Diesel 49 CZ
Flexible service interval:	up to 35,000 km, max. 2 years

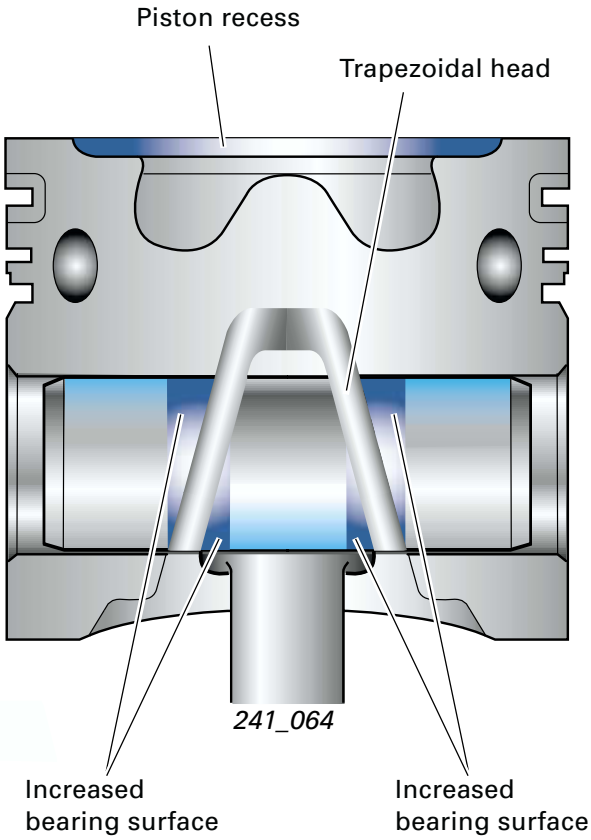
Engine code: AKE



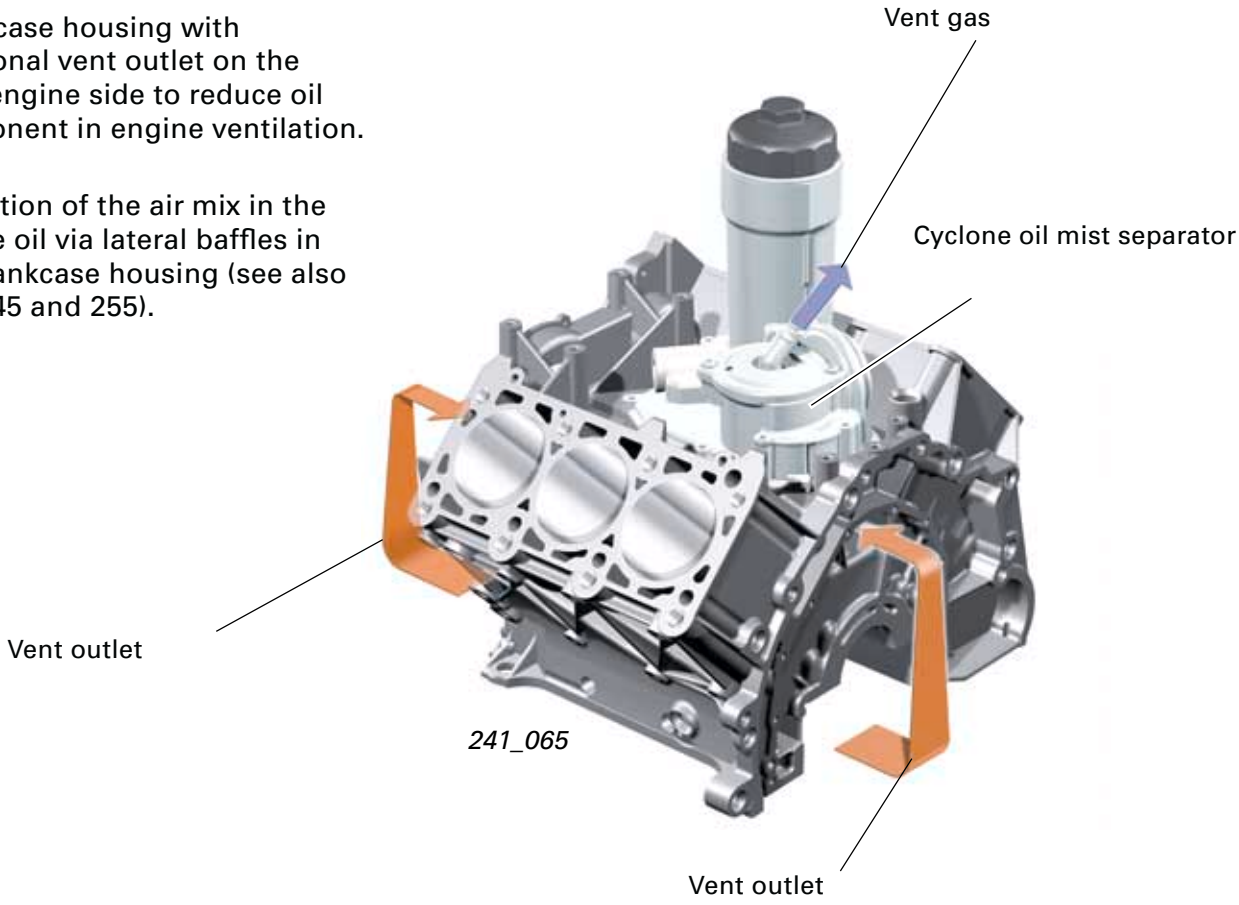
The differences between the 132 kW version and the 110 kW version are described below.

Th essential differences of the V6-TDI/132 kW version

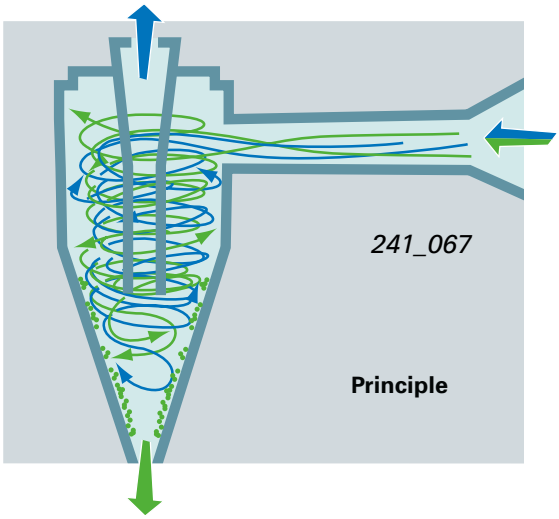
- Pistons made of new, more heat-resistant piston alloy to compensate for higher thermal load.
- Altered shape of piston recess to optimise combustion process.
- Compression ratio reduced to **18.5 : 1** by enlarging piston recess.
- Piston/conrod with trapezoidal head to compensate for the higher combustion pressure and to reduce the oscillating mass by approx. 10% (see SSP 226, Page 10).



- Crankcase housing with additional vent outlet on the front engine side to reduce oil component in engine ventilation.
- Reduction of the air mix in the engine oil via lateral baffles in the crankcase housing (see also SSP 245 and 255).



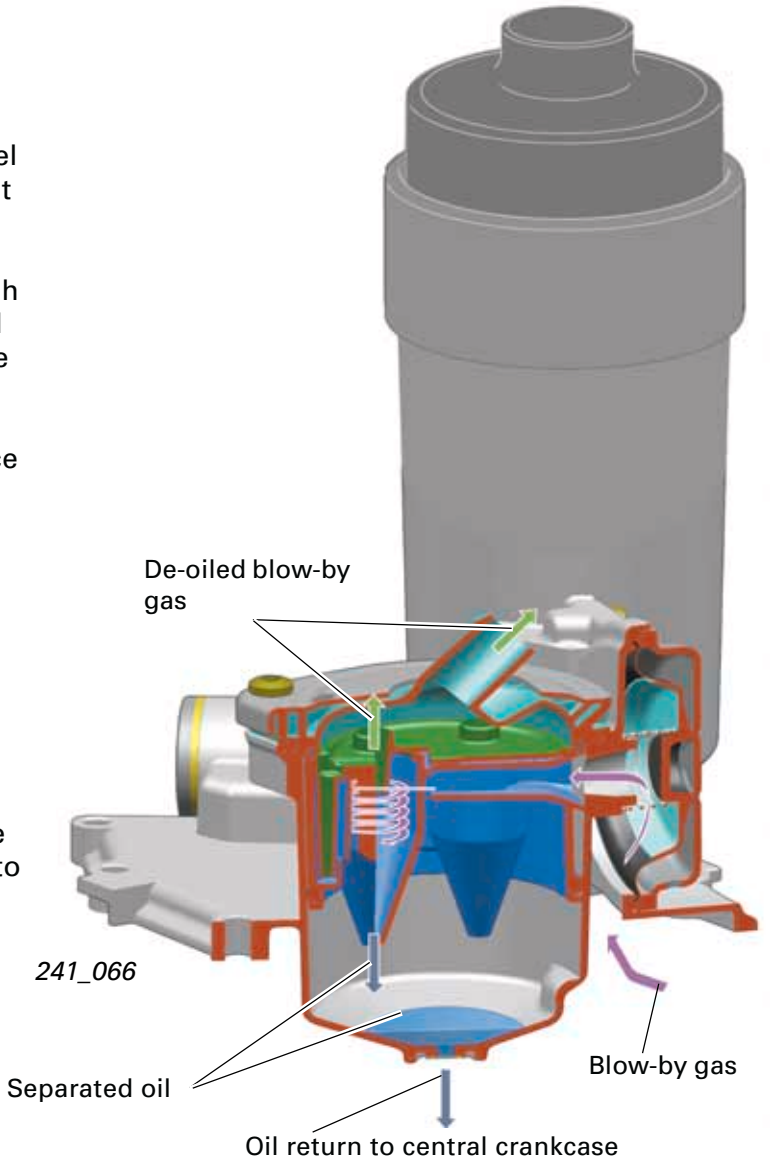
- Crankcase ventilation with cyclone oil mist separator to reduce oil component in the oil mist and blow-by gas (see SSP 226, Page 17).



Principle

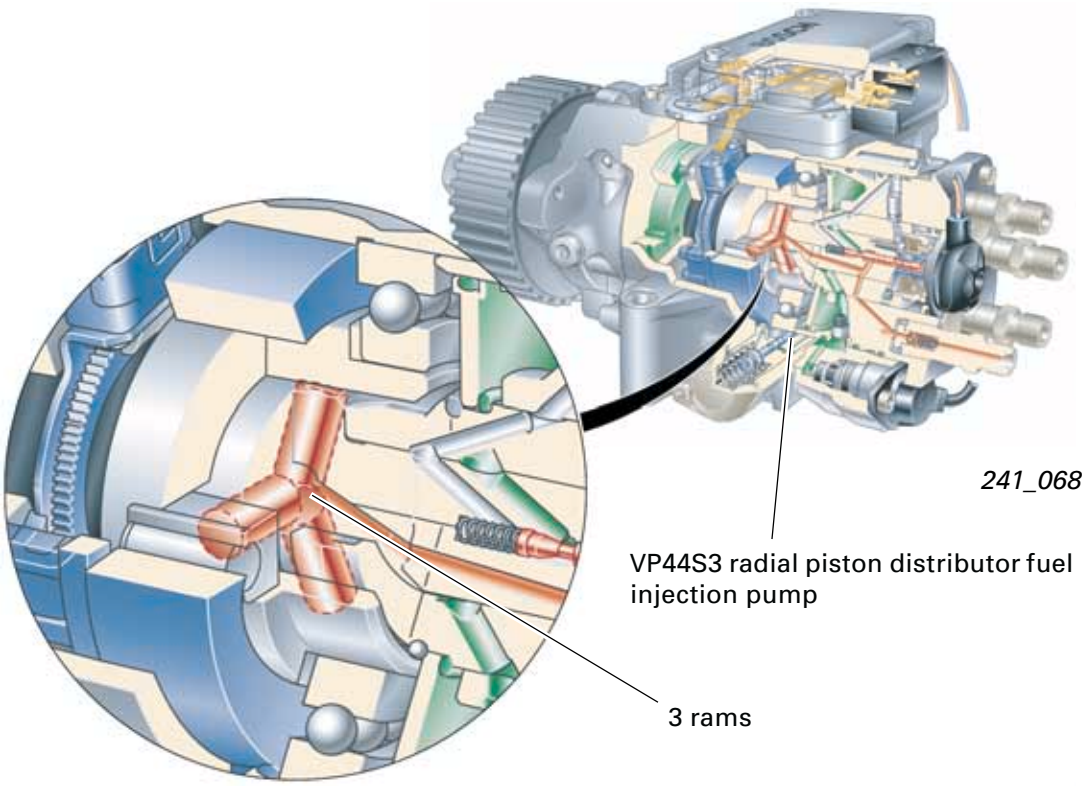
Due to the limited available space the cyclone oil mist separator consists of four single cyclones.
These are connected in parallel and offer the same throughput as a single version.

Unlike oil separators with mesh inserts (filters), the cyclone oil mist separator cannot become blocked.
A high functional reliability is thus guaranteed for the service life of the engine.

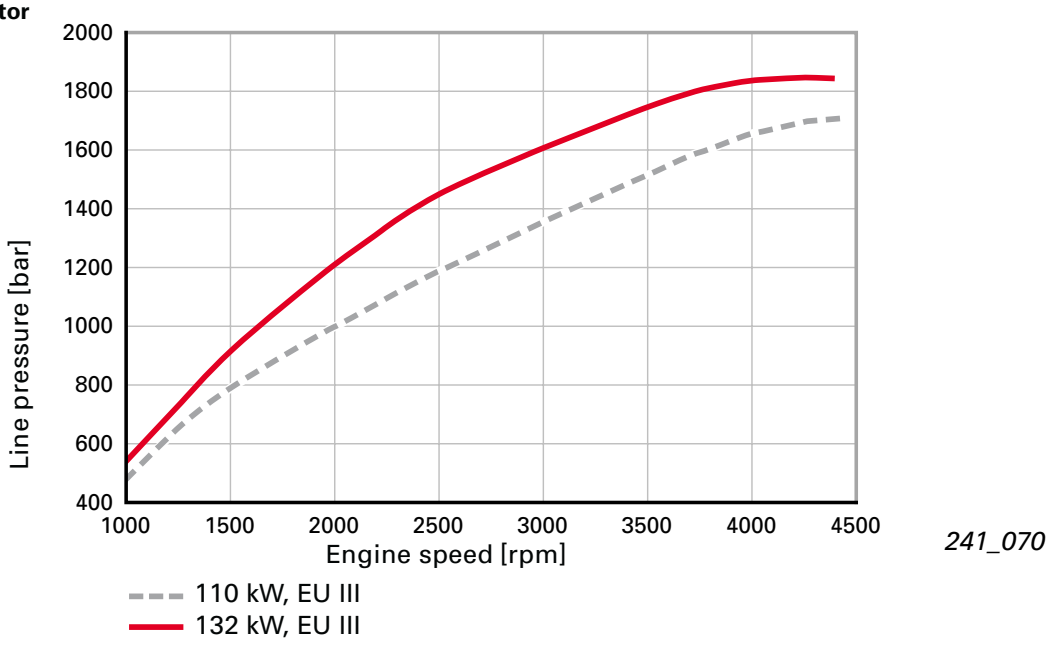


The cyclone oil mist separator can be also retrofitted as a complete unit (oil filter module) into the 110 kW version.

- Radial piston distributor fuel injection pump VP44S3 with 3 rams for increased injection pressure. Fuel injection pressures of up to 1850 bar are achieved at nominal capacity.

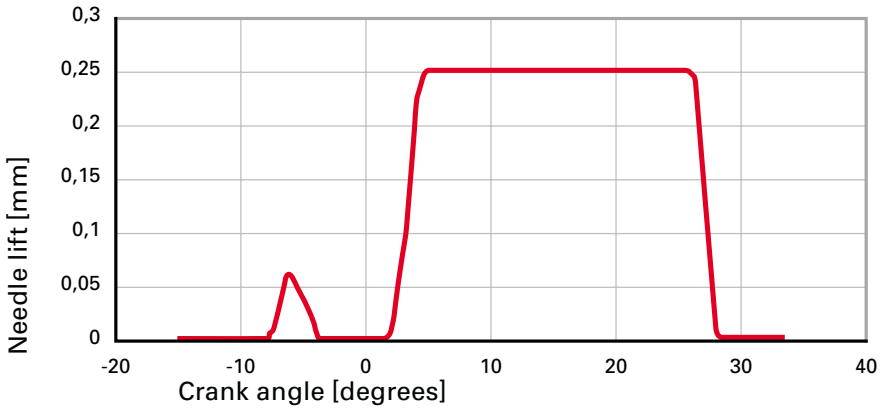


Comparative injection pressure 110 kW with 132 kW, EU III: Maximum line pressure upstream from the injector



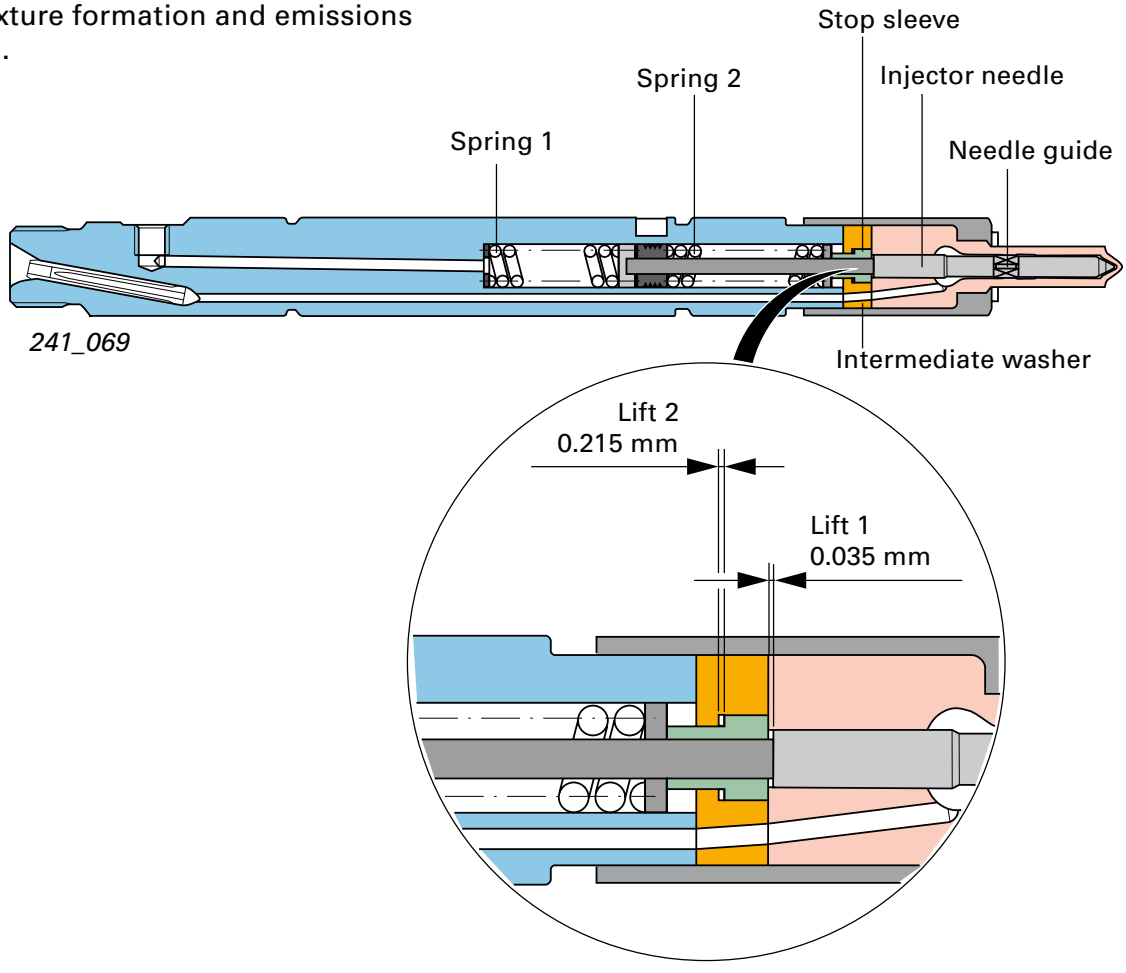
- New: pre-injection controlled via solenoid valve. In conjunction with the dual-spring injector holder combination, it helps reduce combustion noise, particularly when the engine is cold.

Needle lift with pre-injection at 2500 rpm and 40 mg injection quantity



241_071

- **Six-hole** instead of five-hole injectors for better mixture formation and emissions reduction.

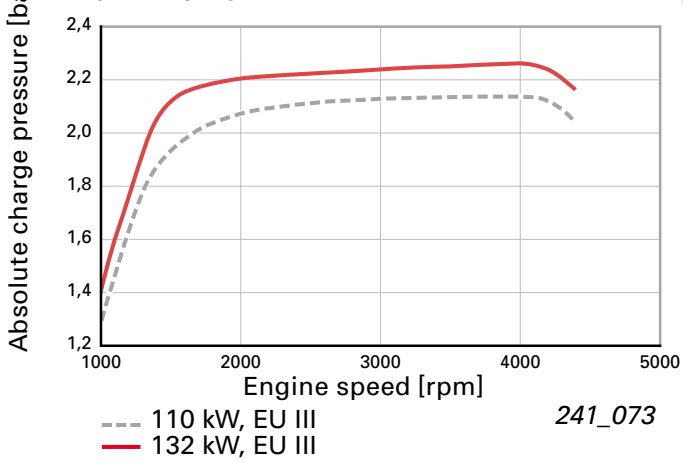


241_069

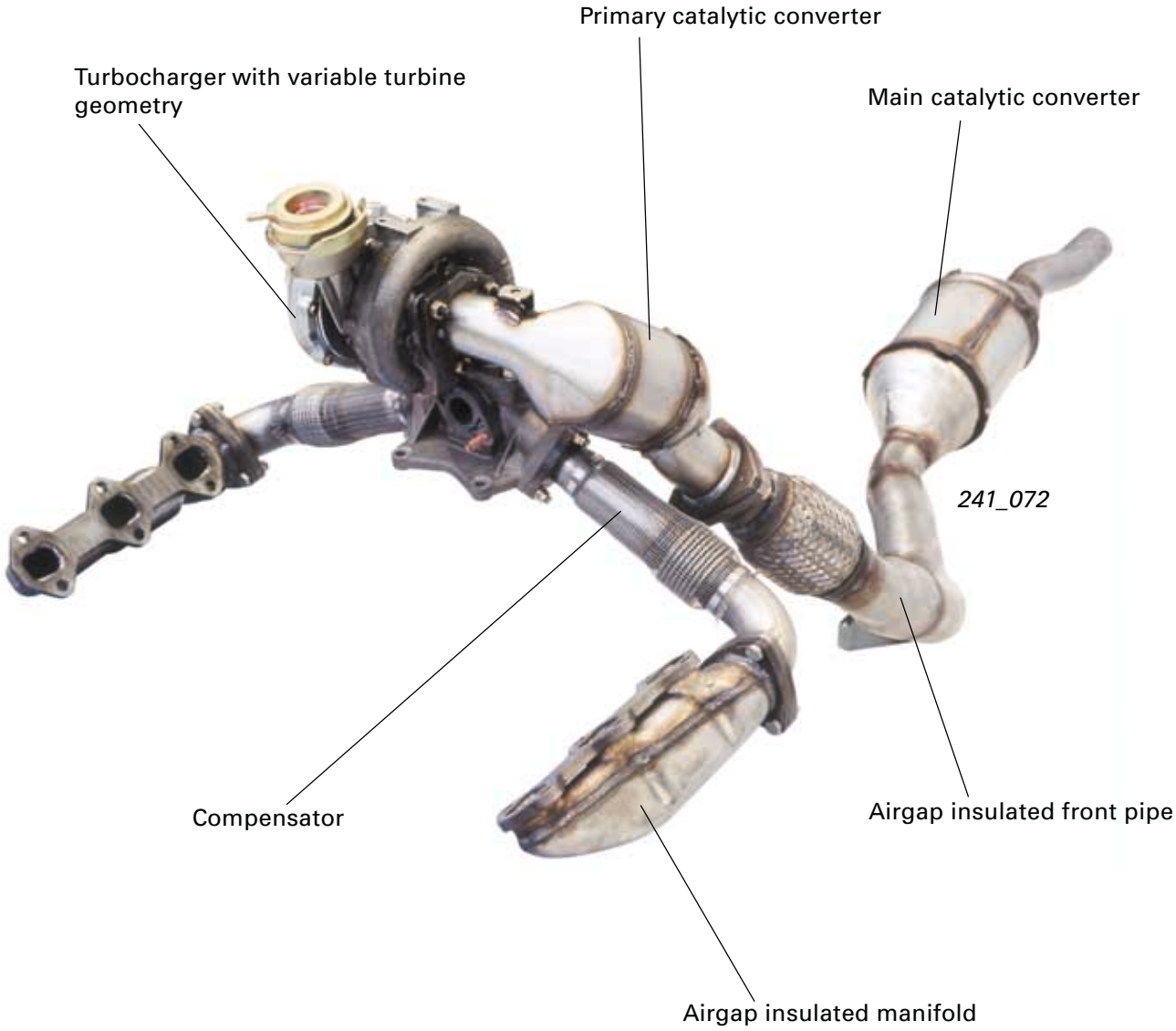
- Turbocharger made of more heat-resistant material, optimised turbine and compressor wheel and improved kinematics of the guide vane adjustment.

- Primary catalytic converter immediately downstream from the turbocharger

Comparison with charge pressure curve V6-TDI 110 kW with 132 kW

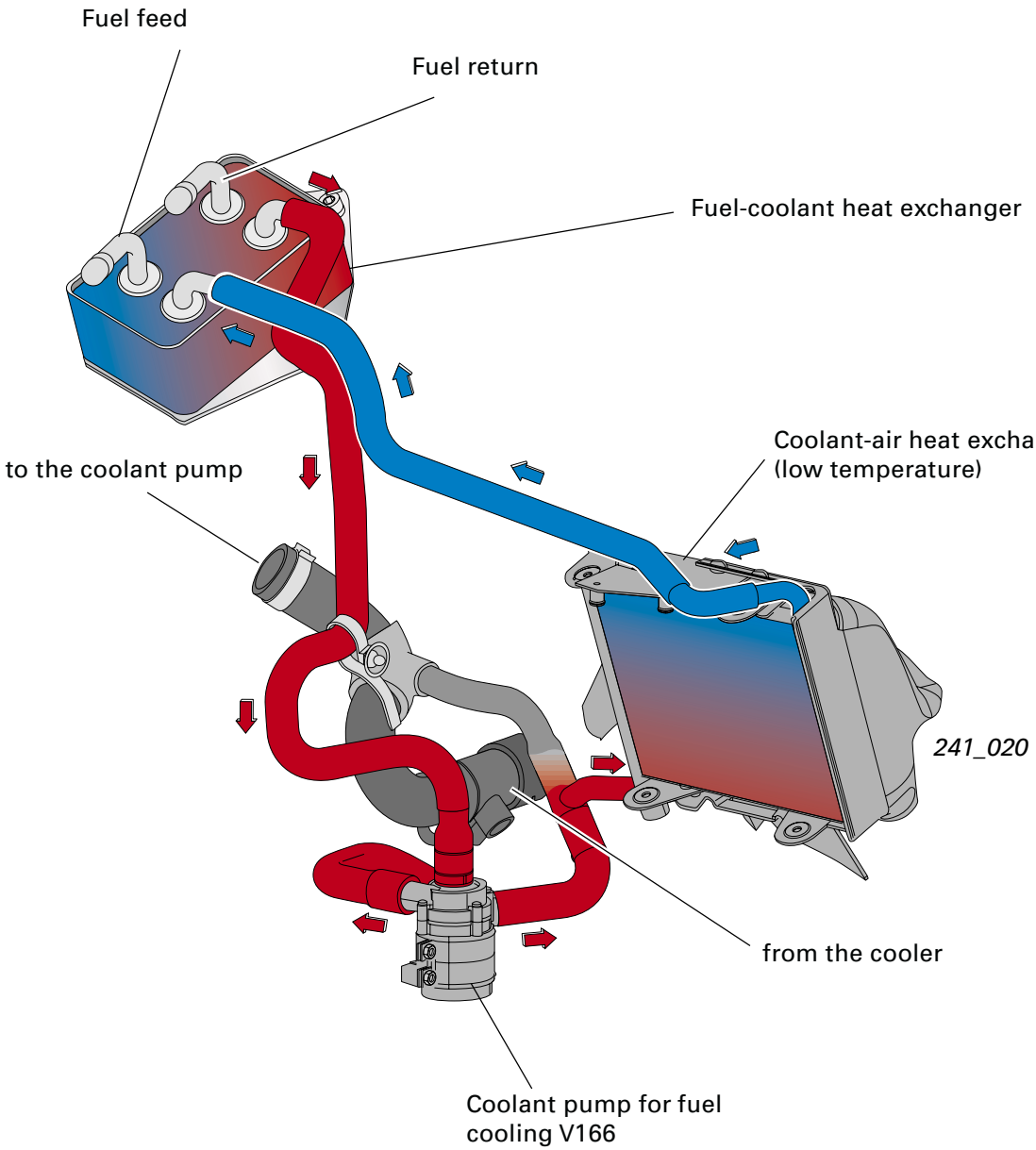


241_073



- Fuel cooling via fuel-coolant heat exchanger and coolant-air heat exchanger integrated into the engine cooling system (see also SSP 226, Page 22).
- To guarantee adequate engine cooling on any terrain, the V6-TDI in the allroad quattro is fitted with an uprated coolant heat exchanger.
- Larger oil-coolant heat exchangers compensate the increased thermal loading of the engine oil caused by the increase in performance.

The fuel cooler is initially intended only for the allroad quattro, but will also be used in other vehicles in the future.



Notes

Gearbox

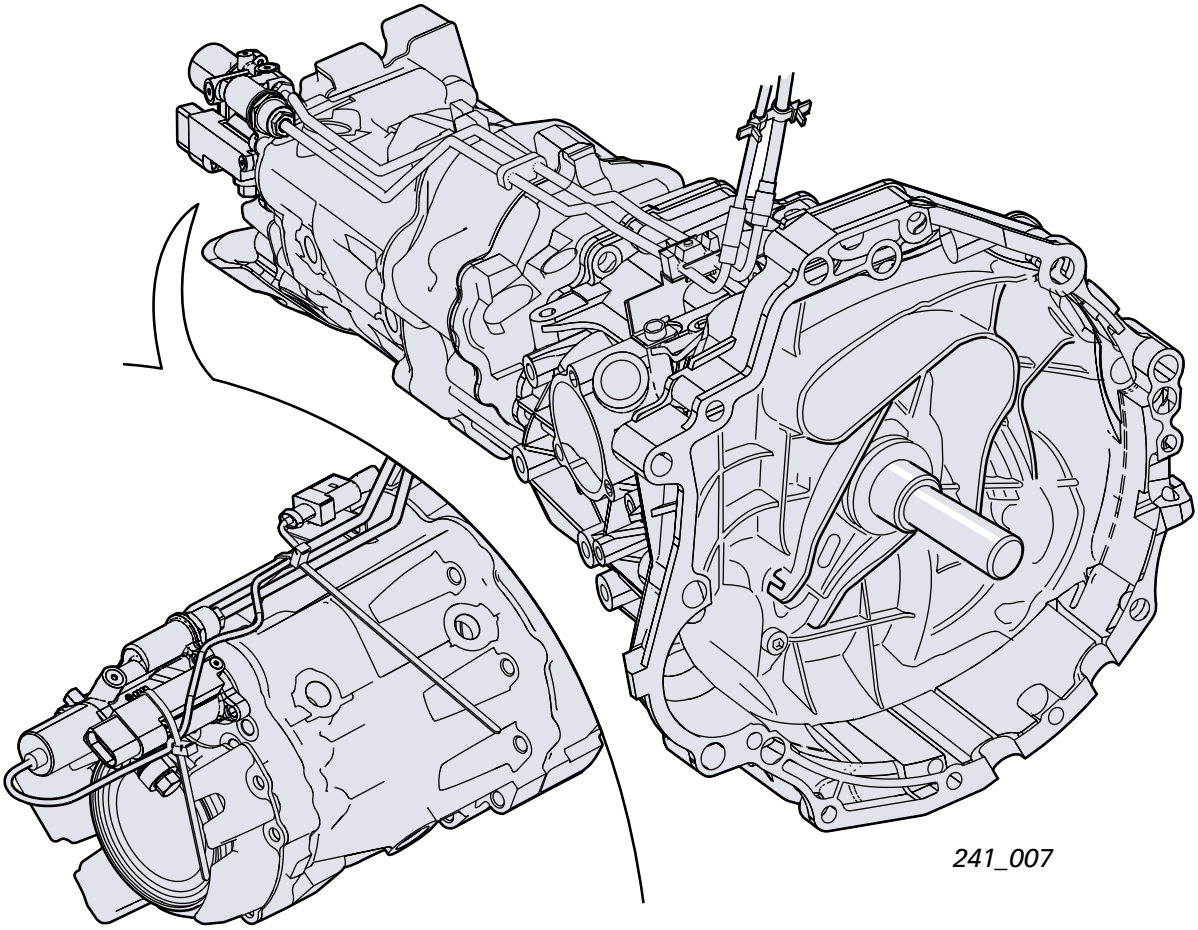
6-speed manual gearbox 01E

The following gearboxes are available for both engine versions:

- 6-speed manual gearbox 01E
- 6-speed manual gearbox 01E with additional low range shift stage (optional).

In conjunction with the manual gearbox 01E, both engine versions have the self-adjusting "SAC" clutch. The design and function is described in SSP 198, Page 66.

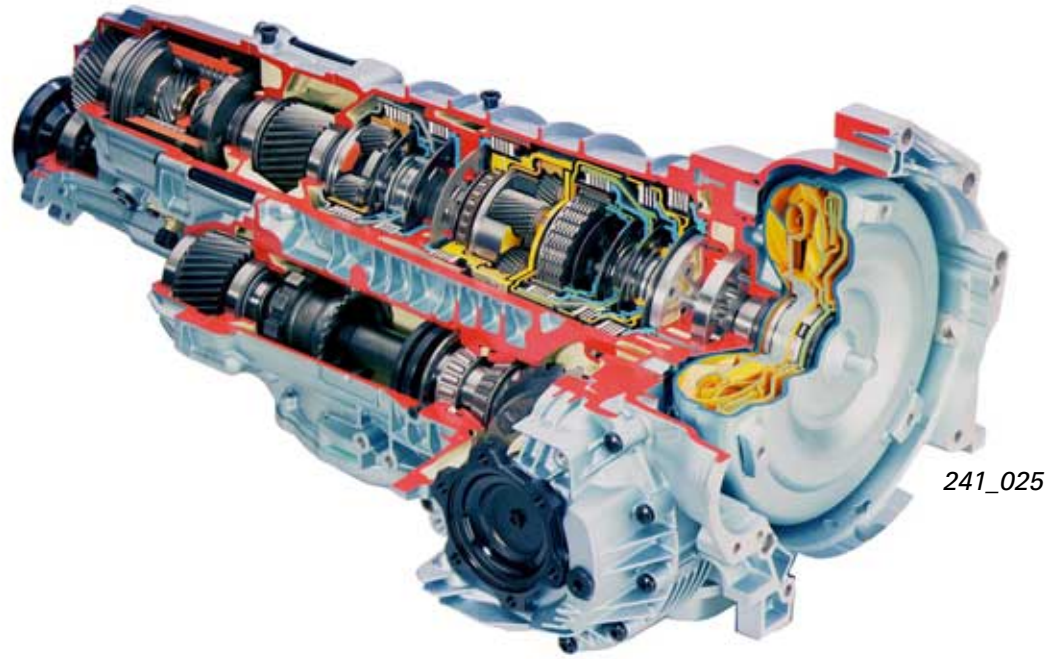
The 01E manual gearbox is generally fitted with an oil cooling system (see SSP 198, Page 71).



241_007

5-speed 01V automatic gearbox

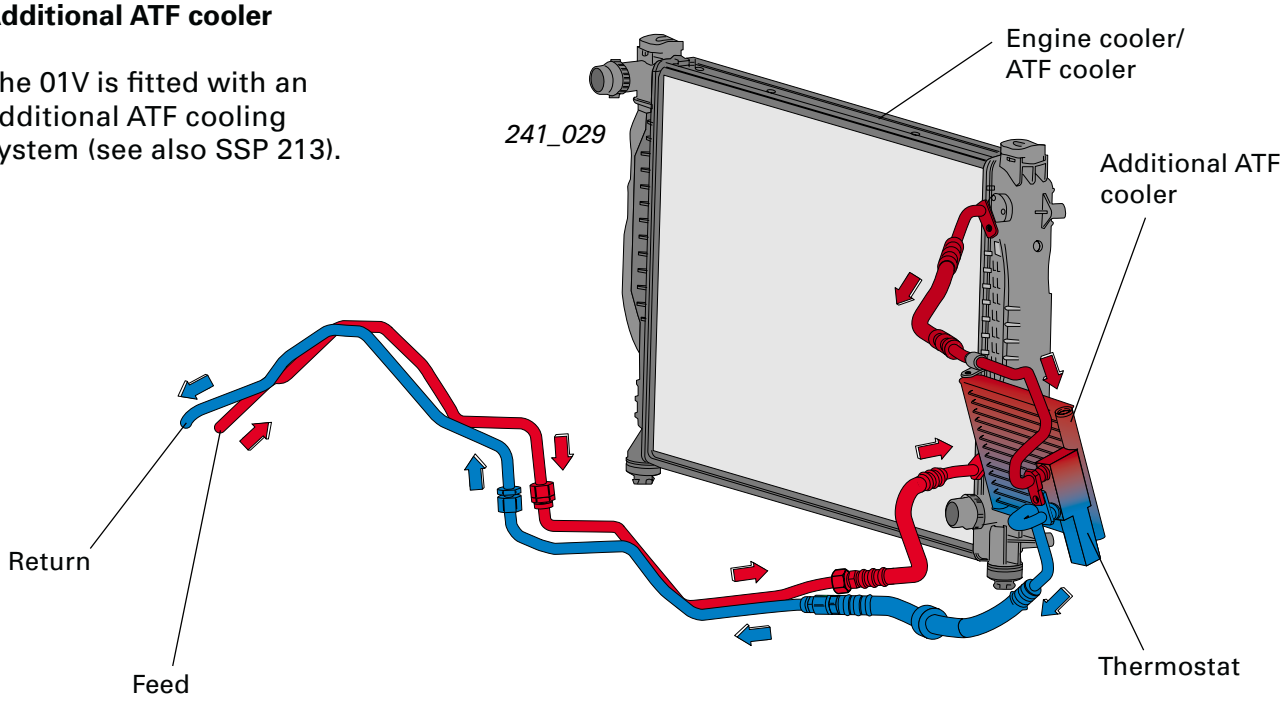
The 01V 5-speed automatic gearbox with tiptronic is also available (cannot be supplied with additional shift stage) for the V6-Biturbo and the V6-TDI.
In both engine versions, the maximum speed is achieved in 5th gear.



241_025

Additional ATF cooler

The 01V is fitted with an additional ATF cooling system (see also SSP 213).

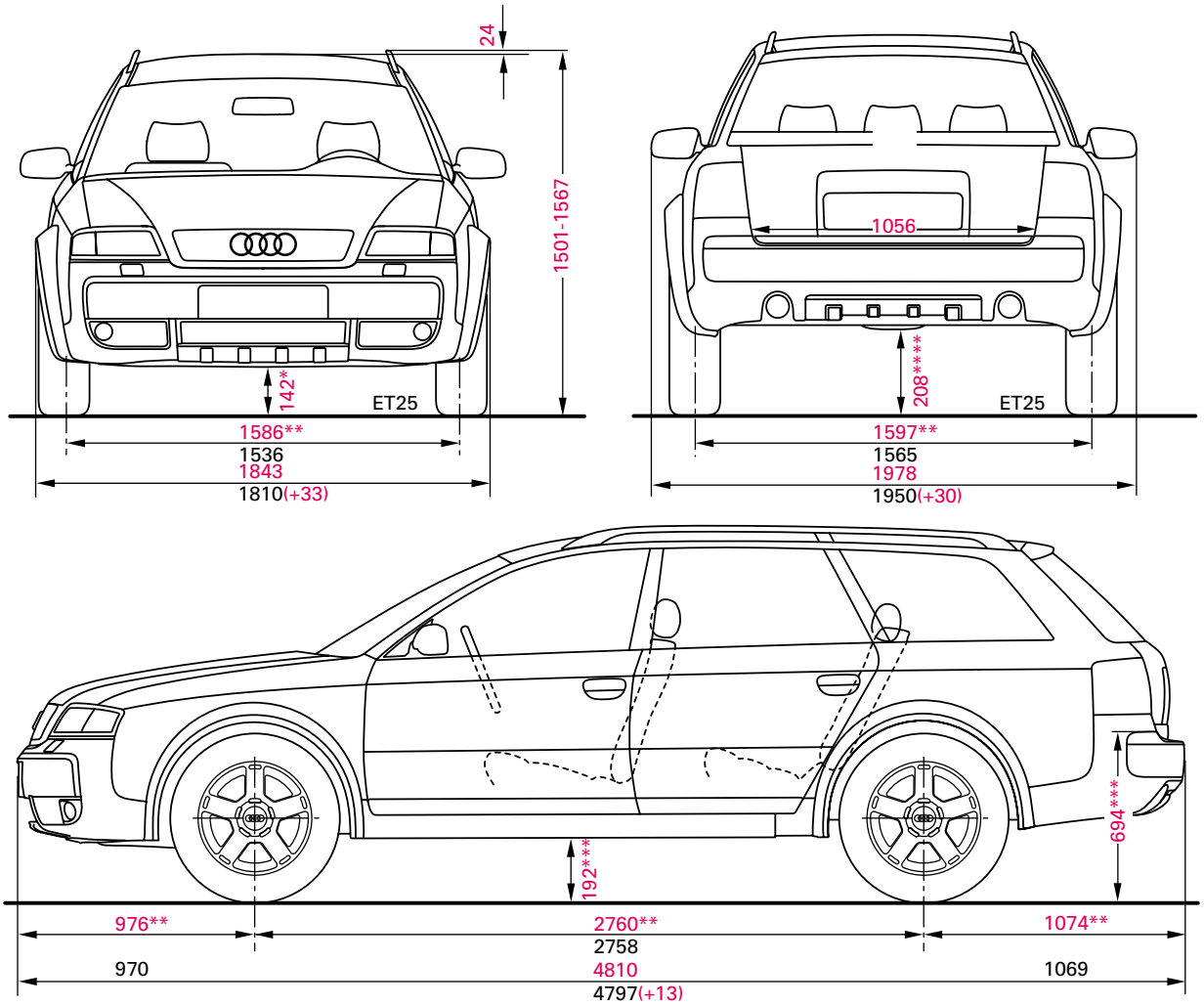


Technical data and dimensions

	allroad quattro 2.7-l-V6-Biturbo 6-speed manual gearbox	allroad quattro 2.5-l-V6-TDI 6-speed manual gearbox
Maximum speed in km/h	236 (234)	207 (205)
Acceleration 0 - 100 km/h in s:	7.4 (7.7)	9.5 (9.6)
Urban fuel consumption in l/100 km [1]):	18.0 (19.2)	12.3 (13.4)
Non-urban fuel consumption in l/100 km [1]):	9.8 (9.7)	7.0 (7.5)
Overall fuel consumption in l/100 km [1]):	12.8 (13.2)	8.9 (9.6)
Cooling system capacity (incl. heater) in l:	approx. 6	
Engine oil capacity (incl. filter) in l:	approx. 6	
Tank capacity in l:	70	
Steering ratio:	16.2	
Turning circle in m:	11.68	
Unladen weight in kg (without driver):	1795 (1825)	1790 (1825)
Admissible total weight in kg:	2425 (2455)	2420 (2455)
Admissible front axle load in kg:	1260 (1285)	1270 (1285)
Admissible rear axle load in kg:	1300	
Admissible unbraked trailer load in kg:	750	
Admissible trailer load, braked on 8% uphill gradient, in kg [2]):	2300	
Admissible trailer load, braked on 12% uphill gradient in kg [2]):	2100	
Admissible roof load in kg:	100	
Admissible support load in kg:	95	
Luggage compartment capacities according to VDA (German automobile industry association) luggage volume standards in l (with back seats folded down and loaded to roof height):	455 - 1590	

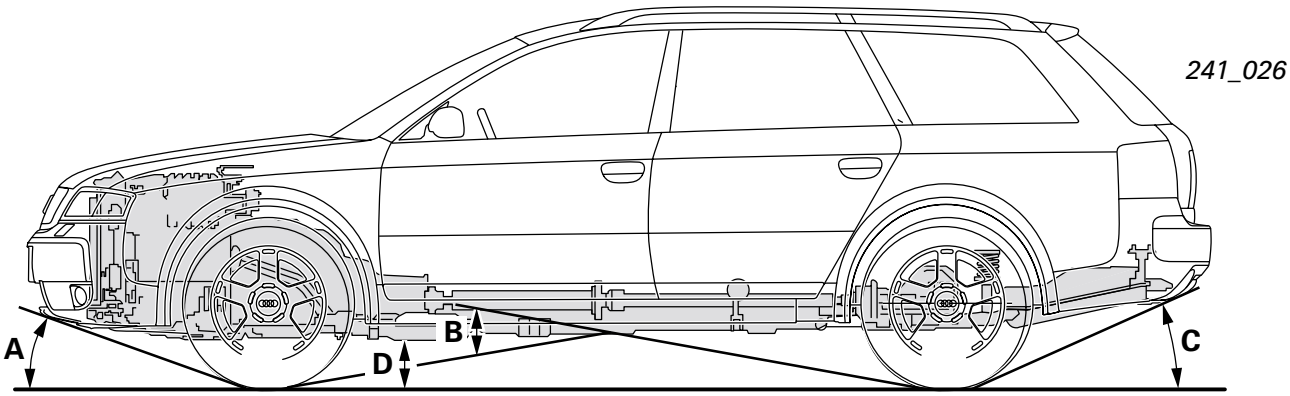
1) according to 93/116/EC
2) use of trailer anti-roll bar increases the admissible trailer load to 2300 kg (up to max. 80 km/h)

The values in brackets relate to automatic gearbox.



Dimensions: red = allroad quattro, black = A6 Avant
Values in brackets correspond to the differences in comparison with the A6 Avant.

241_049



241_026

A Overhang angle Front:	approx. 20 degrees ****	*	Low level
B Ramp breakover angle	approx. 19 degrees ****	**	Normal level
C Overhang angle rear:	approx. 23 degrees ****	***	High level 1
D Ground clearance:	approx. 208 mm ****	****	High level 2

Running gear

Features of the running gear

The running gear is from the Audi A6 quattro and, as already mentioned, is fitted with a self-supporting air suspension system which can adjust the vehicle to four different levels.

Due to the adaptation of the air suspension system and the demands of all-road use, the following modifications have been made:

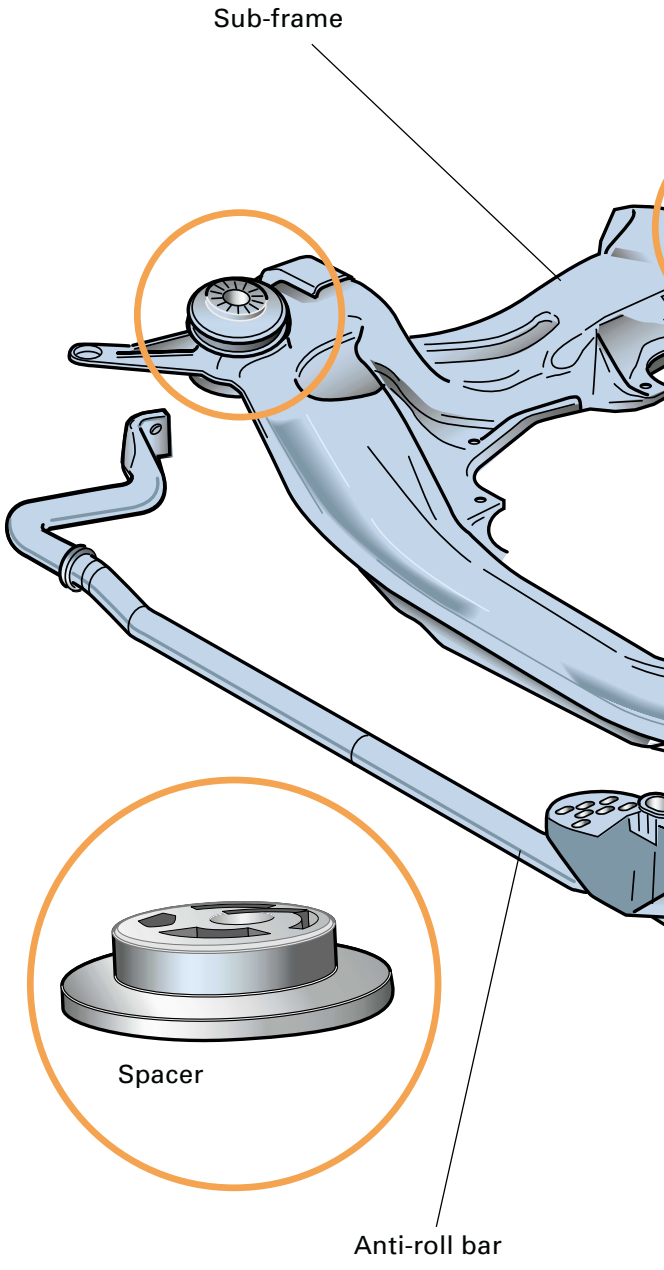
The ductile cast iron pivot bearing has been reinforced at various cross-sectional points. The ball seats have been adapted to the enlarged diameter of the joint pins. The length has been adapted due to the raised bodywork and the altered spring travel.

Front axle

The material thickness of the sub-frame has been increased (as for A6 V8). The sub-frame has been lowered in the region of the drive shafts and the level sensor mountings are welded. Spacers between the bodywork and the sub-frame mountings on the front and rear axles serve to raise the body by 25 mm and increase the ground clearance.

The supports at the rear mountings have been re-dimensioned and reinforced. A cross member serves as reinforcement (as for the S models).

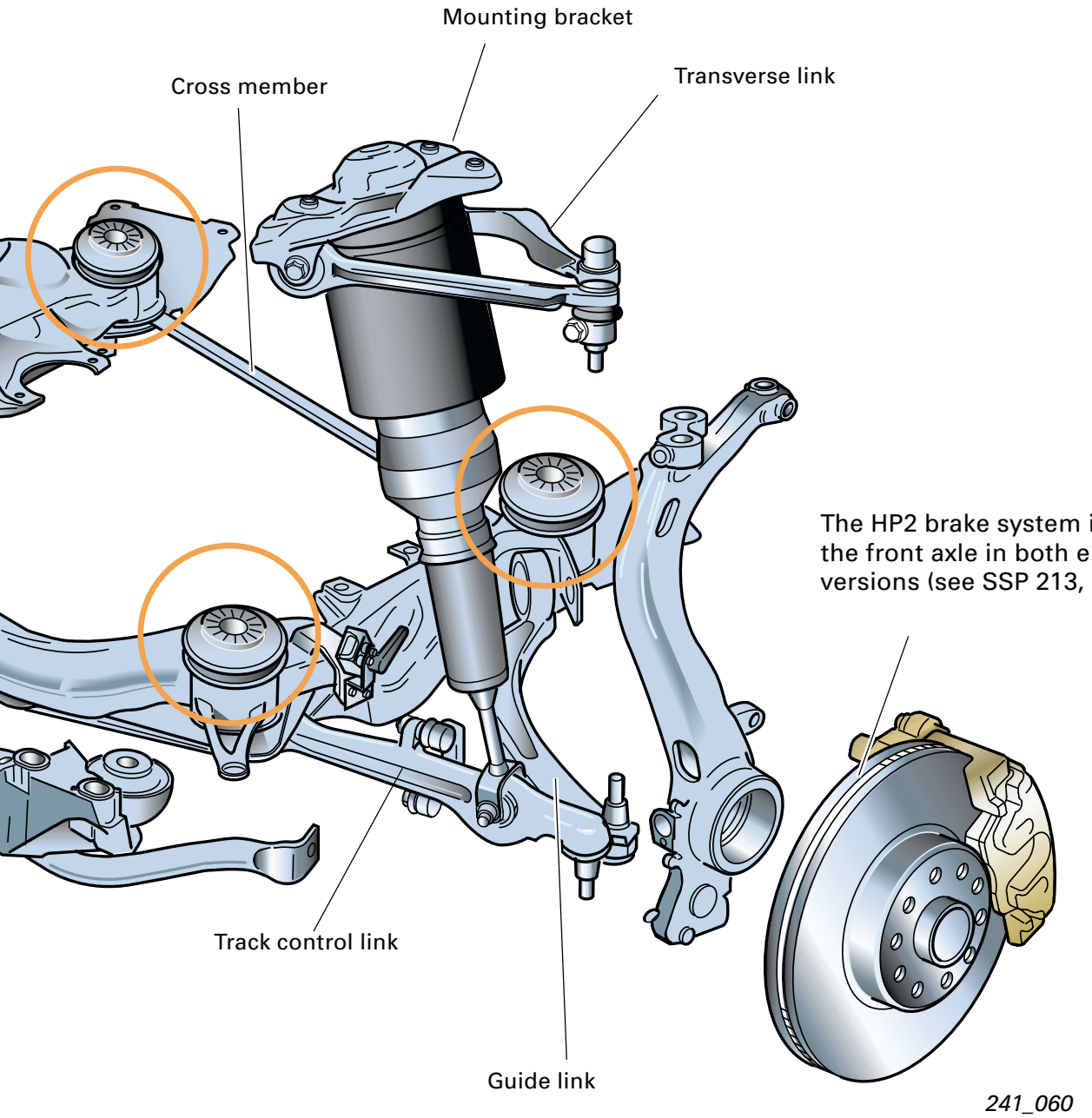
The anti-roll bar (full material, Ø29 mm as for Audi S6) has been made narrower due to the re-positioning of the connecting link mountings.



The aluminium track control link has been reinforced in cross section. The ball pivot cross section has been enlarged and the joint angle adapted to the kinematics. The suspension strut eye is lower and the mountings for the connecting link and the level sensor have been moved inwards (to allow free access of the connecting link to the suspension strut).

In the case of (aluminium) guide links, the cross section of the ball pivot has been enlarged. The joint angle has been adapted to the kinematics.
The joint angle of the upper, front transverse link has also been adapted to the modified kinematics.

The mounting bracket has been completely re-formed and is a component part of the air spring shock absorber.



The HP2 brake system is used on the front axle in both engine versions (see SSP 213, Page 25).

Rear axle

Spacers between the bodywork and the sub-frame mountings on the front and rear axles serve to raise the body by 25 mm and increase the ground clearance.

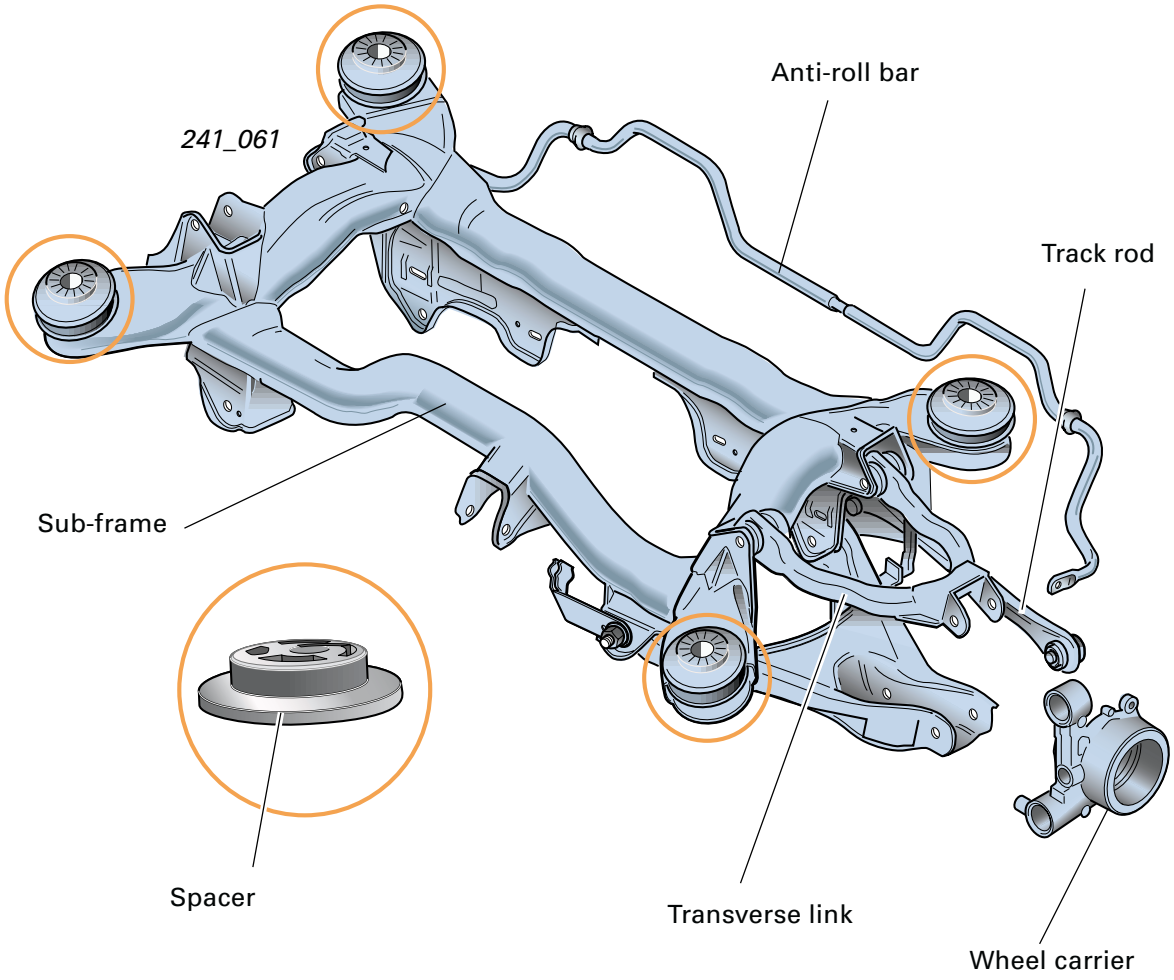
The upper transverse link has been modified in shape and adapted to the air spring shock absorber, and has been reinforced.
In the case of the (steel) wheel carriers, the pivot point of the upper transverse link has been raised to optimise the wheel clearance. As a result, the modified kinematics result in improved driving dynamics.
The track rod is made of wrought aluminium to give greater rigidity and improved tracking stability.
The brake cover plate has been adapted to accommodate the wheel carrier. The attachment points have been acoustically optimised.
The shape of the anti-roll bar has been adapted to accommodate the air supply unit.

Tightening of the links at the front and rear axles must be carried out at normal vehicle level.

Components of the allroad quattro which could be easily confused with standard components, are identified with a brown dot.

The following example demonstrates this concept:

The track rod could be confused with that of the Audi S6.
To prevent contact corrosion, the connection to the wheel carrier is fitted with a steel bush.
(S6: Aluminium wheel carrier/ aluminium bush)

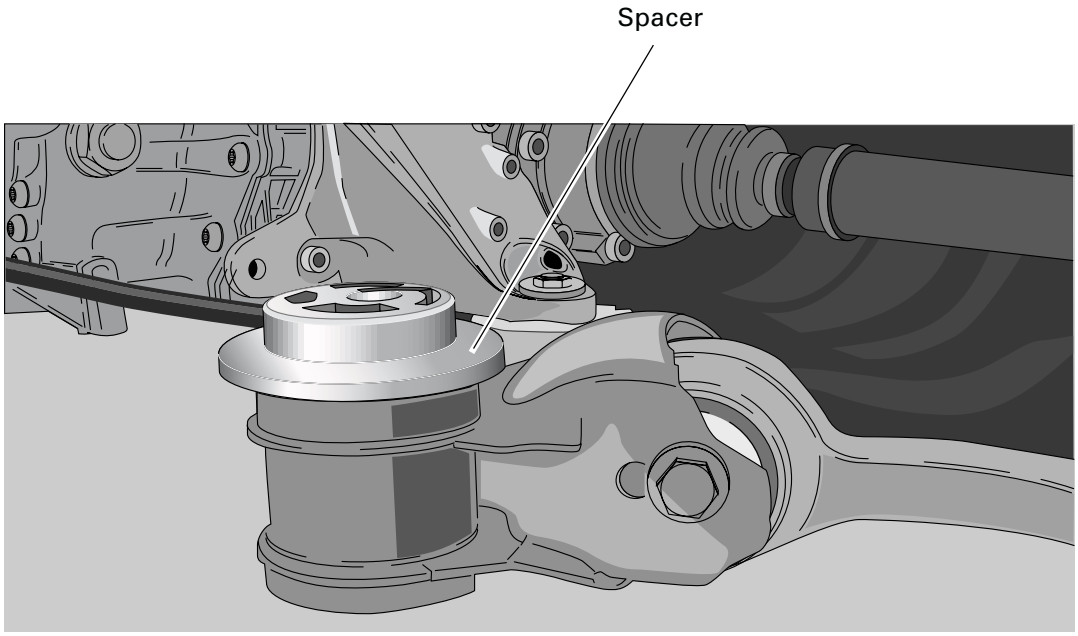


Spacers

As a result of the spacers, longer screws are used to attach the sub-frame.
The spacers are eccentric.
There are two different thicknesses:
Thickness 25 mm and 23.5 mm.
The assembly instructions in the workshop manual must be observed.

The 4 spacers on the front axle are 25 mm thick.

The spacers on the rear axle are of different thicknesses. On the front mountings; 23.5 mm, on the rear mountings; 25 mm.



241_018

Drive train

The front drive shafts have been adapted in length to the running gear kinematics. The inside joint is a tripod constant velocity joint, designed as a monoblock (formed sheet metal housing).
For info. on the tripod constant velocity joint, see SSP 192, from Page 40 on.
The rear drive shafts have increased diameters and the external joints have been strengthened.
The centre support of the propshaft has been adapted to accommodate the raised body.

The front section of the propshaft has been shortened in combination with the additional shift stage.

As the body has been raised with respect to the running gear (25 mm), practically all lines and hoses leading to the drive train and to the running gear (e.g., brake hoses) have been modified.

Wheels

Aluminium wheels in two design versions are currently available for the allroad quattro.

The standard allroad quattro has 5-spoke wheels with dimensions 7.5 x 17 ET 25.

The winter tyre wheels and the spare wheel (collapsible spare) are of a similar design. Both have dimensions 6.5 x 16 ET 16.

241_052

There is an optional “Twinforce wheel” available. Developed specially for off-road use, it has a double spoke design.
This conceals a second supporting wheel spider attached with titanium screws.
A high load-bearing capacity and mechanical strength characterise this design.

The unusual design in the 7.5 x 17 ET 25 format emphasises the powerful appearance of the allroad quattro.

241_053

To maintain clearance, snow chains must be fitted only to the specified winter wheels on the rear axle.

The titanium screws must on no account not be loosened.

Tyres

The 225/55 R 17 97 allroad tyres have been specially developed for the allroad quattro. These successfully combine the conflicting requirements of a high quality road tyre with the demands of a good off-road tyre.
This has been achieved with new material mixtures and a special profile.

Winter tyres: the 215/65 R 16 98 H M+S format is admissible.

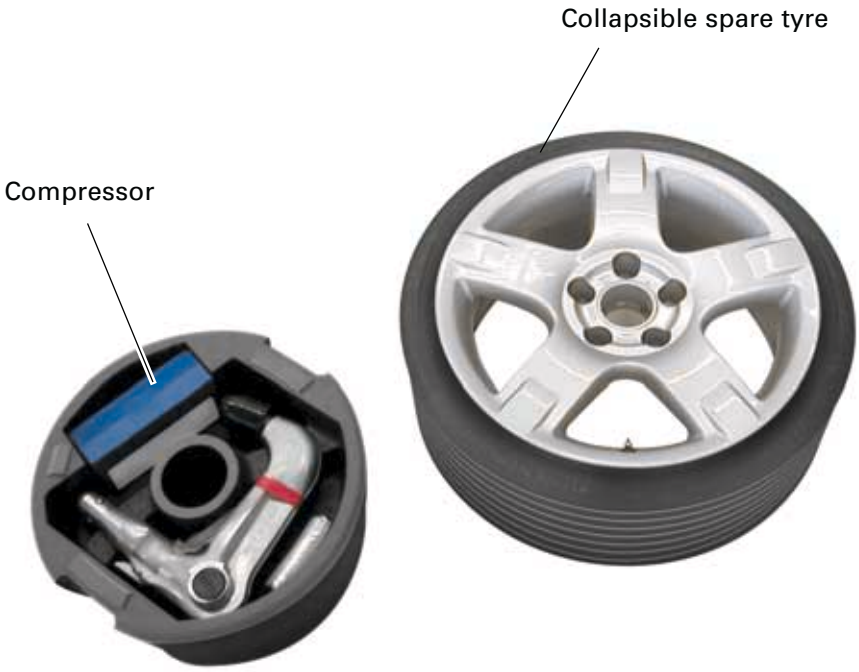
For reasons space-saving, a collapsible spare tyre with compressor is available in 205/70-16 format.

The collapsible spare tyre can be deflated back to its original shape. To make this easier, the tyre valve has a protective metal cap with which the valve insert can be removed.
This eases deflation and the tyre will return quickly to its original shape.

241_031

Before using a jack to raise the vehicle, switch off the air suspension.

You will find instructions for this procedure in SSP 243, in the workshop manual and in the operating instructions.



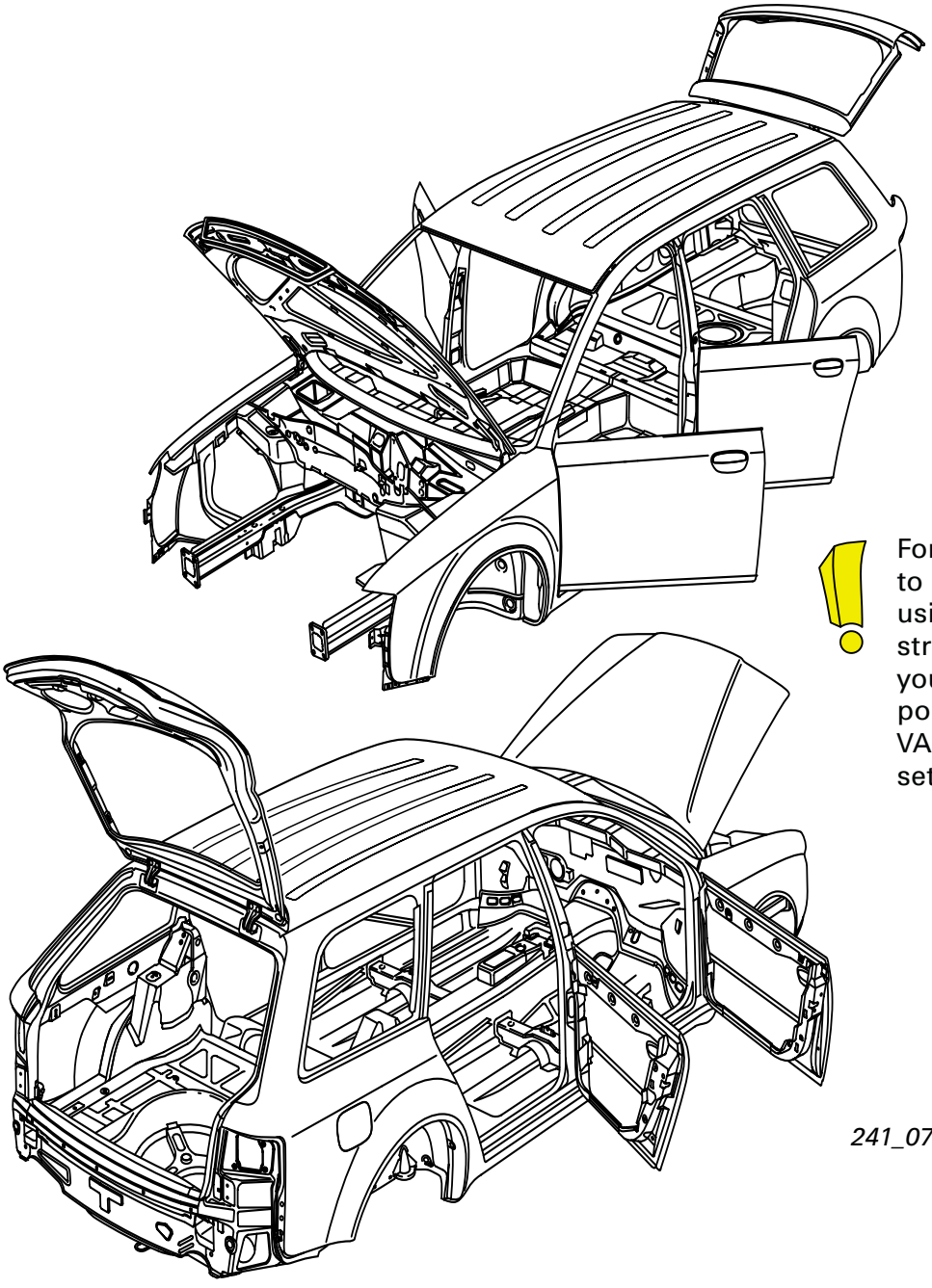
241_032

Bodywork and electronics

As well as changes to the appearance of the bodywork, numerous reinforcement and strengthening modifications have been made for off-road use.

In addition to the bodyshell, many add-on and in-built parts have also been reinforced. One example is the module holder on the dash panel.

This guarantees that you never need compromise on comfort or safety when driving the allroad quattro in off-road conditions. In addition, the modifications all work towards improving the long term quality body.



241_074

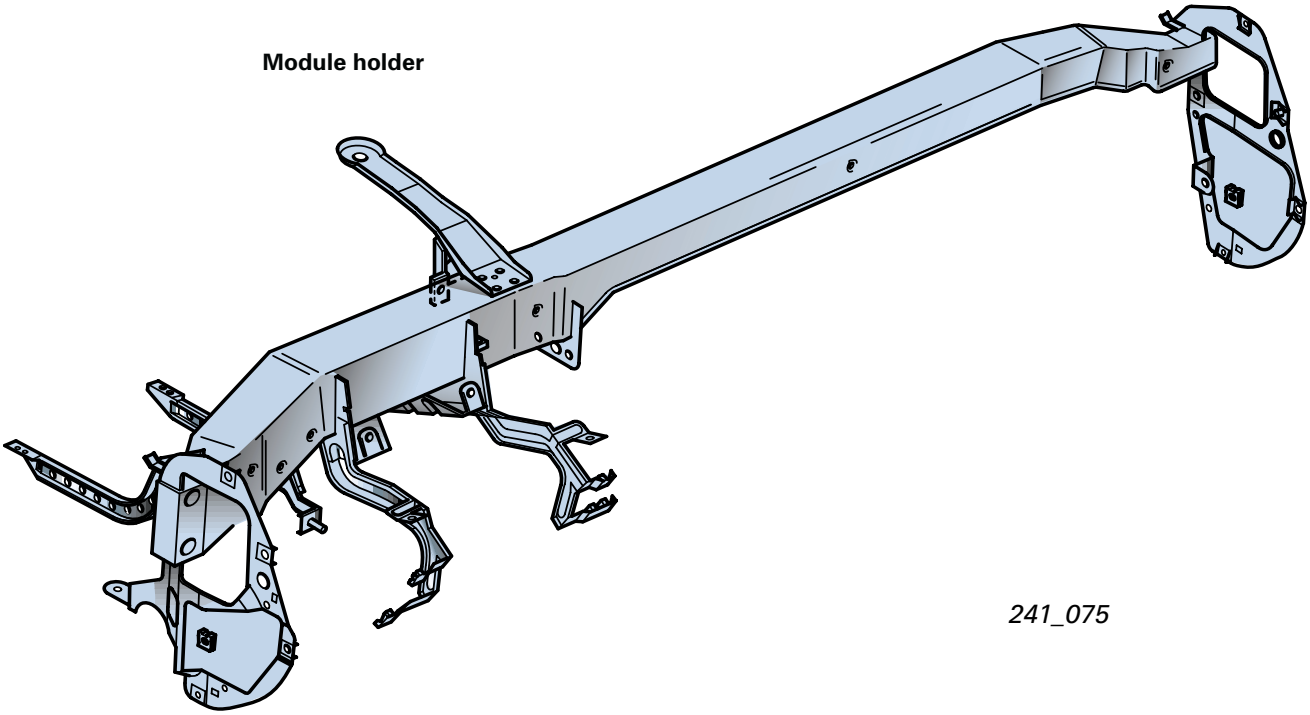
For certain tasks related to bodywork repair using the bench-type straightening system, you will require the portal jig supplement VAS 5035/3 for portal jig set VAS 5035.

With regard to crash safety and vehicle occupant protection, the allroad quattro fulfils the most stringent current requirements.

Particularly in comparison with normal off-road vehicles, the allroad quattro is in a class of its own.

With the occupant safety cell, the electronic stability programme (ESP), a comprehensive airbag system and the optional SIDEGUARD, the allroad quattro offers the same high degree of safety as the Audi A6 Avant (see SSP 194, Page 14 and SSP 213, Page 4).

Module holder



241_075

Electrical System

The allroad quattro is fitted with dynamic headlight range control as standard (with or without xenon lights).

You will find design and functional descriptions in SSP 194, Page 41 and SSP 213, Page 65.

The special features of the allroad quattro headlight range control system can be found in SSP 243, on Pages 23 and 31.

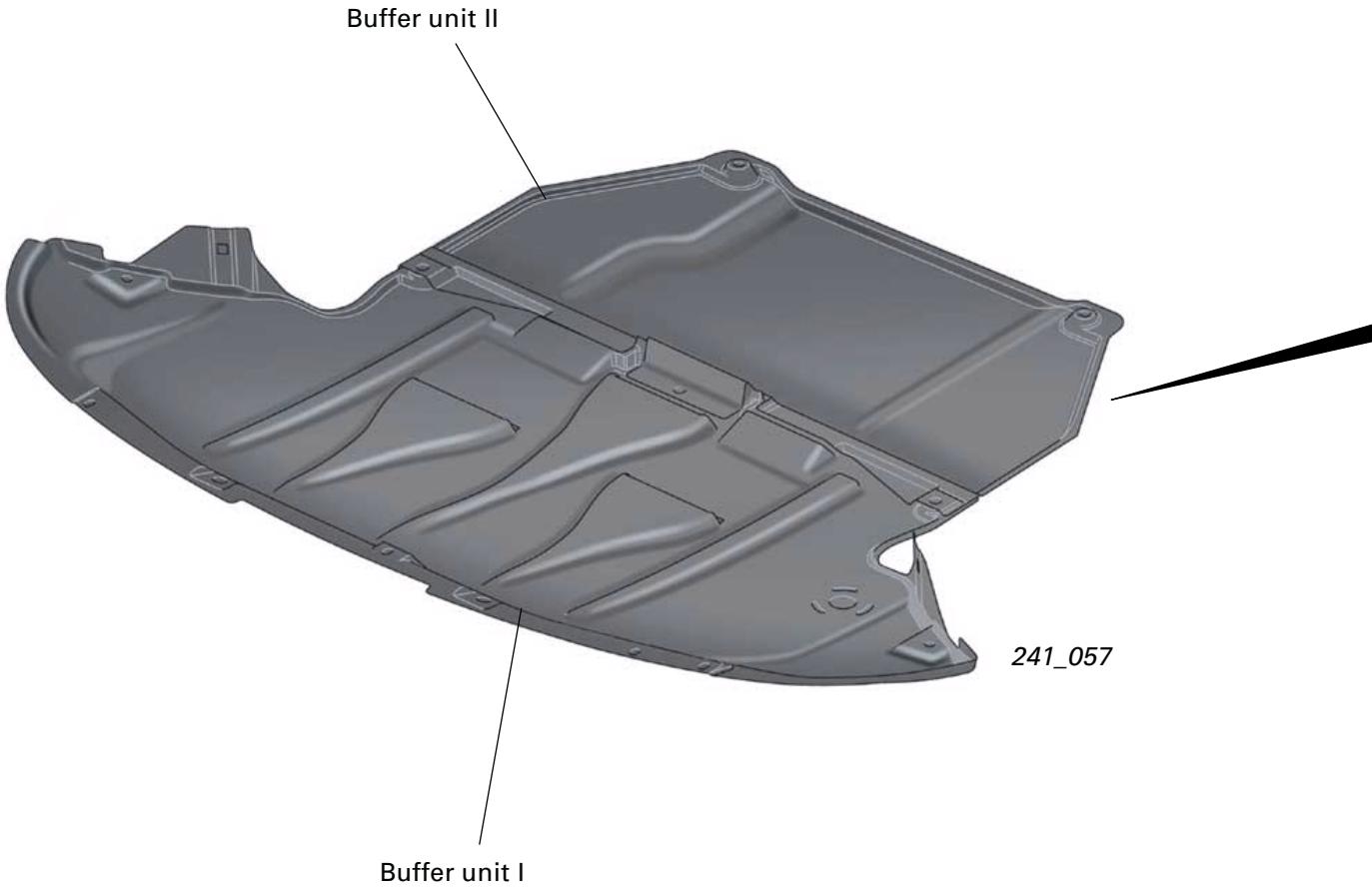
Poor surface measures

Buffer units I and II

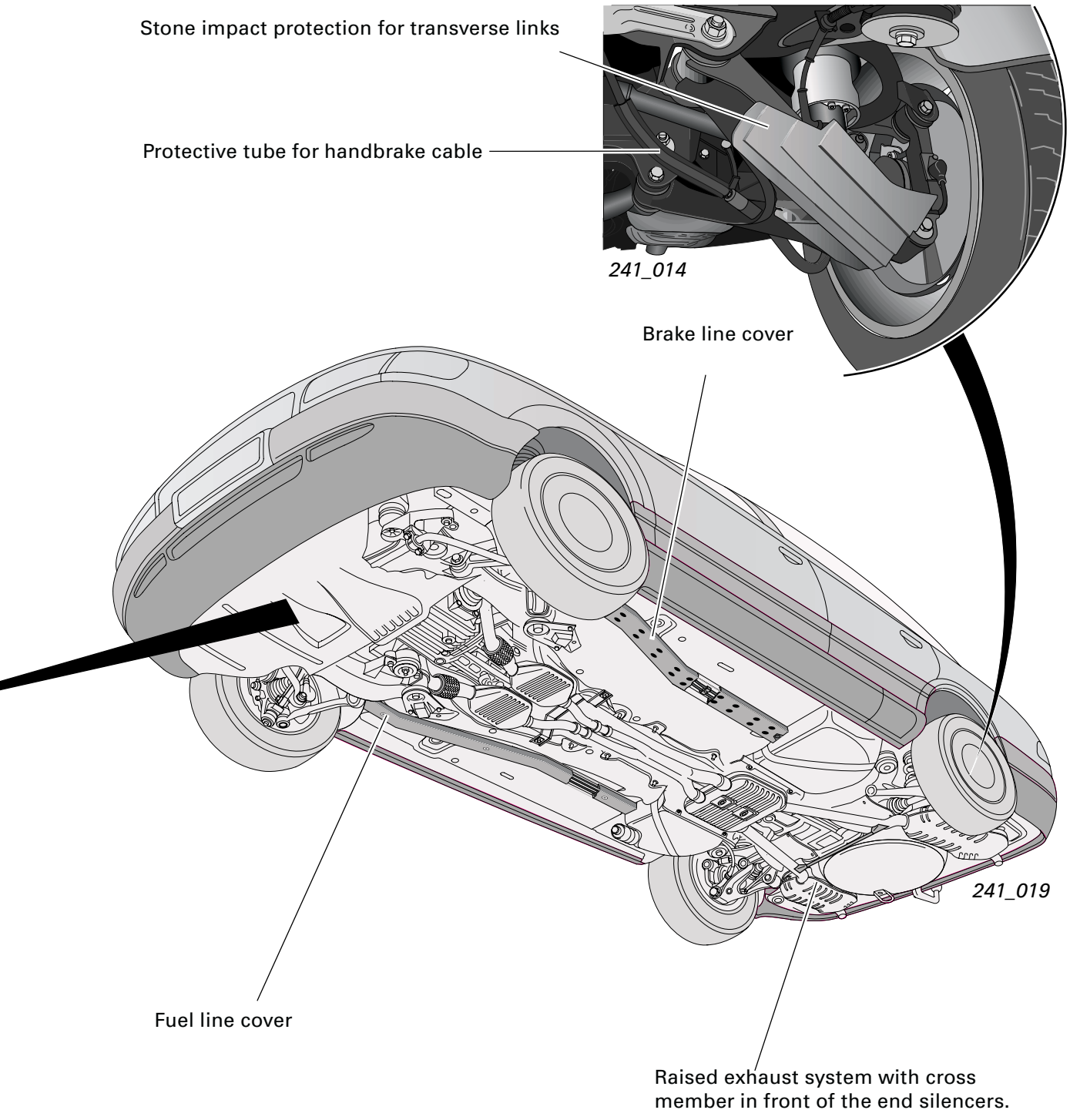
The buffer units protect the engine and gearbox from stone impact and large surface ground-contact. They also serve as soundproofing.

The buffer units are reinforced on the outside and inside with fibreglass mats. Buffer unit 1 has an additional large surface area reinforcing section with a high fibreglass content in the region of the oil sump.

The buffer units are not designed as underride protection/impact protection and do not protect the drive if lowered onto sharp objects. They cannot support the weight of the vehicle in such cases.



Stone impact protection for rear transverse links and protective tube for hand brake cable)

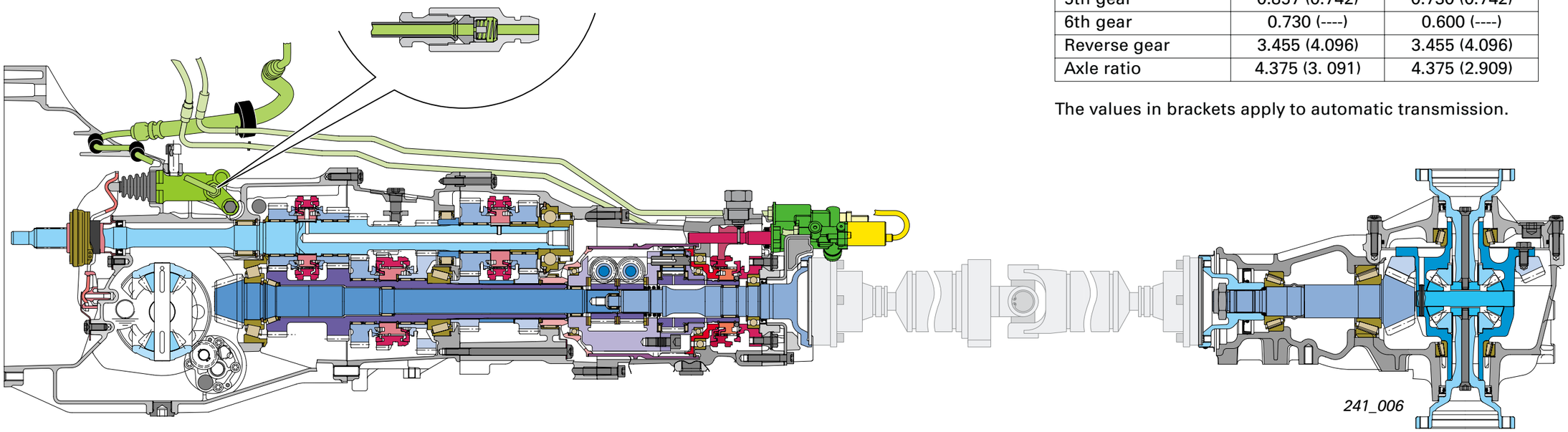


Power flow in the drive train

Transmission ratio	allroad quattro 2.7-l-V6-Biturbo	allroad quattro 2.5-l-V6-TDI
1st gear	3.750 (3.665)	3.750 (3.665)
2nd gear	2.059 (1.999)	2.059 (1.999)
3rd gear	1.417 (1.407)	1.320 (1.407)
4th gear	1.071 (1.000)	0.933 (1.000)
5th gear	0.857 (0.742)	0.730 (0.742)
6th gear	0.730 (----)	0.600 (----)
Reverse gear	3.455 (4.096)	3.455 (4.096)
Axle ratio	4.375 (3. 091)	4.375 (2.909)

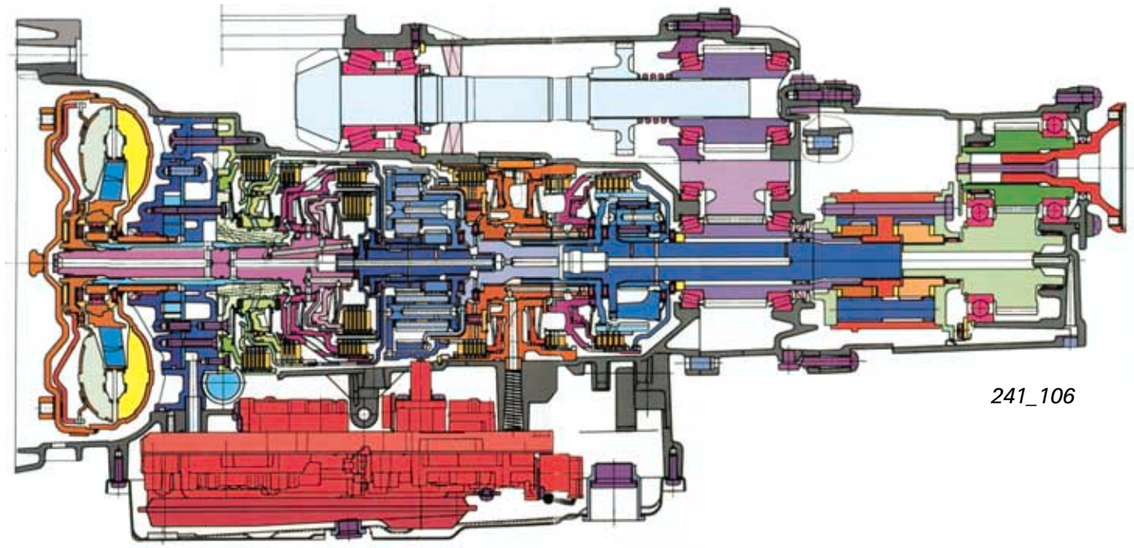
The values in brackets apply to automatic transmission.

6-speed 01E manual gearbox with additional shift stage



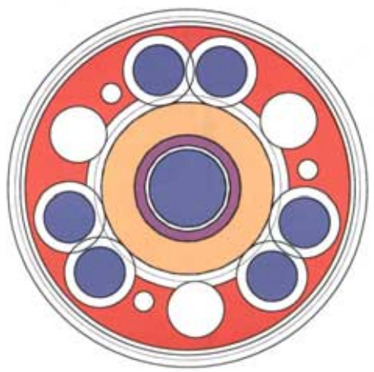
241_006

5-speed 01V automatic gearbox

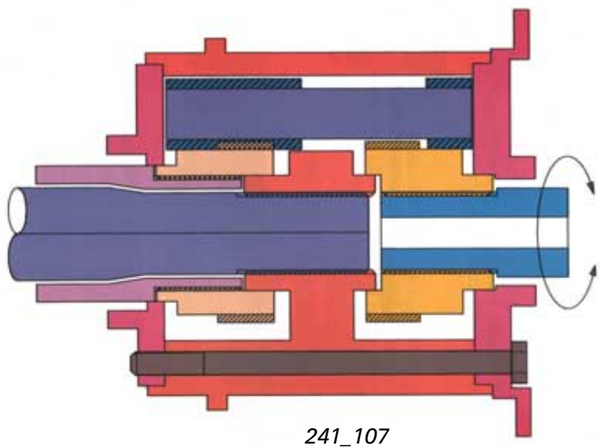


241_106

Parallel-Axis-Torsen (PAT)



241_108



241_107

Quattro drive

The allroad quattro also has a Torsen centre differential (basic distribution 50/50) which transmits the forces to the front and rear axles according to the driving conditions, at a ratio of 3 - 4 to the wheels of the axle with better friction value.

A Torsen differential is also integrated into the 01V 5-gear automatic gearbox, which corresponds in terms of function to the Torsen differential in the manual gearbox, although its differs in design.

As the worm gears are positioned parallel to the input / output, it is termed Parallel Axis-Torsen, or PAT.

The design and function of the Torsen distributor differential can be found in SSP 76.

Parallel Axis Torsen

241_058

Advantages of the Torsen differential:

- Greater comfort because the locking power of the Torsen differential is produced purely mechanically, is always in use and responds continuously.
- Steering control is always guaranteed.
- As long as the friction values on the wheels are adequate, the Torsen differential operates completely unnoticed.
- Error conditions do not occur because the Torsen differential operates automatically.
- The Torsen differential is largely wear-free.

With the Torsen differential together and the EDL electronic differential lock function on all wheels (effective up to 100 km/h), the allroad quattro remains mobile even if only one wheel has traction. The design and function of the EDL control is described in SSP 148 and 162.

Advantages of the EDL as opposed to fixed locks:

- Full steering control is retained.
- Greater comfort as the EDL control is activated automatically.
- Error conditions do not occur because the system operates automatically.

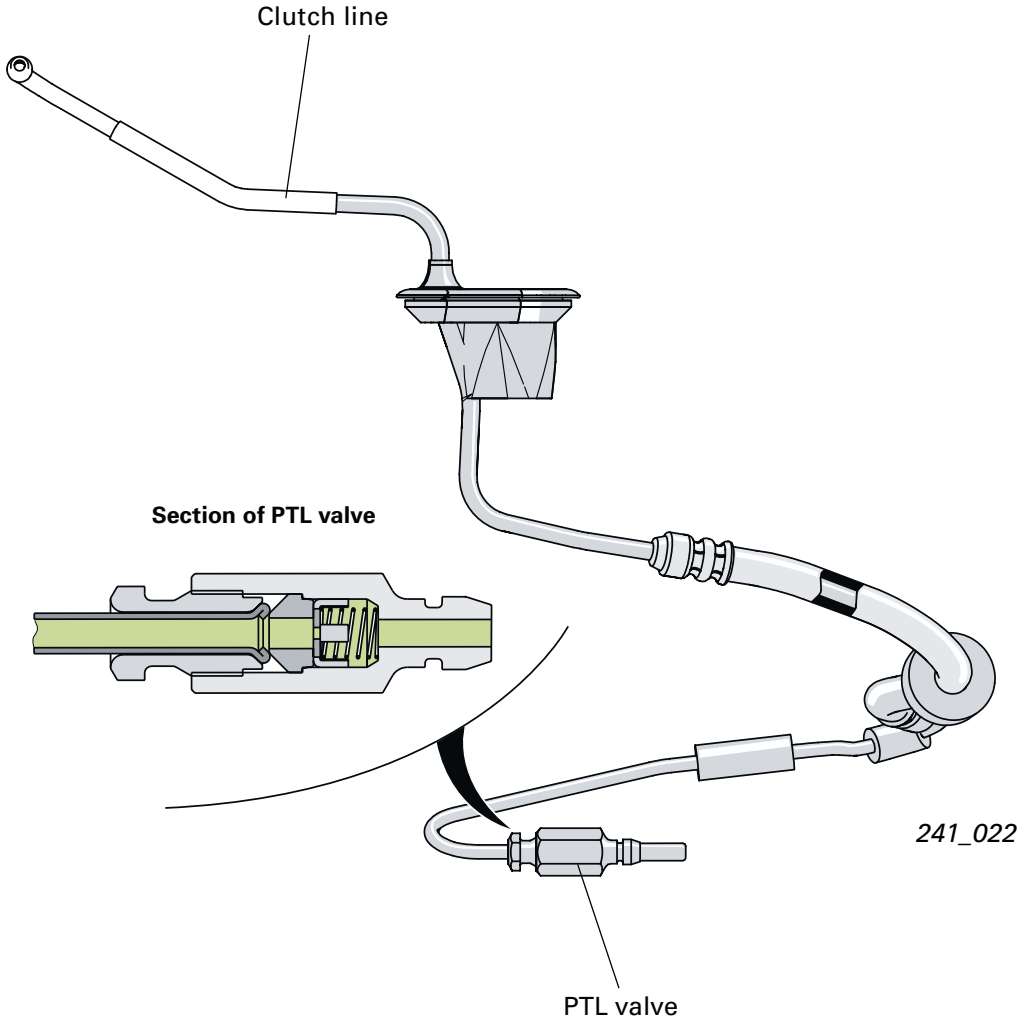
The EDL function has been adapted for use in the allroad quattro. Further information can be found in the chapter entitled ESP - influences, on Page 65.

Clutch mechanism

Clutch line with PTL valve

Due to the powerful torque of the engines in conjunction with the torque increase caused by the additional shift stage, the drive train must be protected against incorrect operation when engaging the clutch.

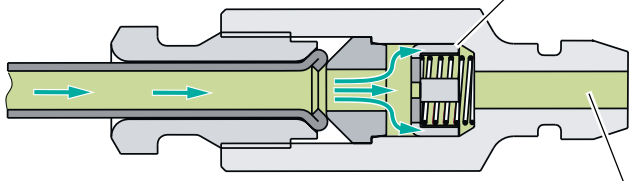
A PTL valve is therefore integrated into the clutch line in the allroad quattro with additional shift stage.
Its purpose is to prevent abrupt clutch engagement when the clutch pedal is released suddenly and thereby reduce the magnitude of torque peaks.



PTL stands for
Peak
Torque
Limiter.
i.e. limiting sudden torque peaks.

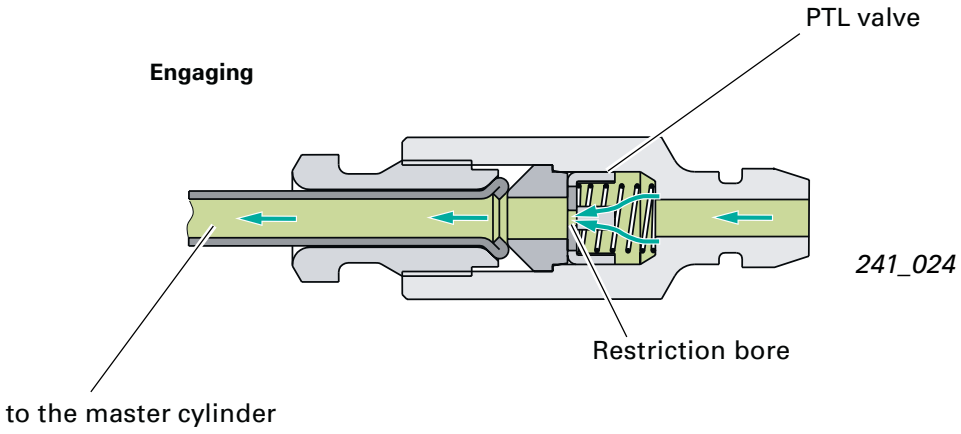
When the clutch is disengaged the PTL valve opens and allows brake fluid to flow unhindered into the slave cylinder.

Disengaging



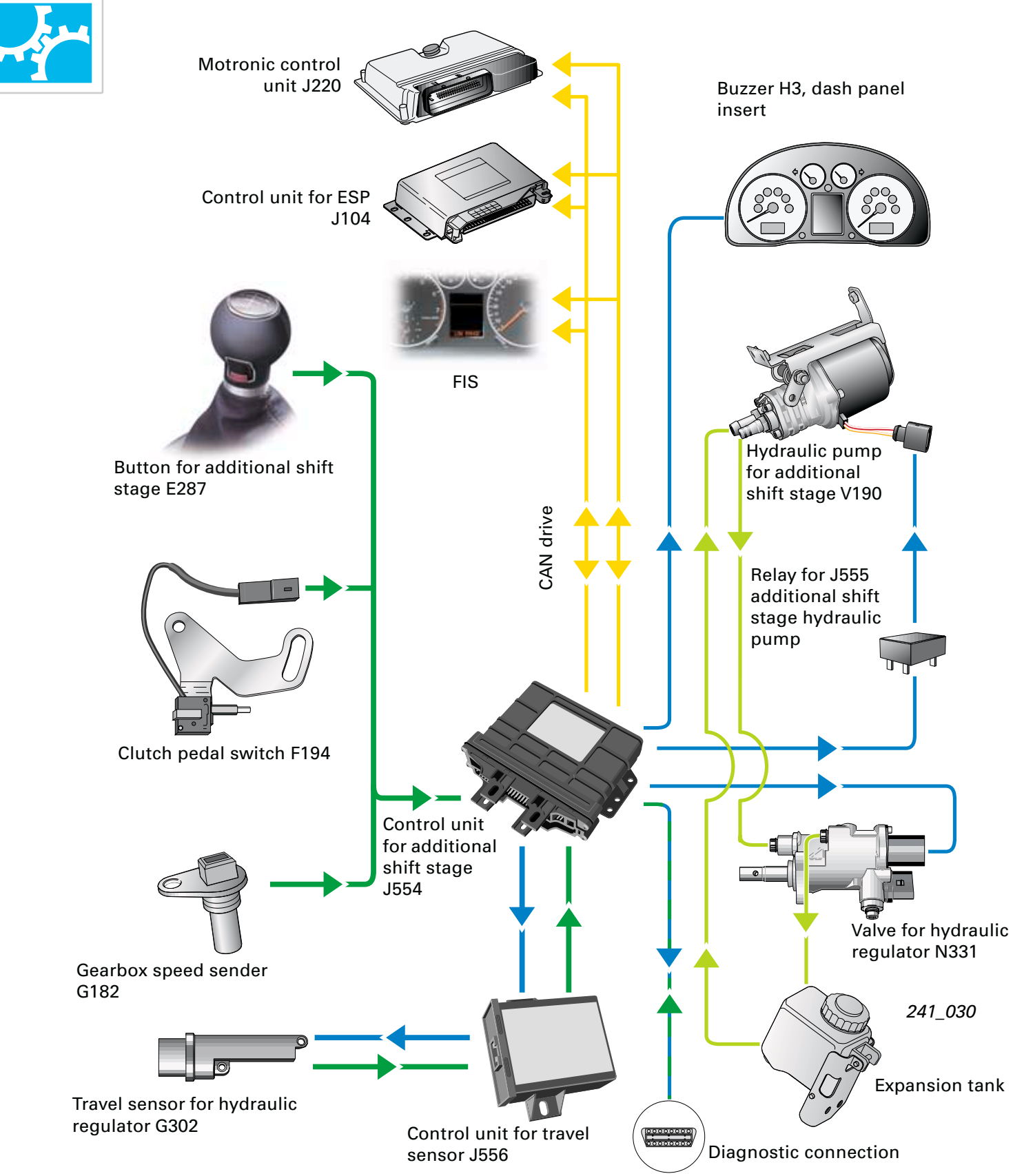
When the clutch is actuated and is engaging, the valve is closed and the restriction bore in the valve plate limits the return flow of fluid into the master cylinder in the event of rapid engagement. The engaging procedure is thus damped, and torque peaks are prevented.

Engaging



Additional shift stage

Overview of system



Operation

The engine must be running in order to actuate the additional shift stage.

The low range additional shift stage switches electro-hydraulically by means of a button and clutch switch. Shifting is fully synchronised and can be actuated at any point up to 30 km/h (when the vehicle is standing or during driving).

The shift procedure is actuated by actuating the clutch (fully depressed) and by simultaneous actuation of the button on the gear shift knob.

When the shift procedure is complete, "LOW RANGE" appears on the FIS display of the dash panel insert. (after approx. 0.5 second).

A flashing "LOW RANGE" display indicates an incomplete shift procedure, e.g. due to the clutch being engaged too soon, and prompts the driver to repeat the procedure.

At speeds of over 50 km/h it is impractical to use the additional shift stage. This places unnecessary load on the system.

If 50 km/h is exceeded while the additional shift stage is activated, the "LOW RANGE" message will flash and a warning tone will sound to prompt the driver to deactivate the additional shift stage.

If the driver fails to respond to this prompt, the engine power will be electronically limited above 70 km/h, to prevent damage to the additional shift stage.

Button on gear shift knob

241_037

FIS display

241_036

Switching on the low range additional shift stage influences the ESP functions.
Further details can be found under ESP influences, from Page 65 on)

Fuel consumption increases when using the additional shift stage.

Additional shift stage

Design of additional shift stage

The speed reduction of 1.54 is effected via a simple planetary gear set whose planet carrier is integrated into the Torsen differential housing.

The drive torque is transmitted to the internal gear via the hollow shaft. The internal gear engages with the planetary gears and is also fixed to the coupling body 1.

The shift actuation is effected via the hydraulic regulator under electronic control and monitoring.

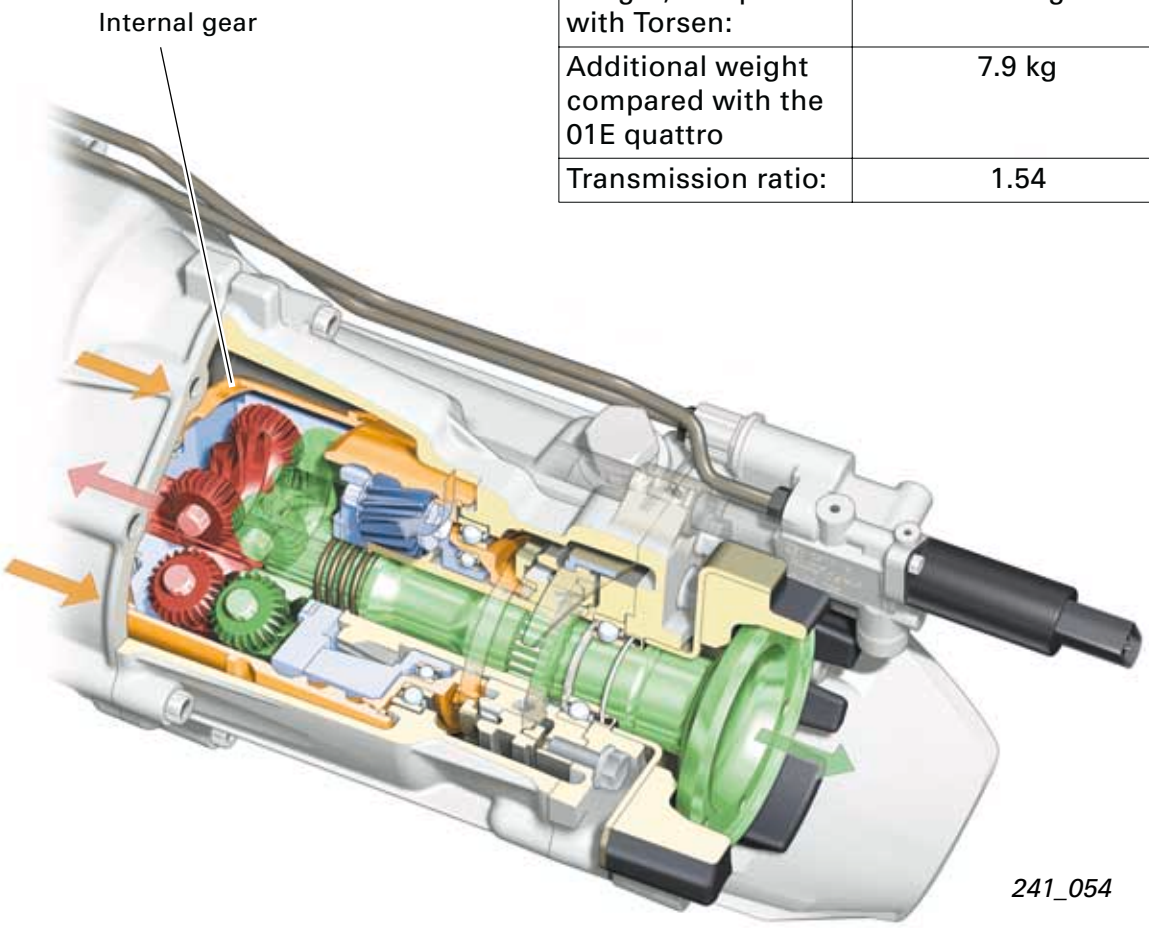
The sun gear is fixed to the synchro-hub which carries the selector sleeve.

Shifting is effected by means of the selector sleeve via the synchro-ring, coupling body 1 or coupling body 2 to the synchro-hub and then to the sun gear.

Clutch-hub 2 is bolted to the housing cover and locks the sun gear in low range operation.

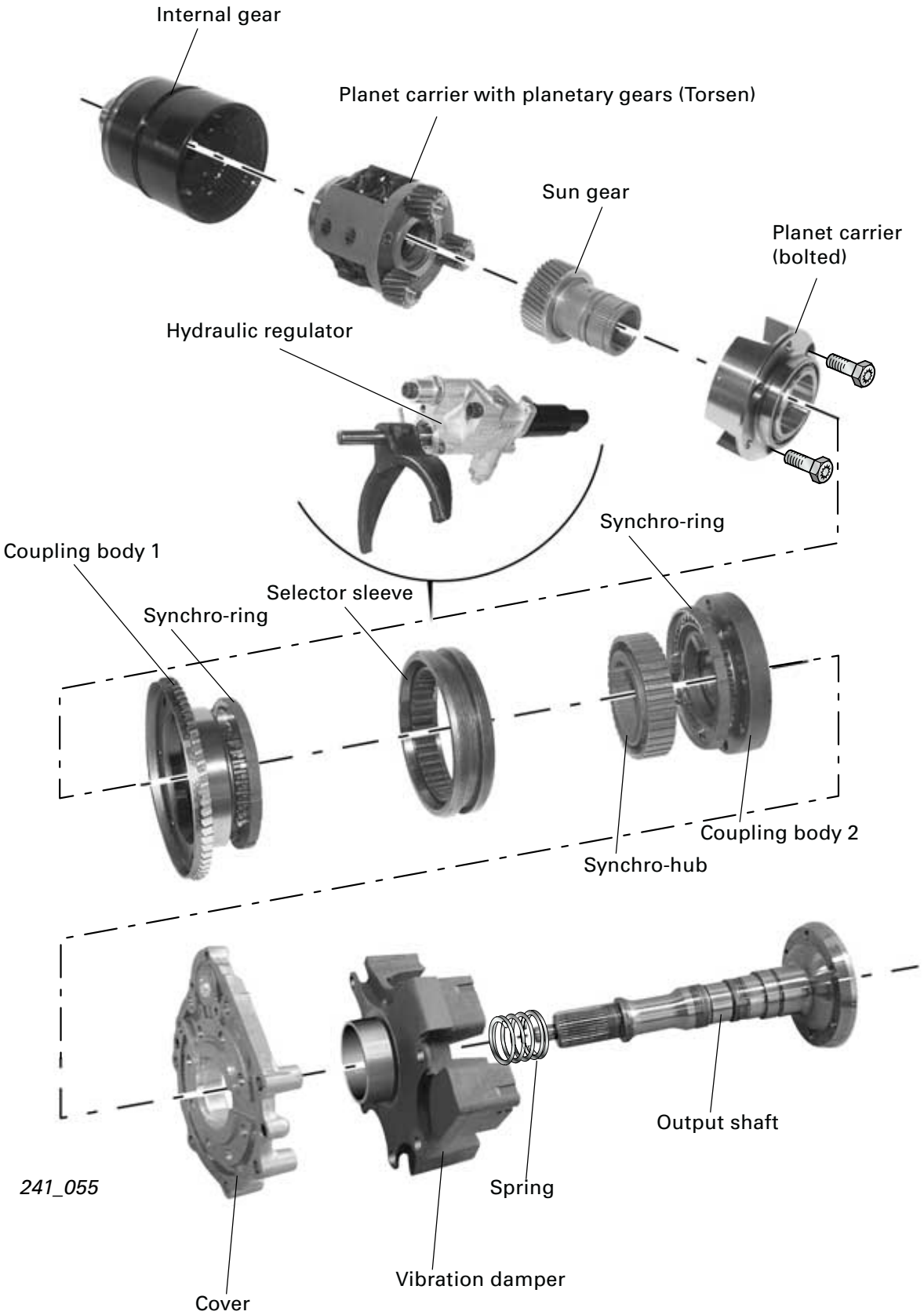
Technical data:

Weight, complete with Torsen:	20.0 kg
Additional weight compared with the 01E quattro	7.9 kg
Transmission ratio:	1.54



241_054

Components:

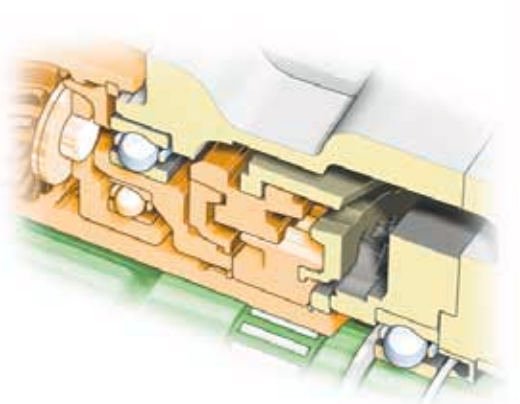

Internal gear
Planet carrier with planetary gears (Torsen)
Sun gear
Planet carrier (bolted)
Hydraulic regulator
Synchro-ring
Coupling body 1
Selector sleeve
Synchro-ring
Coupling body 2
Synchro-hub
Output shaft
241_055
Spring
Vibration damper
Cover

Additional shift stage

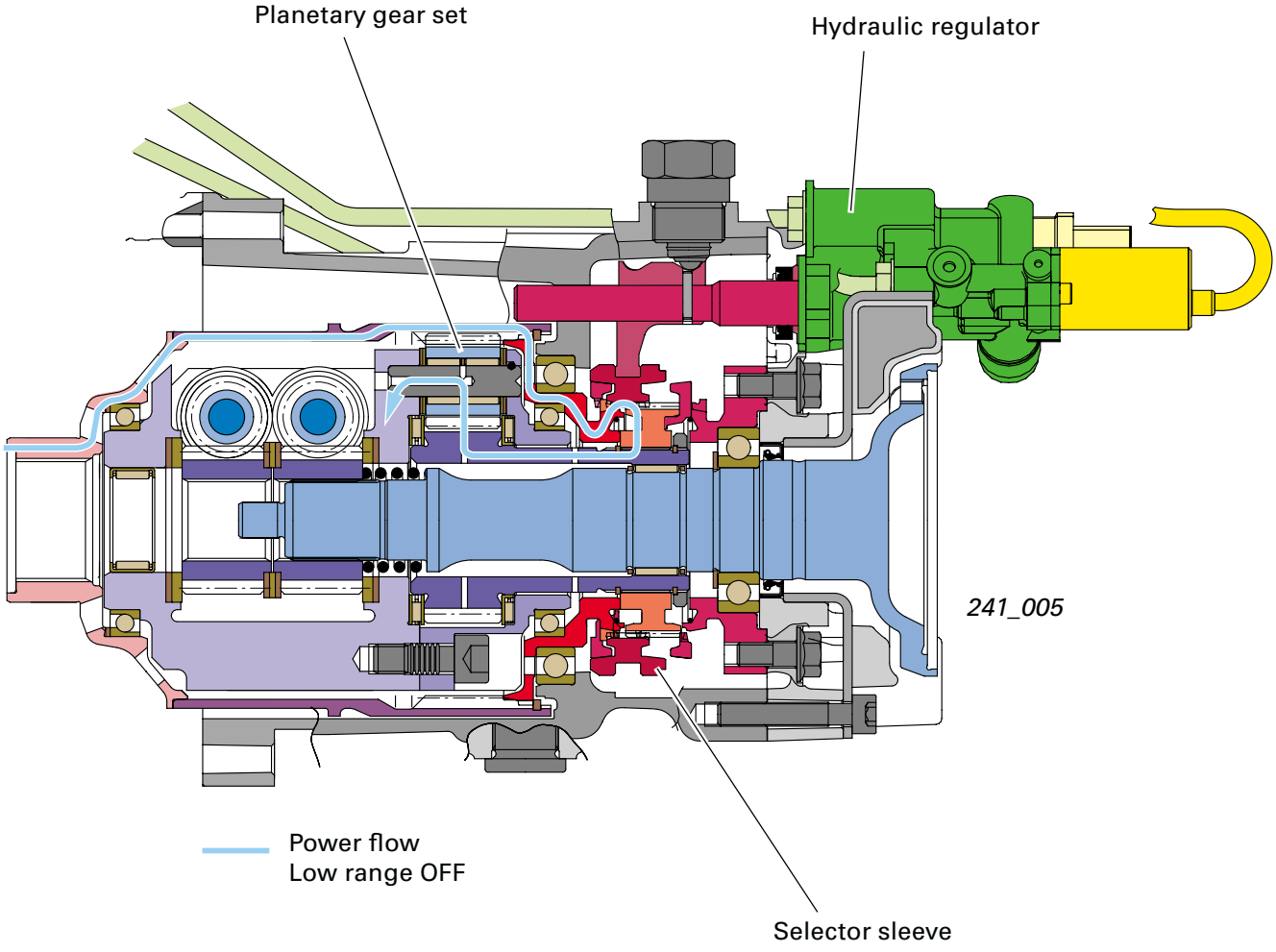
Power flow
Low range OFF

In normal driving operation, the hydraulic regulator is extended. The selector sleeve connects the synchro-hub (sun gear) to the coupling body 1 (internal gear) and thereby couples the sun gear with the internal gear. The planetary set is locked and the drive torque is transmitted 1:1 to the Torsen differential.

Low range OFF



241_081

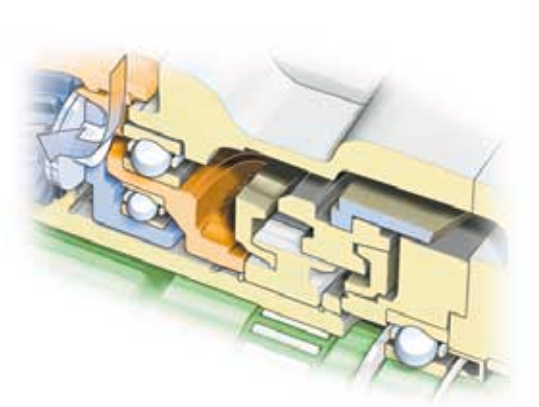


241_005

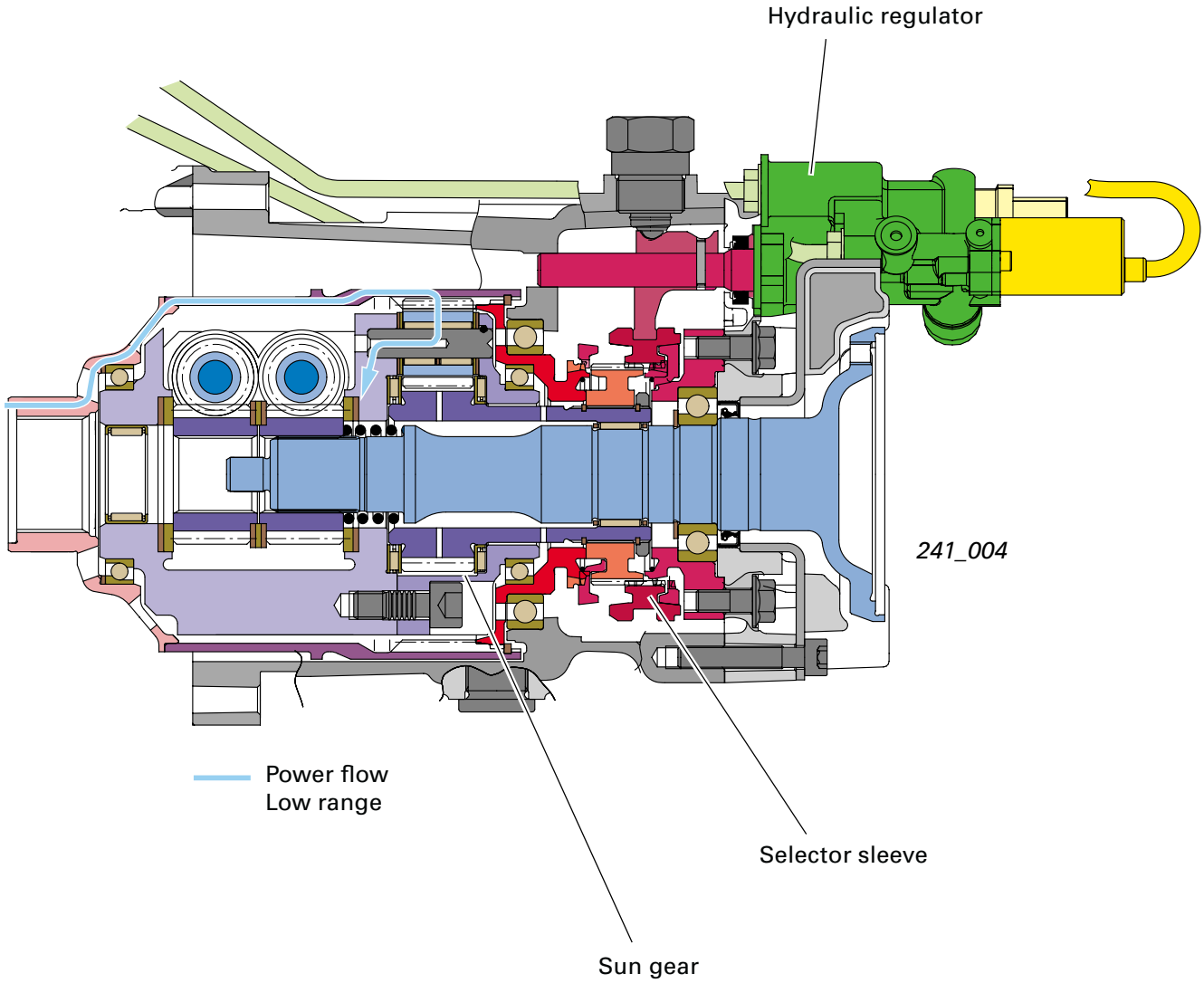
Power flow
Low range

In low range mode the hydraulic regulator is fully retracted. The selector sleeve connects the synchro-hub (sun gear) to the coupling body 2 (fixed to housing) and thus holds the sun gear in a fixed position. The drive torque is then transmitted via the internal gear to the planetary gears. The planetary gears drive the planet carrier via the locked sun gear. A transmission ratio of 1.54 is thus achieved.

Low range



241_082



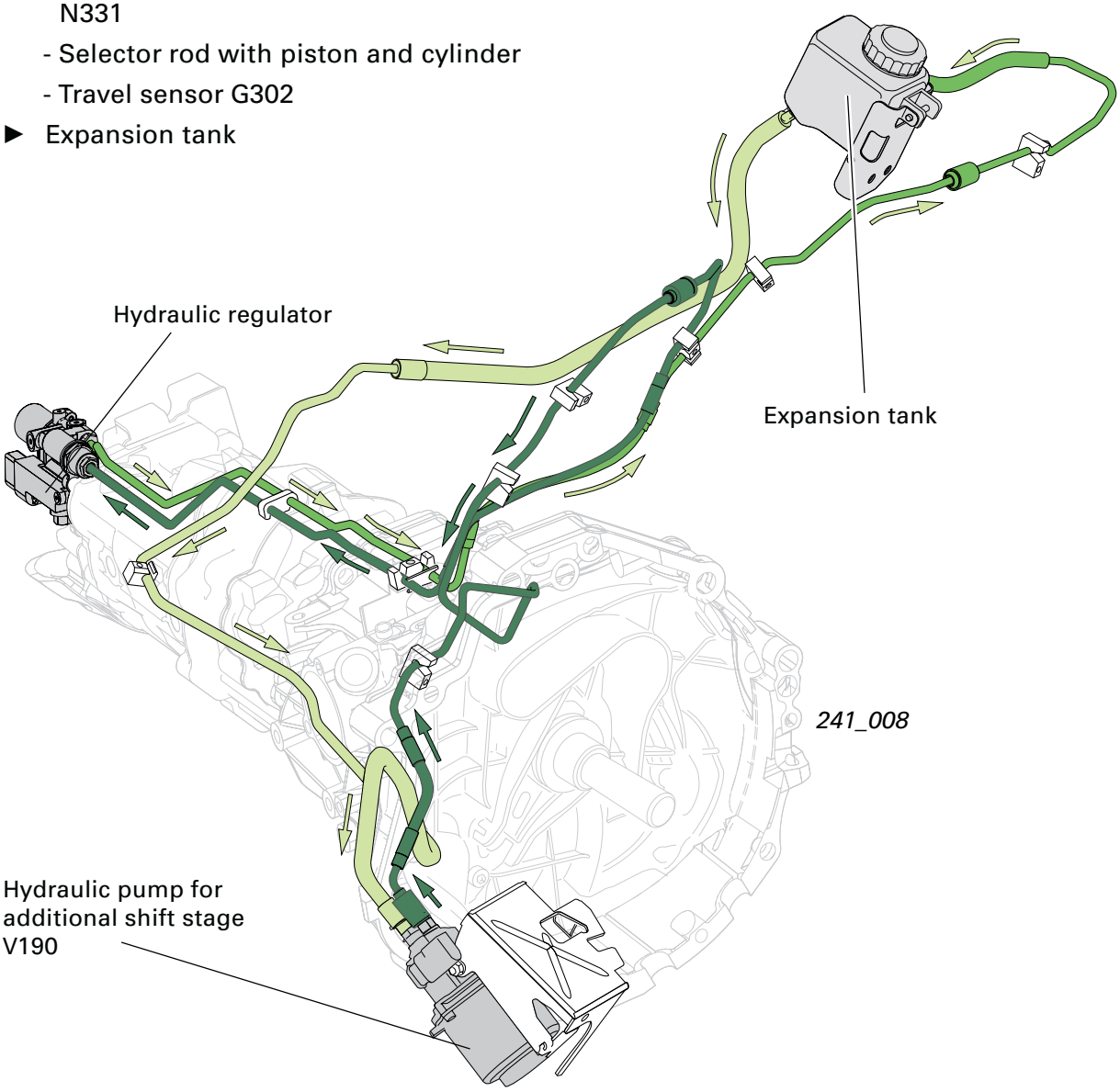
Additional shift stage

Electro-hydraulic control

Components in the hydraulic circuit:

- Hydraulic pump for additional shift stage V190
- Hydraulic regulator consisting of:
  - Solenoid valve for hydraulic regulator N331
  - Selector rod with piston and cylinder
  - Travel sensor G302
- Expansion tank

During shifting, noise from the hydraulic pump is audible.



The hydraulic pump for additional shift stage ...

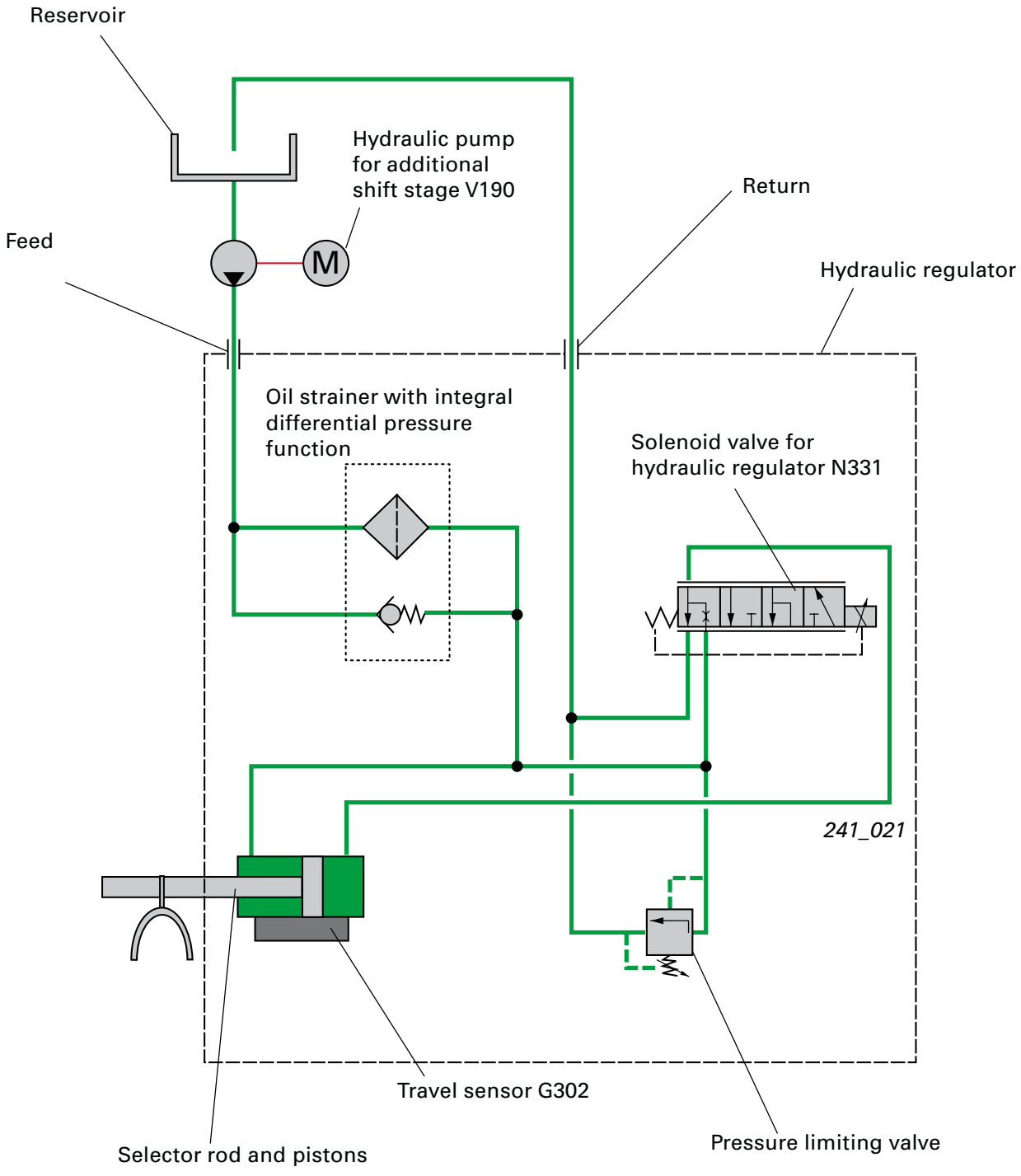
... is of the gear pump design and provides the oil pressure to the hydraulic regulator required for gear shifting.

The V190 is active only during shifting (the system works without accumulator).

After a shift operation has been completed, the system is at atmospheric pressure.

Diagram of hydraulic system

The pressure limiting valve limits the system pressure to approx. 40 bar.



Additional shift stage

Hydraulic regulator

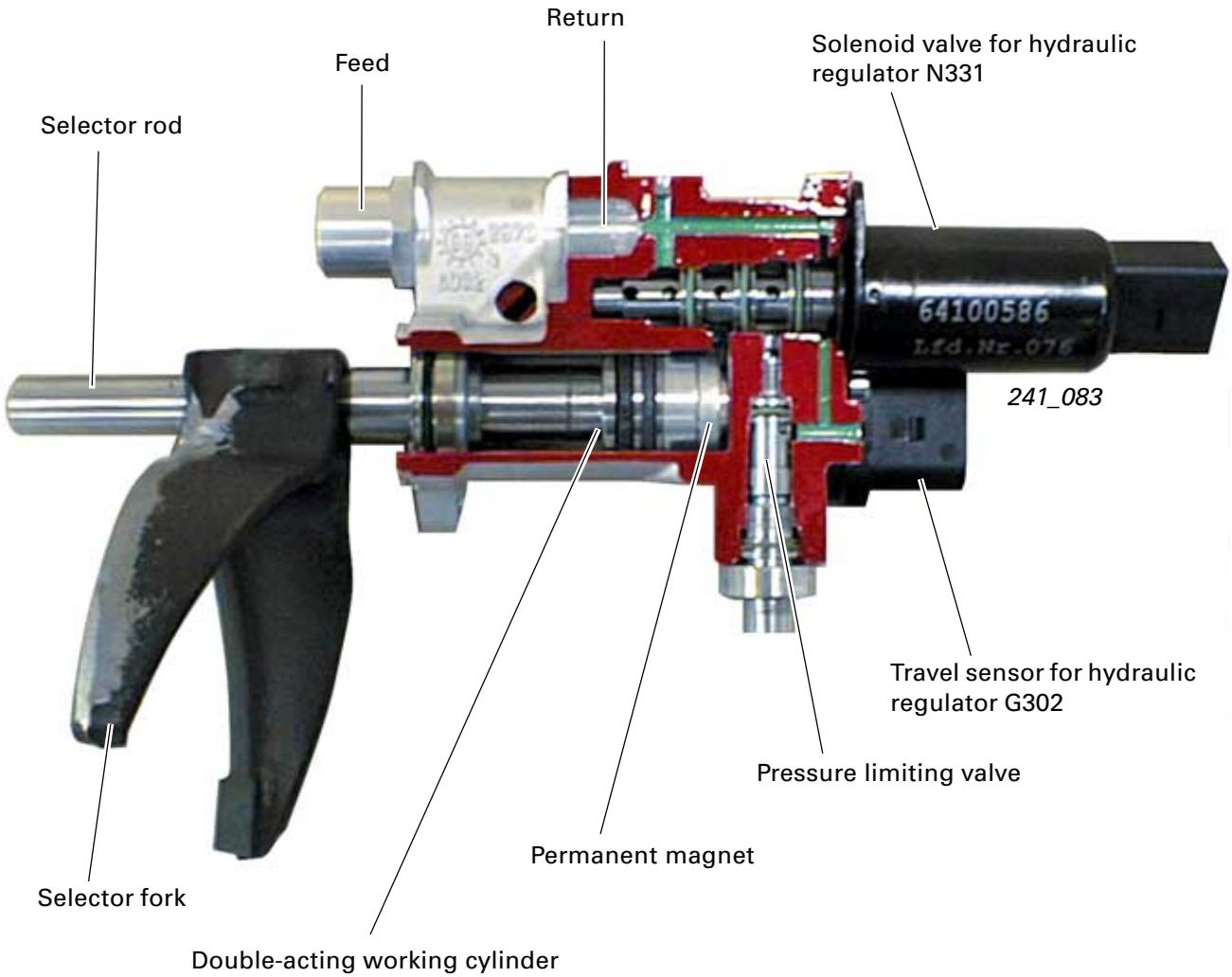
The hydraulic regulator is an actuating element of the shifting procedure and features the following functions:

- Double-acting working cylinder
- Solenoid valve for hydraulic regulator N331
- Pressure limiting valve
- Travel sensor for hydraulic regulator G302

Note:
Recognition of the precise position of the selector fork is of great importance for regulation in neutral position (minimal play between low range and low range OFF).

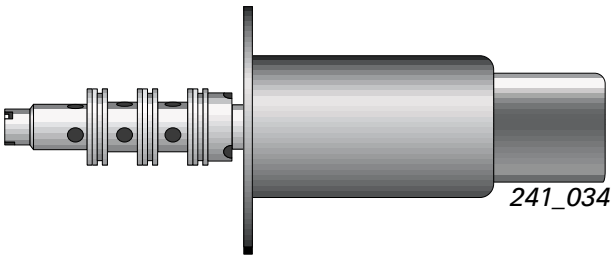
For design reasons a precise positioning of the mechanism of the hydraulic regulator is required for the travel sensor's distance measurement system.
In order to maintain this high degree of accuracy, the hydraulic system's selector fork and selector rod are bored and pinned to one another in a defined position, by the manufacturer.
In this way the precise position of the selector fork with respect to the travel sensor system is guaranteed.

For this reason, the hydraulic regulator, the travel sensor and the selector fork are only replaced as one complete unit.



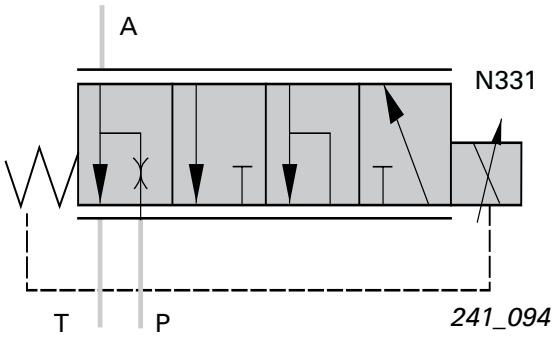
The solenoid valve for hydraulic regulator N331 ...

... is a so-called 3/4 way valve with 3 connections and 4 switch positions.
It is controlled by the control unit for additional shift stage J554 with U_{Batt} pulse-width-modulation.
Depending on the pulse width, the valve for the hydraulic regulator N331 moves to positions 1 - 4 (see shift positions from Page 48 on).


241_034

Connections:

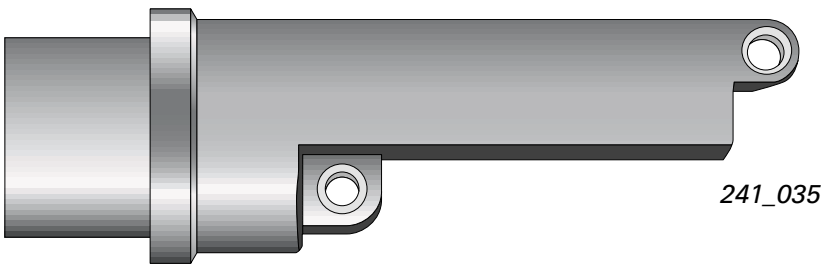
P = pressure connection (input)
T = stands for tank, meaning the return to the expansion tank
A = output (control lead)



241_094

Travel sensor for hydraulic regulator G302

The positions and movements of the selector rod and thus the selector sleeve are determined with the aid of the G302.
The control unit requires the position for the plausibility check and monitoring of the shifting procedure.
Further details can be found under Hydraulic regulator travel sensor G302, Page 56.


241_035

Additional shift stage

Shift positions/shift procedure

Shift position 1

In position 1 the P-T-A connections of the N331 are connected so that pressure equalisation can take place.

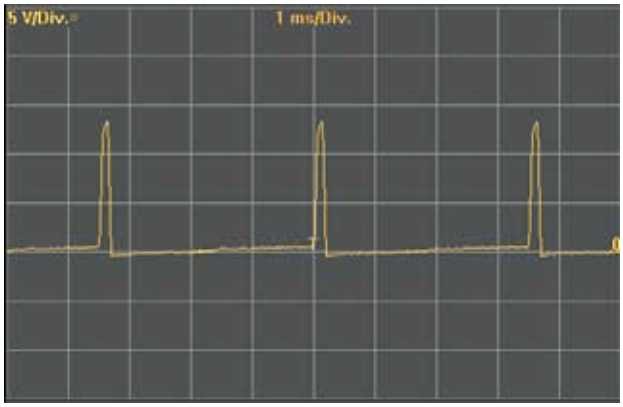
Position 1 is the starting position of the N331 and enables rapid system depressurisation after a “low range” shift procedure. Position 1 is achieved via spring force.

To prevent incorrect operation, it must be ensured that the hydraulic pump V190 is not activated if a fault occurs on the N331.

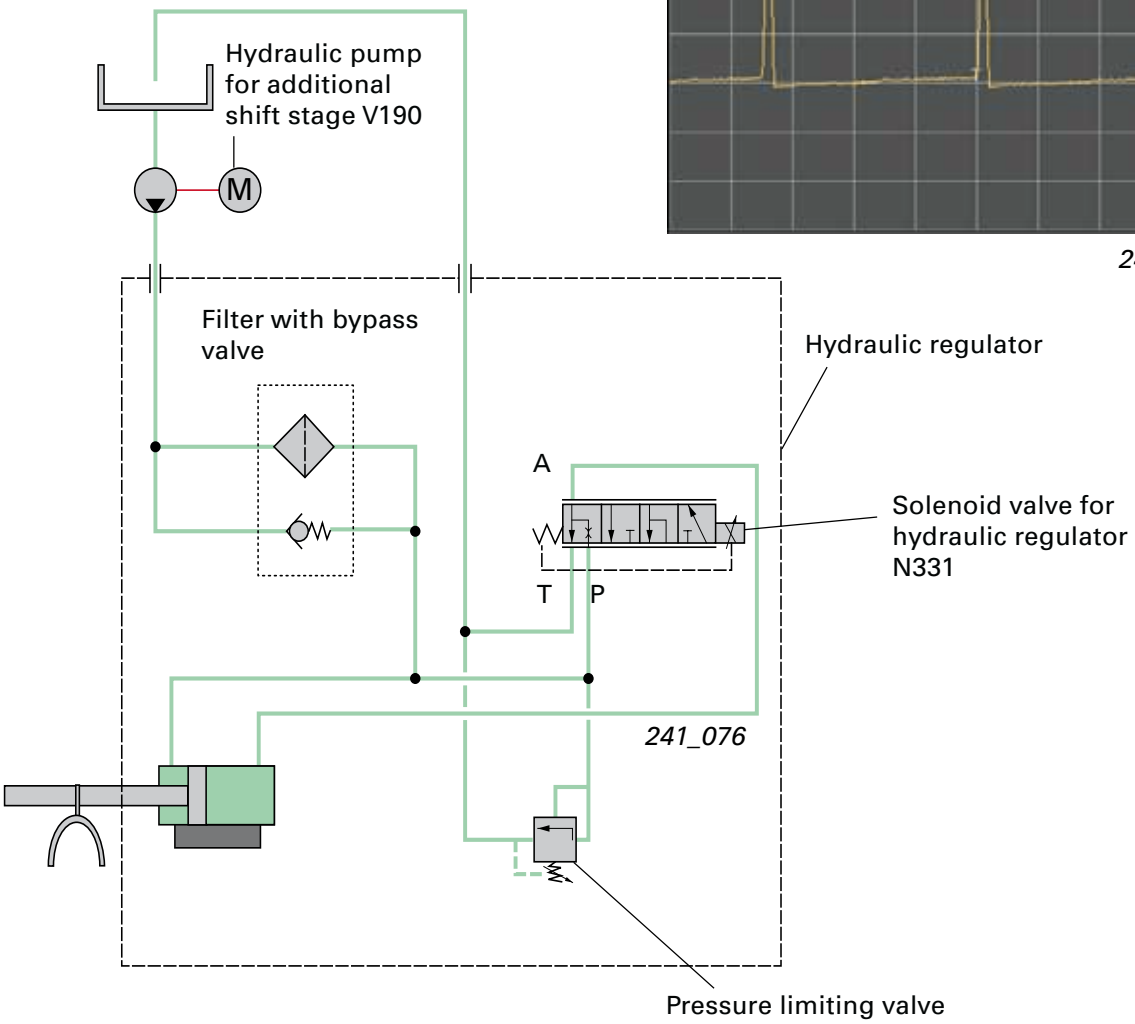
From ignition “ON”, the N331 is pulse-width-modulated for the purpose of self-diagnosis at a pulse duty factor (PDF) of approx. 5%. This corresponds to an average current value of approx. 40 mA.

A break in the circuit causes a change in level at the control unit output, which is immediately diagnosed as an error.

Signal map



241_084

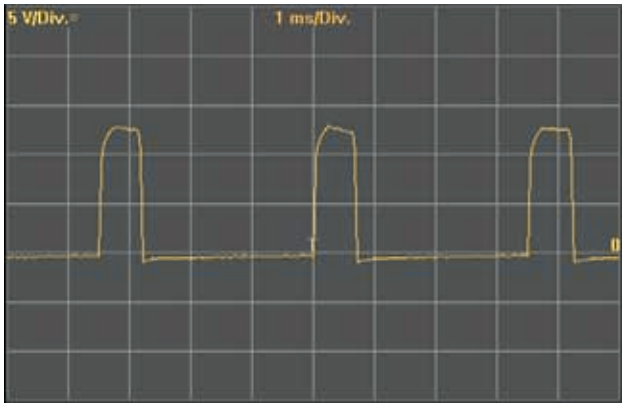


Shift position 2

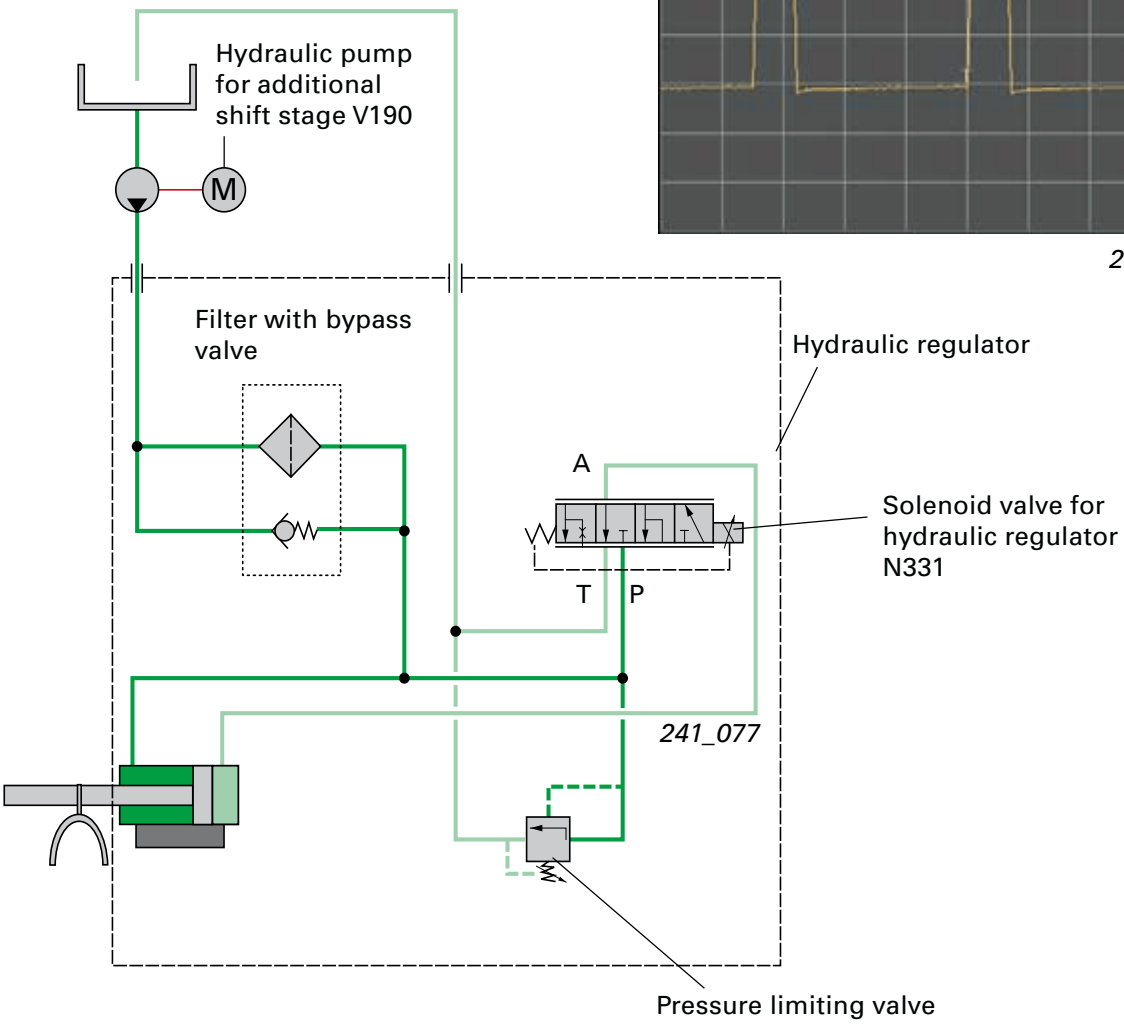
In position 2 connections T and A are connected.

Position 2 is for shifting to “low range” The N331 is pulse-width-modulated at a pulse duty factor (PDF) of approx. 20%. This corresponds to an average current value of approx. 600 mA.

Signal map



241_085



Additional shift stage

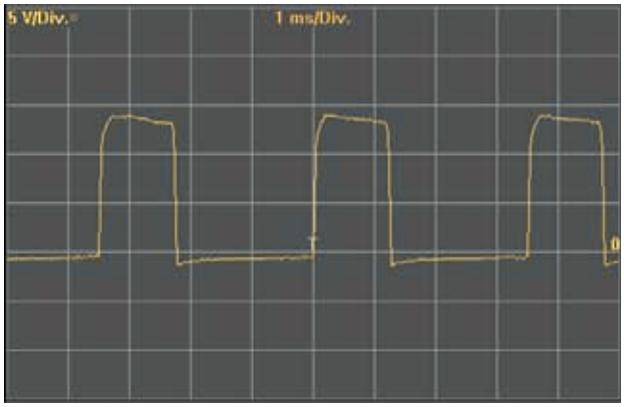
Shift position 3

In position 3 the P-T-A connections of the N331 are connected so that pressure equalisation can take place.

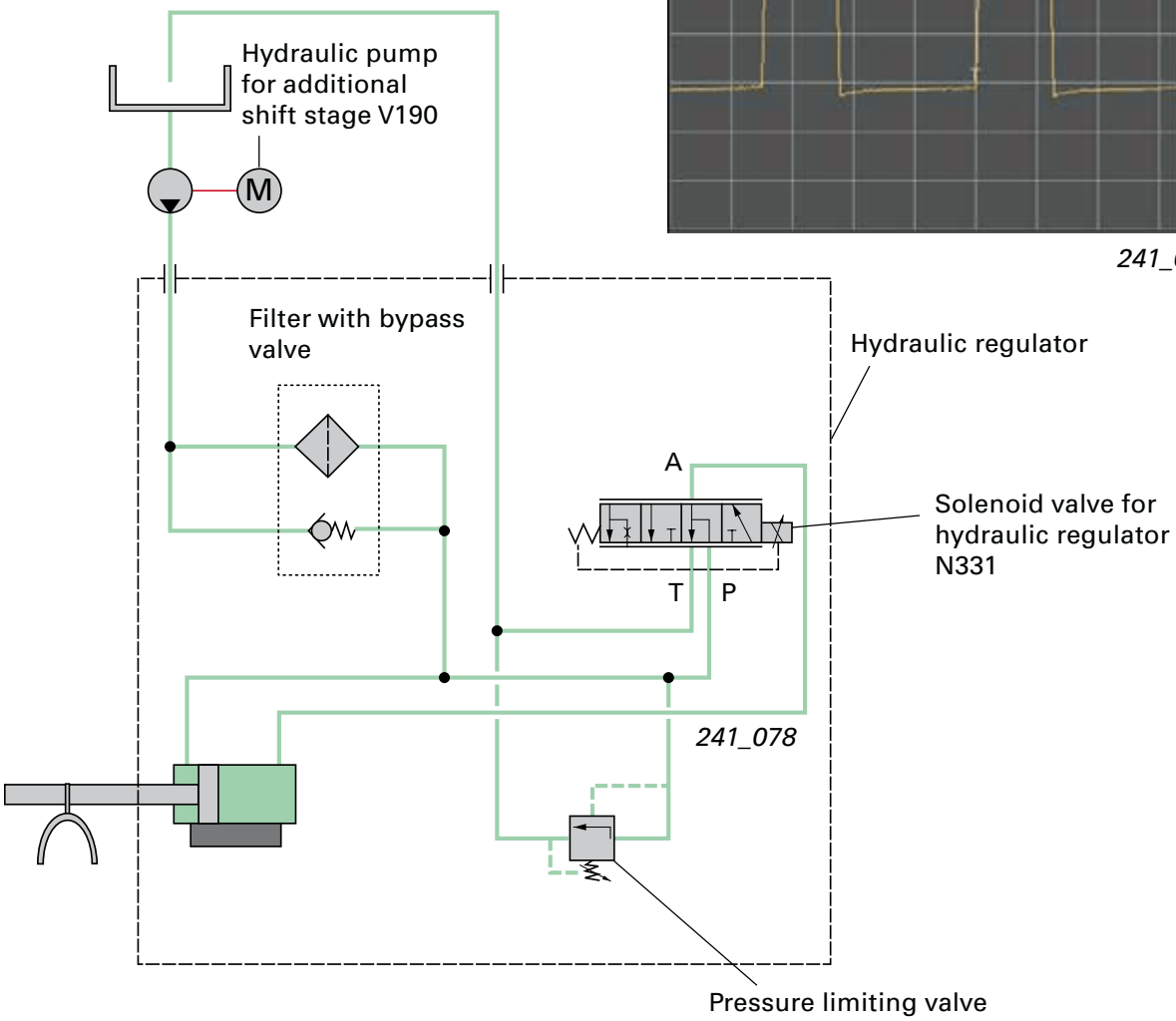
Position 3 is an interim setting for rapid depressurising of the system after shifting to “low range OFF”. Switching to position 3 ensures that the pressure in the system is reduced during the shift from position 4 to 1. The pressure could otherwise cause a counter reaction at position 2.

Position 3 is pulse-width-modulated at a pulse duty factor (PDF) of approx. 35%. This corresponds to an average current value of approx. 1200 mA.

Signal map



241_086

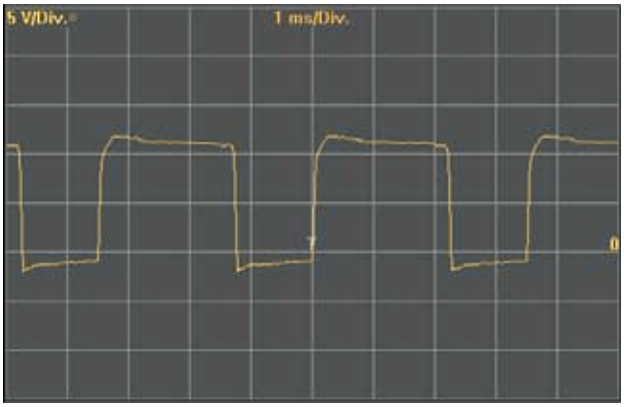


Shift position 4

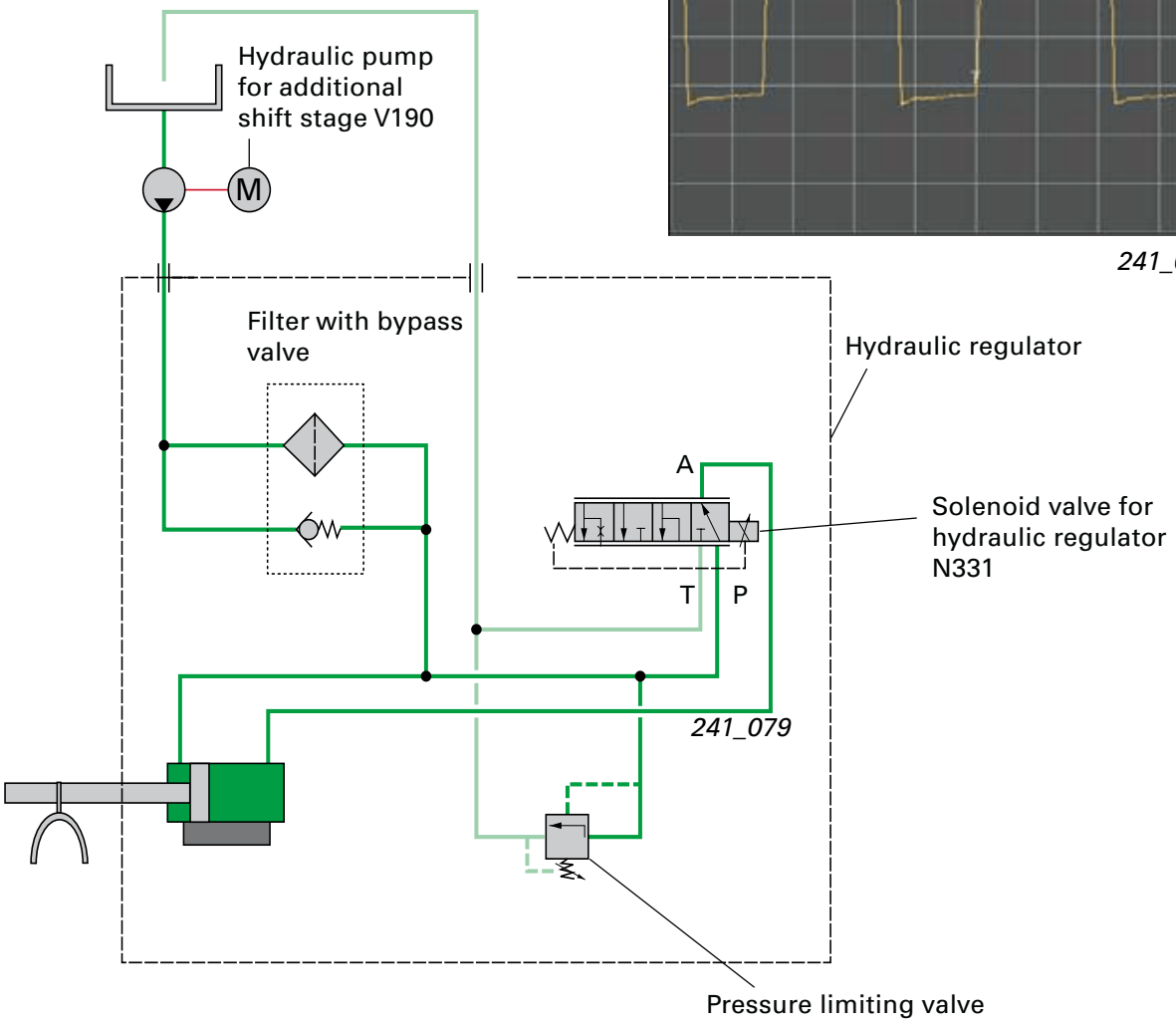
In position 4 connections P and A are connected.

Position 4 is for shifting to “low range OFF”. The N331 is pulse-width-modulated at a pulse duty factor (PDF) of approx. 65%. This corresponds to an average current value of approx. 2000 mA.

Signal map



241_087

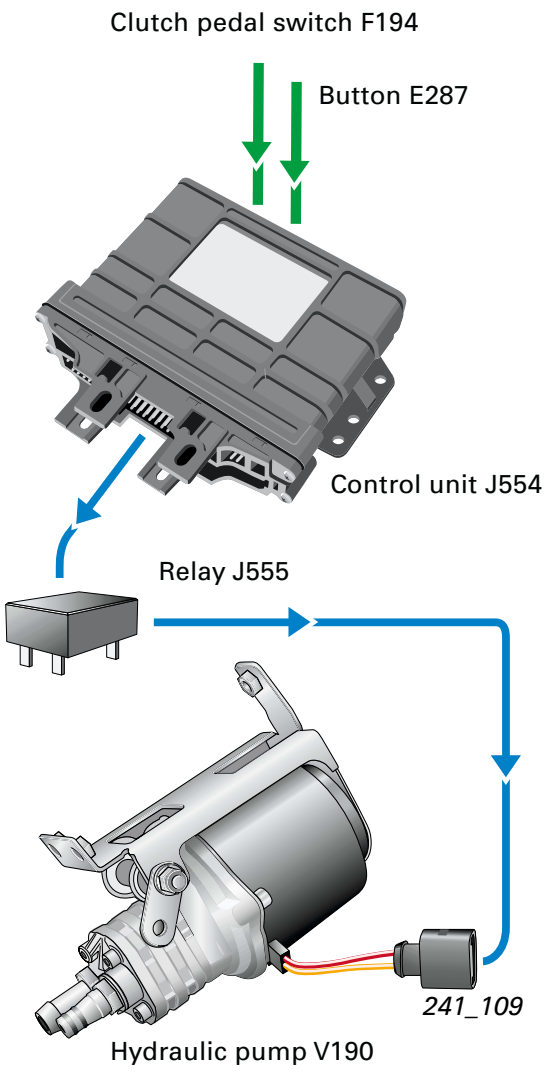


241_079

Additional shift stage

Shifting procedure

Triggered by the button on the gear shift knob E287 in conjunction with the signal from the clutch pedal switch F195, the additional shift stage control unit J554 checks the switch request for plausibility and activates the relay J555 for the hydraulic pump.
The hydraulic pump V190 then increases the oil pressure which is fed to the hydraulic regulator.



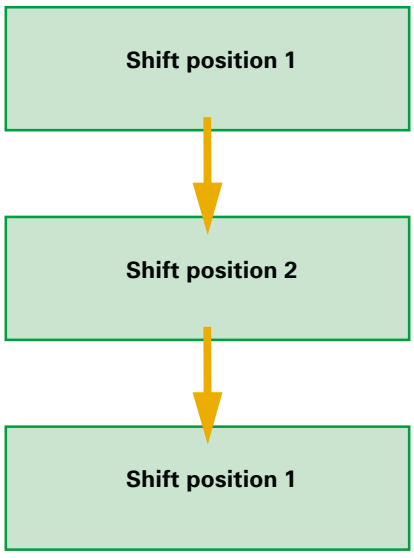
Shifting to low range

At the same time as the hydraulic pump is activated, solenoid valve N331 moves to position 2.

The system pressure acts essentially on the piston rod side of the working cylinder. The piston side is now vented to the return line via N331. The selector rod retracts and low range is activated (see also power flow). “LOW RANGE” appears in the FIS display.

When the selector sleeve reaches the end position (switch time approx. 0.5 seconds) this is recognised by the control unit with the aid of the travel sensor G302. The hydraulic pump is switched off and the solenoid valve N331 moves to position 1.

Shift positions



Shifting to “low range OFF”

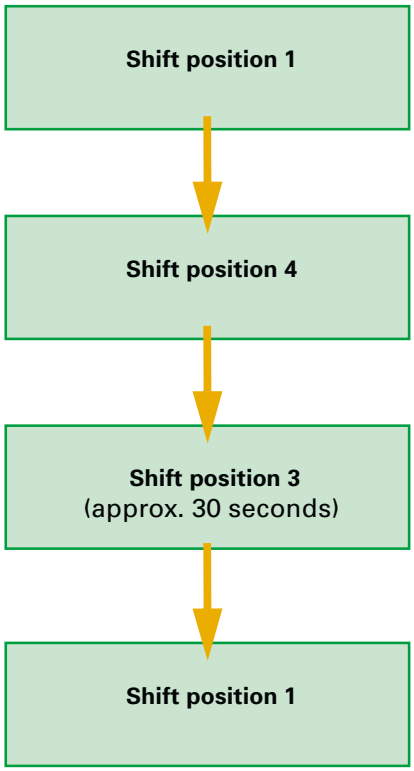
At the same time as the hydraulic pump is actuated, solenoid valve N331 moves to position 4.

The system pressure acts essentially on the piston rod side of the working cylinder. The piston side is now also subjected to system pressure via N331. Due to the greater piston surface area on the piston side (greater force) the piston rod travels outwards and low range is deactivated (see also power flow).
“LOW RANGE” is extinguished in the FIS display.

When the selector sleeve reaches the end position (switch time approx. 0.5 seconds), this is recognised by the control unit with the aid of the travel sensor G302. The hydraulic pump is switched off and the solenoid valve N331 moves to position 3 for approx. 30 seconds.
This rapidly depressurises the system and ensures that the selector rod stays in its current position.
After approx. 30 sec., the solenoid valve N331 returns to position 1.

After a shift operation has been completed, the system is at atmospheric pressure.
The low range and low range OFF settings are retained by means of the detents on the selector sleeve.

Shift positions



During shifting, noise from the hydraulic pump is audible.

Additional shift stage

Malfunctions

If it is not possible to complete a shift action before clutch engagement, the selector sleeve will be returned to neutral position (centre position) in order to prevent mechanical damage.

In this case, despite a gear having been selected, there will be no power transmission. The “LOW RANGE” display will flash.

The shift procedure must be repeated.

The following reasons may cause a shift into neutral:

- Excessively rapid clutch engagement.
- Incorrect setting of the clutch pedal switch F194 or floor mat has slipped under clutch pedal.
- Due to extremely low temperatures, the shifting time is longer than the clutch engaging procedure (only engage the clutch when “LOW RANGE” appears or extinguishes).
- Air in the system
- Insufficient pump output (e.g. voltage at the pump for additional shift stage V190 is too low), pump is defective or suction/ pressure lines are blocked).
- Faulty synchronisation.
- Faulty hydraulic regulator.

241_037

FIS display
Error messages

Flashing “LOW RANGE” display signals an undesirable condition. This could be a speed in excess of > 50 km/h in low range or incomplete shifting procedure.

An inverted “LOW RANGE” display indicates a fault in the system, and prompts the owner to contact an Audi dealership urgently.

An intermittent warning tone signals a critical condition in the following cases:

- If the additional shift stage remains in neutral when the engine is switched off, an acoustic signal warns the driver that there is no transmission power even though a gear has been selected.
- At a speed of > 50 km/h in low range.

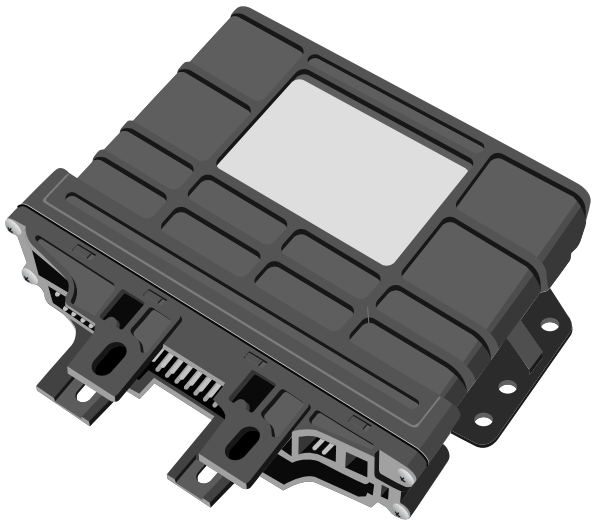
Electronic control

Control unit/shifting strategies

The low range additional shift stage must **only** be used with the engine running.

If the engine is switched off while in low range, low range will automatically be switched OFF when it is restarted and the clutch is actuated.
This will prevent unnecessary low range operation.

If the engine is stalled and restart within 15 seconds, low range will be retained (no automatic OFF).
It is assumed that the driver would prefer this, in this situation.



241_016

Fitting location:
The additional shift stage control unit J554 is located in the housing box below the carpet in front of the passenger seat (instead of the control unit for the automatic gearbox).

Control unit run-on

For safety reasons, the control unit J554 remains active for approx. 30 seconds after ignition “OFF” (via terminal 30).

If the additional shift stage is in the neutral position before switching off the engine (ignition “OFF”, e.g. due to an incomplete shift operation), there will be no power transmission from the engine to the wheels, despite a gear having been selected.
A vehicle parked in this way is not protected against rolling away.

The run-on enables the control unit to recognise this situation and switch low range OFF after the ignition "OFF" (**without actuating the clutch**).

Additional shift stage

Travel sensor system

Travel sensor for hydraulic regulator G302 and control unit for travel sensor J556

In order to check the plausibility of a shift request and to monitor the shift procedure, the control unit must know the positions and movements of the selector sleeve at all times.

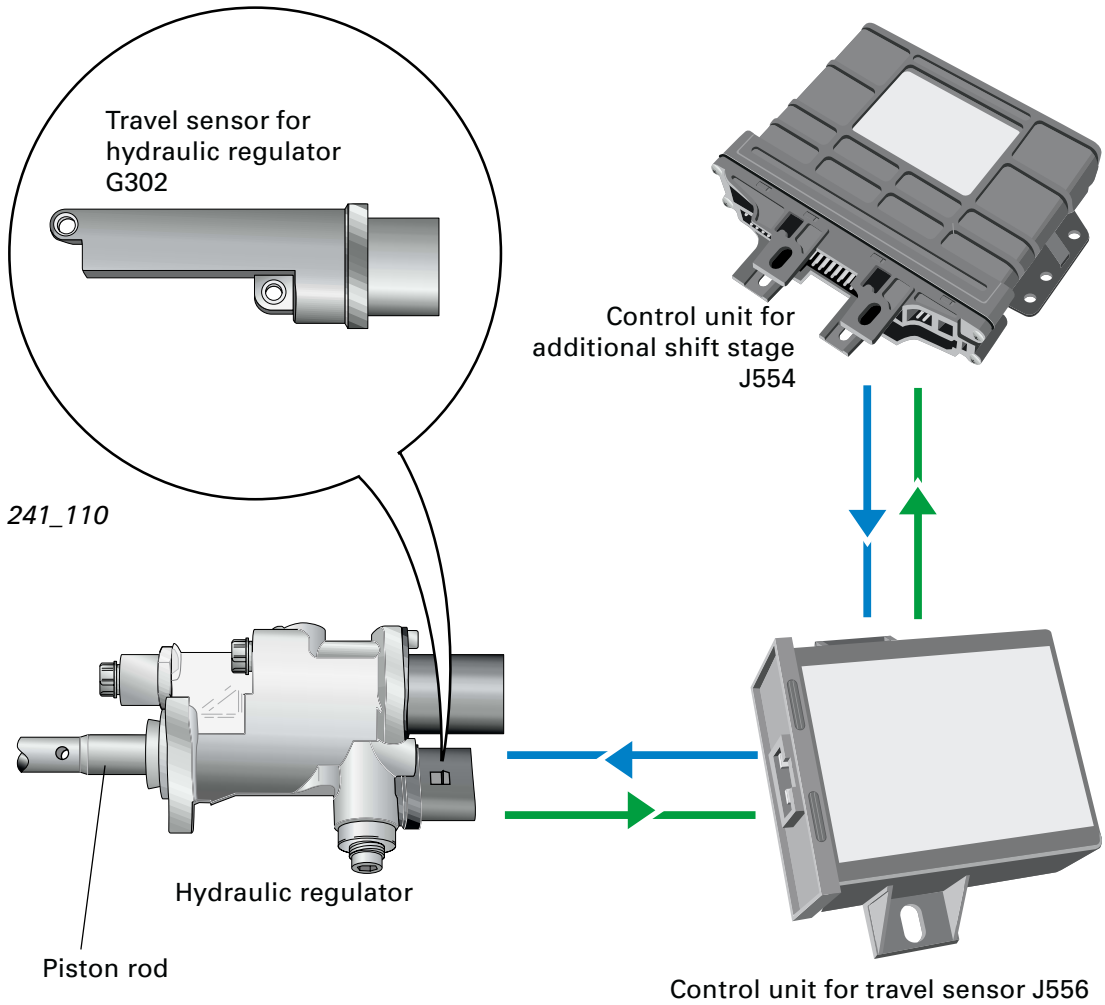
For this purpose the hydraulic regulator is fitted with a travel sensor G302. Together with the separate control unit J556, they provide the information on the position of the piston rod to the additional shift stage control unit J554.

The travel sensor G302 is a so-called PLCD sensor.

The abbreviation **PLCD** stands for

Permanent magnetic
Linear
Contactless
Displacement sensor

and describes a sensor which operates contact-free and which detects a linear travel distance by means of a permanent magnet.



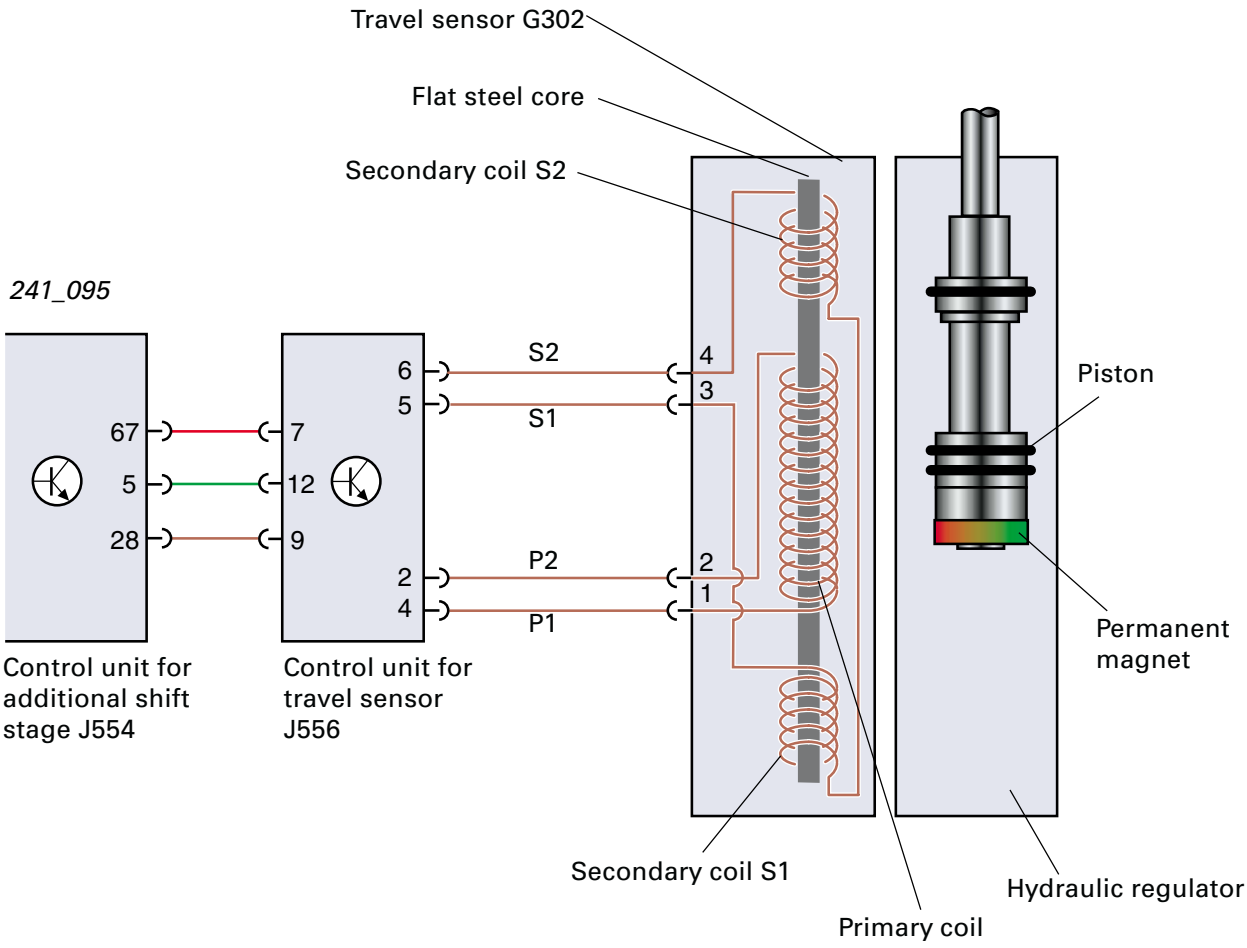
Design of the travel sensor

The travel sensor consists of a flat steel core which is wound along its length with a coil to form a so-called primary coil. At each end of the steel core are short coils, the so-called secondary coils. Both secondary coils are connected in series so that their phases are inverted (opposing).

The alternating current induced in them increases sharply at first.

Travel sensor G302 has a permanent magnet which is mounted on the piston of the working cylinder. The permanent magnet effects a local magnetic saturation of the flat steel core and influences the induction in the secondary coils.

The position of the saturated region and thereby the position of the piston (= position of the selector sleeve) can thus be determined by the coil system).



The travel sensor is measured and assembled together with the hydraulic sensor and the selector fork by the manufacturer. The travel sensor forms a single unit with the hydraulic regulator and can only be replaced as a complete unit.
Further information can be found on Page 46, “Hydraulic regulator”.

Additional shift stage

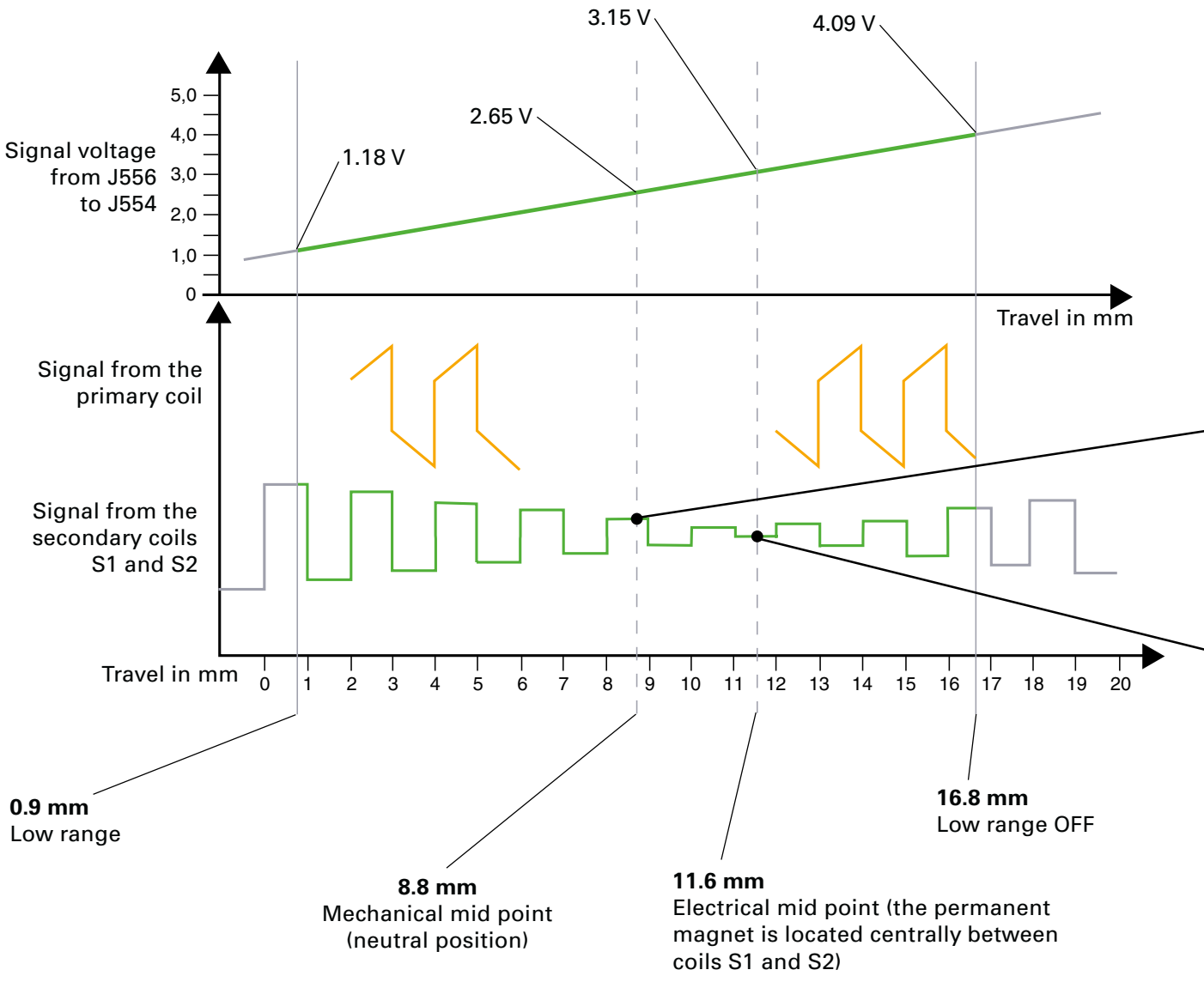
The primary coil is excited by a constant square-wave alternating voltage (from control unit J556). This induces a square-wave alternating voltage in the secondary coils.

As previously explained, the permanent magnet effects a magnetic saturation of the flat steel core. The permanent magnet divides the coil system electro-magnetically into two areas (S1 and S2).

Excited by the primary coil, alternating voltages are induced in the secondary coils, which have opposite phases and different amplitudes depending on the position of the permanent magnet (piston position).

If the permanent magnet is located in the centre of the two secondary coils, their voltages increase sharply. In this position the voltage between S1 and S2 is equal to zero.

Illustration of the travel sensor system
Relationship between the switching mechanism and the travel sensor system



Example, measured value block 2

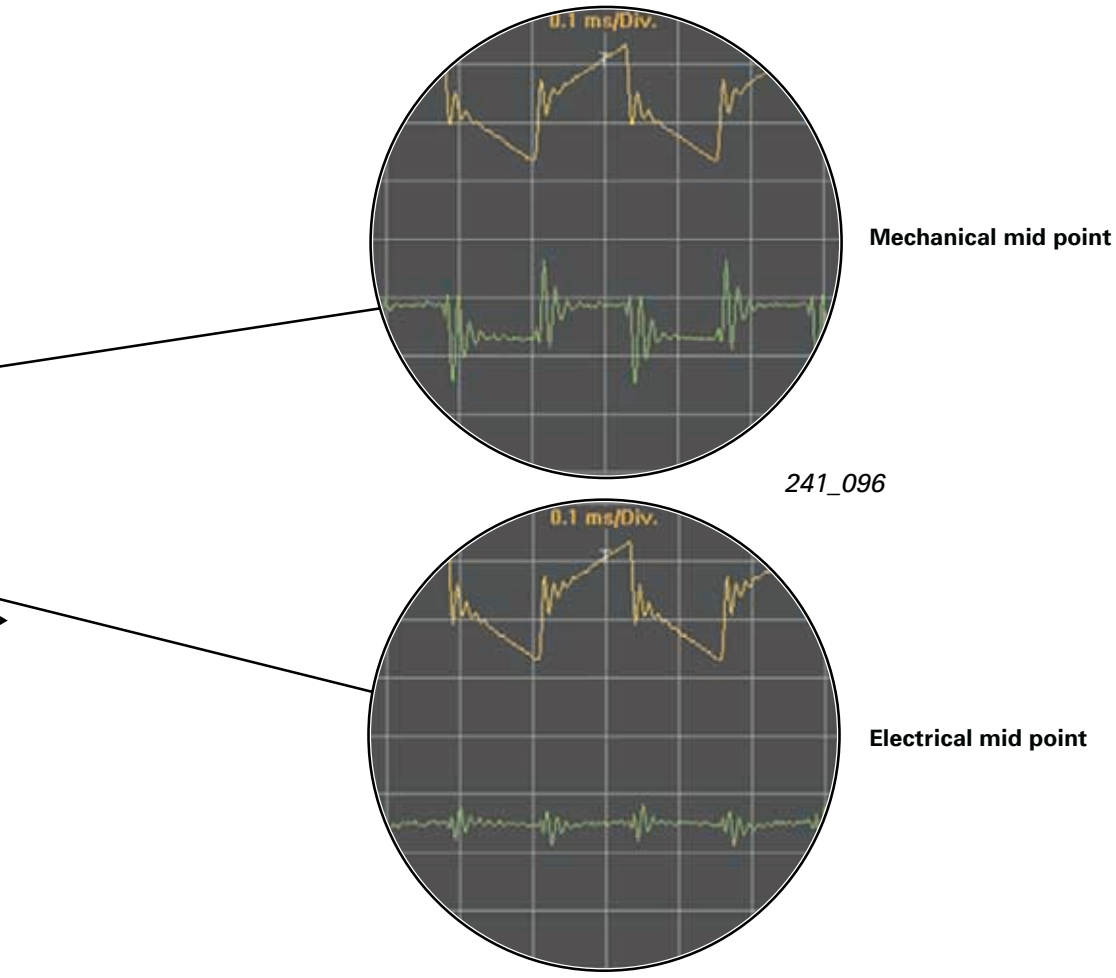
:

Status	1	**2**	3	**4**
Low range Off	1.00 V	**4.09 V**	4.09 V	**16.8 mm**
Neutral position	1.00 V	**2.65 V**	4.09 V	**8.8 mm**
Low range	1.00 V	**1.18 V**	4.09 V	**0.9 mm**

1st and 3rd position =the smallest or largest measured value in the basic set-up

2nd position = current measured voltage from travel sensor system (signal voltage from controller J556 to controller J554

4th position = position of shift actuation in mm



Additional shift stage

If the permanent magnet of one coil is closer than the other, the effective coil length and thereby the inductivity increases.

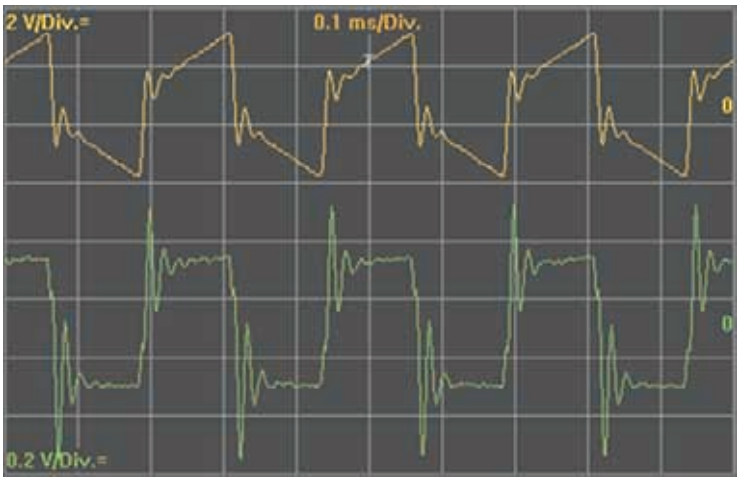
- Long primary coil = higher inductivity = high voltage
- Short primary coil = lower inductivity = low voltage

Starting from the mid point of the coil system, the phase position of the voltage between S1 and S2 changes depending upon the direction of movement of the permanent magnet.

The signal from the secondary coils is fed back to the J556 controller. There, the phase position with respect to the primary coil and the amplitude (voltage) are evaluated.

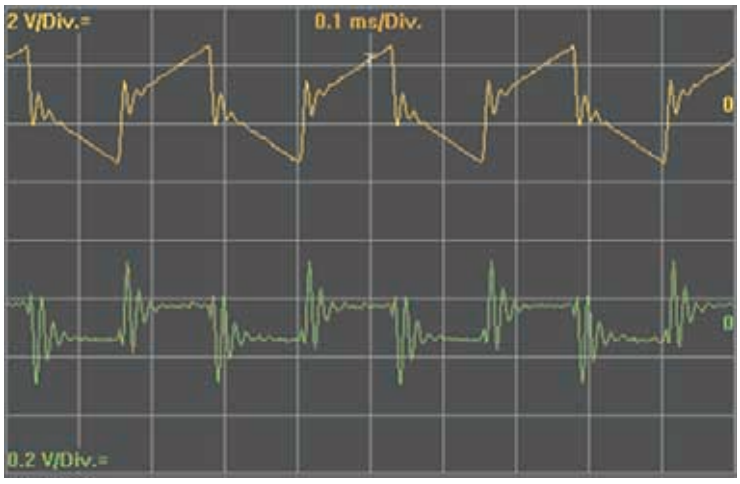
The evaluation electronics of the control unit J556 convert the results into a linear DC voltage signal corresponding to the piston position. The path signal generated by the control unit J556 is transmitted to the additional shift stage control unit J554.

Signal map, low range



241_089

Signal map, neutral position



241_112

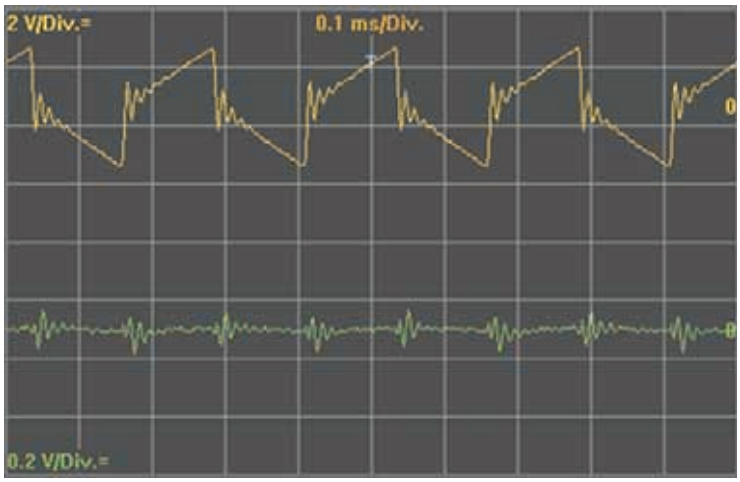
As can be seen from fig. 241_096, the electrical mid point does not correspond to the mechanical mid point.

In order that a linear output signal can be produced, this is compensated by the evaluation electronics in the control unit J556.

A precise fit of the selector fork to the hydraulic regulator (see description of hydraulic regulator) and performance of basic set-up are also preconditions for the problem-free function of the additional shift stage.

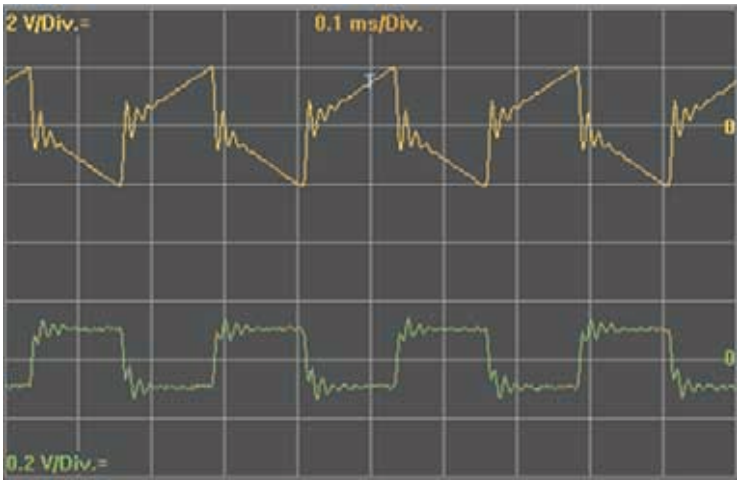
When carrying out basic set-up, the control unit J554 is adapted to recognise the mechanical end positions of the selector fork. Further information can be found in the “Service” chapter under Basic set-up.

Signal map, electrical mid point



241_090

Signal map, low range OFF



241_088

Measuring points on the travel sensor

Primary coil (channel A)
Red measuring probe at pin 2
Black measuring probe at pin 1

Secondary coil (channel B)
Red measuring probe at pin 4
Black measuring probe at pin 3

A measuring adapter VAS 5258 measures the signals from the travel sensor system.

Additional shift stage

Sensors

Button for additional shift stage E287 and clutch pedal switch F194
Triggered by button E287 on the gear shift knob in conjunction with the signal from the clutch pedal F194, the control unit J554 checks the plausibility of the shift request before initiating the shifting procedure.

A shifting procedure can only be carried out if it has been ensured that the power flow to the gearbox from the clutch has been interrupted.

The clutch pedal switch F194 performs this monitoring function.

F194 is positioned in such a way that it is only actuated when the clutch pedal is fully depressed.
The precondition for correct function is the precise positioning of F194 (see workshop manual).

241_036

Note:

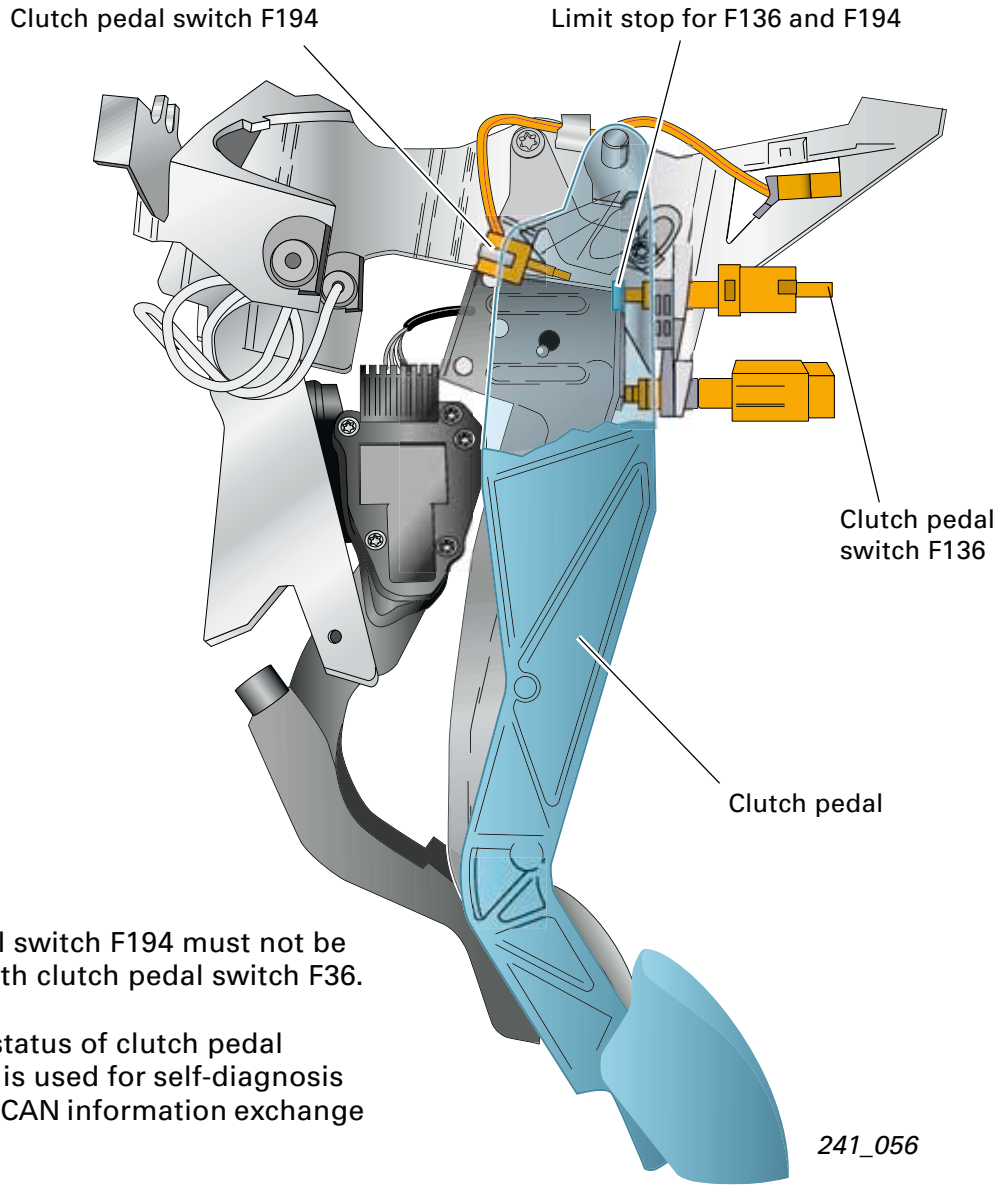
Incorrect positioning of F194 can cause problems in the function of the additional shift stage.

Insufficient switch play:

- Shifting is not performed and/or shifts into neutral (a floor mat which has slipped under the clutch pedal has the same effect).

Switch play too great (clutch does not fully disengage).

- Excess wear in synchronisation system and selector fork
- Shifting noise



Clutch pedal switch F194 must not be confused with clutch pedal switch F36.

The switch status of clutch pedal switch F136 is used for self-diagnosis of F194 (see CAN information exchange chapter).

Additional shift stage

Gearbox speed sender G182

The gearbox speed sender G182 works on the induction principle and scans the 2nd gear wheel.

Originally, G182 was installed for plausibility requests for shifting strategies.
By the end of development, a change in shifting strategies meant that the G182 signal was no longer required.

G182 is now used only for fault diagnosis of “vehicle speed” information.

In the future, gearbox speed sender G182 will be omitted.

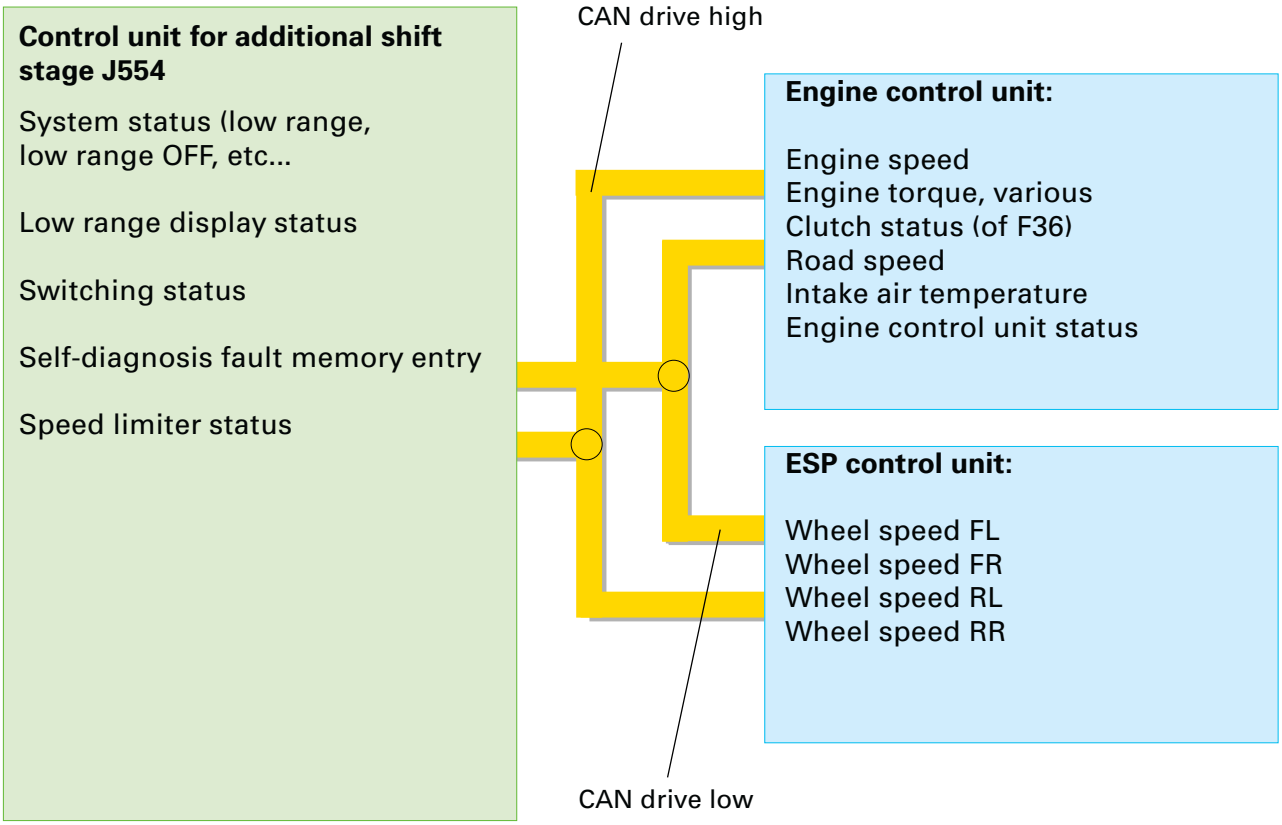
241_103

Gearbox speed sender G182

CAN information exchange
Additional low range shift stage

In the case of the additional low range shift stage, the information exchange takes place via the CAN drive between the additional shift stage control unit J554 and the networked control units, with the exception of certain interfaces.

The system overview displays the information which is provided by the gearbox control unit via the CAN bus and/or received and used by the networked control units.



Information sent by the J554 control unit.

Information received and evaluated by the J554 control unit.

For further information on the CAN bus, please refer to SSP 186 and 213.

Additional shift stage

Interfaces

Terminal 30 ...

... is used for the control unit run-on.

Via terminal 30, control unit J554 and thus the whole system (including J556) remains active for approx. 30 seconds after ignition “OFF”.

Further information on control unit run-on can be found on Page 55.

K wire

Communication for self-diagnosis between control unit J554 and the diagnostic tester is effected via the familiar K wire.

A new feature is the data message, i.e. the communication language between the control unit and diagnostic tester.

Instead of the existing protocol **KWP 1281**, the controller communicates to the additional shift stage using the new protocol **KWP 2000**.

To perform self-diagnosis, the V.A.G./VAS diagnostic tester must be equipped with the corresponding update.

Further information can be found in the “Service/Self-diagnosis” chapter.

ESP in the Audi allroad quattro

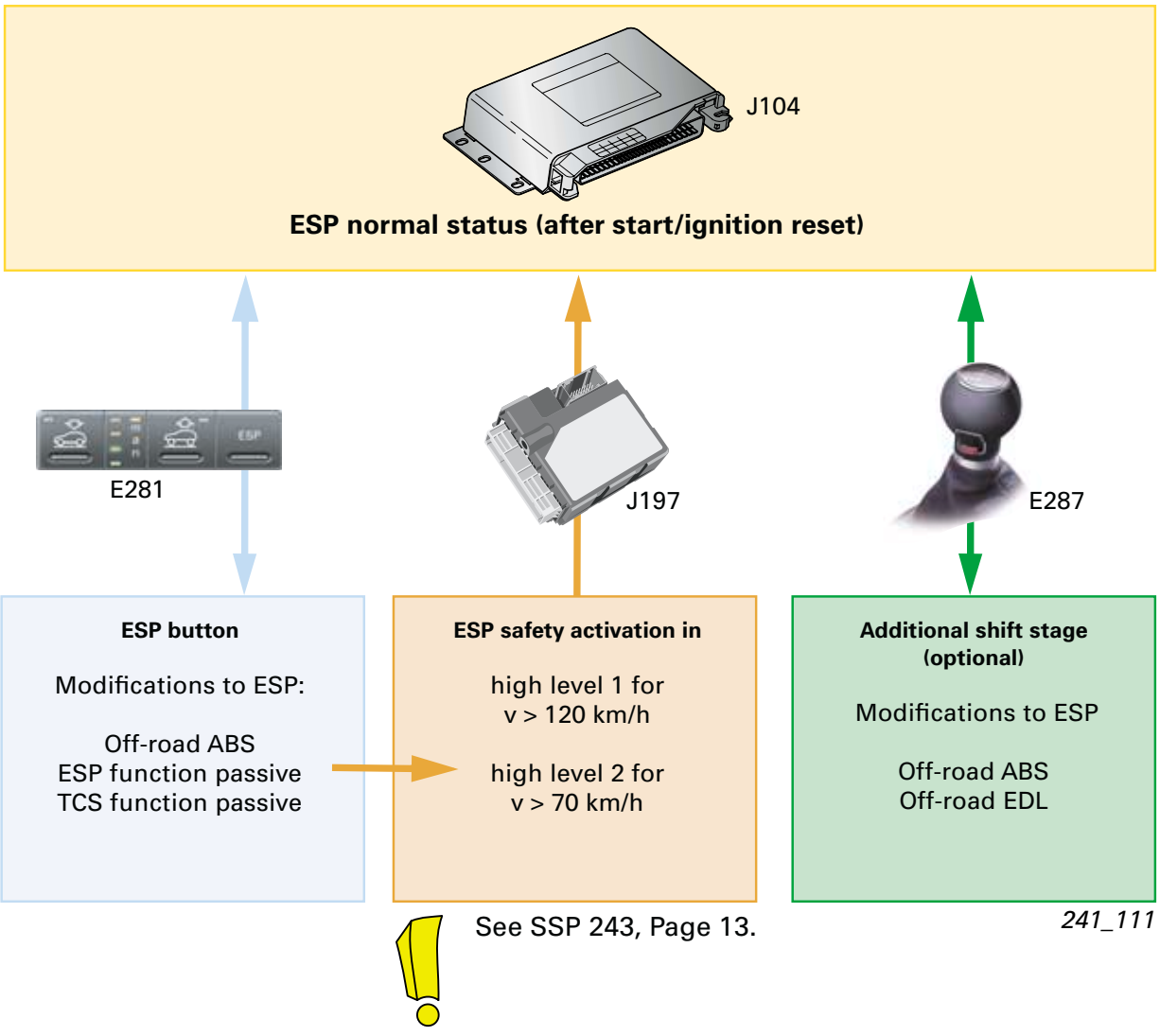
The Bosch ESP 5.3 system forms the basis of the driving dynamics control in the allroad quattro (as for the Audi A6).

To optimise “off road” characteristics, the extended application range and the new part system (4-level air suspension, additional shift stage) of the allroad quattro required re-adaptation and extension of the part functions of the driving dynamics control (ESP/ABS/EDL/TCS/MSR).

The most significant innovations/features are described below.

ESP influences

The graphical display indicates which influences of the driving dynamics control are used when the ESP button is actuated and/or the additional shift stage is activated.



See SSP 243, Page 13.

Additional shift stage

ESP function passive

By actuating the ESP button, the ESP function (anti-skid function) switched to passive.
This means that skidding (rotation about the vehicle's vertical axis) will not affect the driving dynamics control until the brake pedal is actuated.
As soon as the “brakes actuated” information is present, the ESP function will be reactivated for safety reasons.

It makes sense to deactivate the ESP function in particularly slippery terrain since “skidding” around the vertical axis will occur constantly.
The passive "anti-skid function" can prevent unnecessary / undesirable ESP activation.

Another situation in which it is advisable to deactivate the ESP is when “drifting” is desired during cornering.

The ESP system cannot be switched off with the ESP button.
Only the ESP influences can be activated.

The ESP influences activated by the ESP button are indicated via the ESP warning lamps.

ESP influences are not displayed in low range mode.

242_037

ESP button

TCS function deactivated

As is already familiar, if the ESP button has been actuated, the TCS functions are deactivated.

Situations in which increased wheel slip can be advantageous:

- When driving on soft surfaces or in deep snow.
- When driving with snow chains.
- When rocking free a vehicle which has become stuck.

Off-road ABS

When braking on a soft surface, the significantly higher wheel slip and the "wedge" of material formed in front of the wheels reduces the braking distance.

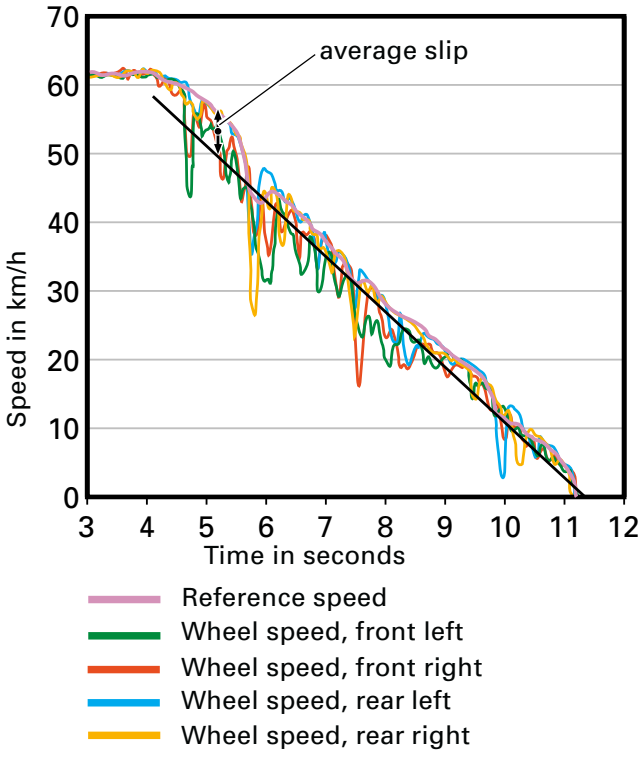
By activating the ESP influences (via the ESP button or in low range operation), a so-called off-road ABS is activated.
This controls the brake pressure at the front axle when wheel slip increases. The off-road ABS is available up to speeds of 60 km/h.

To maintain driving stability, the rear wheels are braked as a feature of the standard set-up.

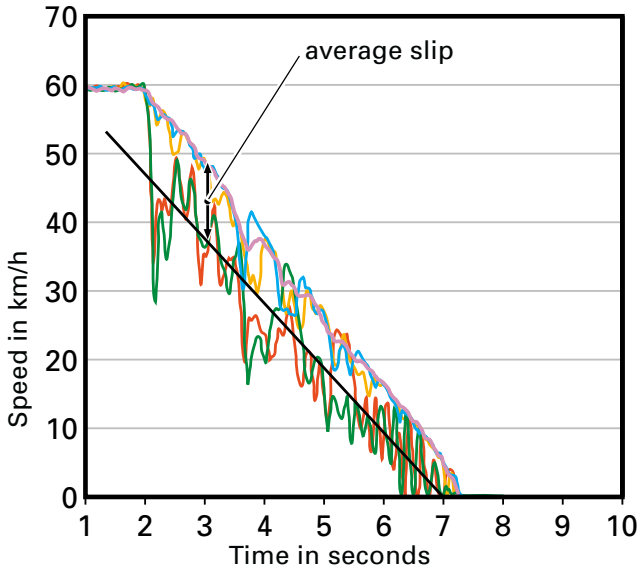
The illustration shows ABS braking in deep snow. Increasing wheel slip at the front axle by approx. 15% significantly increases deceleration and reduces the braking distance.

The off-road ABS is automatically activated when the additional shift stage is activated.

Standard ABS
Deceleration 2.4 m/s^2
Slip at the front axle approx. 10%



Off-road ABS
Deceleration 3 m/s^2
Slip at the front axle approx. 25%



241_100

Additional shift stage

Electronic differential lock EDL

One of the main aims of the adaptation of electronic differential locks via brake intervention (EDL) is to create a locking torque with minimum wheel slip.

The wheel speeds were considered as the primary control parameters when introducing the EDL system.
In order to protect the engine from stalling during braking, relatively high differential wheel speeds were necessary.
EDL control takes place in this case according to pre-set differential wheel speeds, depending upon the vehicle speed.

Since the introduction of ESP, EDL control is performed by creating a so-called torque balance.
The braking effect is determined by taking account of the available engine torque and the drive torque which can be transmitted to the individual wheels.

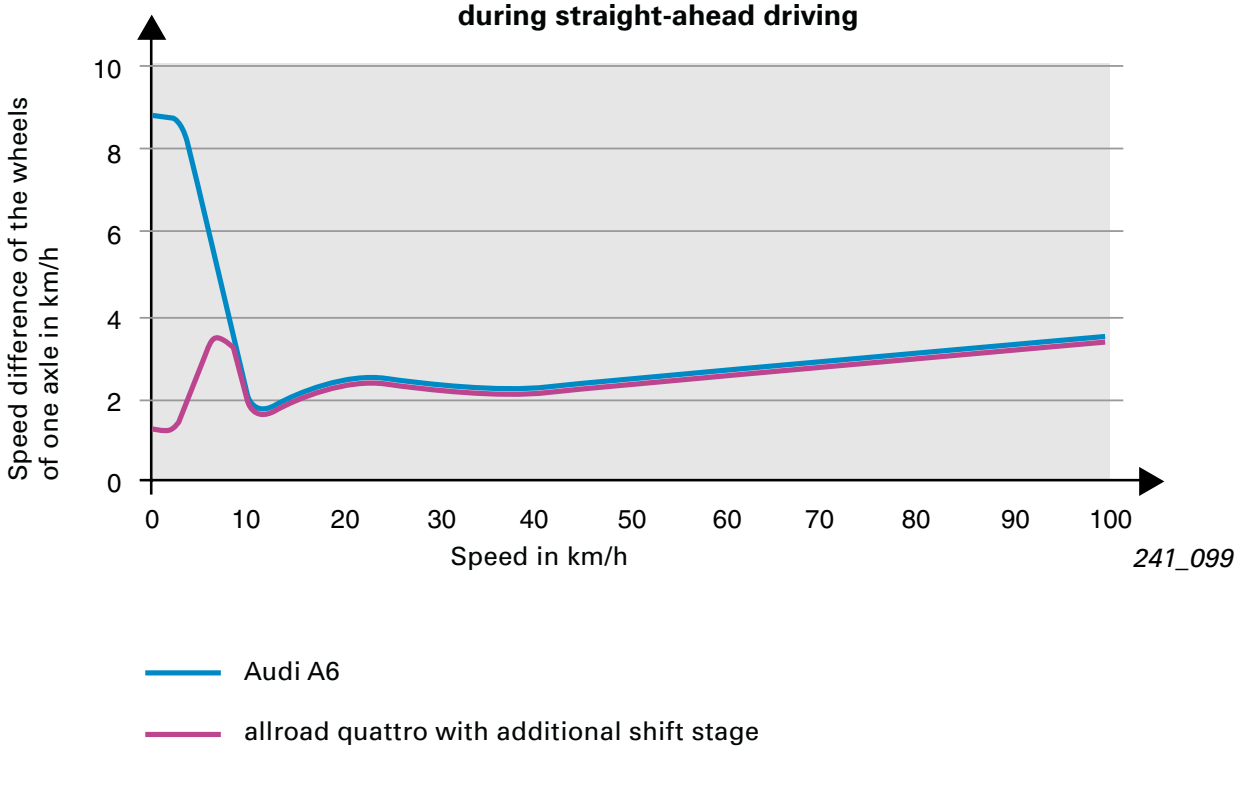
The following applies:

If a high engine torque is available, the EDL control intervenes at lower differential wheel speeds, compared with a low engine torque.

Explanation:

The minimum control threshold is the differential wheel speed which initiates EDL control.
It is dependant upon the torque balance and the vehicle speed.

Comparison of the EDL minimum control thresholds (transverse lock) during straight-ahead driving



The EDL function has been adapted in the following areas specifically for use in the Audi allroad quattro and its off-road use.

- Significant reduction of the minimum control thresholds and corresponding adaptation to engine / gearbox versions.
- Re-adapted synchronous brake intervention, e.g. simultaneous pressure increase at all 4 wheels to support the TCS function.
- Modification of the centre differential lock.
- Optimisation of diagonal brake intervention.
- Extension of the speed limit value for EDL control at 100 km/h.

Off-road EDL

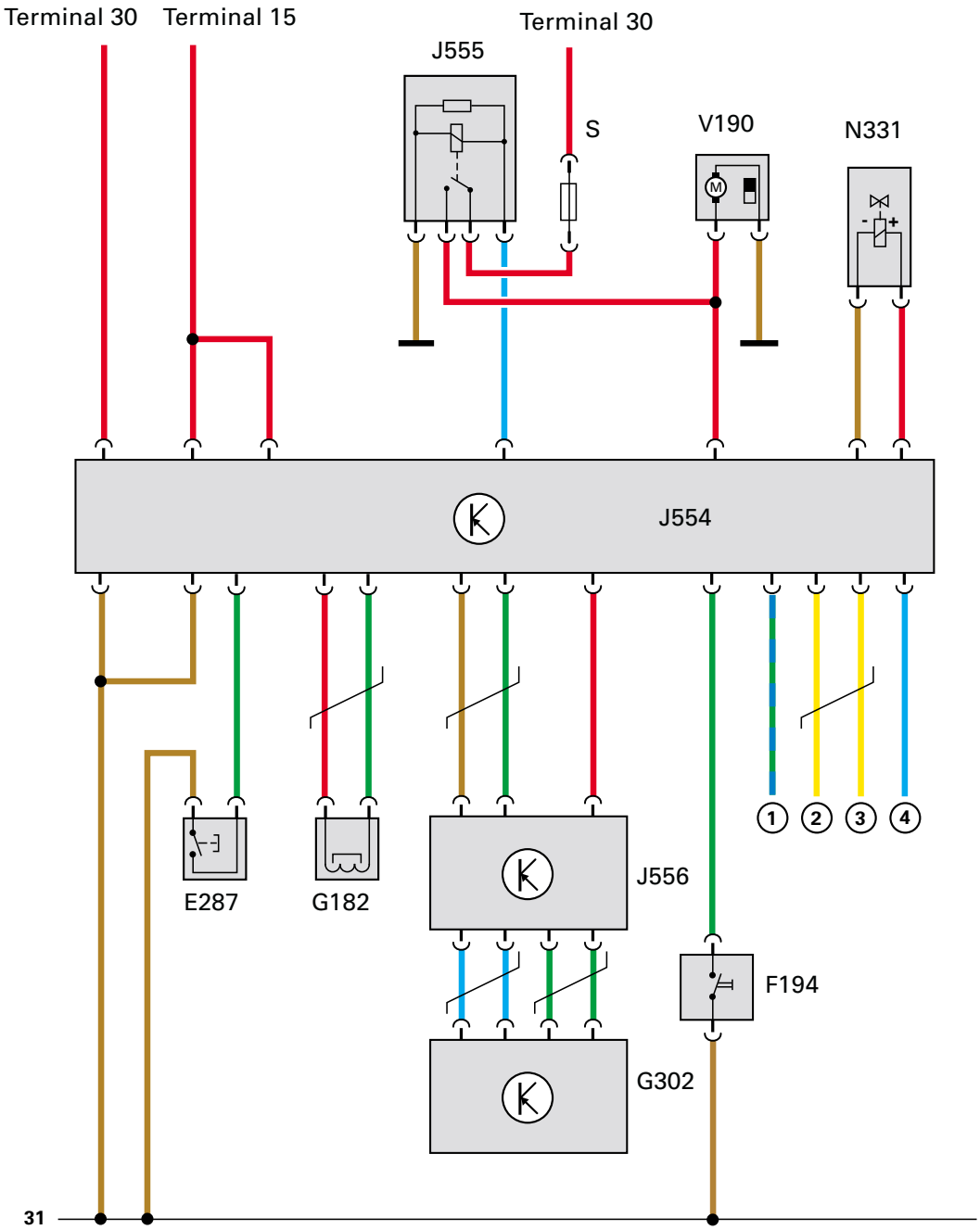
The EDL in the allroad quattro has also been adapted to accommodate the low range additional shift stage.
As the wheel torque is increased by a factor of 1.54 in low range mode, it is desirable to reset the minimum control thresholds.

As shown in illustration 241_099, the minimum control thresholds can be very low in low range mode.
When cornering, this would lead to undesirable EDL control intervention.
EDL control is therefore suppressed when cornering is detected (via the ESP input values).

The function is automatic when the additional shift stage has been actuated.

Additional shift stage

Functional diagram



241_009

Key: to the functional diagram

E287	Button for additional shift stage
F194	Clutch pedal switch
G182	Gearbox speed sender
G302	Travel sensor for hydraulic regulator
J554	Control unit for additional shift stage
J555	Relay for hydraulic pump, additional shift stage
J556	Control unit for travel sensor
N331	Solenoid valve for hydraulic regulator
S	Fuse
V190	Hydraulic pump for additional shift stage
1	Diagnostic connector for K wire
2	CAN drive high
3	CAN drive low
4	To buzzer H3, panel-mounted

= Input signal

= Output signal

= Positive

= Earth

= bi-directional

= CAN

Self-diagnosis of the additional shift stage

As already mentioned on Page 64, communication takes place between the control unit and the diagnostic tester using the new data protocol KWP 2000.

The diagnostic testers must have been updated accordingly in order to be able to communicate with the control unit.

V.A.G 1551
Program version 9.0

V.A.G 1552
Program version 6.0

The **VAS 5051** cannot yet be used for the new data protocol (anticipated from Oct./2000 with new CD 2.0 basis and corresponding CD brand).

Address word 22

Basic set-up

In order to ensure problem-free function of the shifting system, the controller J554 is adapted to recognise the limit positions of the selector fork.

Adaption is performed using the diagnostic testers with the aid of function 04 **Basic set-up** (see Workshop manual).

Basic set-up must be performed:

- At every 60,000 km service
- When replacing the J554 control unit (no system function without basic set-up)
- When replacing the hydraulic regulator.
- When replacing the G302 travel sensor.
- When replacing the J556 control unit.
- When carrying out repairs to the additional shift stage.

The basic set-up also serves as a final control test.
For this reason you should access the fault memory after basic set-up.

Follow the instructions given in the Workshop manual.

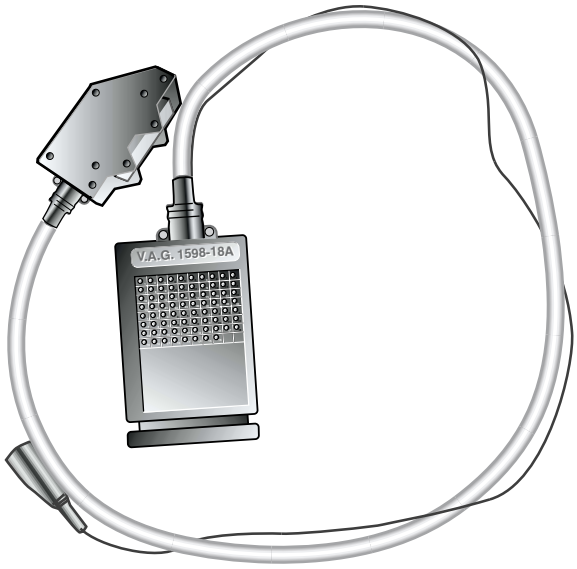
Note instructions on Page 46 and 57 when replacing the hydraulic regulator or the travel sensor.

Special tools

Test box V.A.G 1598/18A

The V.A.G. 1598/A test box is designed as a Y adapter and allows dynamic tests with the control unit connected.

The V.A.G 1598/A test box replaces test box V.A.G 1598 (T adapter).



241_098

Portal jig supplement VAS 5035/3

The portal jig supplement VAS 5035/3 is used to compensate for the raising of the body (via spacers between the sub frame and the body).

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