Self-Study Program 990203

The 2012 Audi A7 Vehicle Introduction

Audi Academy

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Always check Technical Bulletins and the latest electronic service 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.

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

Reference

Note

Introduction

Audi is once again breaking new design ground with the A7, combining athleticism and elegance on a grand scale.

The sleek five-door coupe measures 16.31 ft (4.97 meters) in length and 6.27 ft (1.91 meters) in width, but only 4.66 ft (1.42 meters) in height. Its long hood, flowing C-pillars, and sharply sloping roofline result in a dynamic overall design.

The Audi A7 is three vehicles in one: a comfortable and prestigious sedan with the excitement of a coupe and the functional utility of a station wagon. It features a lightweight body comprised of numerous aluminum components, a powerful and highly efficient V6 engine, a sport chassis, and advanced assistance and multimedia systems.

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The 2012 A7 offers great long-distance driving comfort without sacrificing its substantial sport characteristics. Interior noise levels are very low even at high speeds, with the engine providing subtle acoustic feedback as its power unfolds.

Making these excellent acoustics possible are new structural design methods and high-end materials. These materials include microfiber fleeces and multifunction parts, such as acoustically active wheel well shells and underbody panels.

The interior of the A7 reveals workmanship on a craftsman level. Layered wood veneers are a treat for the senses, with optional ambient lighting adding subtle highlights to the interior.

Body

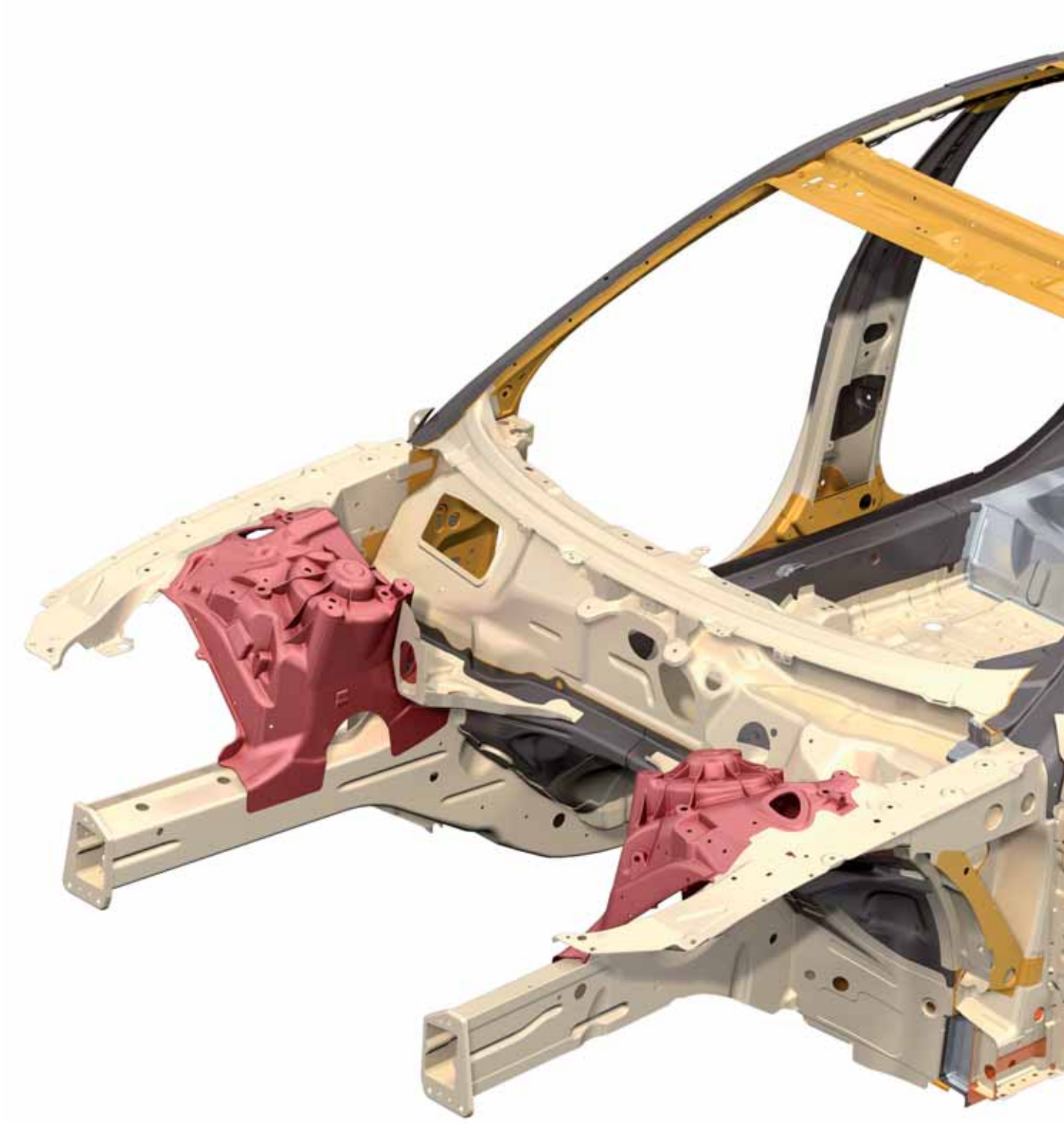
Dimensions and Specs

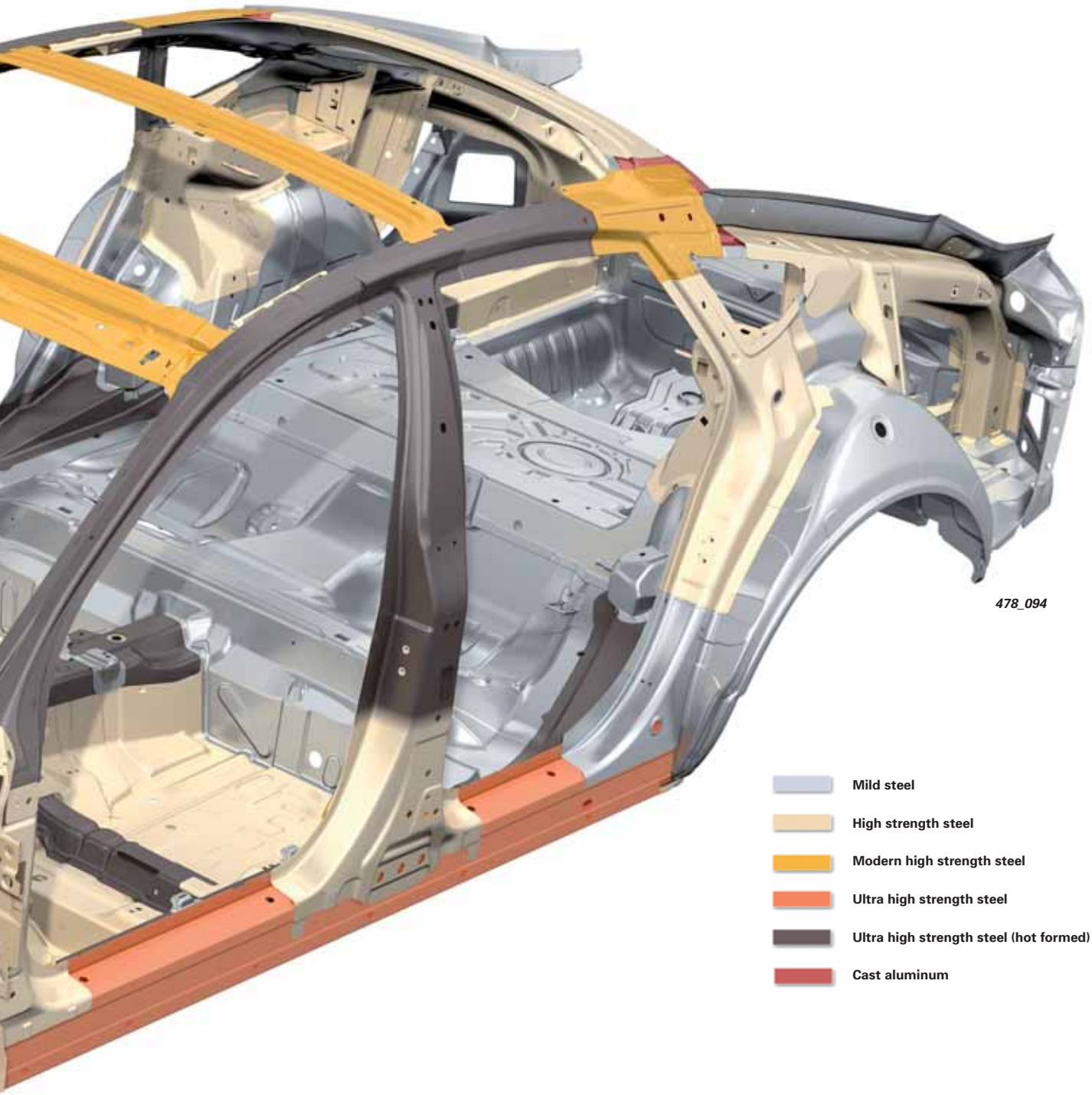
Length	195.6 in (4969 mm)	Front internal width	57.1 in (1452 mm)
Width	75.2 in (1911 mm)	Rear internal width	55.9 in (1421 mm)
Height	55.9 in (1420 mm)	Front headroom	40.4 in (1028 mm)
Front track width	64.7 in (1644 mm)	Rear headroom	37.1 in (944 mm)
Rear track width	64.3 in (1635 mm)	Loading width	36.0 in (915 mm)
Wheelbase	114.7 in (2914 mm)	Load sill height	27.1 in (689 mm)
Trailer load	4629.7 lb (2100 kg)	Trunk capacity	18.8 cu ft / 34.0 cu ft (535 l / 965 l)
Curb weight	4067.5 lb (1845 kg)	Fuel tank capacity	17.1 gal (65.0 l)
Maximum gross weight	5114.7 lb (2320 kg)	Drag coefficient	0.29

Materials

The body of the 2012 A7 is a hybrid construction of steel and aluminum components.

The body shell uses mild, high strength, modern high strength, and ultra high strength steel parts. There are also four cast aluminum parts for the front strut and tailgate hinge mounts.




Mild steel
High strength steel
Modern high strength steel
Ultra high strength steel
Ultra high strength steel (hot formed)
Cast aluminum

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Body Structure

The use of ultra high strength hot-formed components improves body rigidity and crash safety. The following components and assemblies are made from ultra high strength steel:

- Front side member reinforcement
- Bulkhead
- A-pillar and roof frame side
- B-pillar
- Chassis rail (sill)
- Front seat cross member
- Tunnel reinforcement
- Rear longitudinal member

B-Pillar

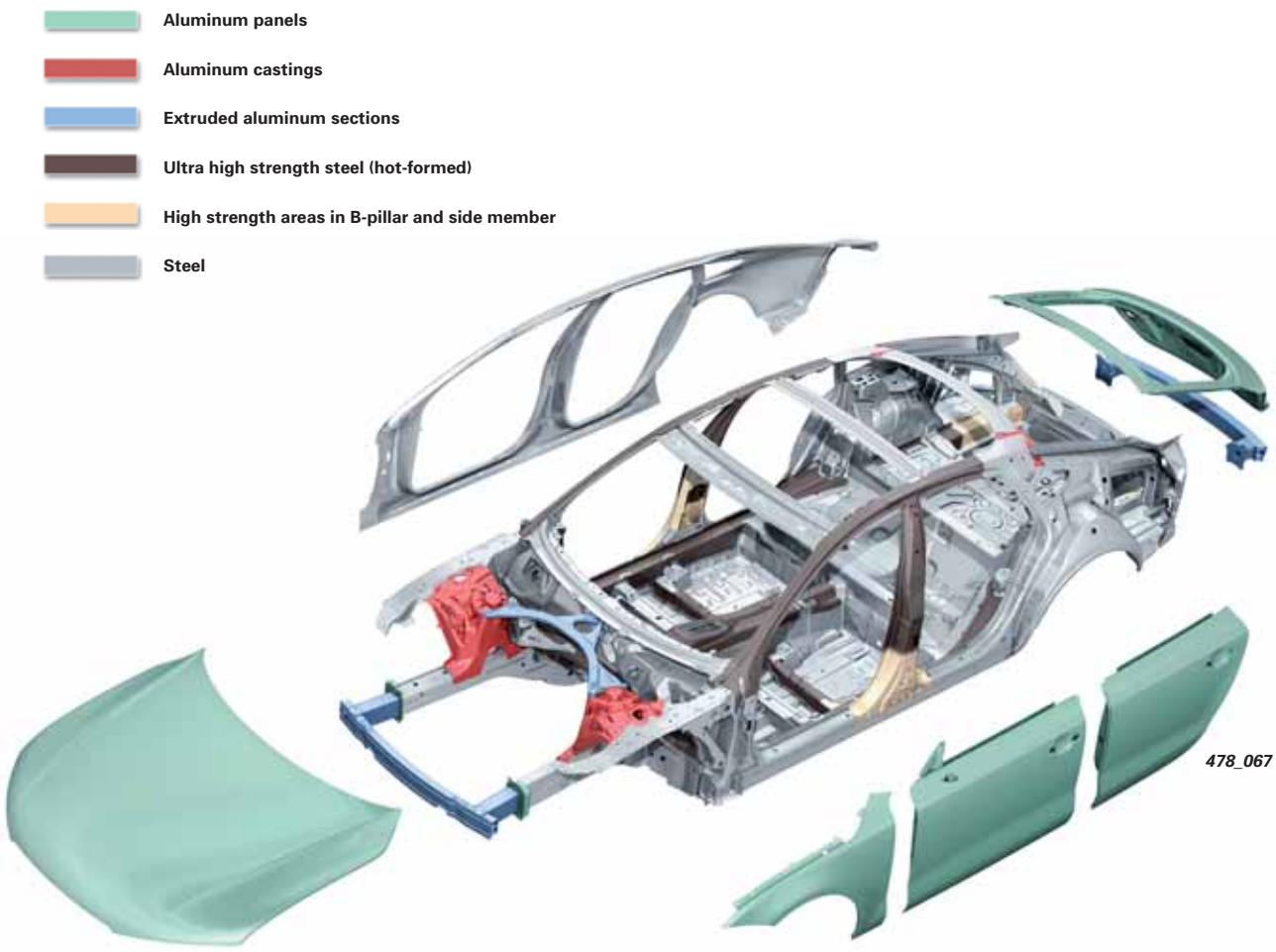
The B-pillar with striker plate is partially tempered during the forming process. The component assembly is very hard at the top end and softer below a narrow transition zone. This enables side impact forces to be absorbed effectively.

Body Attachments

To reduce vehicle weight, the front and rear bumper mounts, fenders, strut brace, doors, and flaps are made from aluminum.

Side Member

Manufactured from two tailored blanks, the side member is high strength sheet metal at the rear and hot-formed ultra high strength sheet metal at the occupant cell. Both sheet metal blanks are butt joined by a laser weld prior to forming.



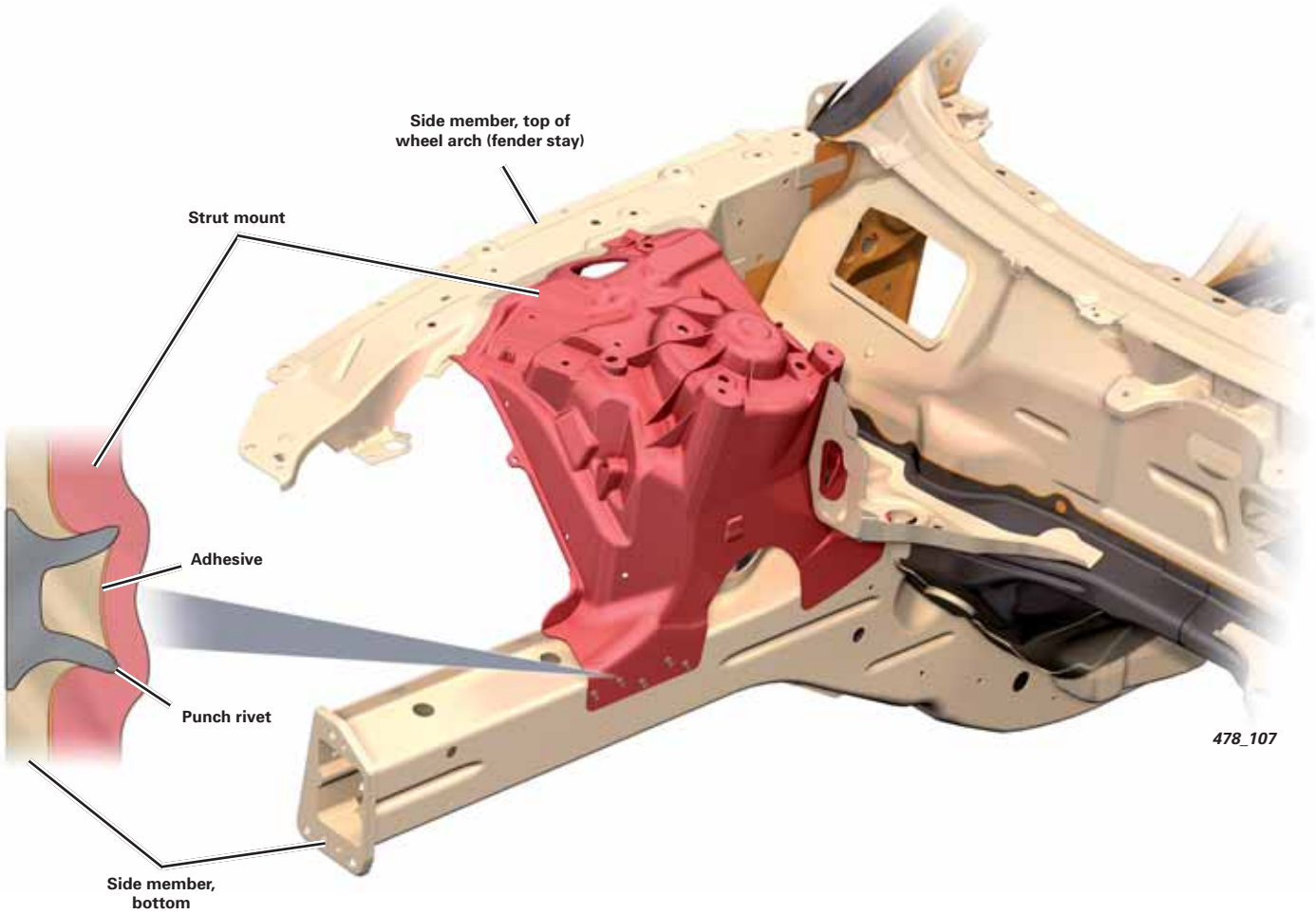
Aluminum Castings

The aluminum castings in the vehicle structure are joined to adjacent sheet metal parts with punch rivets and structural adhesive. The adhesive between these two materials also acts as an insulator and prevents contact corrosion. This method of joining was also used on the 2007 Audi TT and 2011 Audi A8.

Specific repair procedures have been developed for repairing damage to the aluminum castings and adjacent sheet steel parts.

Straightening or reshaping of steel components can cause external and internal cracks in aluminum castings, which may not be easily detected.

Structural integration of front end and strut mount



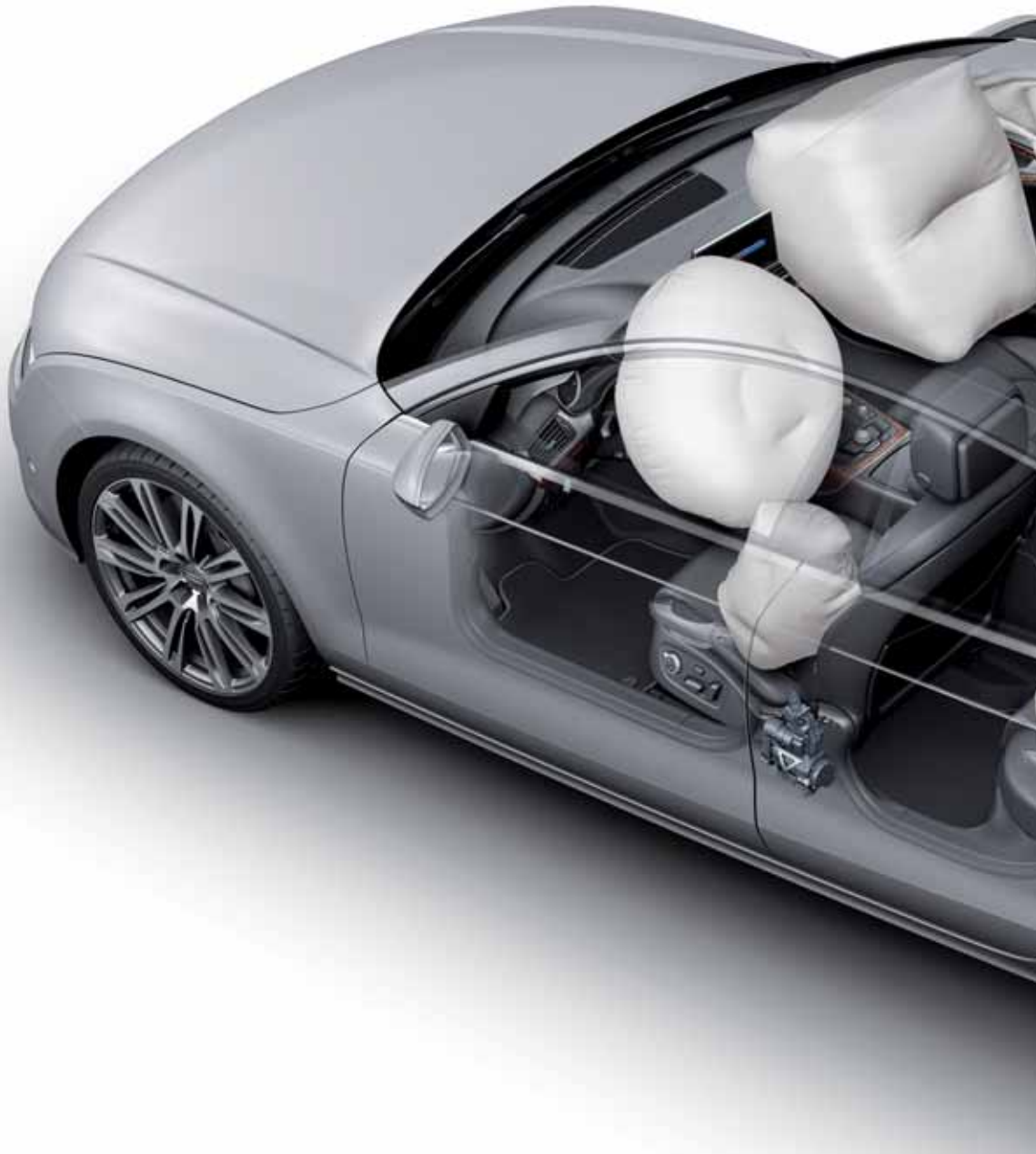
Reference

For further information about punch riveting, refer to Self-Study Program 994703, *The 2008 Audi TT Body.*

Occupant Protection

Overview

Due to different statutory provisions and requirements in the worldwide marketplace, occupant protection equipment is subject to change. This applies to the North American market in particular.



Reference

For further information about the occupant protection system of the A7, refer to Self-Study Program 990603, *The 2012 Audi A7 Occupant Protection, Infotainment, Climate Control, and Head-Up Display.*

Components

The following components are used in the 2012 A7 occupant protection system for the North American market:

- Airbag control module
- Adaptive driver and front passenger airbags
- Front side airbags
- Audi Sideguard (side curtain airbags)
- Driver and front passenger knee airbags
- Up-front airbag crash sensors
- Door-integrated pressure type sensors for side impact detection
- Acceleration-type sensors for side impact detection on the C-pillars
- Front inertia-reel seatbelts with pyrotechnic and electrically reversible belt tensioners and active belt force limiters
- Battery interrupt igniter
- Seatbelt reminder for driver and front passenger
- Seatbelt switch, driver and front passenger
- Seat occupancy sensor in front passenger seat (PODS)
- Driver and front passenger seat position recognition

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Engine

3.0L V6 TFSI Engine

Technical Features

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New spark plugs

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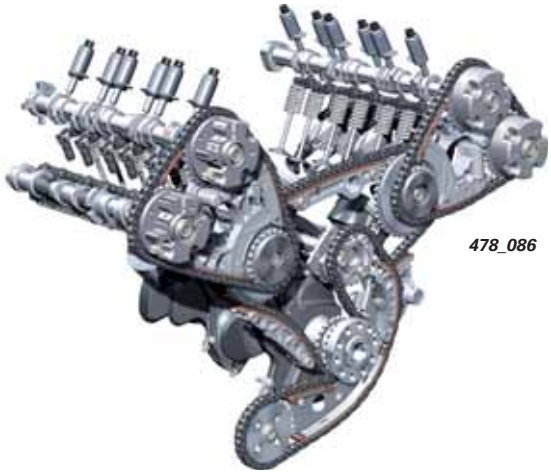
Energy efficient engine oil pump

Friction reduced chain gear with:
- Modified camshafts
- Camshaft adjusters modified for less leakage



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Reference

For further information about the design and operation of the 3.0L V6 TFSI engine, refer to Self-Study Program 925803, *The Audi 3.0L V6 TFSI Engine with Roots Blower.*

Adapted belt drive (without power steering pump)

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Innovative Thermal Management system with active coolant pump

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Improved high pressure injectors

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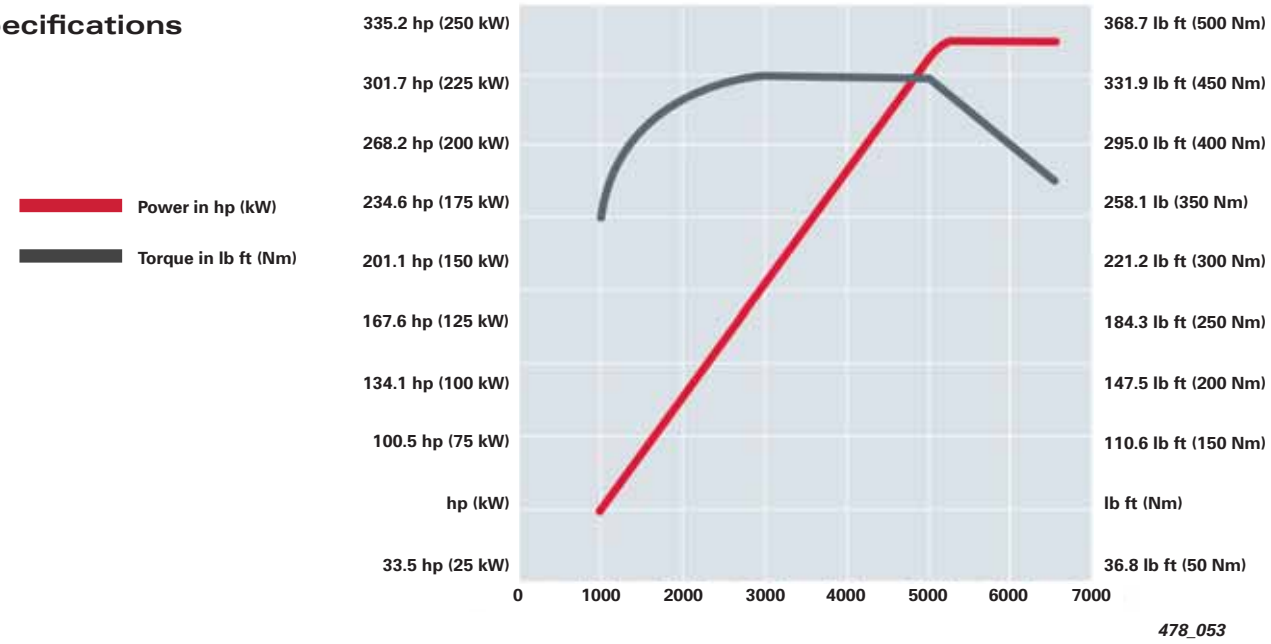
Specifications



Engine Code	CGWB
Engine type	Six cylinder V engine with 90° included angle
Displacement	182.7 cu in (2995 cc)
Maximum power	310 hp (220 kW) @ 5500–6500 rpm
Maximum torque	325 lb ft (440 Nm) @ 2900–4500 rpm
Valves per cylinder	4
Bore	3.32 in (84.5 mm)
Stroke	3.50 in (89.0 mm)
Compression ratio	10.5 : 1
Powertrain	quattro
Engine management	Simos 8
Fuel grade	91 AKI
Exhaust emission standard	ULEV 2

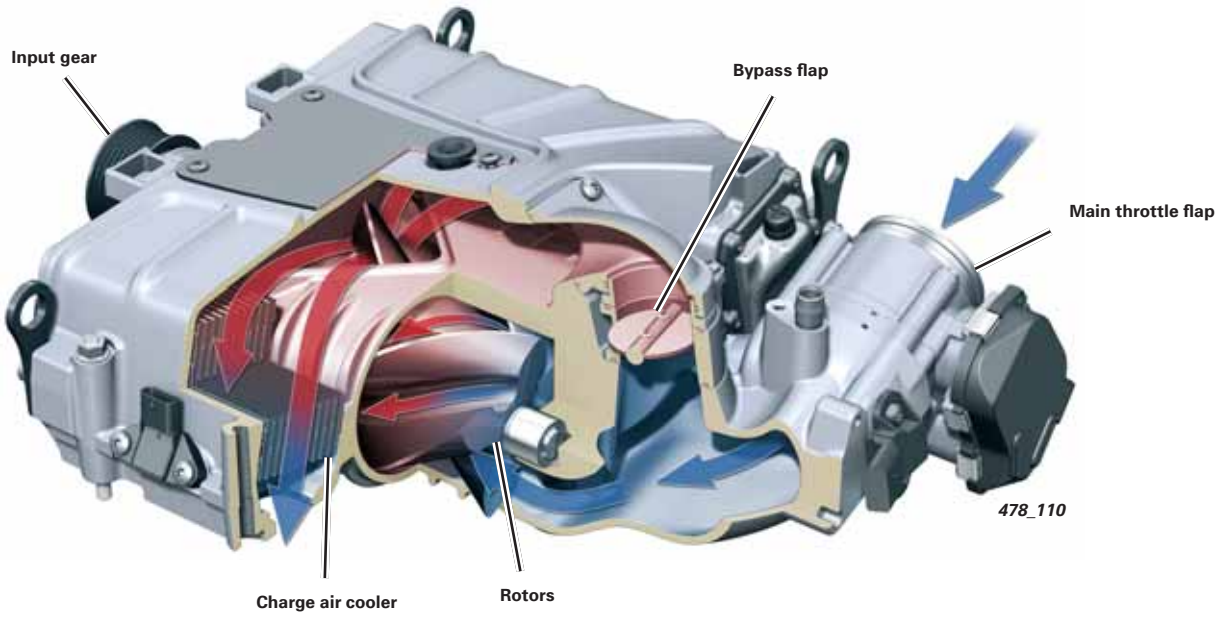
Modifications to the 3.0L V6 TFSI Engine for the 2012 A7	
Cylinder block	– New Innovative Thermal Management System (ITM)
Cylinders	– Honed to a textured finish to reduce oil consumption and wear – Increased piston installation clearance – Reduced pre-stress on the third piston ring land
Main bearing inserts	– Bearing surfaces coated with an additional wear-resistant layer designed to withstand composite friction
Chain drive	– Chain tensioners reconfigured and adapted for reduced oil flow
Camshafts	– Weight of intake valve camshafts reduced – Cam contour revised – Weight of exhaust valve camshafts reduced – All camshafts are now composite construction
Camshaft adjusters	– Enhancements reduce leakage, resulting in reduced oil circuit pressure
Valve gear	– Reduced spring forces
Oil pump	– Smaller, consumes less power, and generates less friction
Spark plugs	– Heat ratings adapted for optimized combustion

Charging

The 3.0L V6 TFSI engine is charged by a Roots blower. This offers the following advantages:

- Fast dynamic torque build-up
- Flat torque curve
- Excellent initial acceleration
- Maintenance free operation
- High percentage of common parts shared with other V engine models

Supercharger module



Innovative Thermal Management

Innovative Thermal Management (ITM) for the 3.0L V6 TFSI engine is similar to the system designed for the 2011 Audi A8 4.2L V8 TFSI. It is an electronically controlled system designed to optimally distribute engine heat flow. The system is controlled by the Heat Manager, a recently developed software module fully integrated into the engine control module (ECM).

The engine coolant is distributed on demand between the engine, transmission, and passenger compartment by a system of valves. To ensure maximum comfort, the demands of the heating and climate control systems are evaluated at all times.

The climate control and transmission control modules communicate their heating requirements to the ECM via CAN bus. These heating requirements, together with the engine heating request from the ECM, are then analyzed and prioritized. ITM components are activated accordingly.

During phase one of operation, the engine coolant does not circulate. This results in the stationary coolant temperature increasing faster than if it was circulated, thus reducing frictional losses in the engine.

After the non-circulation phase, engine coolant is used to rapidly heat the ATF via a heat exchanger. The coolant is directed by an electrical control valve actuated by the Transmission Control Module.

A mixing phase is cycled by the ECM to ensure that hot engine coolant is not circulated immediately, which would impair the frictional properties of the engine.

Passenger Compartment Heating

The stationary coolant phase normally takes approximately 120 seconds. However, there are circumstances where stationary coolant is unwanted, for example, when the Defrost button is pressed. Warm coolant flows immediately to the heater in order to prevent the windshield from fogging up.

If the heater does not need any energy to heat the vehicle interior (at warm ambient temperatures), the climate control module does not send a heating request.

Transmission Heating/Cooling

The ATF is heated and cooled as needed, and is only cooled to the temperature level of the engine coolant.

ITM System Technical Summary
– Active coolant pump
Two sensors: – Engine Temperature Control Temperature Sensor G694 – Coolant Temperature Sensor G62
– ATF heating/cooling
– Heating cut off
– Thermostat opens at 188.6°F (87°C)

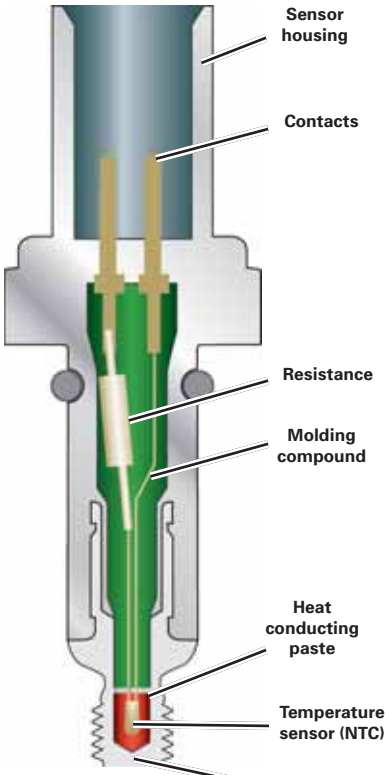
Engine Temperature Control Temperature Sensor G694

G694 is mounted in the left cylinder head. This is a position where components reach critical temperatures quickly. The function of G694 is to provide protection for these components.

A special feature of this sensor is the large surface area of its thread being in the heat transfer zone. This enables quicker heating and cooling.

The design and installation location of G694 ensures that a gradual or sudden coolant loss will be detected earlier.

The sensor also protects against “coolant boil-off“ since it enables warnings to be issued earlier by providing “faster” measurement at the “critical point.”



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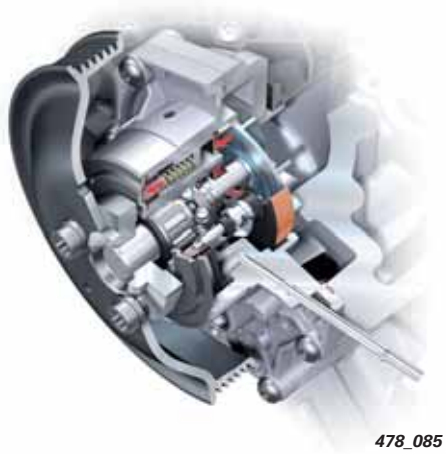
Active Coolant Pump

The active coolant pump is controlled by the Engine Control Module. Vacuum, applied and released via a solenoid valve, positions a pilot valve over the pump impeller, restricting the pump outlet on the pressure side.

When the coolant pump is activated (vacuum applied), coolant flow through the engine is completely stopped. When this occurs, the engine power needed to drive the pump is reduced.

The coolant flow is activated in a cyclical manner. This allows the engine temperature to be gradually equalized during the mixing phase of operation.

Brief activation of the coolant pump at high engine speeds protects the engine from overheating.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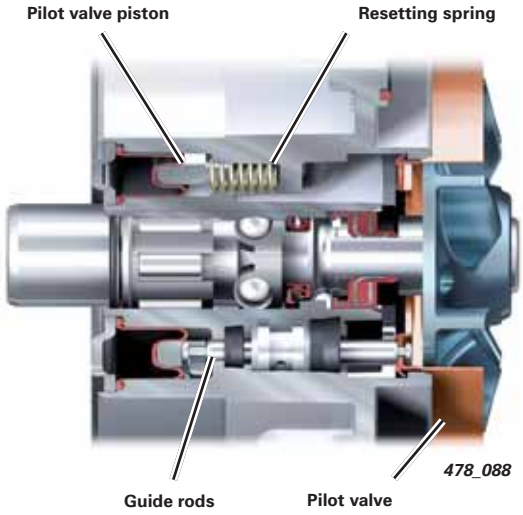
Function

Releasing vacuum from the vacuum chamber exerts force on the pilot valve piston. The pilot valve is pushed over the cylinder block impeller against the pressure of the spring via guide rods. Coolant flow is restricted at the pump outlet on the pressure side. Three circumferential return springs ensure that full delivery of engine coolant is maintained in the event of problems with the vacuum supply.

The pump is not activated at coolant temperatures below –4°F (–20°C) because the seals and diaphragms could be damaged.



Fuel Delivery Unit

The fuel delivery unit is a brushless, permanent magnet (excited) synchronous motor, also known as an electronically commutated (EC) motor. It operates at five to 16 volts. With the exception of the bearing, it is wear-free.

The fuel delivery unit is activated by Fuel Pump Control Module J538 and is controlled by a PWM signal. The level sensor uses three-wire technology and the fuel filter is mounted directly on the Delivery Unit.

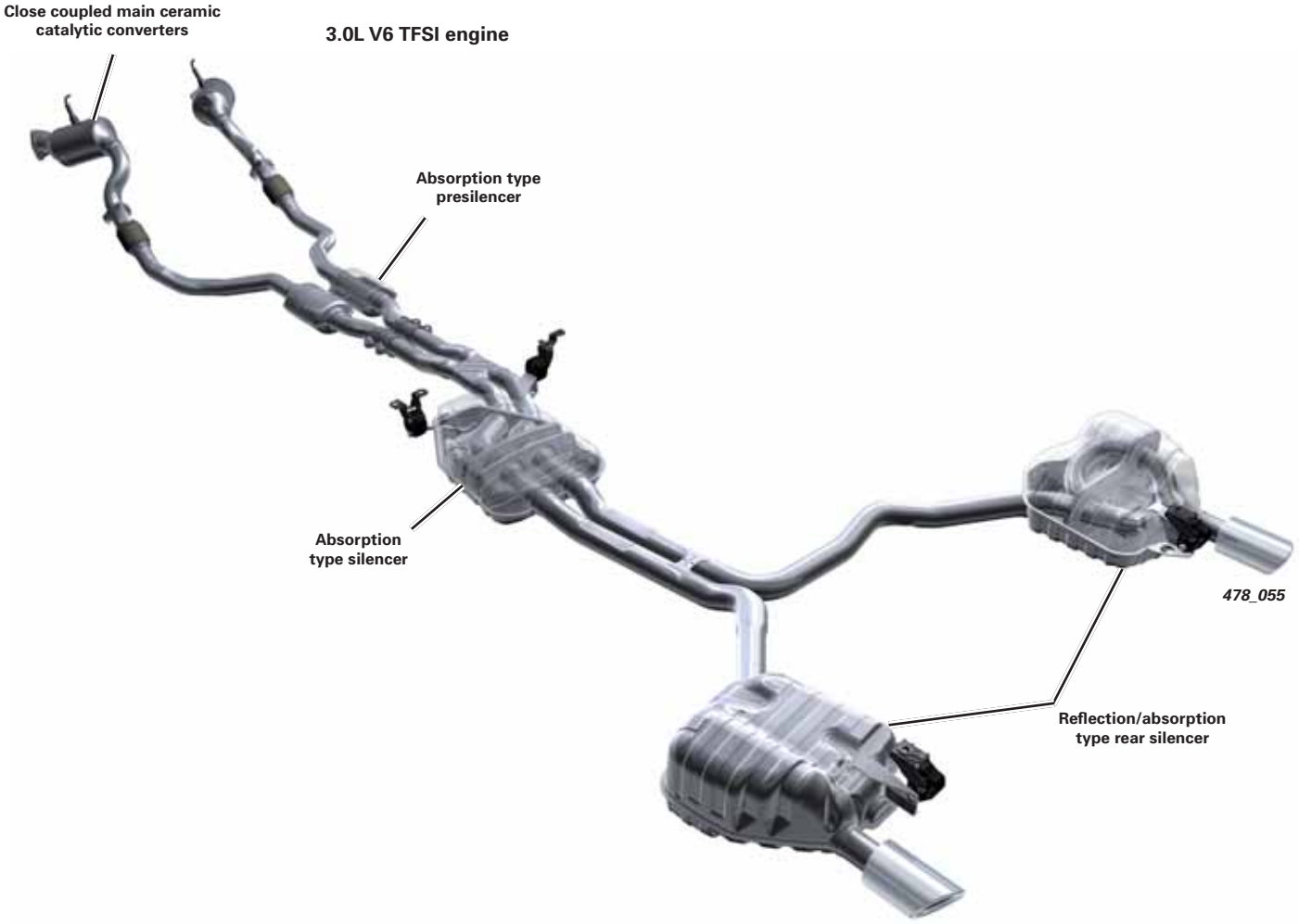
Exhaust System

Absorption Type Silencer

This sound dampener consists of porous material, usually rock wool, glass wool, or glass fiber, which partially absorbs sound energy, converting it to heat. This sound absorption effect is intensified by multiple reflection.

A 50 dB(A) reduction in exhaust noise is possible with this silencer, reducing sound pressure by a factor of 300. Absorption in a silencer primarily reduces high frequencies.

To optimally reduce a wide range of exhaust frequencies, three silencers are used on the A7.



Power Transmission

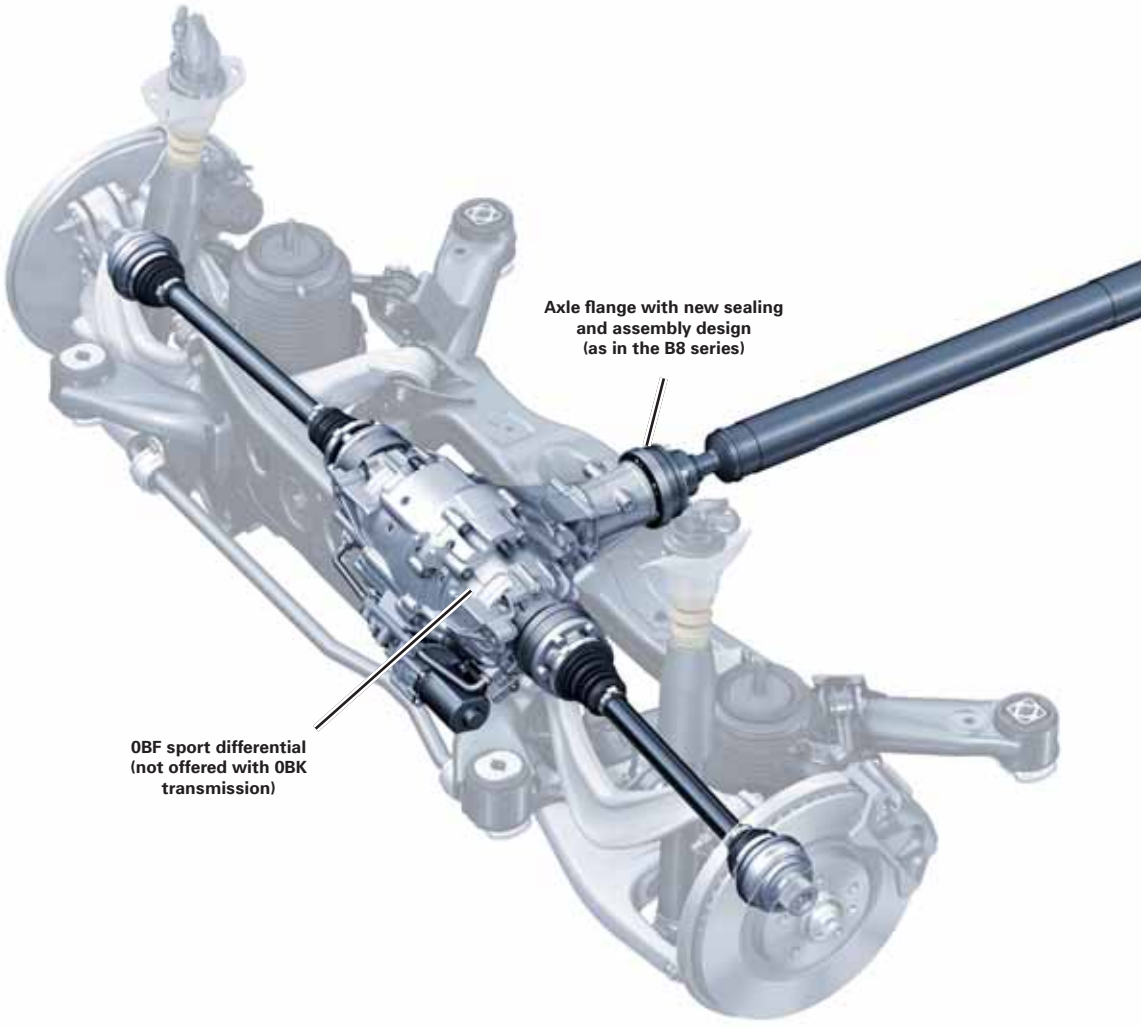
Overview

The 2012 A7 will be introduced with the 8-speed 0BK automatic transmission. This transmission was designed specifically for the North American market.

It is the same transmission used in the 2011 A8 but does not feature the “shift-by-wire” control system. Instead, it uses a cable operated mechanical selector.

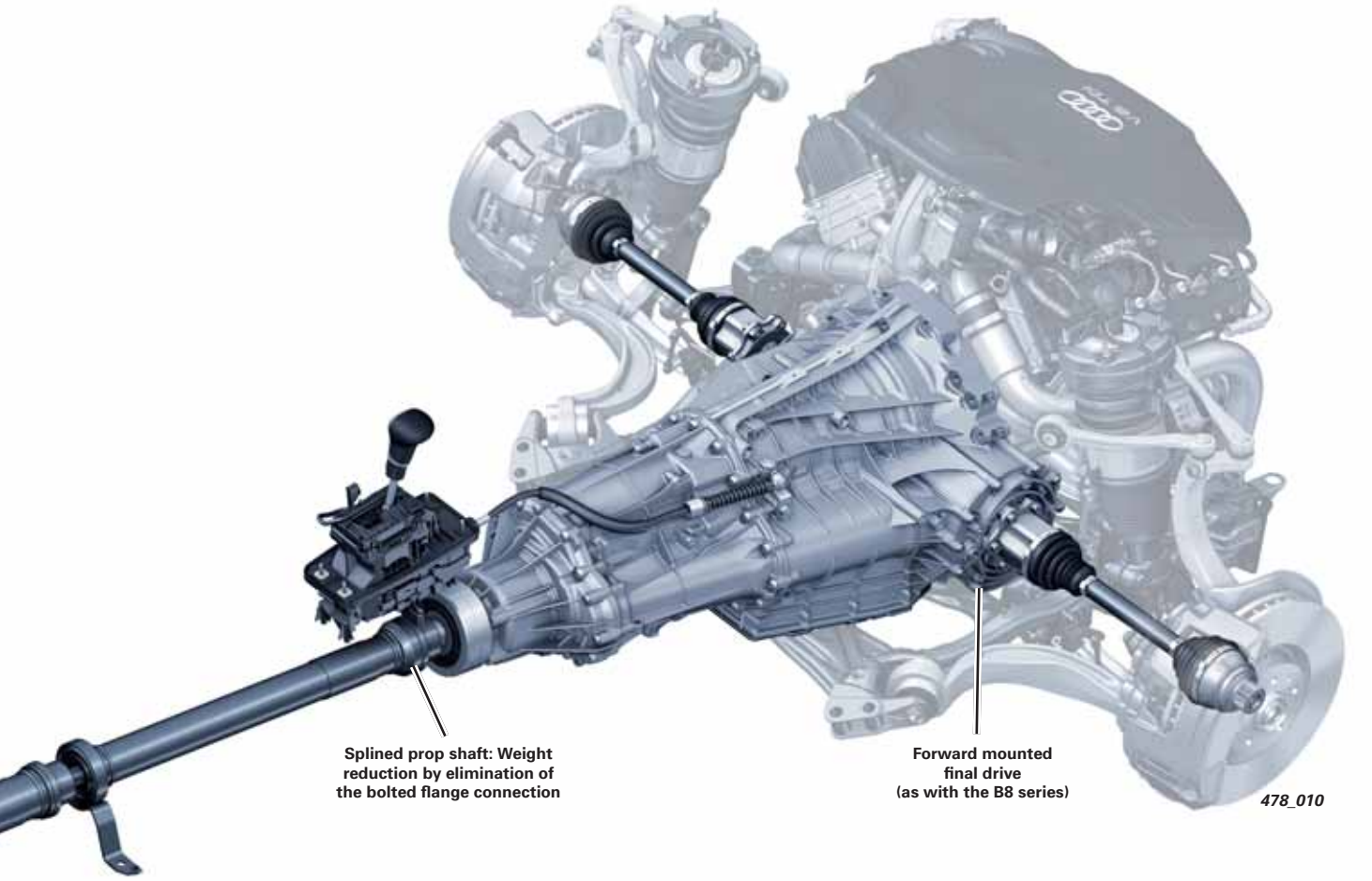
While a front-wheel drive version A7 is scheduled for a future model year, there are no current plans for a manual transmission model.

0BK transmission



Reference

For more details about the mechanical operation of the 0BK transmission, refer to Self-Study Program 950103, *The 2011 Audi A8 Power Transmission.*



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Future Transmissions for the A7

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Multitronic 0AW

– **Step-less transmission for future front-wheel drive models with engines rated up to 295 lb ft (400 Nm)**

478_011

0B5 S tronic 7-speed transmission

– **7-speed dual clutch transmission for use on quattro models**

8-Speed Automatic Transmission 0BK

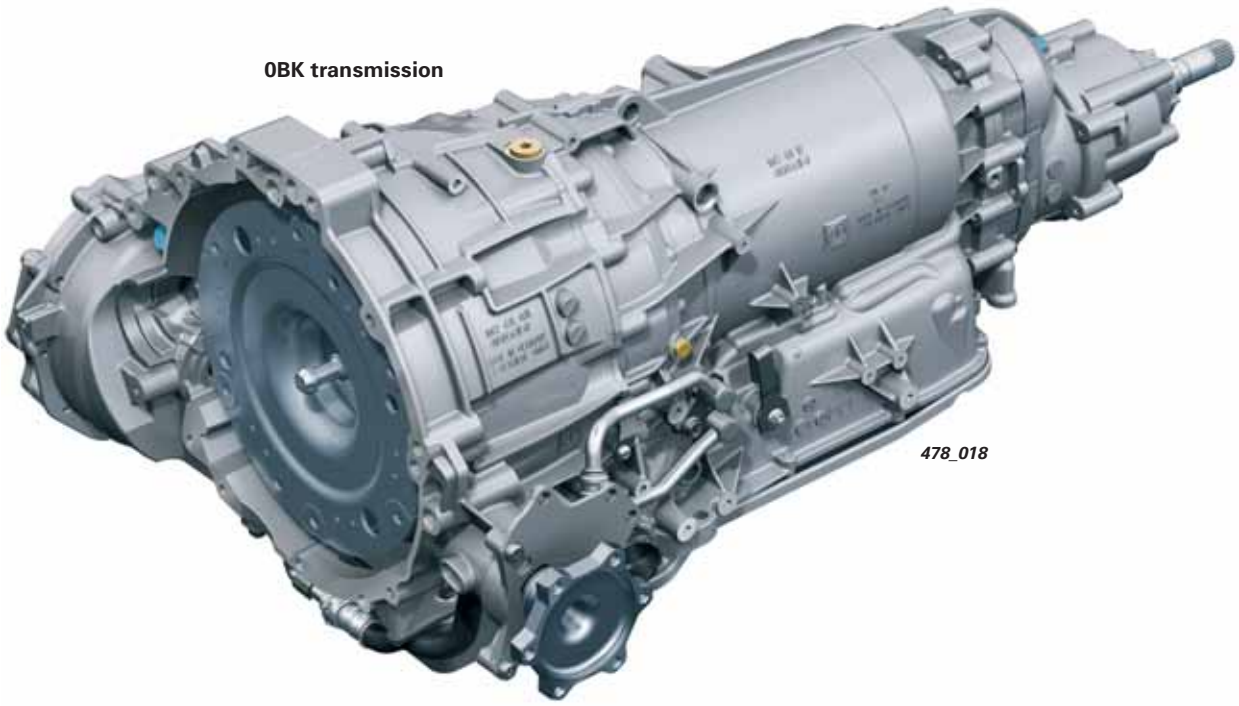
The 0BK has a self-locking center differential with asymmetrical/dynamic torque split. It is similar in design and function to the center differential in the 0B2 and 0B5 transmissions.

A conventional rear final drive (0BC) is standard. The sport differential will not be offered on the 2012 A7 with the 0BK transmission.

0BK features:

- Differential in front of the torque converter
- Eight forward gears and reverse are implemented using four planetary gearsets and five shift elements
- Minimized drag losses because three shift elements are closed in every gear
- Eight gears with a ratio spread of 7.0:1, which enables short gear shifts, a powerful acceleration ratio, and high speeds at low engine rpm
- ATF supply via a chain driven vane pump
- Transmission shifts into Neutral when the vehicle is stationary and the engine is idling (Neutral Idle Control [NIC])

0BK transmission



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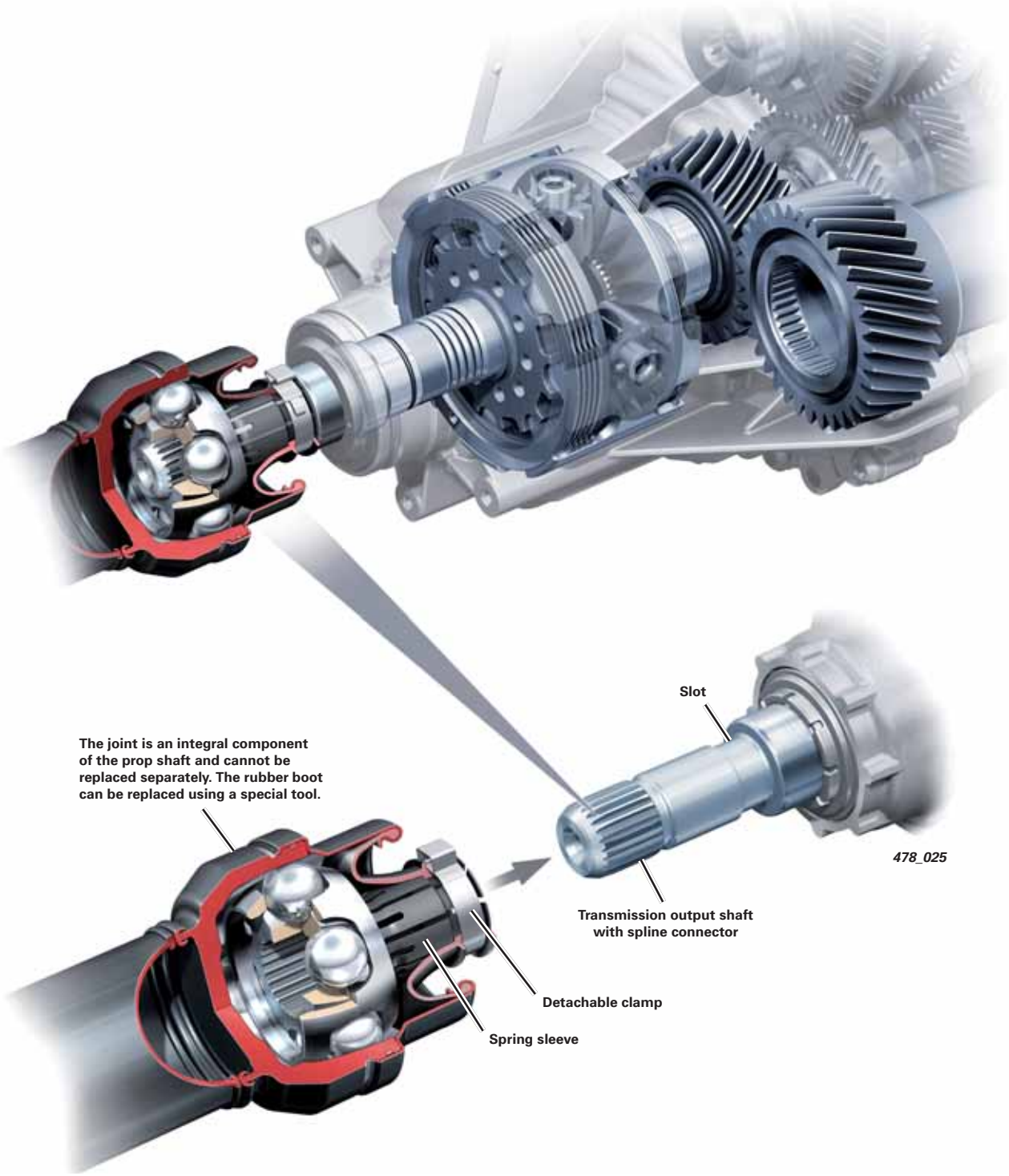
0BK Specifications

	0BK Transmission
Service designation	0BK
ZF designation	8HP-55AF
Audi designation	AL551-8Q
Transmission type	Electro-hydraulically controlled 8-speed planetary transmission with a hydrodynamic torque converter and slip-controlled converter lock up clutch
Control	– Mechatronics (integration of the hydraulic control module and the electronic control system module) – Dynamic shift program with separate S tronic “Sport” program and “Tiptronic” shift program for manual gear shifting
Transmission positioning	– Longitudinally-mounted transmission and all-wheel drive – Final drive/front axle in front of torque converter
Power distribution	Self-locking center differential with asymmetrical/dynamic torque split
Weight including oil	310.8 lb – 321.8 lb (141 kg – 146 kg)
Gear ratio	1st gear: 4.71, 2nd gear: 3.14, 3rd gear: 2.10, 4th gear: 1.66, 5th gear: 1.28, 6th gear: 1.00, 7th gear: 0.83, 8th gear: 0.66, Reverse: 3.31
Ratio spread	7.0:1
Maximum torque	516.2 lb ft (700 Nm)

Splined Prop Shaft

The prop shaft is splined onto the transmission output shaft. The connection is secured axially by a spring sleeve together with a detachable clamp. The spring sleeve interlocks with the inner race of the joint.

During assembly, the joint must be pushed onto the transmission output shaft until the spring sleeve locks into the slot. The detachable clamp ensures that the joint is fixed securely and sealed tightly. This connector system is not only lighter, but also saves a considerable amount of time during assembly and disassembly.



Selector Mechanism

The operating logic of the selector for the sport “S” program has been reconfigured. To shift from “D” to “S” (or from “S” to “D”), the selector is flicked back out of “D” once only. The selector always springs back to the “D/S” position. The shift schematic has been adapted to the new operating logic.

Advantages for the customer:

– The “S” program can now be selected regardless of the mode selected in Audi drive select
– Tiptronic mode can now also be selected in the “S” program

The shift pattern and indicator are integrated into the console trim frame. Selector Lever Transmission Range Position Display Unit Y26 is installed from below as a separate component.

Reference
For further information about the selector mechanism, refer to Self-Study Program 991803, *The 2009 Audi A4 Introduction.*

Suspension System

Overview

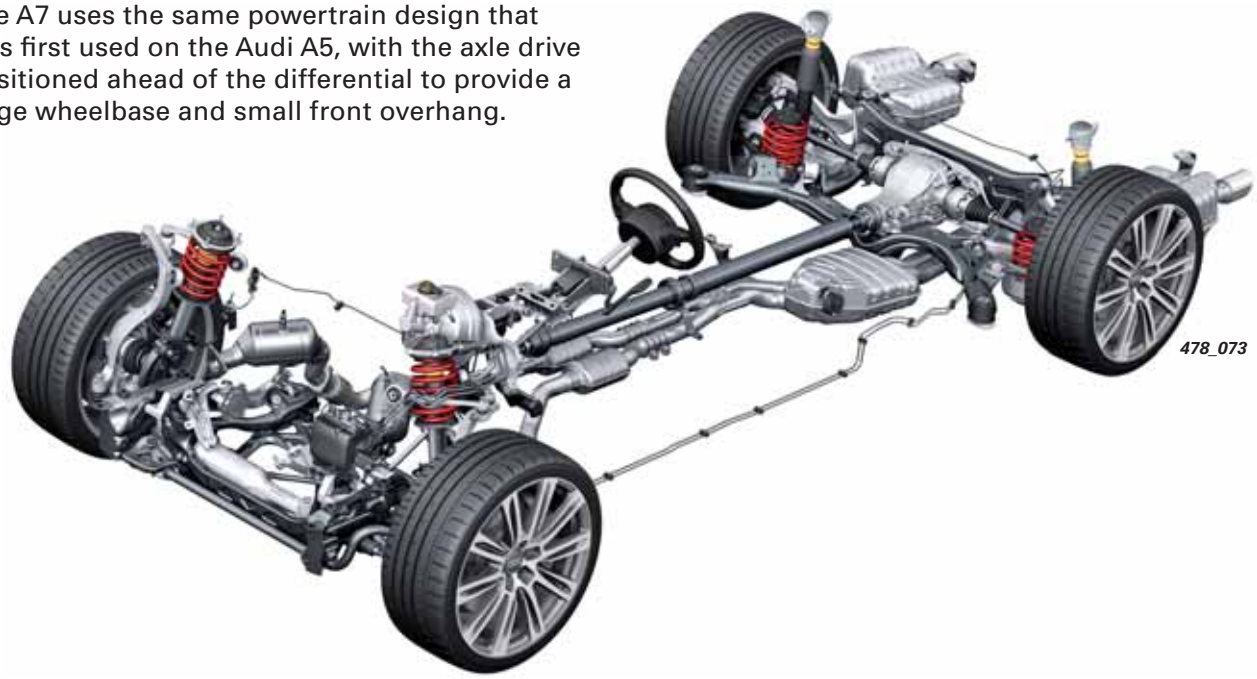
One of the key development goals for the A7 was to provide outstanding agility, driveability and driving enjoyment while also offering a high standard of safety and comfort. This was made possible by adopting the proven design of Audi's five-link front suspension combined with a self-tracking trapezoidal-link rear axle.

A steel-sprung suspension with conventional shock absorbers is standard.

The A7 uses the same powertrain design that was first used on the Audi A5, with the axle drive positioned ahead of the differential to provide a large wheelbase and small front overhang.

Mounting the steering gear on the subframe in front of the front axle provides the necessary, exact steering response and a precise steering feel in every driving situation.

Electro-mechanical steering provides improved fuel economy in addition to allowing more functional options related to handling and control.



Production Control Number (PR)	Description	Technical Implementation	Offer
1BA	Standard running gear /suspension	Steel suspension	Series standard
1BE	Sports running gear /suspension	Steel suspension	Option
1BV	Sports running gear /suspension S line (offered from quattro GmbH)	Steel suspension	Option
1BK	Adaptive air suspension (delayed introduction)	Air suspension	Option

Reference

For further information about the suspension system of the 2012 A7, refer to Self-Study Program 990303, *The 2012 Audi A7 Running Gear and Suspension.*

Axles

Front Axle

The A7 uses the five-link front suspension of the 2011 A8 as a starting point. The bearing pedestal that supports the upper wishbone has been integrated into the body shell.

In addition to saving weight and increasing rigidity, this also reduces the fitting tolerances of the upper wishbones. Anti-roll bars and shock absorbers have been reconfigured to meet the design objectives of the A7.

478_074

Rear Axle

The rear suspension design is based on the trapezoidal link rear axle used on the Audi Q5.

Springs and shock absorbers are separated from one another, providing a large pass-through loading width and a flat load floor.

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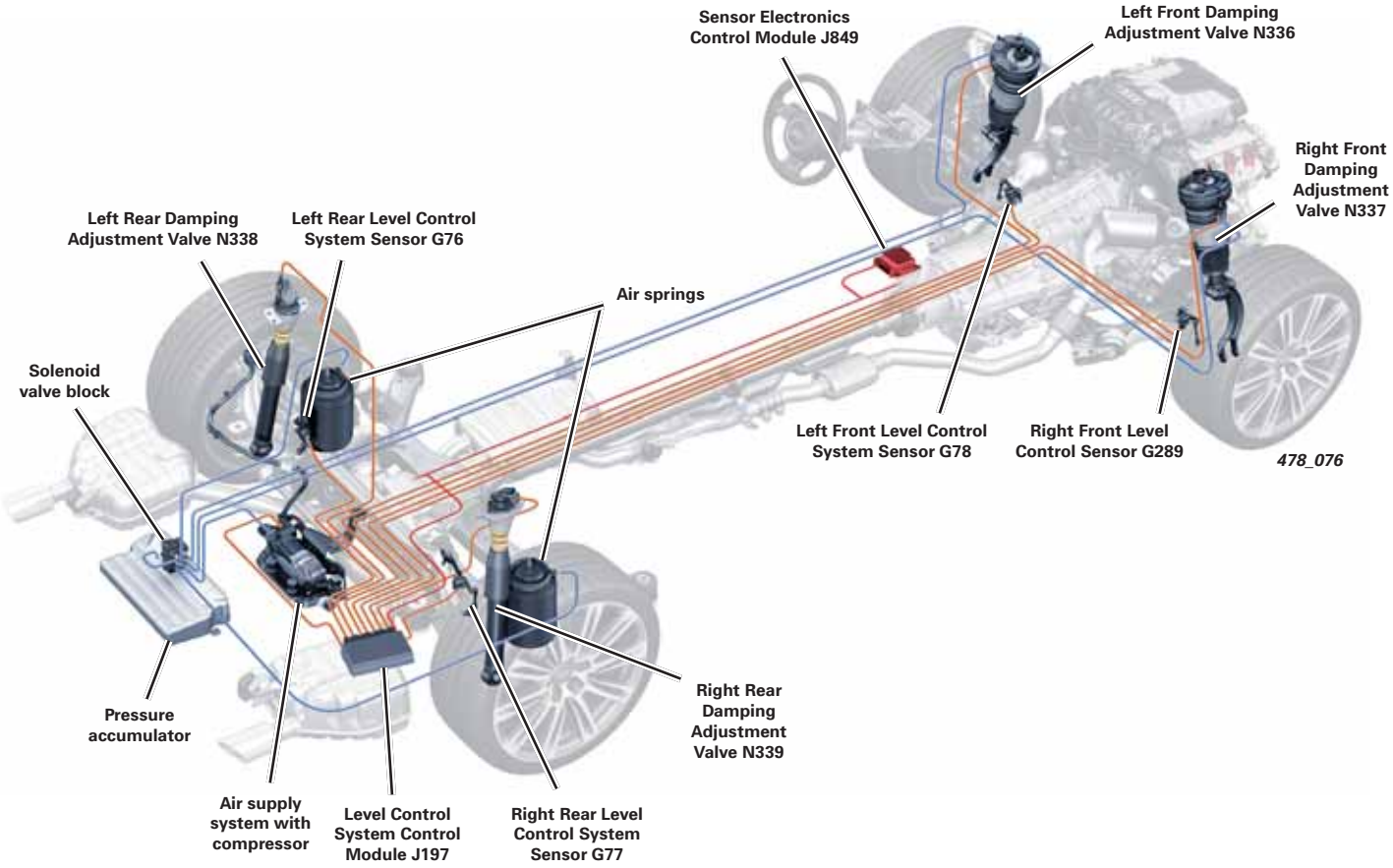
Adaptive Air Suspension

Overview

The Adaptive Air Suspension system of the A7 shares the same design and operation as the system introduced on the 2011 A8. The production control number 1BK is the basic system. This system will not be available at the introduction of the A7.

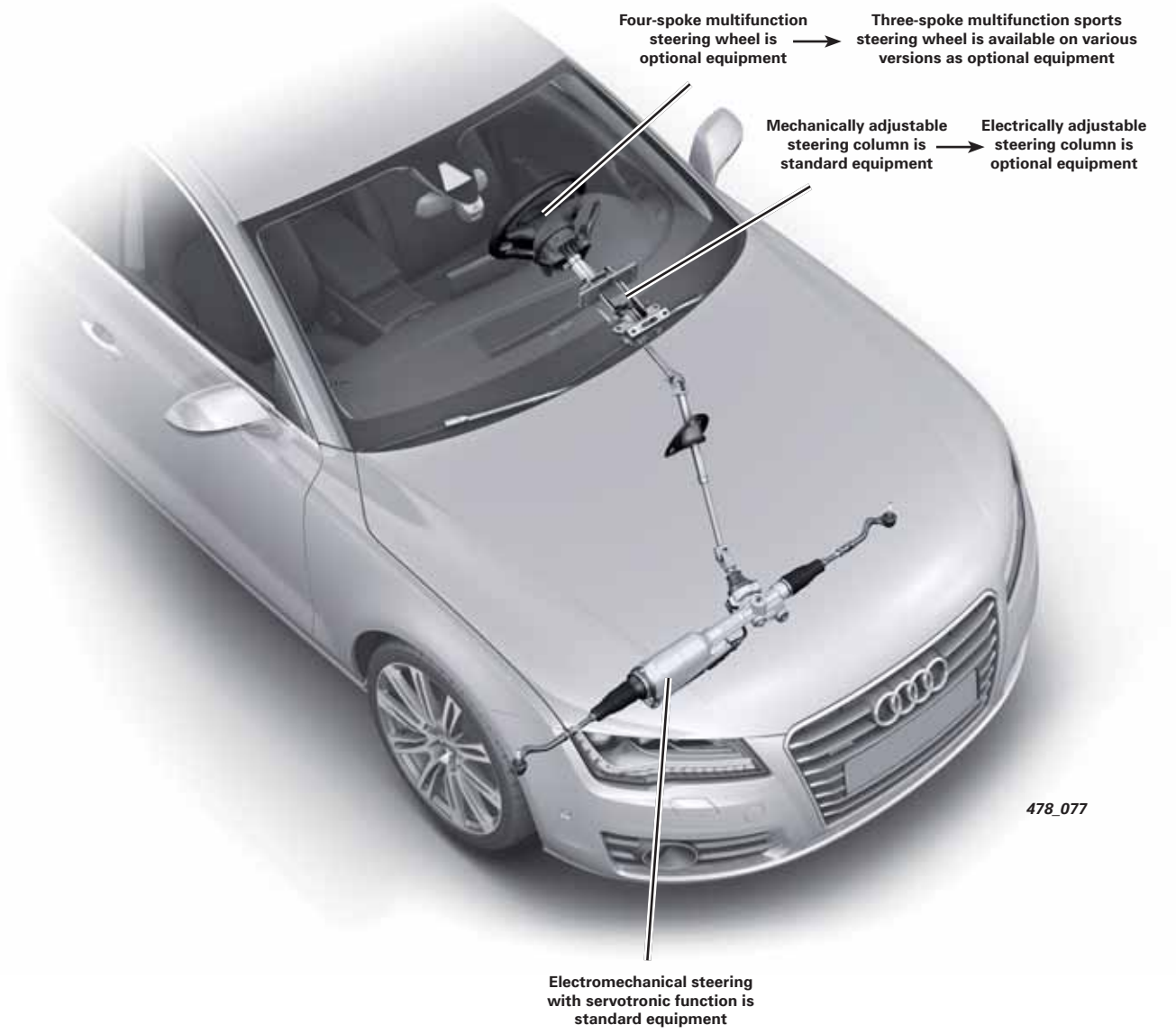


Steering System

Overview

The 2012 A7 uses electromechanical power steering. Servotronic is standard equipment. A manually adjustable steering column is standard, while an electrically adjustable column is available on certain trim levels.

In basic trim, the vehicle comes equipped with a four-spoke multifunction steering wheel. As an option, a three-spoke multifunction sports wheel is available.

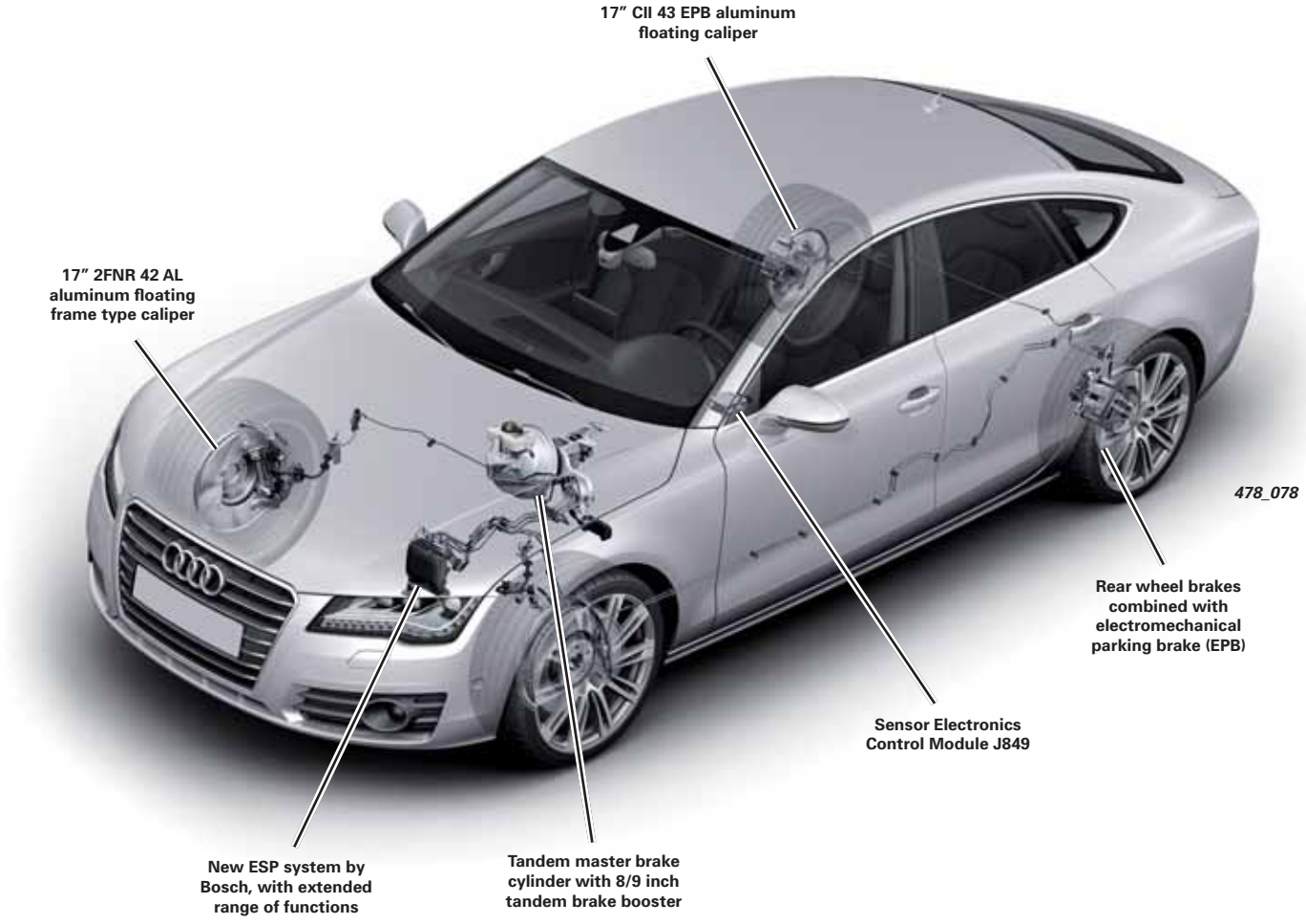


Brake System

Overview

The A7 brake system is similar in design and operation to that of the 2011 A8. An electromechanical parking brake is used at the rear.

A high performance ESP by Bosch with an extended range of functions provides a high standard of safety. As on the 2011 A8, Sensor Electronics Control Module J849 supplies information about vehicle dynamics required to calculate desired control operations.



Torque Vectoring

Torque vectoring is a software system developed by Audi that is integrated into the ESP software of the ABS control module. It is an evolution of the electronic transverse lock (EDL) that is common on front-wheel drive vehicles.

Torque vectoring varies drive torque not just between the front and rear axles but also between wheels on the same axle.

By adjusting torque side-to-side, a higher degree of handling performance is achieved by delivering more torque to the outside wheel in a corner, turning the vehicle more sharply and precisely.

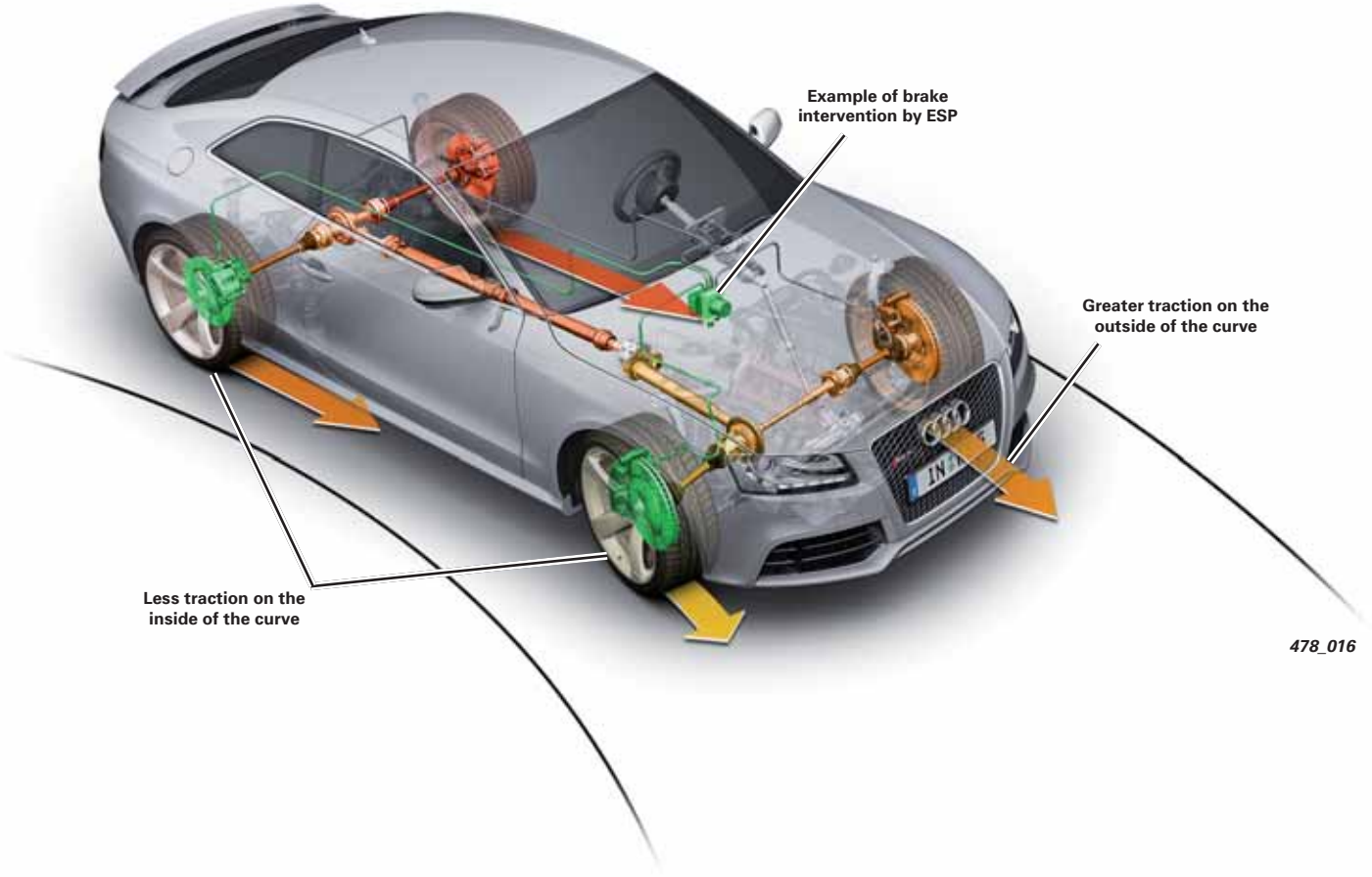
Torque vectoring also enhances safety, because it is an “active” brake system-based vehicle stability control system.

When cornering at high speeds, ESP determines reduced wheel load on inside curves, and increased wheel load on outside curves. From this information, it can accurately determine and implement best possible drive power for each individual wheel.

A lower brake pressure of approximately 43.5–217.5 psi (3–15 bar), at the wheels on the inside curve is enough to counteract the onset of undesirable slip.

Torque vectoring intervenes before the wheels incur critical levels of slip that can impair drive and dynamic stability. More drive torque is available to the wheels on the outside of the curve, helping to maintain neutral handling. Understeer when turning into corners and accelerating is neutralized and the ESP program intervenes later, if needed.

Vehicles with rear differential 0BC have torque vectoring on both the front and rear axles. On models with a sport differential, torque vectoring acts only on the front axle, with a torque control system acting on the rear axle.



Adaptive Cruise Control (ACC)

ACC will also be available as an option for the 2012 A7. It is the same dual sensor system introduced on the 2011 A8.

478_079

Wheels and Tires

The A7 comes equipped with 18" lightweight forged aluminum wheels. A space saver spare tire is also standard. Both 19" and 20" wheels will be available with various option packages.

Tire Pressure Monitoring

Audi's familiar second-generation tire pressure monitoring system is also used on the A7. The system is standard on this model worldwide and is identical to those already in use on other Audi models.

478_080

Head-Up Display

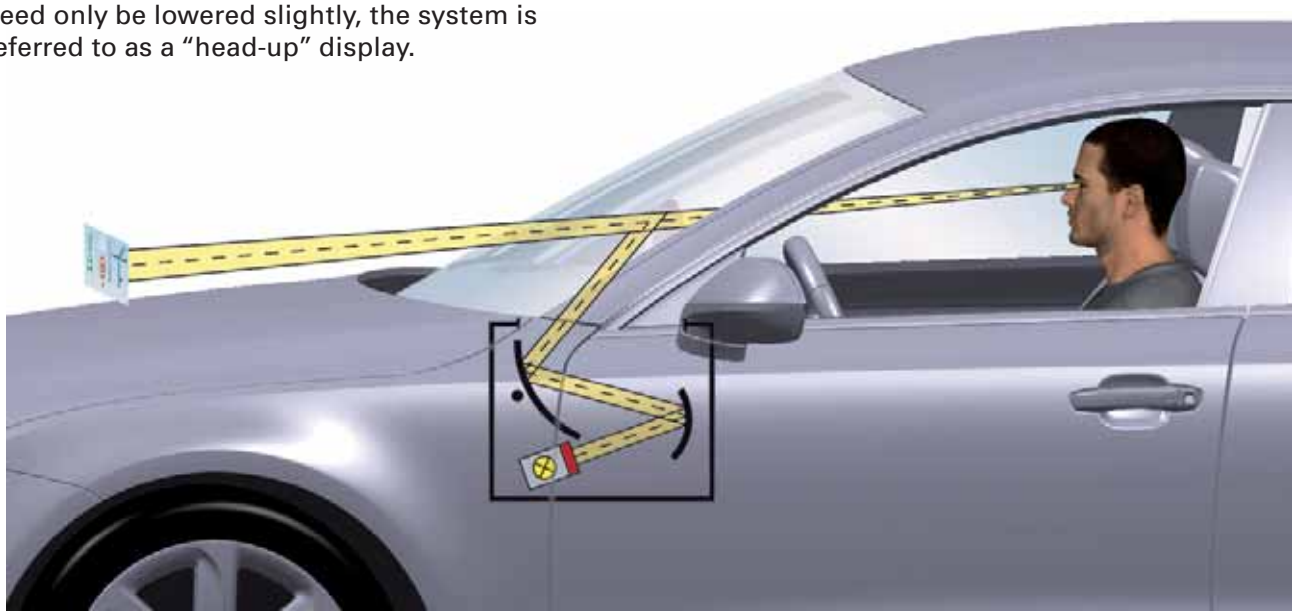
Introduction

The term “head-up display” describes optical systems which project information from various automotive systems into the driver’s extended field of vision.

To view this information, the driver does not have to change their head position significantly and can continue to focus on the road ahead while maintaining an upright posture.

Since the driver’s head can remain “up” and need only be lowered slightly, the system is referred to as a “head-up” display.

The use of special windshields on models with a head-up display gives the impression that the display is not actually in the windshield area, but at a comfortable distance of 8.2 ft (2.5 m) away from the driver. The head-up display appears to hover over the hood.



478_045

Windshield Projection Head Up Display Control Module J898

The central element of the head-up display is Windshield Projection Head Up Display Control Module J898. All optical, mechanical, and electrical components required for the head-up display are accommodated in this control module. It is located in the instrument panel directly in front of the instrument cluster.

J898 is diagnosed with the VAS Scan Tool using Address Word 82.

478_052

Note

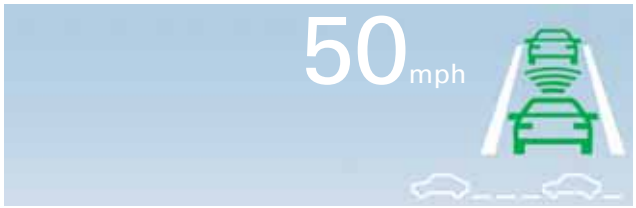
If a component of J898 malfunctions, the complete control module must always be replaced. When replacing J898, the windshield must first be removed. For further information about removing J898, refer to current technical literature.

Display Information

The display can show the following content:

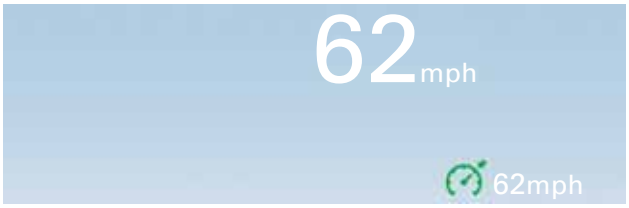
478_046

Current vehicle speed is the only vehicle variable that is always displayed. This display cannot be deactivated by the driver. Navigation information is only displayed when the route guidance function is active.



478_050

The display at the top right appears if ACC or Audi active lane assist is activated. The current control speed of the ACC is displayed briefly at the bottom right after an adjustment is made.

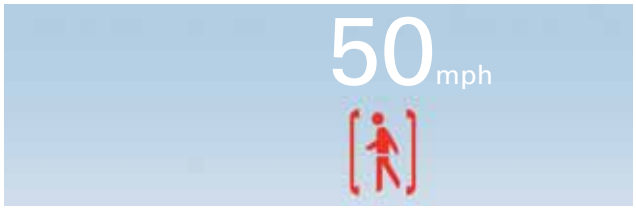


478_047

The current control speed of the cruise control system is displayed briefly at the bottom right after an adjustment is made. The same also applies when the control speed of the ACC is changed.

478_049

If red warning signals appear in the instrument cluster, they also appear on the head-up display. The display of red warning symbols cannot be deactivated. They are only displayed briefly. When red warning signals are displayed, all other content is suppressed except vehicle speed.



478_048

Audi night vision assist warnings can also be indicated on the head-up display.

Note

Displays of the navigation system, night vision assist, cruise control system, and the combined display of the Audi active lane assist and ACC systems can be activated or deactivated via the MMI on the head-up display.

Audi Active Lane Assist

Audi launched the Audi lane assist system in 2007. This system helps drivers stay in their lane while driving. Lane marking lines are identified with the aid of a camera.

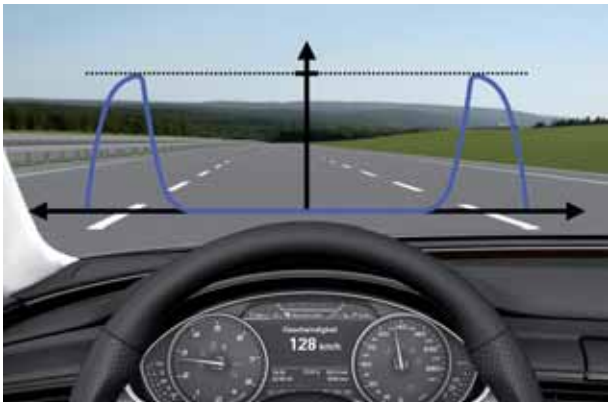
If the driver's vehicle approaches an identified lane marking line and is about to leave the lane inadvertently, the steering wheel vibrates to alert the driver. If the driver activates the indicators when crossing over a lane marking line, the warning is suppressed since the system assumes that the lane change is intentional.

Features of Audi Active Lane Assist
(Delayed Introduction)

In the future, the A7 will use a new generation of the lane assist system: Audi active lane assist. This has been made possible by the introduction of electromechanical power steering.

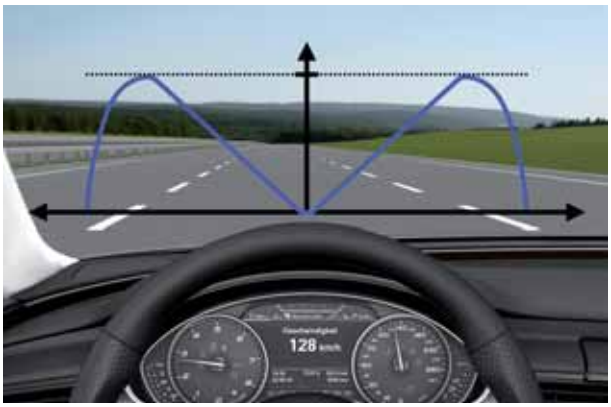
Audi active lane assist has the following new features:

- Corrective steer control by the electromechanical steering motor.
- A system mode which actively steers the vehicle to help ensure the driver does not leave a lane inadvertently. To achieve this, Electromechanical Power Steering Motor V187 briefly applies torque to the steering, which steers the vehicle back toward the center of the lane. This is the default mode on the MMI when the new vehicle is delivered to the customer.



478_064

- A system mode which helps the driver keep to the center of their lane by continuous corrective steer control. The further the vehicle moves away from the center of the lane, the greater the steer torque applied by V187. This mode can be selected by the customer on the MMI control panel.
- Steering wheel vibrations are produced by the electromechanical steering motor, and no longer by an unbalanced motor in the steering wheel spoke.
- The vibration alert function can be deactivated on the MMI control panel.
- The master controller for this function is Image Processing Control Module J851.



478_065

Reference

For more detailed information about Audi active lane assist, refer to Self-Study Program 990503, *The 2012 Audi A7 Convenience Electronics and Active Lane Assist.*

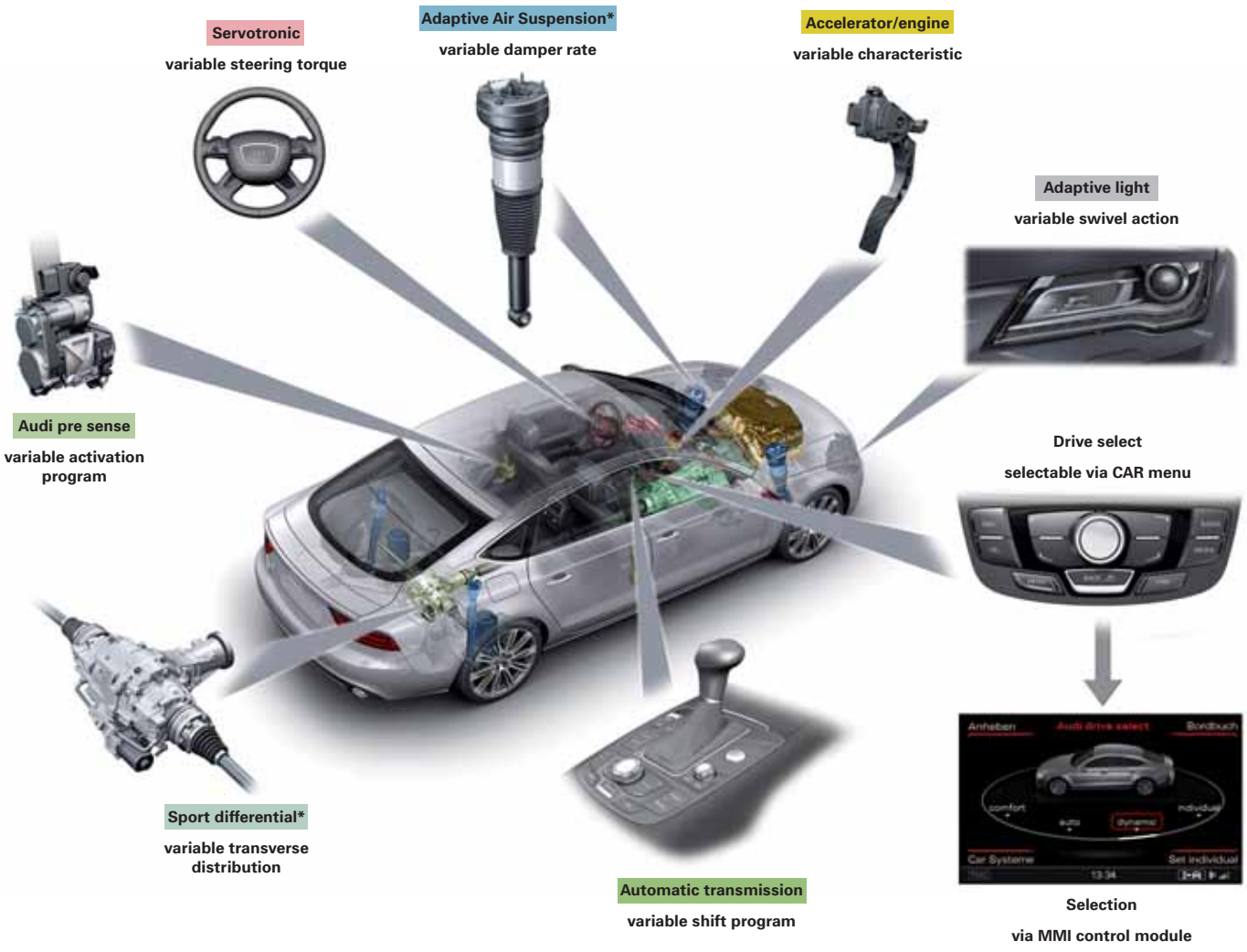
Audi Drive Select

Audi drive select will also be offered on the 2012 A7.

There are three modes: “comfort”, “auto”, and “dynamic”. The driver can select these via the MMI control panel and, for example, switch from a sport to a comfort driving mode. The driver can use the individual mode to configure the vehicle setup to suit his personal preferences.

For instance, a sport engine setup can be combined with light steering action. The trim level dictates which systems are configurable by Audi drive select. In all cases, the engine, transmission, and steering systems are controlled.

Optionally, the following systems can be set via Audi drive select: sport differential, cornering light, reversible seatbelt pretensioners, and the Adaptive Air Suspension.



*Not on US models at the introduction of the A7.

478_061

Operating Modes

In each Audi drive select operating mode, the vehicle is adapted and controlled by various vehicle systems depending on driving situation and speed.

comfort

The “comfort” mode provides a comfort oriented vehicle setup. The engine, automatic transmission, and sport differential respond moderately to accelerator pedal inputs. The steering is light, and the air suspension and corner light employ their comfort characteristics. This setting is suited to driving long distances or on expressways.

auto

The “auto” mode provides a comfortable yet more dynamic overall driving feel. This setting is well suited to everyday use.

dynamic

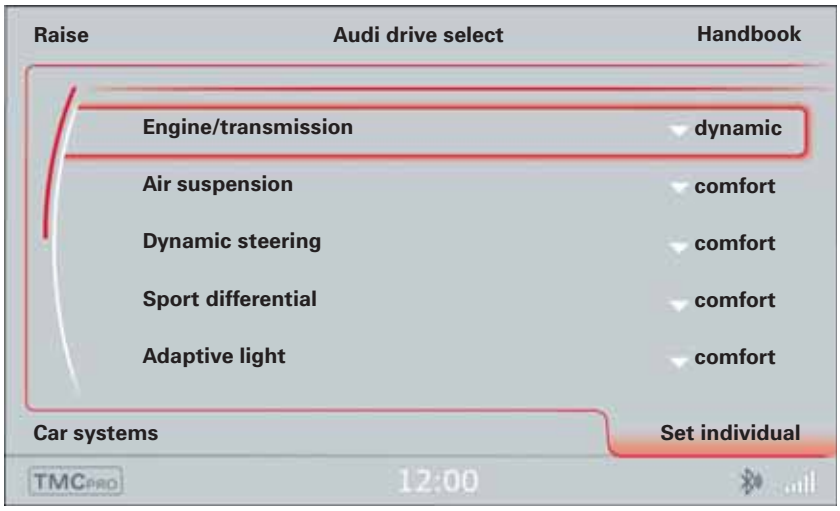
The “dynamic” mode gives the vehicle a sport driving feel. Throttle response is more immediate and the steering is configured for sport handling. The sport differential provides extra agility, the air suspension is firmer, and the transmission adjusts its shift points to a higher rpm range. In addition, the adaptive light employs its dynamic characteristic.

individual

In “individual” mode, the driver can select their own personal setup. These settings are stored and assigned to the key in use.

Unlike the Audi A5/S5, Audi A4, and Audi Q5, which have a separate switch module for setting Audi drive select, A7 settings are made through the MMI controls using the turn/push button. After pushing the “CAR” function button in the MMI menu, the operating modes can be selected.

If the driver also presses the “Set individual” control button, the various vehicle systems can be configured individually.



478_062

Characteristics

The engine and transmission respond more immediately or more moderately, depending on accelerator pedal inputs. The servotronic power steering is adapted to the driving situation and is lighter or firmer, depending on which setting is selected.

The Adaptive Air Suspension, “Air suspension” in the MMI, is an electronically controlled air suspension and damping system. It responds to mode selection, driver inputs (steering, brake, and accelerator), road surface, vehicle speed, and payload.

Vehicle ground clearance varies according to selected mode and speed. If the driver is driving in “auto” or “dynamic” mode at a speed of over 74.5 mph (120 km/h) for longer than 30 seconds, the ride height is set automatically. If the vehicle’s speed drops below 43.4 mph (70 km/h) for longer than 120 seconds, ground clearance is automatically increased.

In “dynamic” mode, the deployment thresholds of the reversible belt pretensioners are adjusted according to transverse dynamics.

As an integral part of the all-wheel drive quattro, the sport differential distributes drive power to the rear axle. The distribution of power varies, depending on which mode has been selected. A high level of agility and acceleration are achieved when cornering, with the vehicle responding very quickly to steering inputs.

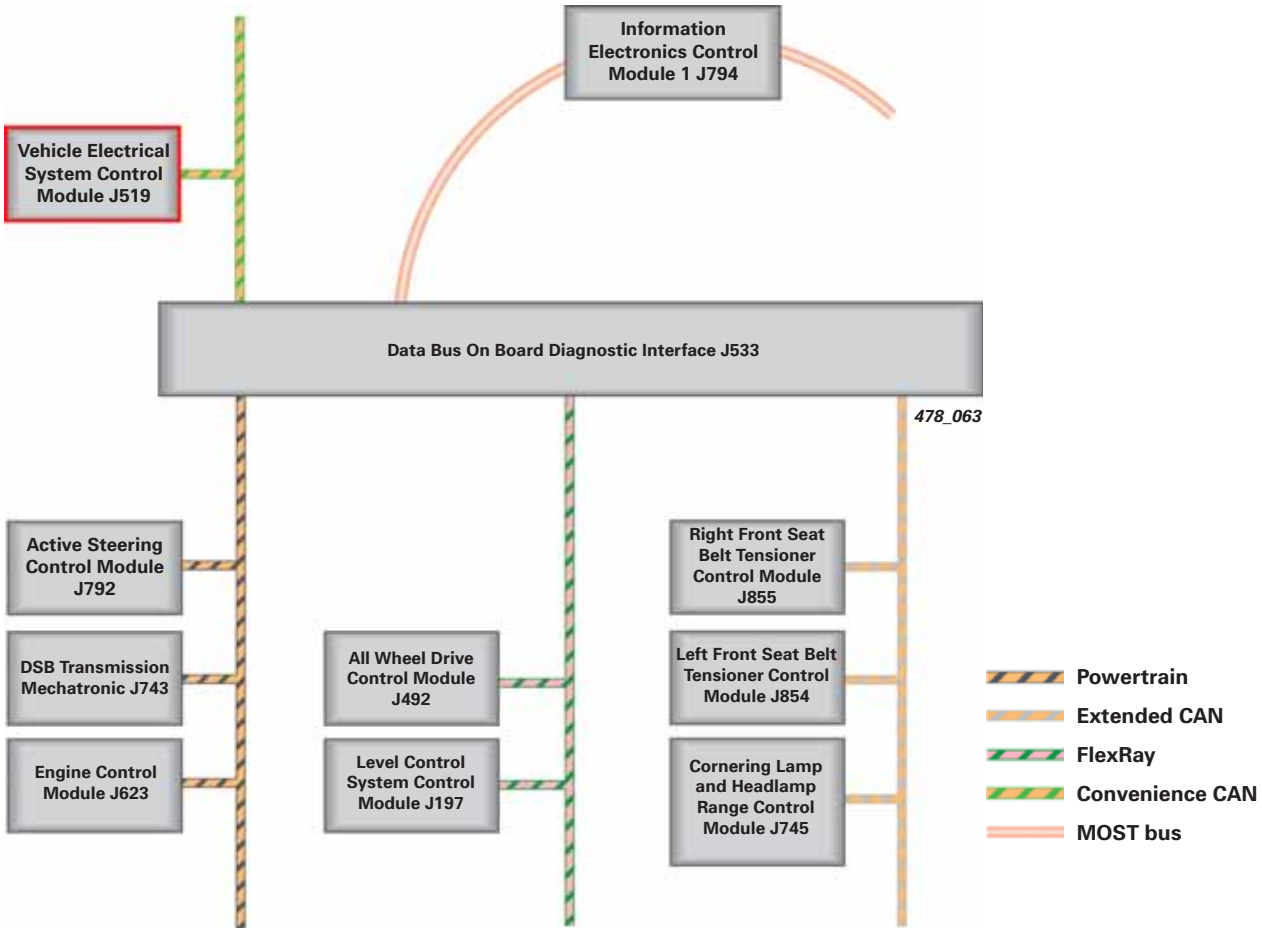
The cornering light adapts to the curvature of a corner at speeds of between 6.2 and 68.3 mph (10 and 110 km/h). The swivel action of the light and illumination level are also adapted to this mode.

Mode Characteristics

		comfort	auto	dynamic
	Engine/transmission	balanced	balanced	sport
	Air suspension*	comfort	balanced	sport
	Steering	comfort	balanced	sport
	Sport differential*	balanced	responsive	sport
	Adaptive light	comfort	balanced	sport
	Reversible belt pretensioners	standard	standard	adapted activation timing

*Not on US models at the introduction of the A7.

System Integration



Vehicle Electrical System Control Module J519 performs the central function of Audi drive select. Information Electronics Control Module 1 J794 reads driver input information, transferring it to J519 via the MOST bus, Data Bus On Board Diagnostic Interface (Gateway) J533, and the Convenience CAN bus.

J519 generates relevant commands from this information, sending them to J533 via the CAN bus. J533 distributes these commands via the Extended CAN bus, Powertrain CAN bus, and the FlexRay bus to the control modules participating in Audi drive select.

As soon as all switching conditions have been met, the user system control module confirms the change-over by sending an acknowledgement message back to J519 via J533.

This keeps J519 informed as to which user system is operating in which characteristic, ensuring that change-overs always appear seamless from the driver's viewpoint.

On B8 series models, Audi drive select was always reset to "auto" mode after removing the ignition key.

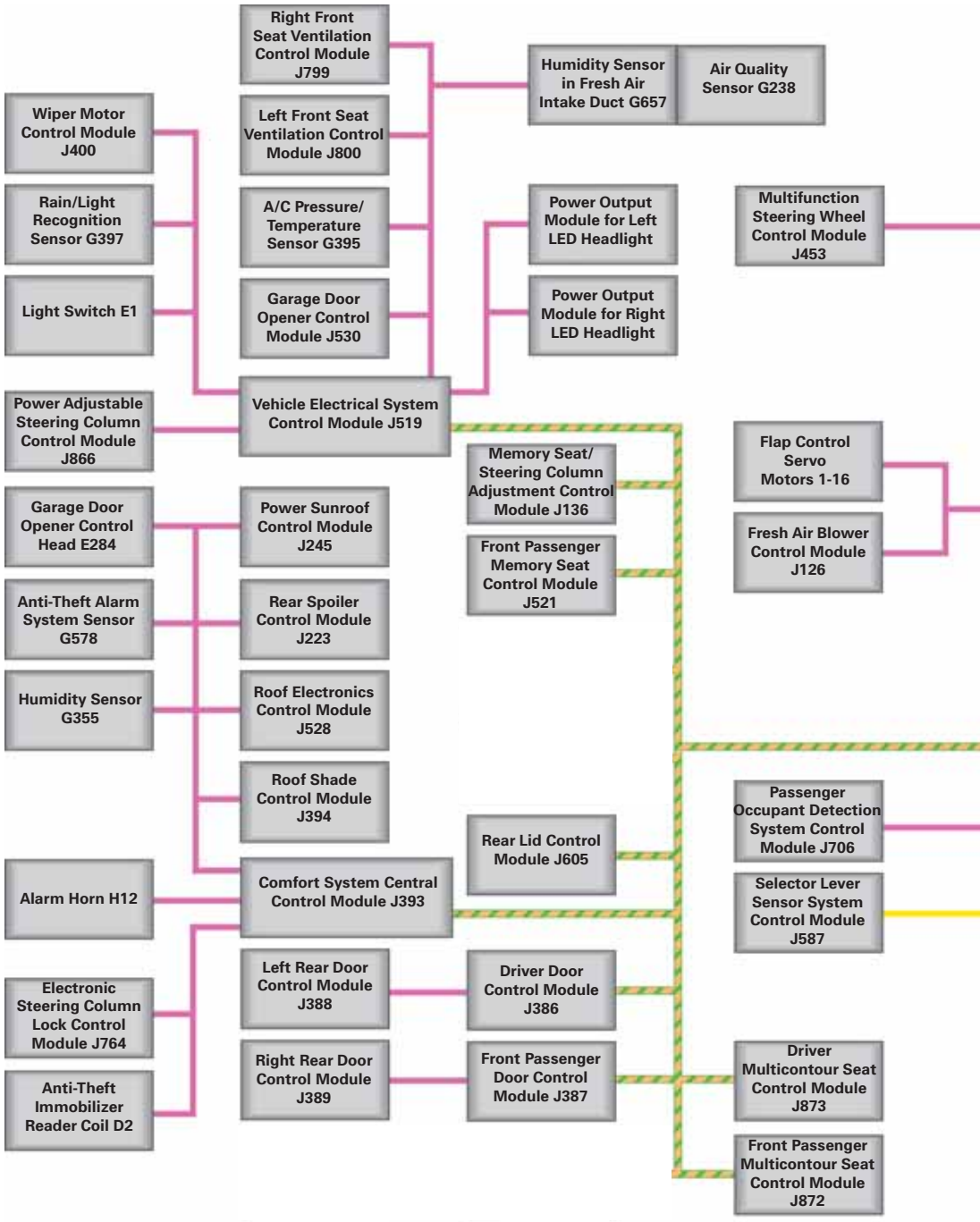
On the A7, the last mode setting, as well as the individual settings are stored automatically and assigned to the vehicle key.

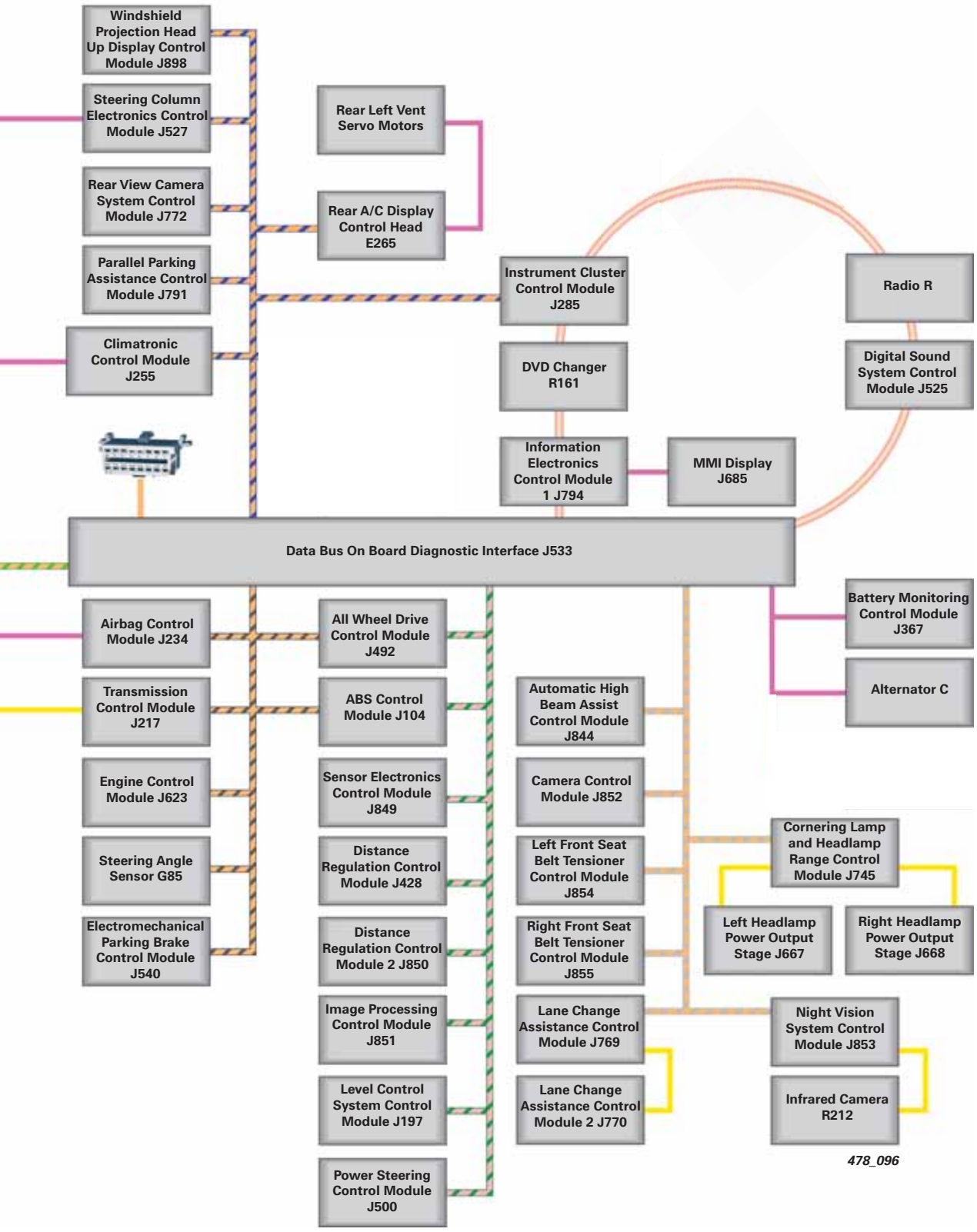
- "Dynamic" mode provides a sport shift characteristic. The transmission position "S" is selected automatically.
- On models with a sport differential, "dynamic" mode is disabled when towing a trailer.
- On some models, the vehicle reaches its top speed only in "auto" and "dynamic" driving modes.

Reference
For further information on the operation of Audi drive select, please refer to the Owner's Manual.

Topology

This diagram shows the network topology for a vehicle with a high level of optional equipment.




Windshield Projection Head Up Display Control Module J898
Steering Column Electronics Control Module J527
Rear Left Vent Servo Motors
Rear View Camera System Control Module J772
Rear A/C Display Control Head E265
Parallel Parking Assistance Control Module J791
Instrument Cluster Control Module J285
Radio R
Climatronic Control Module J255
DVD Changer R161
Digital Sound System Control Module J525
Information Electronics Control Module 1 J794
MMI Display J685
Data Bus On Board Diagnostic Interface J533
Battery Monitoring Control Module J367
Airbag Control Module J234
All Wheel Drive Control Module J492
Alternator C
Transmission Control Module J217
ABS Control Module J104
Automatic High Beam Assist Control Module J844
Engine Control Module J623
Sensor Electronics Control Module J849
Camera Control Module J852
Cornering Lamp and Headlamp Range Control Module J745
Steering Angle Sensor G85
Distance Regulation Control Module J428
Left Front Seat Belt Tensioner Control Module J854
Left Headlamp Power Output Stage J667
Right Headlamp Power Output Stage J668
Electromechanical Parking Brake Control Module J540
Distance Regulation Control Module 2 J850
Right Front Seat Belt Tensioner Control Module J855
Image Processing Control Module J851
Lane Change Assistance Control Module J769
Night Vision System Control Module J853
Level Control System Control Module J197
Lane Change Assistance Control Module 2 J770
Infrared Camera R212
Power Steering Control Module J500
478_096

Climate Control

Overview

Climate Control System Versions

Three-zone and four-zone climate control systems are available on the 2012 A7.

On the three-zone system, rear passengers can adjust the temperature via a button located on the rear center console.

Two humidity sensors, Humidity Sensor in Fresh Air Intake Duct J657 and Humidity Sensor G355 are used in both the three- and four-zone systems.

The four-zone system also has Rear A/C Display Control Head E265 with the following functions:

- Temperature adjustment
- Fan adjustment
- Separate rear left and right air distribution adjustment

To provide climate control in the rear, the four-zone system has air outlets in the B-pillars. The four-zone climate control system has the following features:

- Automatic recirculation control by Air Quality Sensor G238
- Residual heat function
- Separate footwell temperature control
- Glove compartment cooling system
- Three different air conditioning modes: soft, medium, and intensive

Three-Zone Climate Control System

478_068

Four-Zone Climate Control System

478_069

Reference

For further information about the climate control systems of the 2012 A7, refer to Self-Study Program 990603, *The 2012 Audi A7 Occupant Protection, Infotainment, Climate Control, and Head-Up Display.*

Operation

Climatronic Control Module J255

The control knob is used for adjusting temperature, fan speed, and air distribution in the front two climate zones. The diode in each button is lit when that function is activated. The front climate settings are indicated on the Climatronic display and, for several seconds, on the MMI display.

Climate control can be adjusted separately for the driver and front passenger zones. On the four-zone version, front passengers can adjust the rear cabin settings or synchronize all four zones with the driver's climate zone setting. On the three zone version, the rear passengers can only adjust the temperature setting.

478_071

Seat heating/ventilation adjustment buttons

Residual Heat

In the four-zone climate control system, the residual heat function can be activated when the ignition is OFF by pressing and holding the blower speed setting button. The residual heat of the cooling water is used for heating the interior of the passenger compartment. Coolant Recirculation Pump V50 continuously circulates hot water through the heating system. The residual heat function is deactivated automatically after approximately 30 minutes.

478_072

Rear seat heater with three settings

Rear A/C Display Control Head E265

In the four-zone climate control system, both rear climate zones can be controlled by E265.

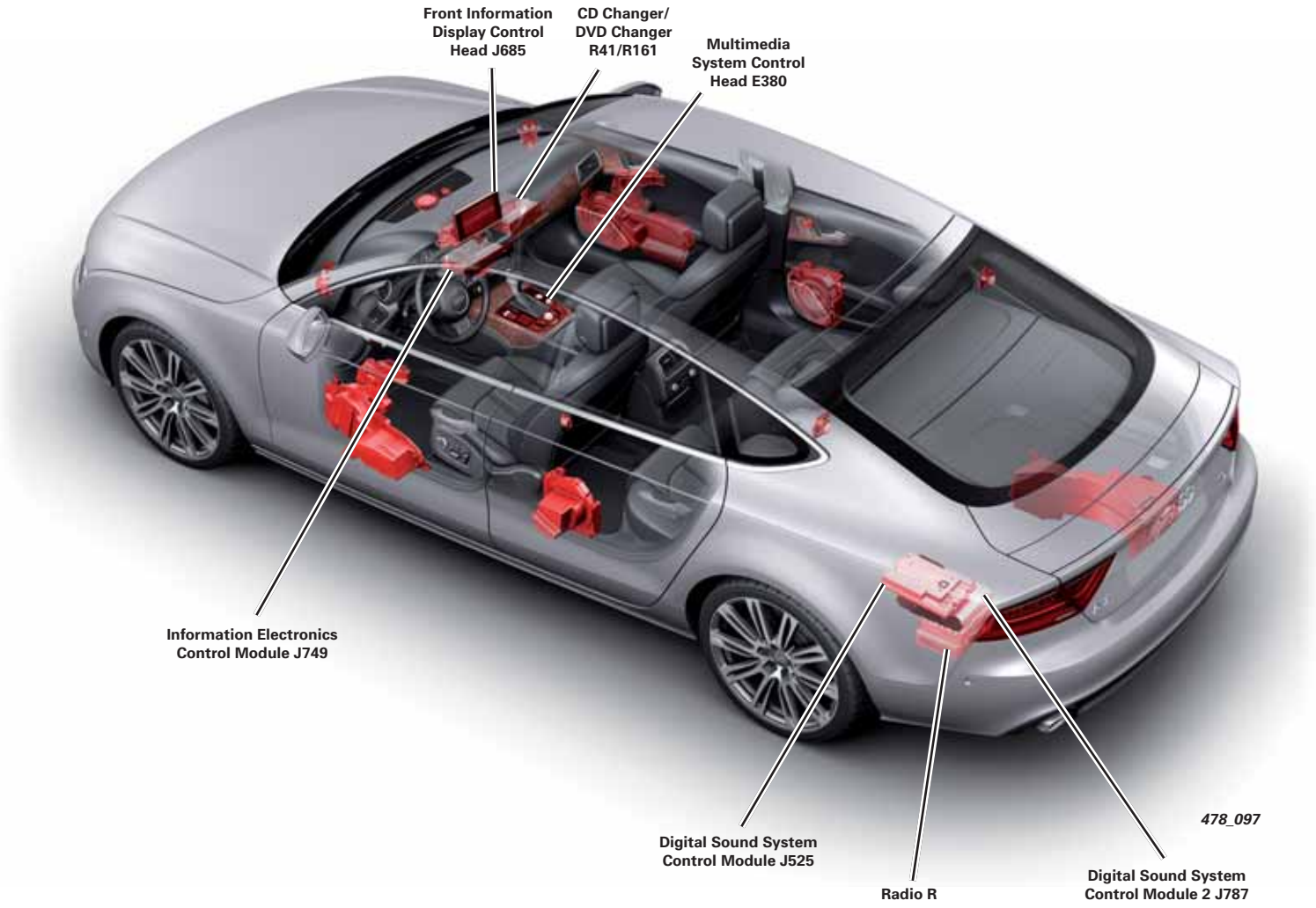
Infotainment

The A7 is available with MMI radio plus or the optional MMI Navigation plus system.

The MMI radio plus system is based on the Radio Media Center (RMC) platform.

Control Module Locations

The following diagram shows the possible installation locations of all infotainment control modules on an A7 with MMI Navigation plus.



Reference

For further information about the infotainment system of the A7, refer to Self-Study Program 990603, *The 2012 Audi A7 Occupant Protection, Infotainment, Climate Control, and Head-Up Display*.

Radios and Navigation Systems

MMI Radio Plus (RMC)

MMI radio plus has the following features:

- 6.5-inch color display with 400 x 240 pixel resolution
- FM dual tuner with phase diversity
- Single-chip AM tuner
- Single-CD drive
- Two SD card readers
- Audi Sound System
- SIRIUS satellite radio
- Audi Music Interface
- Speech dialogue system
- Bluetooth interface
- Monochrome DIS display in instrument cluster

Front panel of J794 for MMI radio plus

MMI Navigation Plus

The MMI Navigation plus system for the 2012 A7 is a third generation MMI system, with the internal designation MMI3G Plus. The following features are standard on the A7:

- 60 GB hard drive with approximately 20 GB for Jukebox
- 3D navigation with 3D city models
- DVD drive
- Two SD card readers (for SDHC cards up to 32 GB in size)
- Premium speech dialogue system
- Radio control module with phase diversity
- 6-channel amplifier with 180 watt power output (integrated into the radio control module)
- 8-inch TFT screen with 800 x 480 pixel resolution
- 7-inch color DIS display in instrument cluster
- MMI touch
- Bluetooth interface

Front panel of J794 for MMI Navigation plus

Reference

For further information about the infotainment system of the A7, refer to Self-Study Program 990603, *The 2012 Audi A7 Occupant Protection, Infotainment, Climate Control, and Head-Up Display*.

MMI Display
(Front Information Display Control Head J685)

Two different displays are used on the 2012 A7. They differ from one another in terms of size and resolution.

The 6.5-inch display with 400 x 240 pixel resolution comes with MMI radio plus.

The 8-inch display with 800 x 480 pixel resolution comes exclusively with MMI Navigation plus.

478_103

6.5-inch display

478_104

8-inch display

MMI Display Swivel Mechanism

The swivel mechanism of the display on the A7 is a new development. Compact fitting dimensions are achieved by using a cable pull drive.

The motor and both limit switches are activated and evaluated by Multimedia System Control Head E380.

The swivel mechanisms of the 6.5-inch display and the 8-inch display have different driving gears. To replace the display, the rotation mechanism must be moved into a service position, which is activated using Guided Fault Finding.

478_105

Sound Systems

Three sound systems are available on the A7, depending on model equipment:

- Audi Sound System
- Bose Surround Sound System
- Bang & Olufsen Advanced Sound System

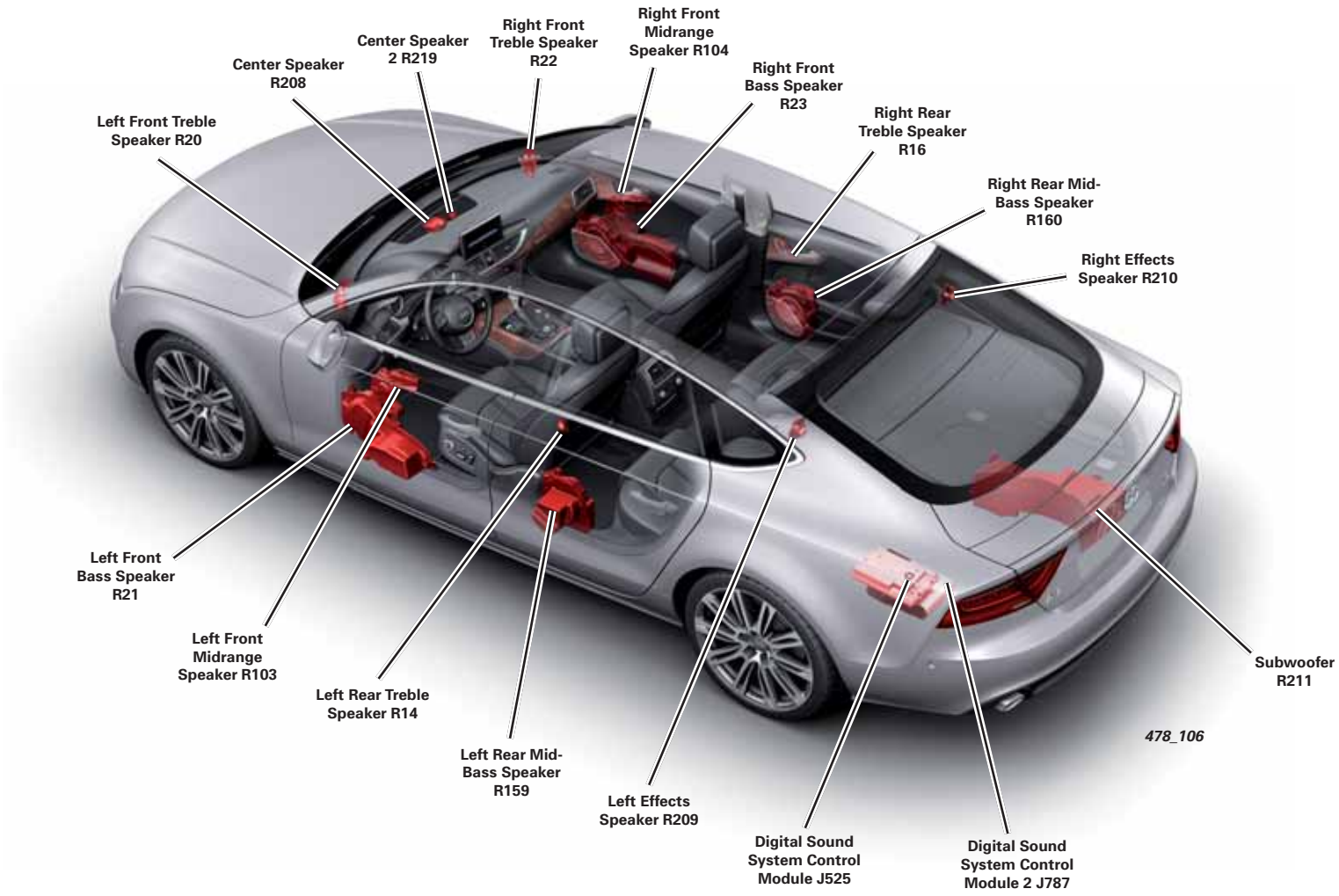
The Audi Sound System distributes 180 watts of power and has 10 loudspeakers.

The Bose Surround Sound System is optional. The separate Bose amplifier distributes 630 watts of power to 14 loudspeakers.

Bang & Olufsen Advanced Sound System

The optional Bang & Olufsen Advanced Sound System uses 15 loudspeakers and two amplifiers. They create a sense of space resembling the ambience of a concert hall.

Both amplifiers supply the loudspeakers with 1300 watts of total RMS output power. Retractable tweeters in the instrument panel set the stage for a perfect production.



Service

Special Tools and Equipment

Workshop Equipment

Isolator box VAS 6606

478_092

For diagnostics on new-generation control modules with 198-pin terminals (UDS control module). The illustration shows a prototype.

Retainer VAS 6395/6

478_114

Engine holder VAS 6095-1-11

478_118

Guide plate VAS 5161-29

478_117

Calibration board for head-up display VAS 6656

478_120

Locking bolt VAS 5161-29-1

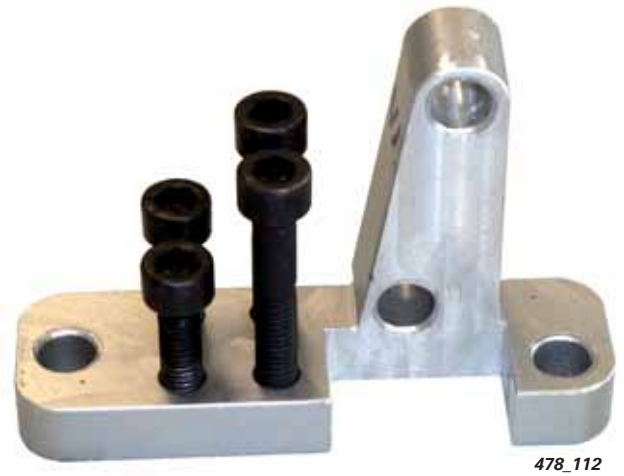
478_119

Special Tools

Installing tool T40048/7

478_113

Detent T40246



478_112

Counter hold tool T40248

478_115

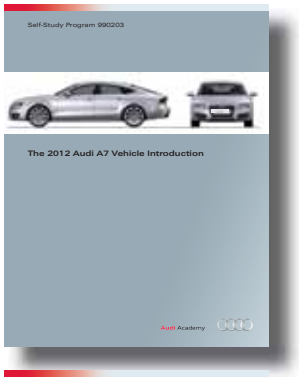
Locking pin T40245

478_116

Self Study Programs for the 2012 Audi A7

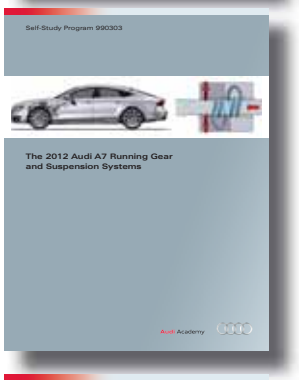
SSP 990203 The 2012 Audi A7 Vehicle Introduction

- Body
- Occupant Protection
- Engine
- Power Transmission
- Suspension System
- Electrical System
- Climate Control
- Infotainment



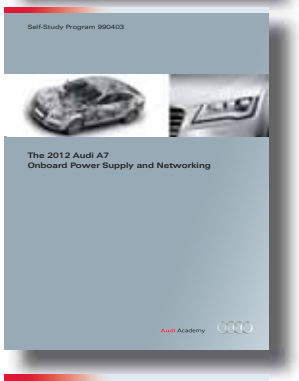
SSP 990303 The 2012 Audi A7 Running Gear and Suspension Systems

- Axles and Wheel Alignment
- Adaptive Air Suspension
- Steering System
- Electromechanical Steering
- Brake System
- ESP
- Sensor Electronics Control Module J849
- Adaptive Cruise Control (ACC)
- Wheels and Tires
- Tire Pressure Monitoring (TPMS)



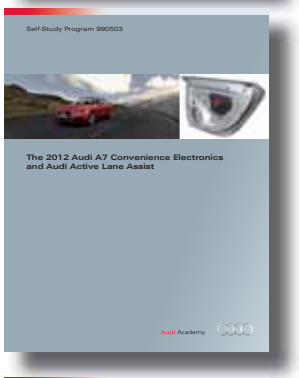
SSP 990403 The 2012 Audi A7 Onboard Power Supply and Networking

- Power Supply
- Networking
- Control Modules
- Exterior Lighting



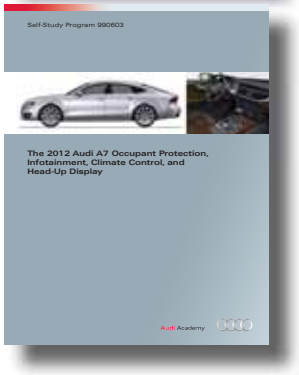
SSP 990503 The 2012 Audi A7 Convenience Electronics and Audi Active Lane Assist

- Topology
- Convenience Electronics
- Audi Active Lane Assist



SSP 990603 The 2012 Audi A7 Occupant Protection, Infotainment, Climate Control, and Head-Up Display

- Occupant Protection
- Audi pre sense
- Infotainment
- Air Conditioning
- Seat System
- Head-Up Display



Knowledge Assessment

An on-line 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:

- Click on the “ACADEMY” tab
- Click on the “Academy Site” link
- Click on the “CRC/Certification” link
- Click on Course Catalog and select “990203 — The 2012 Audi A7 Vehicle Introduction”

For assistance please call:

Audi Academy

Certification Resource Center (CRC)

1-877-283-4562

(8:00 a.m. to 8:00 p.m. EST)

Or you may send an email to:

audicrchelpdesk@touchstone-group.com

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

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