

# Running gear

## Dampers

The Audi A6 Avant '05 with aas also has continuously adjustable rebound and compression damping characteristics. The front and rear axle dampers differ in respect of their design from the dampers on the A8. The electrically activated damping valve is located on the exterior of the damper tube. For this reason, and also because the dampers for the A8 and A6 are sourced from different systems suppliers, we refer to the suspension system on the A6 as a Continuously Controlled Electronic Suspension (CES) system.



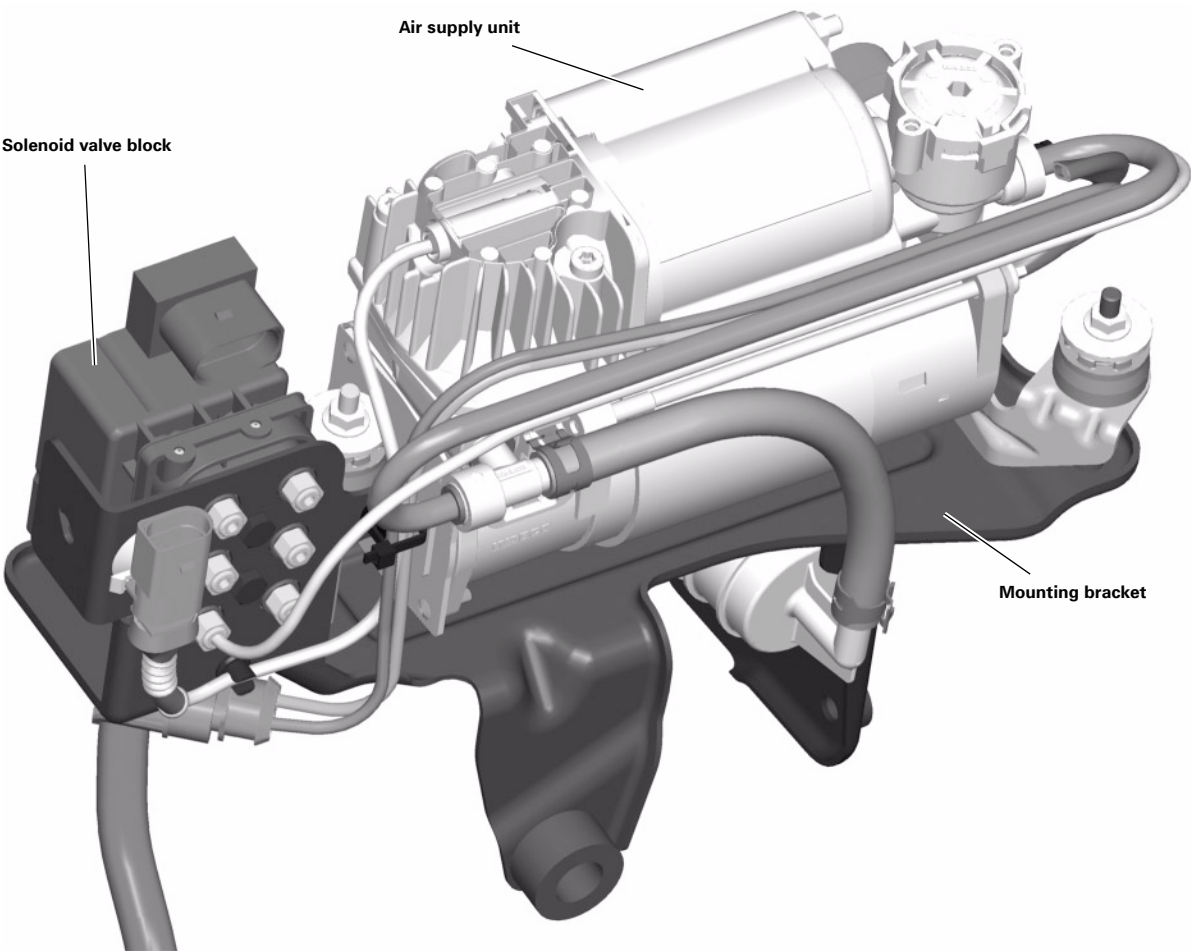
## Separation of the rear axle springs and dampers

The advantages of this configuration are an optimised through-loading width and low boot floor. A boot protects the complete air spring against ingress of dirt. Due to the size of the air springs, no additional air volume is required, which is the case with the A8 D3. The boot can be replaced by a service workshop. A new aluminium trapezoidal link was developed for the aas.



### Air supply unit and solenoid valve block

The air supply unit and the solenoid valve block are identical in design and function to those of the allroad quattro and A8. Both units are now mounted on a common bracket.



344\_007

# Running gear

## Ride heights

The modes implemented in the Audi A6 Avant '05 are the same as in the A8. However, the ride heights are different. The following conditions apply to the aas in the Audi A6 Avant '05:  
In "dynamic" mode, the car's ride height is lowered permanently by 15 mm compared to "automatic" mode.

When the "lift" mode is selected, the car body is raised by 15 mm compared to "automatic" mode.

The lowering of the suspension by 15 mm at motorway speeds in "automatic" mode is also implemented in the Audi A6 Avant '05. In the A6, there is no further reduction in ride height in "dynamic" mode, which is the case in the A8.

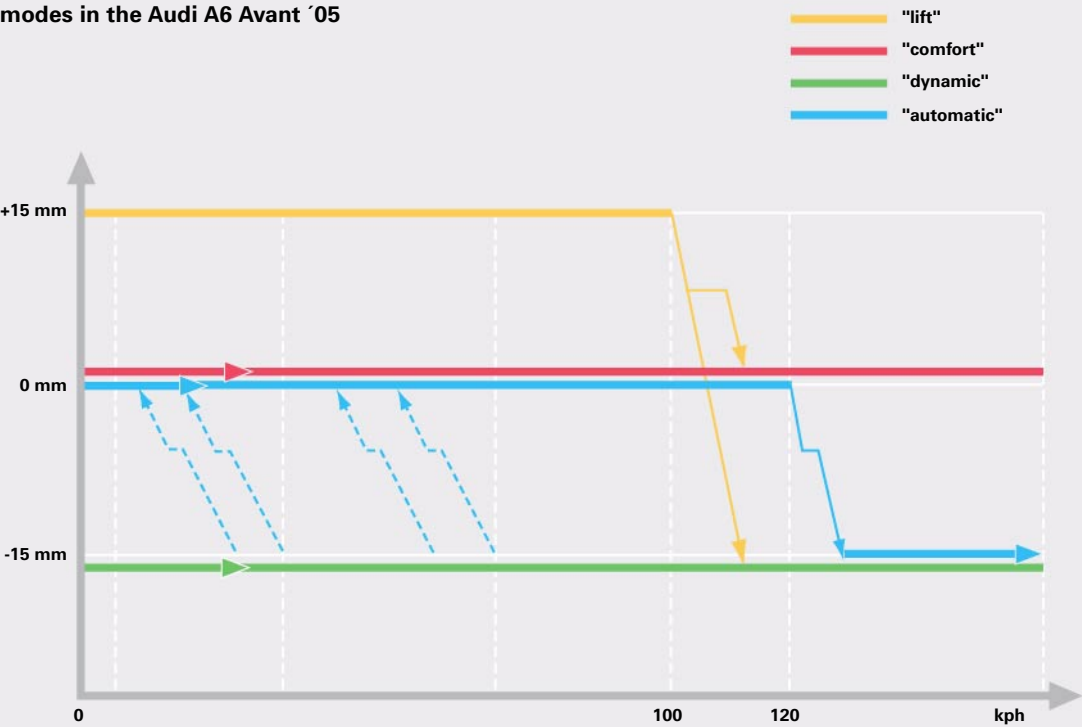
The same conditions as on the A8 must be met in order to select and quit the various modes.

### Reference



For further information, please refer to the current operating instructions and SSP 292.

aas modes in the Audi A6 Avant '05



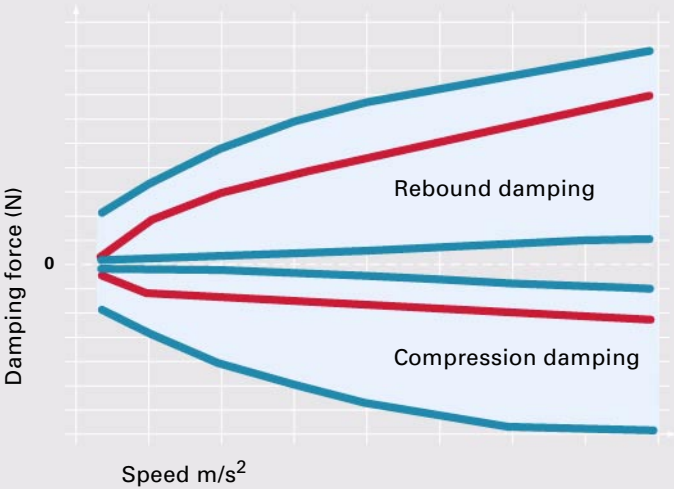
344\_032

System failure response

If the electrical damping valve is deenergised in case of failure, a default damping force characteristic takes effect. In this case, the damper works like a conventional (non-controlled) damper.

Damper set-up

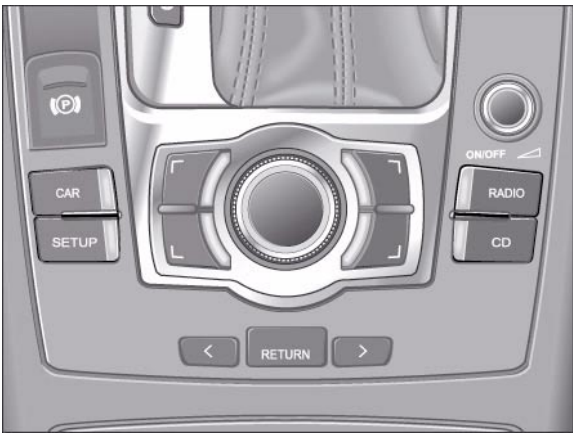
Damping valve deenergised



344\_020

aas with MMI Basic

The aas system is available in the Audi A6 Avant '05 in combination with MMI and also, alternatively, in combination with MMI Basic .



344\_027

## New special tools

The following new special tools are used for aas in the Audi A6 Avant '05:

### T 40082/1-6 spring blocker for air springs

Due to the modified installation dimensions, the spring blockers used for the A8 are unsuitable for the A6. The advantage of using spring blockers on the A6 front axle is that subsequent replacement of the upper transverse rods is no longer needed.



344\_018

### T 40081 ramp

When the system is fully vented , the suspension will be so low that, in case of unfavourable dimensional tolerances, a car jack cannot be used. In such case, the vehicle is driven up onto the 8 cm high ramps. A car jack or an auto-hoist can then be used.



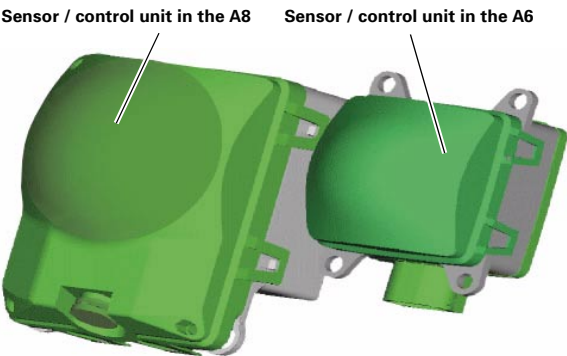
344\_016

A new test adapter with the type designation **VAS 1598/53** is used for the air spring control unit.

# adaptive cruise control (acc)

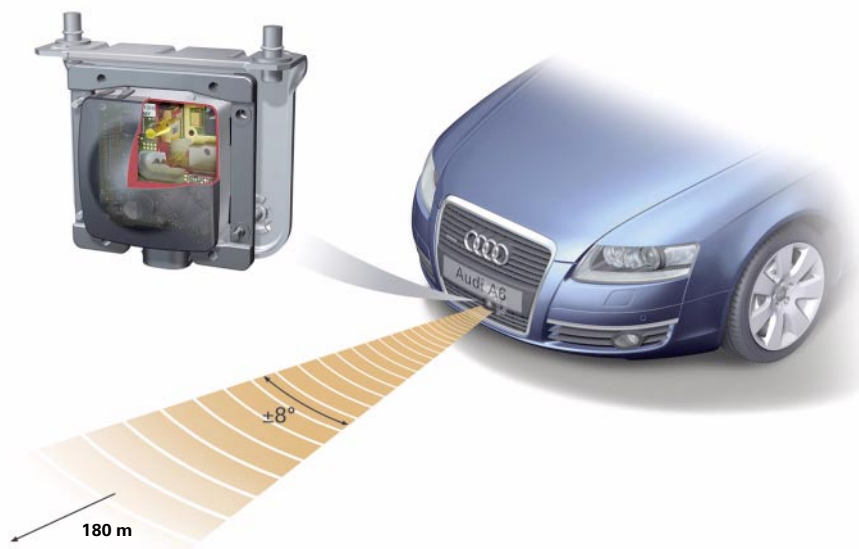
A new generation of the acc is used in the Audi A6 Avant '05. This acc incorporates the following modifications:

the exterior dimensions and weight of the acc unit (sender and control unit) were substantially reduced.



344\_015

The number of radar transceivers integrated into the sender was increased from three to four. As a result, it was possible to increase the beam angle from 8 degrees to 16 degrees. By increasing the range of the sensor, objects in the path of the vehicle can be detected earlier. The maximum range of the object detector was increased to 180 metres from 150 metres. The acc functionality was significantly improved with regard to lane-changing and winding country roads.



344\_033

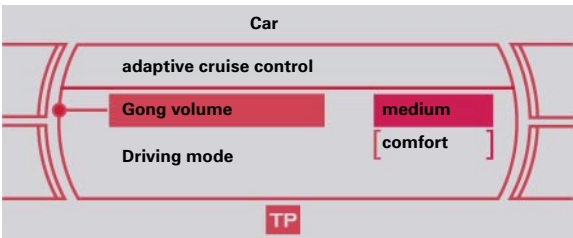
# Running gear

A heater was integrated into the bumper insert in front of the sender. It effectively prevents the build-up of snow or ice on the surface of the bumper in front of the sender in wintry road conditions. As a result, higher system availability is assured.

The heater is powered by the adaptive cruise control unit.

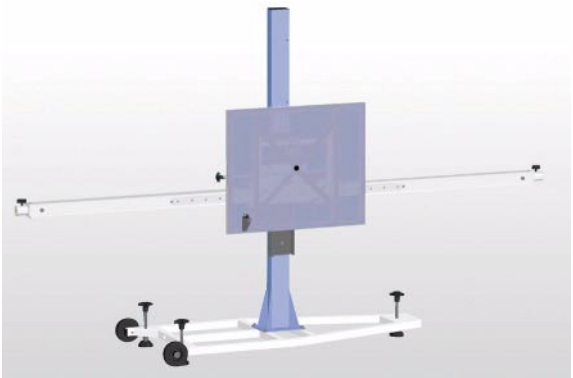
The heater is switched on and off in dependence on the ambient temperature.

The dynamic response of the vehicle in acc mode under acceleration and under braking can now be adapted to suit the driver's preferences by selecting a driving program in addition to the distance setting function. Three different driving modes can be activated with the MMI (for detailed information, refer to the current operating instructions).



344\_021

Rough adjustment is no longer required for setting the sender in the service workshop.



344\_058

## ESP

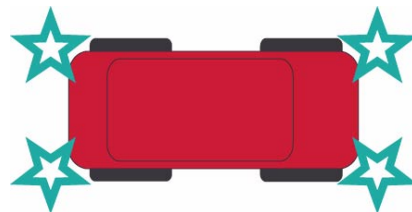
The Bosch 8.0 ESP system previously featured in the A6 saloon will also be used in the Audi A6 Avant '05. Several new functions will be implemented for use of the Bosch 8.0 ESP system in the Audi A6 Avant '05. To implement these auxiliary functions, the processing power of the ESP control unit was enhanced by increasing the clock frequency to 60 MHz from 48 MHz. The new control unit will also be rolled out at the same time in the A6 saloon.

### Modified hydraulic brake assistant control for vehicles with acc

When the vehicle is travelling, acc continuously monitors objects in front of the vehicle within the range of the radar sensor. The object detection function remains active even after the acc function has been deactivated by the driver. The system has the capability to assess the "hazard potential" of a traffic situation. It does so by evaluating a variety of parameters, including the number, position and speed of objects detected, the distance to the objects detected, own vehicle speed etc. If a "potential hazard" is identified, the brake system is pre-filled and the cut-in threshold of the brake assistant is reduced.

### Automatic activation of the hazard warning light system

If the brakes are applied hard, the hazard warning light system is activated automatically to alert traffic following on behind. On vehicles with the Highline trim, the surfaces of the brake lights are also enlarged, depending on the country specification.



344\_040

### Extended understeer correction

When a vehicle is understeering, it can be stabilised by braking the wheels on the inside of the corner. However, if the cornering speed of the vehicle is too high to achieve the required curve radius, this action alone will not be sufficient. In such case, all four wheels are braked and engine torque is simultaneously reduced. A slightly higher brake pressure is applied to the inside rear wheel. In this way, the road speed of the vehicle is reduced and the vehicle is stabilised.

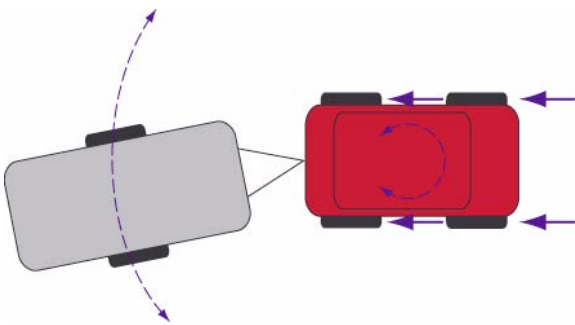


## Automatic stabilisation of the car-trailer combination

Slight swinging movements of a trailer can amplify in such a way as to cause a critical driving situation. This situation usually occurs at road speeds between 75 and 120 kph.

If the trailer begins to swing when the vehicle is travelling at a speed above the critical threshold, the oscillation amplitude of the trailer will progressively increase. The only way to reduce the swinging of the trailer is to reduce speed to below the critical threshold.

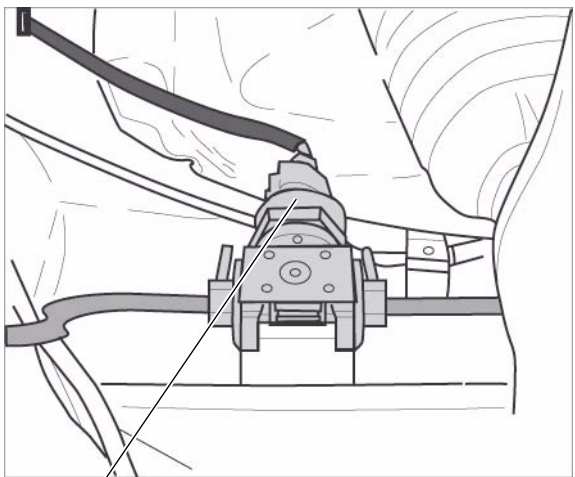
The swinging movements also excite periodic oscillation of the towing vehicle about its vertical axis. These yaw movements are monitored by the yaw rate sender and evaluated by the ESP control unit. If defined limits are exceeded, the ESP control unit instructs the engine control unit to reduce torque in order to slow the vehicle down. If this action is insufficient, all four wheels are braked simultaneously by the ESP control unit.



344\_038

## Enhanced acc braking comfort

On vehicles with acc, two additional pressure sensors are installed in the lines between the ESP unit and the front-axle brake calipers. The previous method, whereby the actual brake pressure was calculated in the control unit, is less accurate than the direct measurement method, particularly at low brake pressures. Using the data supplied by the pressure sensors, ESP can control the build-up of brake pressure more precisely. This results in shorter reaction times, and braking becomes more comfortable.



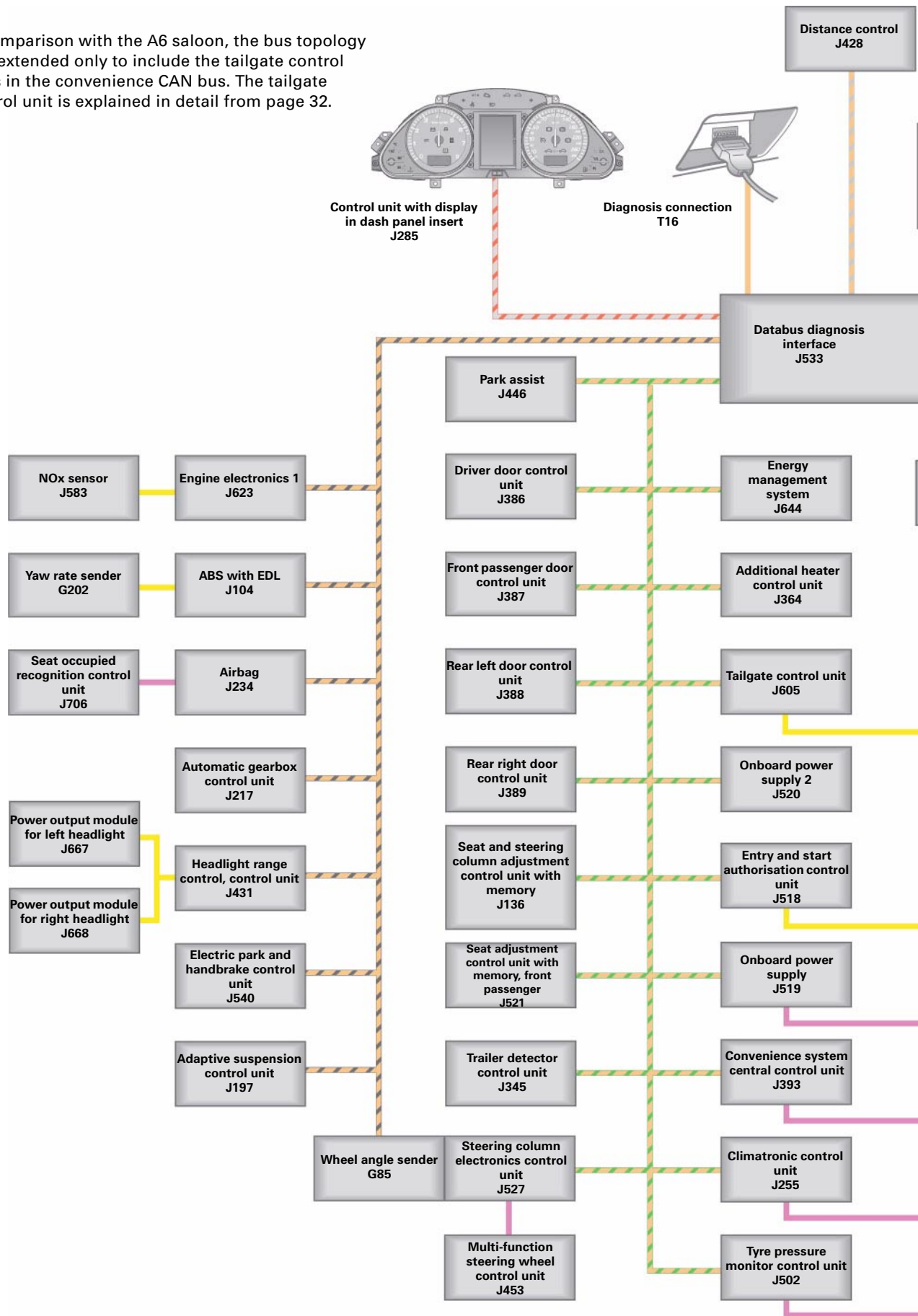
Brake pressure sensor

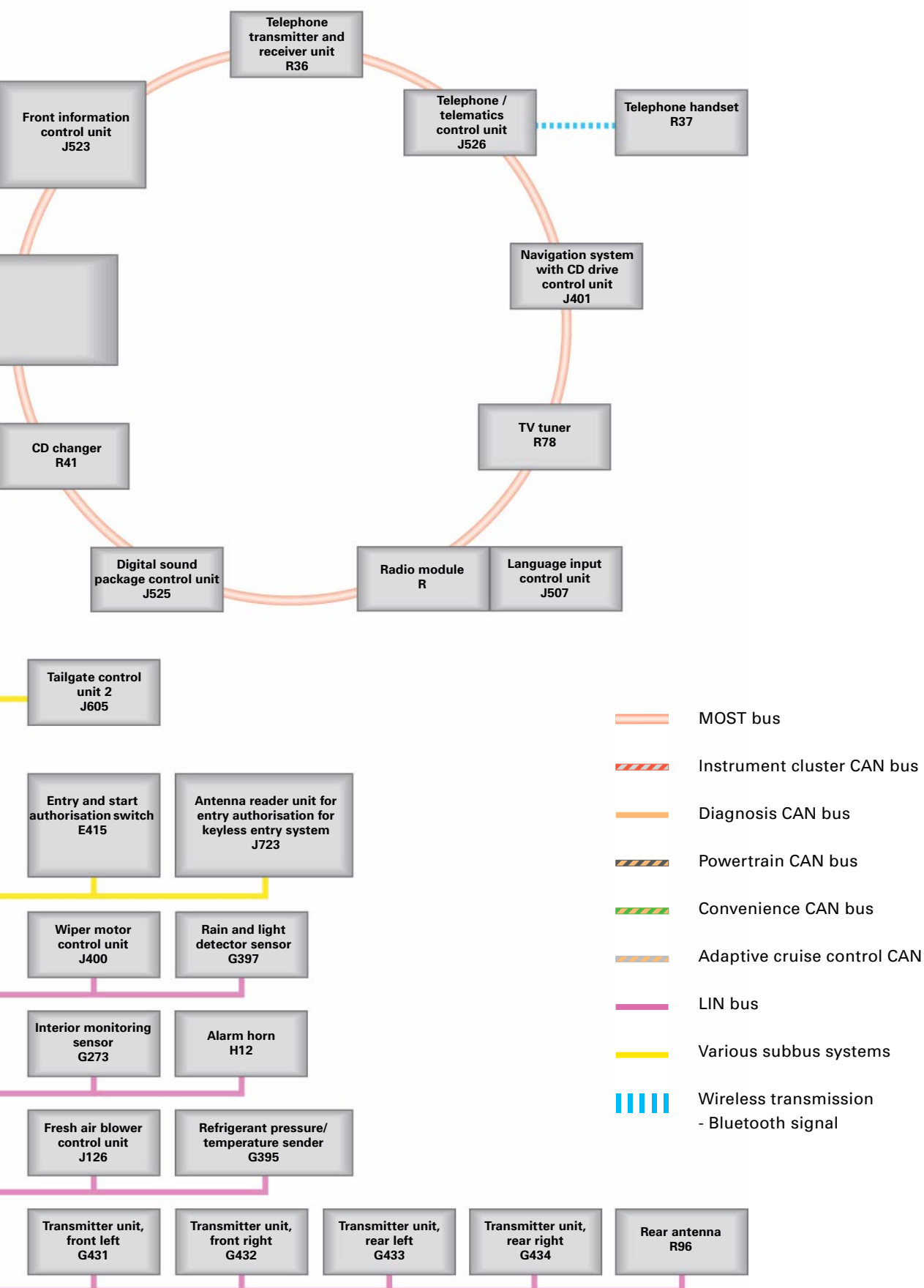
344\_041



Bus topology

In comparison with the A6 saloon, the bus topology was extended only to include the tailgate control units in the convenience CAN bus. The tailgate control unit is explained in detail from page 32.





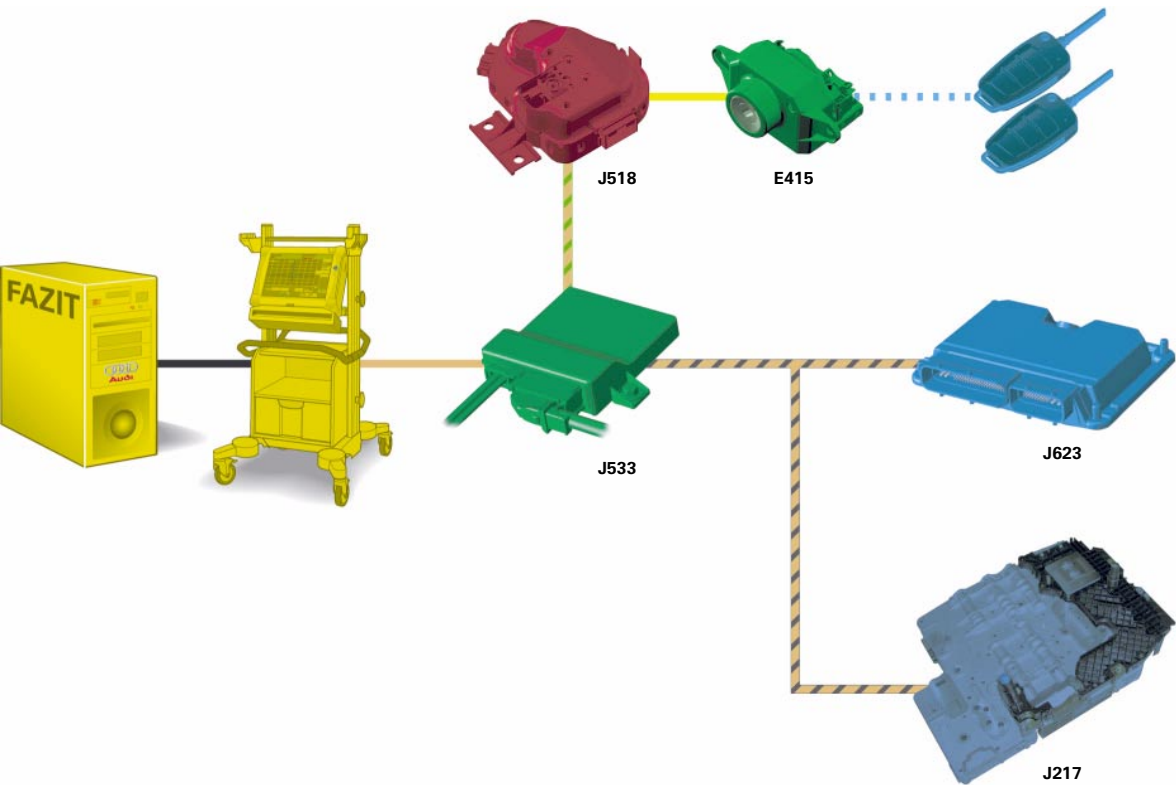
## Immobiliser in automatic gearbox

In the Audi A6 Avant '05, the automatic gearbox was integrated into the immobiliser. This is the case with both 6-speed automatic gearbox 09L and multitronic gearbox 01J. With model year '06 or later, the automatic gearboxes in the A6 saloon and in the A8 will also have an immobiliser function.

These gearboxes have a control unit which is integrated into the gearbox (mechatronics). The relatively sophisticated, and hence secure, installation location serves as a deterrent to parts theft. Because engagement for power transmission is dependent on the gearbox control unit, this immobiliser offers good protection against vehicle theft.

The immobiliser still has the type designation "Immobiliser 4", because it uses the same technology as in the A8 '03.

### Immobiliser topology



344\_013

### Legend

- E415 Entry and start authorisation switch
- J217 Automatic gearbox control unit
- J518 Entry and start authorisation control unit
- J533 Databus diagnosis interface
- J623 Engine control unit

- Component which is not integrated into the immobiliser
- Component which is integrated into the immobiliser
- Master control unit
- PC / mainframe

## Matching

The procedure for matching the gearbox control unit is similar to the procedure for matching the engine control unit.

Furthermore, the gearbox is able to accept a new identity. If a key is stolen and the complete key set is replaced, all control units integrated into the immobiliser can assume a new identity.

The immobiliser still has the type designation "Immobiliser 4", because it uses the same technology as in the A8 '03.

## Response to non-matched control unit

If only the gearbox control unit is not matched, can the engine can be started in the usual fashion. The gearbox control unit detects the missing or false immobiliser information. This is indicated to the driver by an inverted selector lever position indicator on the centre display of the dash panel insert. If a new control unit is used, the vehicle can be operated in an emergency mode with a maximum speed of approx. 20 kph, provided that the control unit has not previously been matched to any other vehicle.

If the control unit has already been installed in another vehicle, emergency operation will not be possible. The selector lever can be engaged by the driver. However, the control unit will prevent tractive power from flowing to the output shaft. As with other immobiliser components, it is only possible to match such a control unit in a vehicle of the same model, i.e. a gearbox which has already been matched to an A8 cannot be matched to an A6.

## Gearbox modifications

### multitronic

The 01J gearbox has no mechanical emergency running mode. The modifications to the immobiliser relate only to the software and certain electronic components in the gearbox control unit.

### 6-speed automatic gearbox

In the case of the 09L and 09E gearboxes, the hydraulic control unit was modified in addition to the software and the hardware so that there is no power transmission when deenergised. To achieve this, the characteristics of several electric pressure control valves have been inverted.








325\_071



325\_051

Overview of the infotainment systems

	MMI basic	MMI basic plus	
Standard equipment			
Display	<div>Monochrome 6.5" screen</div> <div></div>	<div>Monochrome 6.5" screen</div> <div></div>	
Control panel	<div>4-key control panel</div> <div></div>	<div>4-key control panel</div> <div></div>	
Operating and display unit control unit	<div>In the glove compartment</div> <div><ul style="list-style-type: none"><li>– incl. radio module</li><li>– incl. audio single CD drive</li><li>– incl. 2x20W amplifier for 4 loudspeakers, front</li></ul></div>	<div>In the glove compartment</div> <div><ul style="list-style-type: none"><li>– incl. radio module</li><li>– incl. audio single CD drive</li></ul></div>	
Amplifier	<div>Integrated into the operating and display unit control unit</div>	<div>DSP sound system with 160 W total power output in the luggage compartment, rear left, for 10 loudspeakers</div>	
Radio	<div>Radio with diversity radio antenna, integrated into the operating and display unit control unit</div>	<div>Radio with diversity radio antenna and TP memory function, integrated into the operating and display unit control unit. On the 4-key control panel, the TP memory function can be selected via the radio set-up.</div>	
CD drive	<div>Integrated into the operating and display unit control unit</div>	<div>Integrated into the operating and display unit control unit</div>	
Navigation	<div>–</div>	<div>–</div>	
Optional			
CD changer	<div>CD changer in the glove compartment</div>	<div>CD changer in the glove compartment</div>	
Mobile phone preparation	<div>Bluetooth mobile phone preparation integrated into the centre armrest incl. 8-key control panel</div>	<div>Bluetooth mobile phone preparation integrated into the centre armrest incl. 8-key control panel</div>	
BOSE amplifier	<div>–</div>	<div>BOSE 6000 amplifier with<ul style="list-style-type: none"><li>– BOSE Audi-Pilot</li><li>– 8-channel amplifier with 270 W total power output</li><li>– 13 loudspeakers</li></ul></div>	
Navigation	<div>–</div>	<div>–</div>	
Permanently installed telephone	<div>–</div>	<div>–</div>	
Voice control system	<div>–</div>	<div>–</div>	
TV reception	<div>–</div>	<div>–</div>	

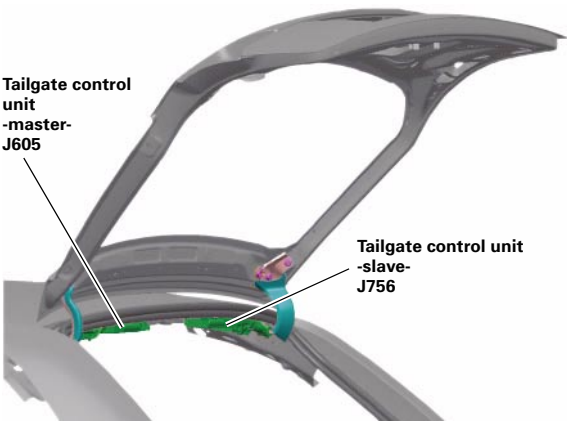
	MMI basic plus with CD navigation system	MMI
	<b>Monochrome 6.5" screen</b> 	<b>7" colour screen</b> 
	<b>8-key control panel</b> 	<b>8-key control panel</b> 
	<b>In the glove compartment</b> <ul style="list-style-type: none"> <li>– incl. radio module</li> <li>– incl. navigation module</li> <li>– incl. single CD drive for navigation or audio CD</li> </ul>	<b>In the dash panel</b>
	DSP sound system with 160 W total power output in the luggage compartment rear left for 10 loudspeakers	DSP sound system with 160W total power output in the luggage compartment rear left for 10 loudspeakers
	Radio with diversity radio antenna and TP memory function, integrated into the operating and display unit control unit	Radio with dual tuner, diversity radio antenna and TP memory function, in the luggage compartment, rear left
	CD changer in the glove compartment	CD changer in the glove compartment
	CD navigation system integrated into the operating and display unit control unit	–
	–	2. CD changer in the glove compartment
	Bluetooth mobile phone preparation integrated into the centre armrest	Bluetooth mobile phone preparation integrated into the centre armrest
	BOSE 6000 amplifier with <ul style="list-style-type: none"> <li>– BOSE Audi-Pilot</li> <li>– 8-channel amplifier with 270 W total power output</li> <li>– 13 loudspeakers</li> </ul>	BOSE 6000 amplifier with <ul style="list-style-type: none"> <li>– BOSE Audi-Pilot</li> <li>– 8-channel amplifier with 270 W total power output</li> <li>– 13 loudspeakers</li> </ul>
	–	DVD navigation system in the luggage compartment, rear left
	–	Permanently installed telephone incl. cordless handset
	–	Voice control system in the K-box
	–	Analog TV receiver Analog TV receiver and digital TV receiver



## Tailgate drive control units J605 and J756

### Introduction

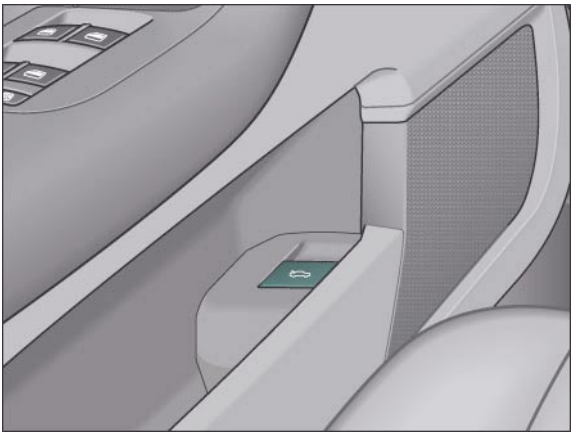
For increased user convenience, an automatic tailgate is optional in the new Audi A6 Avant '05. The automatic opening and closing function is implemented by two electric motors mounted on the tailgate hinges. Each electric motor has a step-up gear, a magnetic coupling, measuring sensors and an electronic control unit. The tailgate drive on the driver side (left-hand side) is the system master; it is connected to the convenience CAN bus. The tailgate drive on the front passenger side is the slave. The



344\_034

### Automatic opening

Opening of the automatic tailgate can be initiated by pressing the centre button on the remote control key, or by pulling the release button on the driver's door, or by pressing the handle on the tailgate. The opening cycle can be interrupted by repeating the initiating operation. Pressing again the centre button on the remote control key or the tailgate release button in the driver's door continues the interrupted opening cycle.

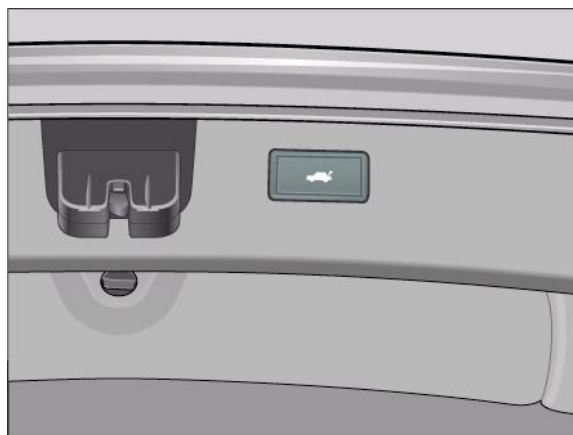


Tailgate release button in the driver door

344\_043

## Saving the limit position of the tailgate

If the tailgate was stopped in an intermediate position, this position can be saved as a future end position. To do this, the "close" button on the tailgate must be pressed for at least 5 s. Please note that this function is only available as of a minimum opening angle of 45 degrees.



"Close" button in the tailgate

344\_045

## Automatic closing

For safety reasons, automatic closing can only be initiated with the tailgate "close" button or with the tailgate handle. Automatic closing can also be interrupted by repeating either operation.

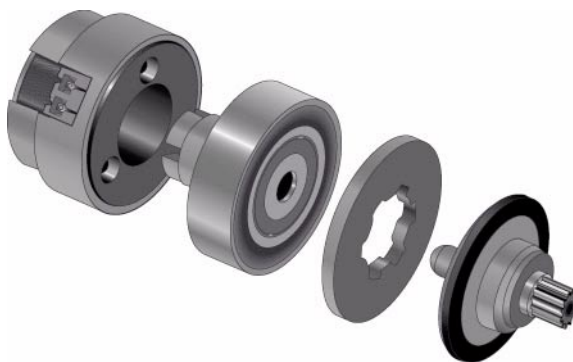
Pressing the "close" button or the tailgate handle again would, however, not continue the closing cycle, but would initiate an opening cycle.

## The magnetic coupling

The torque generated by the electric motor to open and close the tailgate is transmitted via a magnetic coupling. The magnetic coupling consists of a permanent magnet and a solenoid. When the tailgate is opening, the magnetic effect of the permanent magnet is intensified by the solenoid so that a sufficiently high torque can be transmitted from the electric motor.

The permanent magnet alone can hold the tailgate in an open position against its weight and against the pressure of the gas-filled spring. When the tailgate is opened or closed manually, the solenoid produces a magnetic field which neutralises the magnetic effect of the permanent magnet.

The magnetic coupling is open and the tailgate can move freely.

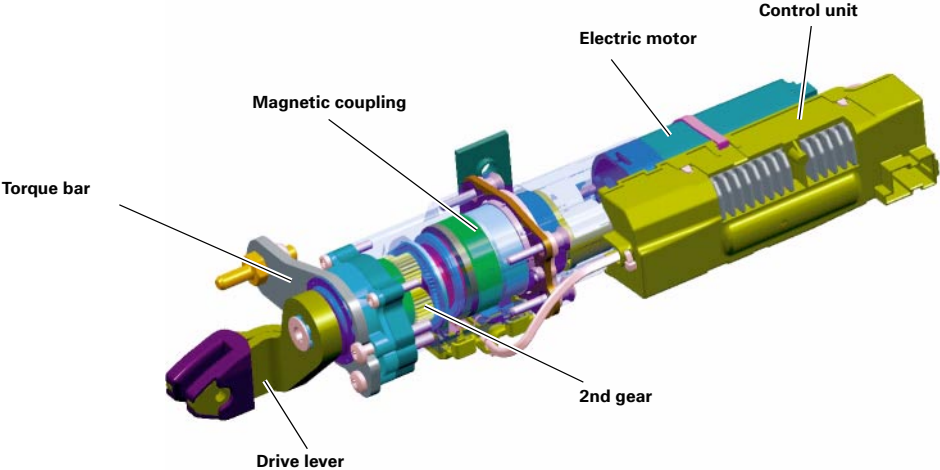


344\_031

## Manual tailgate operation

When the tailgate is moved manually from a stopped intermediate position, the deenergised holding torque is overcome and the "Manual" mode is activated. This manual movement is detected by means of Hall sensors, whereupon the control units energise the couplings in the "freewheel" direction. When movement stops, the couplings are deenergised after approximately one second and the tailgate holds its position automatically.

A second possible way to operate the tailgate manually is to open the closed tailgate by means of the tailgate handle button. The couplings will then also be energised in the "freewheel" direction. This state is maintained for approximately 0.5 seconds after releasing the handle button. If no manual operation is detected during this phase, the couplings will again be energised in the "open" direction and the tailgate will open automatically.



344\_042

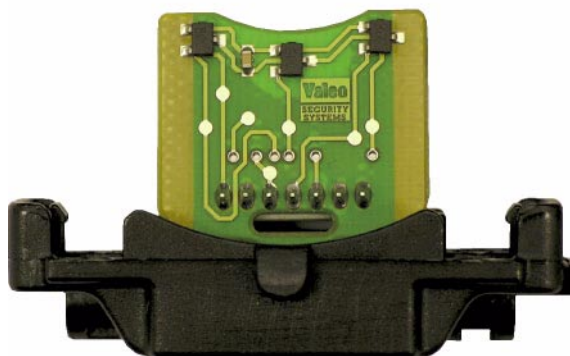
## Speed control

The torque needed to open and close the tailgate is dependent upon several factors, such as the momentary vehicle position, ambient temperature and momentary tailgate position. For this reason, a speed regulator was implemented in the control unit; it adjusts the momentary motor speed to a default speed characteristic. Motor speed is controlled via a high-frequency PWM signal which controls the motor current.

## Sensors

Road speed is monitored by a Hall sensor on the left tailgate drive. The right tailgate drive also has a Hall sensor which detects when "manual" mode is required. An additional three small Hall sensors on the left-hand side monitor the direction of movement of the tailgate and the current tailgate position. The Hall sensors are also used for anti-pinch protection.

This is implemented by a speed/distance detection system. If an obstruction detected, the drive will stop. If an obstruction is detected during a closing cycle, the tailgate is reopened approx. 4 degrees.



344\_053

Hall sensor PCB for the detecting the direction of movement of the tailgate and the tailgate position

## Transport mode and standby current management

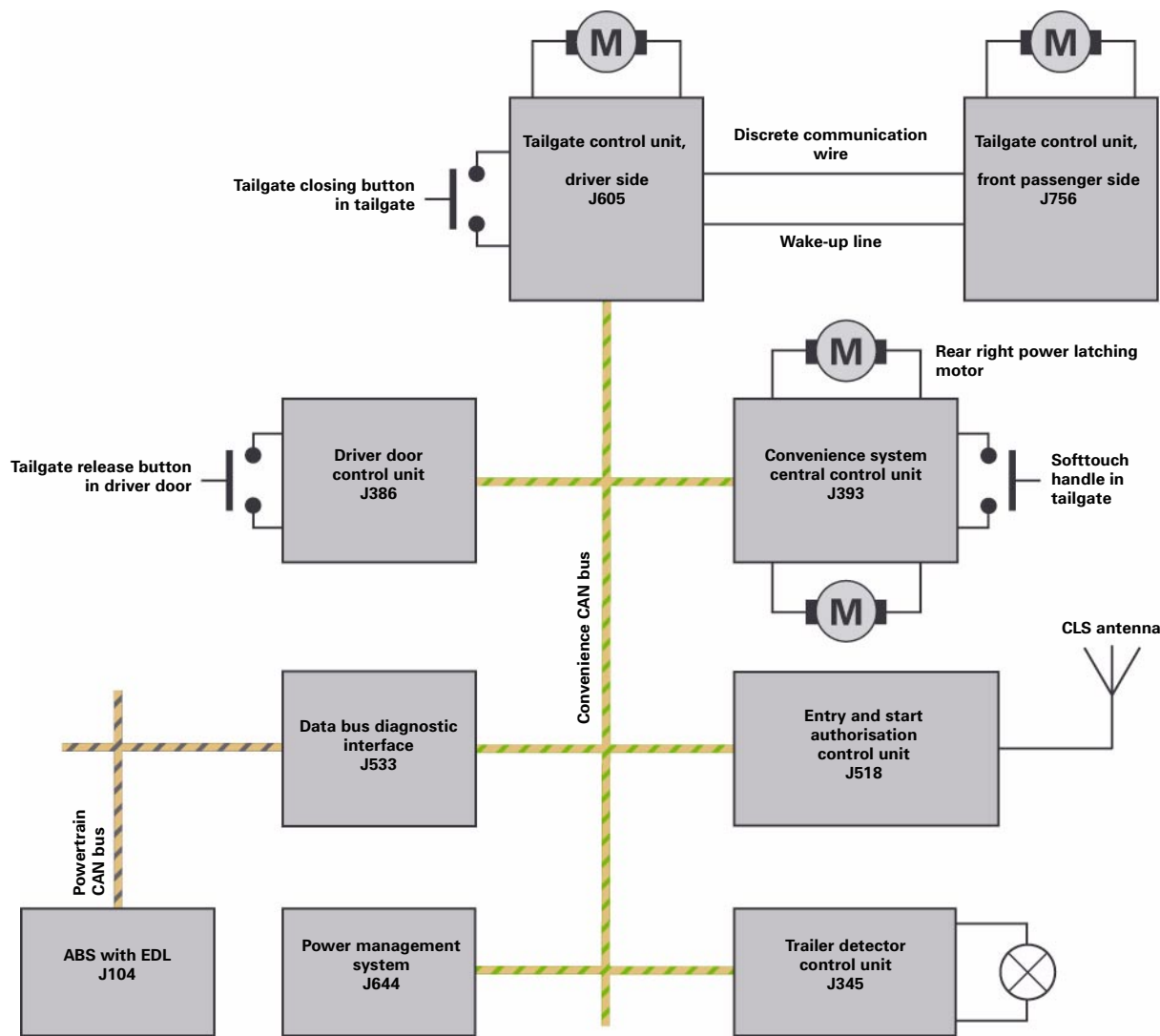
When transport mode is activated, the tailgate control unit is activated, too. In this condition, the tailgate must be operated manually. The electric motors are deactivated and only manual operation is possible. The same applies to standby current management from power-off stage 2.

## Deactivating the electrical tailgate drive

The following system faults will cause the electric tailgate drive to be deactivated:-

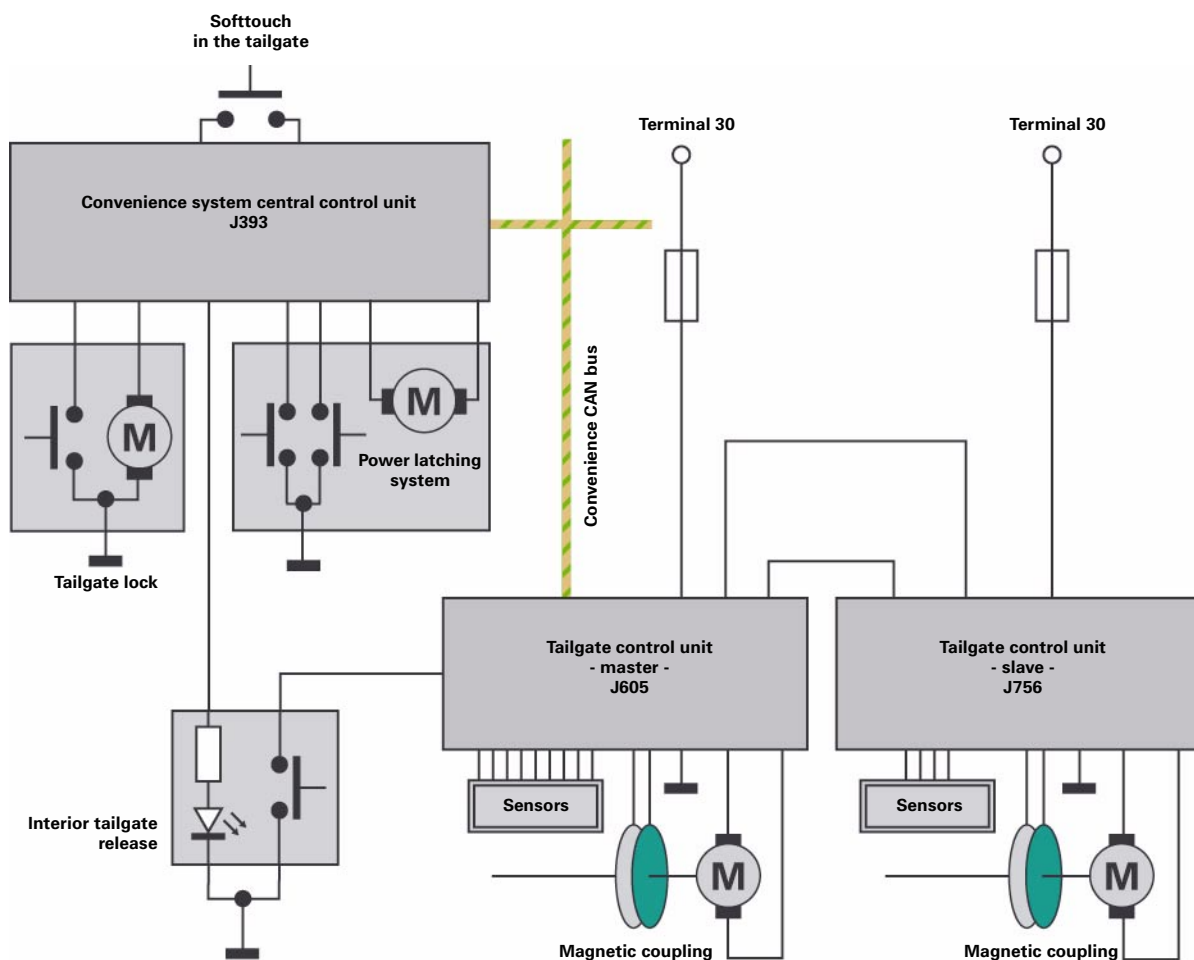
- No CAN communication with driver door control unit J386
- No CAN communication with convenience system central control unit J393
- No CAN communication with entry and start authorisation control unit J518
- Components protection in convenience system central control unit J393 active
- The tailgate power latching system does not start up when the tailgate is open or the started-up power latching system provides no feedback to the convenience system central control unit J393

## System overview - Tailgate control unit



344\_037

- The tailgate control unit J605 receives the vehicle speed signal from the ABS with EDL control unit J104. For safety reasons, automatic tailgate opening and closing are deactivated at a vehicle speed of 3 kph.
- If the tailgate control unit J605 receives from the trailer detector control unit the information "trailer detected", the automatic tailgate operation will also be deactivated for safety reasons.

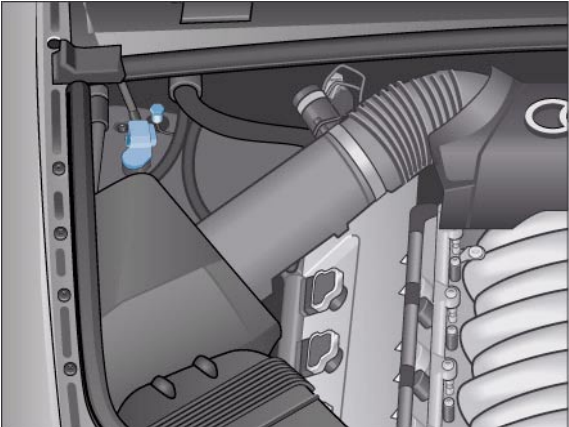


344\_036

- The tailgate control unit master J605 communicates with the tailgate control unit slave J756 via a single-wire bus specified by systems supplier Valeo (no LIN bus).
- Via the wake-up line, the tailgate control unit master J605 can wake up the tailgate control unit slave J756. This is the case if the convenience CAN bus is reactivated in Sleep Mode, or if the interior tailgate release is operated while the convenience CAN bus is in Sleep Mode. The slave tailgate control unit wakes up the master control unit J605 if manual operation of the tailgate is detected .
- The function block of the rear right power latching motor shows two sensors. They have the task of monitoring the two end positions of the power latching system and informing the convenience system central control unit when they are reached.

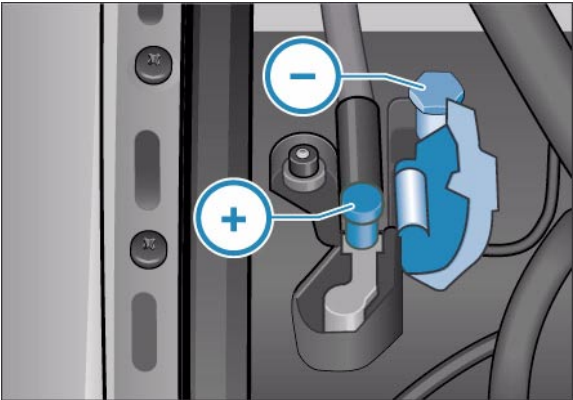
## Slave start connectors in the engine bay

To make the A6 more service-friendly, slave start connectors are installed in the engine bay of the Audi A6 Avant '05 and the A6 saloon from model year '06. Here, the slave start connectors are much more readily accessible than in the luggage compartment. The slave start connectors are located above the right-hand suspension strut tower. The positive pole is concealed below a red plastic cover. The slave start connector was deleted from the luggage compartment.



344\_023

The advantage of locating the slave start connector in the engine bay is that the charger cannot be directly terminated to the battery by mistake. In the event that a charger is terminated directly to the battery, the energy management control unit J644 not know if the battery is charged, and, in some situations, may activate power-off stages even in case of a charged battery. This will ultimately cause loads to be shut down unnecessarily.



344\_024

# Self-study programmes on the Audi A6 Avant

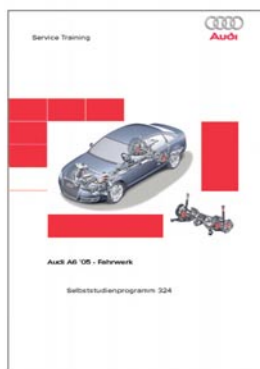
## SSP 323 Audi A6 '05

- Introduction to the vehicle
- Body engineering
- Occupant protection
- Air conditioning

Order number: A04.5S00.06.20



323\_057



323\_058

## SSP 324 Audi A6 '05 Running Gear

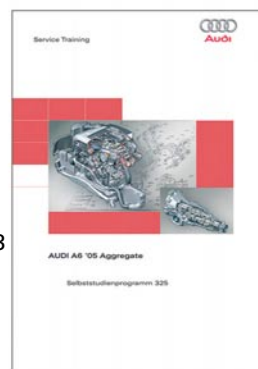
- Front axle technology
- Rear axle technology
- Steering system
- ESP
- Electromechanical Parking Brake EPB

Order number: A04.5S00.07.20

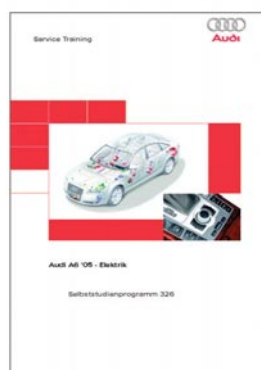
## SSP 325 Audi A6 '05 Engines and Transmissions

- 3.0 V6 TDI Common Rail
- 3.2 V6 FSI
- Manual transmissions 01X, 02X, 0A3
- 6-step automatic transmission 09L
- Multitronic 01J

Order number: A04.5S00.08.20



323\_059



323\_056

## SSP 326 Audi A6 '05 Electrical Systems

- Networking
- Bus topologies
- Convenience electronics
- Infotainment

Order number: A04.5S00.09.20



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