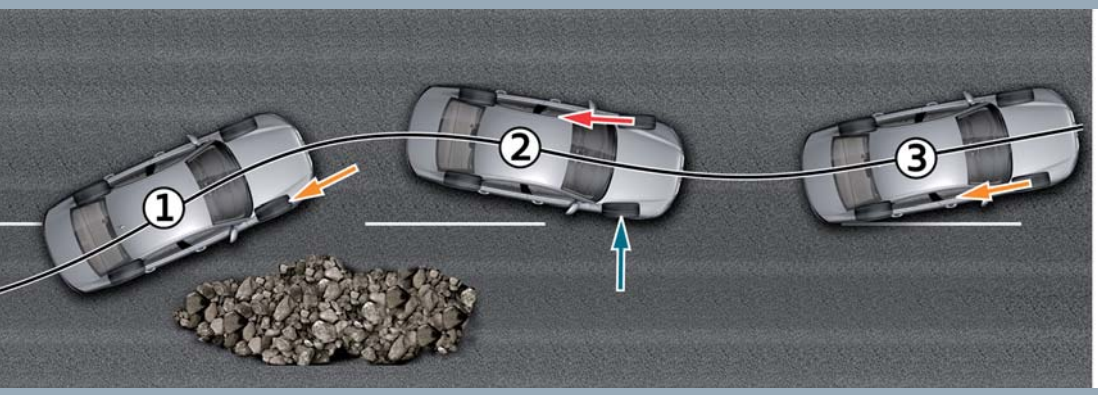
Self-Study Program 960103



The 2011 Audi A8 Running Gear and Suspension Systems

Audi Academy

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Service Training
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Always check Technical Bulletins and the latest electronic repair literature for information that may supersede any information included in this booklet.

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The Self-Study Program provides introductory information regarding the design and function of new models, automotive components or technologies.

The Self-Study Program is not a Repair Manual!
All values given are intended as a guideline only.
Refer to the software version valid at the time of publication of the SSP.

For maintenance and repair work, always refer to the current technical literature.

Reference

Note

Introduction

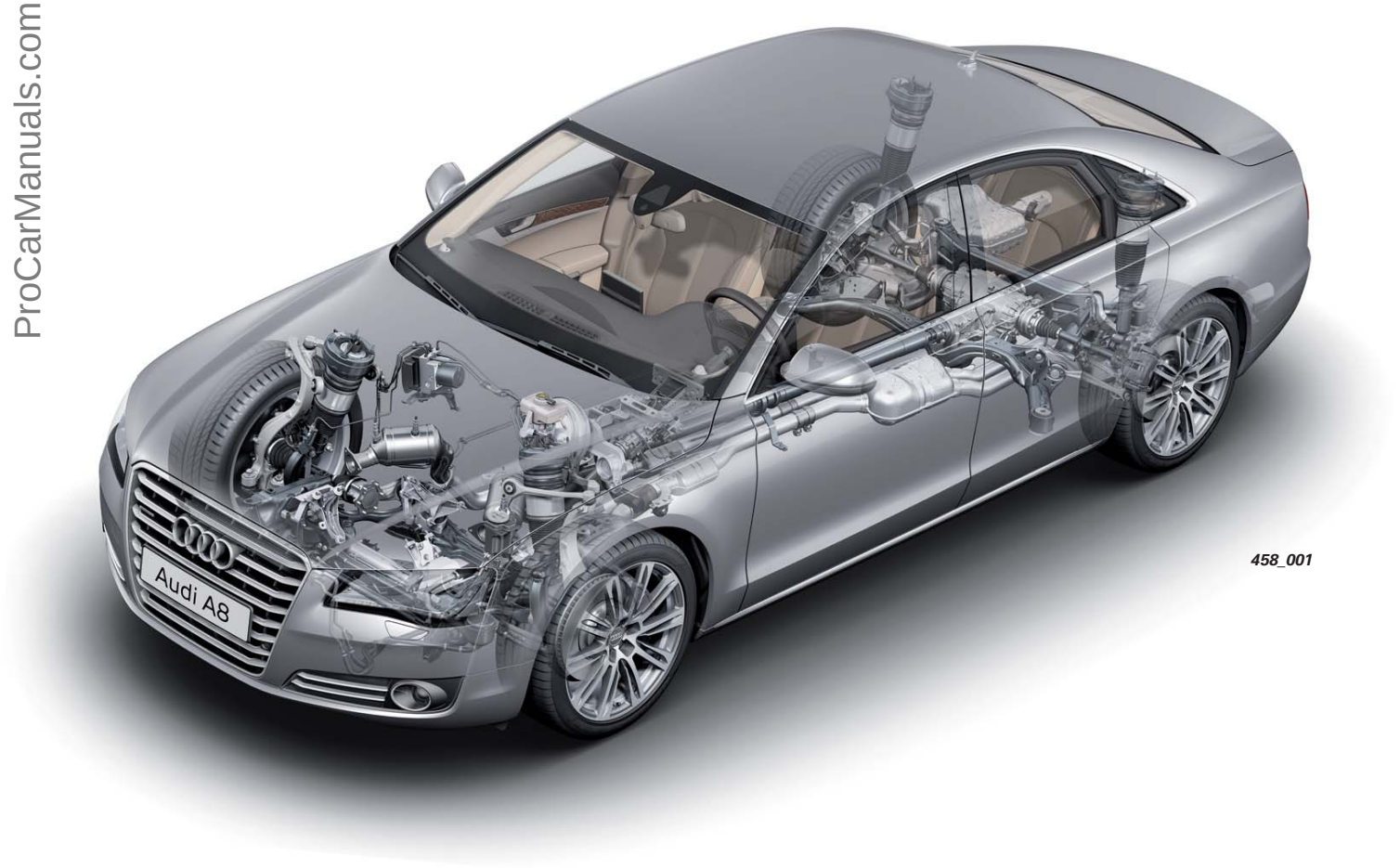
The primary 2011 Audi A8 development objective for its running gear and suspension systems was to enhance the already exceptional driving dynamics and comfort of previous Audi A8 models.

For example, the five-link front axle, trapezoidal link rear axle, as well as the Adaptive Air Suspension, have been further refined.

A new high speed FlexRay bus system quickly provides vehicle dynamic information to relevant systems. A new central sensor control module reduces the number of sensors in the vehicle.

As with its predecessor, the Adaptive Air Suspension system (PR Number 1BK) is standard equipment on the 2011 Audi A8.

An adaptive sport running gear and suspension (PR Number 2MA) is optional. When compared to the standard 1BK suspension, the optional adaptive sport running gear lowers the ride position of the vehicle by approximately 0.40 in (10 mm).



458_001

Axle and Wheel Alignment

On all 2011 Audi A8 models, the front drive axle is located forward of the torque converter. The steering gear is also mounted forward of the front axle. These changes make it possible to position the front axle 5.7 in (145 mm) further forward in the Aluminum Space Frame (ASF) compared to previous Audi A8 models.

The wheelbase has been increased by 1.81 in (46 mm), which improves axle load distribution and reduces vibration transfer to the passenger compartment. It also provides more vehicle interior space.

Increasing the track width by 0.70 in (18 mm) on the front axle and 0.86 in (22 mm) on the rear axle has had a beneficial effect on transverse dynamics. With these changes, the kinematics of the axles have been completely reengineered, with all axle components redesigned.

Despite a substantial wheelbase increase, the vehicle has a smaller turning radius than previous Audi A8 models.

Front Axle Overview

Front axle development was based on the five-link front axle used in the current Audi A4, where the steering gear mounting position is in front of the axle.

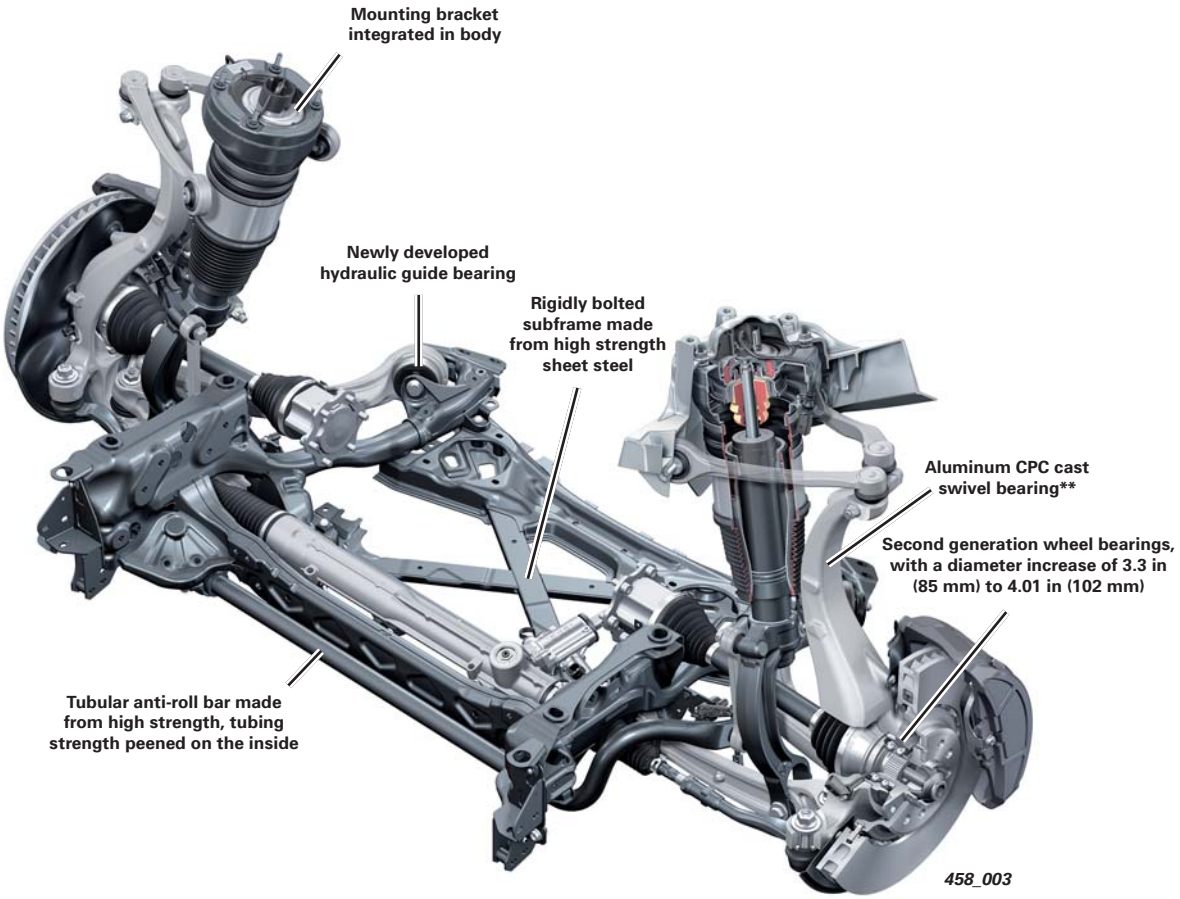
The steering gear assembly is installed with extremely tight tolerances. This means that it is no longer necessary to perform the “raised toe” adjustment as a tolerance compensation measure when performing wheel alignments. Due to the direct connection of the steering rack to the swivel bearing, the track rod can also assume wheel control tasks. It serves as the fifth link.

To reduce weight and increase suspension rigidity, the upper wishbone mounting brackets have been integrated with the vehicle body.

All Audi A8 wishbones are forged aluminum components. To achieve the best axle kinematics*, the outer joints of the support and guide links are arranged as close as possible to each other. For this reason, the support link joint is installed in the swivel bearing as a separate component.

All rubber mounts have been reengineered. A newly developed hydraulic mount that connects the guide link to the assembly mount makes it possible for the demanding and often contrary requirements of comfort, driving dynamics, and acoustics to be met.

To ensure effective steering self-centering when driving straight ahead, the steering axis inclination angle and caster angle have been slightly increased compared to the previous Audi A8.



*** Kinematics = the motion of a body or system of bodies without consideration given to their mass or forces acting upon them.**

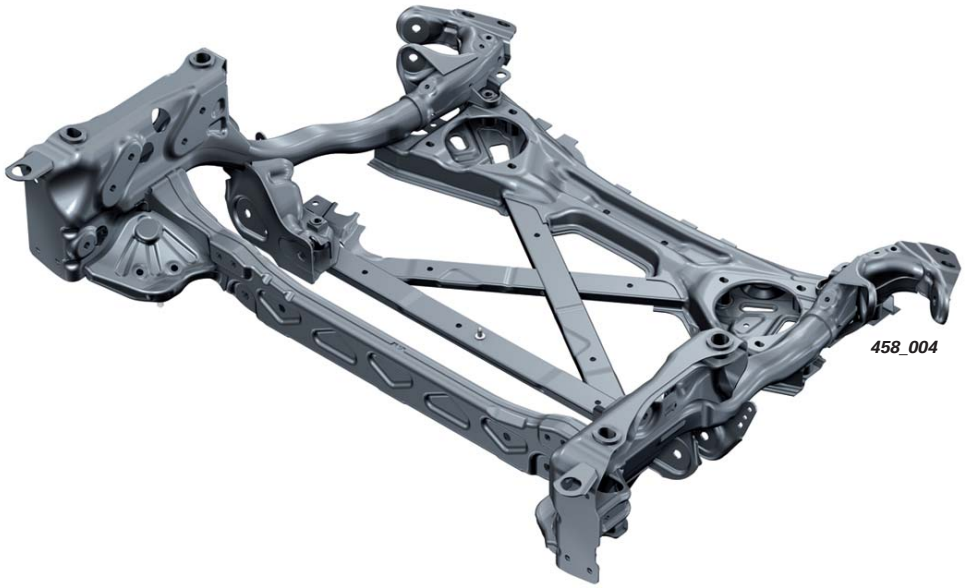
**** See “System components” for detailed information.**

Front Axle Components

Subframe

The subframe is made from high strength sheet steel. The link connection point holes are drilled at the end of the assembly's welding process. This helps ensure the accuracy of the front axle kinematics.

The subframe is bolted to the body. With the exception of the toe settings, no other adjustments are necessary during production.

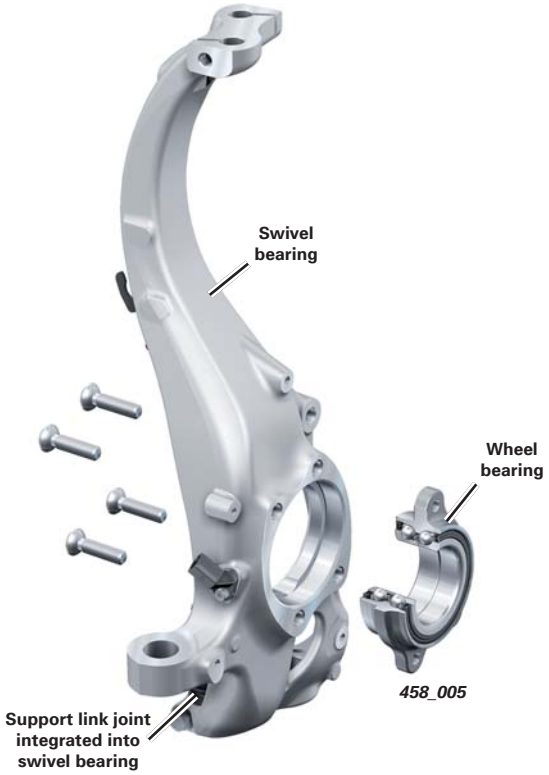


458_004

Swivel Bearing, Wheel Bearing

The aluminum swivel bearing is made in a CPC casting process that achieves an extremely dense grain structure. In this process, the molten mass is cast under high pressure. The casting die is then vented, causing further compacting of the grain structure.

A second generation wheel bearing is now used. Its diameter increased from 3.3 in (85 mm) to 4.01 in (102 mm). The increase in diameter makes it possible to position the outer pivot point of the drive shaft very close to the steering axis. Despite the larger wheel steering angle, maximum permissible flex angles are not exceeded.



458_005

Support Link

This link is bolted to the joint integrated in the swivel bearing.

Guide Link, Guide Bearing

The design of this link ensures all forces are optimally absorbed in all the positions the bearing may be subjected, given the kinematics of the suspension.

Anti-Roll Bar

Tubular anti-roll bars made from high strength steel tubing is used. To reduce weight, the inner wall of the tubing is strength peened. In this process, the surface is compacted when blasted with small steel balls, which increases the strength of the component.

This process reduces the cross-section of the tube while maintaining the same anti-roll (stabilization) effect. The anti-roll bar is mounted on the subframe and is attached directly to the shock absorbers by link rods in rubber-metal mounts.

Suspension Strut/Air Spring

As on the previous model, Adaptive Air Suspension is standard equipment on the 2011 Audi A8. (See the “Adaptive Air Suspension” section on page 10 for detailed information.)

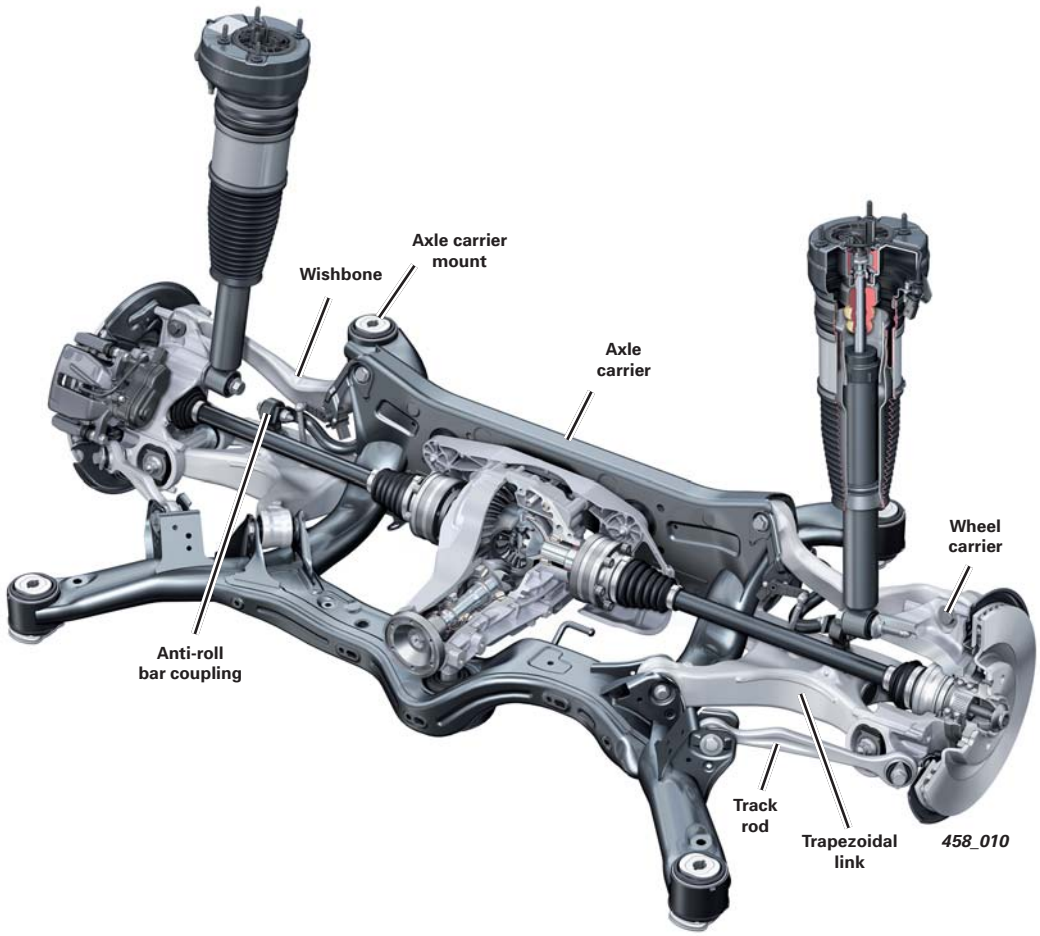
Rear Axle Overview

The 2010 Audi A8 track guided trapezoidal link rear axle was slightly modified for the 2011 Audi A8.

The suspension strut is now supported directly on the wheel carrier. A more direct ratio of 0.9:1 (0.74:1 on the Audi A8 predecessor) provides a more precise response of the damper.

The axle carrier's four high volume hydraulic mounts separate axle components from the body.

All wheel controlling components are of lightweight aluminum construction. The kinematic layout of the axle ensures smoother braking. This design makes it possible for the trunk compartment to be deeper, accommodating a larger fuel tank and a full-size spare tire.



Rear Axle Components

Subframe

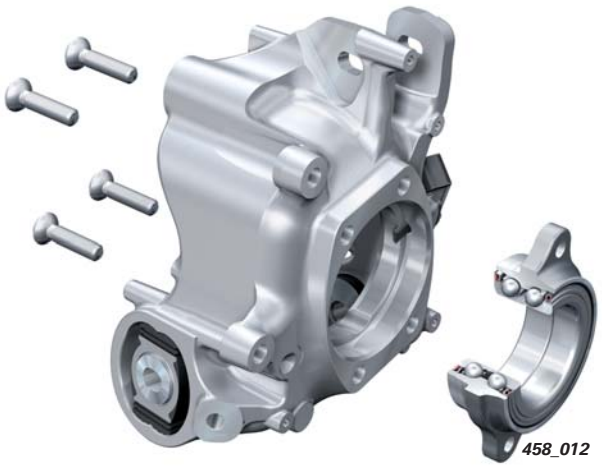
The subframe is made from high strength sheet steel. To reduce weight, the thickness of the sheet steel is partially adapted to the applied load. Thin-walled sheet steel cross struts and tubes with varying wall thickness are used. The tubes are produced in an internal high pressure forming process, whereby a blank (tube) is pressed into an external mold by pressure from the inside.

The hydraulic mounts are press fit and can be replaced. The mounts are designed so that they are extremely rigid in a transverse direction and very soft in a vertical direction. This ensures precision wheel control (forces in transverse direction) and excellent acoustic separation (forces in vertical direction). The hydraulic damping is particularly effective in dealing with longitudinal forces.

458_011

Wheel Carrier, Wheel Bearing

The aluminum wheel carrier is manufactured in a gravity die casting process and is designed to meet the highest rigidity requirements. With an increased wheel bearing diameter, the tilt resistance of the wheel has also been increased, which improves the transverse dynamics of the vehicle through more precise wheel control. The main innovation here is the attachment of the suspension strut to the wheel carrier.



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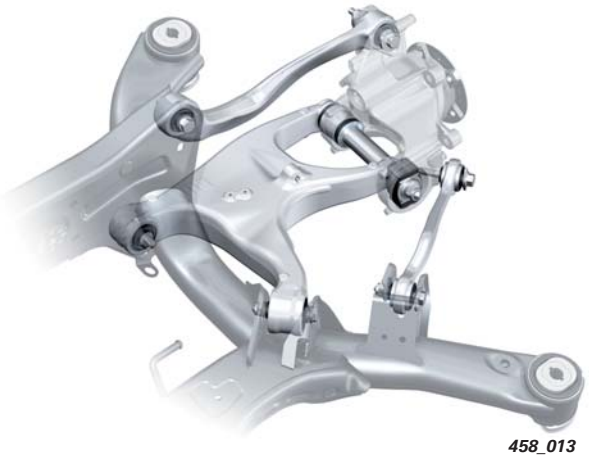
Trapezoidal Link, Upper Wishbone, Track Link

The trapezoidal link is designed as a hollow section and is made from heat treated aluminum in a sand casting process. The wishbone and track link are forged aluminum components.

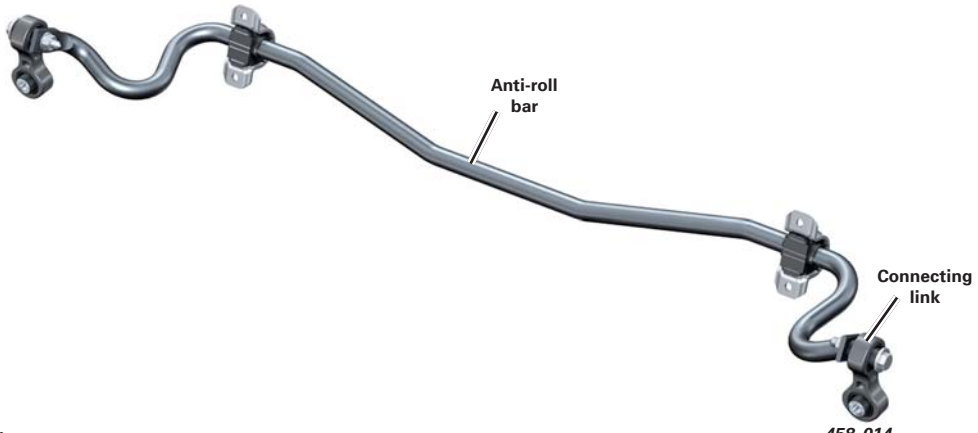


458_013

Anti-Roll Bar

The anti-roll bar is made from heat treated steel tubing. For the first time, the rear axle anti-roll bar is also strength peened on the inside.

The connecting link is made of lightweight, glass fiber reinforced plastic (GRP).



458_014

Rubber Mount

The design objective of the wheel controlling bearing points is to offer the least possible resistance to rotary motion, while also making them sufficiently rigid to absorb longitudinal and transverse forces. Increased applied force to rotary motion (also known as secondary spring rate) results in decreased suspension and damping response characteristics.

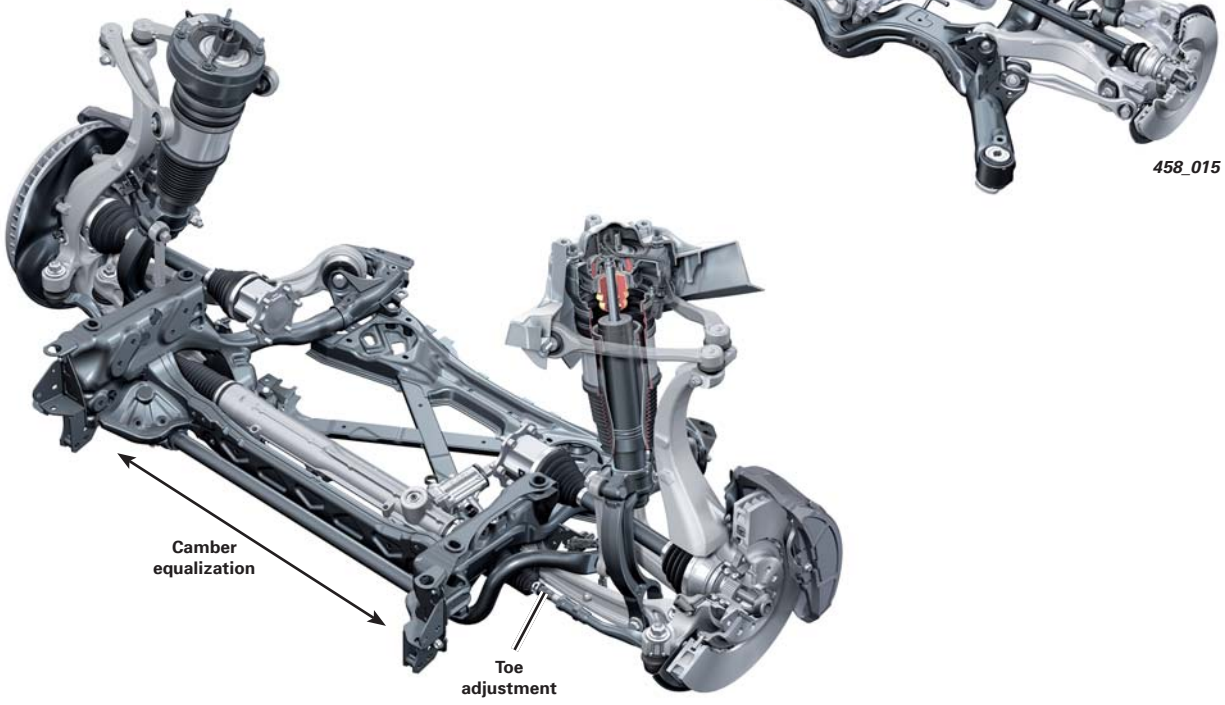
To reduce the secondary spring rate, all wheel controlling rubber mounts have integrated intermediate sleeves and rubber blends that have optimum damping properties. In addition, a completely new and patented elastomer joint was developed as the connecting joint between the wheel carrier and trapezoidal link.

458_013

Wheel Alignment

It is possible to make individual adjustments on the front axle. Due to the location of the steering gear on the subframe, it is no longer necessary to adjust the toe-in curve.

Camber values can be equalized by transverse displacement of the subframe, while toe and camber can be set separately on either side of the rear axle.



458_015

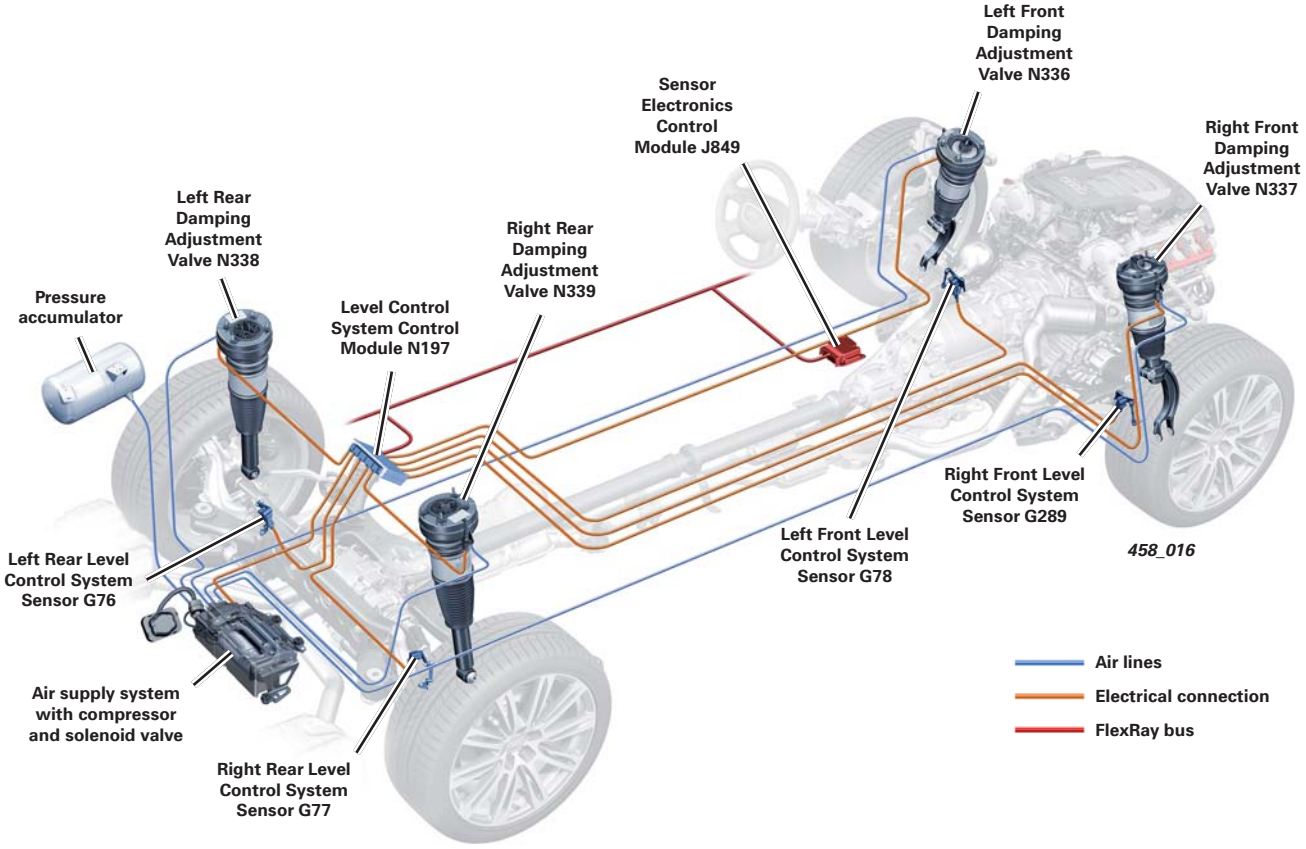
Adaptive Air Suspension

Overview

To achieve “best in class” driving comfort and dynamics in the 2011 Audi A8, all major Adaptive Air Suspension components were redeveloped. The control logic differs for each running gear and suspension variant.

A main feature of the system is the integration of the body acceleration sensor in Sensor Electronics Control Module J849.

Level Control System Control Module N197 communicates via the FlexRay data bus. The display and operation tasks have been integrated into the Audi Drive Select system.



System Components

Level Control System Control Module J197

J197 communicates over the FlexRay data bus, which improves performance throughout the control system. J197 receives relevant vehicle acceleration values from Sensor Electronics Control Module J849 via this bus system.

J197 is installed behind the rear panel in the luggage compartment.

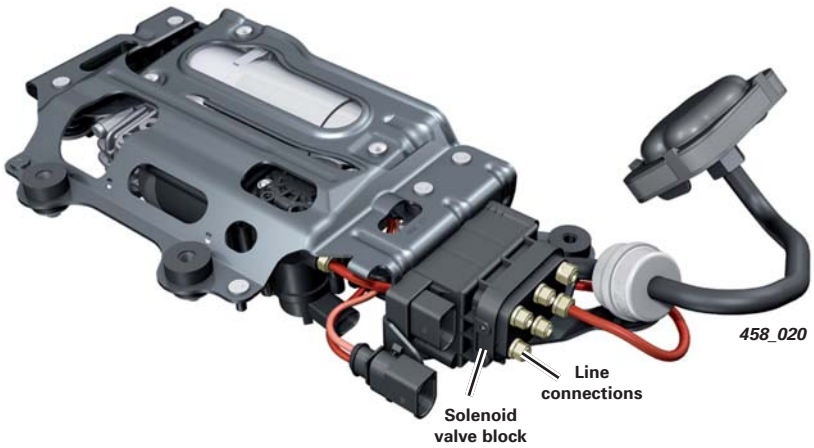
Parameters for the various running gear and suspension variants are adapted as part of the VAS Scan Tool online coding procedure.

J197 actuates the solenoid valves and air compressor, as well as the damper valves. However, the damper valves are only operated while the vehicle is moving. A vehicle speed signal from ABS Control Module J104 (ESP) is required.

The actuating current for the damper valves is between 0.0A to 1.8A. The maximum damping force is realized at 0.0A, while an electrical current of 1.8A provides minimum damping force. To achieve maximum driving comfort, the basic electrical current applied to the damper valves is 1.8A in all modes.

In terms of its design and pneumatic function, the solenoid valve block corresponds to components used in both the 2010 Audi A8 and the Audi A6 models equipped with Adaptive Air Suspension.

The installation positions of the line connections are different from other Audi vehicles, but the color identification markings are identical.



Reference
You will find detailed information on J197 and its components in SSP 994303, *Adaptive Air Suspension*.

Air Supply System

The air supply system consists of a dry-running, electric motor-driven compressor, air dryer, intake, solenoid valve block, and corresponding pneumatic lines.

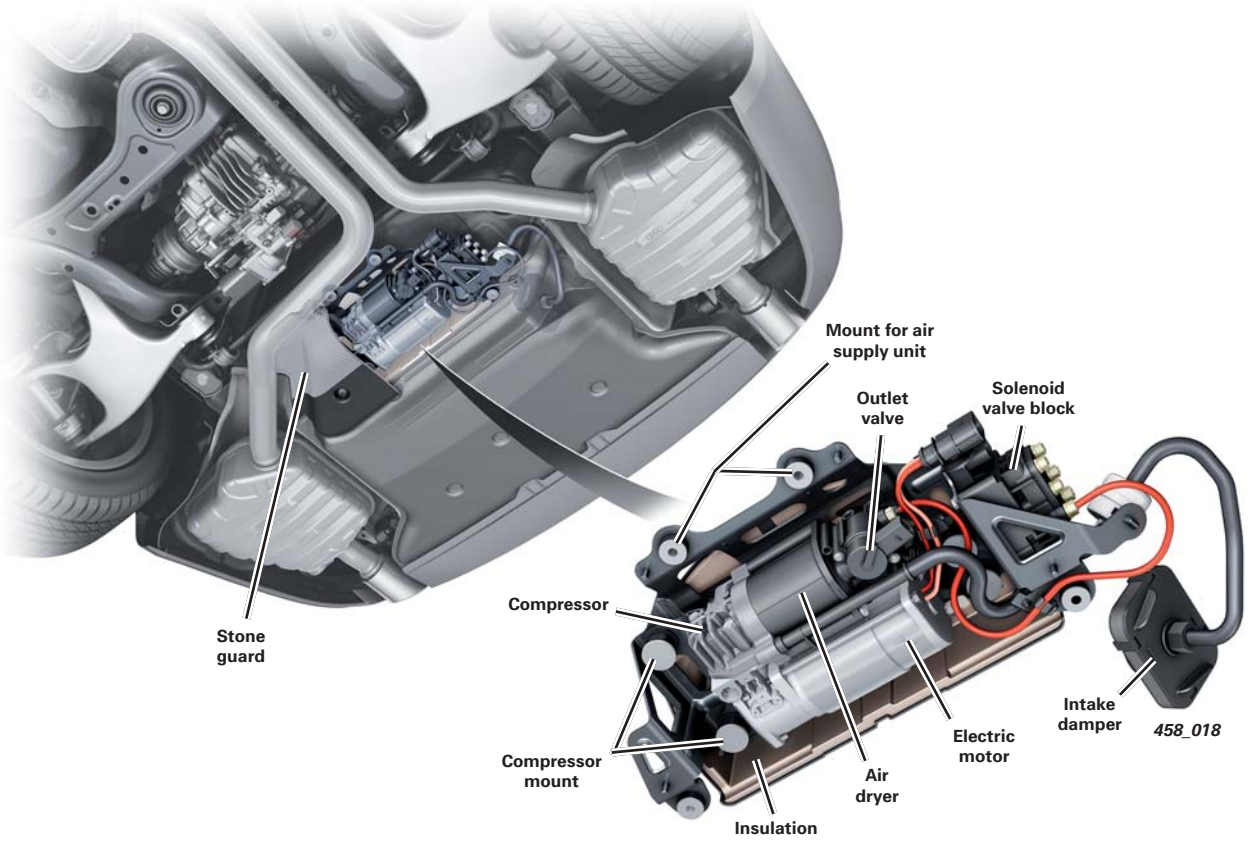
An acoustically enclosed system is installed under the spare wheel well in the trunk. The unit is separated from the vehicle body by four hard rubber-metal mounts. The compressor is installed on a separate bracket, which is attached via four soft rubber-metal mounts on the leading bracket of the air supply system.

Primary system components are enclosed and shielded from the road.

The single-stage compressor generates a system pressure of 261.0 psi (18.0 bar). A pressure limiting valve in the compressor protects the system from overloading. Air intake takes place via the intake damper and air dryer from the spare tire well.

The air dryer is self-regenerating and requires no maintenance. The compressor control rate for raising the vehicle level is approximately 2-3 mm/s at both the front and rear axles. The level is reduced by bleeding off air at a rate of approximately 10 mm/s.

Compressor temperature is determined based on a computer calculation that makes a temperature sensor unnecessary. Temperature is determined by evaluating change in resistance of the magnetic coil in the outlet valve.



Pressure Accumulator

The task of the pressure accumulator is to maintain system availability. It also improves acoustic characteristics, especially during control procedures when the vehicle is stationary or at low vehicle speeds. In these situations, control procedures apply mostly to the pressure accumulator, without the compressor running.

In addition, the vehicle level is raised at a faster rate with the pressure accumulator than with the compressor. The control rate is approximately 4 mm/s for the front axle and approximately 8 mm/s for the rear axle.

The accumulator has a volume of 1.5 gal (5.8 L) and a pressure of 261.0 psi (18.0 bar). To reduce weight, an aluminium structure is used. The pressure accumulator is installed in the rear end.

To rapidly charge the accumulator, 6 mm outside diameter (instead of 4 mm) air lines are used between the solenoid valve block for the pressure accumulator and the solenoid valve block for the compressor.

458_021

Vehicle Level Sensors

Four vehicle level sensors are used. The mounting brackets for the sensors on the front axle are adapted to the new A8 geometry, while the mounting brackets on the rear axle are adopted from the Audi Q5. The sensors operate at a sampling rate of 800 Hz.

458_022

Sensor Electronics Control Module J849

J849 sends vehicle acceleration values in x-, y- and z-axes, as well as corresponding yaw rates to Level Control System Control Module J197.

J197 calculates vehicle movement from this information. Body acceleration sensors are no longer required. Communication between the control modules takes place on the FlexRay data bus.

458_023

Air Spring Strut

The air spring struts are a new design. Infinitely variable twin-tube dampers are used. The control valve is located in the damper piston. The electrical line for actuating the magnetic coil in the valve is routed through a hollow piston rod.

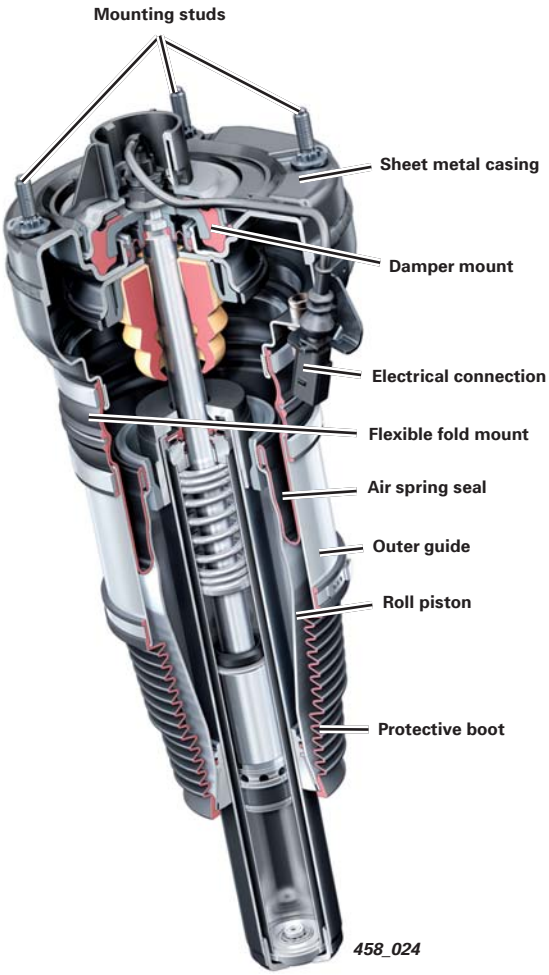
As on the 2010 Audi A8, a continuous damping control (CDC) control system with internal valve is used. A volume of air is located in the area above the damper and is essentially shaped by the sheet metal housing, air spring seal, and roll piston. The housing contains the damper mount and also secures the spring strut to the vehicle body.

The flexible fold mount joins the housing to the outer guide. This mount separates the torsional and flexing movements acting on the air spring seal, relieving the mechanical load on the air spring seal.

To optimize damping and rolling comfort, a glass fiber air spring seal is used, which is clamped to the housing and the aluminum roll piston.

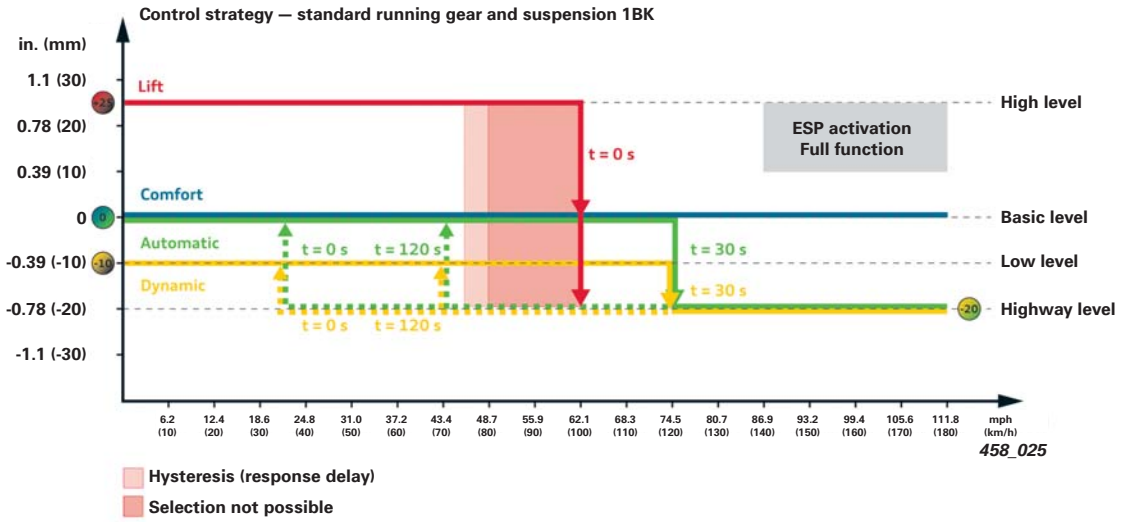
The damper's response characteristics have been substantially improved by minimizing the friction between the piston rod and seal. A protective boot prevents dirt from entering the air spring seal.

Residual pressure retention valves are connected to the air lines of the spring struts. They have the task of maintaining a minimum air pressure of approximately 43.5 psi (3.0 bar) in the air spring, even when an air line is defective or the air spring strut is removed. As a result, the air spring seal is protected from extreme deformation that could otherwise reduce its service life.



Control Strategy

The control algorithms differ depending on the running gear and suspension variant.

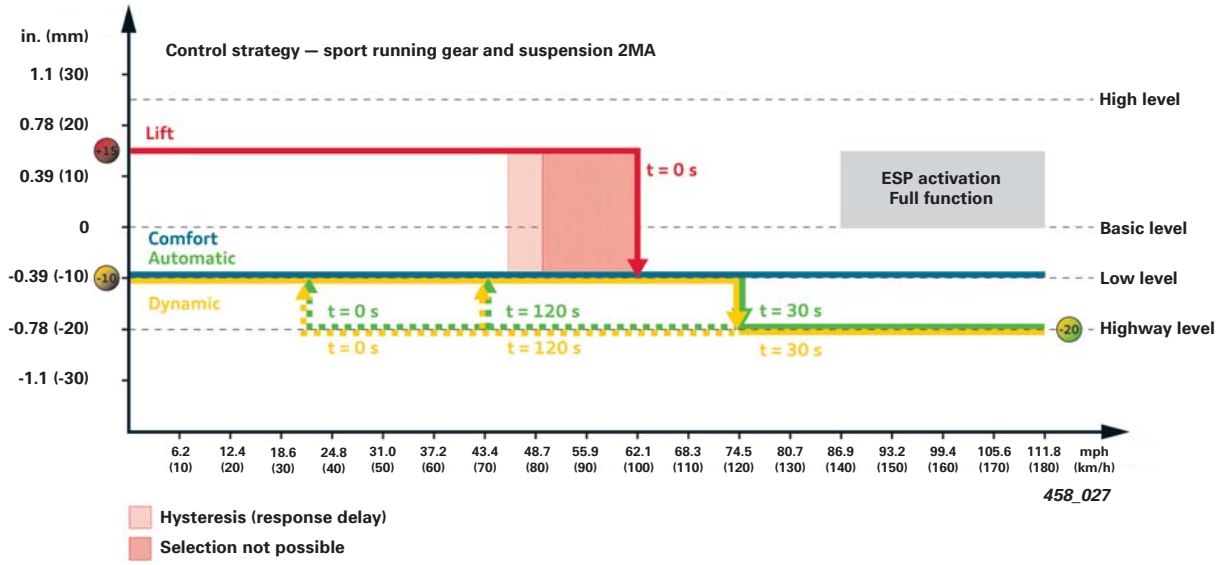


The control system enables four different vehicle height modes (levels). Starting from the basic level, lift mode can be set by raising the vehicle by 0.98 in (25 mm). Lift mode is immediately and automatically deactivated on reaching or exceeding a vehicle speed of 62.1 mph (100 km/h). This mode can be selected up to a speed of 50 mph (80 km/h).

The level is lowered 0.39 in (10 mm) by activating dynamic mode. In automatic and dynamic mode, the level is further reduced to highway level, 74.5 mph (120 km/h) below the basic level, when the vehicle is driven at a speed of 74.5 mph (120 km/h) for 30 seconds.

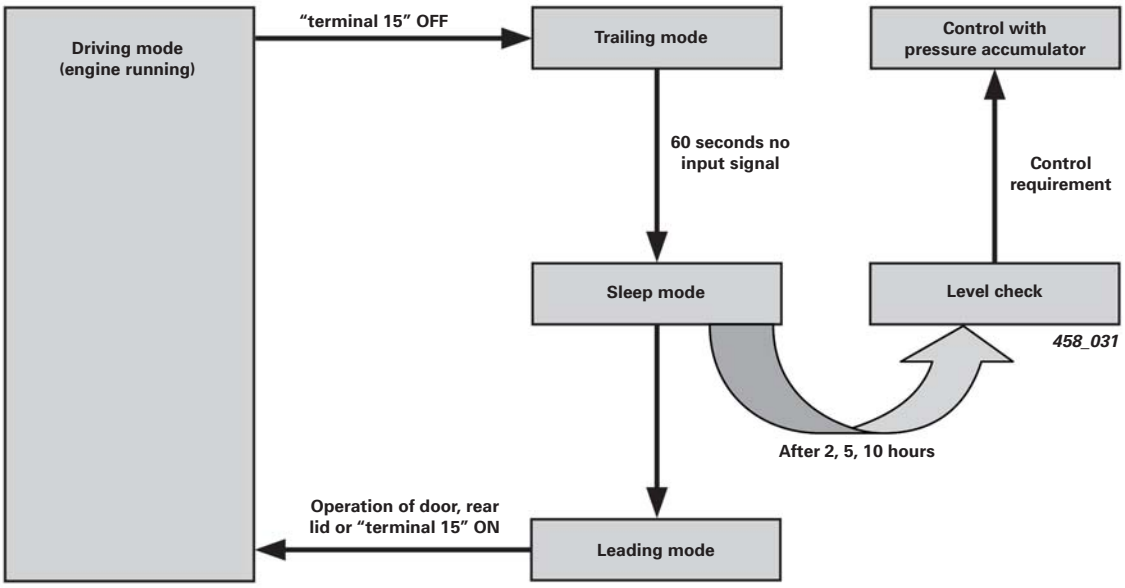
The vehicle is not lowered to highway level in comfort mode. Highway level is deactivated automatically when vehicle speed drops below 43.4 mph (70 km/h) for a duration of 120 seconds or immediately when the speed drops below 21.7 mph (35 km/h).

When activating comfort mode, the basic level is set together with a comfort-orientated damper control. ESP full function is deactivated/activated automatically from a speed of 86.9 mph (140 kmh) when ESP sport mode is switched ON by pressing the ESP button.



Characteristics of the Control Strategy

– When control procedures (changing the vehicle level) are made while driving, the left and right front dampers are moved the same amount. Dimensional changes to the left and right rear dampers are made individually.
– When changes to the level are made for adaptations or when learning control positions during service work, the dimensional changes are done individually at each damper. This helps ensure accuracy of the system.
– After the ignition has been switched OFF, the control module remains active for 60 seconds and waits for further input signals. If no signals are received, energy-saving sleep mode is activated.
– In sleep mode, the vehicle level is checked by Level Control System Control Module J197 after two, five, and 10 hours. J197 supplies operating voltage to the vehicle level sensors and reads their measured values.
– If J197 recognizes that control intervention is required, the system checks to see if there is sufficient accumulator pressure for this purpose, which would need to be a minimum of 43.5 psi (3 bar) higher than the pressure in the air spring to be regulated. If this is the case, the vehicle level is then corrected.
– No further control procedures take place if accumulator pressure is too low. When the anti-theft alarm system is activated, the level is raised to ensure the difference in level does not exceed 0.3°.



– The door/trunk lid signals are no longer sent via discrete lines to J197 but rather via the bus systems
– Vehicle level can drop greatly during prolonged vehicle downtimes. To ensure the vehicle is set to a defined minimum level when starting, compressor operation starts immediately after the ignition is switched ON. This occurs even before the engine starts running, as long as there is a sufficient charge level in the vehicle battery.

Operation and Driver Information

The Adaptive Air Suspension system no longer has a separate menu. The settings are combined with those of other systems in the Audi drive select user interface.

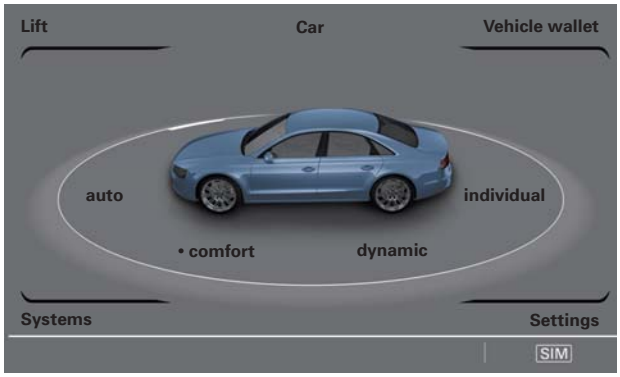
These settings can be made by selecting “Car” in the main menu with the corresponding function key.

456_149

By selecting “comfort”, “auto”, or “dynamic”, various modes are activated in connection with the corresponding settings of other systems (engine, transmission, etc.).

Different system settings (for example, “dynamic” setting of Adaptive Air Suspension with “comfort” engine and transmission setting) can be combined by selecting “individual” mode.

Lift mode is activated by selecting “lift”. The lifting and lowering procedure is indicated in the display by flashing arrows on the front and rear axle. The arrow indicator becomes static when the lift level is reached.



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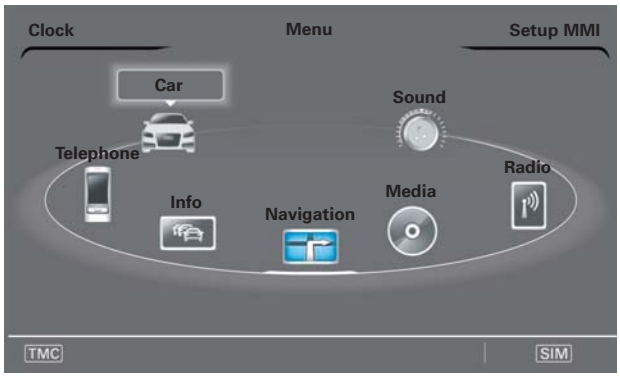


458_033

Messages / Warnings

Text messages relating to the Adaptive Air Suspension are shown in the central display to inform the driver.

Driver information/warning messages are always prioritized according to urgency.

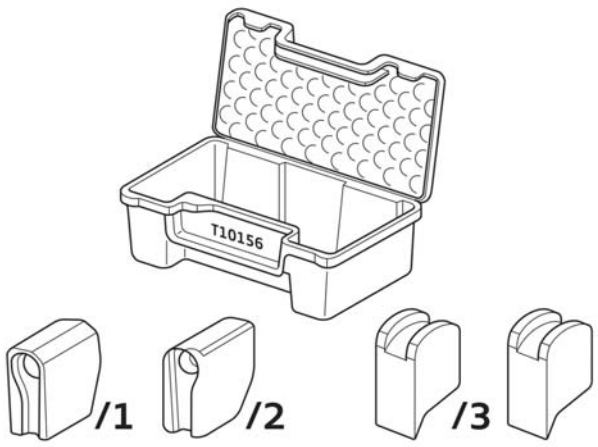
There are three priority levels: Driver information in white, warnings in yellow, and highest priority warnings in red.

Reference
You will find detailed information on Audi drive select in SSP 990103 *The 2011 Audi A8 Vehicle Introduction.*

Service Work

1. Vehicle Transport

If the vehicle is to be raised with the spring blocker set T10156 for transport purposes, the engine should be turned OFF. Steering movements must be restricted to a maximum of one-half turn of the steering wheel.



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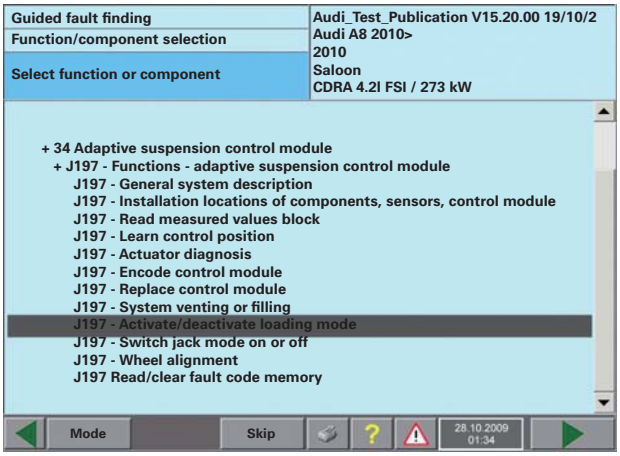
Loading Mode

Loading mode is used to ensure sufficient ground clearance and the greatest possible ramp angle for loading operations. When this mode is activated, the vehicle is set to and then maintained at a level of 1.9 in (50 mm) above the standard level.

Other levels cannot be set as long as this mode is active. Loading mode is activated/deactivated with the VAS Scan Tool. For safety reasons, the mode is deactivated automatically when exceeding a vehicle speed of 62.2 mph (100 km/h) or after covering a distance of 30.1 mi (50 km).



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Transport Mode

Data Bus On Board Diagnostic Interface J533 sets shutdown level 4 when transport mode is activated. The Adaptive Air Suspension control module responds by preventing/deactivating leading and trailing mode and switches OFF the power supply to the damper valves.

The control module remains in sleep mode even when input signals are received (operation of door/trunk lid, change in “terminal 15” status). Transport mode is automatically deactivated when the engine is started.

If both transport and loading mode are to be activated, loading mode must always be activated before transport mode.

Note

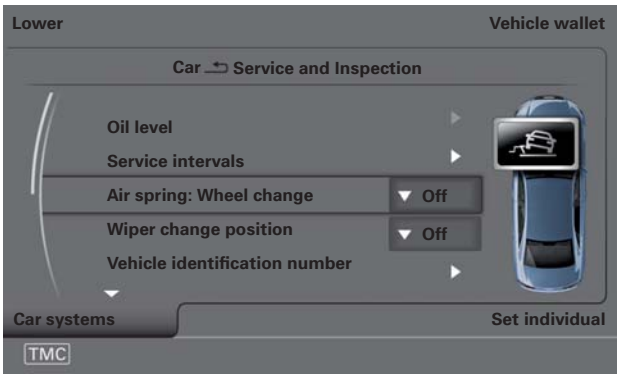
Service maintenance and repair procedures for the Adaptive Air Suspension are in keeping with those on the 2010 Audi A8.

2. Removing and Installing/Replacing System Components and Added Service Work

The system recognizes when the vehicle is raised on a hoist or at the wheel, and therefore prevents all control procedures. Air is released for a short time prior to automatic detection.

For safety reasons, it is recommended to always switch the control system OFF manually before starting any service work. The system is switched OFF by selecting “Air spring: Wheel change” in the MMI. This setting corresponds to the “Jack mode” setting in the 2010 Audi A8.

The deactivated function is automatically activated again at a driving speed in excess of 6.2 mph (10 km/h).



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Level Control System Control Module J197

After installation, a new control module must be encoded online. The software parameters for this specific control module and vehicle are defined and activated by writing data sets as part of the encoding procedure. The coding defines whether the vehicle is equipped with Adaptive Cruise Control (ACC), and/or dynamic steering.

Since the adaptation values of the level sender signals have not yet been stored in this new control module, it is additionally necessary to carry out the “Learn control position” function.

458_017

Air Spring Strut, Solenoid Salve Block, Compressor, Pressure Accumulator

The air system must be opened to remove these components. Therefore, the system must first be vented. Care must be taken when connecting the air lines, especially at the solenoid valve block, to ensure the connections are not interchanged.

The air pressure must be corrected (refilled) before installing new air spring struts. The "Learn control position" function must be carried out using the VAS Scan Tool before reinstalling the air springs.

Vehicle Level Sensor

The "Learn control position" function must also be carried out after replacing a sensor. Since, for tolerance reasons, the new sensor returns different measured values for the same vehicle level, the measured value — vehicle ride height allocation must be sent to and is stored in the control module.

The control module "recognizes" the characteristic curve of the sensors and their vehicle level change to measured value change mechanical ratio when installed.

Once the known measured value for all level positions is assigned through the "Learn control position" function, the control module can determine the assigned level for all other measured values.

458_022

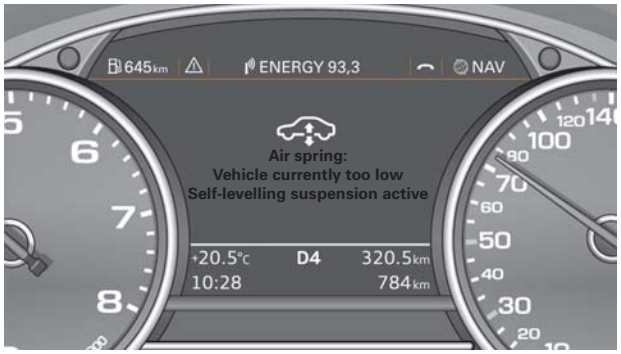
3. Special System Status

Low Level

After prolonged vehicle down periods or when carrying heavy loads, it is possible that the vehicle level may drop below a level suitable for driving. This behavior is consistent with the system and does not constitute a fault. This situation is caused by the air line connections and air spring seals which are naturally subject to slight air loss.

After the ignition is switched ON, a warning appears in the instrument cluster, drawing the driver's attention to this situation. The compressor is already activated, although the engine has not yet been started. This raises the vehicle as quickly as possible to an operational level.

If the low level is caused by a major leak in the system, it will not be possible to raise the vehicle to the required level within a defined period of time. The control module recognizes that there is a fault in the system and issues a yellow warning in the instrument cluster.



458_044

458_045

Extreme High Level

In rare cases, it is possible that the vehicle may assume an extreme high level. This can briefly occur when very heavy loads are removed rapidly from the vehicle. If this situation persists, a system fault will be registered, with a high priority red warning shown in the instrument cluster.

Brake System

Overview

The brake system on the 2011 Audi A8 is a further development of the system used on the 2010 model.

Lightweight construction has substantially reduced the brake system's weight, while also ensuring outstanding braking values in all driving situations.

	Front Axle	Rear Axle
Engine	V8 4.2L FSI	V8 4.2 FSI
Brake type	17" 2FNR 42 AL Aluminum floating frame-type caliper	17" CII 43 EPB Aluminum floating caliper
Number of pistons	2	1
Piston diameter	2 x 1.65 in (42 mm)	1.69 in (43 mm)
Brake disc diameter	14.0 in (356 mm)	12.9 in (330 mm)

System Components

Brake Calipers, Front Axle

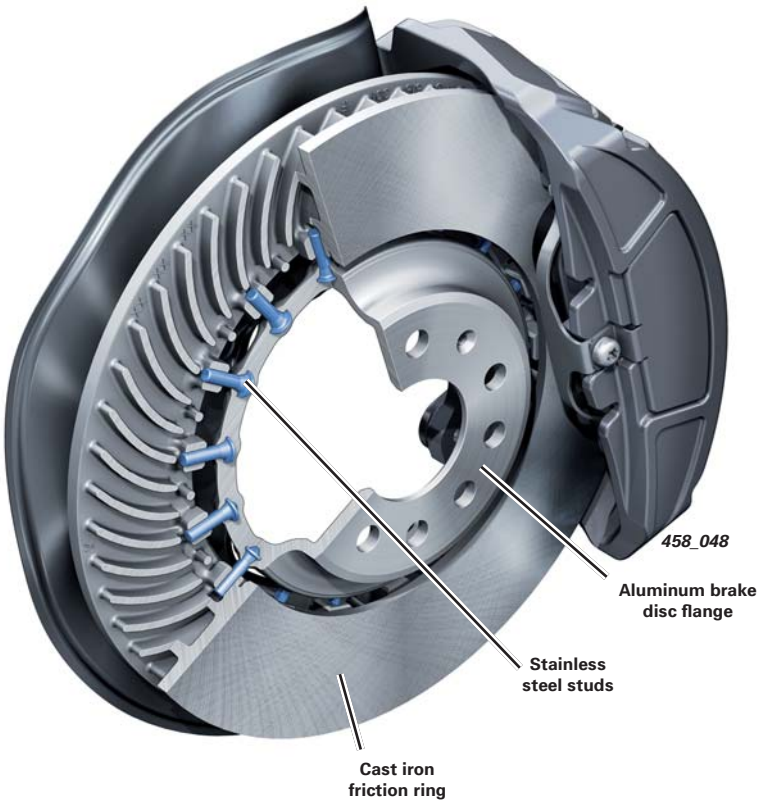
The aluminum brake calipers on the front axle have been re-designed to be more rigid, thereby improving performance. Yet, these new brake calipers weigh about the same as those on the 2010 Audi A8.

Brake Discs, Front Axle

For the first time at Audi, stud-type brake discs with aluminum flanges are being used. This brake design is predominantly used for high performance vehicles.

The brake disc ring is made of a cast iron material specially developed for this purpose. The friction ring is connected to the aluminum flange by stainless steel studs.

Stud-type brake discs enable a weight reduction of approximately 6.17 lb (2.8 kg) for the 17-inch brake disc.



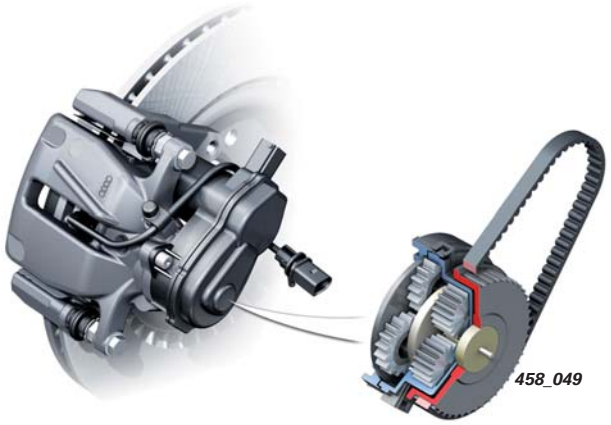
Brake Assembly, Rear Axle

The Colette II brake caliper from the 2010 Audi A8 is augmented by an increased brake disc diameter.

Electromechanical Parking Brake (EPB)

The parking brake system of the 2011 Audi A8 is also used on Audi A4, A5, and Q5 models.

Rear brake pad wear is no longer calculated but instead is measured directly.



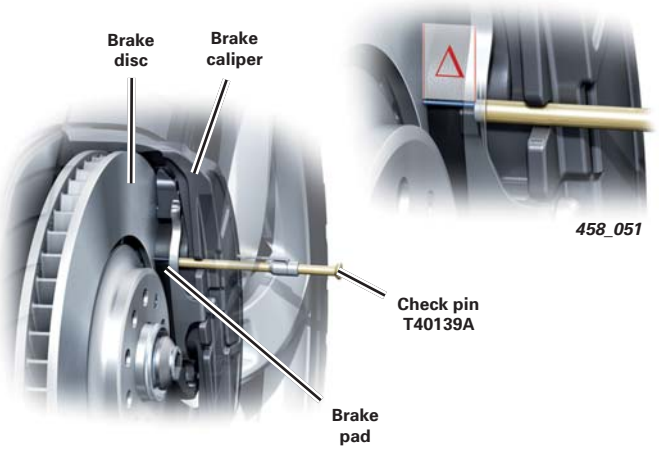
Master Brake Cylinder, Brake Booster, Brake Fluid Reservoir, Pedal Assembly

A lightweight aluminum 8/9-inch tandem brake booster is used on the 2011 Audi A8. The vacuum supply is provided by the engine and an auxiliary electric pump.

The master brake cylinder, brake fluid reservoir, and pedal assembly are adopted from the current Audi A4.

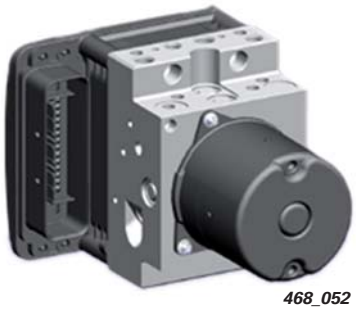
Brake Pad Wear Measurement

Brake pad thickness can be measured with check pin T40139A on all standard and optional wheels available for the 2011 Audi A8.



Overview

The 2011 Audi A8 uses the new generation Bosch ESP Premium system. A newly designed hydraulic pump is used for active pressure build-up. Electronic data communication is increased due to the use of the FlexRay data bus and the extensive networking of the many linked control modules.



468_052

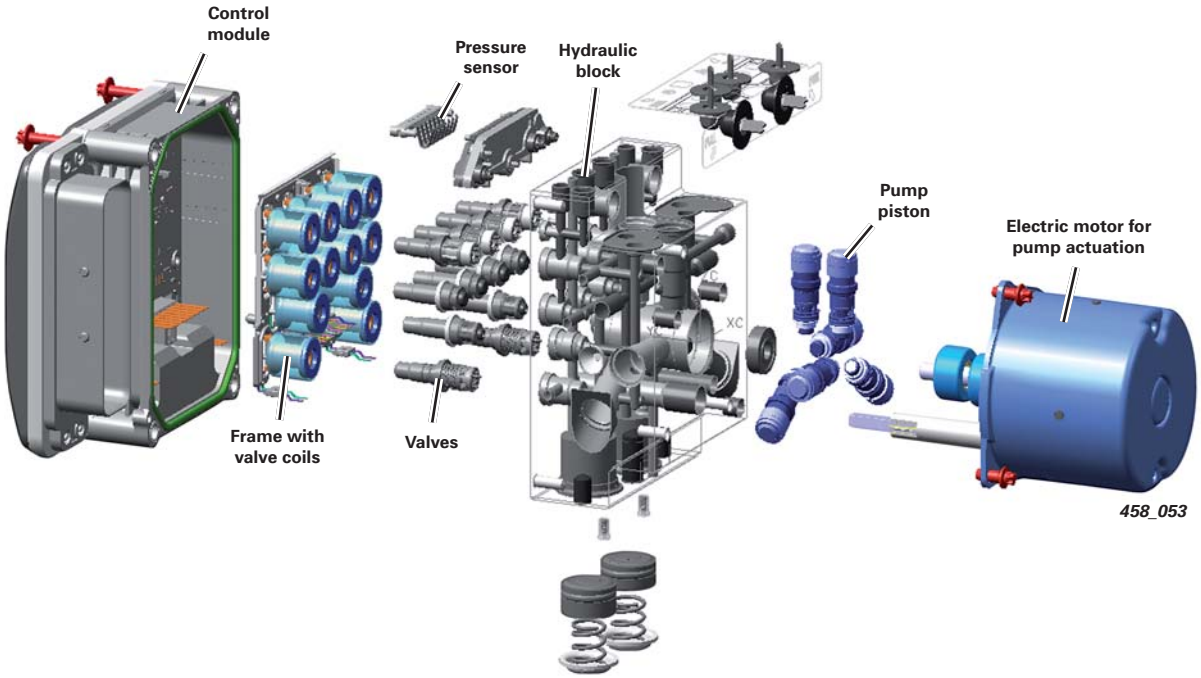
ABS Control Module J104

Greatly improved communication made possible by the FlexRay data bus is a big feature of this system. The values from the transverse acceleration and yaw rate sensors are sent by Sensor Electronics Control Module J849 via the FlexRay bus. This enables rapid and secure data exchange, which in turn leads to improved control and vehicle dynamics.

The electronics of the ABS module generate a high frequency current to actuate the electric motor of the pump drive. This high frequency clock cycle enables more precise actuation, a smooth start-up of the electric motor, and load relief for the vehicle electrical system.

Hydraulic Unit

New to the 2011 Audi A8 is a six-piston pump that improves active pressure build-up dynamics and acoustics. The ESP modules are different in vehicles with and without Adaptive Cruise Control (ACC). Three pressure sensors are integrated in the hydraulic unit for ESP with ACC. Brake pressures at the front right and left wheel brakes are determined in the primary circuit.



458_053

ABS Wheel Speed Sensors G44-G47

The active speed sensors are adopted from the current Audi A4.

458_054

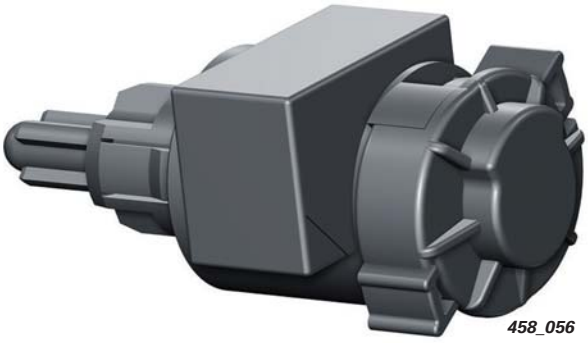
Steering Angle Sensor G85

This steering angle sensor is also adopted from the current Audi A4.

458_055

Brake Light Switch F

The brake light switch is also adopted from the current Audi A4.



458_056

Reference

You will find detailed information on the design and function of the ESP and its components in SSP 999703, *The 2008 Audi A5/S5 Running Gear*.

System Functions/Subsystems

Function/Subsystem	Remarks
Anti-Lock Braking System (ABS) Electronic Brake Pressure Distributor (EBD) Electronic Differential Lock (EDL) Traction Control System (TCS) Engine Braking Moment Control (EBC) Electronic Stability Program (ESP)	Standard control parameter functions
ESP sport mode	Sport mode is selected by pressing the ESP button Greater wheel slip values are permitted without control intervention, thus enabling a more sport-orientated driving style (see next page)
Tire Pressure Monitoring System (TPMS)	TPMS evaluates wheel speeds (wheel circumference) and wheel vibration
Fading Brake Support (FBS)	Compensates for brake fading due to controlled brake pressure build-up
Drive assist	Holds the vehicle while stationary via active pressure build-up, first used in the Audi A5
Electronically Controlled Deceleration (ECD)	Software interface that enables external control modules to “request”, via the ESP, vehicle deceleration by active pressure build-up
Brake disc wiper	Water film is removed by briefly applying the brake pads against the brake discs in order to improve braking response (SSP 992603, *The Audi Q7 Running Gear*)
Hydraulic Brake Assist (HBA)	Assists the driver when performing emergency braking via active brake pressure build-up, which helps achieve optimum vehicle deceleration
Emergency braking function for Electromechanical Parking Brake (EPB)	Brakes the vehicle when the EPB switch is operated
Adaptive brake light	Actuates the brake light and hazard warning system, first used in the 2006 Audi A6 with ESP Bosch 8.0
Brake system pre-filling for Adaptive Cruise Control (ACC) braking guard function	Slightly building up brake pressure by approximately 29.0 psi (2 bar) enables a “state of readiness” for imminent braking, with the objective of reducing response time

ESP Sport Mode

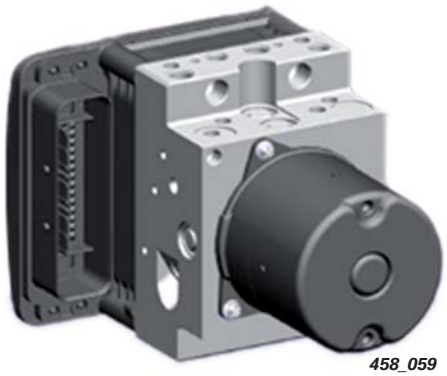
The objective of this mode is to enable sport-orientated driving characteristics. Considerably greater wheel slip values are permitted, while the movement of the vehicle (vehicle dynamics) is tempered by control procedures. Yaw (oversteer/understeer) is controlled so that a driving feel with distinct sport characteristics is achieved.

For example, engine torque is no longer reduced by engine management intervention when the accelerator pedal is depressed. Brake interventions take place considerably later than is the case when sport mode is deactivated. Oversteer when cornering is countered by more stabilizing support when the driver takes their foot off the accelerator. If the vehicle understeers when cornering, the control shifts towards oversteer. The direct effect is sporty and agile vehicle handling.

458_058

Service Work

Online coding is necessary after replacing the control module. Pressure sensors are automatically calibrated as part of encoding. Actuator diagnosis is required after replacing the hydraulic unit. This ensures that the hydraulic lines are connected correctly.



458_059

Sensor Electronics Control Module J849

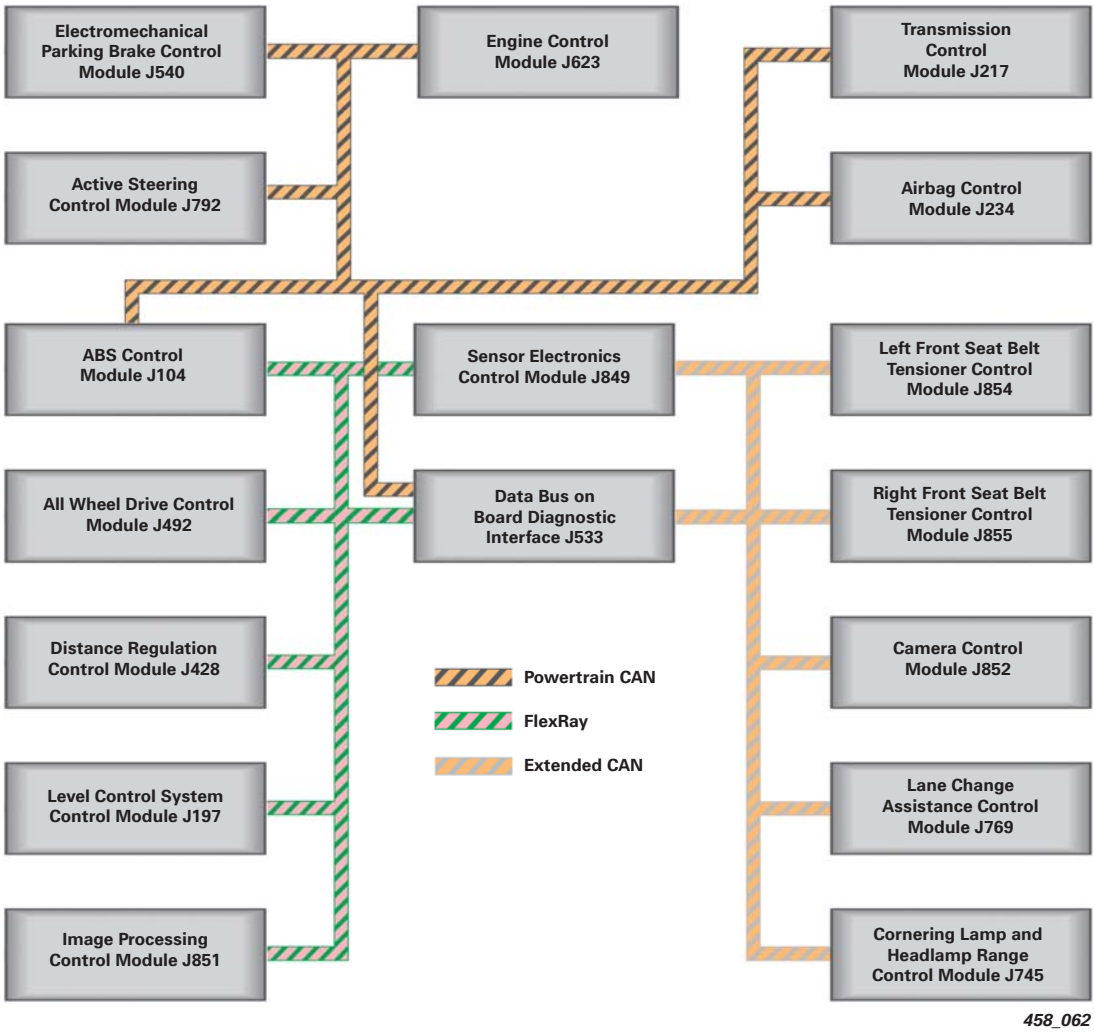
Overview

The 2011 Audi A8 is the first model to use Sensor Electronics Control Module J849. This control module contains sensors for registering all vehicle movements. By linking it to the FlexRay data bus, other control modules can directly use the measured values.

Complexity has been reduced through the central acquisition of vehicle movements. Data communication via the FlexRay bus ensures a high level of networking and fast data transfer between corresponding control modules.

458_023

Control modules that use values from Sensor Electronics Control Module J849



458_062

Design and Function

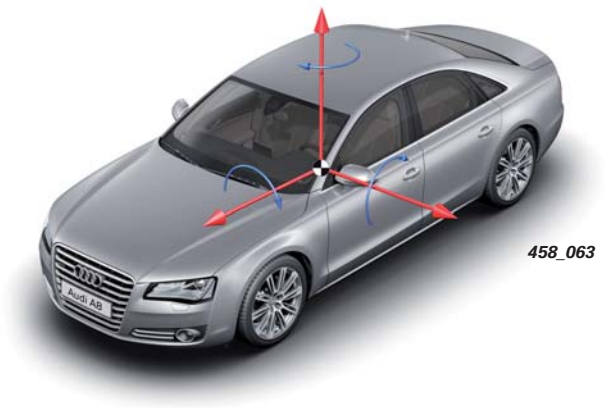
Design

Sensor Electronics Control Module J849 has sensors that measure vehicle acceleration in the x-, y-, and z-axes, as well as vehicle rotation around these axes. It replaces ESP Sensor Unit G419 and the body acceleration sensors for the Adaptive Air Suspension system.

Two versions of the control module are used on the 2011 Audi A8.

The basic version consists of six sensors: one sensor each for registering the movements in x-, y-, and z-axes, as well as the rotary movements around the three axes.

The other control module, featuring an extended sensor system, is used for vehicles with dynamic steering and sport differential. Two sensors acquire each piece of data.



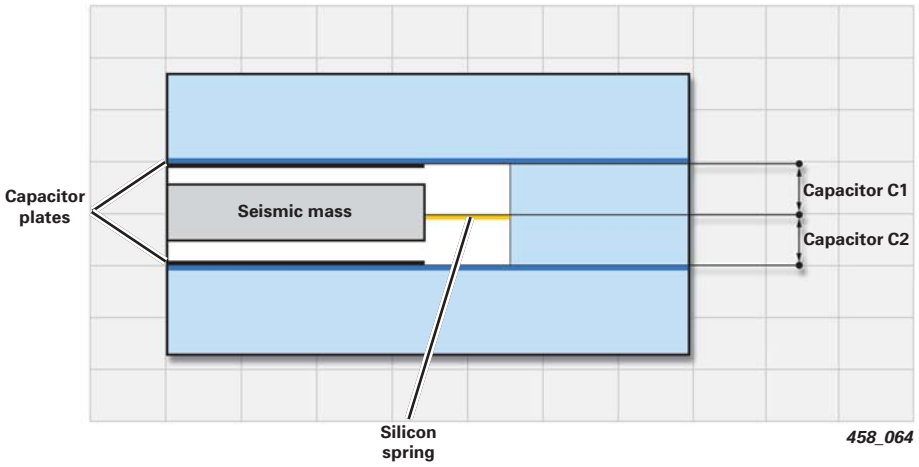
Function of Sensors for Registering Movements in x-, y-, and z-Axes

The sensors for registering the movements in x-, y-, and z-axes, operate in accordance with the "seismic mass" principle. The sensors are part of a spring-mounted mass (seismic mass) located between two electrodes acting as capacitor plates. The mass plate also has two electrodes that form two capacitors together with the electrode of the "housing".

During acceleration, the position of the seismic mass changes relative to the housing. The resulting change in the capacitance (stored energy) of the capacitors is evaluated by electronic logic circuitry.

Rest State:

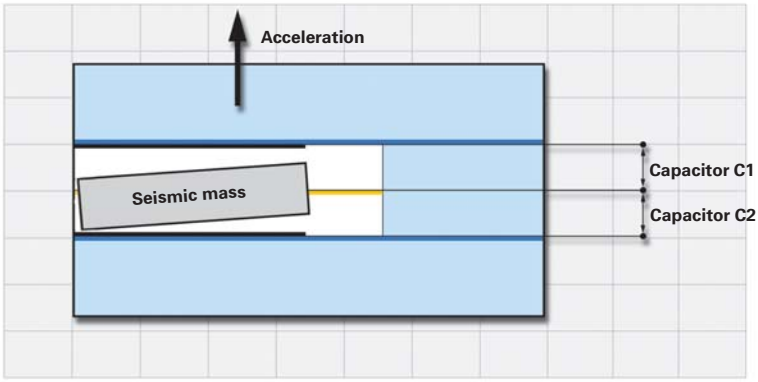
The seismic mass is centered between two outer capacitor plates. The capacitance of both capacitors C1 and C2 is identical.



Accelerated State

During acceleration, inertia deflects or deviates the seismic mass from its mid-position. The distance between the electrode changes, and the capacitance increases as the distance decreases.

For example, the capacitance of capacitor C2 increases compared to the rest state, while capacitor C1 decreases.



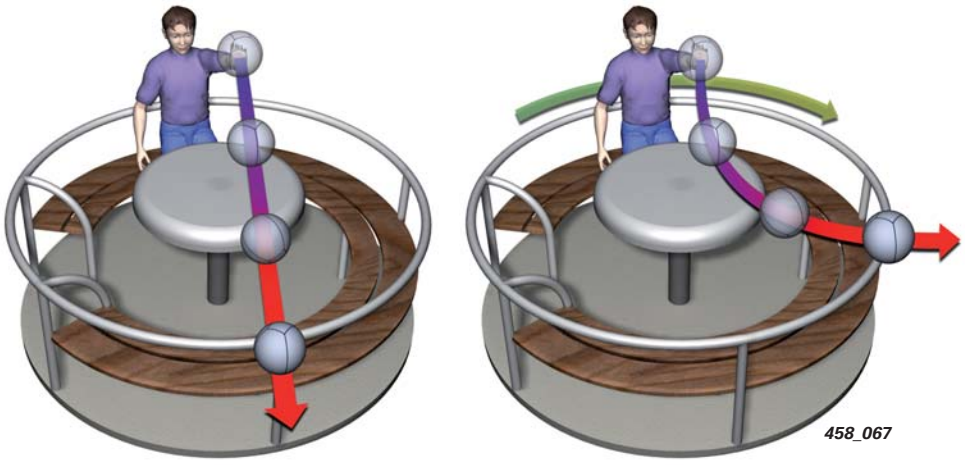
458_065

Function of Sensors for Registering Rotary Motion About the x-, y-, z-axes

The sensors for registering the rotary motions of the vehicle make use of the physical effect of Coriolis force. The Coriolis force acts on all bodies that execute a movement in a rotating reference system.

For example, when a child sitting on an unmoving merry-go-round rolls a ball toward the center of the merry-go-round platform, the ball will roll straight through the platform center.

However, when the merry-go-round is turning, the ball's movement will deviate, depending on the rotational speed of the merry-go-round.



458_067

Simplified, the sensor is a micro-mechanical body which is permanently subjected to oscillation excitation. When the vehicle turns, the direction of movement of the oscillating body changes.

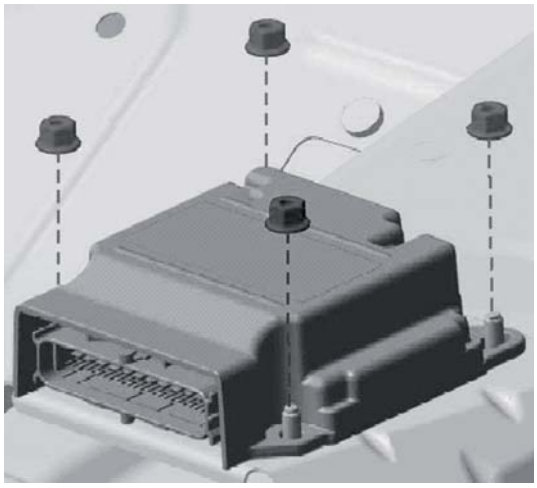
This change in movement is evaluated by electronic logic circuitry. To register rotary motion around the three spatial axes, three identical sensors, each offset by 90° with respect to each other, are arranged in the control module.

Service Work

Removing and Installing/Replacing System Components and Additional Work

The installation location of the control module is subject to close tolerances. For this reason, calibration of the control module installation position is necessary after installation. The vehicle must be parked on flat and even ground and must not be moved. Zero calibration corrects the measured values of the sensors with offset values.

The control module does not require encoding.



458_066

Diagnosis

The control module is fully integrated in the diagnostic procedure. System functions are permanently monitored and fault code memory entries are generated as required. For fault finding purposes it is important to keep in mind that the measured data of the control module is used by various other systems.

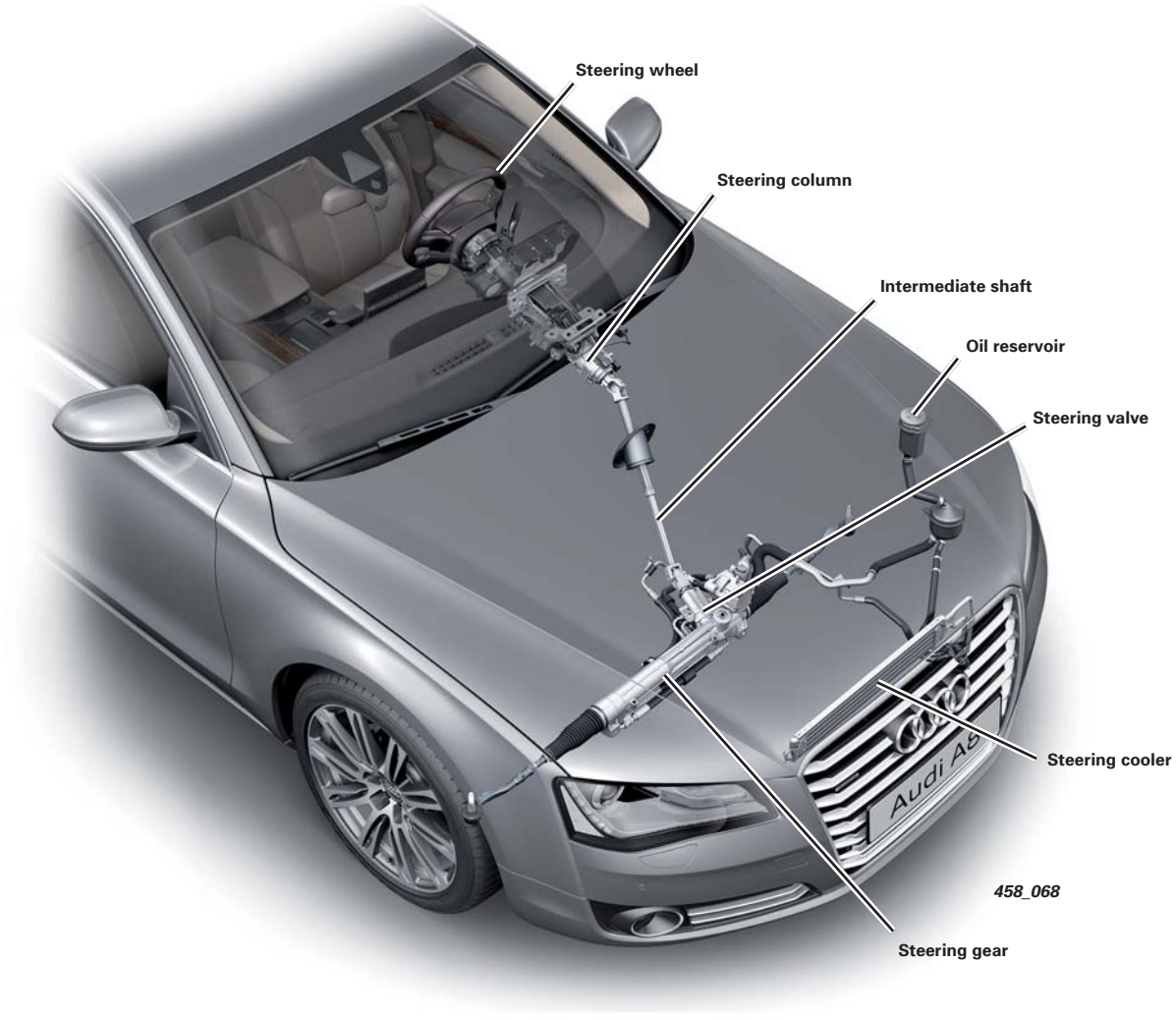
458_023

Overview

Design

The 2011 Audi A8 uses hydraulic rack and pinion steering with an electrically adjustable steering column. The Servotronic speed dependent system is standard equipment.

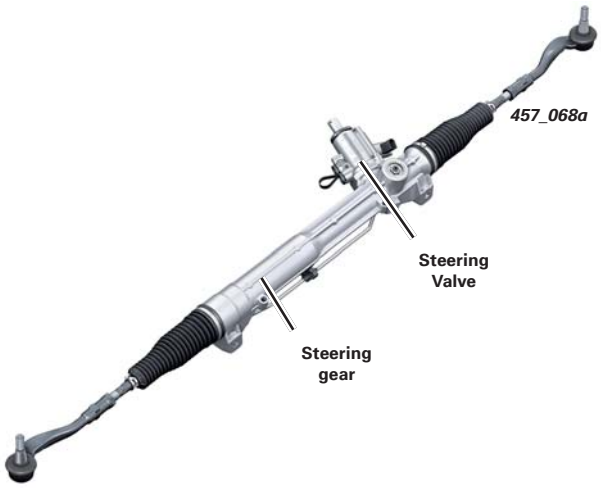
The steering gear, steering column, and steering wheel are new components. The main innovation is the arrangement of the steering gear on the subframe ahead of the front axle, which delivers more direct steering response.



System Components

Steering Gear

A rack and pinion steering gear with a constant gear ratio is used. The design and function of the steering gear correspond to that in the current Audi A4. Given the higher axle load of the 2011 Audi A8, rack and piston diameters have been increased. As on the 2010 Audi A8, the steering gear features internal damping valves and internal flexible limit stops.



Steering Valve

The steering valve is a 10-slot valve with Servotronic II as used on the 2010 Audi A8.

Oil Reservoir

The design and function of the oil reservoir corresponds to those of the current Audi A4. A modified reservoir with a horizontal division into two chambers is used for V8 engine vehicles.

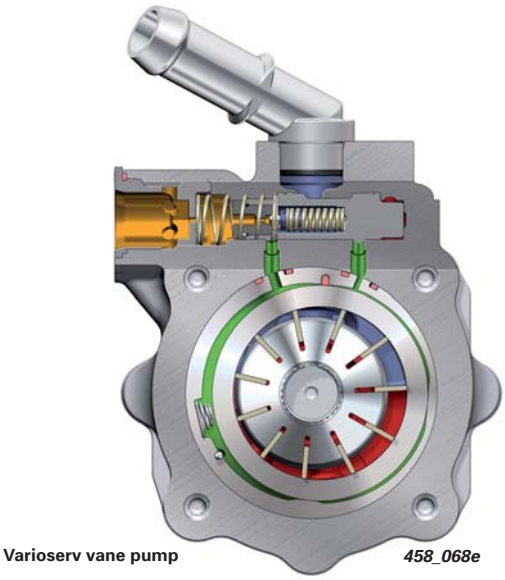
Steering Cooler

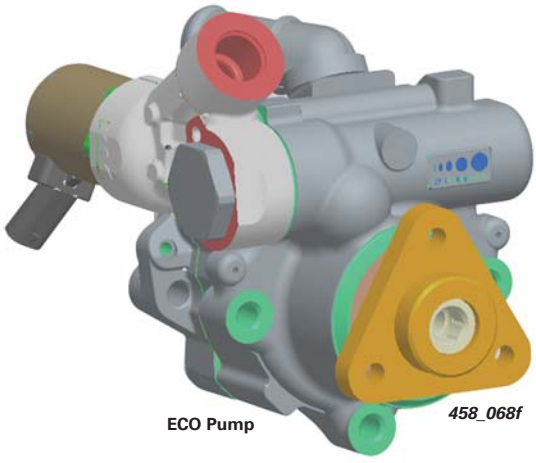
Tubular coolers are usually used in the steering system. Vehicles with dynamic steering are fitted with block heat exchangers.

Steering Pumps

As in other Audi models, the volumetric flow-controlled Varioserv vane pump supplied by ZF is installed in V8 engine vehicles. The adjustable cam ring controls the volumetric flow 0.7 cu in/revolution (13 cm^3/revolution). As a result, the pump only delivers the volume of oil actually required. This substantially reduces the hydraulic power requirement. The oil temperature in the steering system is also reduced. The maximum system pressure is 188.5 psi (135 bar).

All vehicles with dynamic steering are fitted with ECO pumps like those in the current Audi A4, A5, and Q5 models.





Reference

You will find detailed information on the design and function of the ECO pump and its components in SSP 992803, *Audi Dynamic Steering*.

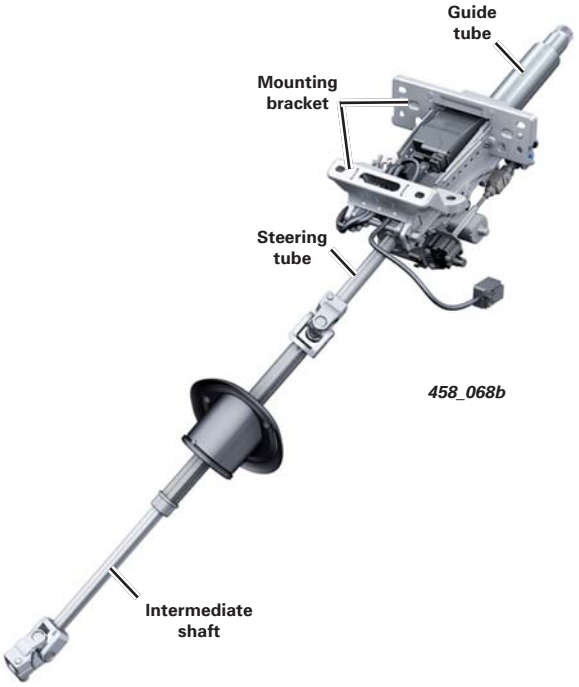
Steering Column

The steering tube is mounted in the guide tube to allow it to be shifted longitudinally. The 2.3 inch (60 mm) maximum adjustment is done by an electric motor with a spindle drive. The guide is installed on a mounting bracket rigidly mounted to the body. To enable angle adjustment, the front bearing mount of the guide tube is used as a longitudinally compensated pivot point.

The rear driver's side mounting is connected to the bracket by two pivot levers. A second electric motor spindle drive adjusts the steering column angle by turning the pivot levers. The total vertical adjustment of the steering wheel is 1.9 in (50 mm).

Power Adjustable Steering Column Control Module J866 is installed directly on the guide tube of the steering column. The steering column is electrically locked automatically when the ignition key is removed. The operation is the same as in the Audi A4.

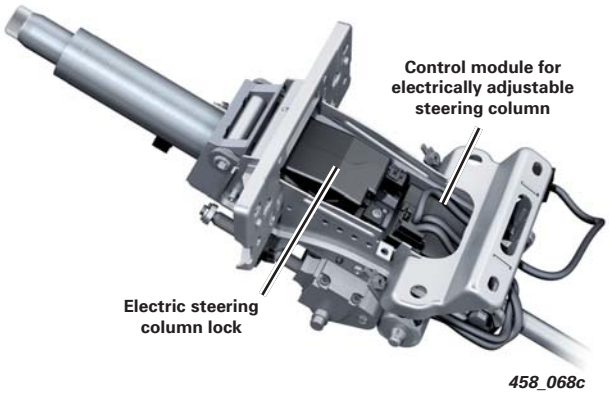
In the event of a collision involving footwell intrusion (displacement of the steering gear in the direction of the driver), the shaft connected to the steering gear slides into the tube for the intermediate shaft. If the driver impacts the steering wheel, the steering tube slides into the guide tube. Impact energy is absorbed by a crash element integrated between the steering tube and guide tube.



Electric Steering Column Adjustment

Power Adjustable Steering Column Control Module J866 communicates with Data Bus on Board Diagnostic Interface J533 via the LIN bus. The adjustment motors are actuated by pulse width modulation (PWM) signals. For the first time, the actuating electronics feature an intelligent position and speed controller to enable higher positioning accuracy, smoother motor start-up, and softer stops.

The easy entry function of the system can be adjusted using the MMI.



458_068c

Steering Wheels

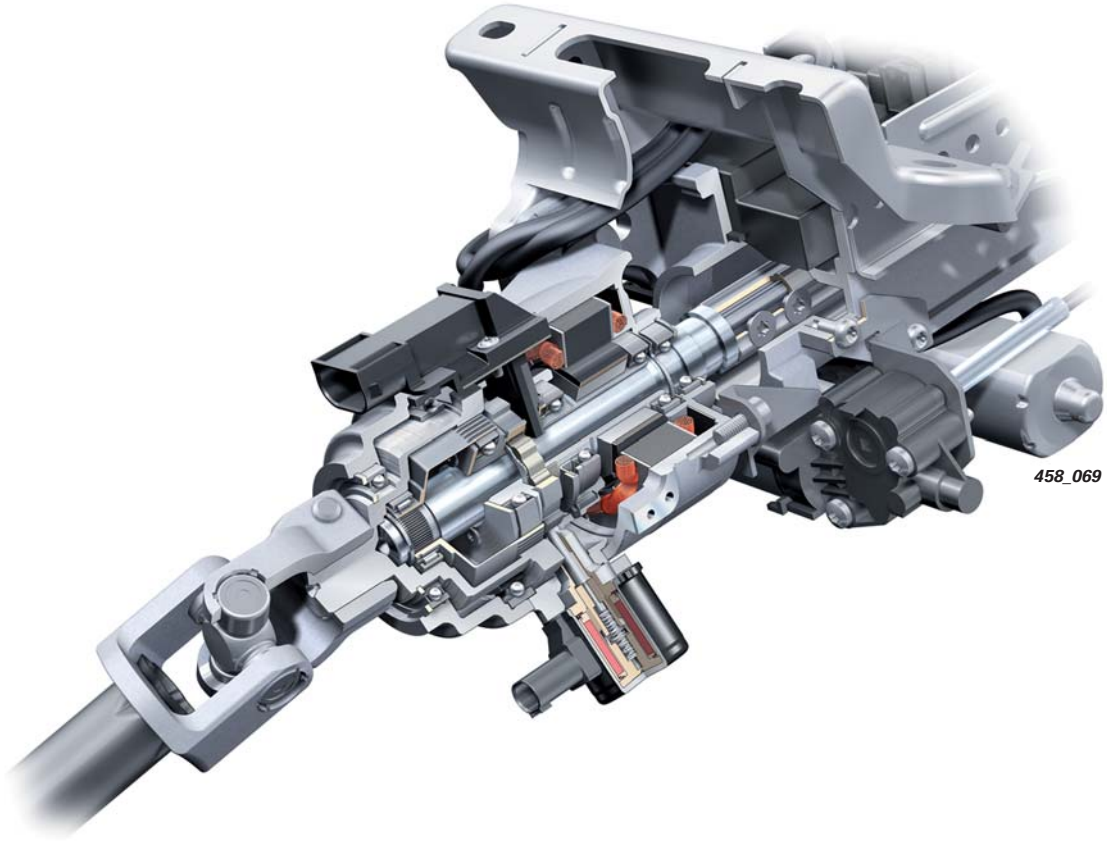
Depending on vehicle equipment level, either a 3-spoke or 4-spoke multifunction steering wheel will be installed.

The mounting arrangement of the airbag module for these steering wheels is different than on previous Audi A8 models. Refer to ElsaWeb for proper removal and installation procedures.

458_068d

Dynamic Steering

This steering option is available in the 2011 Audi A8. The design and function of this system corresponds to that in the current Audi A4. Service procedures are also identical.



458_069

Adaptive Cruise Control (ACC)

Overview

As on the 2010 Audi A8, the Adaptive Cruise Control (ACC) system is an option on the new A8, and is available for all engine and transmission configurations.

A new generation of Bosch ACC is used in the 2011 Audi A8. For the first time, two ACC sensors are installed on the front right and left of the vehicle. With corresponding vehicle equipment, including the video camera for Audi Lane Assist, rear radar sensors for Audi Side Assist, and ultrasonic sensors for the Audi Parking System, it is now possible to view vehicles ahead and behind.

458_070

System Components

- Left Adaptive Cruise Control Sensor G258
- Distance Regulation Control Module 2 J850
- Right Adaptive Cruise Control Sensor G259
- Distance Regulation Control Module J428

458_071

Design

The main innovation is the communication between the control modules using the FlexRay data bus. A more powerful processor is capable of processing sensor data (from the camera, rear radar, parking aid sensors, navigation data). Sensor heating makes the system suitable for winter driving conditions.

The sensors and control modules are installed in a common enclosure. The sensors are adjustable along their x- and y-axes.

Function

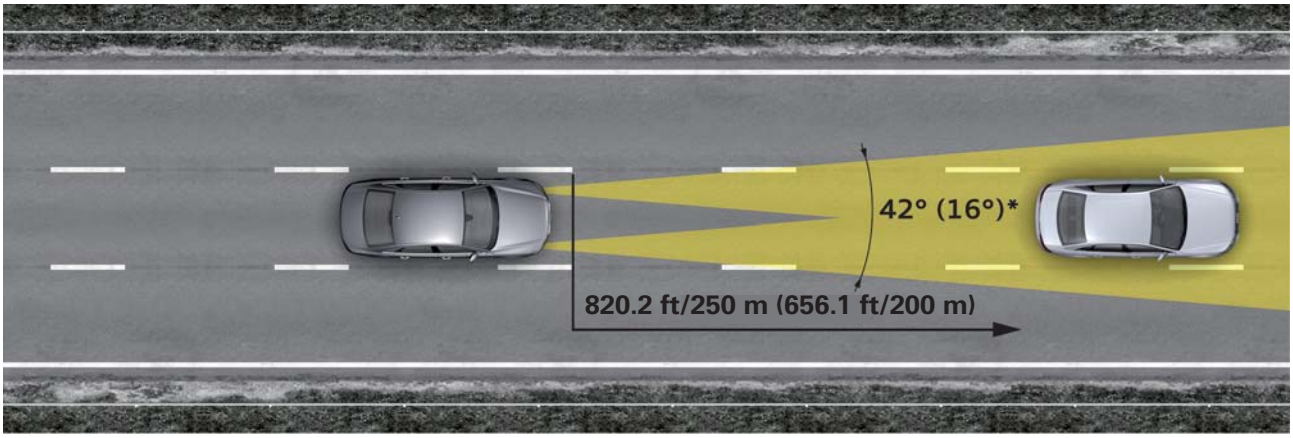
The function of the radar sensor remains unchanged from the previous A8 model. However, greater operational performance is achieved by including video data, navigation data, and other data in the control procedures.

The two control modules have a master/slave architecture. Distance Regulation Control Module J428 (installed on the right) acts as the master while Distance Regulation Control Module 2 J850 (installed on the left) acts as the slave.

458_072

Radar range has been increased compared to previous ACC systems. The measuring range begins approximately 1.6 ft (0.5 m) in front of the vehicle and extends to approximately 820 ft (250 m).

With the double radar design, the side-to-side detection range of approximately 52.4 ft (16 m) at a distance of 98.4 ft (30 m) in front of the vehicle, is wider than a three-lane highway.



*** Values in parentheses refer to the 2010 Audi A8.**

458_073

Functions

The functional scope for the new ACC system has been extended, with the speed range increased to 0 mph (0 km/h) – 155.3 mph (250 km/h). The functions of distance and speed maintenance, as individually set by the driver, remain the same as on the 2010 Audi A8.

The ACC “observes” the traffic situation even when the ACC is switched OFF at the operating stalk.

Stop and Go Function

With the ACC activated, the vehicle will automatically brake to a standstill if required. The pre-condition is that the vehicle ahead is moving before it comes to a standstill. Targets that are stationary at the moment of detection are not included in the control function (for example, in a traffic jam).

ESP initiates braking operations by active pressure build-up. The resulting deceleration is dependent on vehicle speed. At speeds lower than 31.0 mph (50 km/h), maximum deceleration is approx. 8.9 miles/second (4 m/s squared). The last 6.5 to 9.8 ft (2 – 3 m) before the vehicle comes to a standstill are covered at a “crawling” speed of approx. 1.2 – 1.8 mph (2 – 3 km/h).

Stopping distance to the vehicle ahead is approximately 11.4 – 13.1 ft (3 – 4 m).

After the ACC-equipped vehicle has braked to a standstill, the “Go” function is initiated by the driver. It does not occur automatically. The driver must pull the cruise control stalk or touch the gas pedal to activate “Go”.

When the ACC is ready for operation, notification is displayed in the Driver Information System of the instrument cluster.

The ACC system can be activated when the brake pedal is depressed. However, the driver seatbelt must be fastened.

Automatic start-off can be deactivated using the VAS Scan Tool.

Under the following conditions, the ACC is automatically deactivated and the Electromechanical Parking Brake (EPB) activated while the vehicle is stationary:

- Opening a door: The driver's door is monitored redundantly by the door contact and microswitch in the door lock. All other doors are monitored by the door contact switch.

  The ACC receives information from the corresponding door control modules and redundantly from the ABS control module.
- Opening the hood
- Longer parking period: ESP enables the pressure holding function by actuating the valves. Since the valve coils heat up due to the actuating current, the maximum vehicle holding time that can be maintained by ESP is limited. Once this period of time has been exceeded, the function is transferred to the EPB.
- ESP fault
- Fault in another control module relevant to the ACC function (except a fault in the EPB control module)
- Engine turned OFF

  The ACC is deactivated if the EPB is operated while the ACC is active.

If a fault occurs in the EPB system, the ACC is deactivated. Simultaneously, park position "P" is activated automatically. "ACC: TAKE OVER!" is shown in the instrument cluster.

ACC is also deactivated on an uphill grade greater than 18%. ACC deactivation is accompanied by acoustic and visual signals.

458_076

458_077

Stop and Go with Audi Drive Assist

The Audi Drive Assist function can be switched ON and OFF at any time, independent of the ACC.

If Audi Drive Assist and ACC Stop and Go are both active while the vehicle is stationary, the Audi Drive Assist function will switch passively into the background (comparable to “standby” mode).

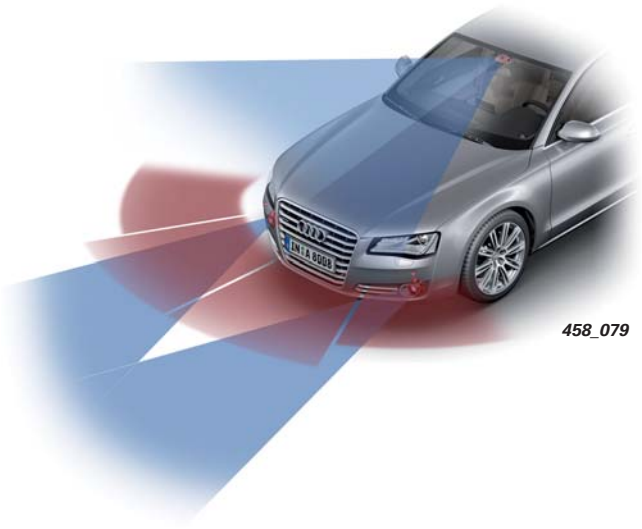
If ACC is switched OFF while the vehicle is stationary and the Audi Drive Assist function is ON, Audi Drive Assist is activated again and further decelerates the vehicle.

Start-Off Monitoring

ACC automatically scans the area directly in front of the vehicle before the vehicle starts moving. Detection takes place in three ways: by radar sensors, video camera, and by the four ultrasonic sensors of the Audi Parking System.

Through a different configuration, ACC ultrasonic sensors are operated in a different mode so that objects are still detected at a distance of approximately 13.1 ft (4 m). A visual warning is shown in the instrument cluster and an acoustic warning (gong) sounds if an obstacle is detected. The vehicle starts moving, but very slowly so that the driver has sufficient time to respond (braking, evading).

If a signal from the video camera or the ultrasonic sensors is not available, the vehicle will always start moving automatically at reduced acceleration. Automatic start-off will not take place if both signals are not available. The system is deactivated and the driver is requested to take over.



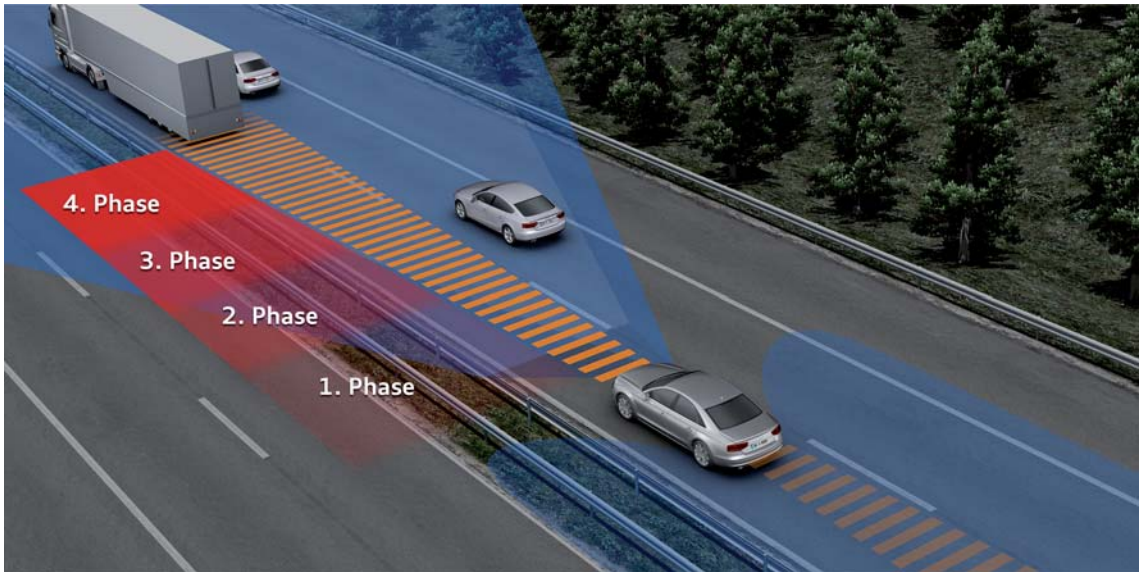
458_079

Audi Braking Guard

This function was first implemented on the Audi Q5, Q7, A4, A5/S5, and has now been expanded to the 2011 Audi A8. When activated, Audi braking guard will brake the vehicle with full deceleration.

The next generation Audi braking guard on the 2011 Audi A8 addresses the following fundamental objectives and situations:

- The system is always activated when there is an increased risk of collision due to excessively high relative speed in relation to a preceding vehicle. The function is also activated when ACC is switched OFF at the operating stalk.
- The four-phase function sequence allows the driver to actively intervene by taking evasive action and/or braking.
- Even if the driver reacts too late or not at all, Audi braking guard reduces driving speed through gradual partial braking and automatic full deceleration. Simultaneously, preventative protective measures are initiated. Even when a collision with a preceding vehicle can no longer be avoided, these measures drastically reduce collision severity.
- In the 2011 Audi A8, Audi braking guard is a subfunction of the new Audi pre sense safety system.



458_080

Reference

You will find detailed information on the Audi pre sense safety system in SSP 990103, *The 2011 Audi A8 Vehicle Introduction*.

Example

Phase 1

Braking guard logic in the control module has detected an elevated collision risk, triggering a visual warning and an audible warning (gong signal). These warning appear approximately 1.5 – 2.5 seconds before the last chance to brake to avoid collision.

The exact appearance of these warnings depends on the driver's driving style. Investigations have shown that driving style, and driver responsiveness characterizes the degree of driver alertness.

For example, a dynamic driving style characterized by frequent acceleration/ deceleration and lane changes generally infers an alert driver. The warning for this type of driver is therefore triggered later than for a less alert driver.

Simultaneously, the brake system is pre-charged at 29.0 psi (2 bar) braking pressure by active pressure build-up initiated by the ESP.

This measure reduces braking system "dead time" and initiates the cleaning/drying of brake discs by applying the brake pads against the brake discs. This subfunction is comparable to the "brake disc wiper function".

At the same time, the triggering criteria for the Hydraulic Brake Assist (HBA) are quickly changed. The HBA is triggered at lower pedal travel speeds. The traffic situation around the vehicle is included in determining the HBA triggering criteria.

To be best prepared for any imminent dynamic actions (evasion, braking with high vehicle deceleration), the Adaptive Air Suspension sets the dampers to maximum damping force.

458_077a

458_082

► Visual and audible warning

► Brake system pre-charged

► Damper adjustment

Phase 2

If the driver does not respond to the instrument cluster warnings, the Adaptive Cruise Control module initiates short-term brake pressure build-up through the ESP control module of approximately 0.9 – 1.5 seconds before the last braking opportunity to avoid collision. This warning jolt, which can be clearly felt by the driver, does not serve to decelerate the vehicle but rather to again warn the driver that an immediate reaction is required on their part to avoid imminent collision.

If the driver initiates braking, they may be assisted by the HBA function of the ESP. Unlike conventional brake assist systems that always initiate full braking, built-up braking pressure either stops the vehicle a short distance behind the vehicle ahead OR vehicle speed is reduced to such an extent that it can safely follow the preceding vehicle. Depending on road conditions (coefficient of friction), maximum deceleration values are initiated if necessary.

If the driver does not initiate braking after the warning jolt, ESP actively builds up more braking pressure, which results in medium deceleration (approximately 30% of the maximum deceleration for approximately 1.5 seconds).

Seatbelt slack is reduced at the start of this braking operation in order to effectively restrain the driver.

The following phases 3 and 4 are initiated only in vehicles equipped with the Audi pre sense plus safety system. The driver can cancel the corresponding function at any time by firmly depressing the accelerator pedal.

458_083

► **Warning jolt**

► **Seatbelt slack reduction**

► **Partial braking (approximately 30%)**

Phase 3

ESP increases brake pressure to approximately 50% of maximum deceleration for approximately one second. Hazard warning lights warn traffic behind the vehicle of the hazard situation.

Since the probability of a collision is now high, open windows/sunroof are closed as far as possible in order to increase the stability of the passenger cell and to protect occupants from object intrusion. The function for closing the windows/sunroof is initiated by the Audi pre sense safety system.

458_084

► Partial braking (approximately 50%)

► Closing of windows/sunroof

► Hazard warning flasher

Phase 4

Approximately 500 milliseconds before impact, braking pressure is increased to maximum vehicle deceleration. The reversible belt tensioners are activated with Audi pre sense.

At this point, the collision can no longer be prevented by the driver. However, full braking power further reduces vehicle speed by a maximum of 7.4 mph (12 k/h). Even if the driver takes no steps to avoid a collision, Audi braking guard can reduce impact speed by approximately 24.8 mph (40 km/h). The best possible automated steps have been taken to prevent an accident, with the severity of the accident substantially reduced.

In contrast to the classic ACC function, Audi braking guard also responds to stationary objects. In these cases, the driver's visual and audible warnings, and, if necessary, the warning jolt are triggered. Active braking, however, does not take place.

458_085

► Reversible belt tensioner activation

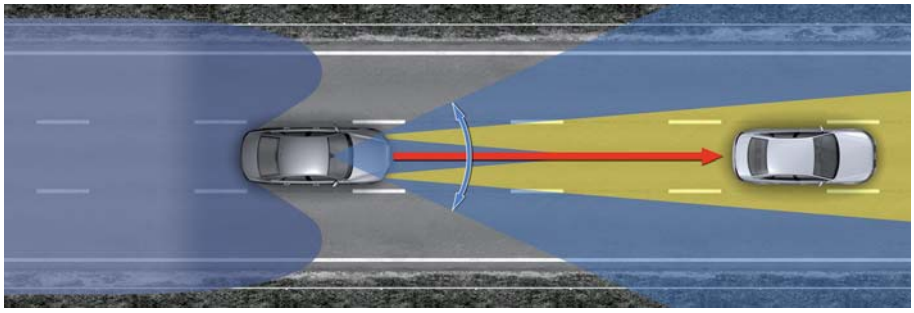
► Emergency braking

ACC Function Expansion

Vehicles with Audi Side Assist

If the vehicle is equipped with Audi Side Assist, the data from the rear radar sensors are included in the calculation of ACC control procedures. If the system detects that the left (right) adjacent driving line is available for a lane change (is clear), automatic brake intervention may take place a little later.

In this scenario, the ACC “waits” to “see” whether the driver will initiate a lane change.
The objective of this control strategy is not to curb the driver prematurely and not to regiment the driver more than is necessary.

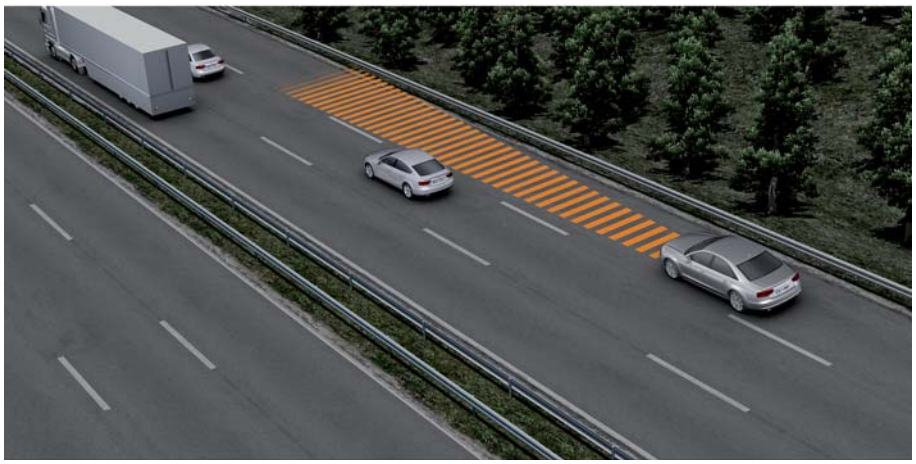


458_087

Function Expansion Preventing Overtaking on the Right (Left) Driving Lane

In active ACC mode, overtaking/passing in the right (left) driving lane is only possible, without restrictions, up to a vehicle speed of approximately 50 mph (80 km/h). At speeds in the range of approximately 50 – 56 mph (80 – 90 km/h), it is only possible to pass a vehicle with limited relative speed.

This function is active at speeds in excess of 56 mph (90 km/h). The function can be cancelled by manual acceleration with the operating stalk (RESUME), by pressing the accelerator pedal, or by increasing the set speed.



458_088

Operation and Driver Information

The familiar operating functions of switching the Adaptive Cruise Control system ON and OFF (ON, OFF), setting speed (SET), interrupting control (CANCEL), resuming control (RESUME), setting distance, as well as increasing/decreasing control speed, are driver initiated via the ACC operating stalk.

As stated earlier, the ACC function can be activated in a speed range of 0 mph (0 km/h) – 155.3 mph (250 km/h). If the system is activated at speeds below 18.6 mph (30 km/h), the vehicle is accelerated to 18.6 mph (30 km/h) and is controlled at this speed.

Another new feature is that the vehicle can be accelerated manually by pulling the operating stalk (RESUME) while ACC is active. Control is suspended for as long as the stalk is held in this position. The vehicle returns to the set speed again after releasing the stalk.

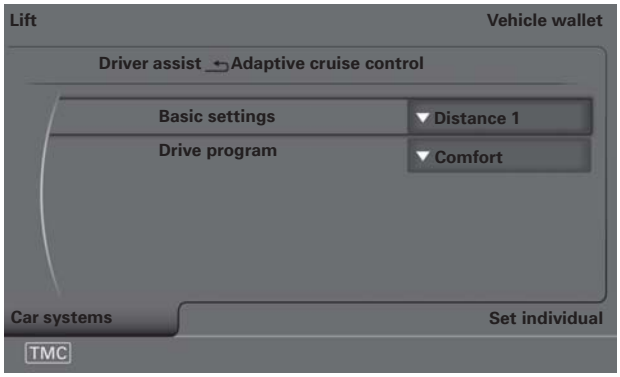
The distance is reset to the “Distance 3” setting every time the ignition is switched ON or OFF. It is possible to activate a different presetting with the VAS Scan Tool. In this case, the menu item “Basic settings” is enabled for the customer.

The indicators in the display and speedometer generally correspond to the familiar displays/ indicators of the ACC systems in other vehicle models.

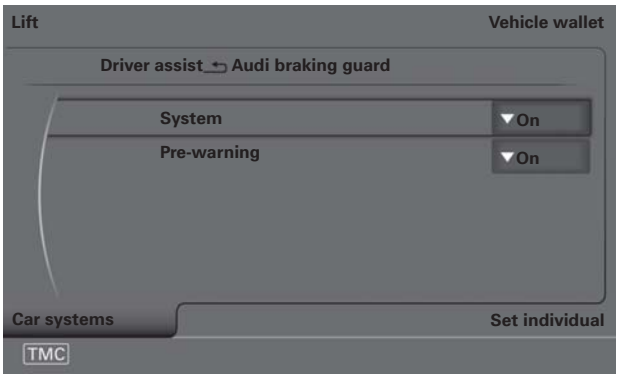
The driver has the capability of selecting via the MMI how dynamically the ACC system will respond.

On request, the visual/audible distance/collision warning functions, as well as Audi braking guard can be deactivated in the MMI. Audi braking guard is also deactivated when ESP is switched to sport mode by pressing the ESP OFF button.

458_074



458_090

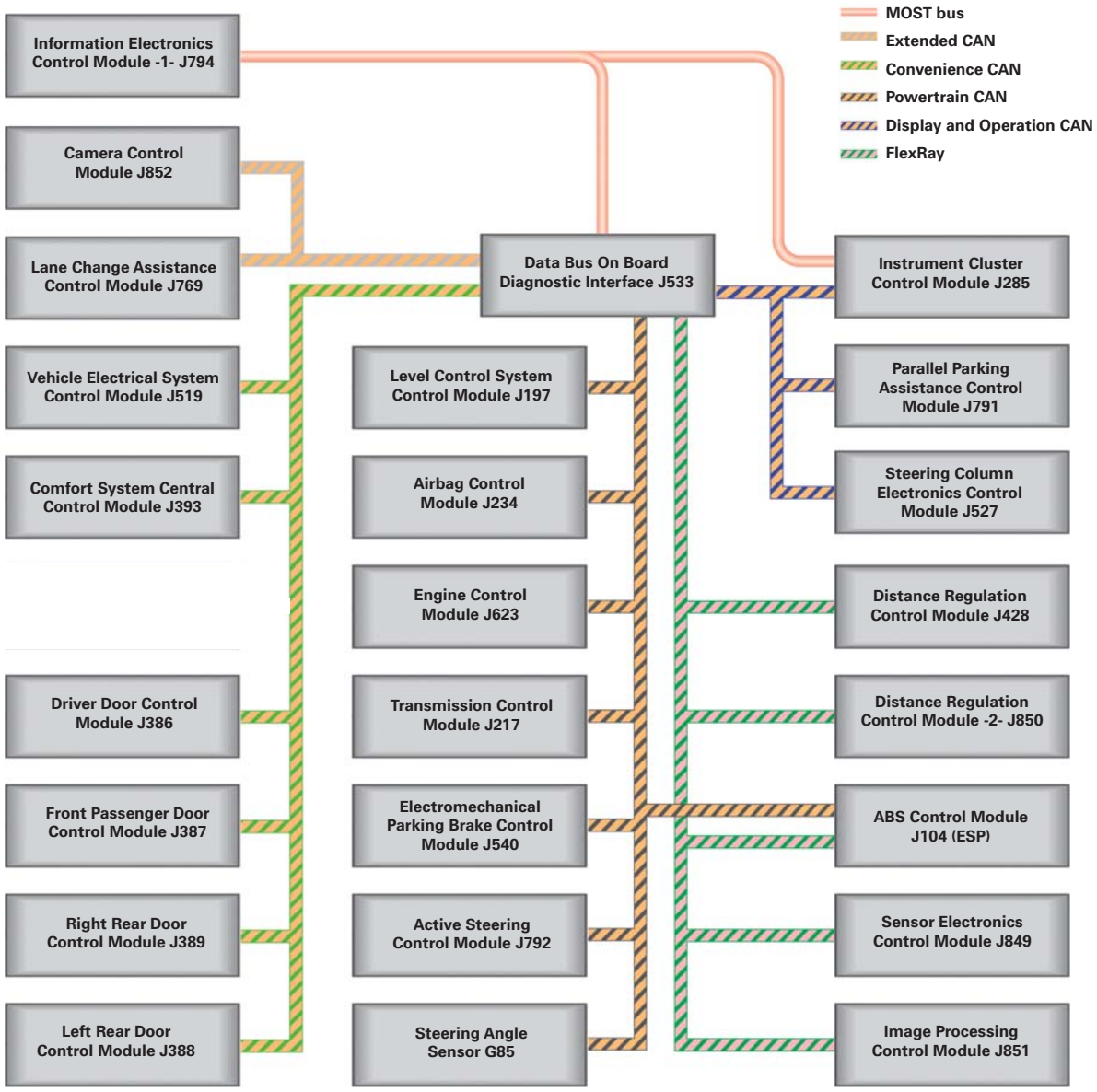


458_091

Networking/CAN Data Exchange

The ACC control module reads approximately 1,700 different signals from other control modules and sensors.

The following overview shows the control modules involved in this data exchange.



458_092

Service Work

1. Removing and Installing/Replacing System Components and Additional Procedures

Right Adaptive Cruise Control Sensor G259, Distance Regulation Control Module J428, Left Adaptive Cruise Control Sensor G258, and Distance Regulation Control Module 2 J850 are combined into one component. The control modules are encoded online and are part of the component protection system.

After replacement, the sensors must be reset.

458_093

2. Special Settings

The sensors require adjustment when:

- Rear axle alignment is adjusted
- J428 and/or J850 are removed and re-installed
- Front bumper is removed and re-installed
- Front bumper is loosened or displaced
- There is damage to the front bumper
- Misalignment angle is greater than -0.8° to +0.8°

To ensure they both function correctly, sensors G259 and G258 must be adjusted. The adjustment always starts with sensor G259 (master).

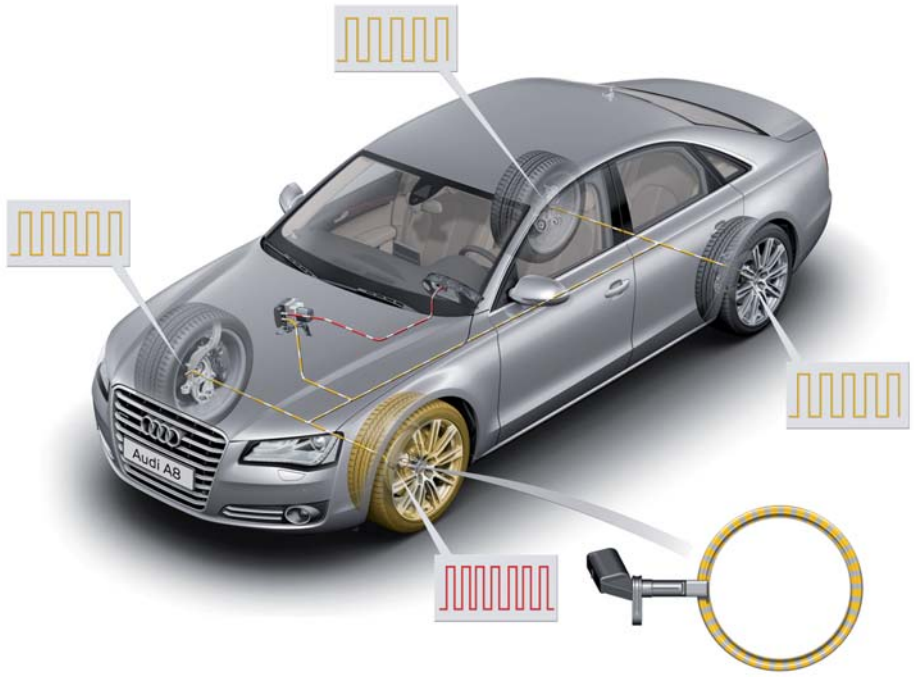
Compared to the setting of the ACC senders already in use, the setting procedure has been simplified. It is performed with special tool VAS 6430.

Note

Since the sensors are secured directly to the bumper, extra care must be taken that the bumper is mounted correctly, especially at the wheel arches and the underride guard.

Tire Pressure Monitoring (TPMS)

The 2011 Audi A8 is equipped with the second generation Tire Pressure Monitoring System (TPMS).



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458_097

By evaluating the vibration characteristics of each wheel/tire, the new TPMS system is capable of determining and indicating which tire is experiencing pressure loss.

The system can also detect slow (gradual) pressure loss, as well as simultaneous pressure loss at several wheels.

Reference

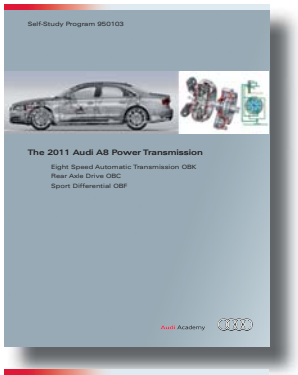
You will find detailed information on the second generation Tire Pressure Monitoring System in SSP 990193, *Audi New Technology 2009 – 2010*.

Notes

Self-Study Programs for the 2011 Audi A8

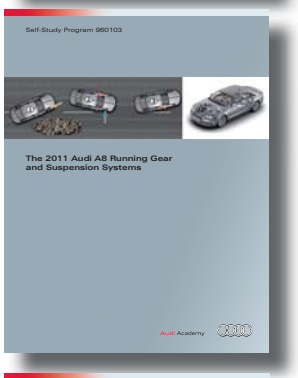
SSP 950103 The 2011 Audi A8 Power Transmission

- Eight-Speed Automatic Transmission OBK
- Shift-by-Wire Control System
- Rear Axle Drive OBC
- Sport Differential OBF



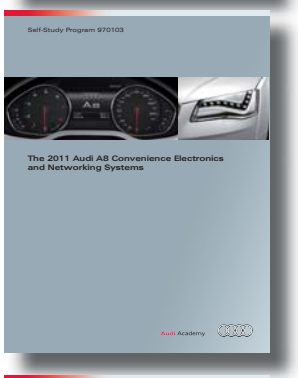
SSP 960103 The 2011 Audi A8 Running Gear and Suspension Systems

- Axle and Wheel Alignment
- Adaptive Air Suspension
- Brake System
- ESP
- Steering System
- Adaptive Cruise Control (ACC)



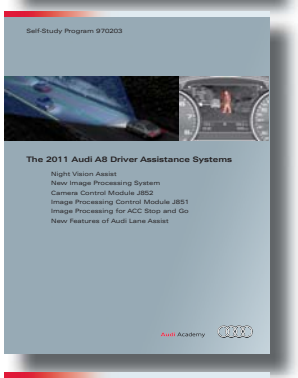
SSP 970103 The 2011 Audi A8 Convenience Electronics and Networking Systems

- Power Supply
- Network System
- FlexRay
- Exterior Lights
- Ambient Lighting



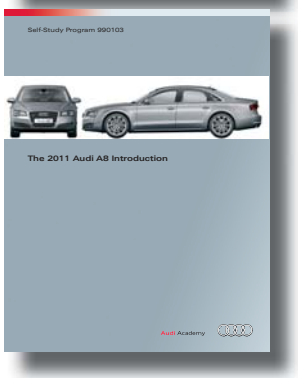
SSP 970203 The 2011 Audi A8 Driver Assistance Systems

- Night Vision Assist
- New Image Processing System
- Image Processing Functions for ACC Stop and Go
- Diagnostic Functions and System Calibration
- New Features of Audi Lane Assist



SSP 990103 The 2011 Audi A8 Introduction

- Body
- Passive and Active Safety
- Powertrain
- Audi Drive Select
- Heating, Ventilation, and Air Conditioning (HVAC)



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An online Knowledge Assessment (exam) is available for this Self-Study Program.

The Knowledge Assessment is required for Certification.

You can find this Knowledge Assessment at:

www.accessaudi.com

From the accessaudi.com Homepage:

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- Click on the “Academy Site” link
- Click on the “CRC/Certification” link
- Click on Course Catalog and select “960103 — The 2011 Audi A8 Running Gear and Suspension Systems”

For assistance call:

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Or you may send an email to:

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Thank you for reading this Self-Study Program and taking the assessment.

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