Service.

The Audi TT Coupé

Design and Function

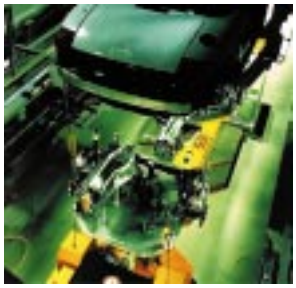
Self-Study Programme 207

For internal use only.

The plant – the plants

Ingolstadt plant
The model series Audi A4 and Audi A3 are produced in Ingolstadt. A separate production line has been set up for the body in white of the Audi TT Coupé.
The head office of Technical Development is also located in Ingolstadt.

Special trucks were developed for transferring the body-shells to Györ for final assembly.



High-tech from Györ
Qualified specialists and a good infrastructure are key factors for the Audi production shop in Györ.
Audi has been manufacturing four-cylinder 5V, V6 and V8 engines here since 1997. Final assembly of the TT has also been taking place here since 1998.

Axle and steering geometry measurement

100% reliability is ensured through a series of systematic checks integrated in the production process.

Watertightness test

Functional tests are an integral part of the production process

Mounted parts are tested for accuracy of fit, build quality and functionality after each stage of assembly.

Quality that is measurable

After final assembly, extensive tests and adjustments are carried out on every single Audi.

Electrical function test

Roller dynamometer

Exhaust emission test and optimal setup

Acoustic test bench

Contents

The Self-Study Programme provides you with information regarding design and function.

The Self-Study Programme is not a Workshop Manual.

Please refer to the Service Literature for all the relevant maintenance and repair instructions.

New.

Important.
Note.

A brief introduction to the TT

Design needs no explanation

The name alone suggests that this is an Audi with a difference. The Audi TT was named after the legendary Tourist Trophy race on the Isle of Man - the only one of its kind in the world.
The Audi TT is equally as unique as its legendary namesake.

The interior styling matches the exterior perfectly - a fact reflected in the features of the dash panel, the styling of the instruments, the air nozzles and controls.
The styling of some parts has also been influenced by the use of aluminium.

Engines

As befits a sports car, the Audi TT is powered by a four-cylinder 5-valve turbocharged engine developing 180 bhp with a sports gearbox in the front-wheel drive and quattro versions. A four-cylinder 5-valve turbocharged engine developing 225 bhp is available for the quattro version.

Running gear

The running gear also underscores Audi's total commitment to the sports car concept. The front axle kinematics were revised with regard to steering quality and response. This, in combination with the Audi TT's sporty, stiff suspension tuning, ensures excellent handling and a high standard of driving safety.

The basic version is equipped with 16-inch wheels shod with size 205/55 R 16 tyres.
A 17-inch suspension is standard with the quattro and available as optional equipment for all other engine variants.

There is no doubt that the real highlight of the Audi TT is its emotive design, both on the exterior and in the interior. The engineers at Audi had an ambitious development goal: to meet all functional and quality standards as well as the latest statutory requirements and Audi's high standards of safety without compromising the design concept and while retaining the car's full viability for everyday use.

Quattro power train

The TT will feature a new generation of Audi technology and the new Haldex viscous coupling, further emphasising the vehicle's sporty character.

SSP207/1

Safety

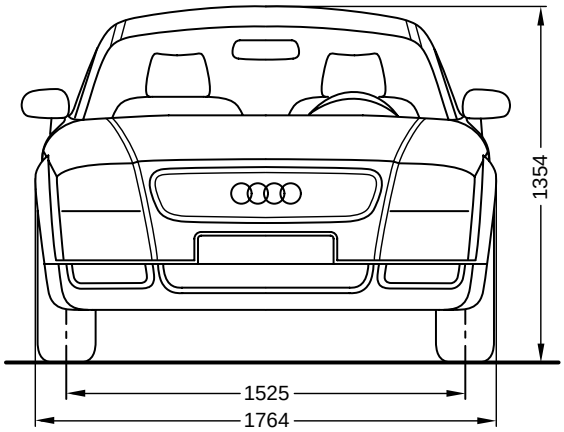
Safety is paramount:
That's why the TT is equipped with front airbags for the driver and front passenger.
The TT already complies with the new European safety laws which will come into effect in the year 2003 as well as the tougher requirements according to the US Head Impact Protection Act.

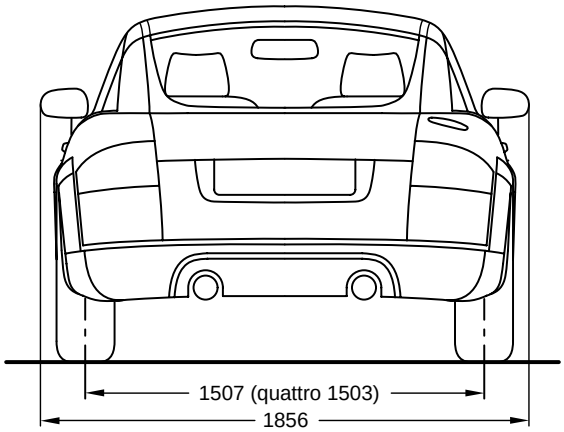
Design

We at Audi firmly believe that the most important thing about designing is that actions speak louder than words. Suffice to say, a good design speaks for itself.
The TT has a "wheel-hugging" design, that is to say the entire body is styled around the wheels. That also goes for the front and rear bulges as well as the roof and window lines and the low-slung passenger cabin.

A brief introduction to the TT

Vehicle dimensions



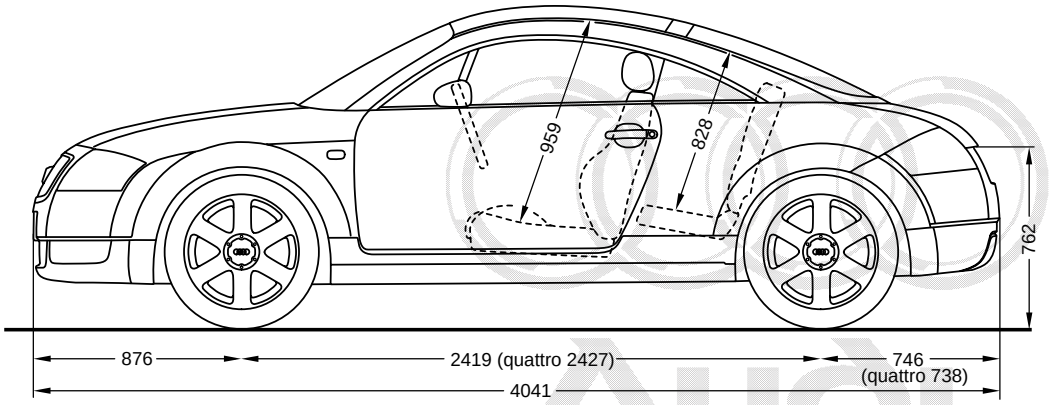


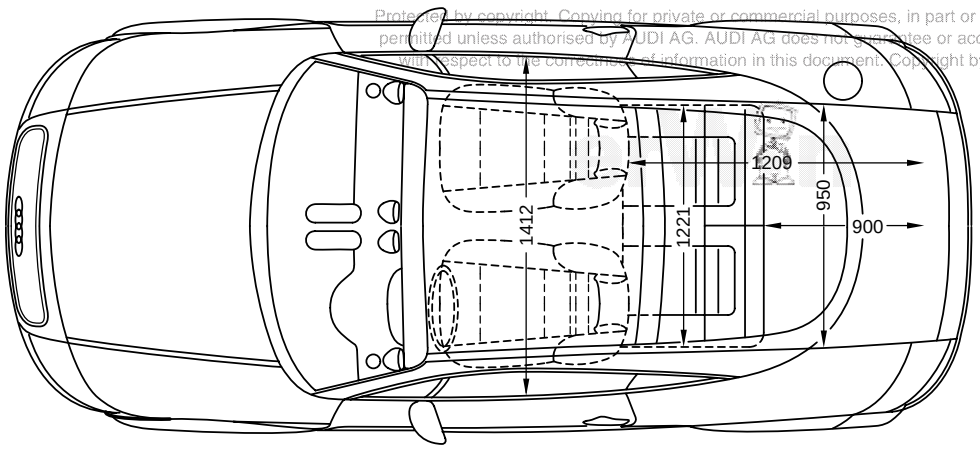
The “+ and –“ dimensions are reference values compared to the Audi A3

Length:	–111 mm
Width:	+45 mm
Height:	–69 mm

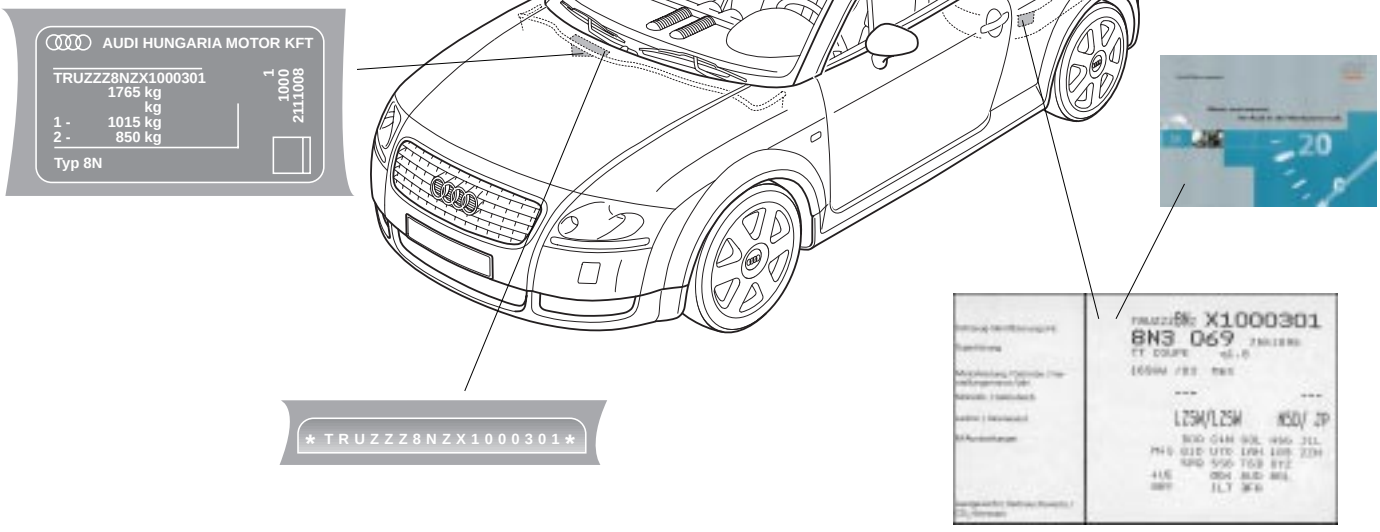
Track width

Front:	+12 mm
Rear:	+12 mm
	+ 8 mm quattro
Wheelbase:	–93 mm
	–85 mm quattro





Vehicle identification



Key of manufacturing plants within the Group in digit position 11: A Ingolstadt N Neckarsulm 1 Györ X Poznan K Karmann/Rheine	World manufacturing code			Part describing vehicle Filler constant = Z Digits 1 + 2 vehicle class. acc. to structure table						Part identifying vehicle Model year, alphanumeric as prescribed by law Manufacturing plant within the Group (as at 04/94) Serial No. beginning with:								
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Audi Hungaria Motor Kft:																		
TT/TTS *	T	R	U	Z	Z	Z	8	N	Z	X	1	0	0	0	0	0	1
Audi AG:																		
A3 *	W	A	U	Z	Z	Z	8	L	Z	X	A	0	0	0	0	0	1
A4 *	W	A	U	Z	Z	Z	8	D	Z	X	A	0	0	0	0	0	1
A6 (incl. SKD Poland) *	W	A	U	Z	Z	Z	4	B	Z	X	N/X	0	0	0	0	0	1
A8 *	W	A	U	Z	Z	Z	4	D	Z	X	N	0	0	0	0	0	1
Cabrio *	W	A	U	Z	Z	Z	8	G	Z	X	K	0	0	0	0	0	1
Audi 100 (C3, CKD) *	W	A	U	Z	Z	Z	4	4	Z	X	A	0	0	0	0	0	1

* Vehicles to US specification
(USA, Canada, Saudi Arabia, tourists)
On the VIN (behind the windscreen), the certification label and on official documents, the fillers (Z) are replaced by a vehicle code (digits 4-8) or by a test mark (digit 9). This (18-digit) number is the official vehicle identification No. (VIN) in the countries listed above.

A brief introduction to the TT

Environmentally-friendly production

Environmental protection is firmly rooted in Audi's corporate strategy. During the vehicle development process, all environmental criteria are incorporated into the product and production concept from the outset. Economic goals and ecological needs are balanced so that no conflicts of aims arise.

Produce locally - think global:

Audi lays great store by waste avoidance, reduction and recycling.

– Almost all production resources and supplied parts are delivered in re-usable packaging.

– Most sheet-metal blanks are designed so as to minimise cutting waste after pressing.

Waste avoidance and reduction

From 1998 onwards, Audi will use only water-soluble paints in a effort to make its production process more environmentally-friendly. This step will see a dramatic reduction in solvent emissions. Today's fillers and base coats, for example, contain up to 45% solvent. By comparison, the solvent content in water-soluble systems is only about 6%.

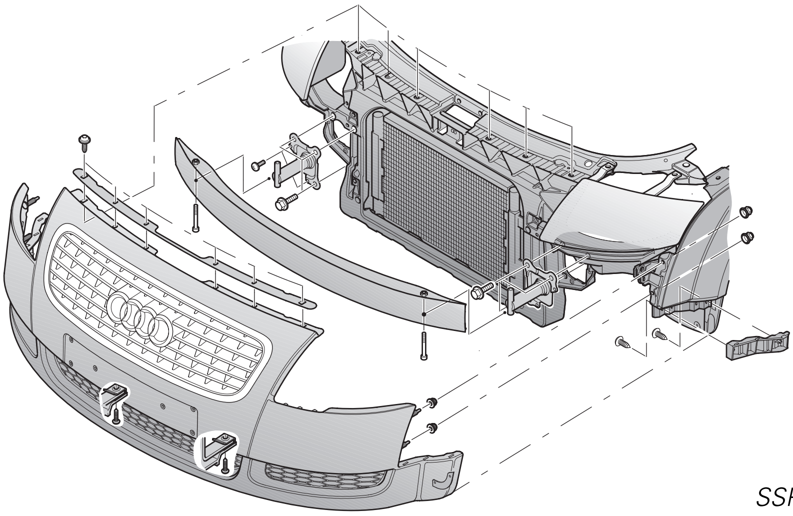
Recycling

The recycling rate at Audi is now about 94% by weight. Metal cuttings from the press plant are used to manufacture small parts as far as possible. The resulting scrap is returned to the steelworks, where steel and zinc are separated from one another.

Other waste materials such as paper, cardboard, timber, polystyrene, etc. are collected separately and fully recycled .

Special features

Front bumper

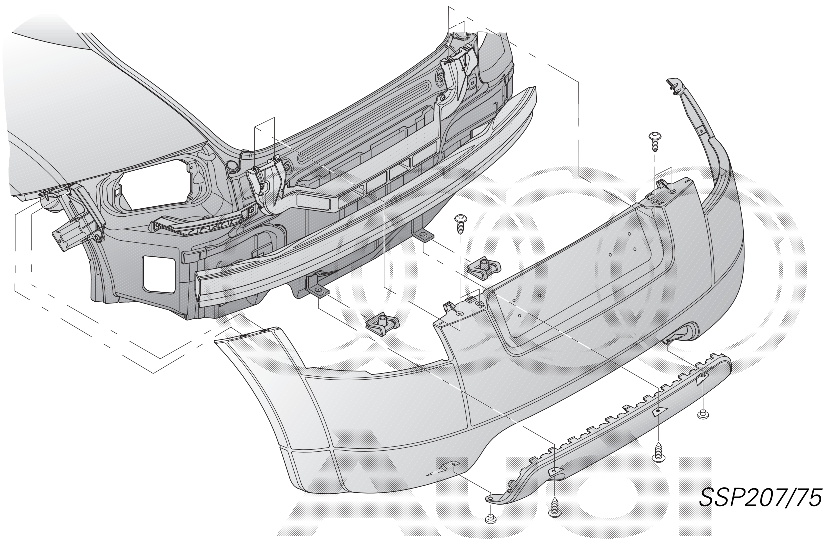


SSP207/74

The front bumper comprises two parts: the cover panel and a decorative grille. The bumper carrier is made of aluminium and bolted to the side members by impact absorbing elements.

The guide profiles attached to the left and right wings ensure an even gap all round. A zero joint is created by attaching the bumper to the wing by means of threaded bolts as well as nut and washer combinations.

Rear bumper



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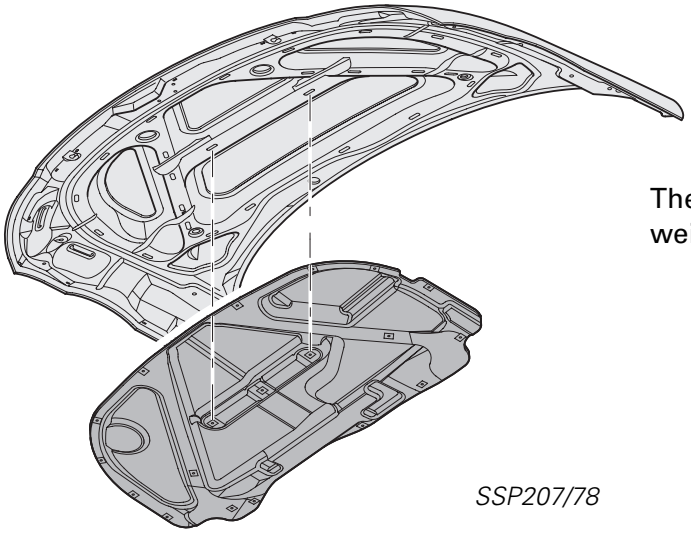
The rear bumper comprises a total of 4 parts: the bumper panel, the rear cover, the aluminium cross-member and the central locating element.

The rear cover is available in two versions depending on engine variant (TT has one tailpipe, the TTS two). A seamless transition to the body side section (zero joint) is produced by means of 2 bolts on each body side section.

Body

Bonnet



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The bonnet is made of aluminium to save weight.

Tailgate

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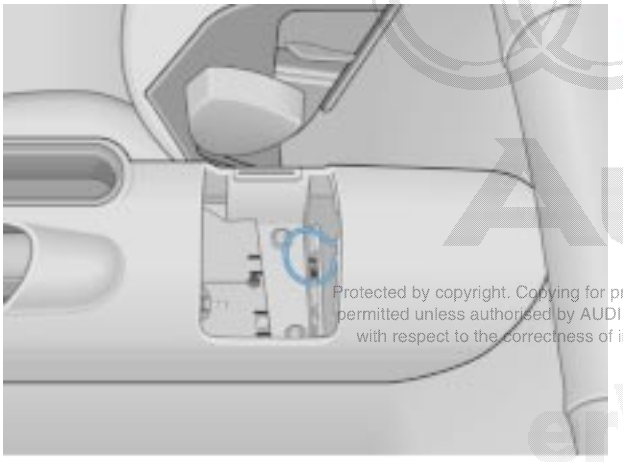
The tailgate can only be opened from the interior by means of the switch in the central console or by radio-wave remote control. The tailgate does not have a lock cylinder or a handle.

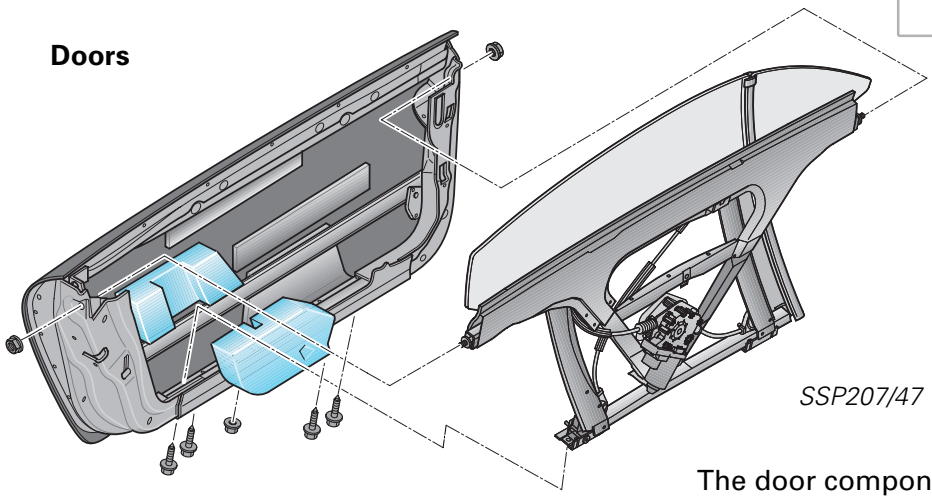
The tailgate has a single-joint hinge.



SSP207/76

If the electrical system fails, the tailgate can be released in an emergency by means of the cable pull located below the rear central console cover.

Doors



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The doors of the Audi TT Coupé are frameless and of two-piece construction.
The door panel is made of steel with a bolted high-strength side reinforcement integrated in the door.

The door component carrier is made of aluminium and can be adjusted for length, height and inclination.

Additional side protection pads protect the pelvis area.

Fuel filler flap

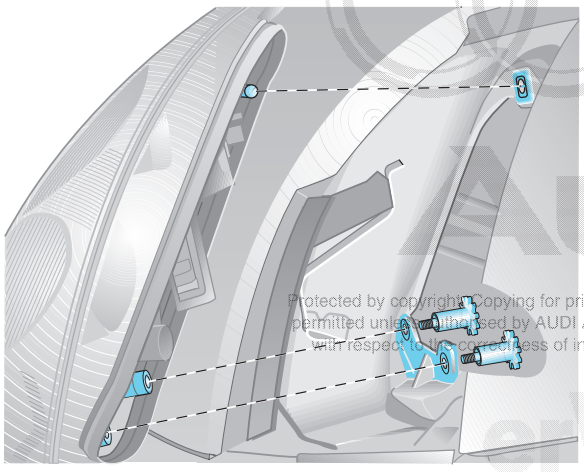
SSP207/72

The fuel filler flap is made of aluminium. It can only be opened electrically via a switch in the central console.

The fuel filler flap is attached from the exterior with three anti-theft-protected bolts plus four decorative bolts.

If the electrical system fails, the fuel filler flap can be opened via an emergency release mechanism in the luggage compartment. For this purpose, it is necessary to open the flap in the side trim panel on the right-hand side of the luggage compartment and pull the cable in the direction indicated on sticker.

Taillights



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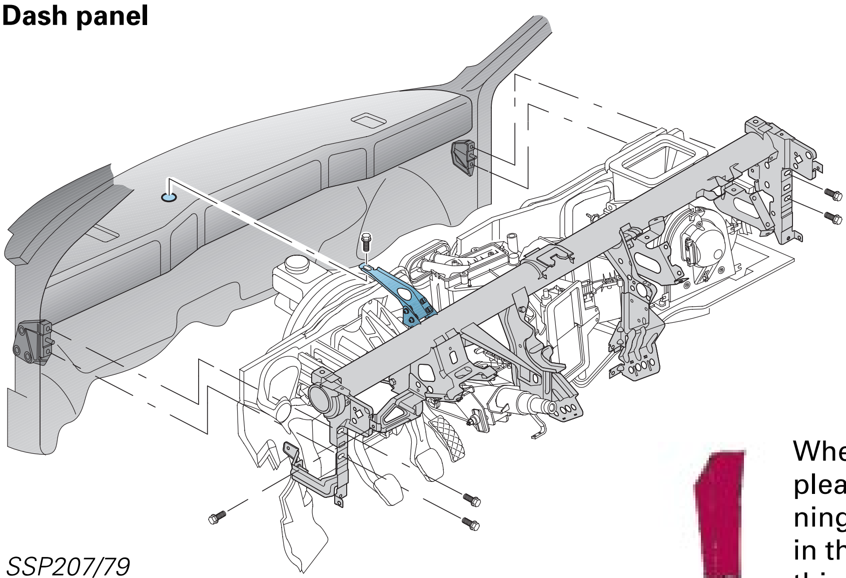
To replace the filament lamps, the complete taillight unit is removed without needing any tools. Flaps are attached to the luggage compartment linings on the left and right. The light cluster is secured on the inside by means of 2 captive knurled bolts. On the outside, the taillight is engaged in a ball head.

The light cluster can be adjusted along the vehicle's longitudinal axis by means of the threaded sleeves.

Body

Dash panel



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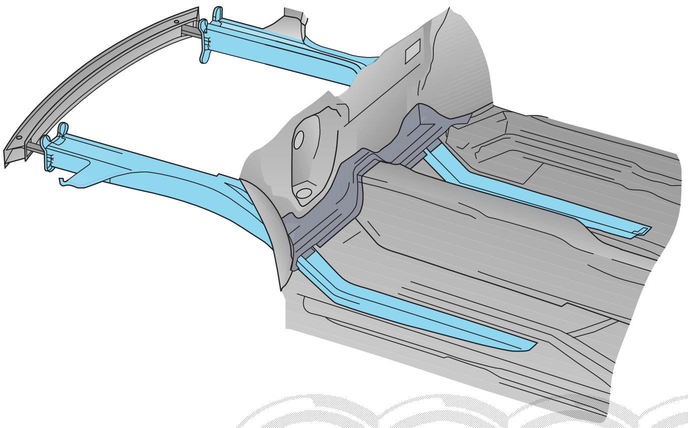
When removing the cross-tube, please note that one of the fastening bolts is located on the outside in the plenum chamber. To remove this bolt, it is necessary to remove the wiper linkage.

Structure

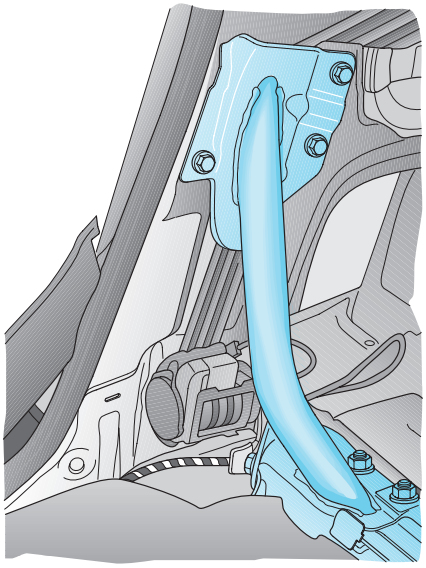


SSP207/15

The vehicle front-end area deforms in a predefined manner, absorbing the impact energy without impairing the stability of the occupant cell. The side members are manufactured from 2-, 3- and 1.5-mm-thick mash-welded metal plates. In the case of a side impact, the strong cross members will also deform on the side of the body facing away from the impact to absorb some of the impact energy.

The body structure of the vehicle rear-end area is designed in such a way that, firstly, the integrity of the fuel system remains largely intact and, secondly, the load on the occupants is kept to a minimum even in serious accidents.
The Audi TT Coupé therefore complies with the statutory crash requirements as well as the laws relating to frontal and side impacts due to enter into effect in the EU and USA.

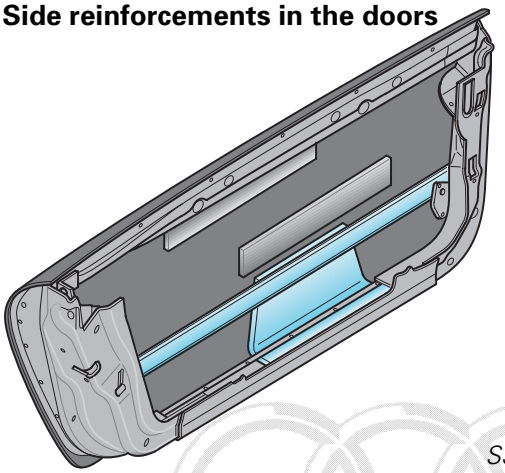
B-pillar



SSP207/9

To absorb the load resulting from a side impact, the body structure is extremely rigid even though the B-pillar is not continuous. An additional transverse support extending from base of the B-pillar to the rear seat cross-member minimises cell deformation and the rate of intrusion into the side structure. This leads to low occupant loads.

Side reinforcements in the doors



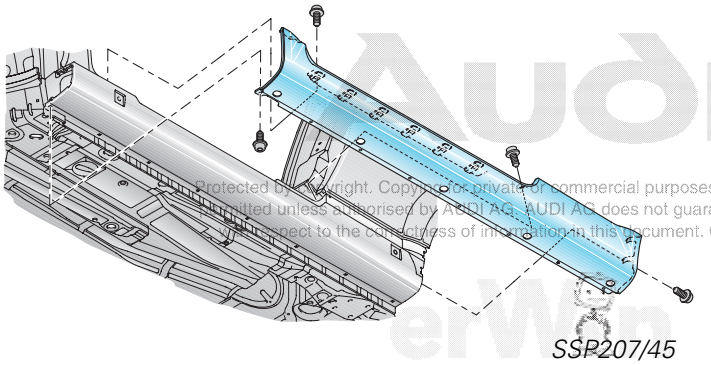
SSP207/5

Since the deformation path for energy absorption is very limited during a side impact, various design measures are necessary to perform this task effectively.

These include the side reinforcements made of high-strength extruded aluminium sections in the doors. The double-rectangular section can absorb large mounts of energy .

During a side impact, the forces acting on the vehicle are distributed via the side reinforcements in the doors to the sill and the A- and B-pillars.

Door sill



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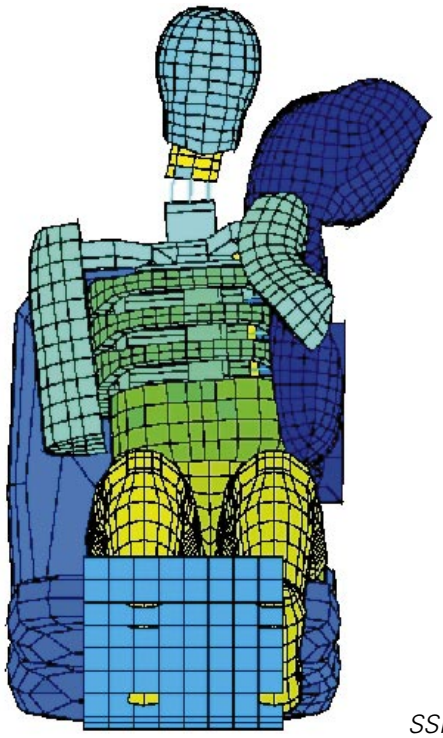
The strong sill also absorbs energy and simultaneously transmits this energy to the stable floorpan assembly.

The sill trim is made of steel and is secured to the sill with 17 bolt + washer combinations.

Be careful when placing the car on a lift support, otherwise the door sill may become dented.

Vehicle safety

Occupant protection



SSP207/80

The Audi TT Coupé has head-thorax side airbags for the driver and front passenger.

These side airbags are integrated in the seat backrests and extend from the rib cage area up to the head when inflated.

When the side airbag is tripped, the head and neck areas are thus provided with better protection.

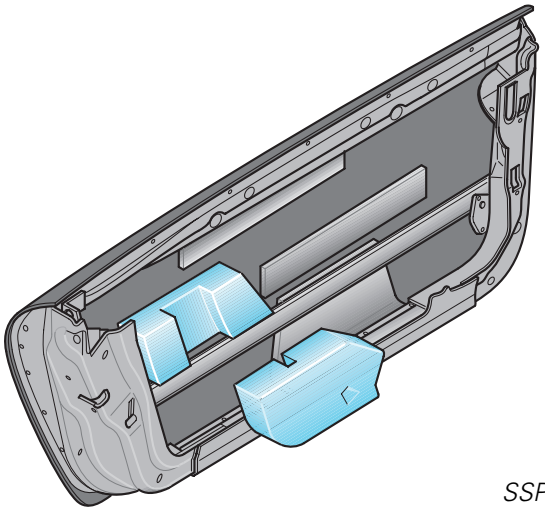
In the Audi TT Coupé, the belt tensioners can be fired independently of the airbags depending on how the trigger criteria are defined.

SSP207/81

The Audi TT Coupé has a disable function for deactivating the front passenger airbag.

When using Reboard child seats on the front passenger seat, the driver must disable the front passenger airbag with the vehicle key via the key switch located inside the glove box (see Operating Manual Audi TT Coupé).

A yellow indicator light in the central console indicates when the airbag is deactivated.



SSP207/6

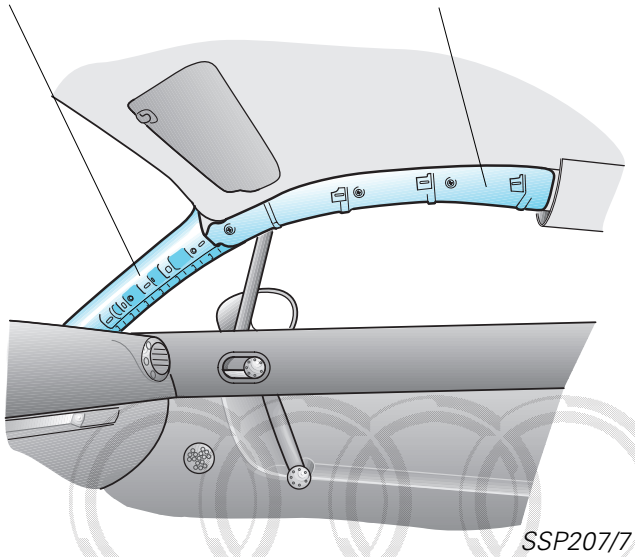
During a side impact, the vehicle occupant is inevitably subjected to a relative movement towards the force application point and away from the deformation path.

Therefore, it is very important to ensure that the contact surface between the occupant and the vehicle is large and energy-absorbing.

The side protection paddings made of plastic foam protect the vehicle occupants in the pelvis and rib cage areas.

Deformation element

Roof padding

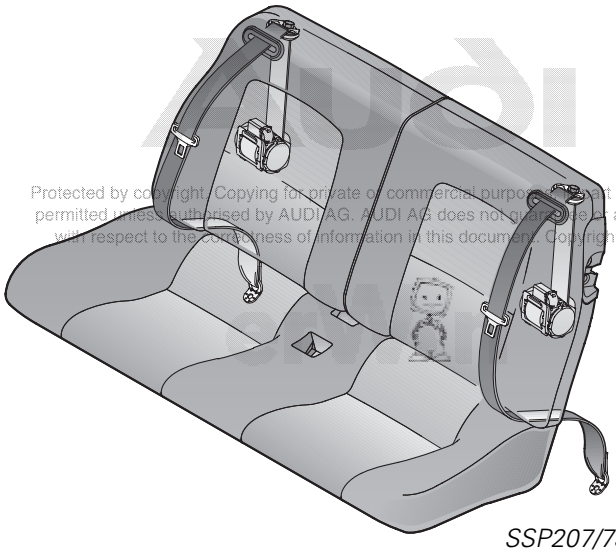


SSP207/7

For protection of the head, a padding is also integrated in the roof area.

An additional deformation element has been welded onto the A-pillar.

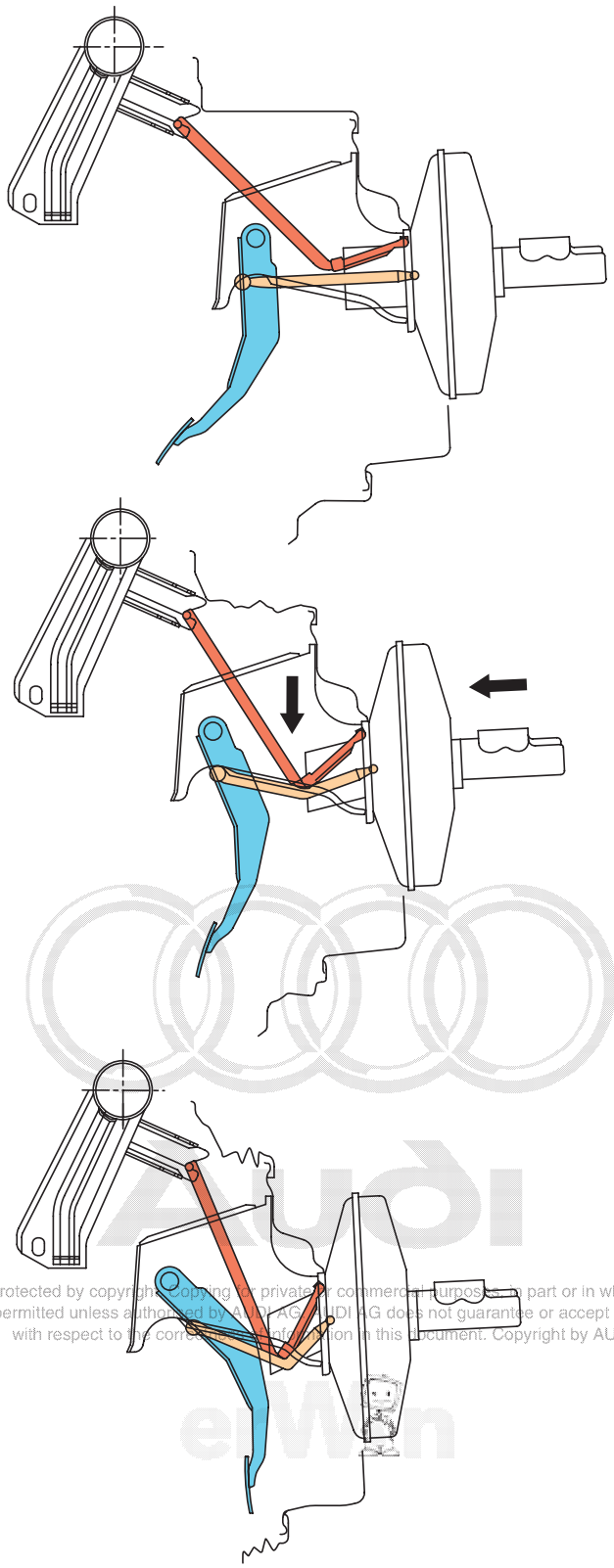
These measures have enabled Audi to comply with the new US head impact laws for the first time.



SSP207/73

The rear seat has been approved as a Group 3 child seat (approx. 6 - 12 years) and is compliant with ECE-R44. Children of heights ranging from 1.30 m to 1.50 m without raised seat swab.

Vehicle safety



To minimise the risk of foot injuries in serious head-on collisions, the brake pedal is swung away from the foot area by means of a collapsing support if severe deformation of the vehicle occurs.

This function is determined by deformation of the engine bulkhead and is not dependent on operation of the brake pedal.

In the event of a frontal crash, the foot controls are displaced towards the central tube. This causes the collapsing support to deflect and the piston rod to buckle.

The pedal footplate is swung up to 170 mm away from the foot area.

The buckling of the piston rod and the deformation work resulting from this dampens the angular movement of the braking foot. This reduces the acceleration forces (braking foot) which normally arise considerably.

SSP207/126

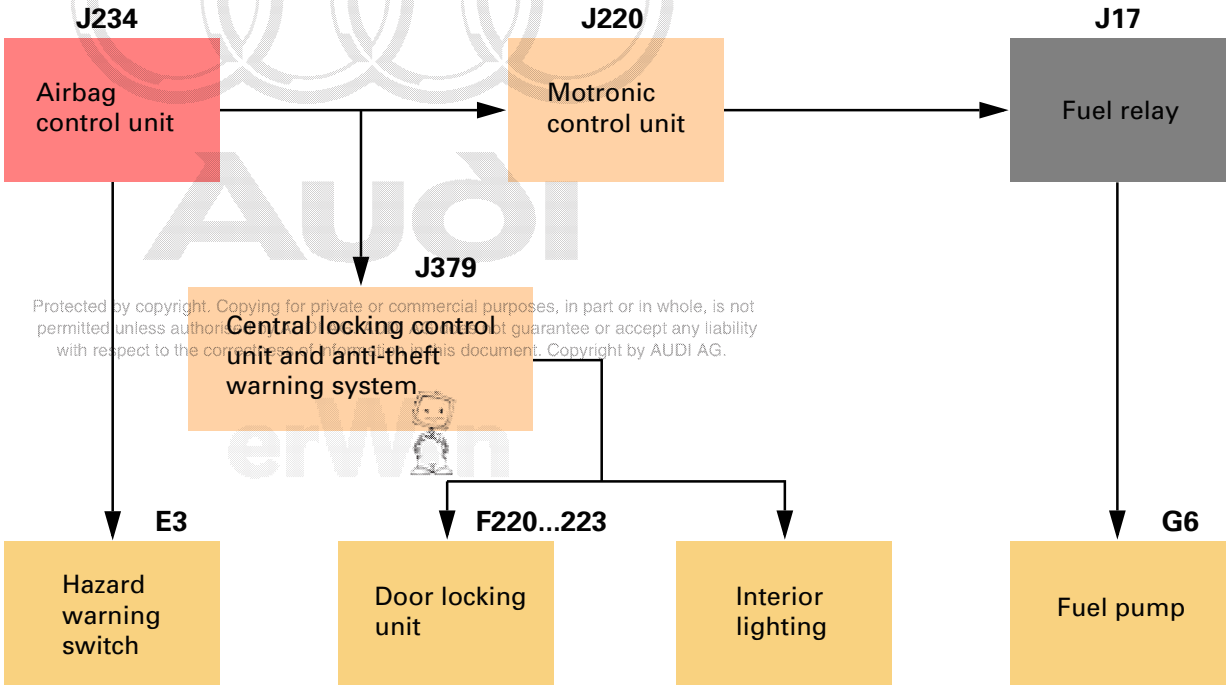
Fuel cut-off

The fuel tank is made of plastic and is housed in a protected position in front of the rear axle.

The Audi TT Coupé is the first Audi to be equipped with a fuel cut-off.
In connection with an airbag trigger mechanism (crash signal output), the Motronic control unit switches the fuel pump off.

The central locking control unit receives this signal simultaneously and unlocks the vehicle doors. The hazard warning lights are activated automatically and the interior lighting is switched on.

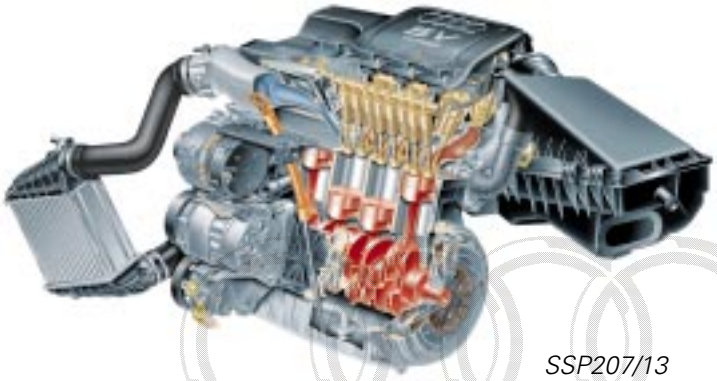
A restart function enables the engine to be restarted after an accident and it can be moved from the danger zone under its own power.



Drive units

Engine and gearbox combinations

Engine	Gearbox	Code
1.8-ltr. 5V turbocharged **AJQ** 132 kW/180 bhp	MQ 250 5-speed front 02J.N	**DZF**
1.8-ltr. 5V turbocharged **APX** 165 kW/225 bhp	MQ 350 5-speed quattro 02M.3	**DXW**
	MQ 350 6-speed quattro 02M.1	**DQB**



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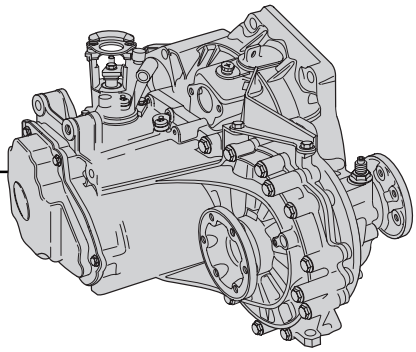

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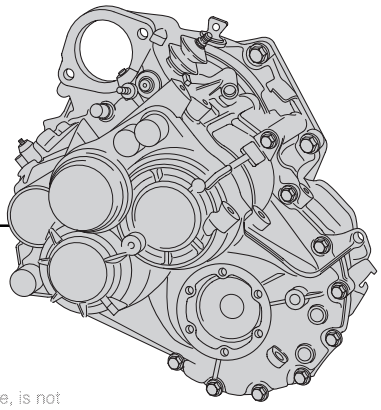

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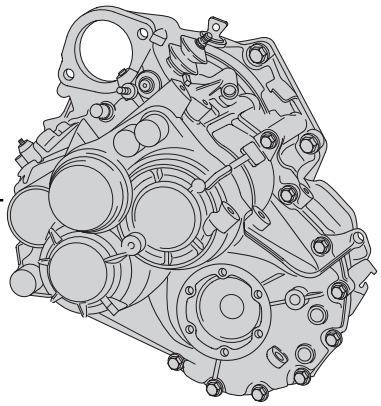


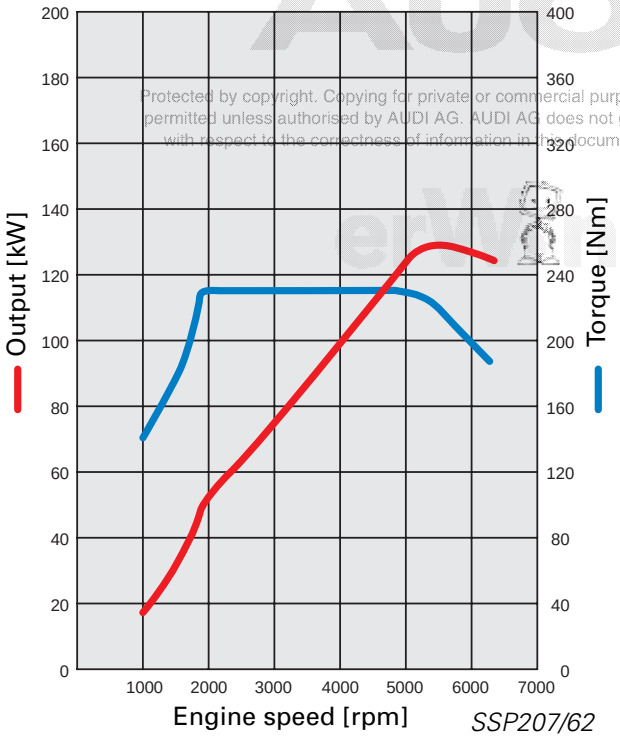
SSP207/33

1.8-ltr. 5V turbocharged engine 132 kW AJQ

SSP207/13

Specifications

Engine code:	AJQ
Type:	4-cylinder 5-valve four-stroke petrol engine with exhaust gas turbocharger
Valve timing:	Double overhead camshaft (DOHC)
Displacement:	1781 cm^3
Bore:	81 mm
Stroke:	86.4 mm
Compression ratio:	9.5 : 1
Torque:	235 Nm at 1950 - 4700 rpm
Rated output:	132 kW/180 bhp at 5500 rpm
Engine management:	ME 7.5
Fuel:	Premium unleaded 98 RON (RON 95 can be used, but reduces power output)



SSP207/62

Technical modifications:
Basic 110 kW (150 bhp)

- EU II + D3
- electronic throttle control
- "Tumble" duct
  (For details of the tumble duct in the intake system, refer to SSP 198)
- Engine control unit (characteristic curves adapted)
- CAN-BUS with TCS/EDL/ESP
- electr. activated air divert control valve

Drive units

System overview – 1.8-ltr. 132 kW 5V turbocharged

Sensors

Hot-film air mass meter G70

Engine speed sender G28

Hall sender G40

Lambda probe G39

Throttle valve control unit J338
with angle sender G187 for
throttle valve gear G186

Intake air temperature sender G42

Coolant temperature sender
G2 and G62

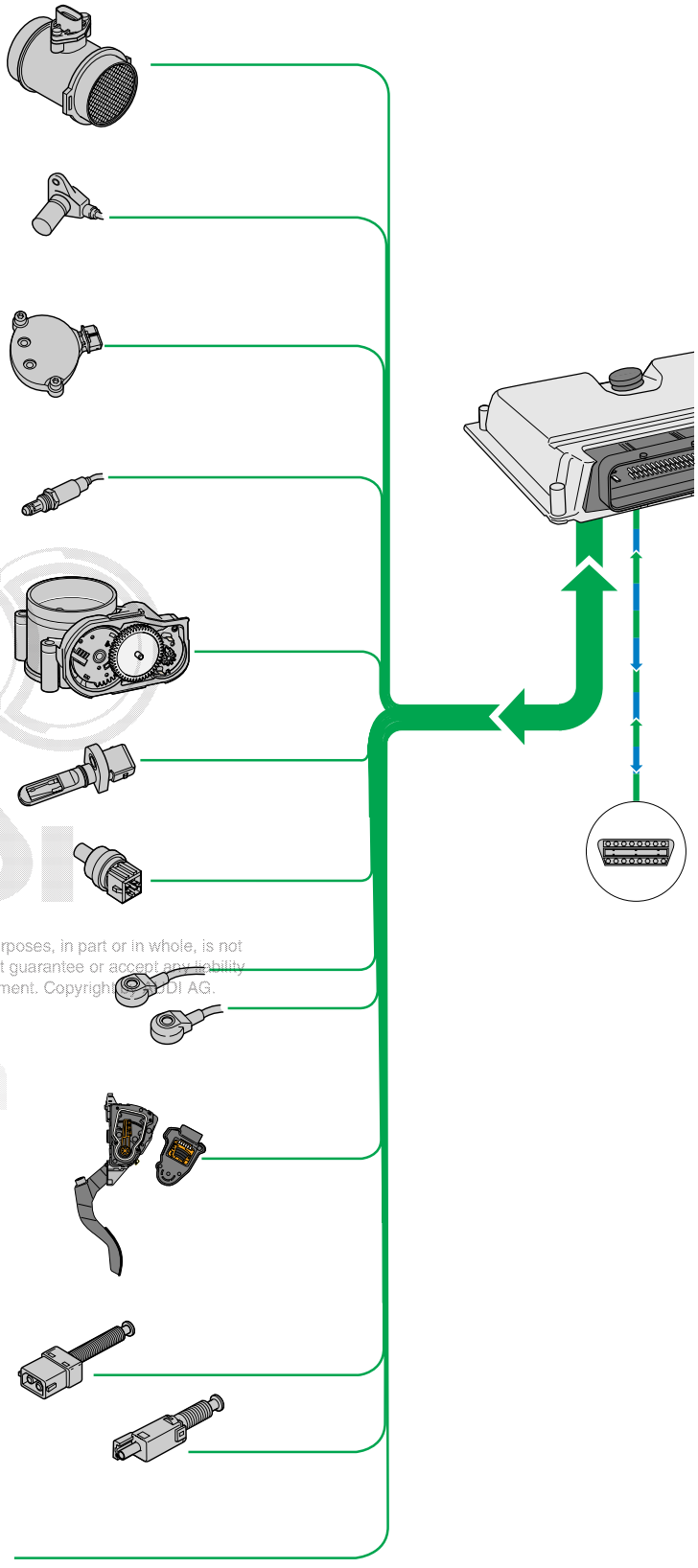
Knock sensor 1 (cyl. 1 - 2) G61
Knock sensor 2 (cyl. 3 - 4) G66

Accelerator pedal module with accele-
rator position sender G79 and G185

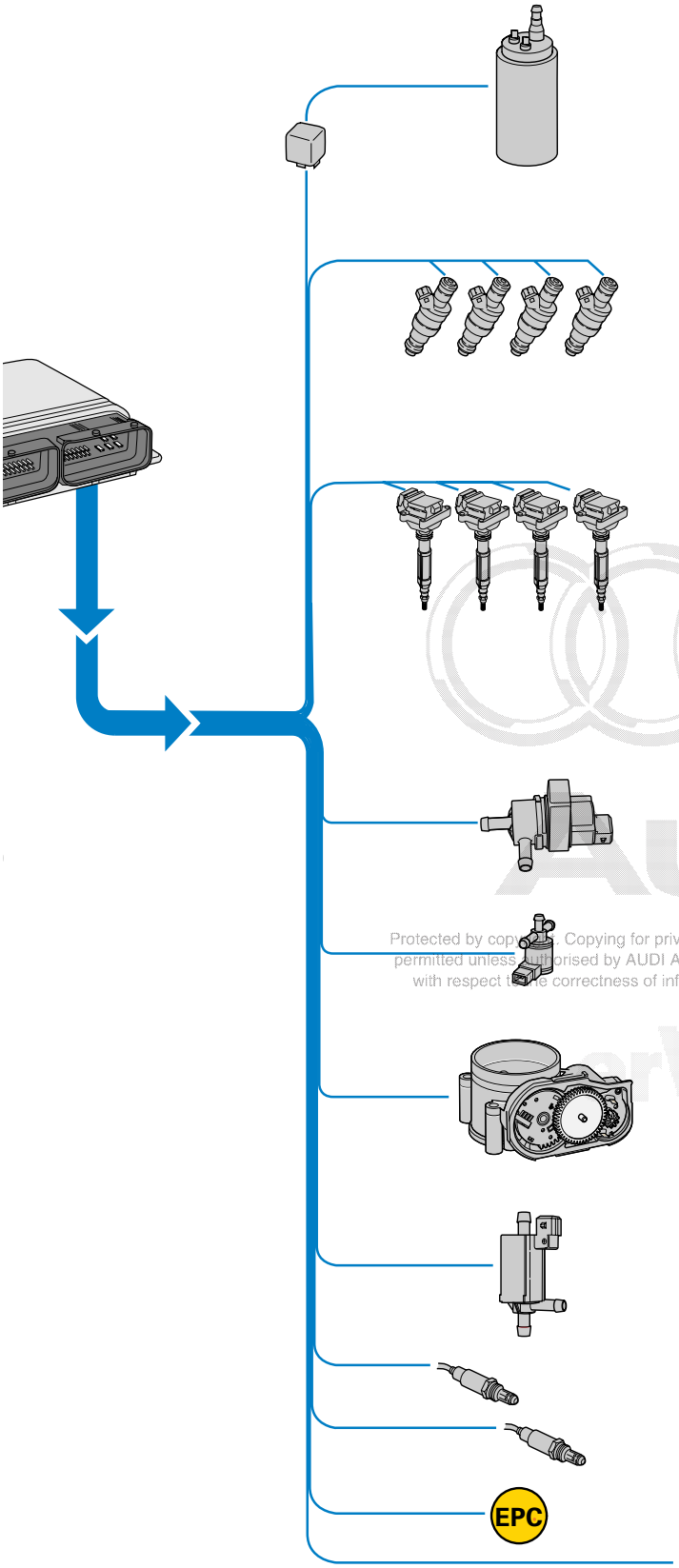
Brake light switch F and brake
pedal switch F47

Clutch pedal switch F36

Auxiliary signals:
Pressure switch for power steering F88
Cruise control
Intake manifold pressure sender G71



Actuators



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Fuel pump relay J17 and fuel pump G6

Injection valves N30, N31, N32, N33

Power output stage N122 and ignition coils N (1st cyl.), N128 (2nd cyl.), N158 (3rd cyl.) and N163 (4th cyl.) with integrated power output stage

Solenoid valve for activated charcoal canister N80

Solenoid valve for charge pressure limitation N75

Throttle valve control unit J338 with throttle valve gear G186

Air recirculation valve for turbocharger N249

Heater for lambda probe Z19

Fault lamp for electronic throttle control K132

Auxiliary signals

Function chart

Turbocharged 1.8-ltr. 132 kW 5V engine

Motronic ME 7.5

Components

A	Battery
E45	Switch for cruise control system
E227	Button for cruise control system
F	Brake light switch
F36	Clutch pedal switch
F88	Power steering (pressure switch)
G6	Fuel pump
G28	Engine speed sender
G39	Lambda probe
G40	Hall sender with quick-start sender wheel
G42	Intake air temperature sender
G61	Knock sensor 1
G62	Coolant temperature sender
G66	Knock sensor 2
G70	Air mass meter
G71	Intake manifold pressure sender
G79	Accelerator position sender
G186	Throttle valve gear (electronic throttle control)
G187	Throttle valve drive angle sender 1
G888	Throttle valve drive angle sender 1
J17	Fuel pump relay
J220	Motronic control unit
K132	Fault lamp for electronic throttle control
M9/10	Stop lights
N	Ignition coil
N30...33	Injection valves
N75	Solenoid valve for charge pressure limitation
N80	Solenoid valve for activated charcoal canister
N128	Ignition coil 2
N158	Ignition coil 3
N163	Ignition coil 4
N249	Air recirculation valve for turbocharger
P	Spark plug socket
S	Fuse
Q	Spark plugs
Z19	Heater for lambda probe

Auxiliary signals

CAN-BUS H =
CAN-BUS L = } Databus drive

A	Engine speed signal (out)
B	Fuel consumption signal (out)
C	Road speed signal (in)
D	Air-conditioner compressor signal (in-out)
E	Air conditioning ready (in)
F	Crash signal (in) from airbag control unit
G	Alternator terminal DF/DFM (in)
	W- line (in-out)

For the applicable Fuse No. and amperage, please refer to the current flow diagram.

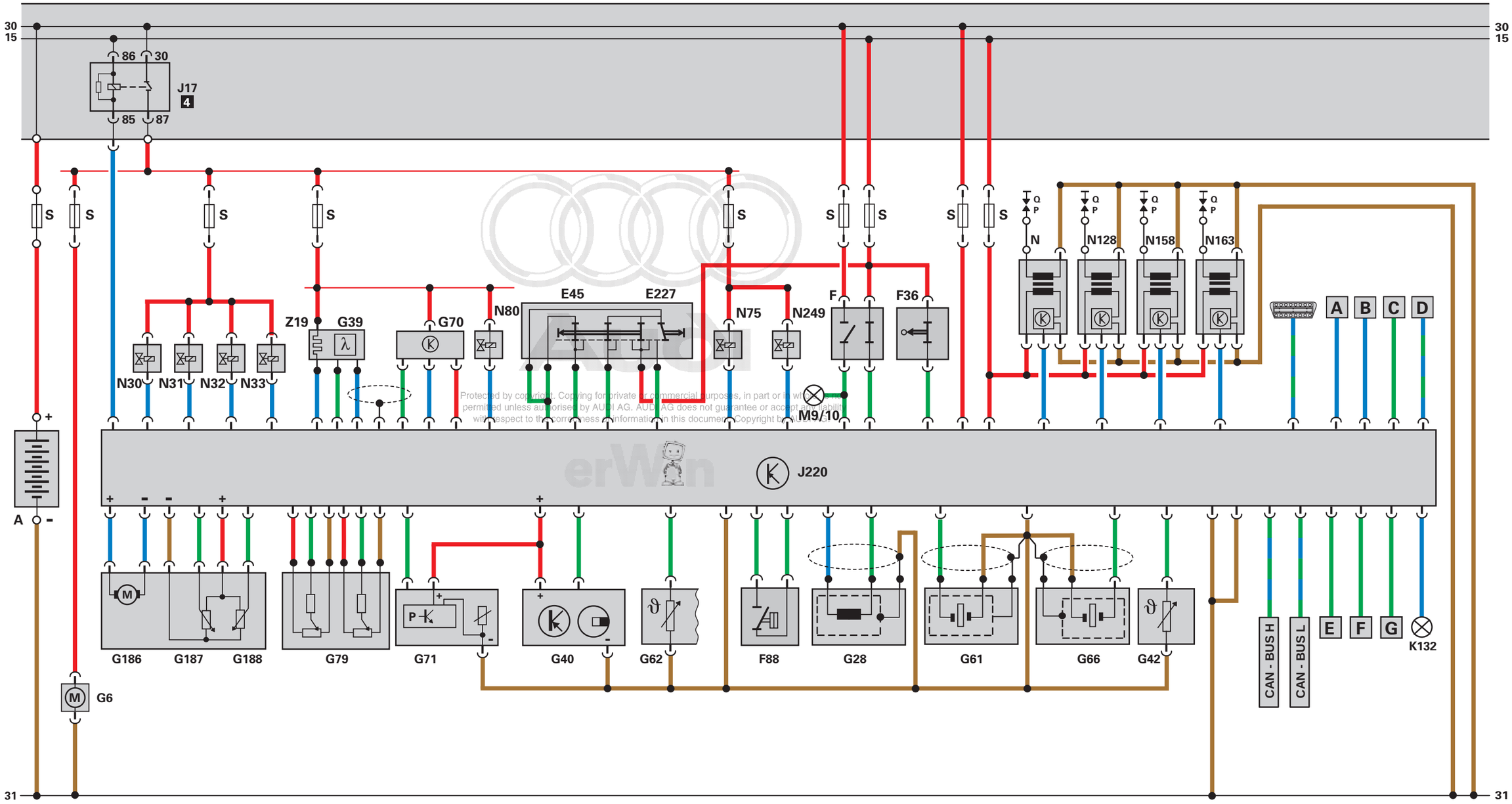
Input signal

Output signal

Positive

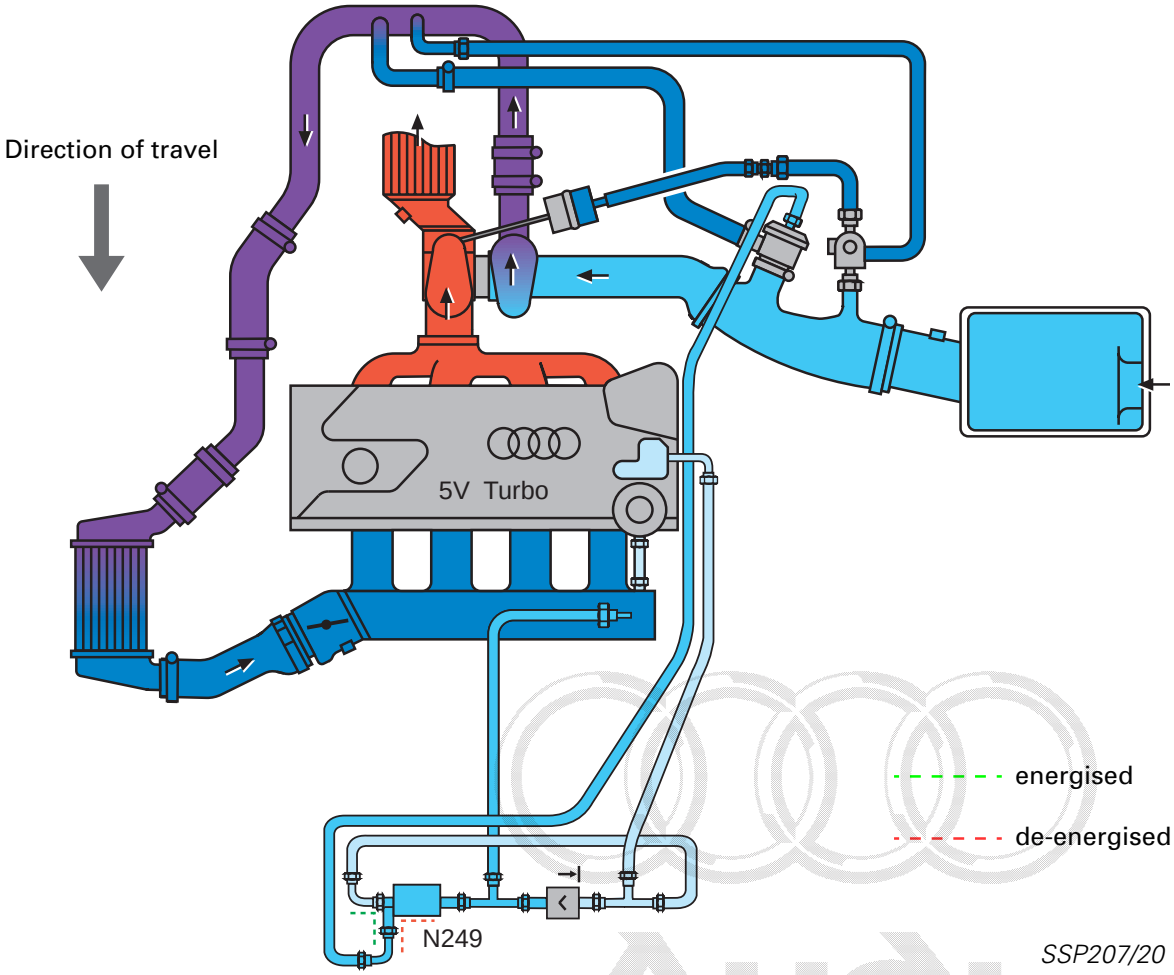
Earth

Bidirectional



SSP207/25

Charging



SSP207/20

The turbocharging system comprises the following components:

- Exhaust emission turbocharger
- Charge air cooler
- Charge pressure control
- Air divert control in overrun

The flow energy of the exhaust emissions is transferred to the fresh air entering the exhaust gas turbocharger. In the process, the air required for combustion is compressed and the volume of air entering the cylinders per working cycle is thus increased.

The air temperature, increased by compression, is again reduced in the charge air cooler. Since the density of the cooled air is higher, the amount of fuel-air mixture entering the engine is greater, too.

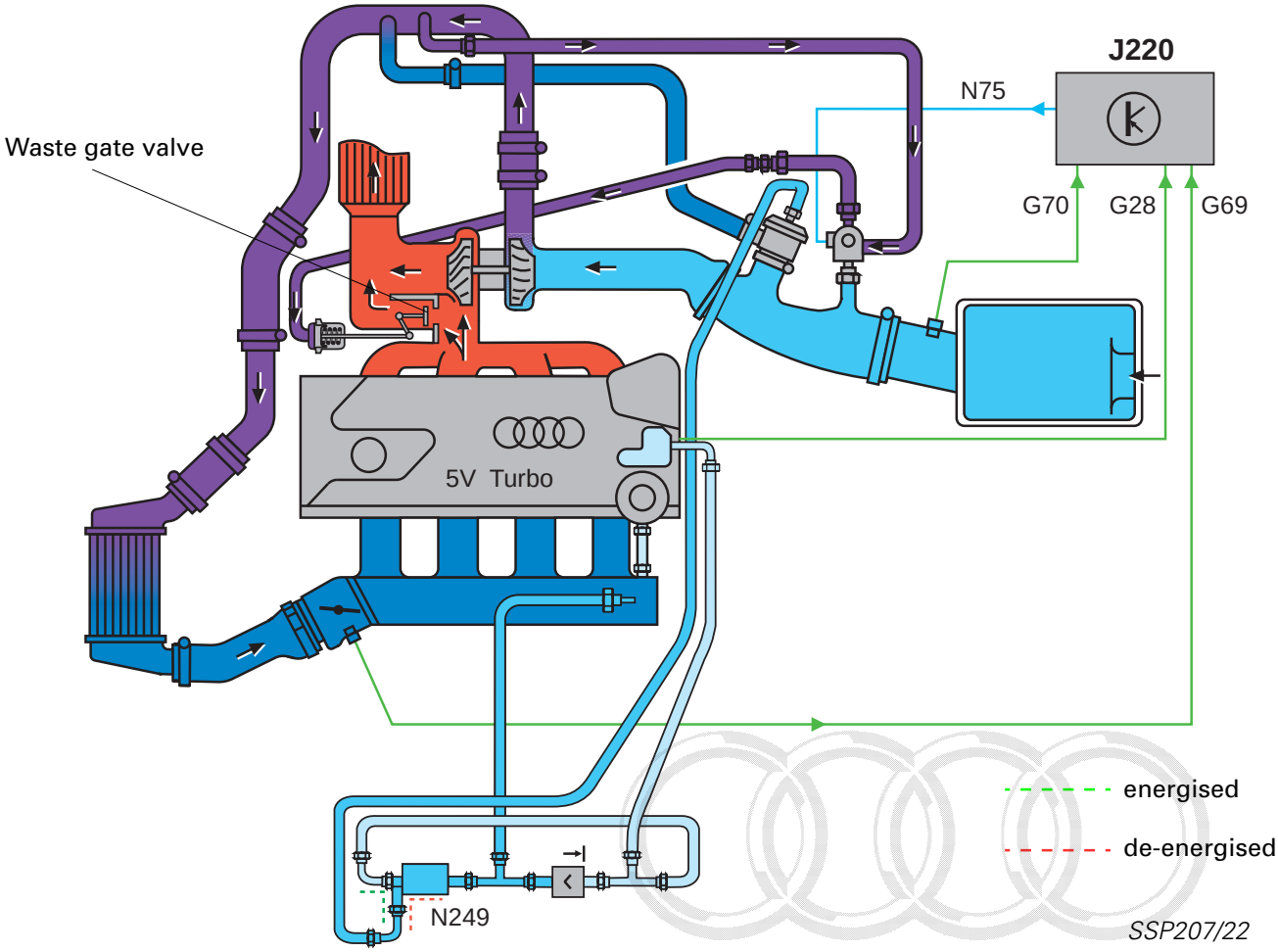
The result is an increase in power output for the same displacement and engine speed.

In the case of the 1.8-ltr. 5V turbocharged engine, turbocharging is also used to provide high torque from the bottom end to the top end of the rev band.

Charge pressure increases in proportion to the turbocharger speed. The charge pressure is limited to prolong the life of the engine. The charge pressure control performs this task.

The air divert control prevents the turbocharger slowing down unnecessarily if the throttle valve closes suddenly.

Charge pressure control



The engine control unit calculates the charge pressure setpoint from the engine torque request.

The engine control unit regulates the charge pressure as a function of the opening time of the solenoid valves for charge pressure limitation N75. For this purpose, a control pressure is generated from the charge pressure in the compressor housing and the atmospheric pressure.

This control pressure counteracts the spring pressure in the charge pressure control valve (vacuum box) and opens or closes the waste gate valve in the turbocharger.

In the de-energised state, the solenoid valve N75 is closed and the charge pressure acts directly on the vacuum box. The charge pressure control valve opens at low charge pressure.

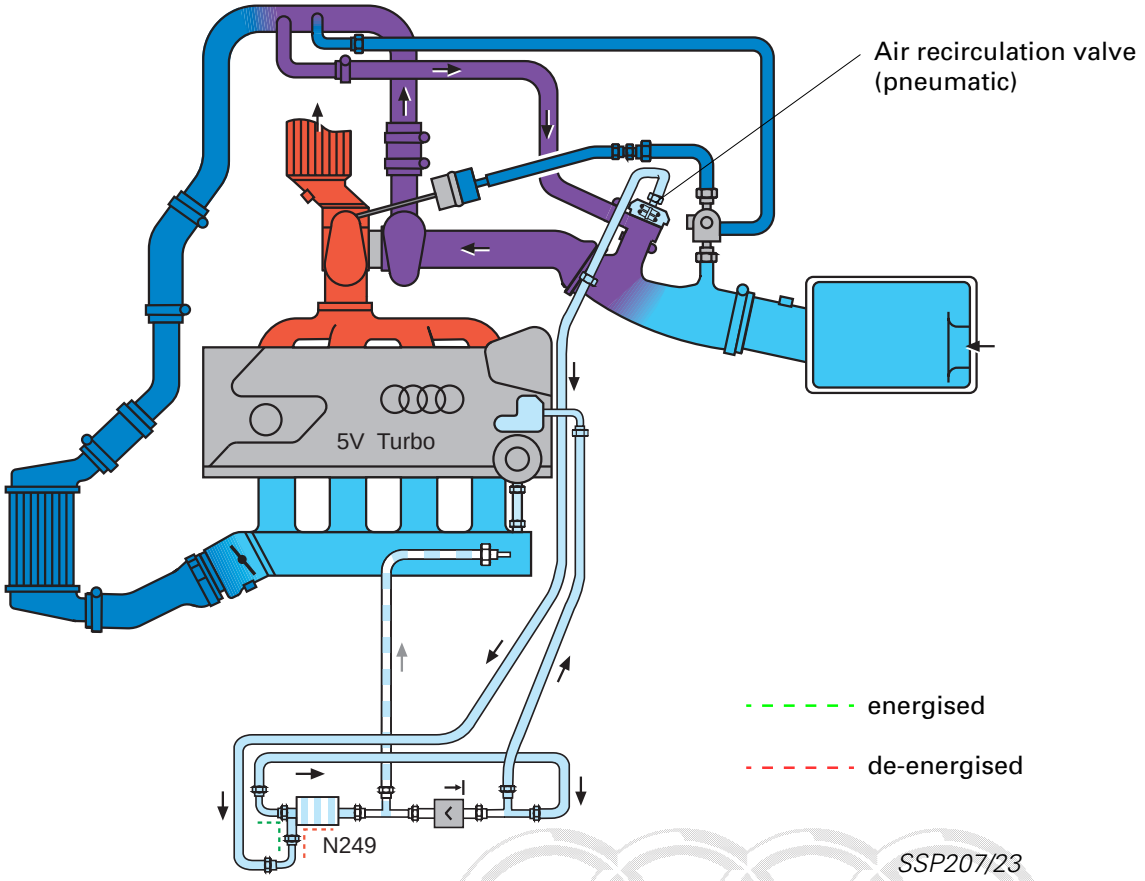
If the control fails, the maximum charge pressure is limited to a basic charge pressure (mechanical charge pressure).

If the bypass is closed, the charge pressure rises. In the lower engine speed range, the turbocharger supplies the charge pressure required to develop high torque or the required volume of air.

As soon as the charge pressure has reached the calculated charge pressure, the bypass opens and a certain quantity of exhaust gas is ducted past the turbine. The turbocharger motor speed decreases, and so too does the charge pressure.

For more detailed information regarding charge pressure control, please refer to SSP 198.

Air divert control in overrun



When the throttle valve is closed, it produces a backpressure in the compressor circuit due to the charge pressure still present. This causes the compressor wheel to decelerate rapidly. When the throttle valve is opened, the speed of the turbocharger must again be increased. The air divert control in overrun prevents turbo lag, which would otherwise occur.

The air recirculation valve is a mechanically activated and pneumatically controlled spring diaphragm valve. It is also activated via an electrically activated air recirculation valve for turbocharger N249. This, in connection with the vacuum reservoir, enables the air recirculation valve N249 to operate independently of the intake manifold pressure. If the air recirculation valve fails, control takes place as a result of the engine vacuum downstream of the throttle valve.

As soon as the throttle valve is closed, the air recirculation valve briefly closes the compressor circuit.

The vacuum counteracts the spring in the valve. The valve opens, and the compressor and intake sides of the compressor circuit close for a short period of time. There is no deceleration of the compressor wheel.

When the throttle valve re-opens, the intake manifold vacuum drops. The air recirculation valve is closed by the spring force. The compressor circuit no longer closes briefly. Full charger speed is available immediately.

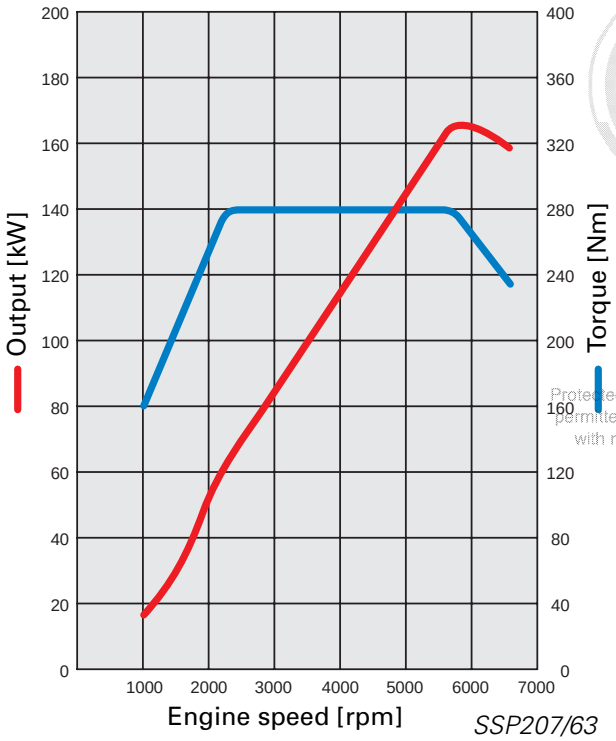
For more detailed information regarding the air divert control in overrun, please refer to SSP 198.

1.8-ltr. 5V 165 kW APX turbocharged engine

SSP207/14

Specifications

Engine code:	APX
Type:	4-cylinder 5-valve four-stroke-petrol engine with exhaust gas turbocharger
Valve timing:	Double overhead camshaft (DOHC)
Displacement:	1781 cm^3
Bore:	81 mm
Stroke:	86.4 mm
Compression ratio:	9 : 1
Rated output:	165 kW at 5900 rpm
max. torque:	280 Nm at 2200 to 5500 rpm
Engine management:	ME 7.5
Fuel:	Premium unleaded 98 RON
Exhaust gas treatment:	Twin-flow catalytic converter, one heated lambda probe upstream and downstream of the catalytic converter

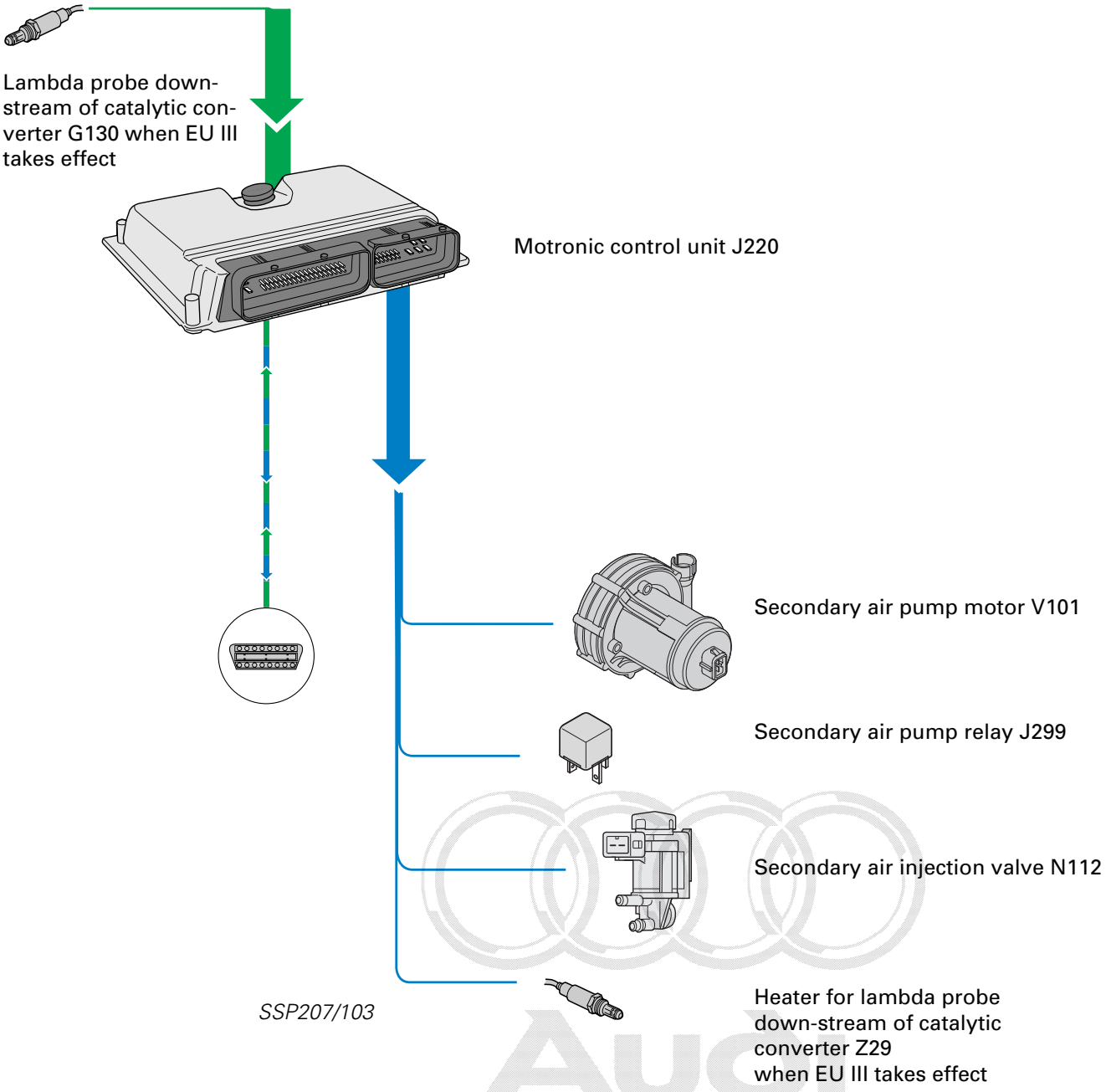


SSP207/63

Technical modifications:
Basic 132 kW (180 bhp)

- Cooling water afterrun pump (approx. 10 min)
- Secondary air system
- Piston (modified), thus changing the compression ratio to 9.0 : 1 from 9.5 : 1
- Manifold (new exhaust and flange)
- When EU III takes effect, there will be a 2nd lambda probe downstream of catalytic converter for catalyst monitoring
- 2 in-line charge air coolers
- Injection valves (higher flow)
- Quick-start sender wheel
- Piston cooling by oil injectors (volumetric flow adaptation)
- Hot-film air mass meter with reverse flow detector HFM5 integrated in the intake air filter upper section
- Single-flow throttle valve unit integrated in the electronic throttle control positioner

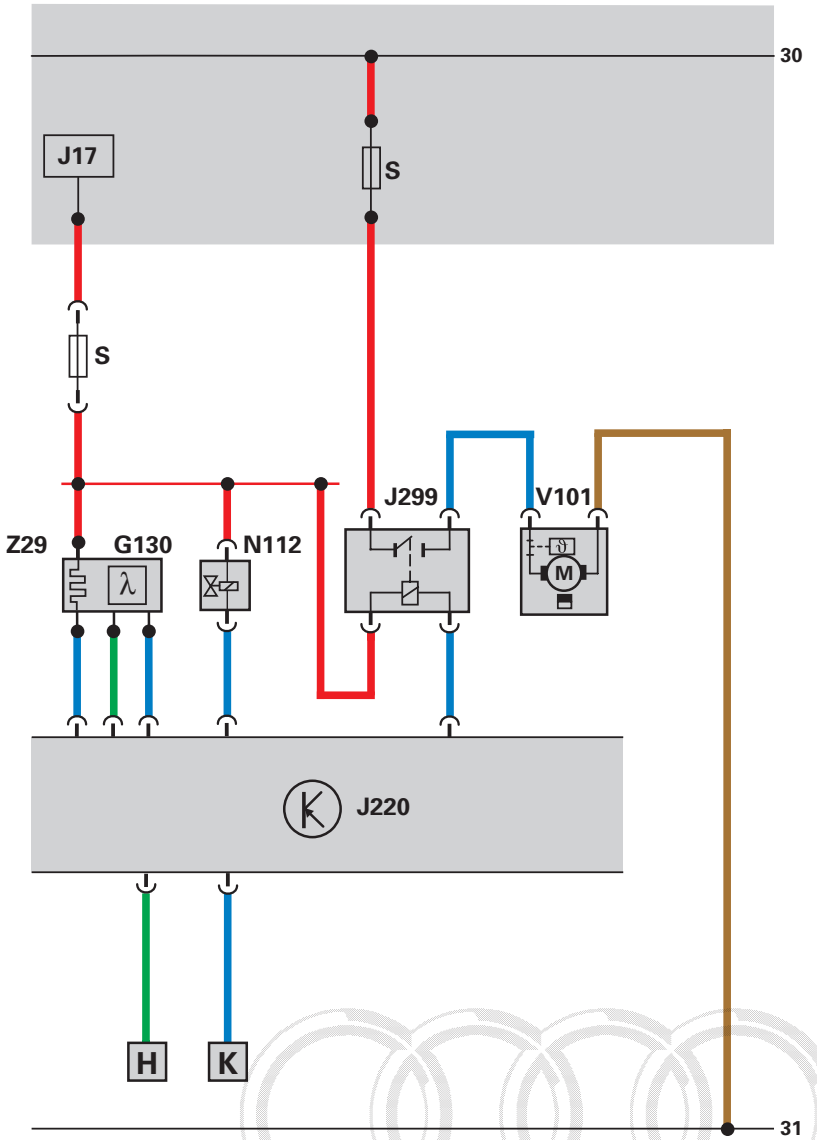
Extended system overview - 1.8-ltr. 165 kW 5V engine



The secondary air system in the 1.8-ltr. 5V engine developing 165 kW ensures that the exhaust emissions comply with the EU III+D3 standard.

A probe will be installed downstream of the catalytic converter to meet the requirements stipulated in EU III.

Extended function diagram - 1.8-ltr. 165 kW 5V engine



SSP207/27

As of series production launch, the 1.8-ltr. 165 kW engine will be equipped with extended system components to ensure it complies with European exhaust emission standard EU II + D3.

The basic version is equivalent to the engine management system used in the 1.8-ltr. engine developing 132 kW (refer to function diagram).

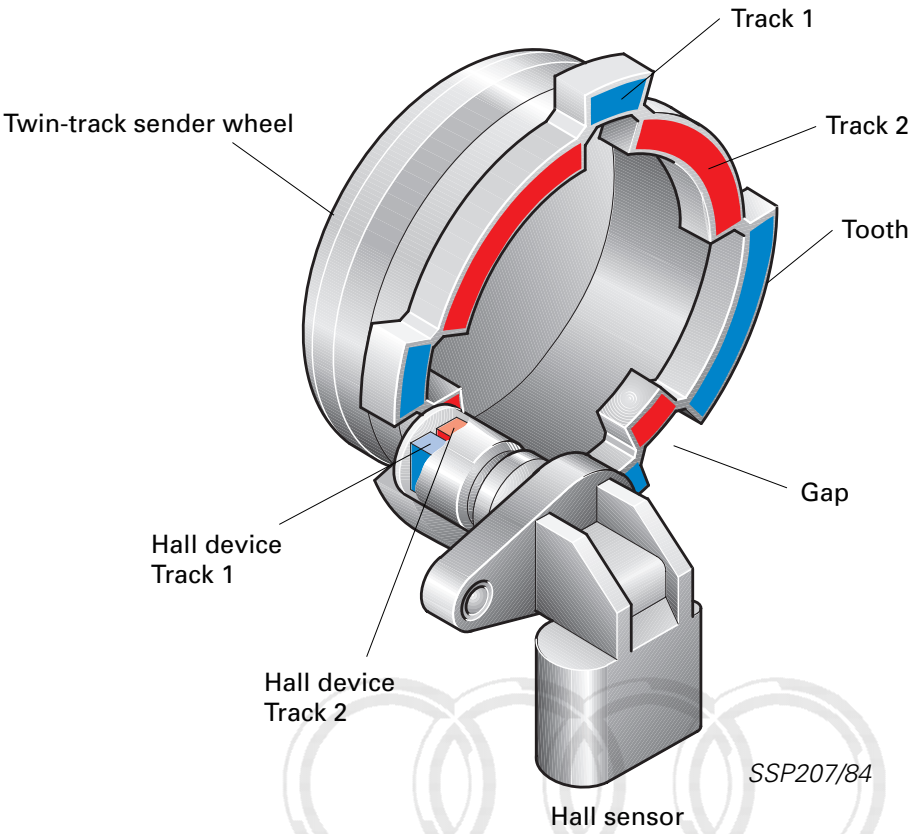
Legend

G130	Lambda probe downstream of catalytic converter when EU III comes into effect
J17	Fuel pump relay
J299	Secondary air pump relay
N112	Secondary air injection valve
V101	Secondary air pump motor
Z29	Heater for lambda probe downstream of catalytic converter when EU III comes into effect
H	Air conditioning PWM signal
K	Fault lamp

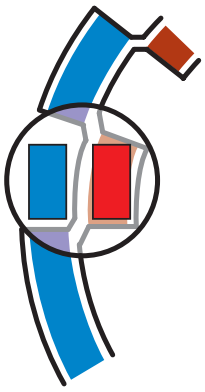
Quick-start sender wheel

The quick-start sender wheel is attached to the camshaft. It supplies a signal which enables the engine control unit to determine the position of the camshaft relative to the crankshaft more quickly and, in combination with the signal which the engine speed sender supplies, to start the engine more quickly.

On previous systems, it was not possible to initiate the first combustion cycle until a crank angle of approx. 600° - 900° was reached. The quick-start sender wheel enables the engine control unit to recognise the position of the crankshaft relative to the camshaft after a crank angle of 400° - 480°.
This allows the first combustion cycle to be initiated sooner and the engine to start more quickly.



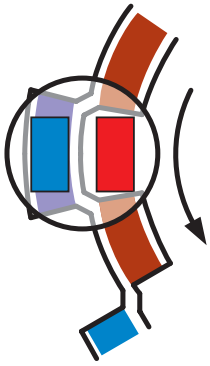
The quick-start sender wheel comprises a twin-track sender wheel and a Hall sensor. The sender wheel is designed so that two tracks are located side by side. In the position where there is a gap in one track, there is a tooth in the other track.



SSP207/85

The control unit compares the phase sensor signal with the reference mark signal and thus ascertains the working cycle currently taking place in the cylinder.

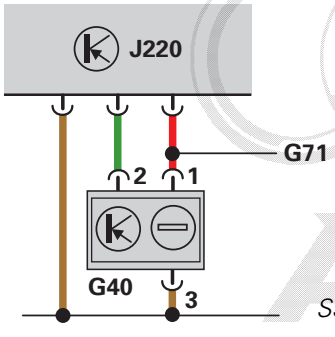
Low phase signal = Compression cycle
High phase signal = Exhaust cycle



SSP207/86

The signal which the engine speed sender G28 supplies enables the injection cycle to be initiated after a crank angle of approx. 440°.

Electrical circuit



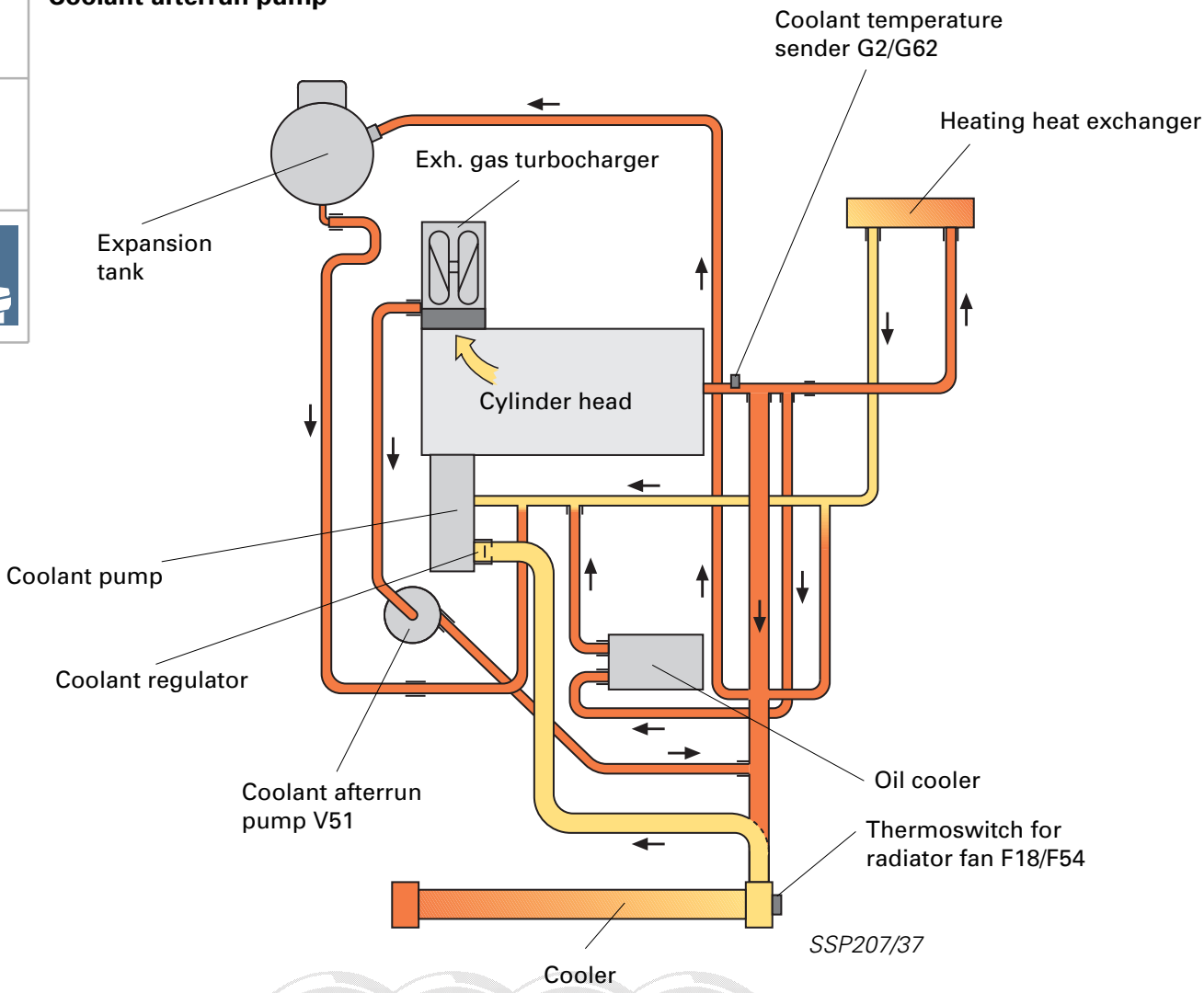
SSP207/87

The Hall sender G40 is connected to the sensor earth terminal of the engine control unit.

Even if the Hall sender fails, it is still possible to start the engine.

Cooling circuit

Coolant afterrun pump

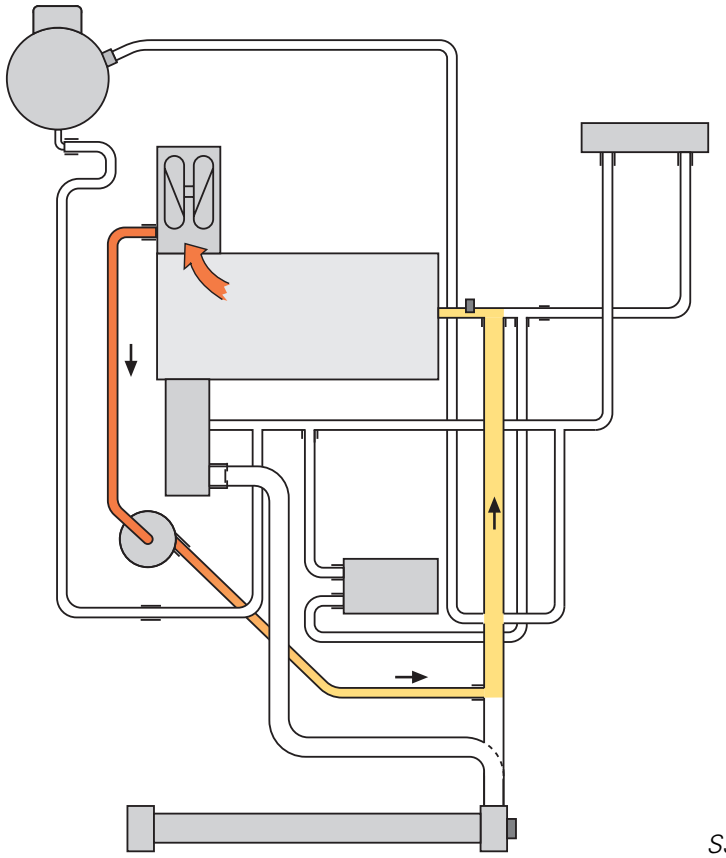


The exhaust gas turbocharger is water-cooled and integrated in the cooling circuit.

When the coolant regulator is open, the coolant flows back to the cooler or coolant pump via cylinder head, exhaust gas turbocharger and coolant afterrun pump, among others.

The coolant afterrun pump protects the coolant against overheating, e.g. after turning off a hot engine.

Coolant afterrun pump V51



SSP207/38

The coolant afterrun pump V51 is attached to the radiator fan housing.

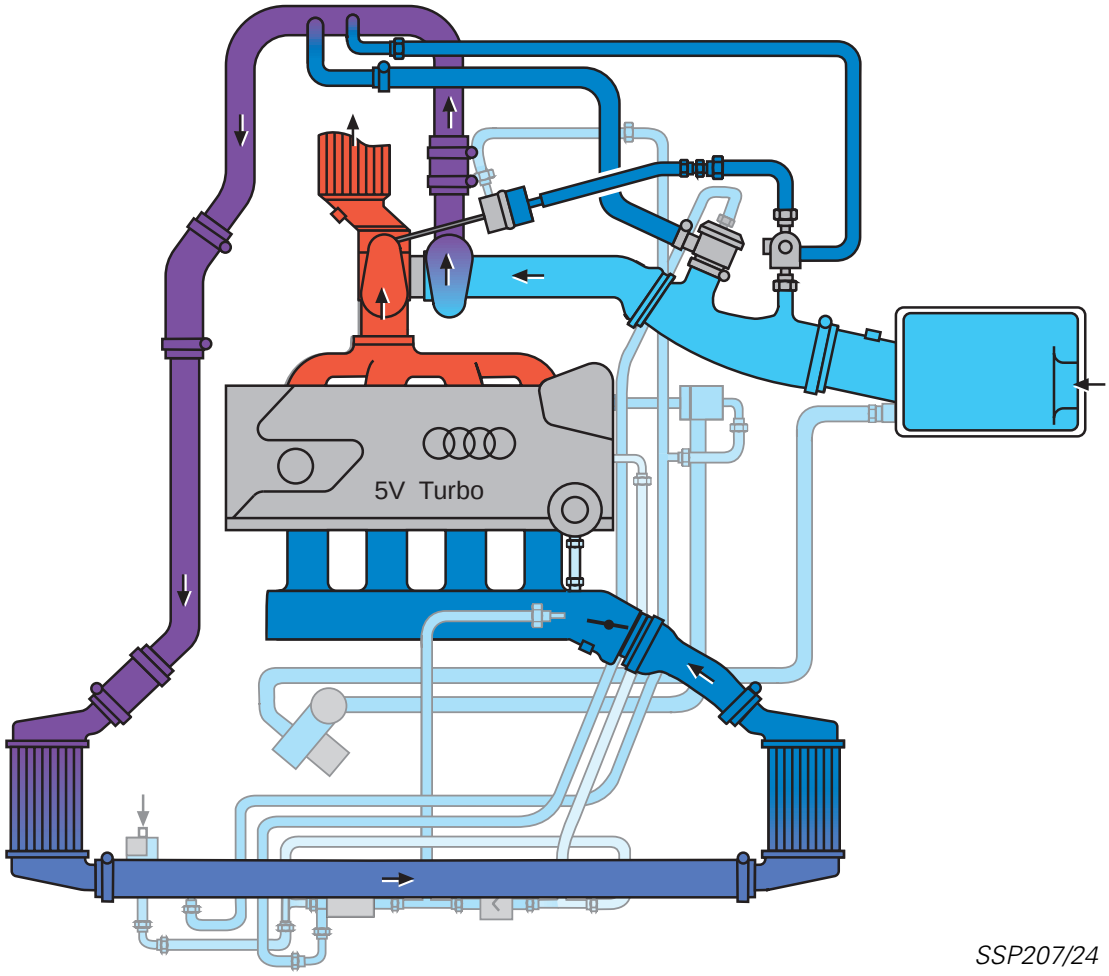
To counteract the thermal loads, and in particular at the exhaust gas turbocharger, the pump V51 starts up when the ignition is turned “On“.

Function in vehicle with air conditioning

The pump starts via radiator fan control unit J293 when the ignition is turned “On“. A timer module integrated in the control unit J293 ensures that the pump V51 runs on for approx. 10 min after the ignition has been switched off.

In vehicles without air conditioning, these functions are implemented by means of a timer relay.

Charging



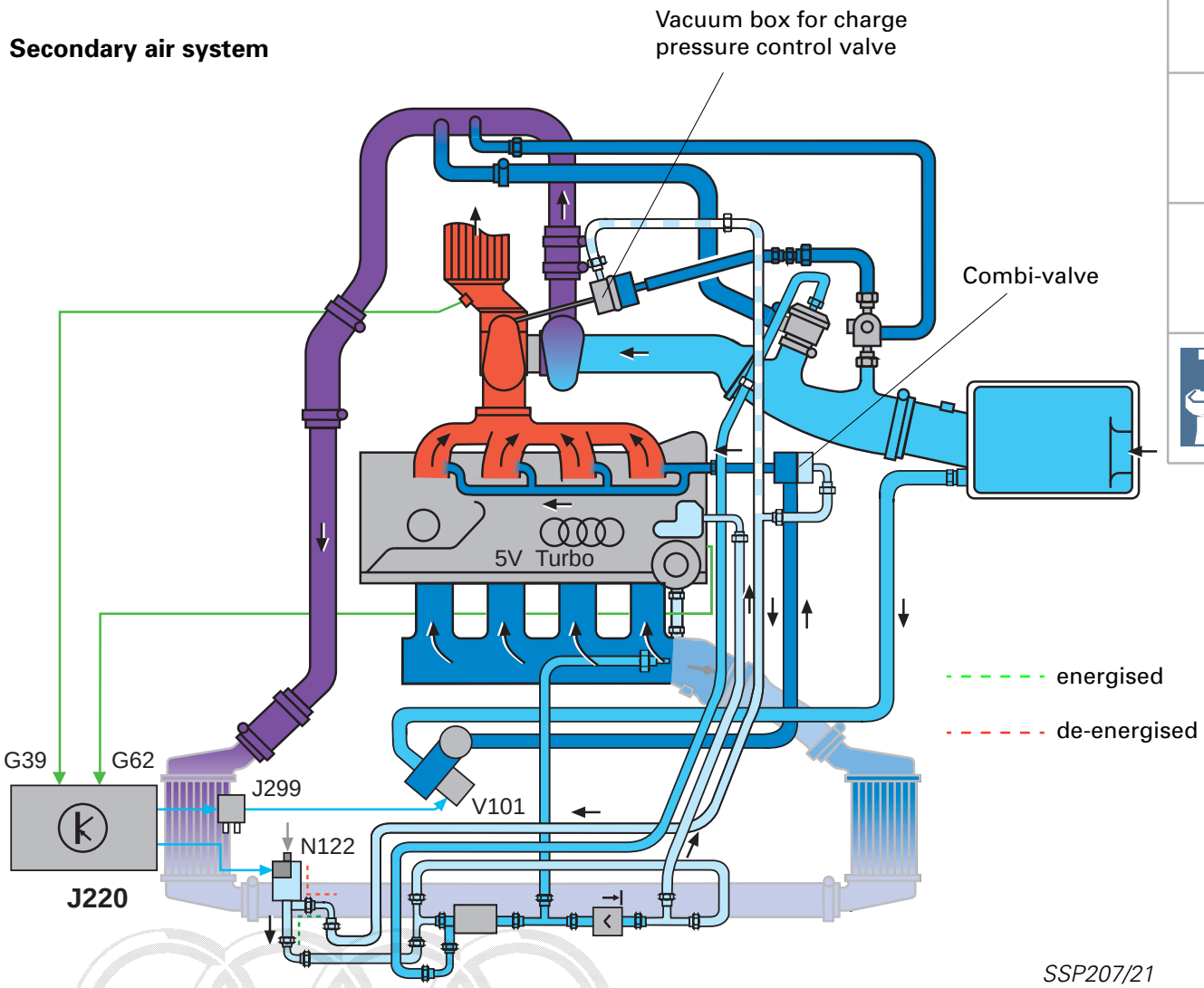
SSP207/24

To increase the power output and torque of the 1.8-ltr. 5V engine to 165 kW, it was necessary to make various design modifications to the basic engine of the Audi TT Coupé developing 132 kW.

A characteristic feature of the engine is its higher air demand, making it necessary to enlarge the diameter of the intake port and exhaust gas turbocharger.

Since the previous charge air cooler was no longer capable of effectively cooling down the increased air flow through the exhaust gas turbocharger, it was necessary to accommodate a second, parallel charge air cooler on the left-hand side of the vehicle.

Secondary air system



SSP207/21

In the cold start phase, the exhaust gases contain a high proportion of uncombusted hydrocarbons.

To improve the exhaust gas composition, these constituents must be reduced. The secondary air system is responsible for this task.

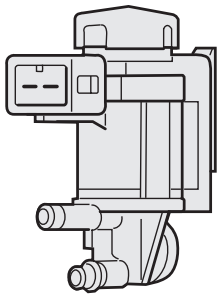
The system injects air upstream of the outlet valves during this phase, thus enriching the exhaust gases with oxygen. This causes post-combustion of the uncombusted hydrocarbons contained in the exhaust gases.

The catalytic converter reaches operating temperature more quickly due to the heat released during postcombustion.

The vacuum box for the charge pressure control valve is controlled in the cold start phase by the electro-pneumatic secondary air control valve N112 while the secondary air system is in operation.

The control pressure acts on the turbocharger waste gate, and the exhaust gas flow is routed past the turbine wheel up to the upper load range.

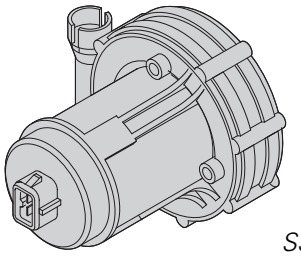
The hot exhaust gases help the secondary air system to quickly heat the catalytic converter up to operating temperature during the cold start phase.



SSP207/16

Secondary air injection valve N112

The secondary air injection valve is an electro-pneumatic valve. It is switched by the Motronic control unit and controls the combi-valve.
To open the combi-valve, the secondary air injection valve releases the intake manifold vacuum.
To close the combi-valve, the secondary air injection valve releases atmospheric pressure.



SSP207/17

Secondary air pump V101

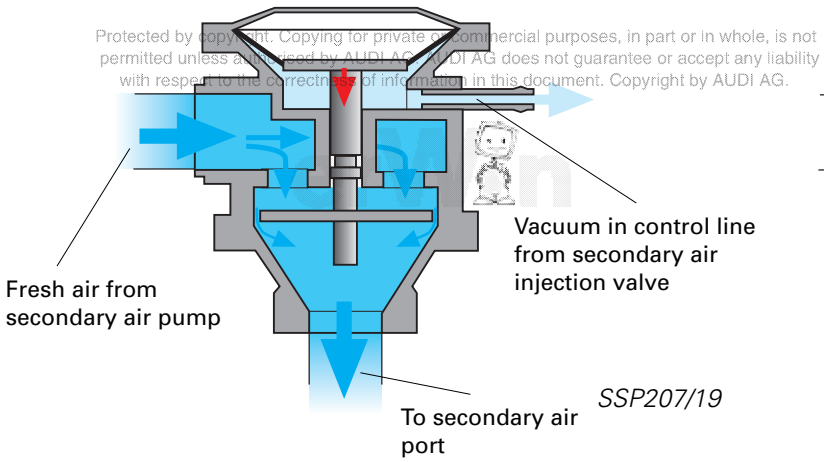
The secondary air pump relay J299 which the Motronic control unit drives switches the electric current for the secondary air pump motor V101. The fresh air which is mixed with the exhaust gases is drawn out of the air filter housing by the secondary air pump and released by the combi-valve.

The combi-valve

The combi-valve is bolted to the secondary air duct of the cylinder head.
The air path from the secondary air pump to the secondary duct of the cylinder head is opened by the vacuum from the secondary air injection valve.

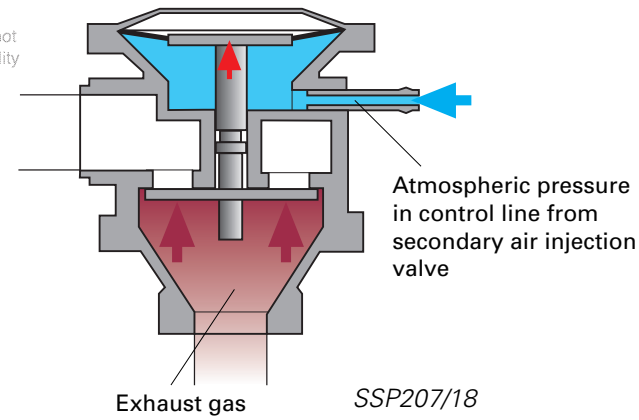
This valve also prevents hot exhaust gases entering and damaging the secondary air pump.

Valve opened



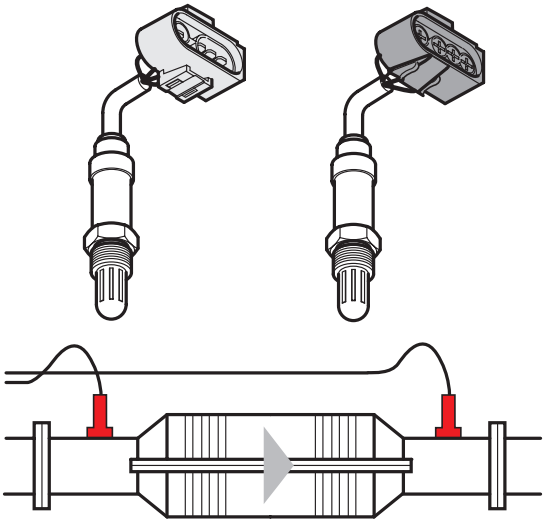
SSP207/19

Valve closed



SSP207/18

Lambda control in EU III 165 kW



SSP207/100

Lambda control in the EU III

An additional lambda probe (G130), which is located downstream of the catalytic converter, was integrated in the system to comply with EU III. Its purpose is to test the function of the catalytic converter.

Depending on vehicle type, the connectors, plug colours and fitting locations are different to help identify the connectors correctly.

What is the purpose of the EU III test?

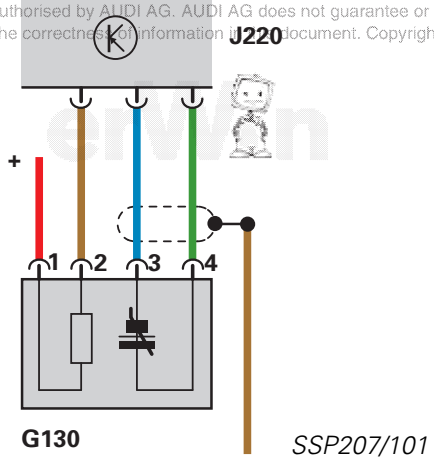
An aged or defective catalytic converter has a lower oxygen storage capacity, which also means that its conversion efficiency is poorer. If the applicable limit values for hydrocarbon content in the exhaust gases are exceeded by a factor of 1.5 in the course of a statutory exhaust emission test, this must be identified via the fault memory.

Catalytic conversion diagnosis

During the diagnosis, the engine control unit compares the probe stresses upstream and downstream of the catalytic converter probe and calculates an upstream-to-downstream ratio.

If this ratio deviates from the nominal range of values, the engine management recognises that the catalytic converter has malfunctioned. After the fault conditions have been fulfilled, the appropriate fault code is saved to the fault memory.

Electrical circuit



SSP207/101

Effects of signal failure

The engine lambda control also operates if the probe downstream of the catalytic converter fails.

The only function which is unavailable if the probe fails is the catalytic converter function test.

In this case, the Motronic cannot execute a functional test on the probe upstream of the catalytic converter either.

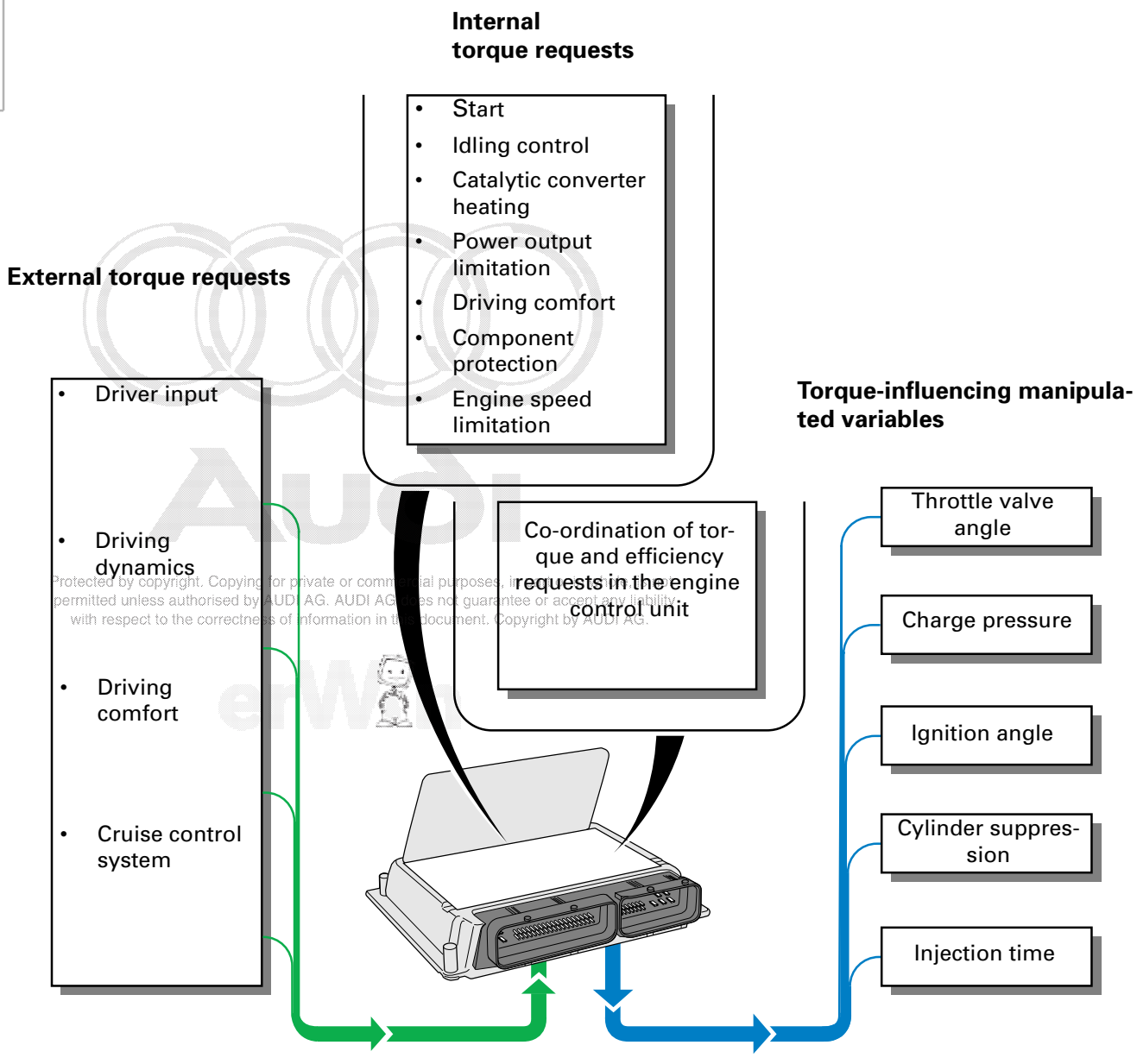
See SSP 175 – On-Board Diagnosis II.

Subsystems of the Motronic

Torque-oriented engine management

The Motronic ME 7.5 has a torque-oriented functional structure.
The new electronic throttle control function makes this possible.

External and internal torque requests are co-ordinated by the engine control unit, making allowance for efficiency and implemented with the available manipulated variables.



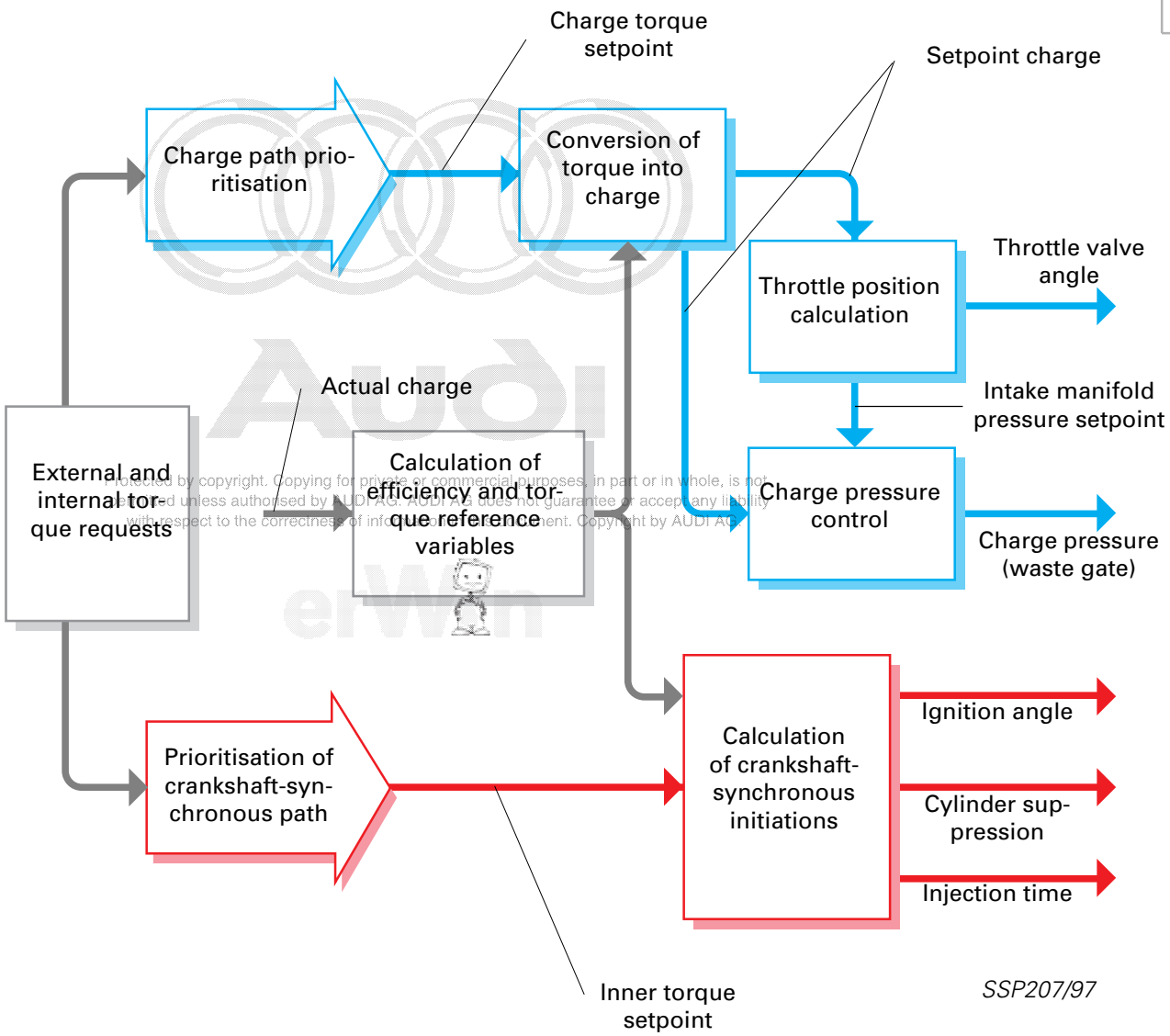
SSP207/96

Torque-oriented functional structure

In contrast to previously known systems, the ME 7.5 is not limited to the output of torque variables to the networked control units (ABS, automatic gearbox). Instead it refers back to the basis of this physical variable when it calculates the manipulated variables.

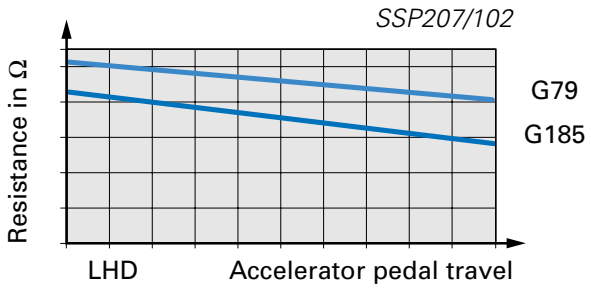
All - internal and external - torque requests are combined to form a nominal torque.

To implement the nominal torque, the manipulated variables are co-ordinated, making allowance for consumption and emission data so as to ensure optimal torque control.

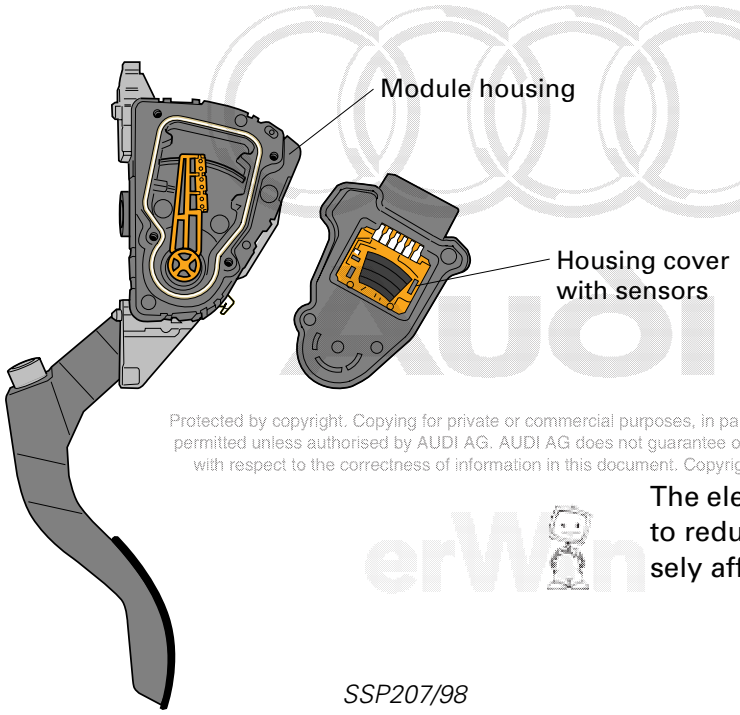


Accelerator position senders G79 and G185

The accelerator position sender transmits the driver inputs to the Motronic.



The accelerator position sender transmits to the Motronic an analogue signal corresponding to the accelerator pedal position. To ensure the functional reliability of the electronic throttle control, the accelerator position sender has two independent potentiometers G79 and G185.
The characteristics are different (refer to diagram).
The control unit monitors the function and plausibility of the two senders G79 and G185. If a sender fails, the other sender acts as a back-up.



SSP207/98

The electronic throttle control function is used to reduce and increase torque without adversely affecting the exhaust emission values.

Torque reduction	Torque increase
• Traction control	• Speed control
• Engine speed limitation	• Engine braking control
• Speed limitation	• Dash pot function
• Power output limitation	• Idling control
• Cruise control system	• Driving dynamics control systems
• Driving dynamics control systems	

Electrically actuated throttle valve (electronic throttle control function)

With Motronic ME 7.5, there is no longer a mechanical throttle control cable between the accelerator pedal and throttle valve. This has been replaced by an electronic control unit (drive-by-wire).

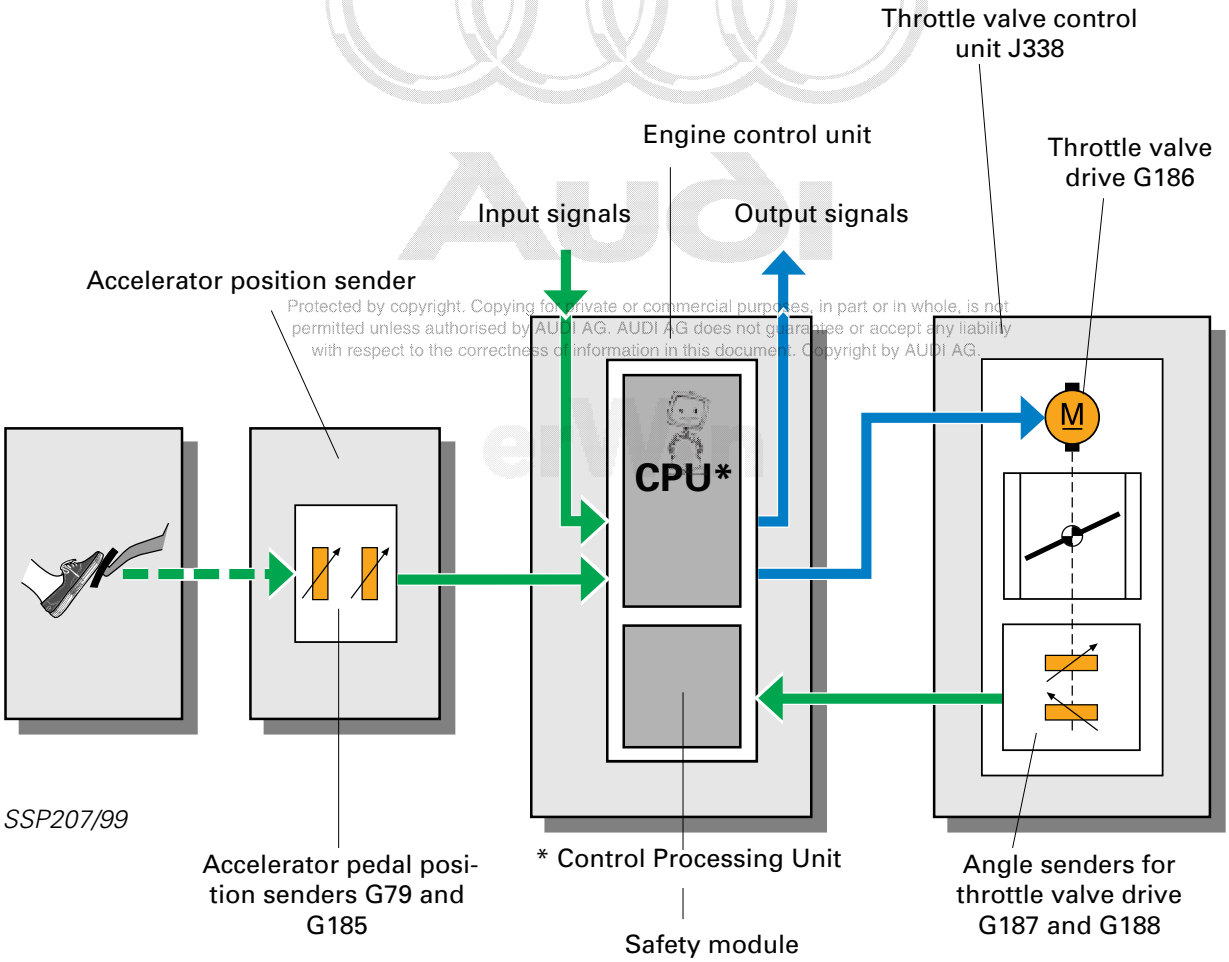
The driver input at the accelerator pedal is registered by the accelerator position sender and transmitted to the engine control unit.

The system comprises the following components:

- Accelerator position sender
- Engine control unit
- Throttle valve control unit

The engine control unit positions the throttle valve via an electric motor. The engine control unit is provided with continuous feedback on the throttle valve position.

Extensive safety measures have been implemented in the hardware and software. For example, dual senders, a safety module and a self-monitoring processor structure are integrated in the electronic throttle control function.



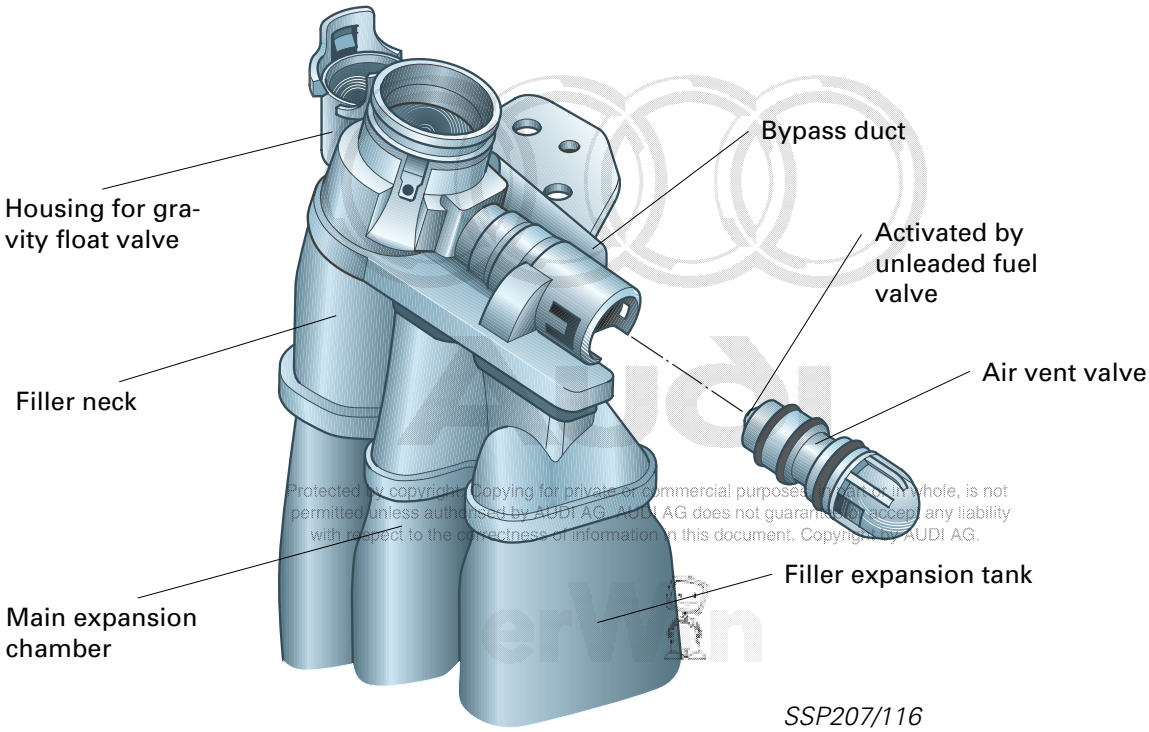
Fuel system

Fuel tanks for vehicles with front-wheel drive and quattro power train

Different fuel tanks are used in the front-wheel drive and quattro versions of the Audi TT. Both fuel tanks are made of plastic and have a capacity of 55 ltr. and 62 ltr. in the front-wheel drive and quattro versions respectively.

The filler neck cannot be separated from the fuel tank.

Air vent valve for vehicles with front-wheel drive and quattro power train

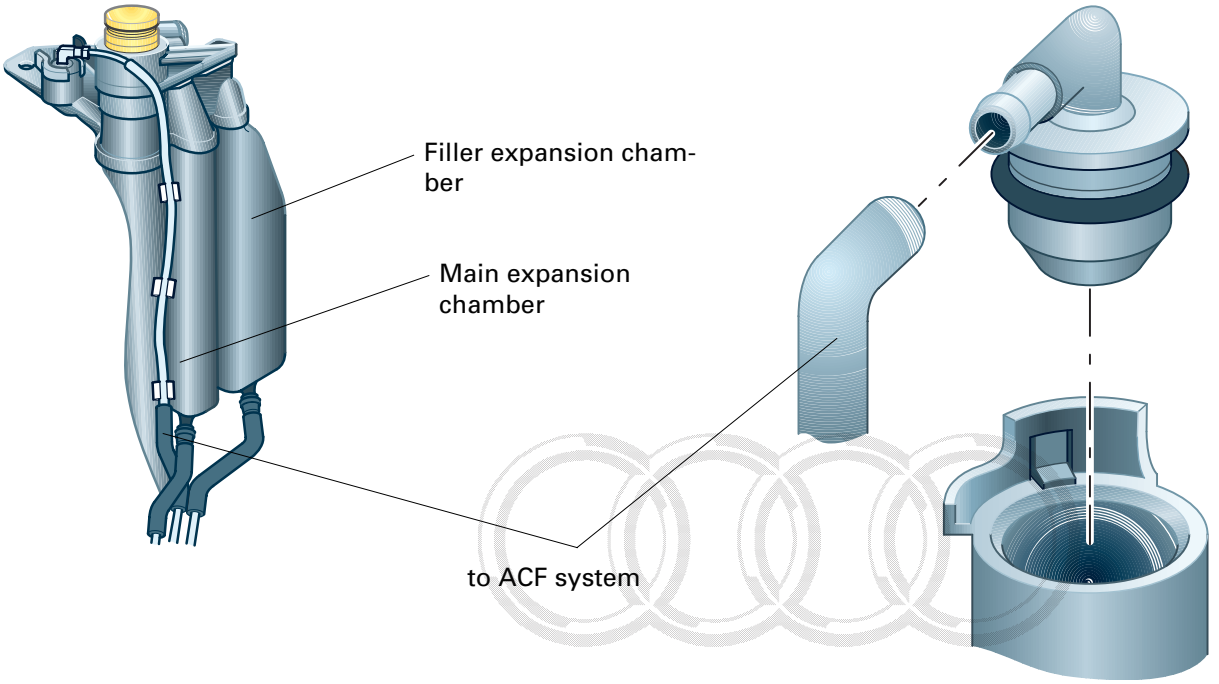


SSP207/116

When refuelling the vehicle, the unleaded fuel valve activates the air vent valve. The valve seals the main expansion chamber so that no fuel vapour can escape from this tank when the vehicle is being refuelled.
The filler expansion chamber is vented by the filler neck.

In the US version and after EU III takes effect, fuel vapours will be routed to the ACF system by an additional vent line connected to the air vent valve while the vehicle is being refuelled.

Gravity float valves for vehicles with front-wheel drive and quattro power train



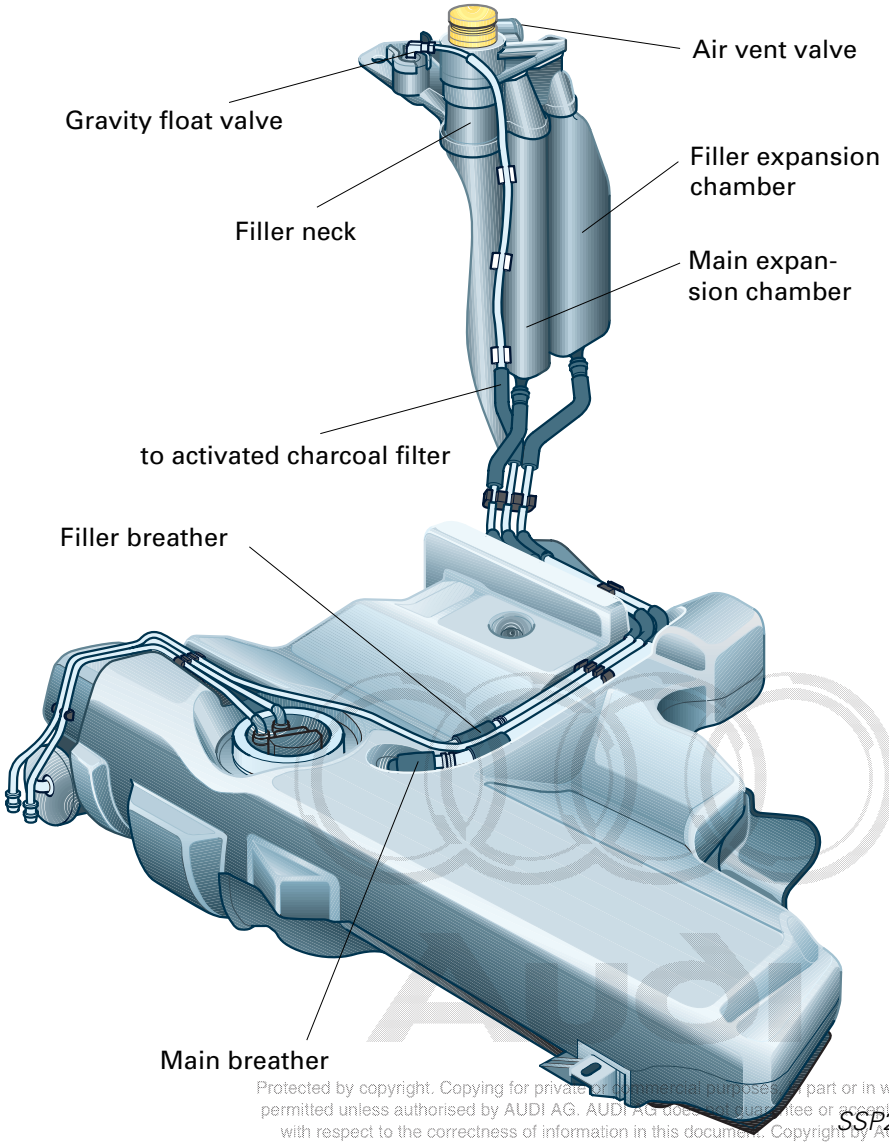
SSP207/117

The gravity float valve prevents fuel from entering into the ACF system when cornering at high speed or if the vehicle rolls over.

The filler expansion chamber as well as the main expansion chamber are combined at the filler neck upper section and purged via the gravity float valve by the ACF system.

Fuel system

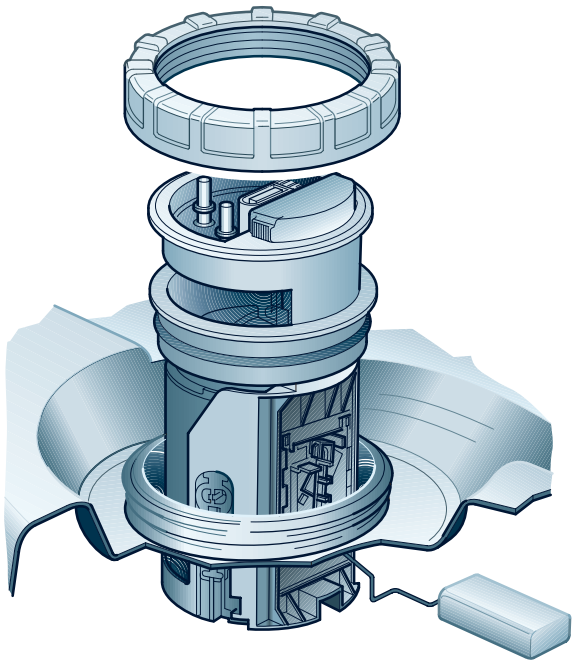
Fuel tank for front-wheel drive version



When refuelling the fuel tank, the gas mixture is conveyed via the filler breather directly into the filler expansion chamber and from here via the filler neck into the atmosphere.

Heat-induced fuel vapours are channelled through the operating vent and collected in the main expansion chamber at the filler neck upper section.

The vapours are conveyed to the activated charcoal filter via the closed filler neck, the bypass at the air breather valve and the gravity float valve.



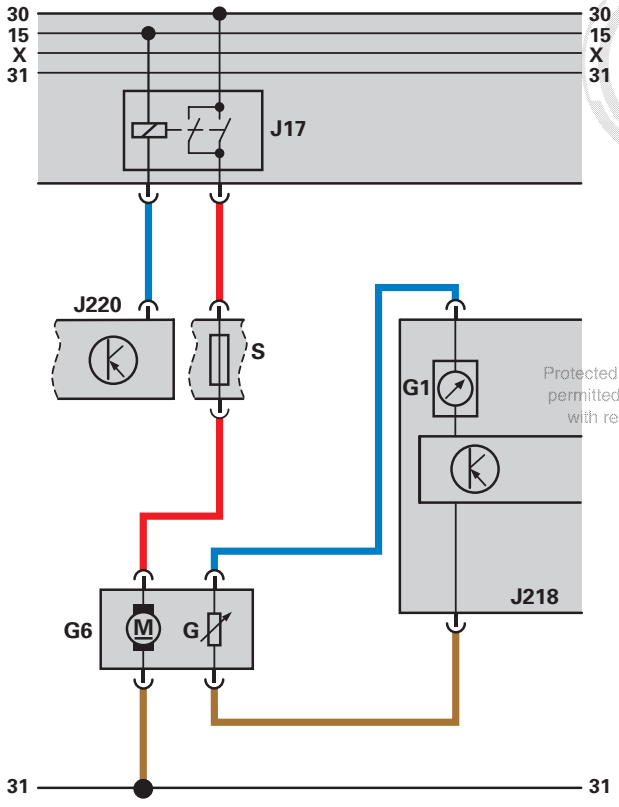
SSP207/119

The fuel is transferred to the engine by a high-performance fuel pump with a pressure increase from 3 to 4 bar.

In the event of a crash, the fuel pump is switched off by the fuel pump relay.

A single-stage fuel pump is used in vehicles with front-wheel drive.

Electrical circuit



SSP207/55

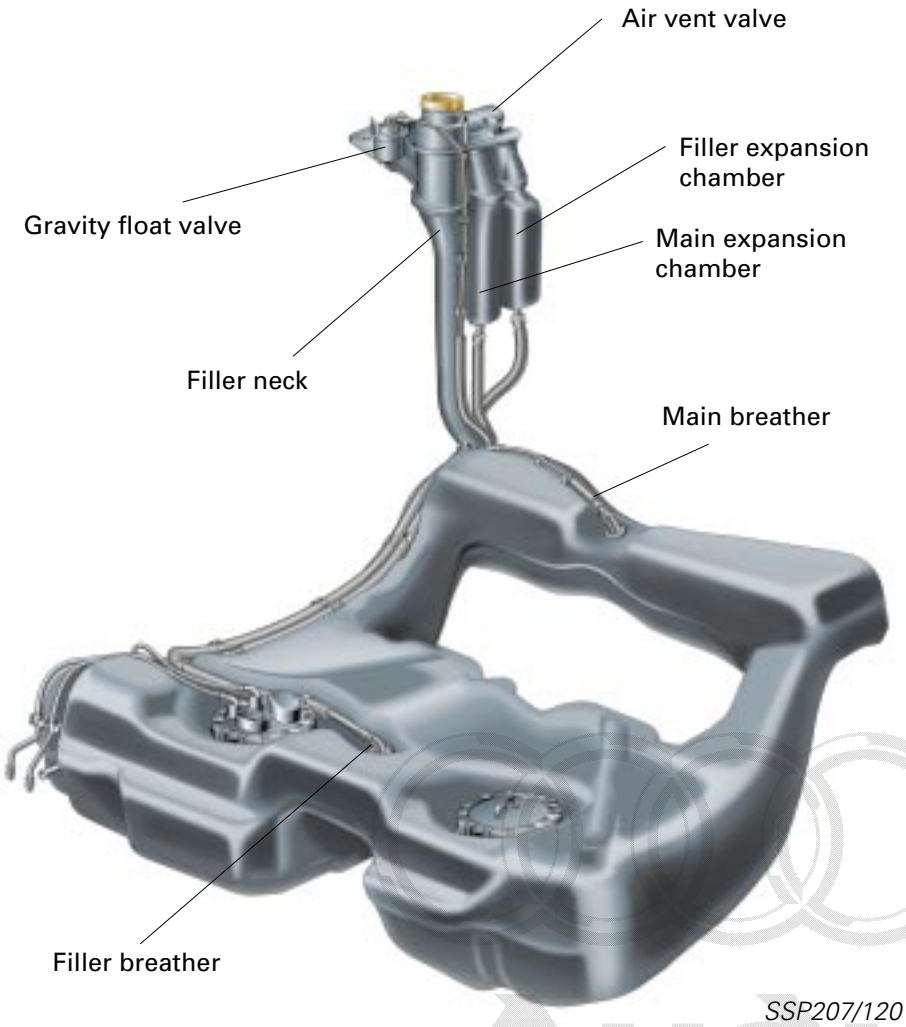
Components

G	Fuel gauge sender
G1	Fuel gauge
G6	Fuel pump
J17	Fuel pump relay
J218	Combi processor in dash panel insert
J220	Motronic control unit
S	Fuse

Fuel system

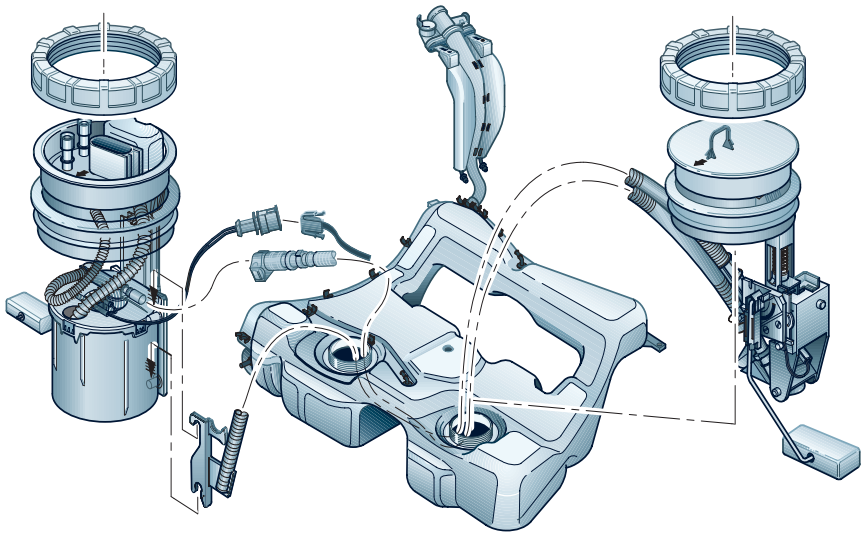
Fuel tank for quattro vehicles

The breather system is designed in the same way as for front-wheel drive vehicles.



SSP207/120

Located in the quattro fuel tank on the left-hand side is a suction jet pump which pumps the fuel from the left-hand fuel tank part upstream of the baffle housing of the fuel delivery unit.



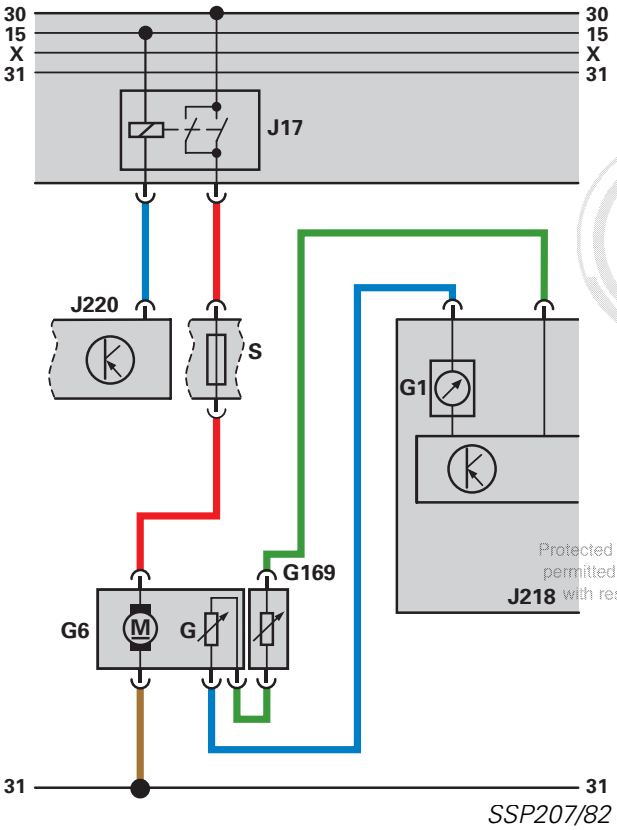
SSP207/121

The suction jet pump is driven by the two-stage fuel pump.

The suction jet pump can only be removed after de-taching the fuel lines and tank sender from the baffle housing.

The fuel lines and left-hand tank sender are connected to the baffle housing in the tank.

Electrical circuit



SSP207/82

Components

G	Fuel gauge sender
G1	Fuel gauge
G6	Fuel pump
G169	Fuel gauge sender 2
J17	Fuel pump relay
J218	Combi processor in dash panel insert
J220	Motronic control unit 2
S	Fuse

The tank senders are connected in series.
$R_1 + R_2 = R_{total}$
Signals are evaluated in the dash panel insert microprocessor.

The senders can be accessed via two openings below the rear seat.
For removing and installing the senders, please follow the instructions given in the Work-shop Manual.

Power transmission

Three gearbox variants are used for power transmission:

132 kW	**AJQ**	5-speed front-wheel drive		2-shaft gearbox	02J.N
		5-speed quattro drive	}	3-shaft gearbox	02M.3
165 kW	**APX**	6-speed quattro drive			02M.1

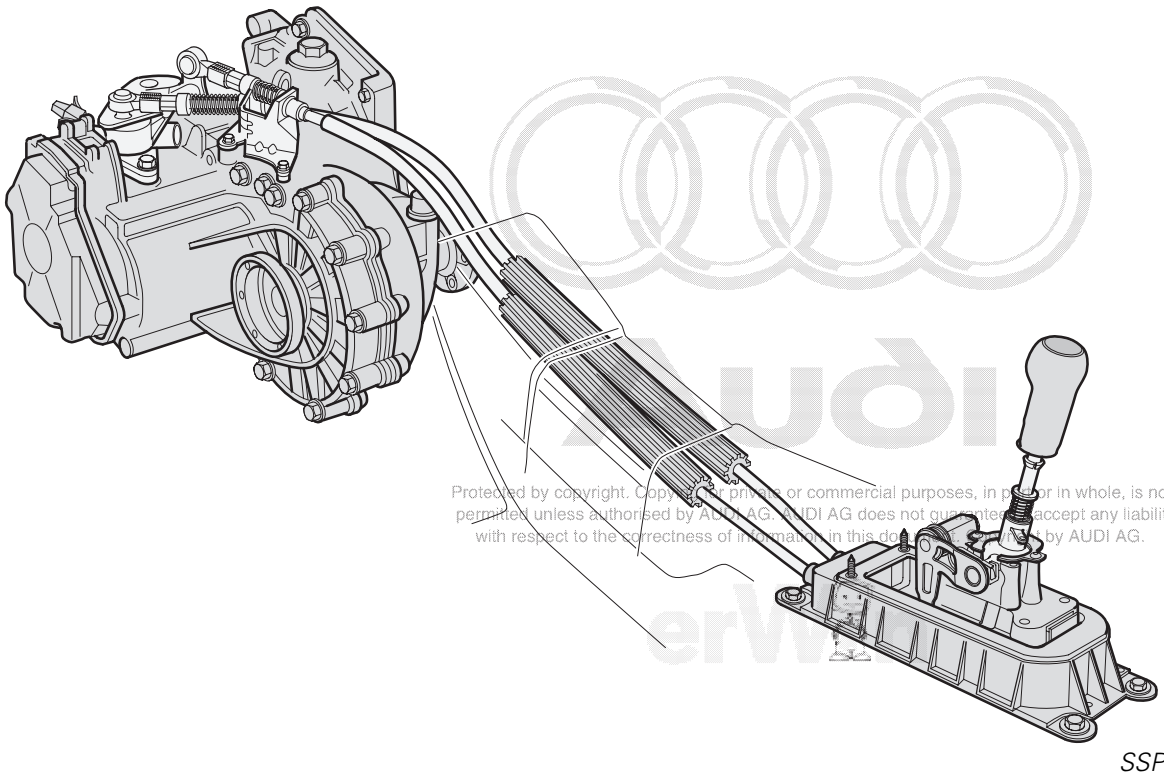
Technical features of the gearboxes

The 5-speed and 6-speed quattro gearboxes are identical as regards their design, whereby the change gear for 6th gear in the 5-speed gearbox has been replaced with a spacer sleeve.

4 manual shift gates are used for the 5- and 6-speed variants (an optimal layout is possible for both versions).

5-speed manual gearbox

Compared to the standard version (A3), the 5-speed front-wheel drive version has a modified ratio, a re-inforced differential with flange shaft adaptation and triple roller joint shaft. The gearbox was modified in the selector shaft area (standardised gear change linkages used), and the gear lever of the sporty version of the TT has been adapted.



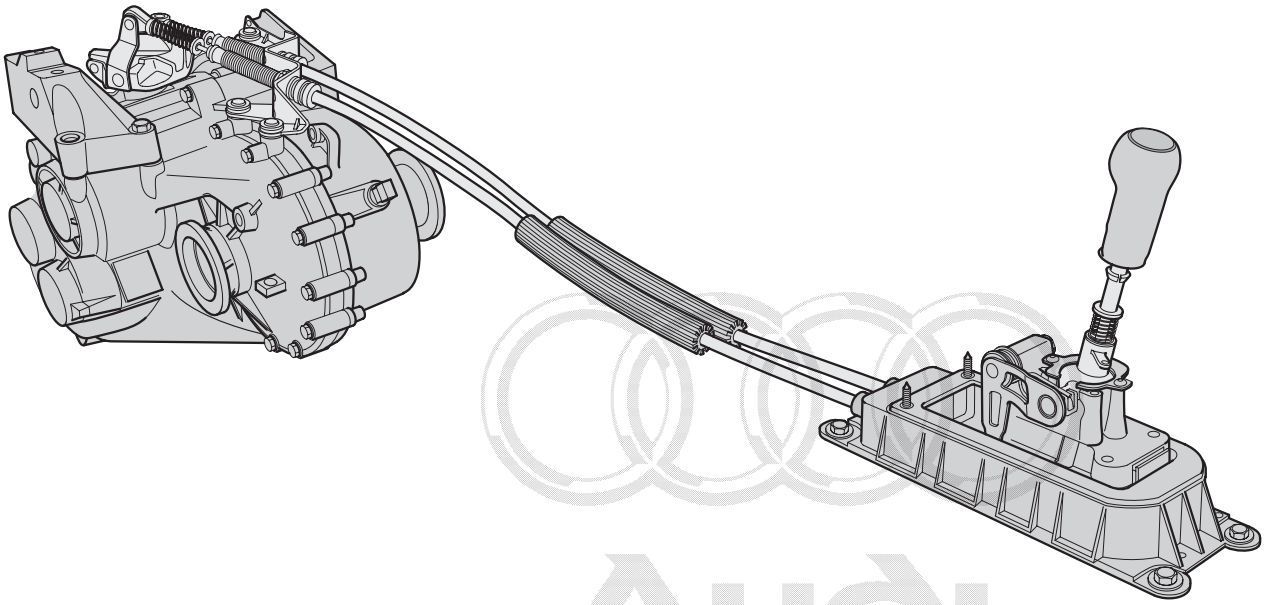
SSP207/124

6-speed manual gearbox
3 shafts

The triple-shaft design permits a space-saving and highly compact design.

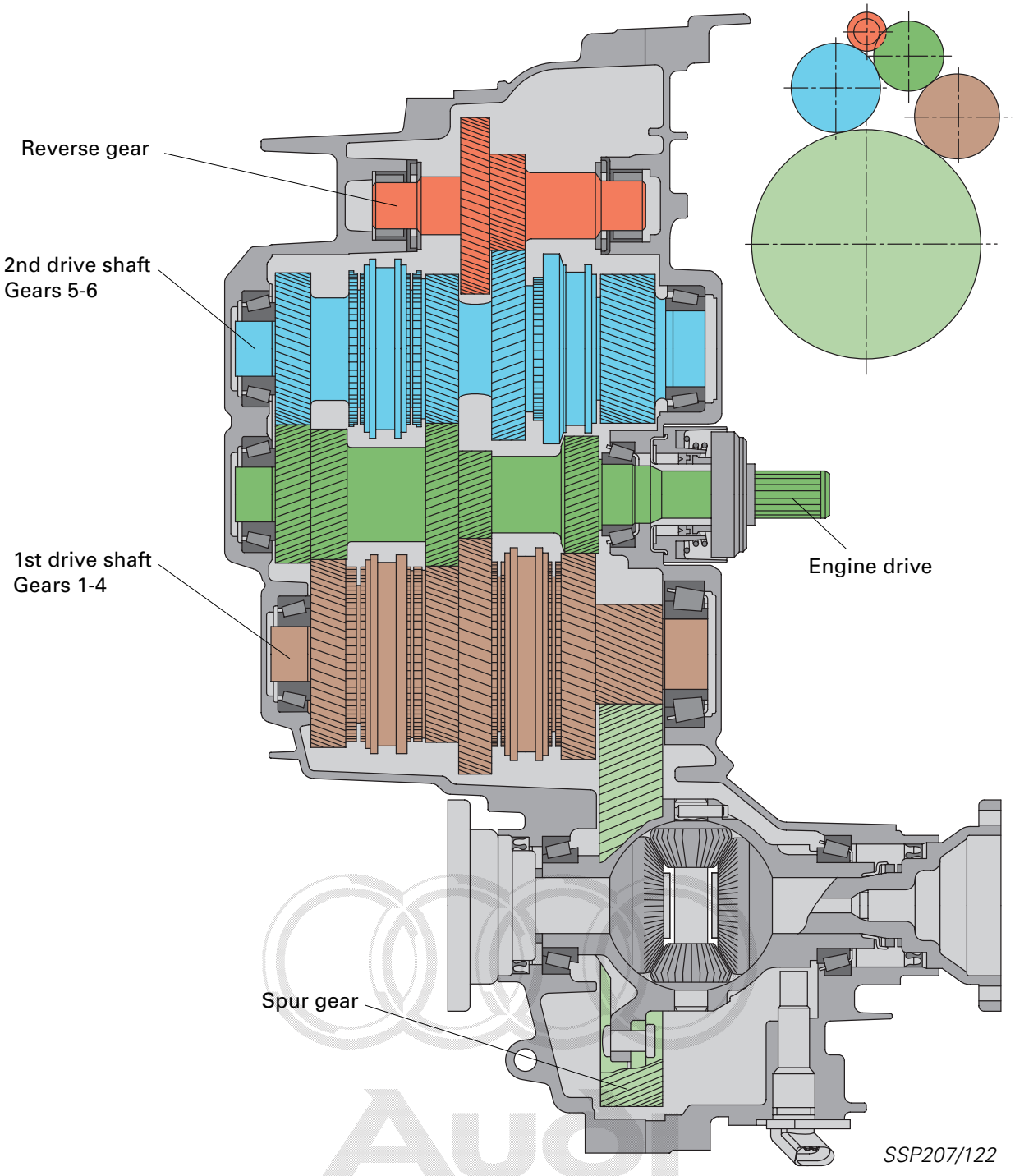
A distinction is made between two gearbox variants, the variant for vehicles with front-wheel drive and the variant for vehicles with four-wheel drive (quattro). Both variants differ from one another as regards their attachment points and oil penetration points.

The use of magnesium as a housing material results in a weight reduction of 30% due to its lower density (aluminium has a density of 2.695 g/cm^3 and magnesium has a density of 1.738 g/cm^3).



SSP207/54

3-shaft gearbox MQ 350 in 6-speed version

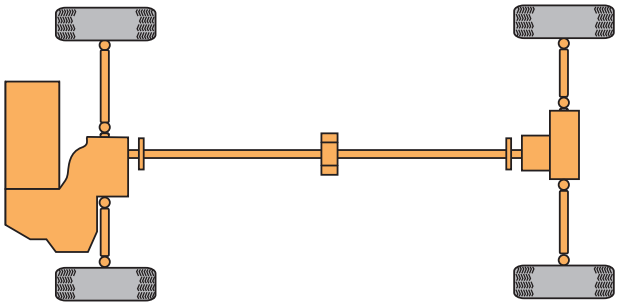


The spur gear is riveted to the differential. If repair work is necessary, the spur gear must be bolts.

For more detailed information on the manual gear-boxes, see SSP 205.

Notes

Haldex viscous coupling

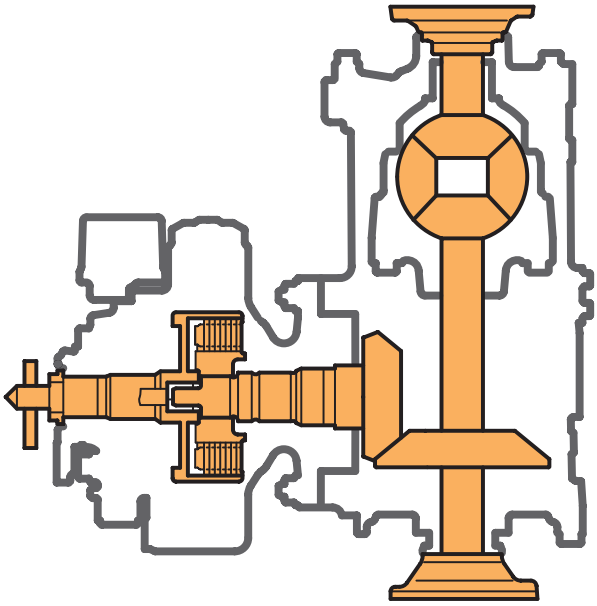


SSP207/28

The four-wheel power train used in the Audi TT Coupé quattro is a logical progression on the proven four-wheel drive concept.

A new feature of the power train is the slip-dependent force distribution control on both axles by means of a Haldex viscous coupling.

The manual gearbox transmits the engine output directly to the front axle and simultaneously via an angle gear and the propshaft to the Haldex viscous coupling flanged to the rear axle drive.



SSP207/29

The rear axle drive is composed of the Haldex viscous coupling, the axle drive and the differential.

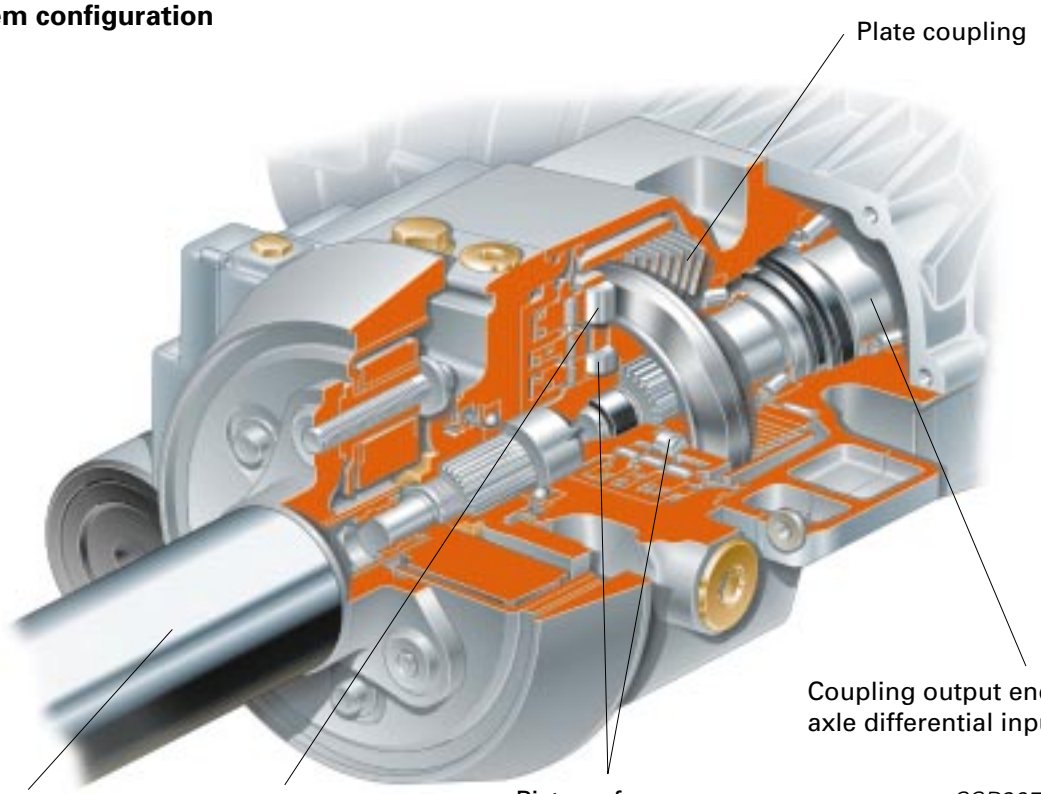
The transmitted torque is dependent on the speed difference between the front and rear axles.

Also, the torque transmission parameters are defined in the software (variable torque transmission control adapted to the driving situation).

Advantages of the Haldex viscous coupling:

- Permanent four-wheel drive is fully automatic for the driver
- Permanent four-wheel drive at engine speeds higher than 400 rpm
- Controllable four-wheel drive system, the characteristic curve is not constant
- High rear axle drive torque of up to 3200 Nm
- Acceleration with high directional stability
- Handling is neutral with a slight tendency to understeer
- No restrictions on towing when the axle is raised off the ground
- Communication via CAN-BUS

The system configuration



The Haldex viscous coupling is accommodated in a closed housing and mounted in front of the rear axle drive.

The input shaft and the output shaft are separate.

These shafts are connected via a plate coupling running in oil.

The coupling package comprises inner and outer plates, which are connected to the input shaft and output shaft respectively.

Arranged around the shaft at the coupling input end are a working piston and two parallel annular piston pumps with a single annular piston each.

The housing is filled with oil and hermetically sealed against the atmosphere.

The plate coupling which runs immersed in oil represents a closed system.

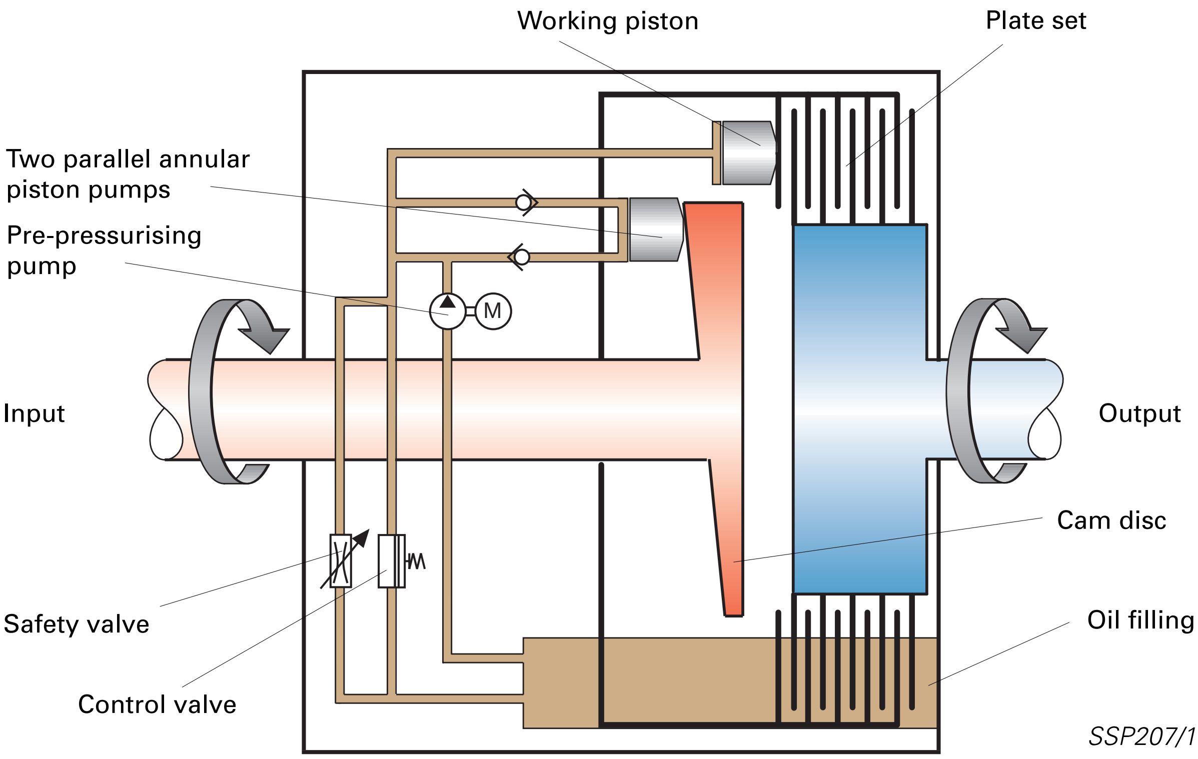
It has its own oil circuit, hydraulic components, an electrohydraulic control valve and an electrical control unit.

The system is electrically linked to the on-board CAN databus.

The rear axle is a rear differential.

Power transmission

The hydraulics



SSP207/12

Torque is transmitted to the rear axle drive by means of the plate coupling .

The necessary coupling pressure is generated via the two annular piston pumps. The annular piston (also known as axial piston) is driven by an axial piston pump.

The speed at which this pump rotates is the difference between coupling input and output speeds.

An even pressure curve is ensured by three phase-shifted pump strokes.

The annular pistons runs in floating bearings. They are driven by the pressure generated by the pre-pressurising pump (an electrically driven gear pump).

The pre-pressurising pump only operates if the ignition has been turned on and engine speed is greater than 460 rpm.

In the event of a breakdown, this means that the vehicle can be towed without the engine running and with the axle raised off the ground.

Torque is developed at the coupling depending on the driving situation.

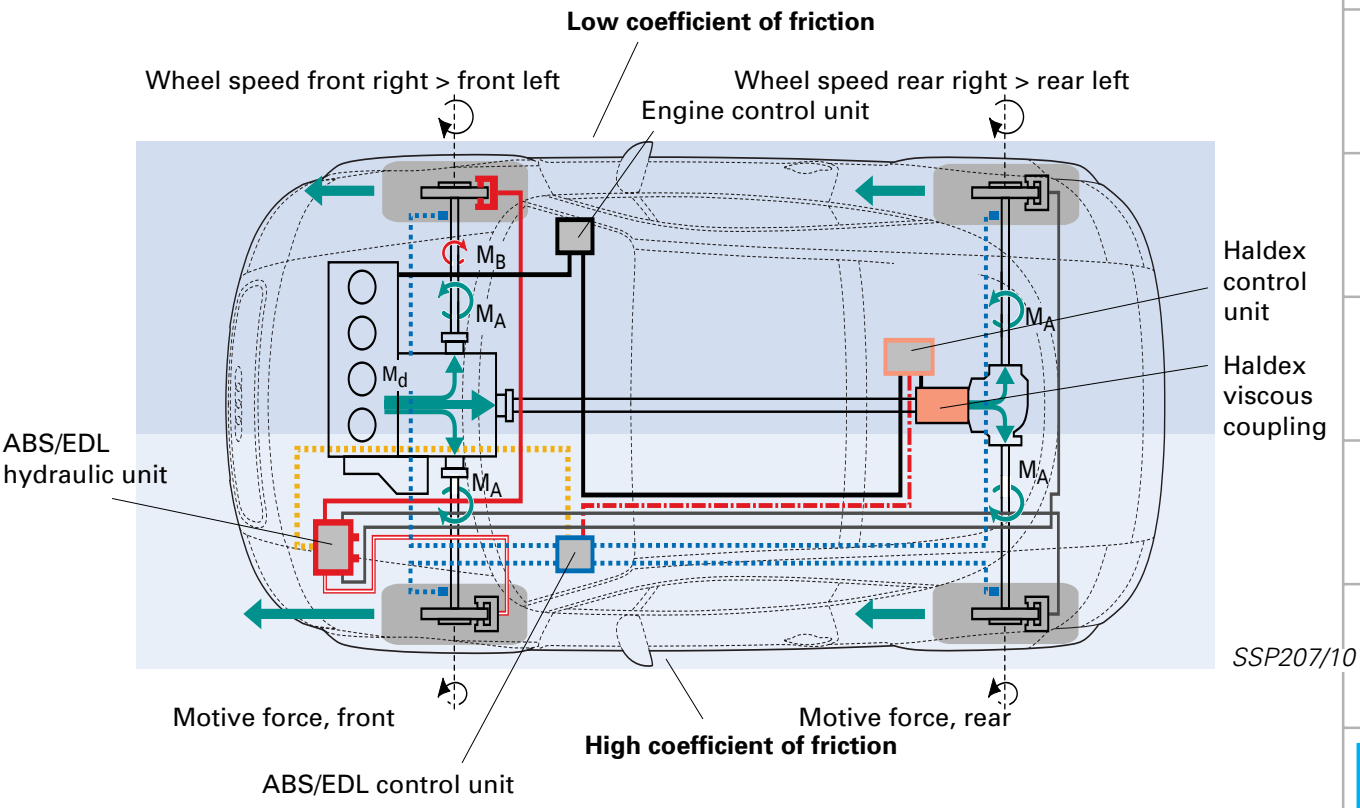
Pressure modulation is induced by means of the control valve (hydraulic proportional valve), whose opening cross-section is altered by a slide valve.

The slide valve is activated by a rack and a stepping motor.

The control unit together with its software are located in the immediate vicinity of the stepping motor.

A safety valve opens at very higher inner pressure to prevent the coupling from being damaged.

The control system



The Haldex viscous coupling does not have any sensors of its own apart from a temperature sensor (necessary for compensating for temperature-dependent oil viscosity).

The system conditions the signals which the CAN-BUS supplies (ABS/EDL control unit, engine control unit).

These are
- speed of each individual wheel
- engine torque
- engine speed
- driving condition (straight-ahead driving, thrust, braking, ABS)
- accelerator pedal position/throttle valve

The control system can recognise corners, manoeuvring mode, acceleration phase and different wheel circumferences. The stiffness of the Haldex viscous coupling is adjusted according to the recognised driving conditions.

Legend

	ABS/EDL sensor line
	ABS/EDL control line
	Brake line, pressurised
	Brake line, depressurised
M_A	Drive torque per wheel
M_B	Brake torque per wheel
M_d	Engine torque
	Accelerator pedal position, Engine torque, Engine speed
	Wheel speeds

If faulty signals are generated or if CAN messages cannot be received, the vehicle switches to emergency mode.
If speed signals are missing, the coupling is opened fully for safety reasons.

The Haldex viscous coupling is integrated in the vehicle self-diagnosis. Address word: 22 – 4wd electronics.

Running gear

Steering

The safety steering column is adjustable for rake and reach as standard.

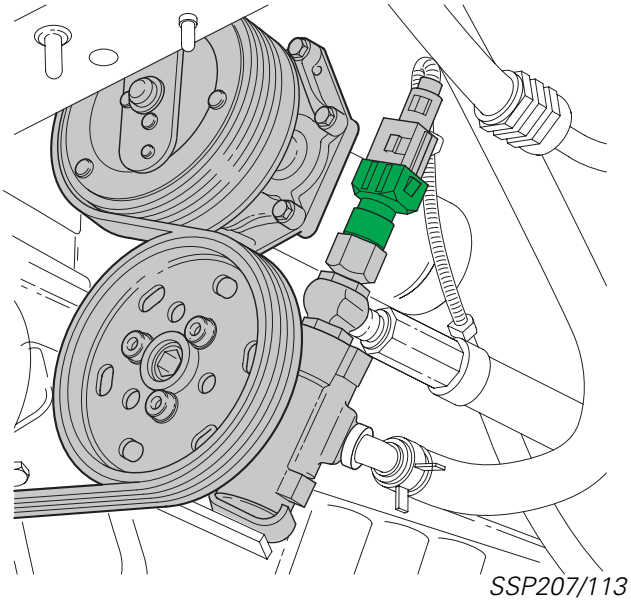
SSP207/2

The maintenance-free rack and pinion steering gear is power-assisted. The steering gear stroke is transmitted directly to the swivel bearing due to the fact that the track rods are optimally attached to the steering arm. Consequently, the steering is direct.

A steering damper reduces the influence of impacts and vibrations which are transmitted from the wheels to the steering gear.

The vibration-optimised attachment of the steering column to the dash panel cross-member keeps the steering wheel free of undesirable vibrations.

Pressure switch for power steering



SSP207/113

The pressure switch for power steering is located on the vane pump. It informs the engine control unit when the vane pump is subjected to a load.

The vane pump is driven by the engine by means of a the ribbed V-belt. At full steering lock, the vane pump generates a pressure. This also places a higher load on the engine, and idling speed can drop sharply. The signal which the pressure switch generates enables the engine control unit to recognise engine loading in time and to regulate engine torque at idling speed.

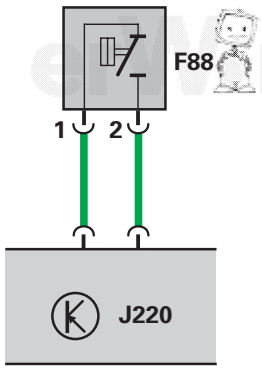
This is how it works:

As steering forces increase, the pressure switch closes and sends a signal to the engine control unit.

Without steering wheel movement, the pull-up integrated in the engine control unit is at +5 V.
When the pressure switch is closed, the engine is connected to earth.

The ME 7.5 determines itself how engine torque is to be increased at idling speed, in order to counteract the load (e.g. ignition angle correction towards “retard“).

Electrical circuit



SSP207/83

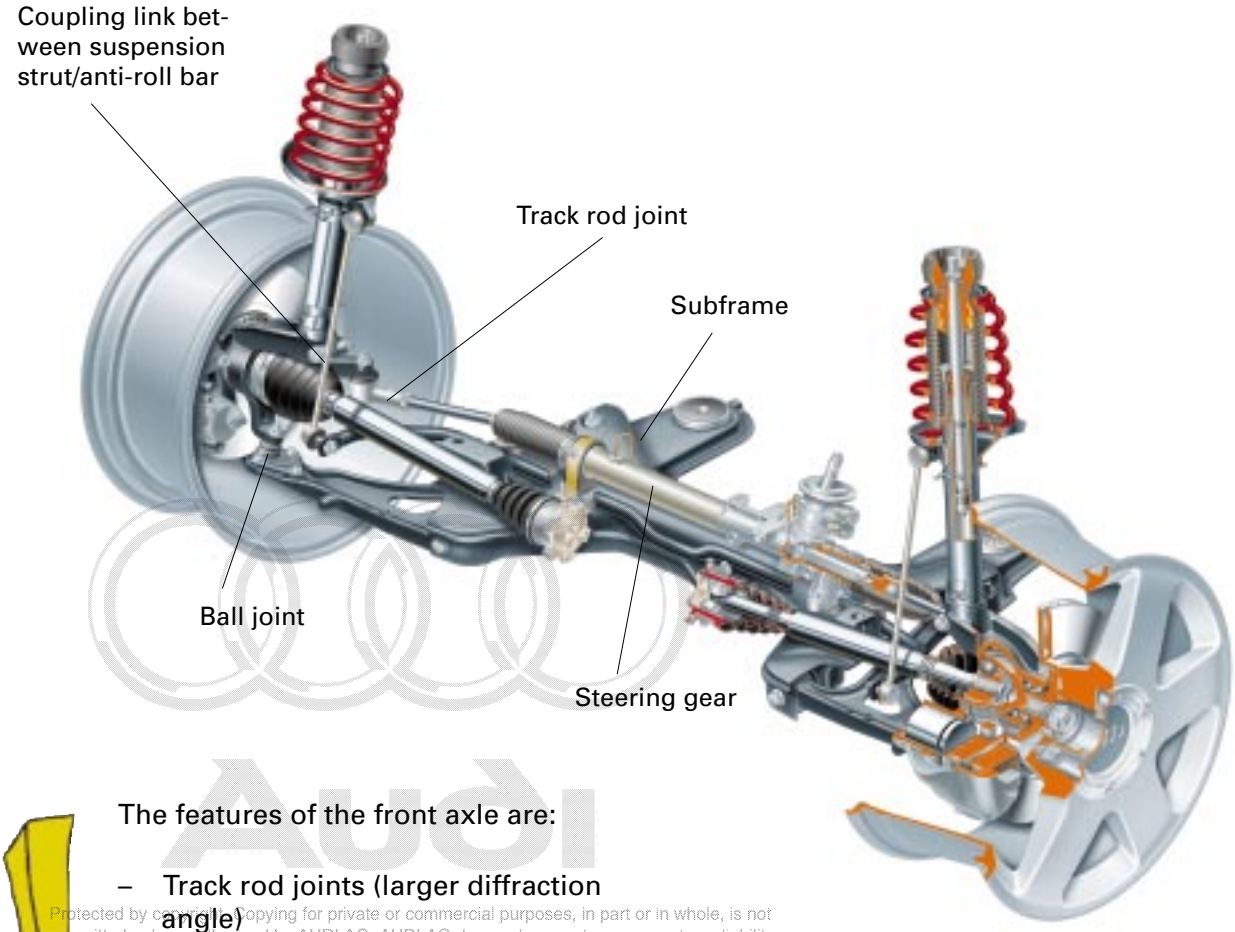
Components

J220 Engine control unit
F88 Pressure switch for power steering

Front axle

Incorporating double wishbones, subframe and transverse anti-roll bar, the McPherson strut axle is designed as a sports suspension.

To enhance track stability, newly developed cast steel-swivel bearing with modified track rod attachments as well as a new forged cross-member are used.



SSP207/3

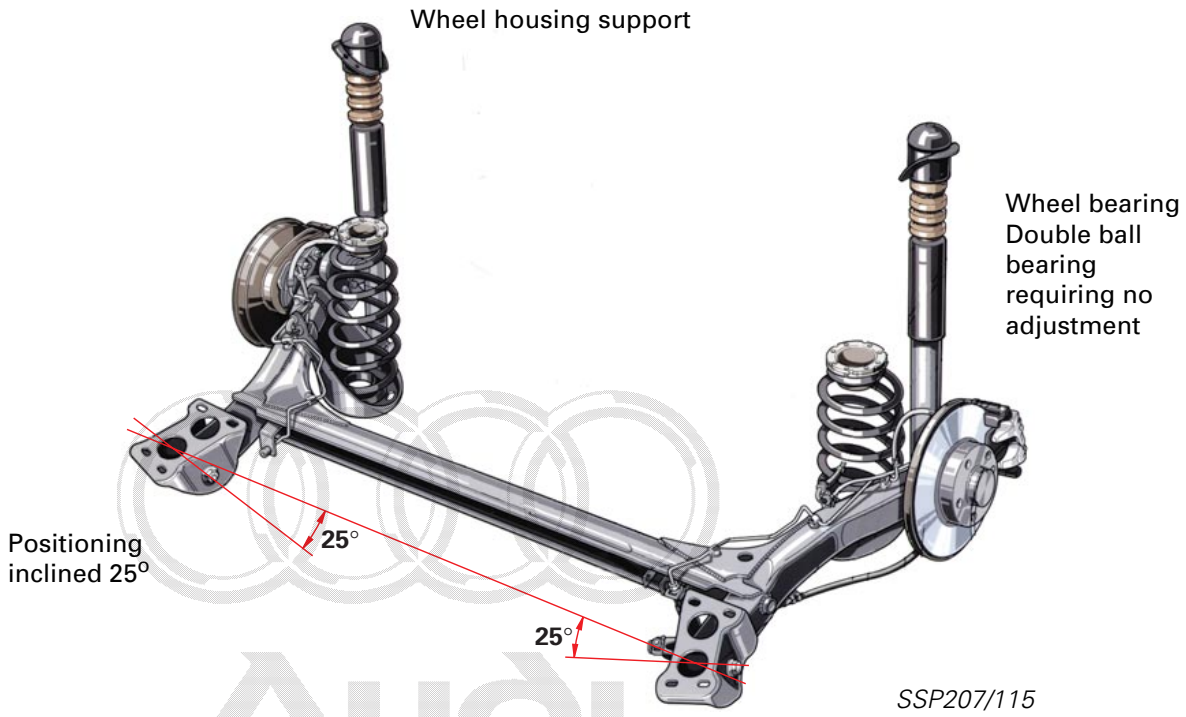
The features of the front axle are:

- Track rod joints (larger diffraction angle)
- Ball joint is reinforced by thicker journals
- The subframe is rigidly bolted to the aluminium bush
- The suspension strut attachment to the anti-roll bar ensures better response

Rear axle

Front-wheel drive

Torsion beam axle with anti-roll bar



- Track width: 1507 mm
- Modified axle plates for increased camber and modified toe-in
- Track-correcting axle bearing

The self-steering effect of the rear axle is more favourable thanks to the bearing inclination of 25°.

Due to the rear axle inclination, the side forces which occur when cornering are transmitted favourably to the bearing and from the bearing to the body.

The shock absorbers are supported in the wheel housing and the coil springs are supported below the side member.

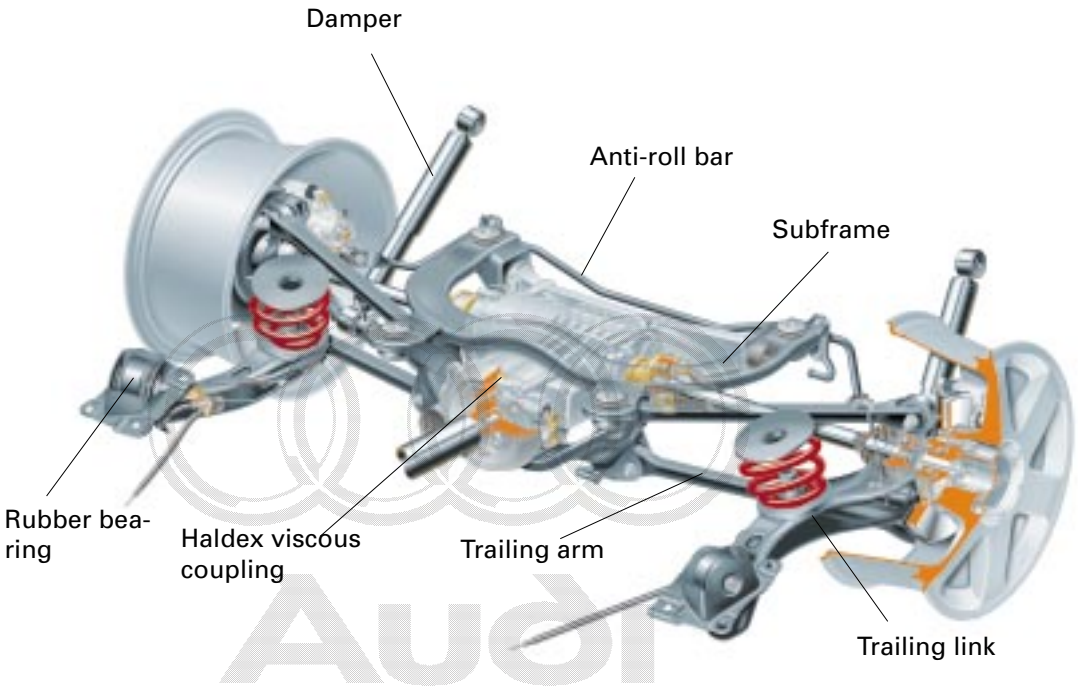
The axle is stabilised by a tubular anti-roll bar.

Due to the separate layout of the springs and shock absorbers, the vehicle has a large luggage compartment and driving noise inside the passenger cabin is reduced (sound insulation).

Rear axle

Quattro drive

Dual link trailing arm axle (DLTA) with Haldex viscous coupling



SSP207/4

– The dual link trailing arm axle is fixed via the subframe (4-point attachment) and each of the track-correcting wishbones attached to the trailing link.

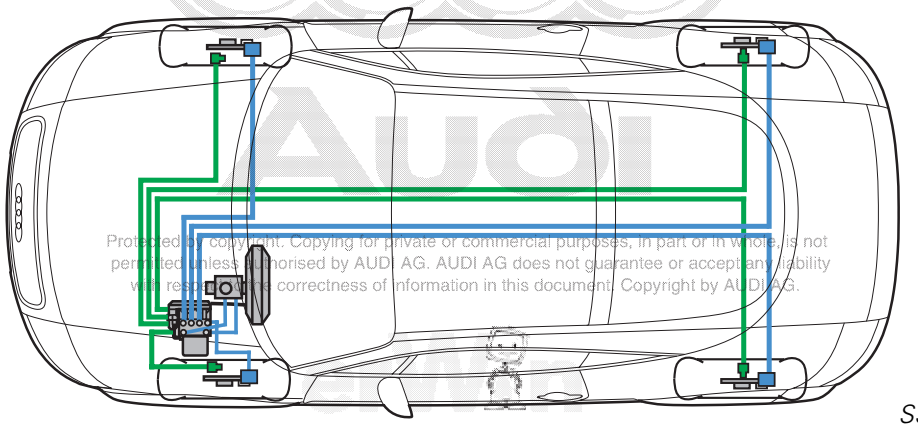
– For stabilisation purposes, a transverse anti-roll bar is located on the axle subframe.

– Fitting position of damper (approx. 45°)

New tool for mounting rear wheel bearings.

Brake system

132 kW	165 kW
Diagonal-split dual circuit brake system Anti-lock Braking System (ABS) with electronic brake force distribution (EBFD)	
Traction Control System (TCS)	
Disc brakes at front and rear	
Ventilated at front	Ventilated at front and rear
Brake servo	
10“	10“



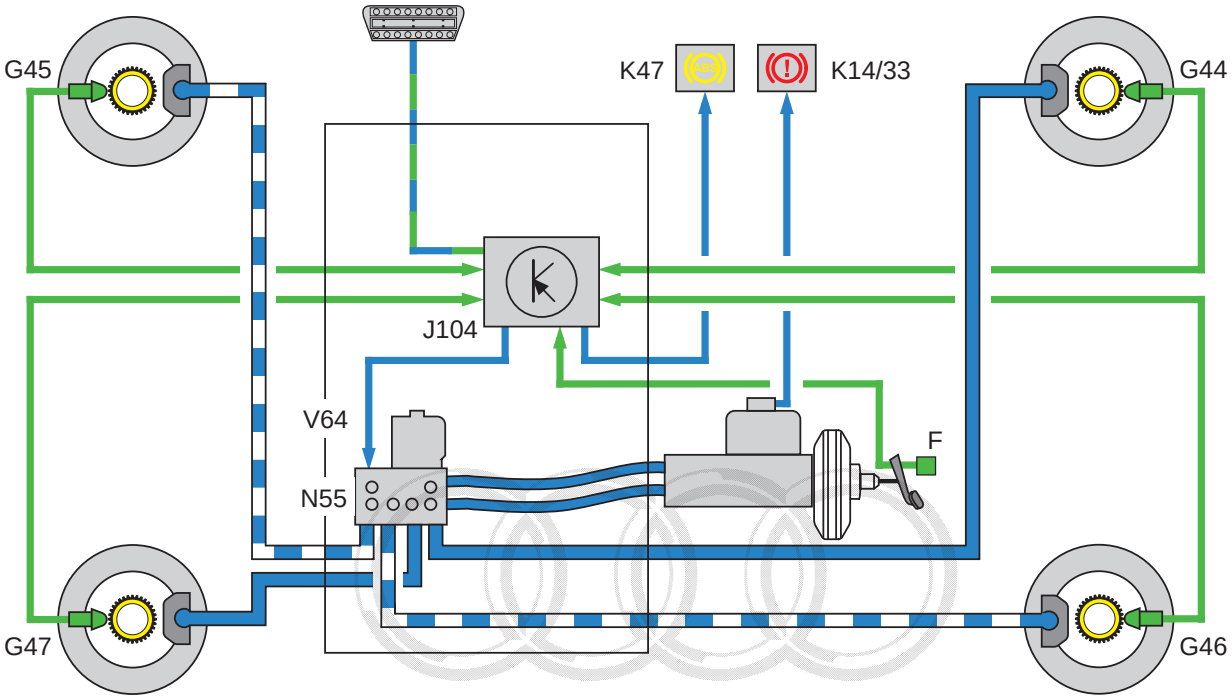
SSP207/42

– The electronic brake force distribution (EBFD) regulates the brake pressure acting on the rear wheels via the ABS control unit so that they cannot be overbraked.
The EBFD control is suppressed when the ABS control takes effect.

– The electronic differential lock (EDL) provides assistance with driving away on slippery surfaces.
Spinning wheels are braked automatically and the drive torque is diverted to the wheel which has traction.

– The Traction Control System (TCS) prevents the driven wheels from spinning by reducing engine torque (by adjusting the ignition angle and intermittently switching off the injection valves).

Anti-lock Braking System
ABS ITT/Mark 20 IE



SSP207/31

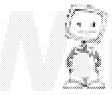
For a brief description of the components, please refer to function diagram

Brake circuit
Brake circuit
Output signals
Input signals

The basis of the ABS system is a dual-circuit brake system. The brake circuits are laid out diagonally and supply the front left, rear right, front right and rear left wheels.

A separate brake line running from the 4-channel system of the hydraulic unit is assigned to each wheel.

The EBPD is entirely software-supported and does not require any hardware.

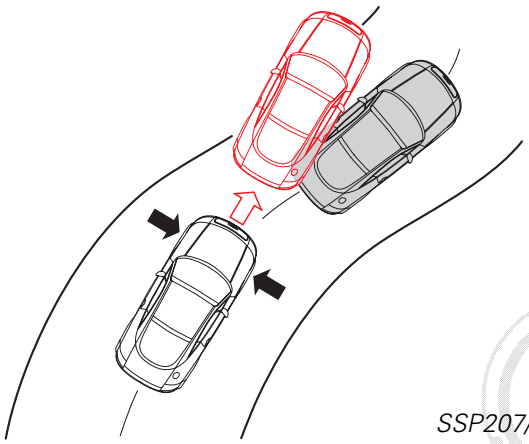


Fault recognition in the ABS system is via warning lamps (visual contact) and by means of the self-diagnosis (diagnostic unit).

Electronic stability brake system - ESBS

The electronic stability brake system improves the track stability and steerability of braked vehicles by applying each brake as required.

It utilises the sensors and actuators of the ABS system.
ESBS is a software development in the ITT Mark 20 IE control unit.



SSP207/94

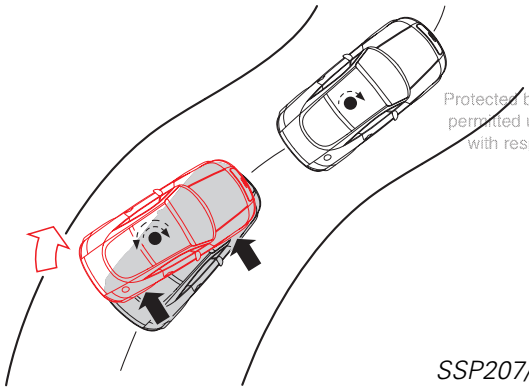
Brake application

Vehicle movement when understeer occurs

Understeer

If a vehicle understeers during a braking operation, this means that the maximum cornering grip of the wheels has been exceeded. The vehicle will slide towards the outside of the corner over the front axle.

The ABS control unit recognises this situation from the circumferential speed of the wheel. The brake pressure acting on the front axle is thus reduced in order to increase cornering grip. The vehicle stabilises itself and follows the direction in which the vehicle is steered.



SSP207/95

Brakes application

Vehicle movement when oversteer occurs

Vehicle vertical axis

Yaw moment

Counteracting yaw moment

Oversteer

If the vehicle oversteers during a braking operation, this means that the maximum cornering grip of the rear wheel has been exceeded. The vehicle breaks away towards the outside of the corner over the rear axle.

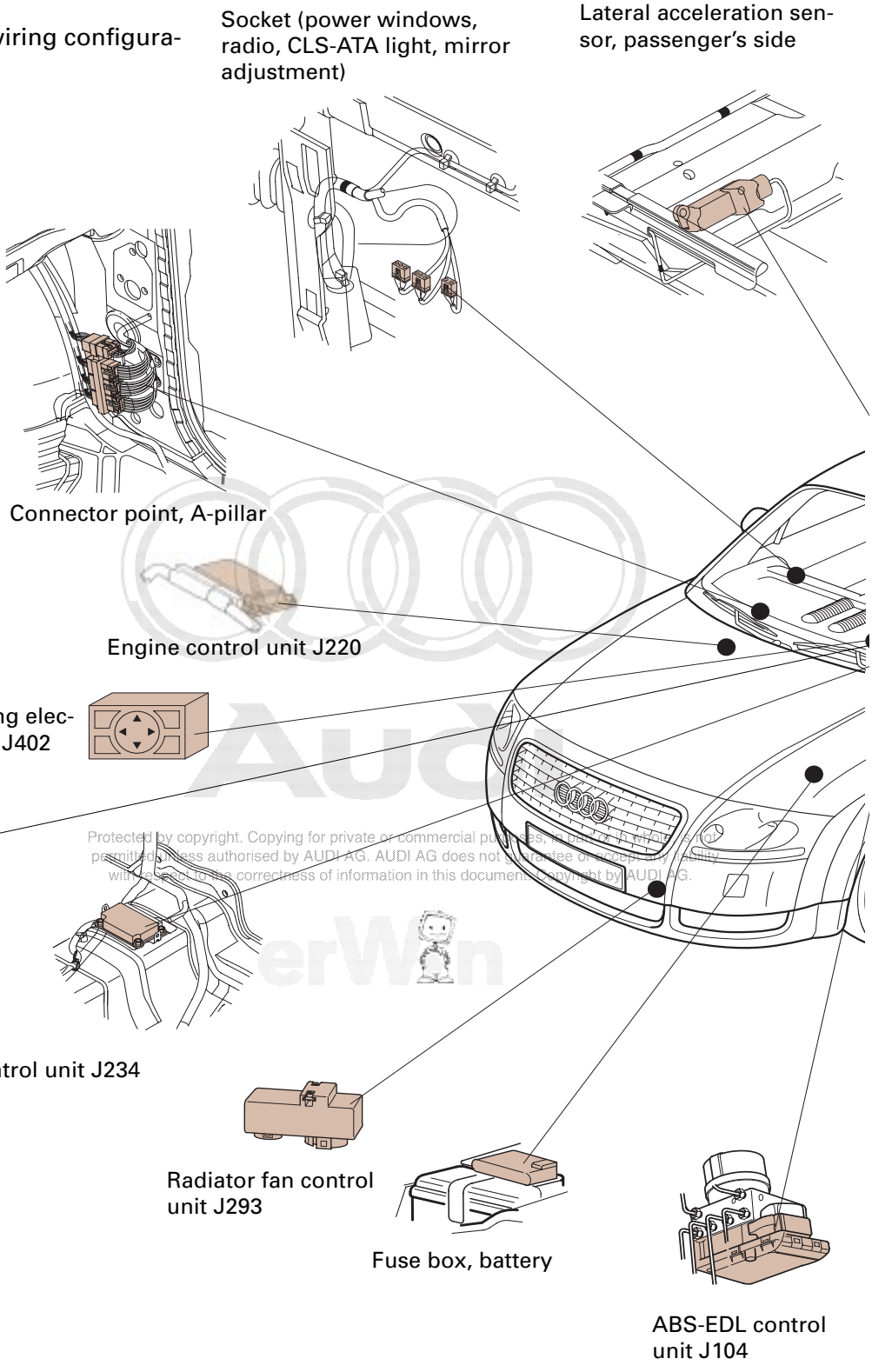
The ABS control unit recognises this situation from the reduced circumferential speed of the rear wheels and reduces the braking force acting on the wheels on the inside of the corner. The guide forces acting on the inner wheels are increased and thus stabilised.

A functional fault of the ESBS can neither be diagnosed nor rectified, since the driving dynamics cannot be reconstr ucted with workshop equipment.

The vehicle electrical system

The electrical/electronic connector stations as well as the necessary control units are decentralised to meet the requirements.

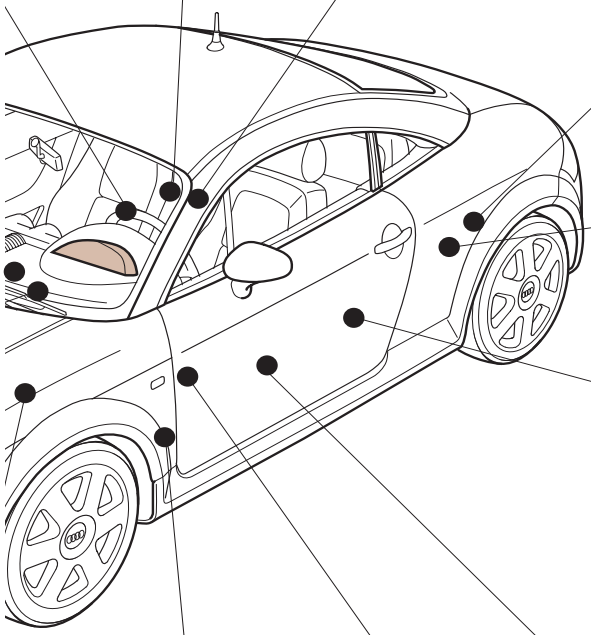
This ensures an optimum wiring configuration.



Telephone operating electronics control unit J412

Control unit for headlight range control J431

Central locking control unit J429



Control unit for navigation system and CD J401

Lateral acceleration sensor, driver's side

Socket (power windows, loudspeaker, radio, central locking, anti-theft alarm)

Fuse carrier

Coupling point, A-pillar
Mini-electrics

SSP207/112

Interior monitoring

The vehicle interior is monitored by an ultrasonic monitoring system.

It gives the alarm audibly via the horn of the anti-theft warning system and visually via the hazard warning lights.

The following requirements must be fulfilled to ensure that the interior monitoring functions properly:

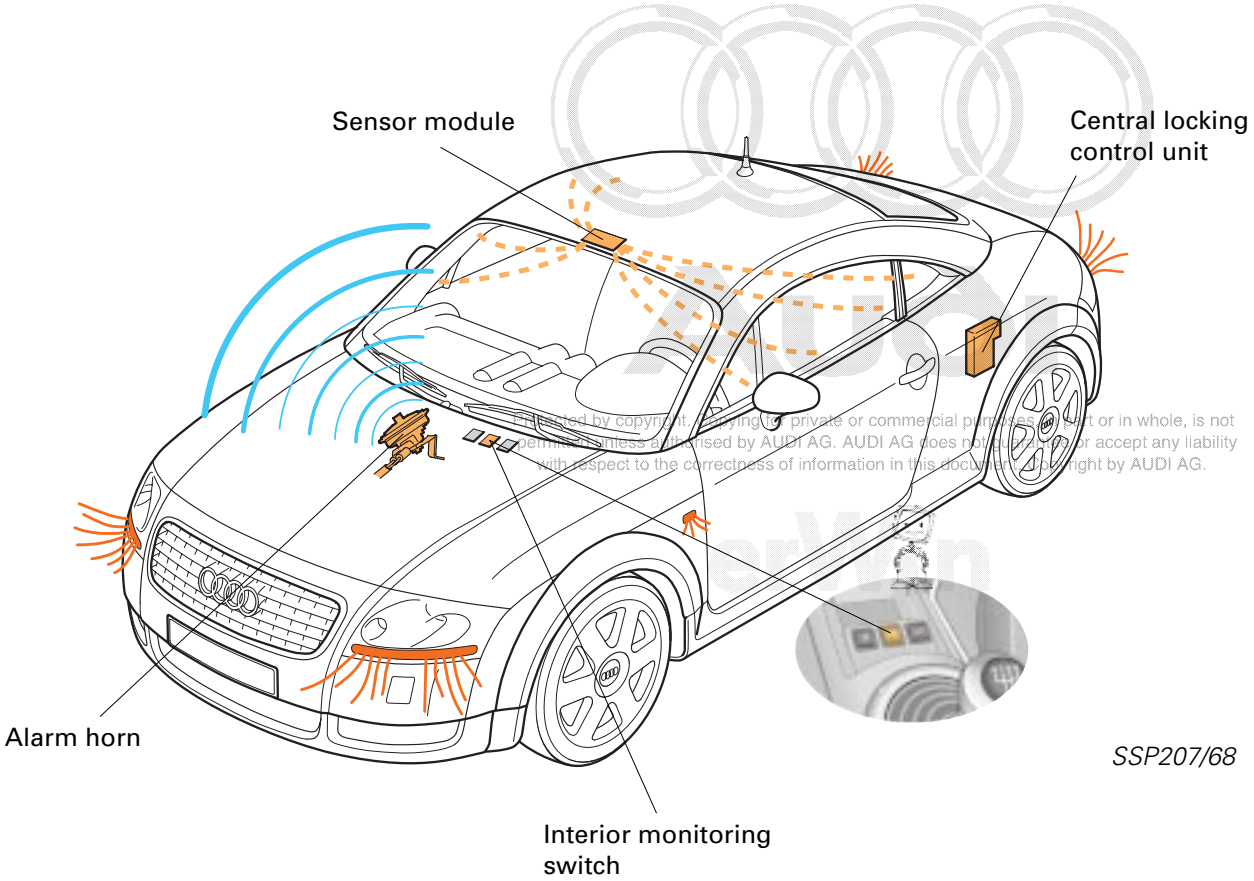
- The vehicle must be closed on all sides
- There must be no additional air movement in the vehicle interior

The system is safeguarded against false alarms, e.g.:

- knocking on the roof of the vehicle or against the window
- air movement caused by wind or passing vehicles
- temperature changes, e.g. due to the interior of the vehicle heating up as a result of exposure to strong sunlight
- any kind of noise (horns, sirens, bells).

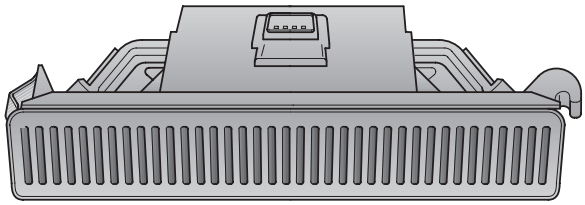
The system communicates with the anti-theft warning system regarding activation/deactivation as well as tripping of the alarm.

Located on the central console is the interior monitoring switch. It switches off the interior monitoring for a single locking operation.



SSP207/68

Functional description



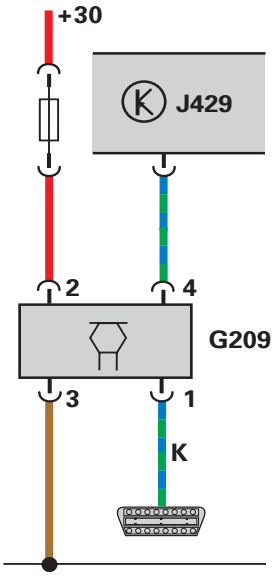
SSP207/69

The sensor unit comprises a sender, a receiver and the evaluation electronics. The sensor unit is located behind the interior lighting in the vehicle headliner.

In its activated state, the transmitter module sends out sound waves at a frequency of 40 kHz (imperceptible to the human ear) and receives the echo a short time later via the receiver module. The evaluation electronics detects irregularities in the ultrasonic field and sends an “alarm“ signal to the central locking control unit.

The anti-theft warning system LED indicates that the system is on standby.

Electrical circuit



SSP207/67

Self-diagnosis

Address word for self-diagnosis: 45
The interior monitoring sensor unit only has diagnostic capability when deactivated.

Only one bi-directional communication line is used to activate and trigger the alarm.

G209 Ultrasonic sensor for ATWS
J429 Central locking control unit
PIN1 K-diagnosis line
PIN2 Positive supply 12 V
PIN3 Earth
PIN4 Sensor signal “Activate alarm/signal“

For more detailed information regarding the anti-theft warning system/interior monitoring, please refer to SSP 185.

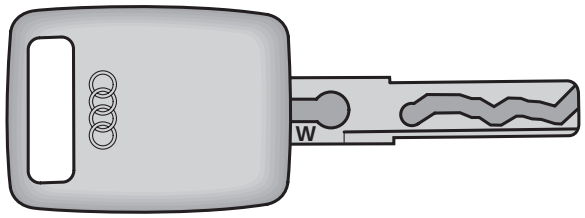
The immobiliser

is an electronic anti-theft protection device of the 3rd generation and will be gradually phased into the Audi TT. It prevents the vehicle from being operated by unauthorised persons by intervening in the engine control unit.

The aim of the 3rd generation immobiliser is to incorporate the engine control unit actively into evaluation and monitoring processes.

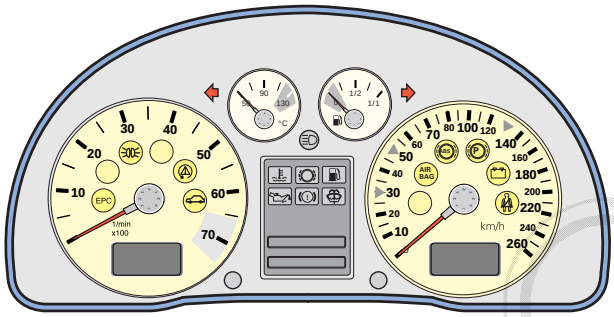
The 3rd generation immobiliser differs from the previous immobiliser in the following respects:

– Variable code evaluation in the engine control unit and immobiliser control unit. The engine control unit has an equation which calculates the generated variable code in the same way as in the immobiliser control unit.



SSP207/88

After teaching in the electronic module of the key transponder once, the immobiliser key is paired up with the immobiliser and cannot be used for any other immobiliser.



SSP207/90

The components of the immobiliser are as follows:

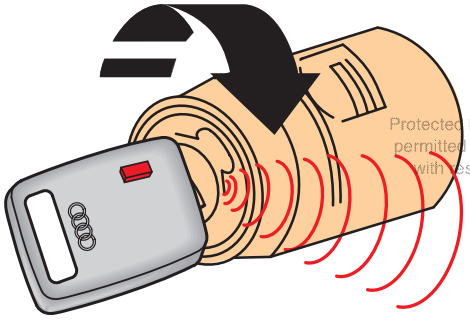
– The immobiliser control unit is integrated in the dash panel insert.

– The warning lamp in the dash panel insert

– The reading coil on the ignition lock

– The adapted ignition key

– The engine control unit



SSP207/89

Always use the corresponding Workshop Manual when carrying out repairs.

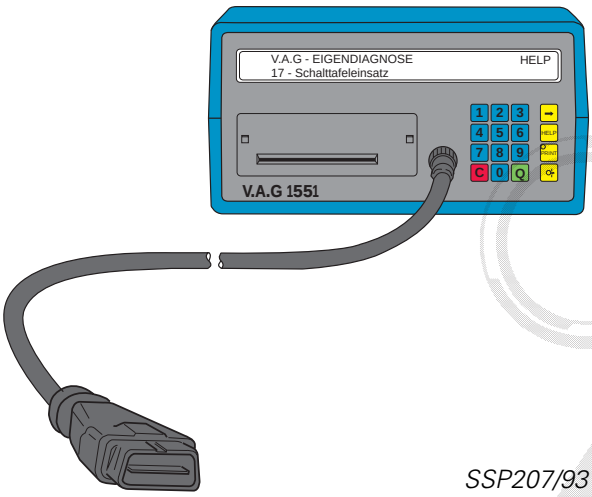
Functional description

After turning on the ignition, the key transponder sends the fixed code to the immobiliser control unit. If this is identified as correct, a variable code is generated in the immobiliser control unit. This code is sent to the transponder.

A secret arithmetic process is started in the transponder and in the control unit according to a set of equations. The result of the computing process is evaluated in the control unit. If the results tally, the vehicle key is acknowledged as correct. The engine control unit then sends a variable code to the immobiliser control unit.

The engine control unit has a set of equations. It is also stored in the immobiliser control unit, according to which the variable code is converted into a secret code. The “Adapt immobiliser” function also saves in the control units the result of key interrogation, the immobiliser PIN, the immobiliser control unit ID as well as the VIN . If all these data match up with one another, vehicle start-up is enabled.

Due to the fact that a new variable code is generated every time in this secret computing processes, this code is not decipherable. It is not possible to copy the vehicle key.



SSP207/93

Self-diagnosis

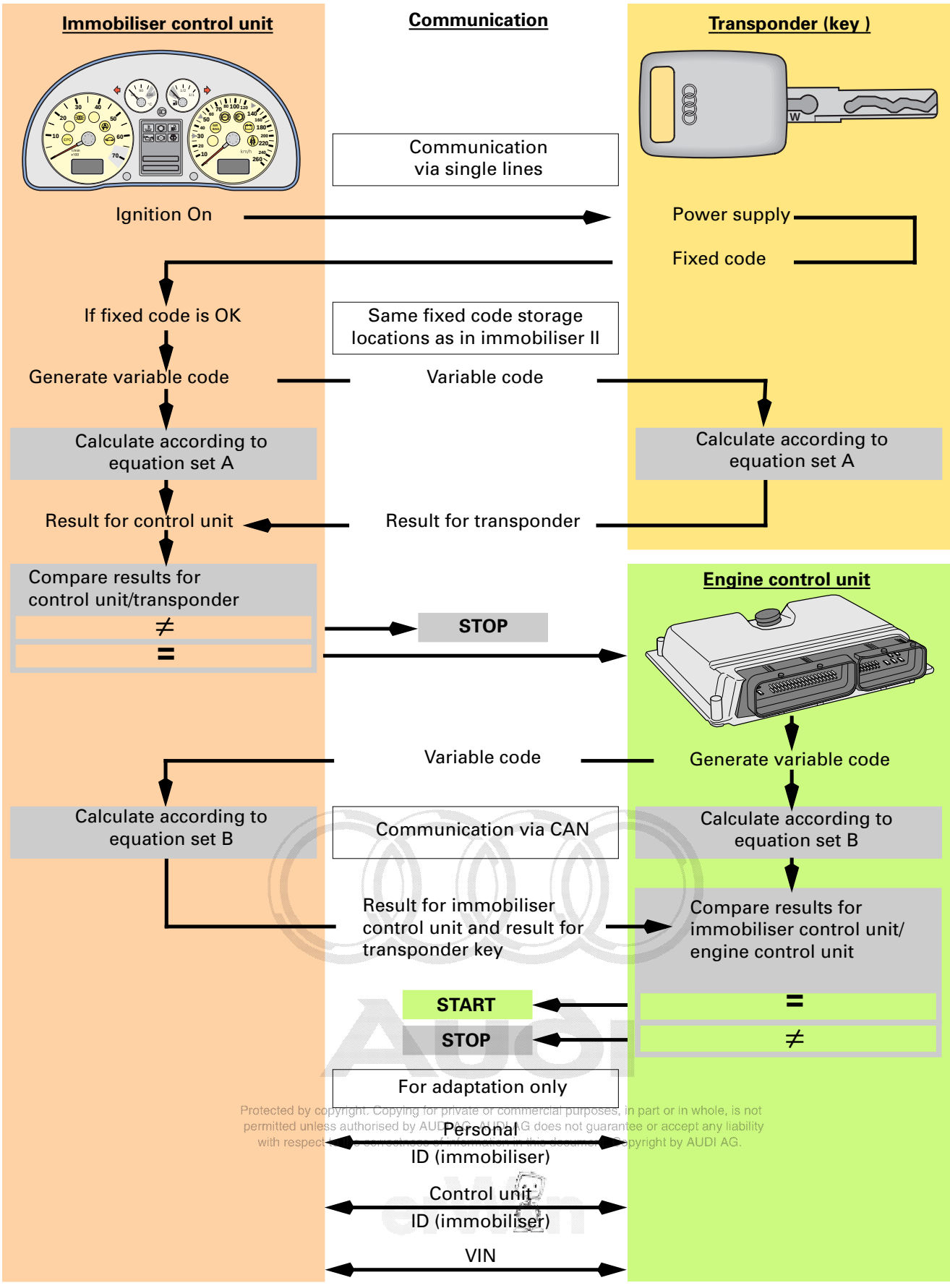
The immobiliser has extensive self-diagnosis capability.
Address word: **17**

You can find further information on the self-diagnosis in the Workshop Manual “Electrical System”.

Emergency start function

The emergency start function makes it possible to re-enable a vehicle which is stranded because the immobiliser has been disabled. The prerequisite for this is a knowledge of the secret number. You can find further information on the emergency start function in the Workshop Manual “Electrical System”.

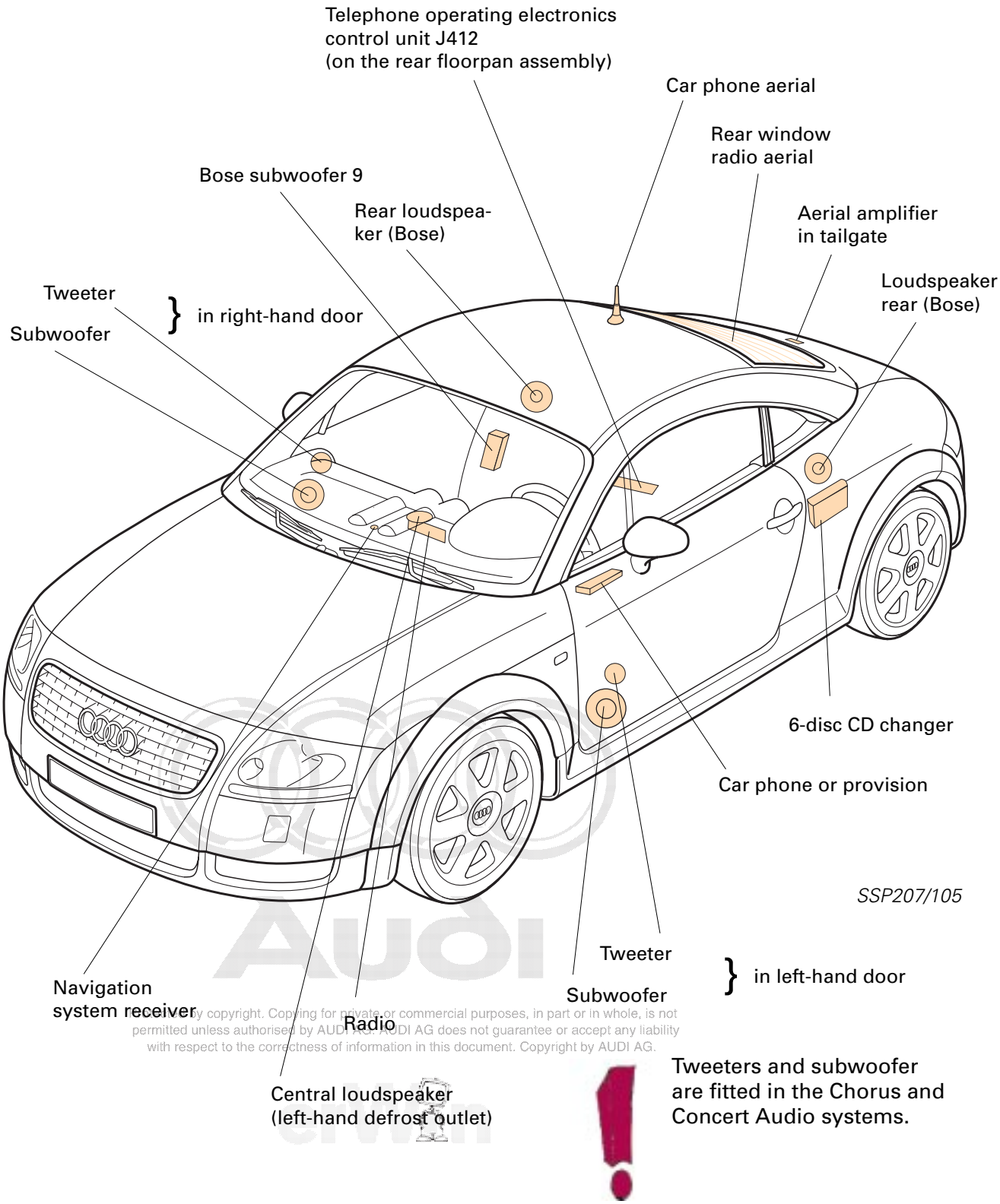
Immobiliser III



Notes

Sound system

Fitting locations for radio, Bose amplifier, 6-disc CD changer, loudspeaker, aerial and car phone system:



Tweeters and subwoofer are fitted in the Chorus and Concert Audio systems.

The Audi TT Coupé has been prepared for the Chorus and Concert radio series which are already featured in the A6.

In addition, the Audi/Bose sound system is available with 7 high-performance loudspeakers as well as a 250 W power amplifier.

The reception of the rear window aerial is boosted by an aerial accommodated in the tailgate.

The door loudspeakers of the audio system are also used by the navigation system and the hands-free car phone.

When the car phone is used (prepared for Nokia 3110 mobile phone), the audio system cuts out (mute function).

When the navigation system is used (without magnetic field probe), output volume is reduced by about 6 dB so that the directions which the navigation system gives are easier to follow. Directions are displayed visually on the screen in the dash panel insert.

Audi systems

Audi Chorus - Basic equipment (version prepared for radio is possible)

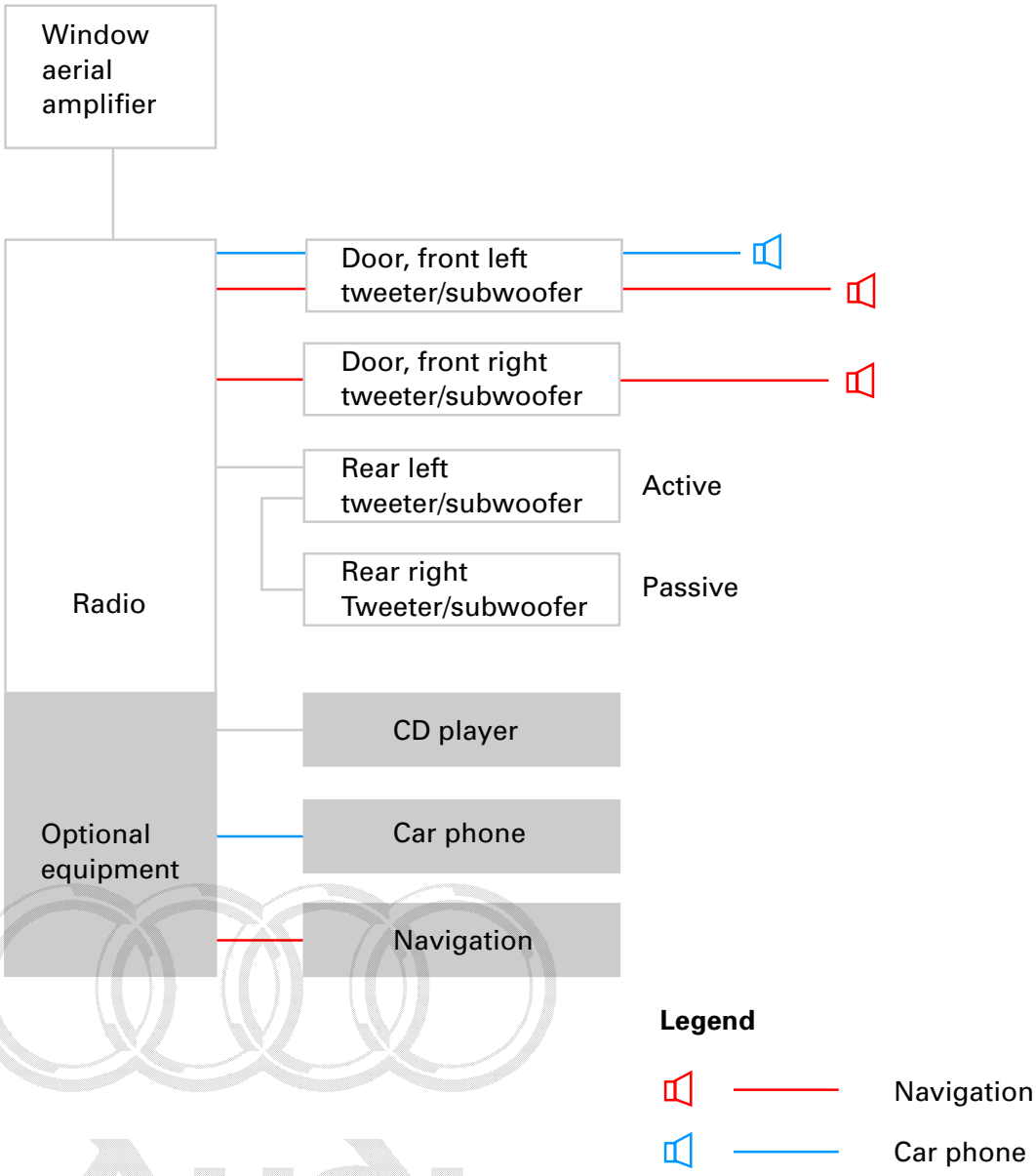
Audi Concert - Version with auxiliary functions as well as Bose sound system

When the Bose sound system is in use, the "FADER" function is deactivated (volume distribution between front/rear left/right loudspeakers) in order to safeguard sound quality in the vehicle interior.

In this case, the separate amplifier module located in the rear end of the vehicle distributes volume to the individual loudspeaker pairs.

Sound quality is also stabilised and enhanced via a loudspeaker integrated in the left-hand defrost nozzle. The rear loudspeakers are driven directly (active) on the left-hand side and passively (from the left-hand side) on the right-hand side.

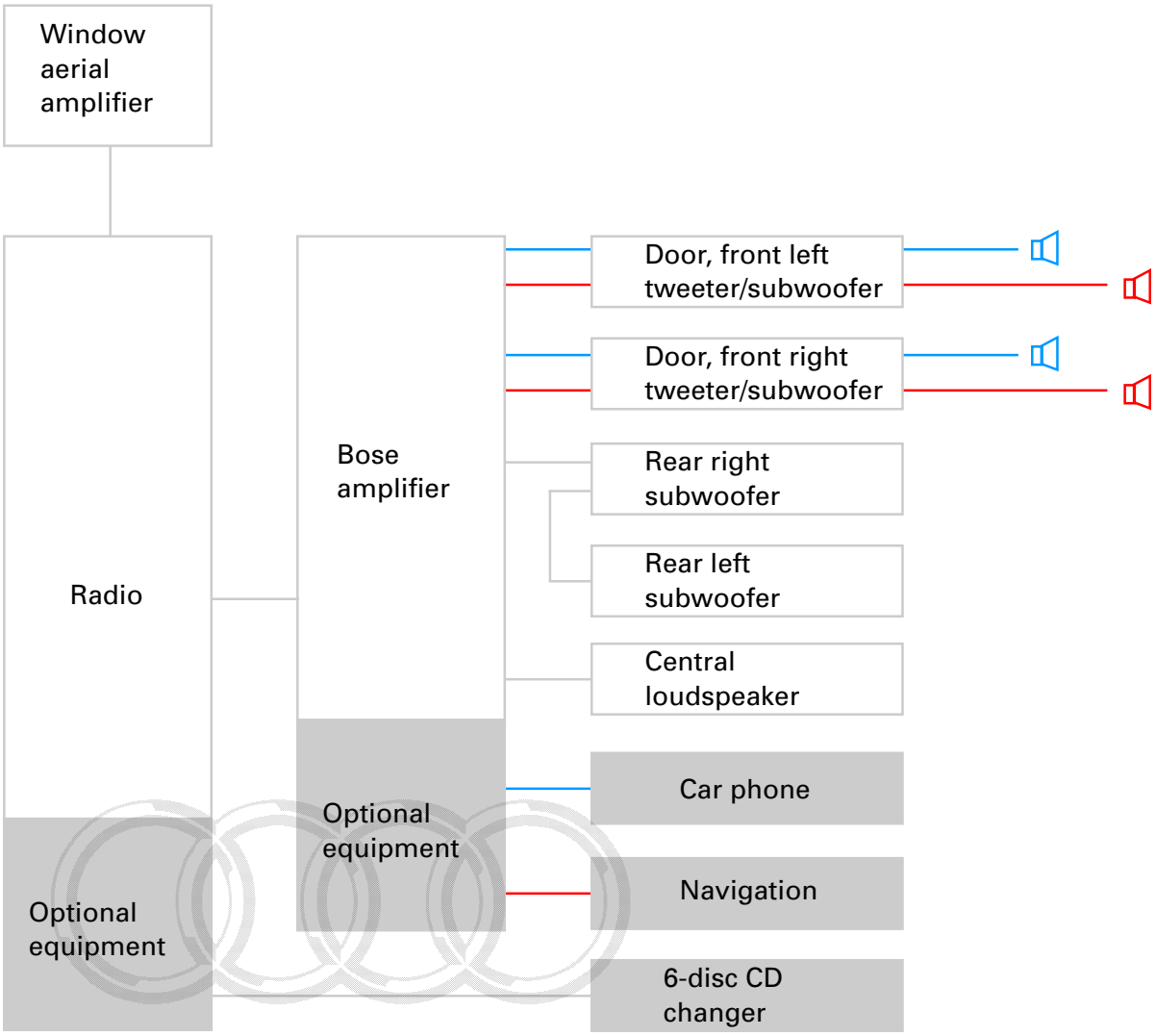
Chorus/Concert and Concert audio systems with optional equipment

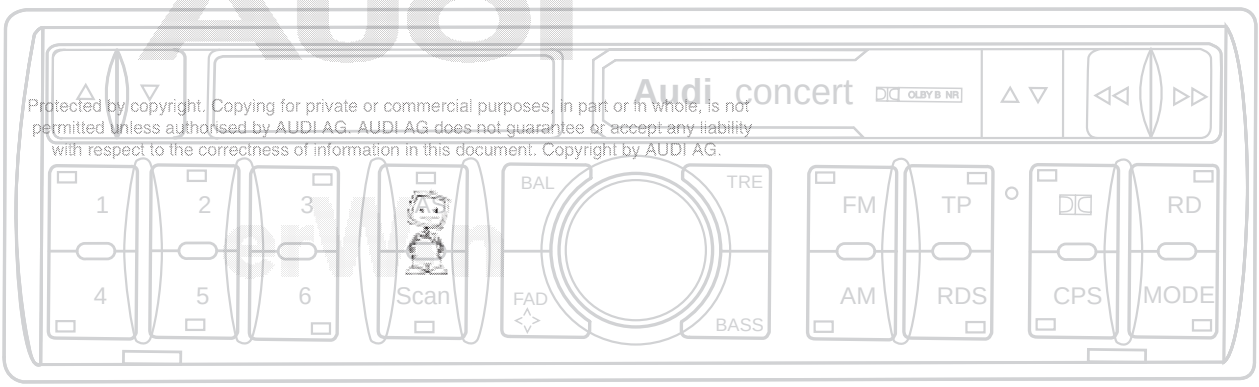


Car phone announcements are played back via the front-left door loudspeaker.

In connection with the navigation system, the door loudspeakers on the front left and right are used.

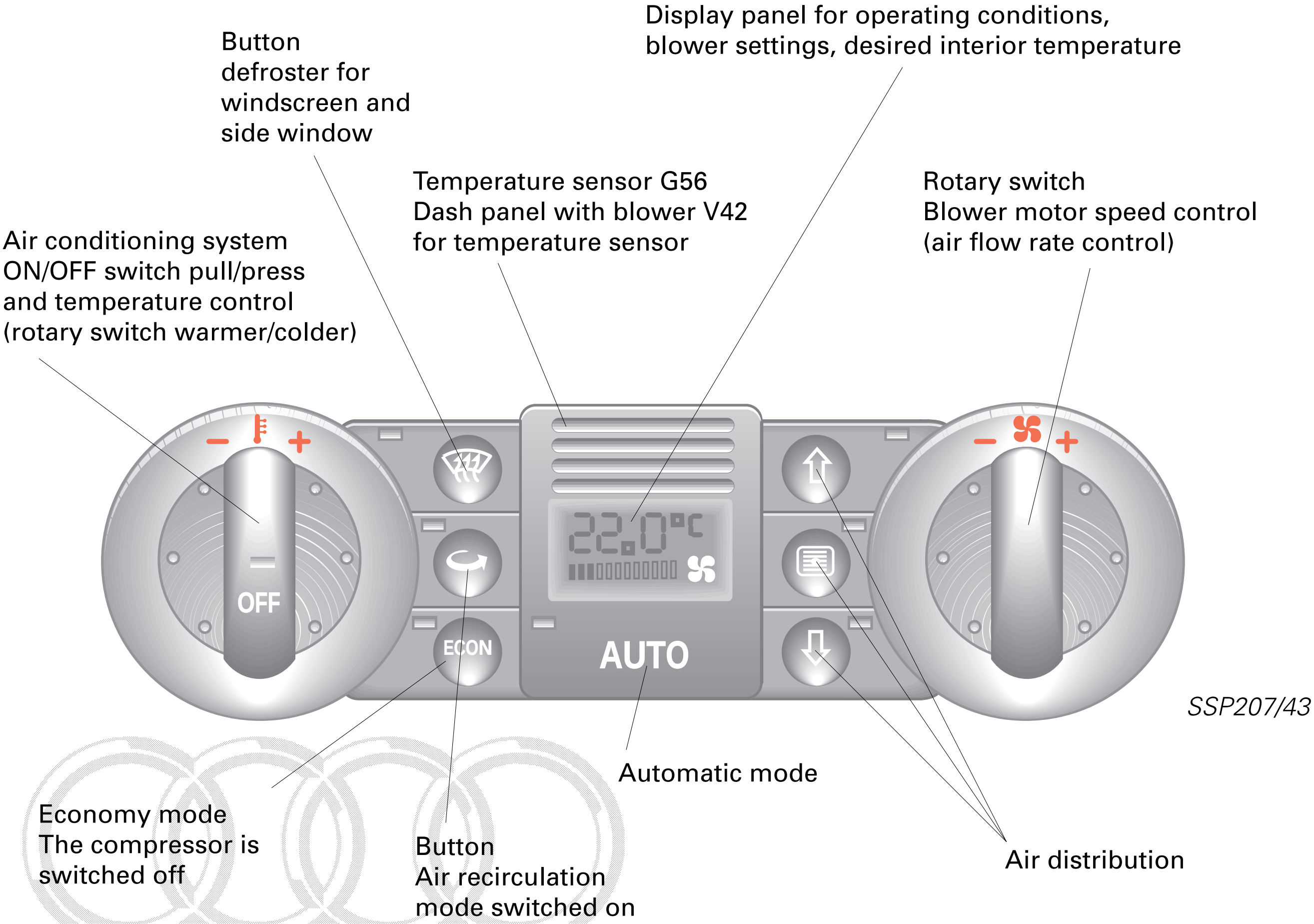
Concert with Bose amplifier audio system and optional equipment





Overview

Operating and indicator unit



SSP207/43

The fully automatic air conditioning system operates according to Audi's tried and tested principle. The sensors and actuators provide automatic temperature and air flow rate control.

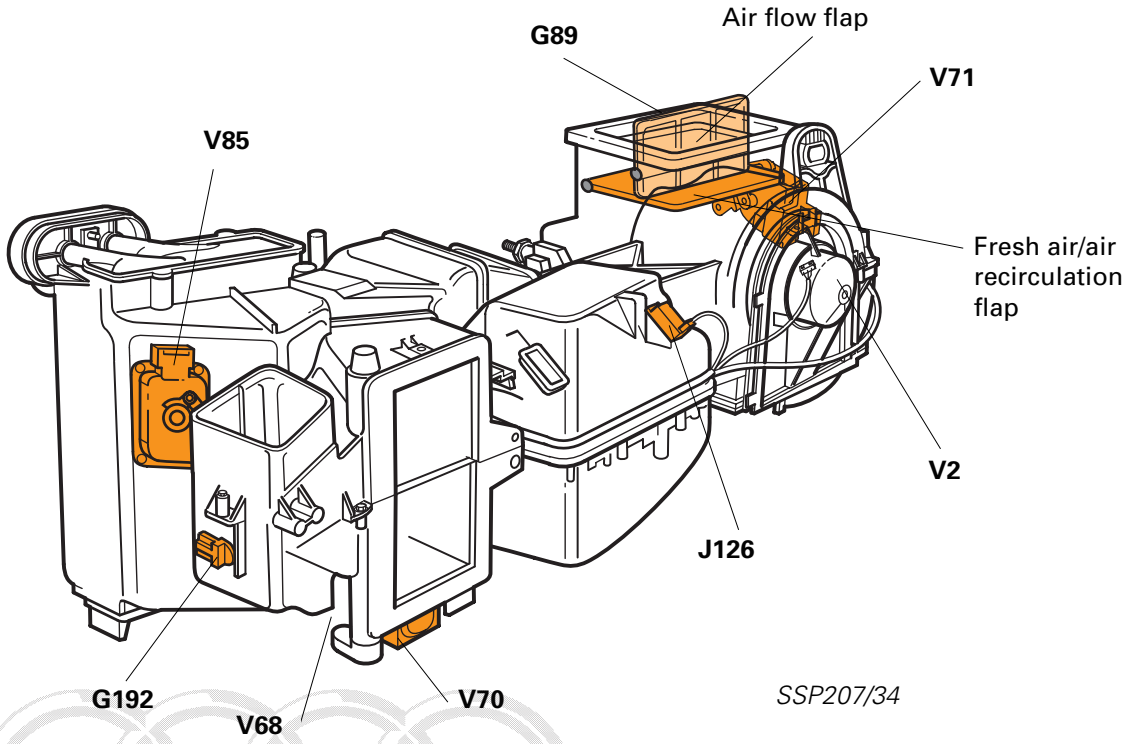
The air conditioning control unit has the same functional capability as the unit used in the A3 and its styling has been adapted the design of the TT.

Press the "Defroster" button, and the air recirculation mode will be disabled automatically.

Air recirculation mode is inactive in "Defrost" mode.

If the temperature sensor G56 or blower V42 is faulty, the operating and display unit must be replaced.

Air conditioner



SSP207/34

This overview shows the component parts of the heater:

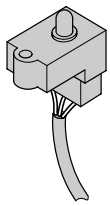
G89	Fresh air intake duct temp. sensor
G192	Footwell vent temp. sender
J126	Fresh air blower control unit
V2	Fresh air blower
V68	Temperature flap actuating motor
V70	Central flap control motor
V71	Air flow flap control motor
V85	Footwell/defrost flap positioning motor

The air conditioner may only be removed after evacuating the coolant circuit properly.

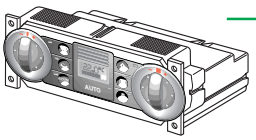
Heating/air conditioning system

Sensors

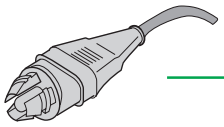
Photosensor for sun G107



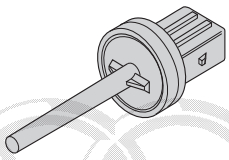
Dash panel temperature sensor G56
with blower for temperature sensor V42
not replaceable



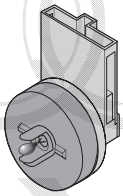
Ambient temperature sensor G17



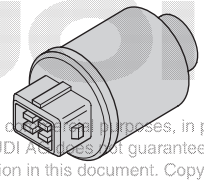
Fresh air intake duct temperature sensor G89



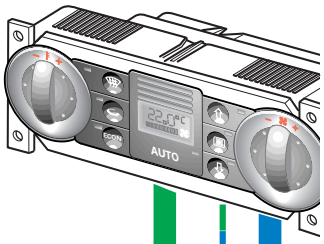
Footwell vent temp. sender G192



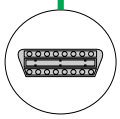
Pressure sensor for air conditioning system G65



Operating unit for air conditioning system E87

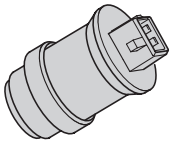


Diagnosis plug connection T16

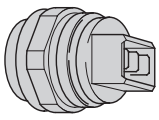


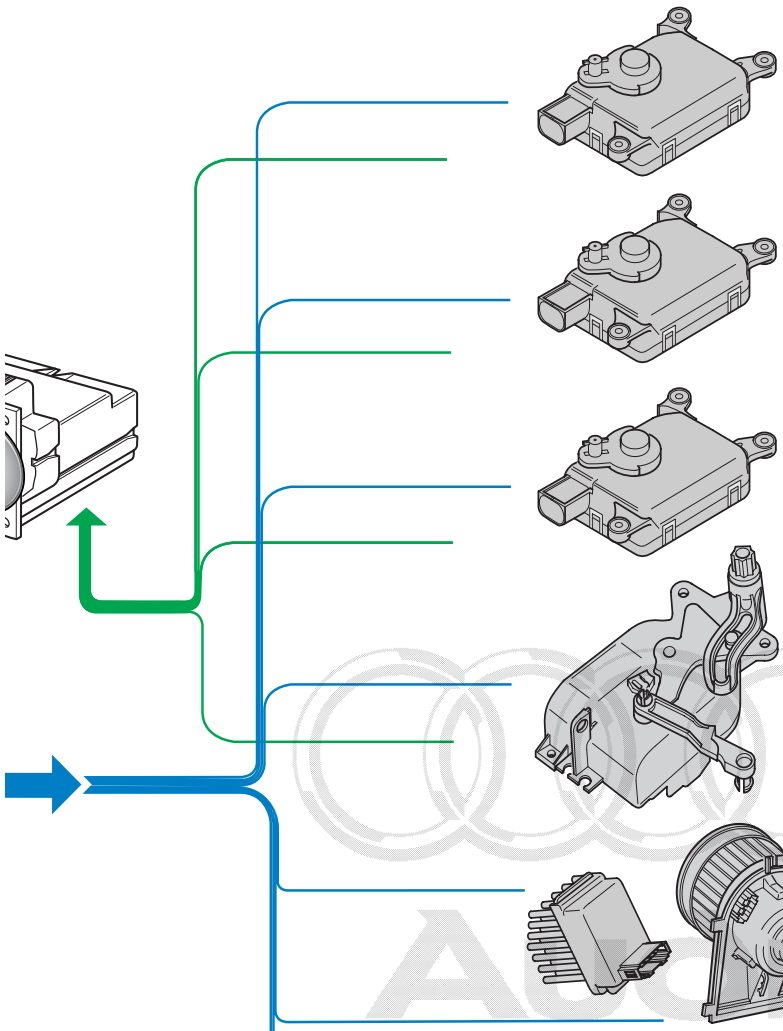
Auxiliary signals:
- Stationary period signal
- Road speed signal
- Engine speed signal
- Engine temperature/engine hot LED

Thermoswitch for air conditioning system switch-off F14



Thermoswitch for radiator fan F18/F54





Actuators

Actuating motor for defroster flap in footwell V85 with potentiometer G114

Control motor for central flap V70 with potentiometer G112

Control motor for temperature flap V68 with potentiometer G92

Positioning motor for air flow flap V71 with potentiometer G113

Fresh air blower V2 with blower control unit J126

Auxiliary signals:
- Engine control unit
- Ambient temperature display

Solenoid coupling N25

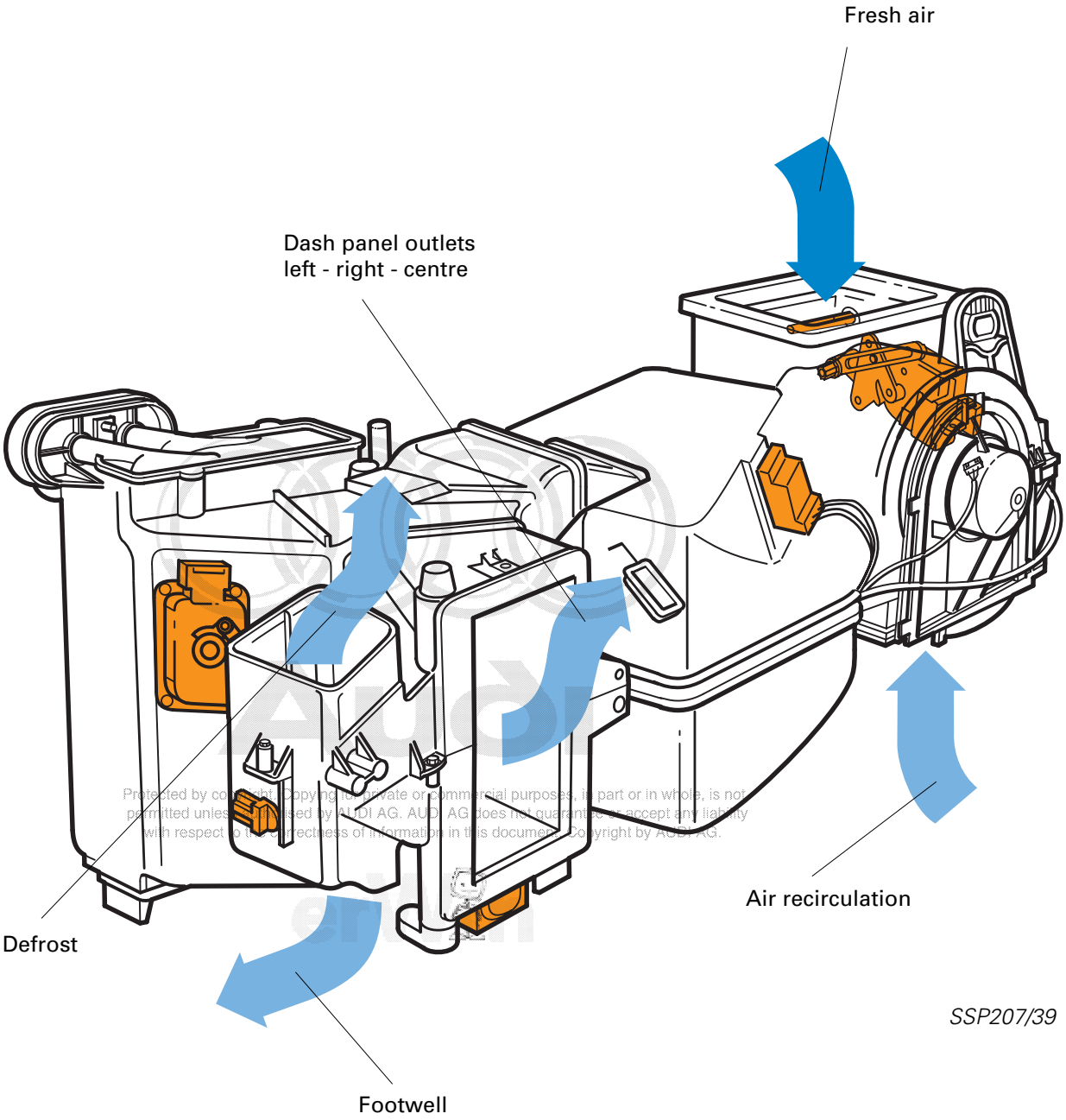
Radiator fan control unit J293

Radiator fan V7

SSP207/35

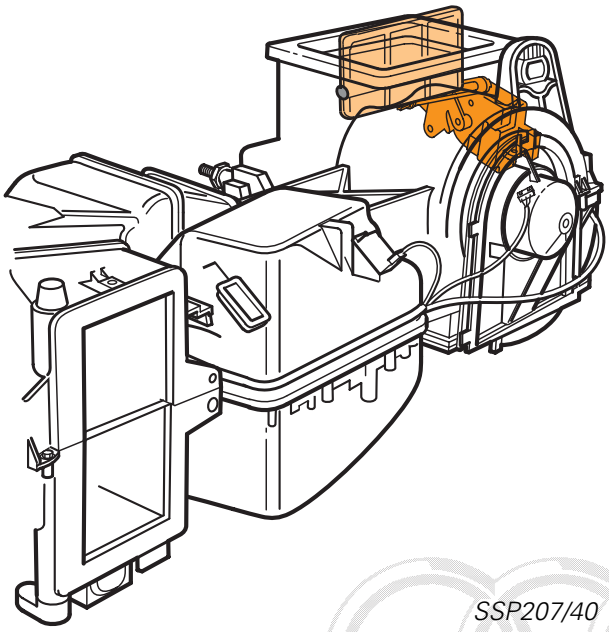
Heating/air conditioning system

Air distribution



SSP207/39

Ventilation control



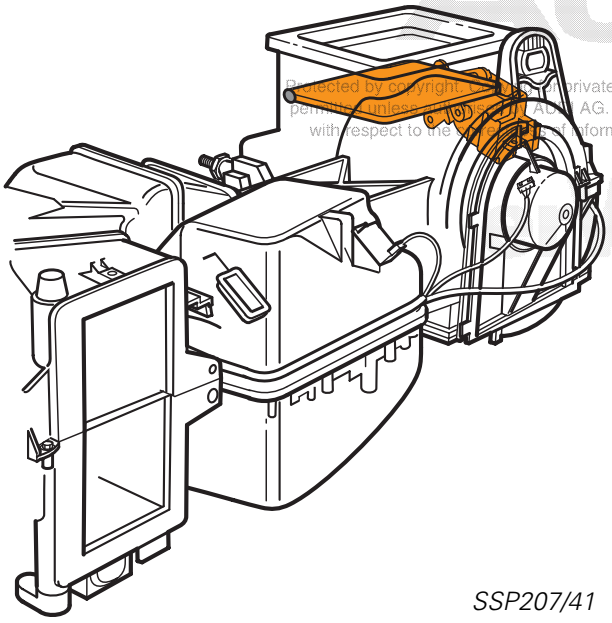
SSP207/40

In fresh air mode, the air flow flap is closed depending on the selected fresh air blower motor speed and vehicle road speed.

Fresh air ventilation produced at high engine speeds is kept at an almost constant value by controlling the closing of the air flow flap. The fresh air supply is not interrupted entirely.

In “Off mode“, the air flow flap is closed and the air recirculation flap is opened. There is no fresh air supply to the vehicle interior.

Air recirculation mode



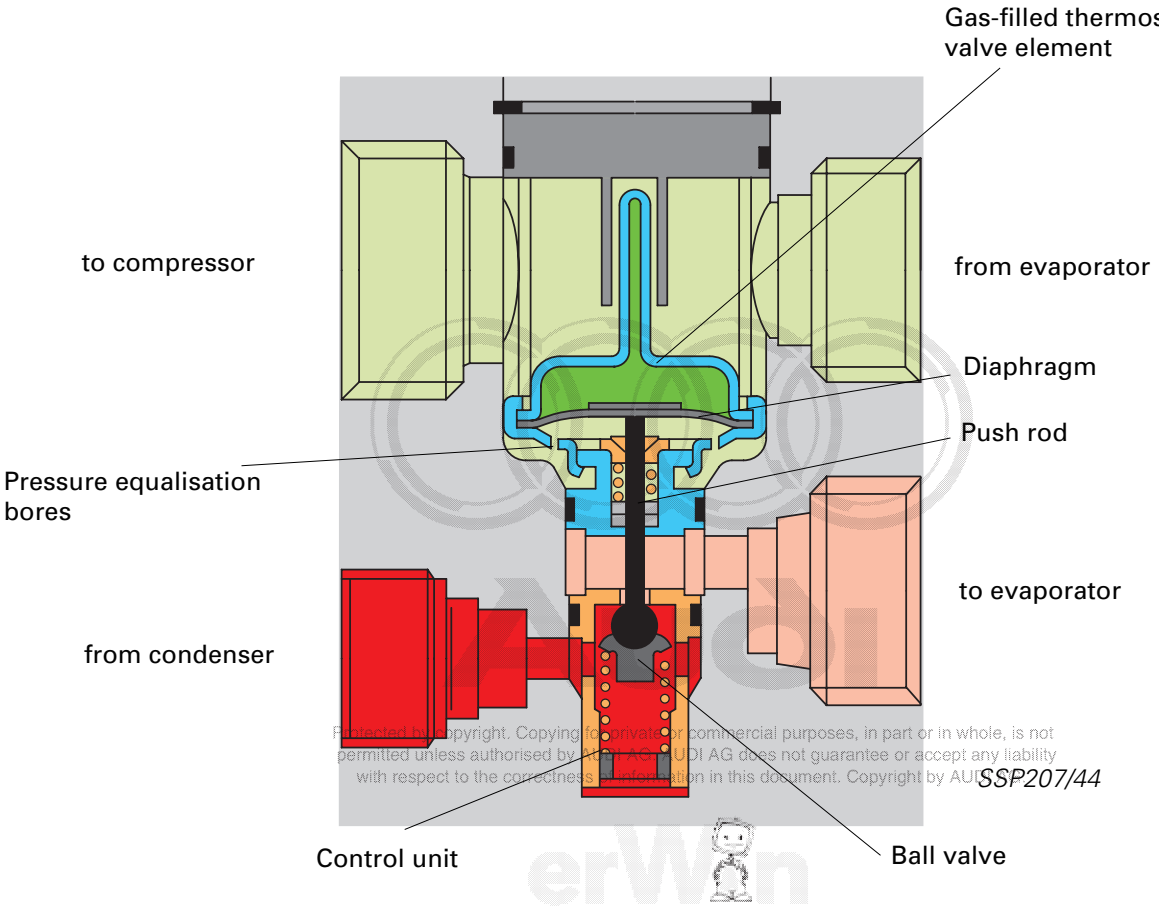
SSP207/41

Press the air recirculation button and the air recirculation flap is closed by the positioning motor.

When the air recirculation flap is closed, the air in the vehicle interior is recirculated. Ambient air does not enter the vehicle interior.

Expansion valve

The expansion valve is located directly in front of the evaporator between the high pressure and low pressure sides of the refrigerant circuit.

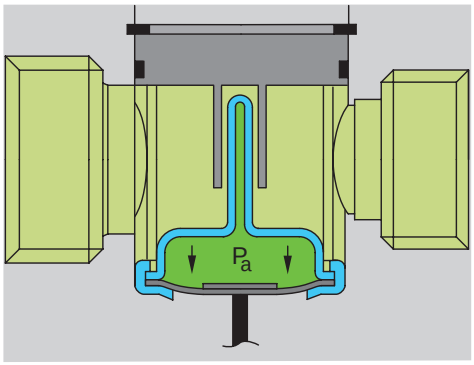


Lack of thermal insulation will lead to a change in the control characteristic setting.
The cooling output of the air conditioning system is reduced.

The expansion valve is thermostatically regulated. It has a control unit with a thermostatic valve element and a ball valve.
The thermostatic valve element on one side of the diaphragm has a special gas filling.
The other side is connected to the evaporator outlet (low pressure) via pressure equalisation drillings.
The ball valve is activated by a push rod.

The temperature at the evaporator outlet is higher due to the cooling load increase.

Pressure rise (P_a) of the gas filling in the thermostatic valve element.

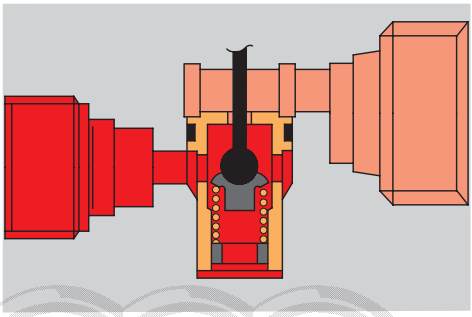


SSP207/49

The cross-section of the ball valve is enlarged via the diaphragms and push rod.

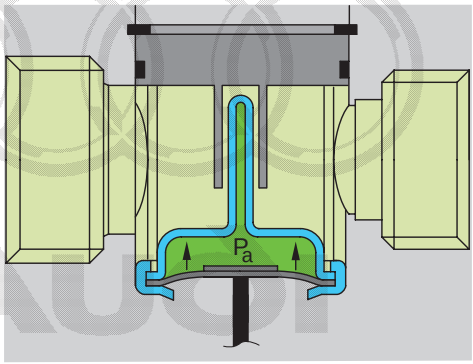
Refrigerant flows to the evaporator and absorbs heat at the transition from high pressure to low pressure.

The air flowing through the evaporator is cooled.



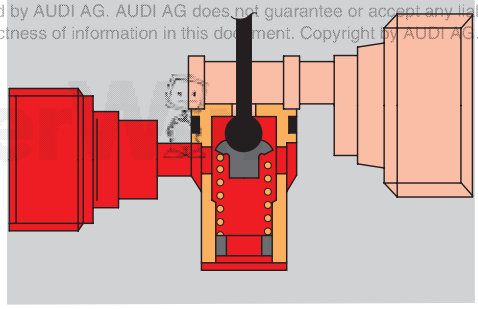
SSP207/50

The temperature at the evaporator outlet drops, causing a pressure drop in the thermostatic valve element.



SSP207/51

The cross-section of the ball valve is reduced.



SSP207/52

The pulse duty factor of the valve openings is dependent on the temperature at the evaporator outlet (low pressure). Pressure equalisation is regulated.

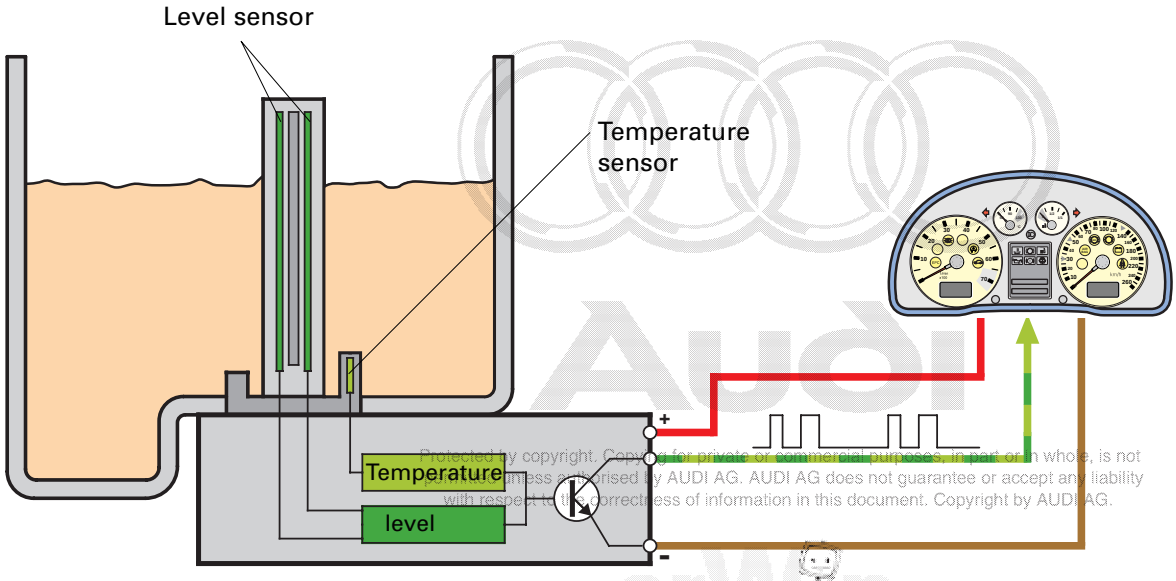
Flexible service interval indicator

The service interval indicator informs the driver when a service is due.

If the remaining distance until the next service is less than 2,000 km or if a year has elapsed, a message appears on the combi-display every time the ignition is turned on. The driver can call up the remaining distance until the next service on the display at any time by pressing the check key.

The fixed interval indicator, i.e. limitation of service interval to 15,000 km or 1 year, will be gradually replaced by a flexible service interval indicator in the Audi TT Coupé. By comparison with fixed maintenance intervals, the flexible service interval indicator will enable the performance margins of the engine oil to be utilised to full capacity. A new type of sensor for oil level and oil temperature recognition has been developed for this purpose.

Oil level sensor



SSP207/91

Oil level sensor

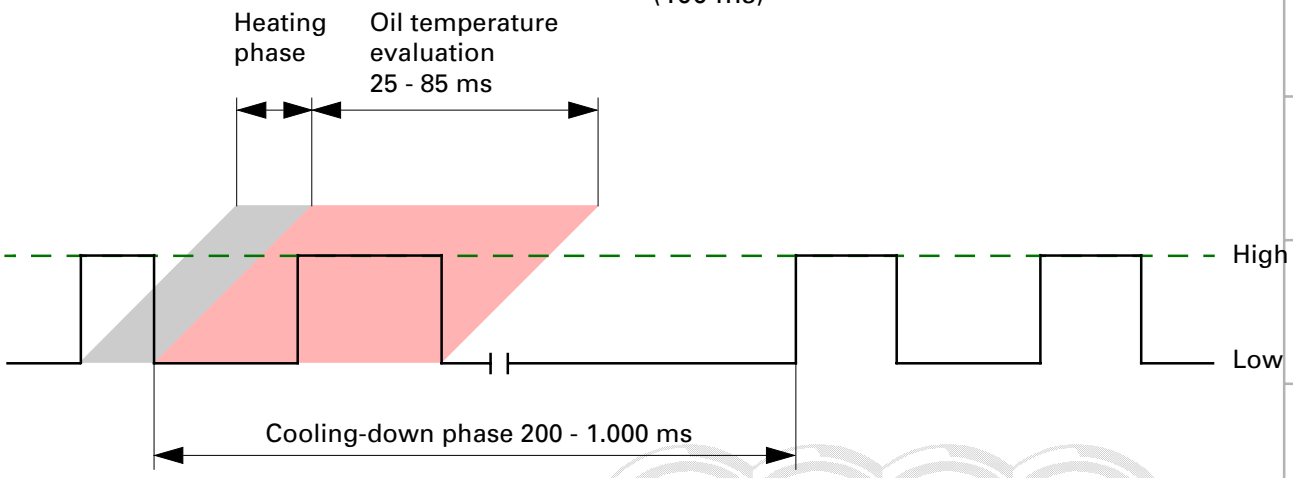
The oil level sensor is installed in the oil sump from below.

The level and temperature data are determined continuously and transferred to the dash panel insert in the form of a pulse width modulated output signal.

The “Adaptation” function in the dash panel insert, the flexible service interval indicator can be converted to a fixed interval indicator.

Signal waveform and evaluation

The electronically controlled measuring element is heated up slightly for a short period of time as a function of the momentary oil temperature (output = high) and subsequently cools down again (output = low).
This process is repeated continuously.
In this case, the high times are dependent on the oil temperature and the low times are proportional to oil level.



Oil temperature

The signal for oil temperature is transmitted during the sensor cooling-down phase.

The influencing criteria for the flexible service interval indicator are: oil level, oil temperature, fuel consumption in l/h per cylinder and distance covered.

Oil level

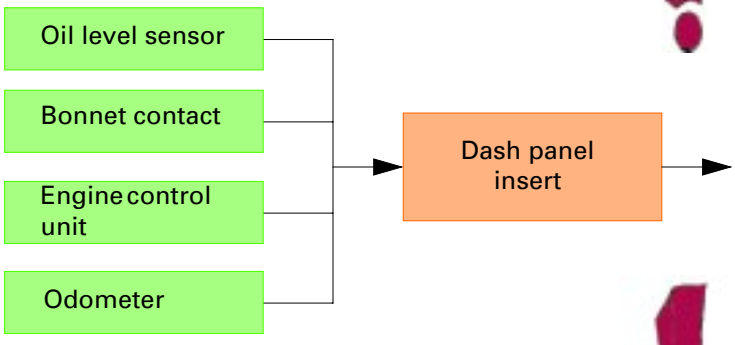
The oil level in mm can be calculated from the cooling-down period during the cooling-down phase by means of a sensor equation. Accuracy is approx.
± 3 mm.

Long cooling-down period = oil level too low (1,000 ms)

Short cooling-down period = oil level too high (100 ms)

In the combi-instrument, the condition of the oil in the vehicle determined by evaluating these influencing variables, and the upper limit values in km (max. 30,000 km) and time (max. 2 years) until the next service are adapted variably.

The upper limit values can be set in units of kilometres and time as fixed values via the “Adaptation” function in the combi-instrument.



Warning indicator

1. Priority “min“ oil level
2. Priority “min“ oil level as a function of distance covered

The oil level only influences the FSIA indirectly.
The factor of fuel consumption is increased when the fuel level is too low.

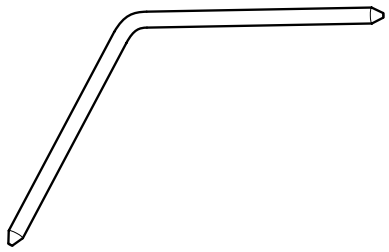
Specifications of the Audi TT

		1.8 T (132 kW)	1.8 T quattro (165 kW)
Engine/electrics			
Engine code		AJQ (EU II + 3D standard)	APX (EU 3D standard)
Engine type	cm^3	In-line 4-cylinder, four-stroke petrol engine, exhaust gas turbocharger Five valves per cylinder; double overhead camshafts (DOHC)	
Displacement	cm^3	1781	
Bore x stroke	mm	81 x 88.4	
Compression ratio	: 1	9.5	9.0
Max. output	kW (bhp) @	132 (180)/5500	165 (225)/5900
Max. torque	Nm @	235/1950-4700	280/2200-5500
Mixture preparation		Motronic with electronic throttle control	
Engine control unit		System self-diagnosis, emergency running programme; mapped, cylinder-selective knock control	
Ignition system		Distributorless ignition system with static high-voltage distributor, long-life-spark plugs with 60,000 km replacement interval	
Exhaust gas treatment system		Closed-loop catalytic converter, heated lambda probe, activated charcoal filter	
Battery	A/Ah	Manual: 220 A/44 Ah Automatic: 280 A/60 Ah	Manual: 220 A/44 Ah Automatic: 280 A/60 Ah
Alternator	A max.	90 A	120 A incl. air conditioning 90 A
Power transmission			
Drive		Front-wheel drive, Traction Control System (TCS), EDL	Four-wheel drive Electronic differential lock (EDL)
Clutch		Hydraulically activated single dry plate clutch with asbestos-free linings, two-mass flywheel	
Gearbox type		5-speed manual gearbox fully synchronised	6-speed man. gearb. quattro
Gearbox code		fwd: 02J.N/DZF quattro: 02M.3/DXW	02M.1/DQB
Gear ratios	1st gear	3.300	3.417
	2nd gear	1.944	2.105
	3rd gear	1.308	1.429
	4th gear	1.034	1.088
	5th gear	0.838	1.097
	6th gear	–	0.912
	Reverse	3.060	4.107
Final drive ratio		3.938	4.200/3.316
Running gear/steering/brakes			
Front axle		McPherson strut suspension with bottom wishbones, subframe, transverse anti-roll bar	
Rear axle		**Front:** Torsion beam axle with separate spring damper layout, track-correcting axle bearing, tubular anti-roll bar	**quattro:** LDQ axle (dual link trailing arm suspension), track-correcting axle bearing, anti-roll bar

		1.8 T (132 kW)	1.8 T quattro (165 kW)
Steering		Power-assisted, maintenance-free rack and pinion steering system, track-stabilising kingpin offset	
No. of steering wheel revolutions lock to lock		2.79	
Steering ratio		15.67	
Turning circle	m	10.45	
Brake system, front/ rear		Diagonal-split dual circuit hydraulic brake system, anti-lock braking system (ABS) with electronic brake force distribution (EBFD), TCS (Traction Control System), disc brakes at front and rear, ventilated at the front	Diagonal-split dual circuit hydraulic brake system, anti-lock braking system (ABS) with electronic brake force distribution (EBFD), disc brakes at front and rear, ventilated at the front and rear
Brake disc diameter, front/rear	mm	front: 312 x 25 fwd rear: 232 x 9 quattro rear: 239 x 9	front: 312 x 25 rear: 256 x 22
Wheels		7J x 16	7 1/2J x 17
Offset depth of rims	mm	31	32
Tire size		205/55 R16	225/45 R17
Body/dimensions			
Body type		self-supporting, fully galvanised, steel, aluminium bonnet front/rear crumple zones, side protection	
Number of doors/seats		2 + 2	
Frontal area A	m^2	1.99	
Drag coefficient	c_d	0.34	
Total length	mm	4041	
Width without mirror	mm	1764	
Width incl. mirror	mm	1856	
Vehicle height	mm	1354	1351
Wheelbase	mm	2419	2427
Track width front/rear	mm	1525/1507	1525/1503
Overhang front/rear	mm	876/746	876/738
Ground clearance, unladen	mm	120	120
Load sill height	mm	762	764
Tailgate width, bottom	mm	834	
Tailgate width, top	mm	885	
Load opening	mm	1180	
Load sill height	mm	364	
Through-loading width, luggage compartment	mm	950	
Luggage compartment length	mm	900	

		1.8 T (132 kW)	1.8 T quattro (165 kW)
Length of luggage compartment with rear seat folded down	mm	1397	1360
Height of luggage comp.	mm	764	660
Luggage compartment vol.	l	272/547	218/493
Vert. headroom, front/rear	mm	49/-87	
Max. seating height, front/rear	mm	959/828	
Elbow room, front/rear	mm	1412/1221	
Weights			
Kerb weight (w/o driver)	kg	1205	1395
Max. perm. gross weight	kg	1575	1765
Payload	kg	370	
Max. permissible axle load, front/rear	kg	940/735	1015/850
Max. permissible roof load	kg	75	
Capacities			
Cooling system capacity	l	7	
Engine oil capacity	l	4 ltr. and 4.5 ltr. without and with filter change respectively	
Gearbox oil capacity	l	fwd: 2.3	quattro: 2.6
Tank capacity	l	55	62
Windscreen washer fluid tank	l	4 l (3.74 ltr. usable water volume)	
Performance/consumption/acoustics			
Max. speed	kph	228	243
at engine speed	rpm	6430	6281
Acceleration			
0-80 kph	s	5.5	4.3
0-100 kph	s	7.4	6.4
Elasticity in 4th/5th gear (5th/6th gear for 165 kW engine)			
60-120 kph	s	9.9/13.1	11.2/14.8
Fuel type		Premium unleaded 98 RON	
Consumption acc. to 93/116/EC			
Urban cycle	ltr./100 km	10.9	/
Out-of-town cycle	ltr./100 km	6.3	/
Overall	ltr./100 km	8.0	9.2
CO2 emission	g/km	192	221
Theoret. range (MVEG)	km	687	674

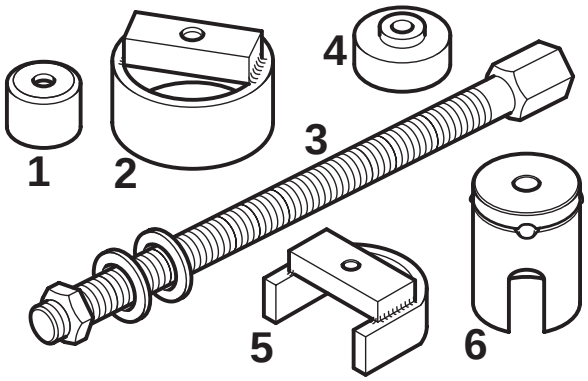
Special tools



SSP207/127

Pin

Order No. T10027

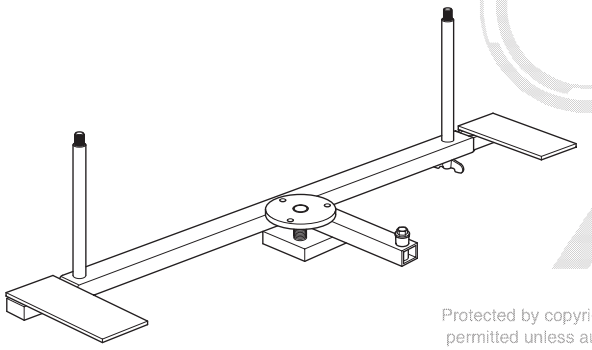


SSP207/128

Wheel bearing puller for quattro rear axle

comprises:

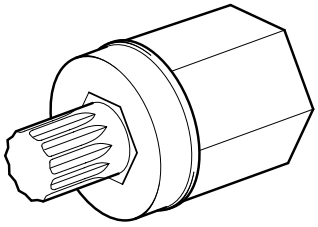
Order No.	
Sleeve	T10030/1
Tube	T10030/2
Spindle	T10030/3
Thrust piece	T10030/4
Cross piece	T10030/5
Tube	T10030/6



SSP207/134

Adapter

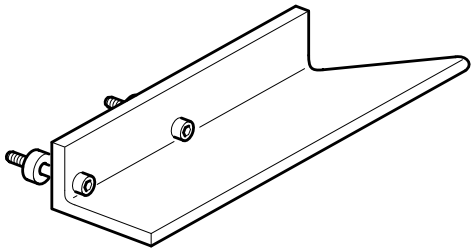
Order No. T10031



SSP207/130

Socket

Order No. T10035



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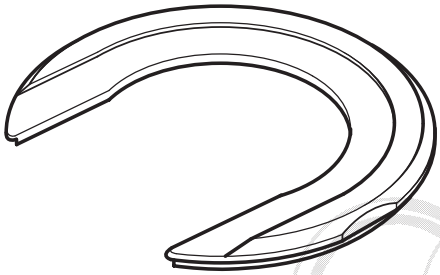
Attachment for SW 3300A
(front-wheel drive vehicles only)

Order No. T10036



SSP207/132

Additinal tool for set V.A.G 1459B
Thrust piece VAS 5146

Spring retainer
(in preparation)

+ Gear wheel

Dear readers,

By reading this Self-Study Programme, you will have now familiarised yourself with the technical innovations of the new Audi TT.

The appearance of this SSP is in accordance with the CI for Audi's own Self-Study Programmes.

The section on Service provided you with information regarding new special tools and service highlights, among other things.

We would be pleased to receive any suggestions for improvement of the Self-Study
Programmes. If you have any queries, please do not hesitate to contact us under Fax No. ++49/841 89 637.

With kind regards,
Technical Service Training Team

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