Self-Study Program 970103

The 2011 Audi A8 Convenience Electronics and Networking Systems

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.

Table of Contents

Table of Contents

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

With the increase in sophisticated electronic systems and components, stability and reliability of a vehicle's electrical system are extremely important.

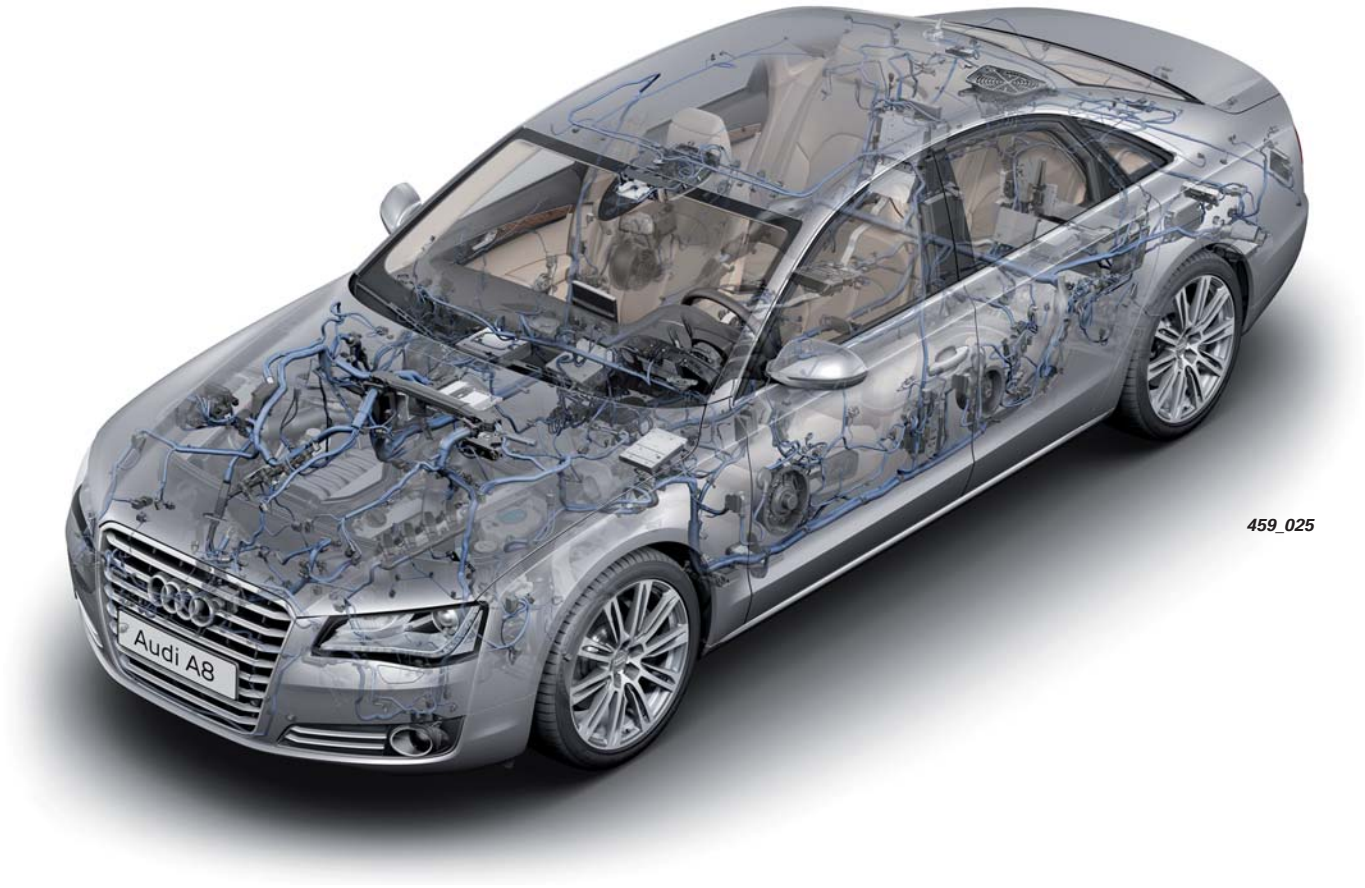
In the 2011 Audi A8, there are over 1,500 individual wires with an average length of 6.5 ft (2.0 m). Numerous terminals, switches, fuse boxes, seals, and wiring ducts make the electrical system one of the heaviest and most expensive components of the vehicle. The weight of the electrical system alone can approach approximately 110 lb (50.0 kg).

Given today's energy and environmental considerations, the development of new and more lightweight electrical system components is extremely important, as weight plays a major factor in fuel consumption and, therefore, CO2 emissions.

Most of today's innovations have only been made possible by the increased performance of electronic systems.

Without this development, many vehicle comfort and convenience features that are now taken for granted would not have been achievable. In comparison with its predecessor, the 2011 Audi A8 electrical system has the following significant differences:

- Number of control modules has increased from 68 to 95
- New bus system, FlexRay, has increased the number of bus systems from six to seven
- Software volumes on the vehicle now exceed 230 MB, almost four times the amount on the previous model



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Power Supply

Battery

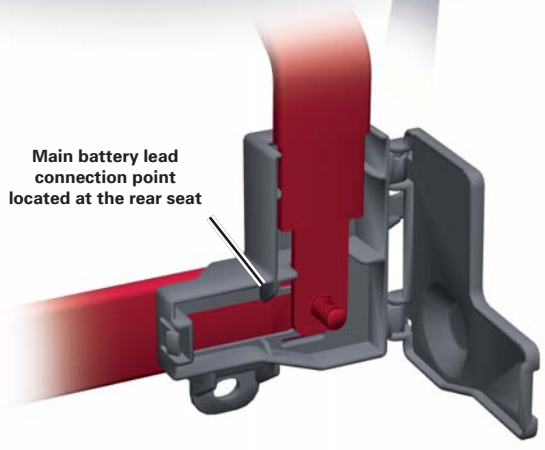
The battery of the 2011 Audi A8 is installed in the center of the spare tire well. Main fuse box SD and Battery Interrupt Igniter N253 are attached to the positive terminal.

Battery Monitoring Control Module J367 is connected to the negative terminal. It is often referred to as Battery Data Module (BDM).

AGM Batteries

AGM (Absorbent Glass Mat) batteries contain a glass microfiber mat in which the electrolyte is absorbed. They are distinguished by their spill-proof design, excellent rechargeability, good cold-starting properties, low self-discharging rates, and zero-maintenance characteristics.

When a battery is replaced, the type of battery must be specified by ETKA, and the serial number of the new battery must be entered in Battery Monitoring Control Module J367 using the VAS Scan Tool.

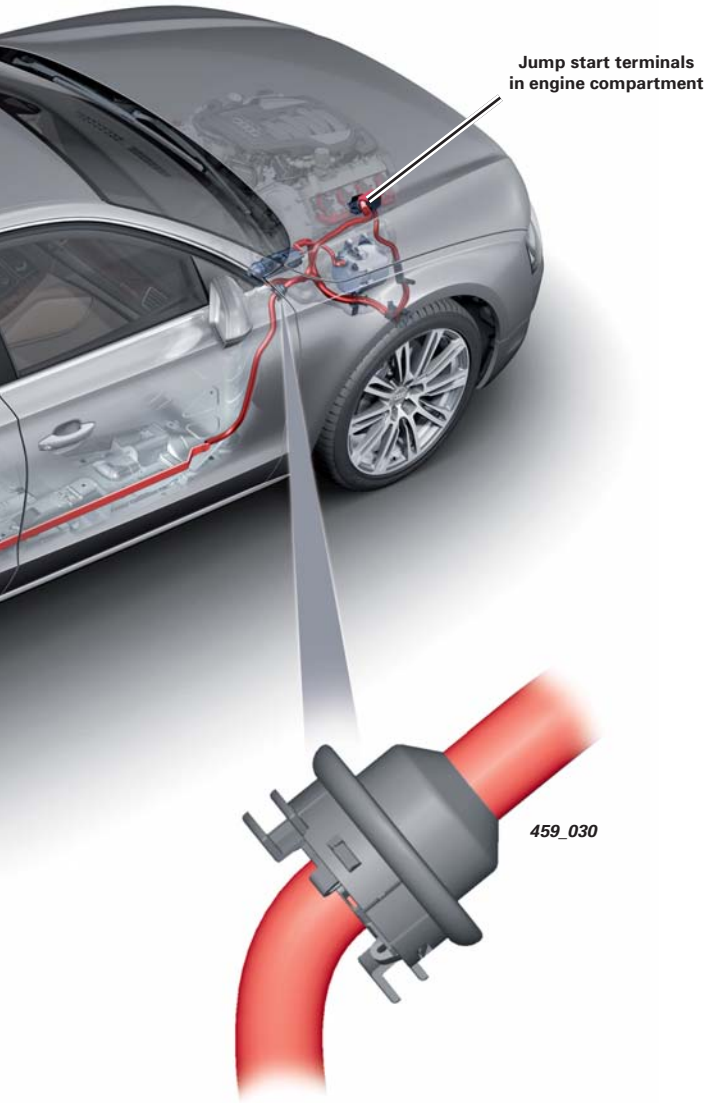


Reference

More information on AGM batteries can be found in Self-Study Program 972903, *Audi Vehicle Batteries and Energy Management Systems*.

Jump Start Terminals

Located on the right side of the engine compartment, the jump start terminals can be used for charging the battery in the showroom or when performing diagnostic checks in the workshop.



Main Battery Cable

An advanced-design main battery cable is used on the 2011 Audi A8. It is made of aluminum and is covered with a red plastic insulation layer.

Cable Routing

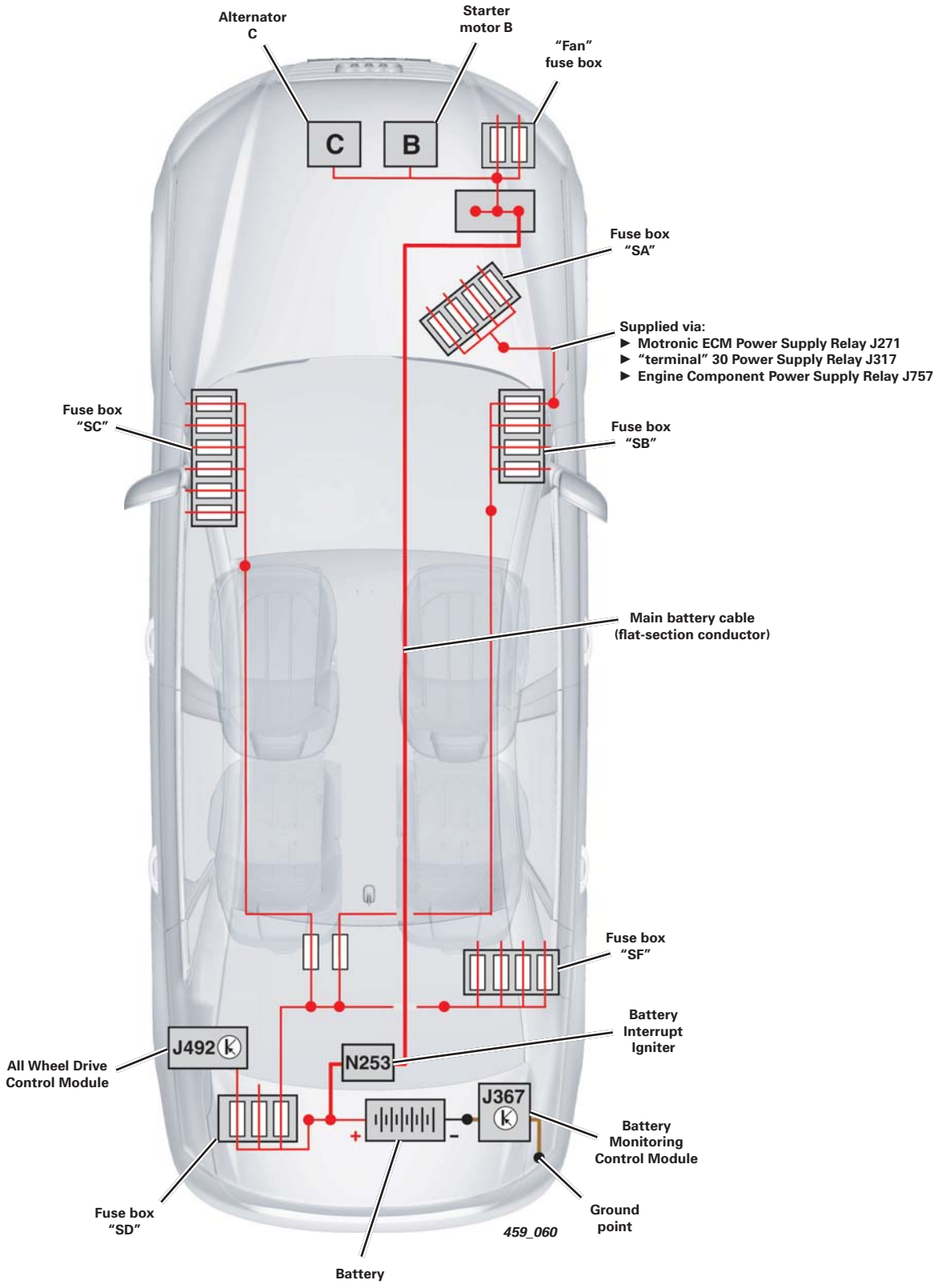
The main battery cable starts at the battery positive terminal as a flexible, round-section cable. It becomes a rigid, flat-section conductor before it leaves the spare tire well. Apart from its light weight, this type of battery cable has other advantages:

- Because of its shape and rigidity, retainers can be eliminated
- It does not require cable ducts
- Available space is more efficiently used
- The 150 mm² cross-section main cable can be routed through the passenger compartment

The cable is made up of two sections which are bolted together on the floorboard near the rear seat. Near the right A-pillar, the flat conductor changes back into a flexible, round-section cable again. It is protected by a rubber grommet, and passes through the bulkhead from the passenger compartment to the engine compartment.

Power Supply Overview

This illustration only provides a power supply overview of the 2011 Audi A8. For exact details of fuse assignment and cable routing, refer to the current wiring diagram and component locations.



Fuses and Relays

Fuse and relay box in engine compartment

This box is designated as “SA” in the Current Flow Diagram.

Fuse box behind right side of instrument panel

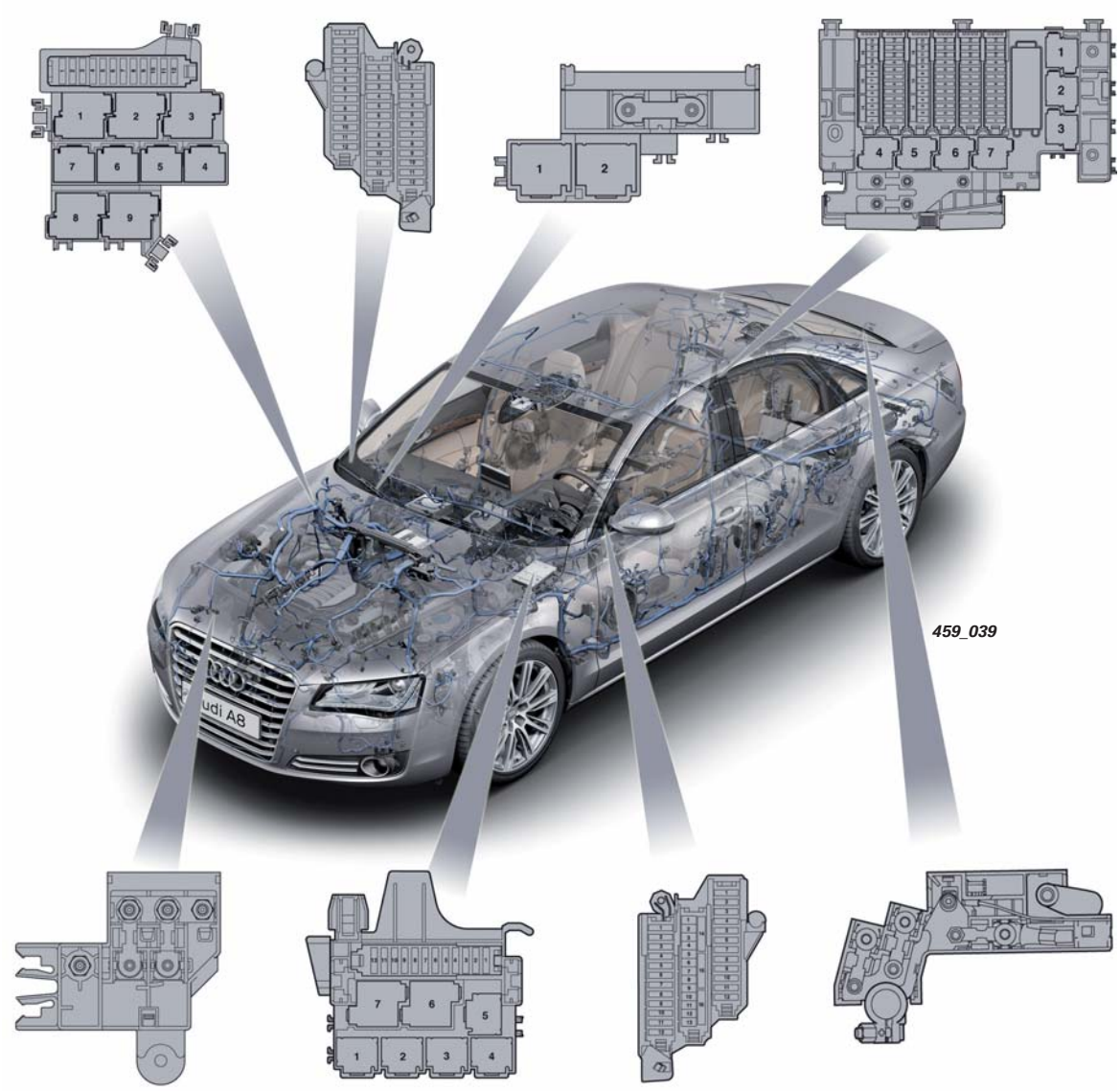
This box is designated as “SB” in the Current Flow Diagram; the customer can access these fuses by removing the trim cover on the end of the instrument panel.

Fuse and relay box at base of right A-pillar

This box holds the fuse for ABS Control Module J104.

Fuse and relay box on electronic module in right side of trunk

This box is designated as “SF” in the Current Flow Diagram; the customer can access these fuses by removing a cover.



Fuse box at forward end of longitudinal chassis member

This fuse box holds fuses for the radiator fans.

Fuse and relay box near Vehicle Electrical System Control Module J519

Located below the instrument cluster in the driver’s side footwell.

Fuse box behind instrument cluster on left

This box is designated as “SC” in the Current Flow Diagram; the customer can access these fuses by removing the instrument panel trim.

Fuse box on battery positive terminal

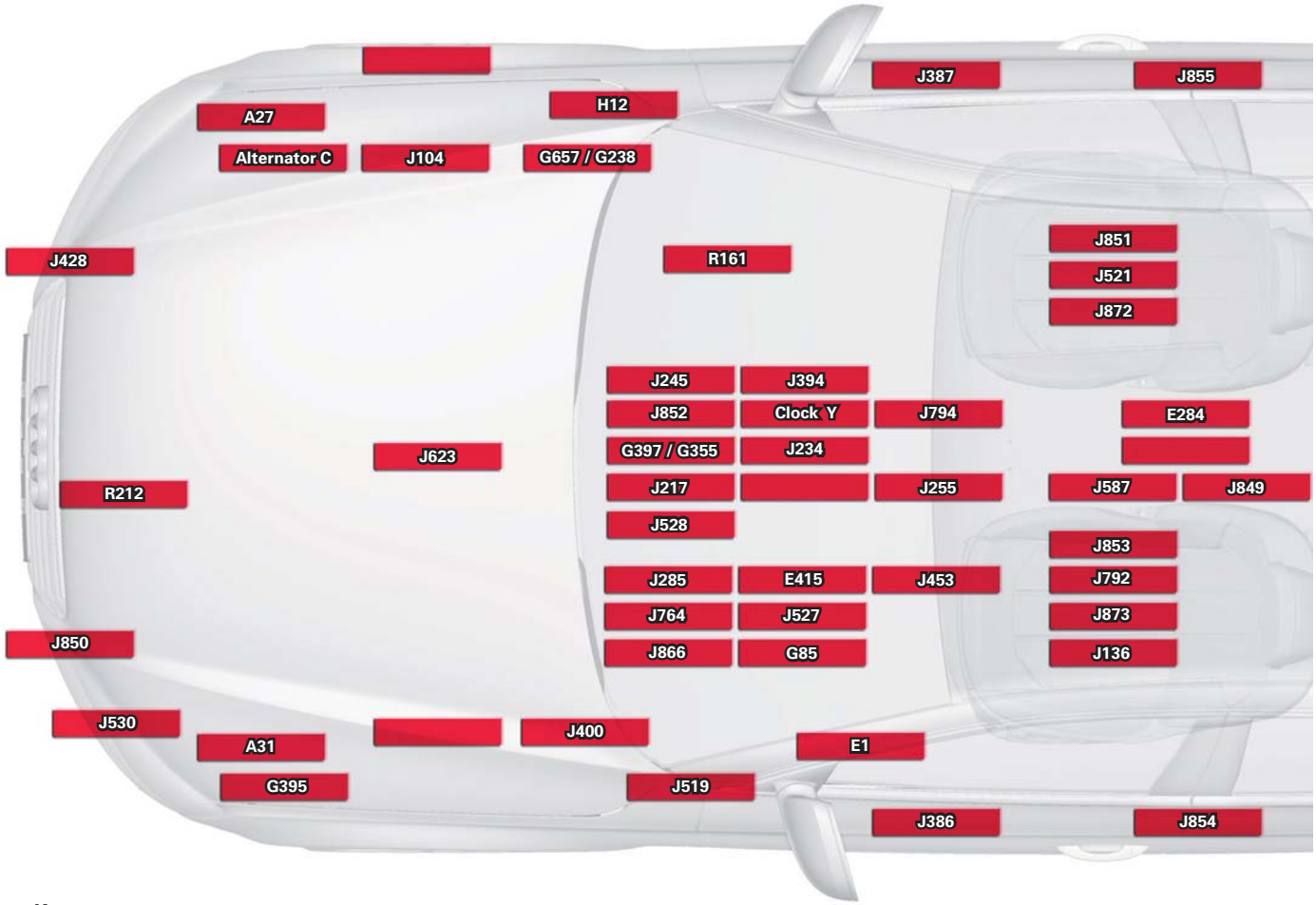
This box is designated as “SD” in the Current Flow Diagram; Battery Interrupt Igniter N253 is also located here.

Network System

Control Module Locations

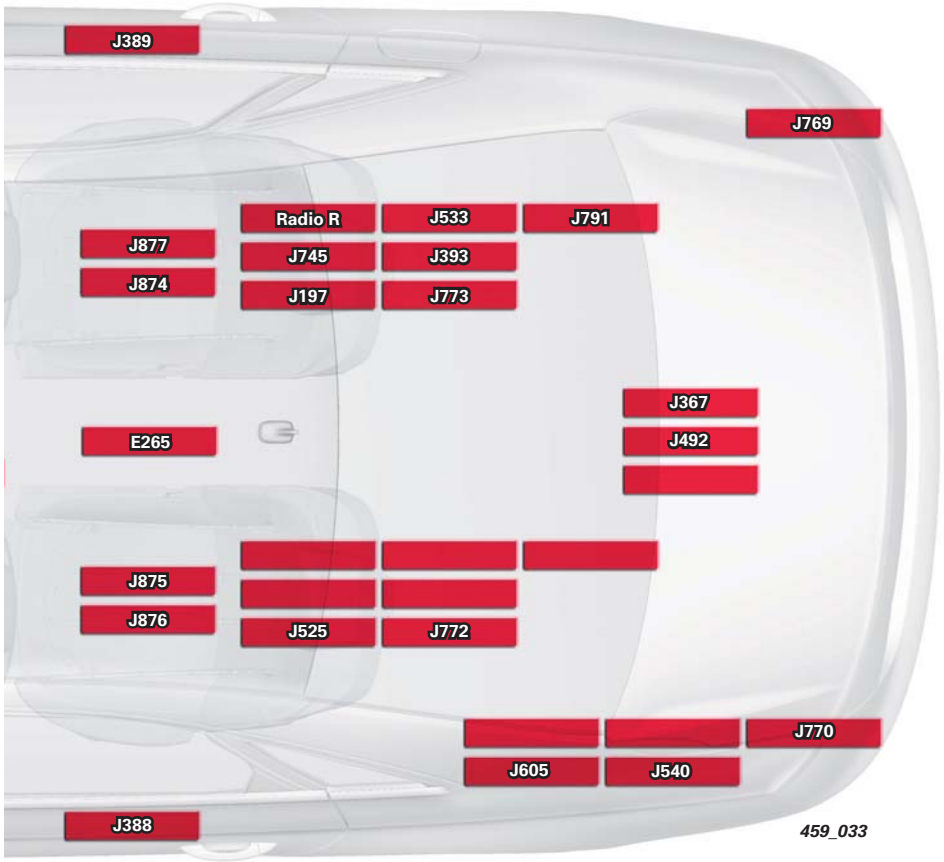
Notes on the exact locations of control modules and their removal/installation instructions can be found in current service repair literature.

Red boxes without numbers indicate the installation position of components not used in the North American market.



Key:

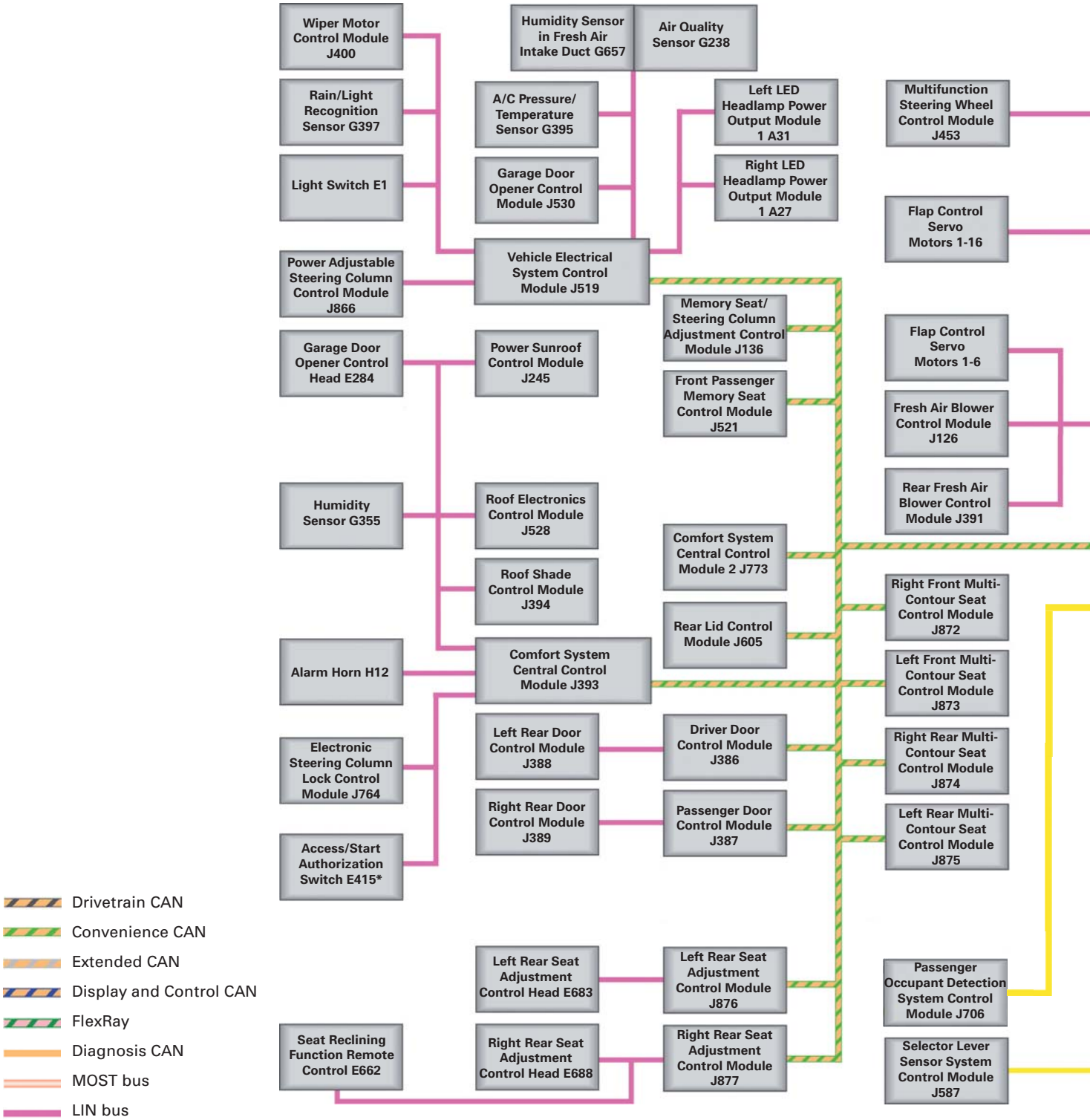
A27	Right LED Headlamp Power Output Module 1
A31	Left LED Headlamp Power Output Module 1
E1	Light Switch
E265	Rear Climatronic A/C Display Control Head
E284	Garage Door Opener Control Head
E415	Access/Start Authorization Switch
G85	Steering Angle Sensor
G238	Air Quality Sensor
G355	Humidity Sensor
G395	A/C Pressure/Temperature Sensor
G397	Rain/Light Recognition Sensor
G657	Humidity Sensor in Fresh Air Intake Duct
H12	Alarm Horn
J104	ABS Control Module
J136	Memory Seat/Steering Column Adjustment Control Module
J197	Level Control System Control Module
J217	Transmission Control Module
J234	Airbag Control Module
J245	Power Sunroof Control Module
J255	Climatronic Control Module
J285	Instrument Cluster Control Module
J367	Battery Monitoring Control Module
J386	Driver Door Control Module
J387	Front Passenger Door Control Module
J388	Left Rear Door Control Module
J389	Right Rear Door Control Module
J393	Comfort System Central Control Module
J394	Roof Shade Control Module
J400	Wiper Motor Control Module
J428	Distance Regulation Control Module
J453	Multifunction Steering Wheel Control Module
J519	Vehicle Electrical System Control Module
J521	Front Passenger Memory Seat Control Module
J525	Digital Sound System Control Module
J527	Steering Column Electronics Control Module



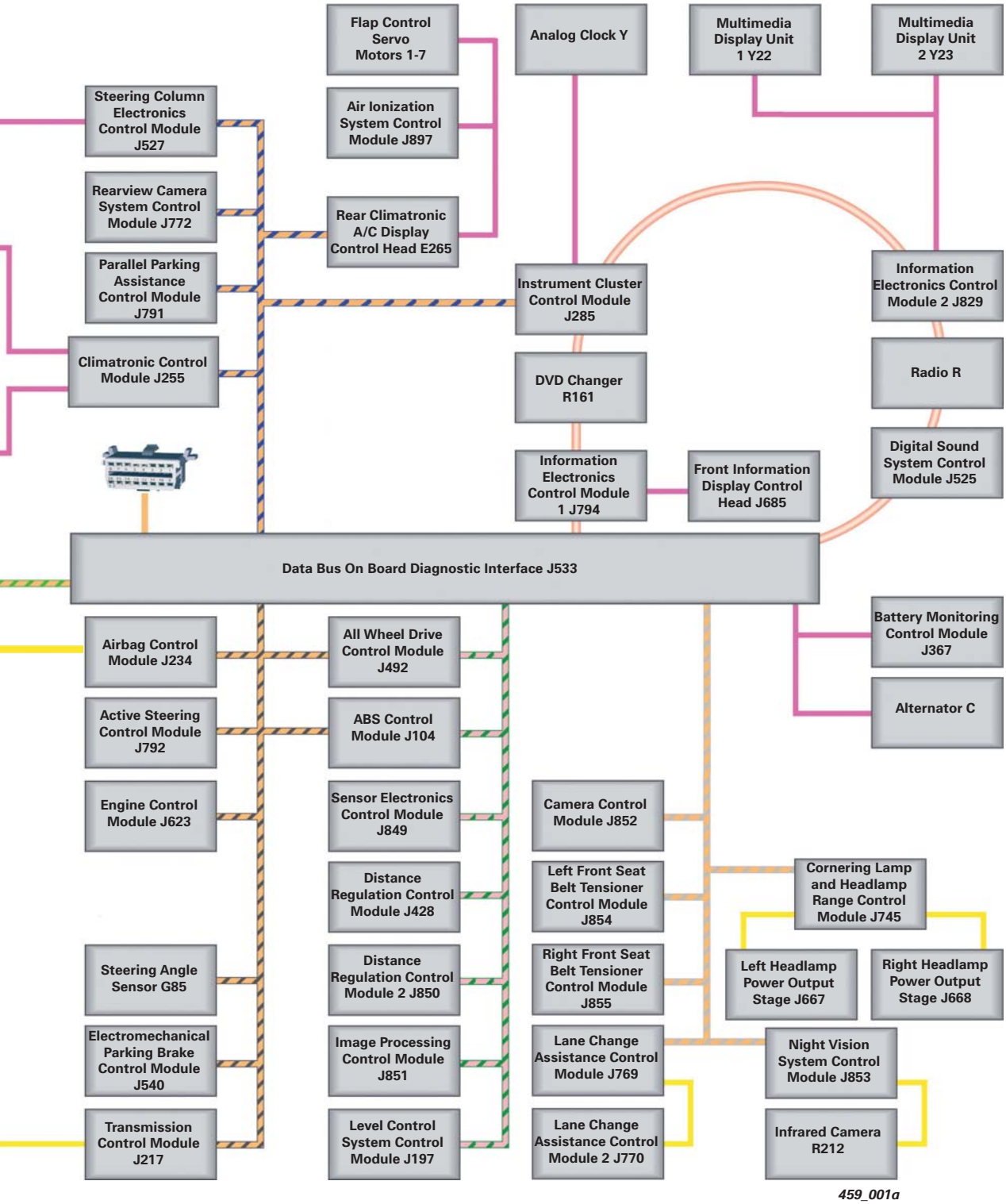
J528	Roof Electronics Control Module
J530	Garage Door Opener Control Module
J533	Data Bus On Board Diagnostic Interface
J540	Electromechanical Parking Brake Control Module
J587	Selector Lever Sensor System Control Module
J605	Rear Lid Control Module
J623	Engine Control Module
J745	Cornering Lamp and Headlamp Range Control Module
J764	Electronic Steering Column Lock Control Module
J769	Lane Change Assistance Control Module
J770	Lane Change Assistance Control Module 2
J772	Rearview Camera System Control Module
J773	Comfort System Central Control Module 2
J791	Parallel Parking Assistance Control Module
J792	Active Steering Control Module
J794	Information Electronics Control Module 1
J849	Sensor Electronics Control Module
J850	Distance Regulation Control Module 2
J851	Image Processing Control Module
J852	Camera Control Module
J853	Night Vision System Control Module
J854	Left Front Seat Belt Tensioner Control Module
J855	Right Front Seat Belt Tensioner Control Module
J866	Power Adjustable Steering Column Control Module
J872	Right Front Multi-Contour Seat Control Module
J873	Left Front Multi-Contour Seat Control Module
J874	Right Rear Multi-Contour Seat Control Module
J875	Left Rear Multi-Contour Seat Control Module
J876	Left Rear Seat Adjustment Control Module
J877	Right Rear Seat Adjustment Control Module
R161	DVD Changer
R212	Infrared Camera

Topology

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



*Only on early production vehicles. To be removed and replaced with Reader Coil.


Flap Control Servo Motors 1-7
Analog Clock Y
Multimedia Display Unit 1 Y22
Multimedia Display Unit 2 Y23
Steering Column Electronics Control Module J527
Air Ionization System Control Module J897
Rearview Camera System Control Module J772
Rear Climatronic A/C Display Control Head E265
Parallel Parking Assistance Control Module J791
Instrument Cluster Control Module J285
Information Electronics Control Module 2 J829
Climatronic Control Module J255
DVD Changer R161
Radio R
Digital Sound System Control Module J525
Information Electronics Control Module 1 J794
Front Information Display Control Head 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
Active Steering Control Module J792
ABS Control Module J104
Engine Control Module J623
Sensor Electronics Control Module J849
Camera Control Module J852
Distance Regulation Control Module J428
Left Front Seat Belt Tensioner Control Module J854
Cornering Lamp and Headlamp Range Control Module J745
Steering Angle Sensor G85
Distance Regulation Control Module 2 J850
Right Front Seat Belt Tensioner Control Module J855
Left Headlamp Power Output Stage J667
Right Headlamp Power Output Stage J668
Electromechanical Parking Brake Control Module J540
Image Processing Control Module J851
Lane Change Assistance Control Module J769
Night Vision System Control Module J853
Transmission Control Module J217
Level Control System Control Module J197
Lane Change Assistance Control Module 2 J770
Infrared Camera R212

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New Bus System Features

The number of control modules and bus systems has increased substantially when compared to the 2010 Audi A8.

Bus Systems Used on the 2011 Audi A8

Bus System	Cable Color	Type	Transmission Rate	Characteristic
Drivetrain CAN		Electrical two-wire bus system	500 kbit/s	Not capable of single-wire operation
Convenience CAN		Electrical two-wire bus system	500 kbit/s	Not capable of single-wire operation
Extended CAN		Electrical two-wire bus system	500 kbit/s	Not capable of single-wire operation
Display and Control CAN		Electrical two-wire bus system	500 kbit/s	Not capable of single-wire operation
Diagnosis CAN		Electrical two-wire bus system	500 kbit/s	Not capable of single-wire operation
FlexRay		Electrical two-wire bus system	10 Mbit/s	Not capable of single-wire operation
MOST bus		Fiber-optic bus system	22.5 Mbit/s	Ring break = failure of complete system
LIN bus		Electrical single wire bus system	20 kbit/s	
Sub bus system		Electrical two-wire bus system	500 kbit/s	

Most Important New Features

- Convenience CAN is a new higher speed bus system
- New FlexRay data bus system is faster and more reliable than CAN and offers system-wide redundancy
- Instrument Cluster Control Module J285 is a bus device in two bus systems — Display and Control CAN and MOST bus
- All Wheel Drive Control Module J492 and ABS Control Module J104 are bus devices in two bus systems — Drivetrain CAN and FlexRay
- Analog clock is a LIN bus component
- Information Electronics Control Module 2 is only installed on vehicles with the Rear Entertainment System
- Control modules for multi-contour seats are only installed on vehicles with the massage seat function

Reference

Basic information on the data bus systems used in Audi vehicles to date can be found in Self-Study Program 971603, *Audi Data Bus Technologies*.

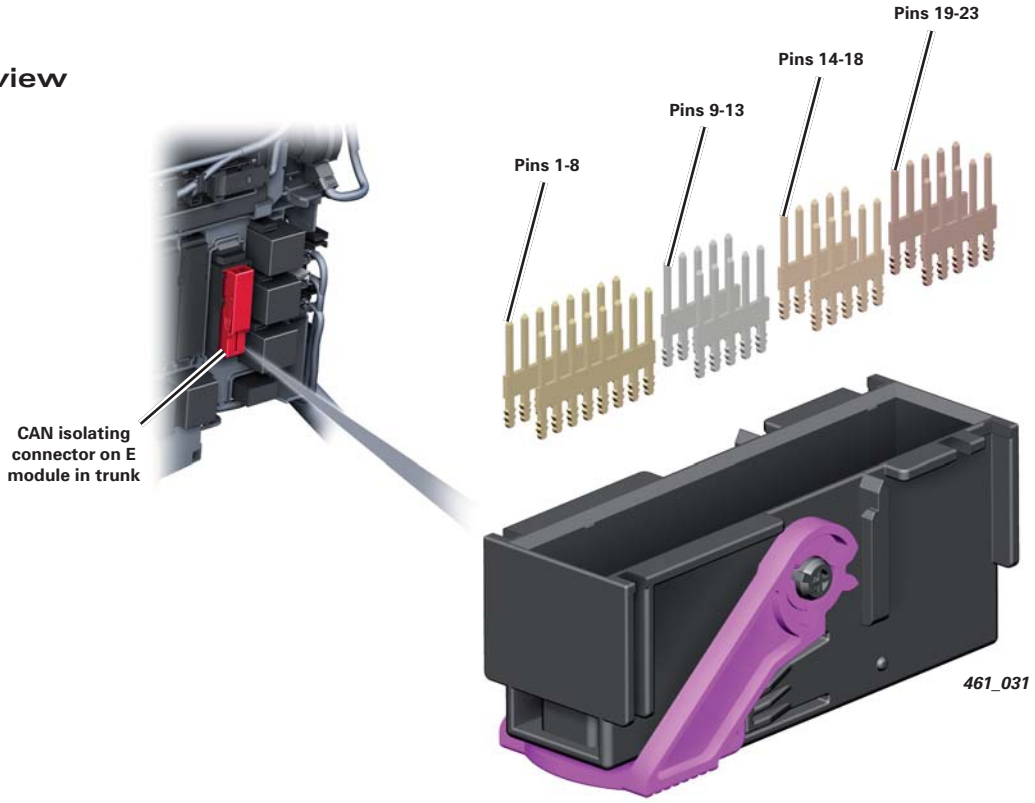
CAN Isolating Connector

The 2011 Audi A8 has only one CAN isolating connector, which is fitted to the E module in the right side of the trunk. The isolating connector houses the lead connectors for four bus systems:

- PINs 1–8 (Convenience CAN intersection)
- PINs 9–13 (Drivetrain CAN intersection)
- PINs 14–18 (Display and Control CAN intersection)
- PINs 19–23 (Extended CAN intersection)

By removing jumpers from the isolating adaptor, it is possible to isolate individual lines from the CAN bus. Readings can then be taken not only on the individual lines but also on the entire CAN bus while systems are operating. This enables systematic analysis of faults on the CAN bus and the identification of their causes.

Overview



FlexRay

Introduction

FlexRay makes its debut at Audi on the 2011 Audi A8. FlexRay is a new data bus system developed by a consortium of manufacturers established in 2000. The consortium includes the Volkswagen Group.

The FlexRay data bus system is designed to be faster and more reliable than CAN and other data bus systems. It provides high-speed, pre-determined, distributed control for advanced automotive applications.

FlexRay's dual-channel architecture offers system-wide redundancy that meets the reliability requirements of emerging safety systems, such as brake-by-wire.

With 10 Mbit/s throughput per channel, the FlexRay system can also be employed as a vehicle-wide network backbone, working in conjunction with already well-established systems, such as CAN and LIN. It also drives down costs by reducing the number of parallel CAN networks used to solve bandwidth bottlenecks.

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Benefits of FlexRay

- Simplified vehicle network architectures
- Enhanced control intelligence
- High data transfer rate: 10 Mbit/s maximum
- Reduced wiring requirements
- Reduced weight of networked subsystems
- Distributed computing through a global time clock
- Electromechanical systems (drive-by-wire) replacing hydraulic components
- Time and event triggered data transfer

Example

FlexRay networking works differently from CAN, LIN, and MOST data bus systems.

Think of FlexRay as a cable car station system. The cable car stations represent the bus devices: senders and receivers (control modules). The cable cars themselves represent the message frames, and the passengers the messages.

The time at which a bus device can send messages over the FlexRay is precisely defined. The time at which a sent message reaches the receiver is also precisely known. We can compare it to the scheduled timetable for a cable car service.

Even if a bus device does not send any information at the allotted time, a certain bandwidth is reserved for it. This is like a cable car which travels whether or not there is anyone onboard. This means that prioritization of messages, which occurs on a CAN bus, is not necessary.

On the Audi version of the system, an "empty cable car" is identified as a sender fault, with the control modules always sending data. New information is flagged by an "update bit". If there is no new information to send, the old data is re-sent.

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Comparison Between CAN bus and FlexRay

Characteristic	CAN data bus	FlexRay
Wiring	Electrical, two-wire	Electrical, two-wire
Signal status	“0” — dominant, “1” — recessive	“Idle”, “Data 0”, “Data 1”
Data rate	500 kbit/s	10 Mbit/s
Access principle	Event-controlled	Timer-controlled
Topologies	Passive star coupler, bus	Active star coupler, point-to-point, daisy chain[1]
Arbitration	Higher-priority message sent before lower-priority message	None, data is sent at defined times
Confirmation signal	Receiver confirms receipt of a valid data protocol	Sender gets no confirmation that a data protocol has been correctly transmitted
Fault protocol	A fault can be identified on the network by a fault protocol	Every receiver checks for itself whether the data protocol received is correct
Data protocol length	Maximum eight bytes useful data	Maximum 256 bytes useful data
Usage	– Used when required – Time at which the CAN bus can be used depends on available capacity – CAN bus can potentially be overloaded	– Time at which the data protocol can be used is defined – Duration of usage is defined – Sending slot is reserved even if it is not required
Time of receipt	Unknown	Known

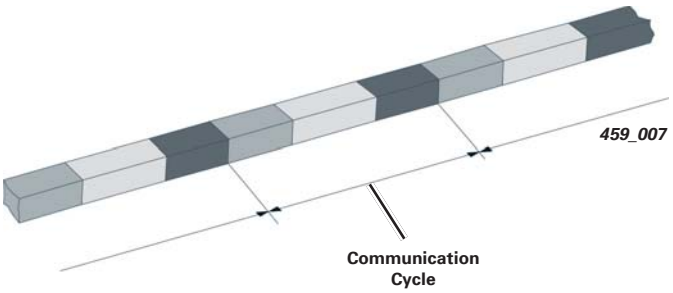
[1]Daisy chain = Taken from the children’s game of threading daisies together to make a string, the inference here refers to a series of control modules connected together in series.

Protocol

On the FlexRay bus, messages are transmitted in communication cycles. A communication cycle is a sequence that is continually repeated, with one cycle immediately followed by the next. One communication cycle may be only five milliseconds.

It consists of:

– Static segment
– Dynamic segment
– Network idle time

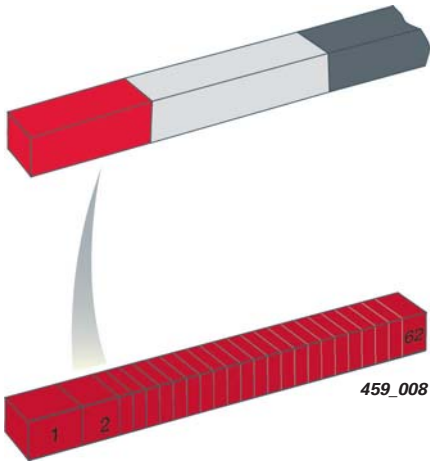


Static Segment

This segment is used to transmit messages between the bus devices. It is subdivided into 62 static time slots for data transmission. Only one particular bus device may send in each separate static time slot. However, all bus devices can receive in all static time slots, including those not allocated to them.

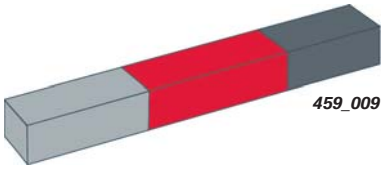
All static time slots have precisely the same length of 42 bytes. The order of the slots is permanently fixed. From one communication cycle to the next, the message contents transmitted in the static segments in each case may change.

The entire time slot structure is transmitted regardless of whether all of the slots contain messages. In the Audi system version, the bus devices always send messages and use “update bits” to indicate whether or not the information is new.



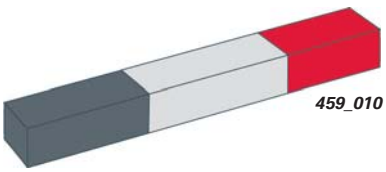
Dynamic Segment

This dynamic segment is a reserved space within a communication cycle where event-controlled data can be sent. Subdivided into mini-slots, the dynamic segment is received by all bus devices.



Network Idle Time

Network idle time is a period of time when the network is inactive. It is a time when no data is transmitted over the FlexRay bus. Idle time is needed by Data Bus On Board Diagnostic Interface J533 to synchronize the FlexRay data transmission sequence. All bus devices use network idle time to synchronize their internal clocks to a global time base.



Configuration

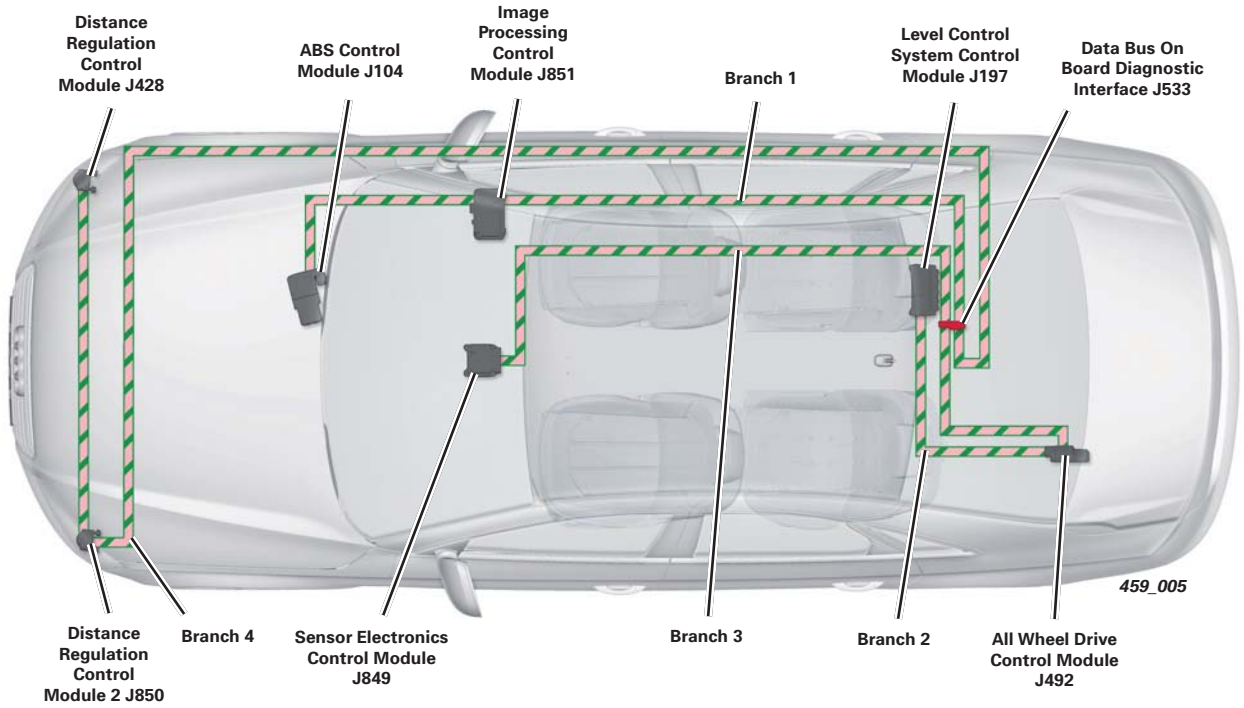
The FlexRay network is an “active” star coupler system with point-to-point (branch 3) and daisy chain (branches 1, 2 and 4) connections.

Other bus devices are configured around Data Bus On Board Diagnostic Interface J533 on the various branches.

On the 2011 Audi A8, there are two control modules on each branch.

The active star and “terminal control modules” on each branch have a low terminal (internal) resistance while the “mid control modules” have a high terminal (internal) resistance.

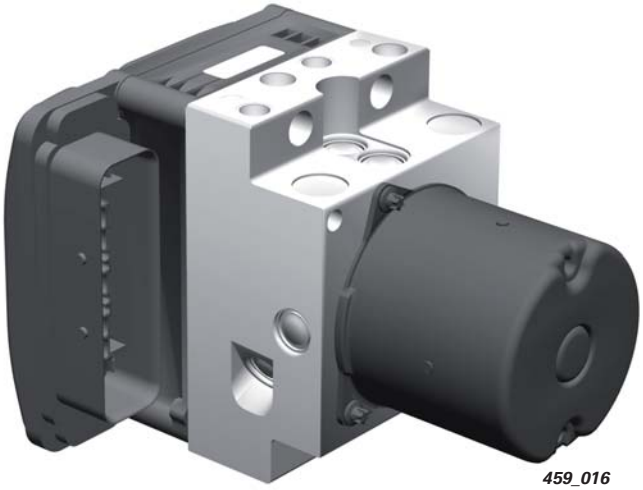
Topology



Control Modules

The “mid control modules” on a FlexRay branch have four pins for connecting to the FlexRay bus. Two of the pins are for “looping through” the bus signals to the other down-line control modules.

The other two pins are for direct communication on the FlexRay network. The “terminal control modules”, such as the ABS Control Module, have only two pins.



Functional Sequences

Network Wake-Up

If the FlexRay is in sleep mode, the wake-up sequence initially switches the system to standby mode. However, waking up the “terminal 30” devices does not immediately enable active communication on the FlexRay network.

To wake-up the network, a control module places what is called a “wake-up symbol” on the FlexRay. Before transmission, it always waits a certain amount of time to make sure there is definitely no communication taking place on the FlexRay, that all control modules are definitely in sleep mode.

Network Start-Up

This sequence initiates actual communication on the FlexRay bus. The network can only be started by what are referred to as “cold start” control modules.

The first cold start control module that sends a message on the FlexRay initiates the start-up sequence. Cold start and synchronization control modules are allowed to start-up a network and establish synchronization. The cold start and synchronization control modules are:

- Data Bus On Board Diagnostic Interface J533
- ABS Control Module J104
- Sensor Electronics Control Module J849

By contrast, “non-cold start” control modules are not allowed to start-up the FlexRay and make no contribution to synchronization. Non-cold start control modules cannot send messages on the FlexRay until at least two other bus devices are active on the network. The non-cold start control modules are:

- Distance Regulation Control Module J428
- Distance Regulation Control Module 2 J850
- Image Processing Control Module J851
- All Wheel Drive Control Module J492
- Level Control System Control Module J197 (shown at right) cannot start-up the network but contributes to synchronization

Initialization

Cold start control module 1, the control module that has initiated start-up, begins transmitting data based on its own unsynchronized time reference. Cold start control module 2 then synchronizes itself with the data stream from cold start control module 1. Only when at least two cold start control modules are communicating on the network can a non-cold start control module synchronize itself with the FlexRay.

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Signal Status

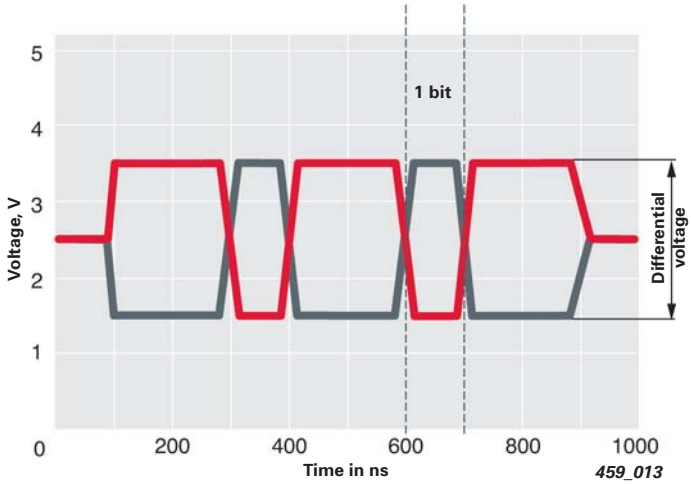
The two wires of the FlexRay cable are designated bus positive and bus negative. Their voltage levels vary between 1.5 – 3.5 volts. The FlexRay has three signal statuses:

- *Idle:* the level of both bus cable wires is 2.5 volts
- *Data 0:* the bus positive has a low voltage level and the bus negative a high voltage level
- *Data 1:* the bus positive has a high voltage level and the bus negative a low voltage level

One bit has a width of 100 nanoseconds (ns). Transmission time is dependent on cable length and transition times through the bus drivers. Signals are transmitted by differential means, as two cable wires are required.

The receiver detects actual bit status via the difference between the two signals. Typical signals have voltage differences of 1.8V to 2.9V. At the sender, a voltage differential of at least 1200 millivolts (mV) must be present. A voltage differential of at least 800 mV must still be present at the receiver.

If no activity takes place on the bus for 640–2660 milliseconds (ms), the FlexRay automatically enters sleep mode (idle).



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Diagnosis

Data Bus On Board Diagnostic Interface J533 detects faults on the network and can ensure that unaffected areas can continue to function.

Some faults may be limited to specific areas while others may affect the entire network.

The following types of faults on the FlexRay system can be identified using the VAS Scan Tool, Address Word 19:

- Control module — no communication
- FlexRay data bus defective
- FlexRay data bus initialization failure
- FlexRay data bus signal fault

Response of FlexRay to Faults

One bus wire shorting to ground
J533 detects a permanent voltage differential. The bus spur affected is deactivated until "idle" status, the sleep mode, or voltage level is detected again.

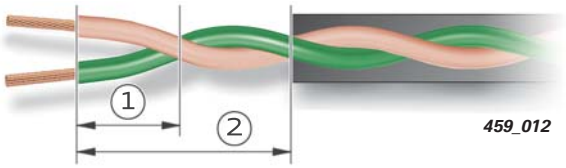
Short between bus wires
J533 detects a permanent "idle" signal voltage. Sending and receiving is not possible for any devices on the bus spur affected.

Control module sending constant "idle" signal
J533 detects this situation and deactivates the bus spur affected.

Repairing a FlexRay Lead

The FlexRay cable wires are twisted together like CAN wires. They are also sheathed. However, the plastic sheathing does not provide shielding against electromagnetic interference. This sheathing can only minimize the effects of humidity and temperature on the wire's characteristic impedance.

FlexRay wires can be replaced in sections if repairs are required. Always twist the wires as shown in current service repair literature. The untwisted length (1) and the unsheathed length (2) must be observed.



Note
For details of the exact procedure for repairing a FlexRay lead and which special tools are required, you should refer to current service repair literature.

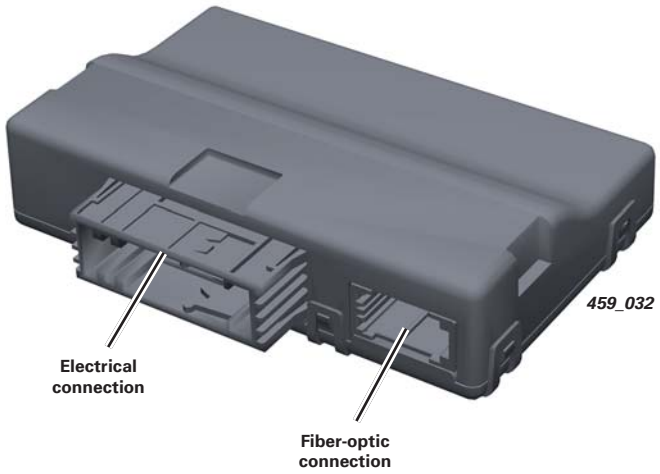
Notes

Control Modules

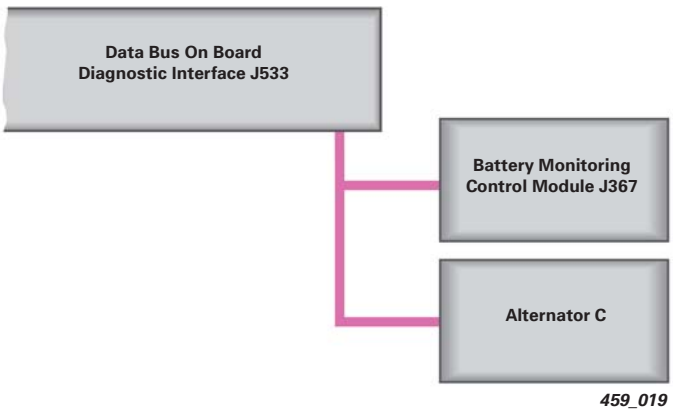
Data Bus On Board Diagnostic Interface J533

J533 is connected to the following bus systems:

- Convenience CAN
- Drivetrain CAN
- Extended CAN
- Display and Control CAN
- Diagnosis CAN
- FlexRay
- MOST bus
- LIN bus



Summary Information	
Description	Data Bus On Board Diagnostic Interface J533
Installation Location	E box on right side of trunk
Functions	– Network system gateway – Diagnosis master for diagnosing ring break on MOST bus – LIN master for: • Battery Monitoring Control Module J367 • Alternator C
Diagnosis Address Word	19
New Functions	Showroom mode for component protection



Showroom Mode for Component Protection

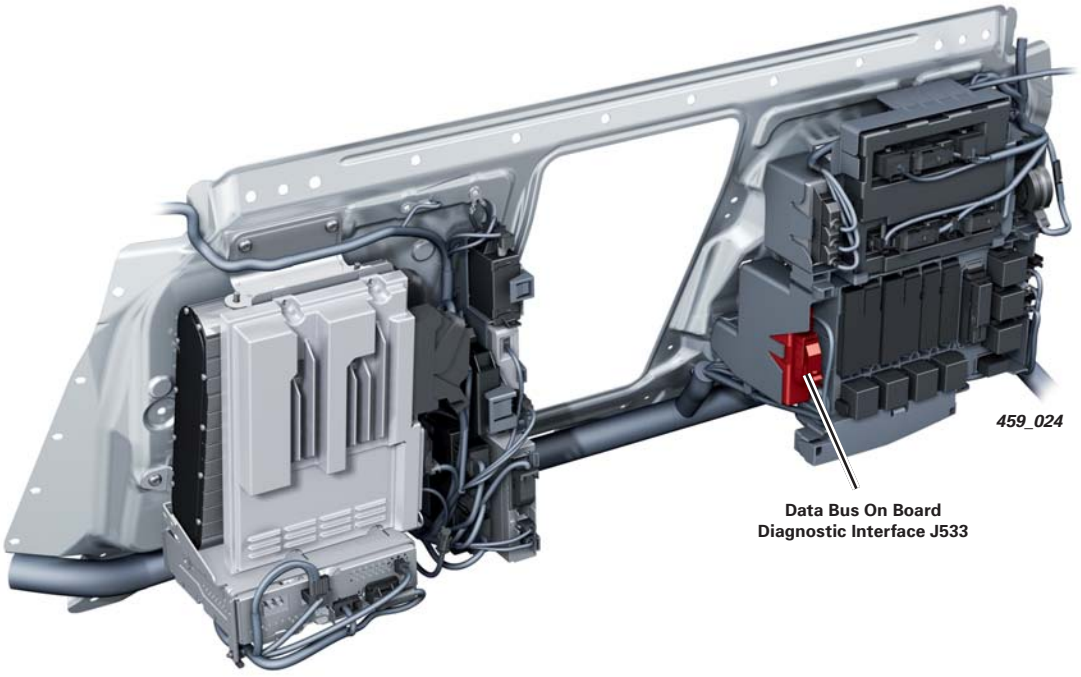
A showroom mode for component-protected control modules is being used for the first time on the 2011 Audi A8. Its purpose is to prevent component-protected modules from activating the protection function unintentionally in showrooms or exhibition centers.

Background: component-protected control modules require cyclic authentication by Data Bus On Board Diagnostic Interface J533.

If control modules have been activated a certain number of times without the ignition being switched ON between activations, the component protection function for the modules is activated.

After activating showroom mode, J533 sends an authentication signal to all control modules after the system is awakened.

The showroom mode function is activated and deactivated using the VAS Scan Tool.

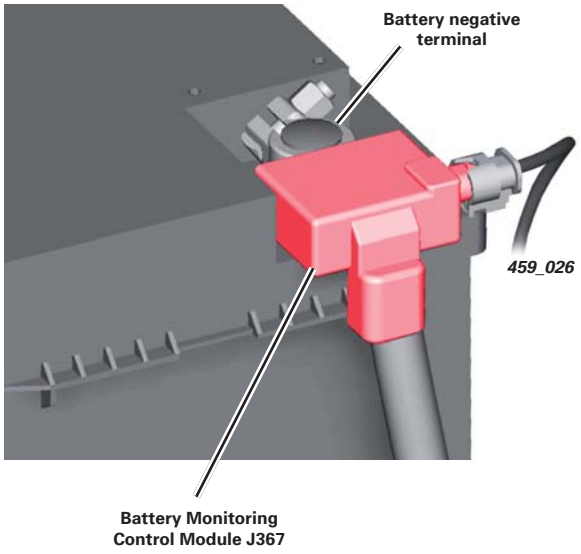


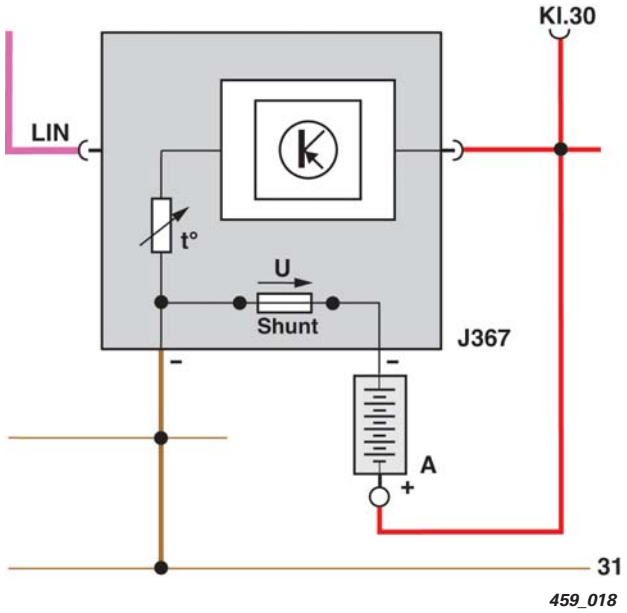
Battery Monitoring Control Module J367

The 2011 Audi A8 uses Energy Management System 2, which debuted on the Audi A5.

Energy Management Control Module J644 is no longer used. Its functions have been assumed by Data Bus On Board Diagnostic Interface J533.

Summary Information	
Description	Battery Monitoring Control Module J367
Installation Location	Negative terminal of vehicle battery
Functions	Measurement of: – Battery current – Battery voltage – Battery temperature
Diagnosis Address Word	None, LIN slave, readings and diagnosis performed via Data Bus On Board Diagnostic Interface J533 (master)





Key:

A	Battery
J367	Battery Monitoring Control Module
Shunt	Measuring shunt

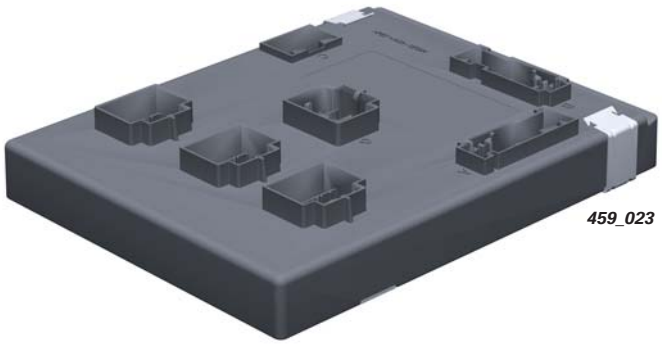
Reference

More information on Battery Monitoring Control Module J367 can be found in 99A703, *The 2008 Audi A5/S5 Networking*.

Notes

Vehicle Electrical System Control Module J519

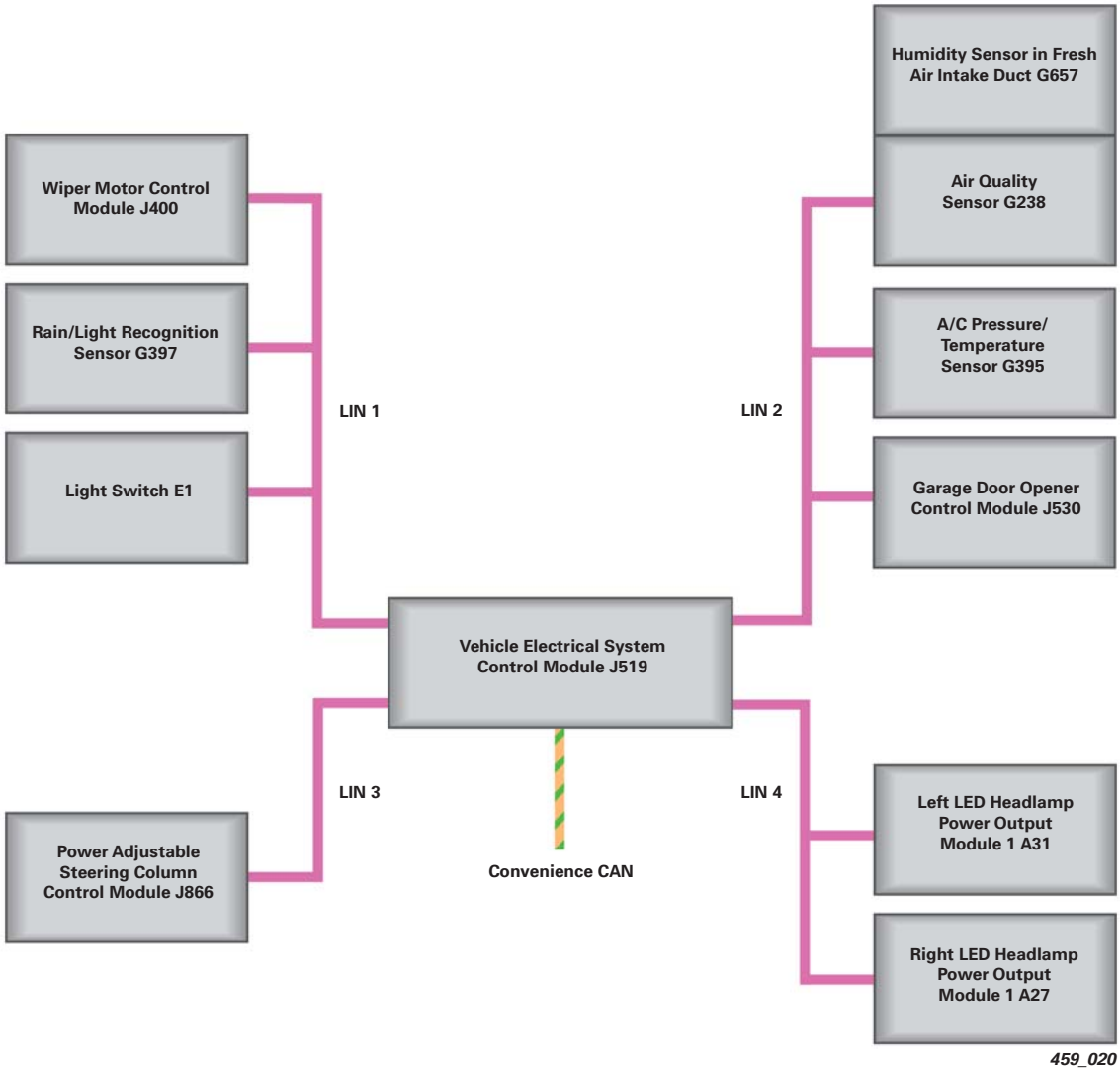
In the 2011 Audi A8, Vehicle Electrical System Control Module J519 has expanded responsibilities and now performs the functions of Vehicle Electrical System Control Module 2 J520 found in earlier A8 models.



459_023

Summary Information	
Description	Vehicle Electrical System Control Module J519
Installation Location	Behind footwell trim on driver's side
Functions	– All functions of J519 and J520 from earlier Audi A8 models – LIN master – LIN gateway
Diagnosis Address Word	09
New Functions	See summary on page 26

LIN bus Master and LIN Gateway Functions



Vehicle Electrical System Control Module J519 is a network device on the Convenience CAN.

J519 is the master control module for the following LIN bus devices:

- Control module for wiper motor
- Rain/light sensor
- Light switch
- Electrically adjustable steering column control module
- Power modules for LED headlights

J519 acts as gateway for the following LIN bus devices:

- Air quality sensor
- Air humidity sensor
- A/C Pressure/Temperature Sensor
- Garage door opener control module

J519 Functions

Lighting System Functions

- Exterior lighting master and operating front lights
- Safe-mode algorithm for lights if main processor fails
- Reading rain/light sensor signal via LIN bus link
- Reading hazard warning light button signal and illuminating button
- Safe mode master for flashers (turn signals, hazard warning, crash warning) if J393 fails
- Operation of front flashers (flasher master is J393)
- Operation of side repeater flashers via door control modules*
- Reading signal from rotary light switch via LIN bus connection*
- Turning/cornering headlight function using main headlights*
- Interior lighting master (interior lights, front and rear footwell lights)*
- Function and location lighting (“terminal 58s/58st/58d”)*

Driver Information

- Reading outside temperature*
- Reading oil pressure switch signal*
- Reading brake pad wear warning signal*
- Reading brake fluid warning signal*
- Reading coolant warning signal*
- Reading washer fluid warning signal*
- Reading light warning signal*

Climate Control Functions

- Operating front seat heating*
- LIN gateway for Air Quality Sensor J238, A/C Pressure/Temperature Sensor G395 and Humidity Sensor in Fresh Air Intake Duct G657*
- Operating air conditioning compressor*

Washer/Wiper Functions

- Activating Wiper Motor Control Module J400 via LIN bus connection
- Reading Rain/Light Recognition Sensor G397 signal via LIN bus link
- Operating windshield washer pump
- Operating headlight washer pump*

Interfaces with J393

- Enabling electric steering column lock (discrete signal and via CAN)*
- Reporting back discrete “terminal 15” signal (reporting to J393 via CAN)*
- Valet Key button and function LED*
- Reading rear sun shade button signal*

Other Functions

- Operating horn relay
- Reading back-up light switch signal (CAN signal from Transmission Control Module 217)
- Reading emergency brake switch signal (CAN signal from electromechanical parking brake)
- Reading hood switch signal
- LIN gateway for Garage Door Opener Control Module J530
- Reading settings via MMI (exterior lights, interior lights, wipers, Audi drive select, and Home Link)
- Operating valve for Servotronic*
- LIN gateway for the garage door opener control module*
- Plausibility-checked “terminal 15”: “terminal 15” via CAN or “terminal 15” via discrete lead*
- Coordinator for Audi drive select*

Special Functions

- Energy management shutdown stages (interior lights, footwell lights, coming/leaving home lights, daytime lights, heated washer jets)
- Transport mode (interior lights, footwell lights, coming/leaving home lights, daytime lights, heated washer jets)
- Participation in component protection
- Deactivating daytime lights coding variant

*New functions compared to those performed by J519 and J520 on earlier A8 models.

Notes

Comfort System Central Control Module

Inputs and Outputs

J393 is connected to the following supply lines:

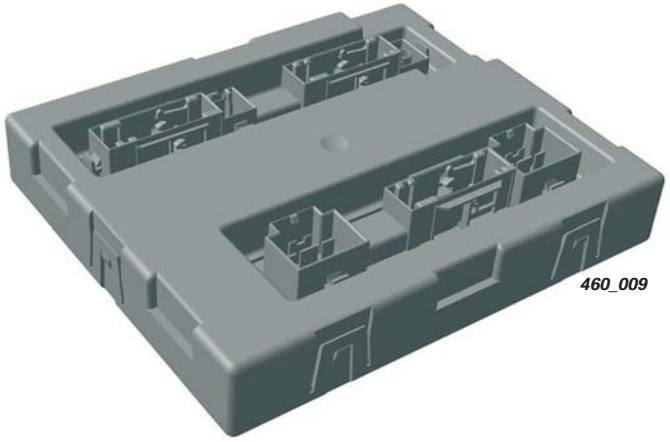
- Two “terminal 30” lines (protected by two 20A fuses)
- “terminal 30” line for trunk lid power latching motor (protected by a 20A fuse)
- Two ground wires

The following bus lines are connected to J393:

- Convenience CAN High
- Convenience CAN Low
- LIN bus 1 (garage door opener, control panel, slide/tilt sunroof, roof electronics control module, windshield heater, humidity sensor, sunroof roller blind)
- LIN bus 2 (alarm horn of anti-theft alarm system)
- LIN bus 3 (electrical ignition lock, electrical steering column lock)

J393 reads signals from the following switches and buttons:

- Brake light switch
- Soft touch button in trunk lid
- P/N signal for automatic transmission
- Start/stop button
- Redundant start/stop button
- Microswitch of trunk lid power latch for “fully retracted” position
- Microswitch of trunk lid power latch for “fully extended” position
- Microswitch in rotary latch of trunk lid lock
- Microswitch for “key inserted” position in electronic ignition lock
- Microswitch for “terminal 15” position in electronic ignition lock
- Redundant microswitch 1 for “terminal 15” position in electronic ignition lock
- Redundant microswitch 2 for “terminal 15” position in electronic ignition lock



J393 reads signals from the following sensors:

- Touch sensor, door outer handle, front left
- Touch sensor, door outer handle, front right
- Touch sensor, door outer handle, rear left
- Touch sensor, door outer handle, rear right

J393 outputs the following signals:

- Steering column lock enabling signal
- “terminal 50” signal
- Signal for actuation of ignition key removal lock

J393 activates the following lights and lamps:

- LED tail light, left and right, in trunk lid
- LED brake light, left and right, in trunk lid
- LED rear fog lights, left and right, in trunk lid
- LED turn signal, left and right, in trunk lid
- LED tail light, left and right, in bodyside
- LED brake light, left and right, in bodyside
- Back-up light, left and right, in bodyside
- LED turn signal, left and right, in bodyside
- Luggage compartment light
- License plate light
- High mounted brake light

The following antennas are connected to J393:

- Central locking antenna
- Keyless antenna in center console
- Keyless antenna in left rear door
- Keyless antenna in right rear door
- Keyless antenna in left rear shelf
- Keyless antenna in right rear shelf

J393 activates the following relays:

- “terminal 1” relay
- Rear window defroster relay
- Socket relay

J393 activates these motors and actuators:

- Rear roller blind drive
- Trunk lid power latch motor
- Fuel tank flap lock actuator

Instrument Cluster Control Module J285

A new instrument cluster has been developed for the 2011 Audi A8 which meets the increased demands on in-car displays and the requirements of various driver assistance systems.

A high-resolution 7" Driver Information System display is located directly within the driver's field of vision. It has an excellent resolution of 800 x 480 pixels.

460_003

The displays for coolant temperature and tank capacity are arranged in a modern bar graph display. The round gauges and bar graph displays are mounted in chrome bezels and are highlighted by a special light in the 3D dial faces

The gauges still have LED rings to signal ACC set speed and the tachometer's red zone. The gauge dials rest in the six o'clock position.

The center display in the cluster offers superb contrast, brightness, and true color. The homogeneous white scale and red dial illumination create an eye-appealing yet clearly functional data display. Combined lighting intensity can be regulated manually and is adapted automatically to ambient brightness levels by a built-in light sensor.

Warning lamps are also arranged in an ergonomically favorable position below the display, directly within the driver's field of vision.

Analog Clock

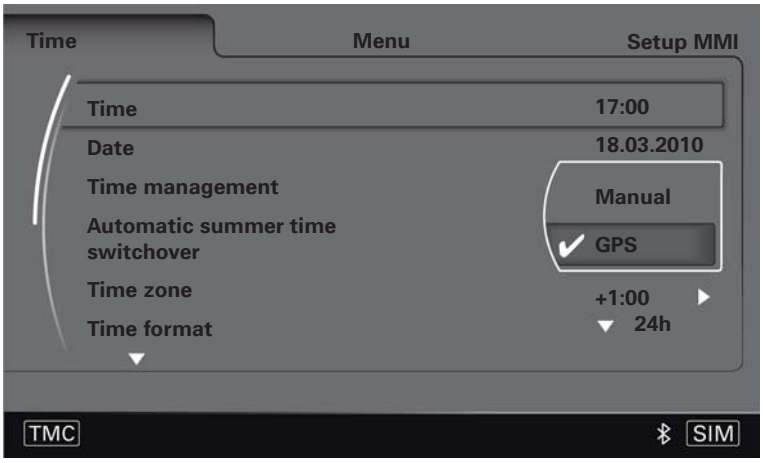
Installed in the center console, the analog clock communicates with the instrument cluster via a LIN bus.

When the ignition is switched ON, the analog clock continuously receives signals from the instrument cluster. When the ignition is switched OFF, the clock continues to operate independently.

460_004

Clock time can be set manually on the MMI. If the vehicle has a navigation system, the instrument cluster can also use the clock time from the navigation system, which acquires its time information from the GPS signal.

The instrument cluster can be configured to use either the manually entered time or the navigation system time under the "Time management" menu option on the MMI.



460_005

Driver Information System Operation and Display

An innovative operating and display system for driver information debuts on the 2011 Audi A8. The complete display area of the multifunction display is subdivided into three sections. The taskbar is located in the top section of the display.

The taskbar is used to select which information is to be shown in the center section of the display. The bottom section of the display contains a status bar, which presents basic information, such as temperature, time, selected gear, trip mileage, and total mileage.

460_006

Taskbar

The taskbar can display up to six tabs, depending on trim level. The tabs are assigned to the following content:

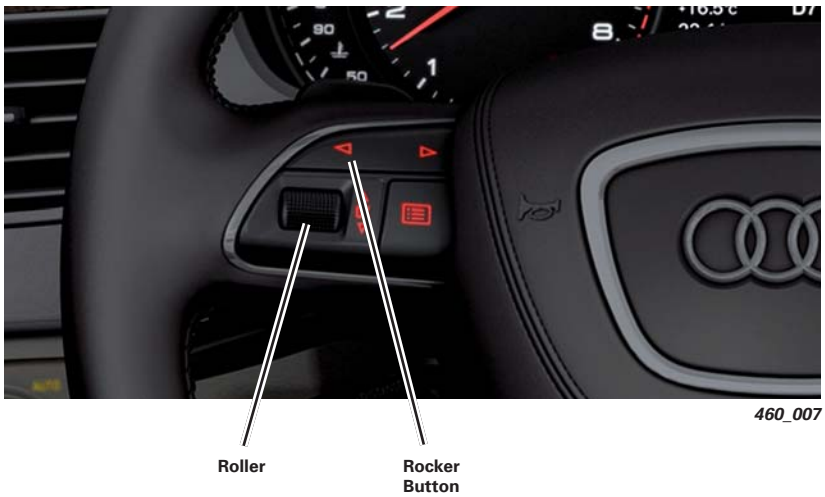
First tab:	Vehicle functions
Second tab:	Warning lamps and driver information
Third tab:	Night Vision Assist control module
Fourth tab:	Audio systems
Fifth tab:	Telephone
Sixth tab:	Navigation

Operation

The driver has special controls on the standard multifunction steering wheel for operating the driver information system.

The rocker button can be used to go from one tab to the next. Push the roller to select a tab.

The roller button is used to scroll through display menus, and pushed to make a selection.

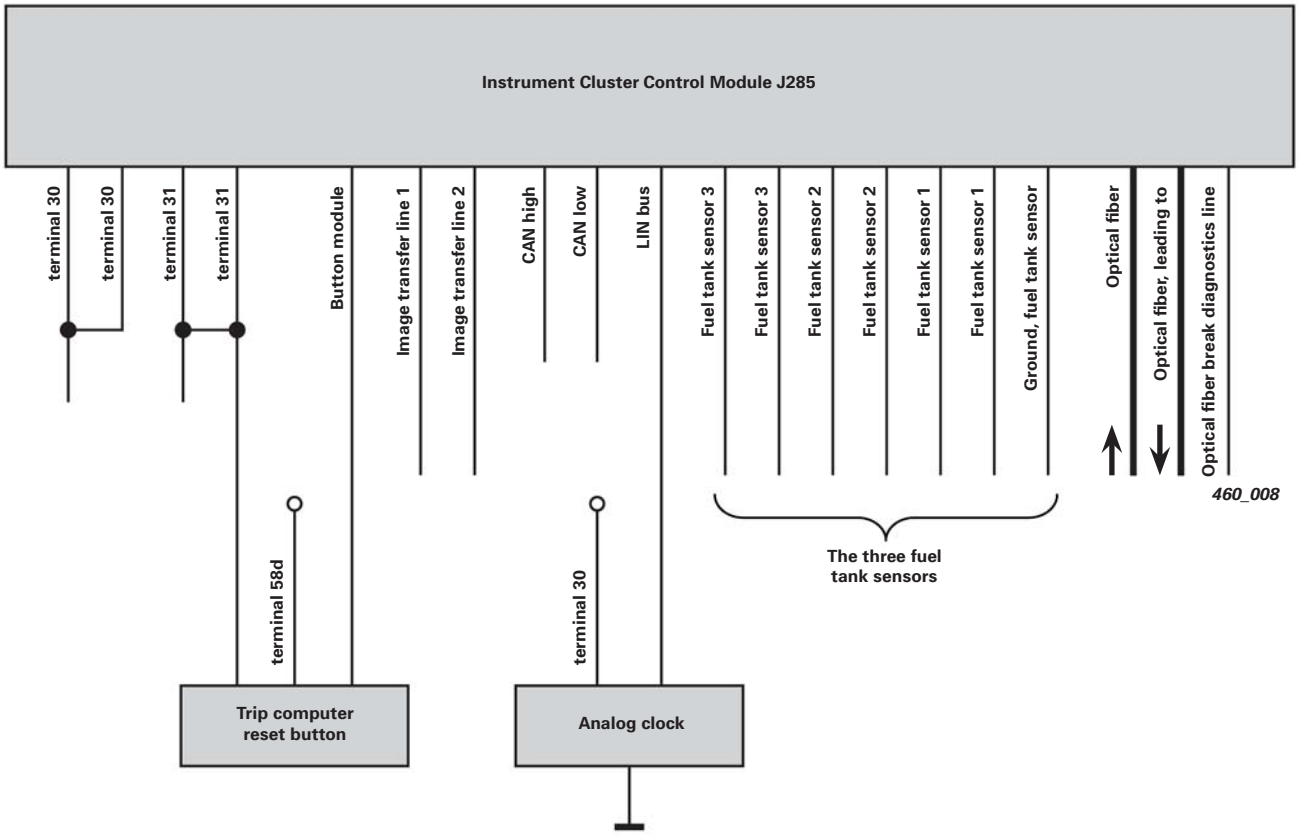


460_007

Note

The second tab is only shown if at least one warning lamp or one item of driver information is on display. Display of the Night Vision Assist tab indicates if the system is ON or OFF.

Terminal Diagram of Instrument Cluster Control Module J285



Fiber Optics

To display high resolution graphics of the navigation system, Instrument Cluster Control Module J285 is connected to the MOST bus. The higher bit rate of the MOST bus makes it possible to display high resolution images, such as detailed road intersection images.

Ring-Break Diagnostic Line

Since the instrument cluster is a MOST bus user, it requires a ring break diagnostic line for diagnosis purposes.

Image Transfer Line

Both analog image transfer lines are required for the transfer of images from Night Vision Assist. These images are recorded by the thermal imaging camera of the Night Vision Assist and are shown on the Driver Information System display.

LIN bus

The instrument cluster communicates with the analog clock in the center console via the LIN bus.

CAN Lines

The instrument cluster communicates with other control modules via the two lines of the Display and Control CAN bus.

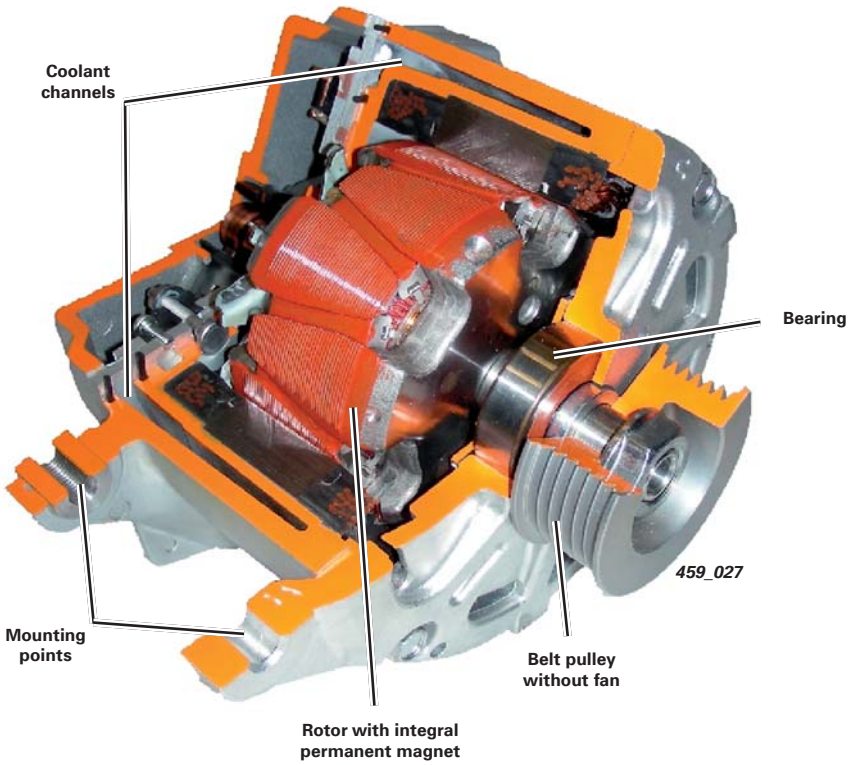
Alternator C

The 2011 Audi A8 uses a second generation water-cooled alternator. It has a rated output of 210A, is more efficient, and reduces fuel consumption.

This alternator does not require a cooling fan, which means that the engine uses no power to overcome the air resistance associated with fan-equipped air-cooled alternators.

Summary Information	
Description	Alternator C
Installation Location	Right side of the engine at the bottom; driven by the central poly-V belt
Function	Charging vehicle battery
Diagnosis Address Word	None, LIN slave, readings and diagnosis performed via Data Bus On Board Diagnostic Interface J533 (master)

Design



Reference

More information on the water-cooled alternator can be found in Self-Study Program 921403, *The 6.0L W12 Engine in The Audi A8L*.

Energy Recuperation

Energy recuperation refers to the recovery and storage of kinetic energy developed when the vehicle is braking or the engine is in overrun. The “free” or surplus energy produced is recovered and stored in the vehicle battery.

Method of Operation

The energy recuperation function is an essential part of electrical energy management conducted routinely by Data Bus On Board Diagnostic Interface J533. There are two different energy recuperation operating modes.

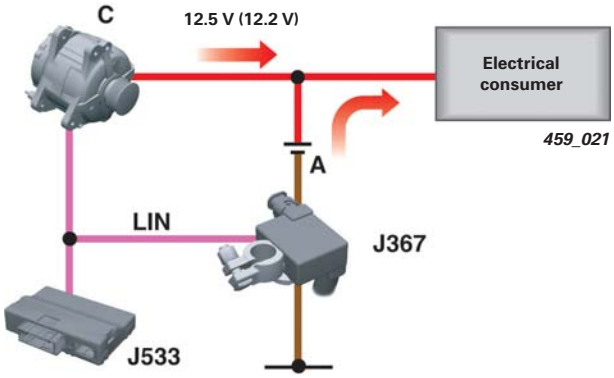
Power Transmission Mode: Battery is Discharged

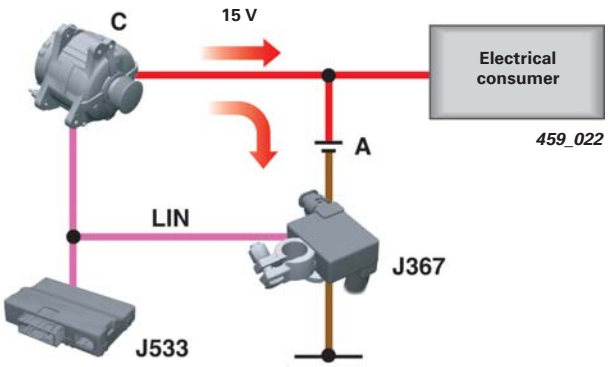
When the engine is transmitting power to the drivetrain, the alternator output voltage is lowered to a level below the battery voltage (12.5 V) and the alternator’s current output drops. This reduces the load on the engine so that fuel consumption and, consequently, CO2 emissions are reduced.

During this phase, the battery takes over power supply to the electrical system.

Overrun Mode: Battery is Charged

In contrast to drive transmission phases, engine overrun phases raise alternator voltage, recharging the battery.





Key: A Battery J367 Battery Monitoring Control Module
C Alternator J533 Data Bus On Board Diagnostic Interface

There are several pre-conditions (statuses) for energy recuperation:

- Battery temperature
- Electrical system load
- Battery condition
- Engine load
- Coolant temperature
- Air conditioning system
- Lighting system

In addition, neither production or transport mode can be active.

Alternator Testing

Before an alternator test, the following checks should be performed:

- Attachment of terminals
- Tension of alternator drive belt
- Alternator attachment
- “terminal 30” connection on alternator
- Ground connections

When testing the alternator with a VAS Scan Tool, the lights must be switched ON so the test results cannot be distorted by energy recuperation. With the lights ON, the alternator makes sure that a charging voltage of at least 13.5 volts is provided.

Note

When performing an alternator test, the headlights must not be covered by a protective mat. Otherwise, there is a risk of overheating.

Light Switch

Through the use of advanced bus technology, the number of light switch connections has been reduced from eight on earlier Audi A8 models to four on the 2011 Audi A8.

Function

The light switch can be set to one of four possible positions:

0 Lights are OFF. In some countries the Daytime Running Lights (DRL) are switched ON at “terminal 15 on”

AUTO The headlights are switched ON and OFF automatically according to light sensor readings

 Side lights

 Low beam headlights

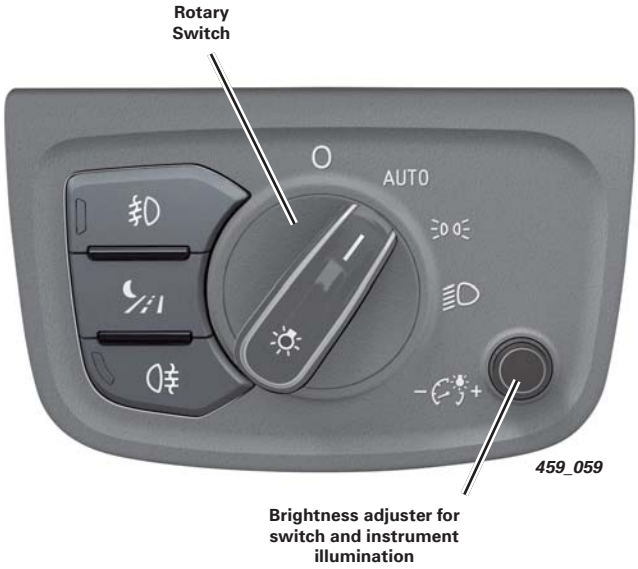
Electrical Connections and Circuitry

The rotary switch position, button positions, and the instrument illumination adjuster setting are read by Vehicle Electrical System Control Module J519 via the LIN lead.

In addition, all commands for switch illumination and the individual function indicator lamps are communicated to Light Switch E1. A redundant back-up lead is connected to ground via an electronic circuit inside the switch and is used to check the plausibility of switch settings.

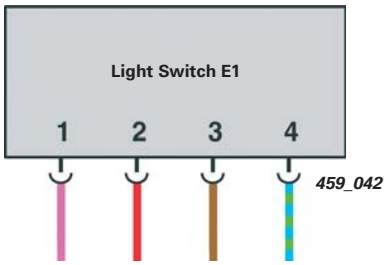
If there is a short circuit on the LIN or in a redundant back-up lead, the lighting system safe mode (“low beam headlights on”) is activated by J519 and a corresponding fault is registered in fault memory.

Summary Information	
Description	Light Switch E1
Installation Location	Driver’s side of the instrument panel
Function	Communicating driver’s desired light settings to Vehicle Electrical System Control Module J519
Diagnosis Address Word	None, LIN slave, readings and diagnosis performed via J519 (master)

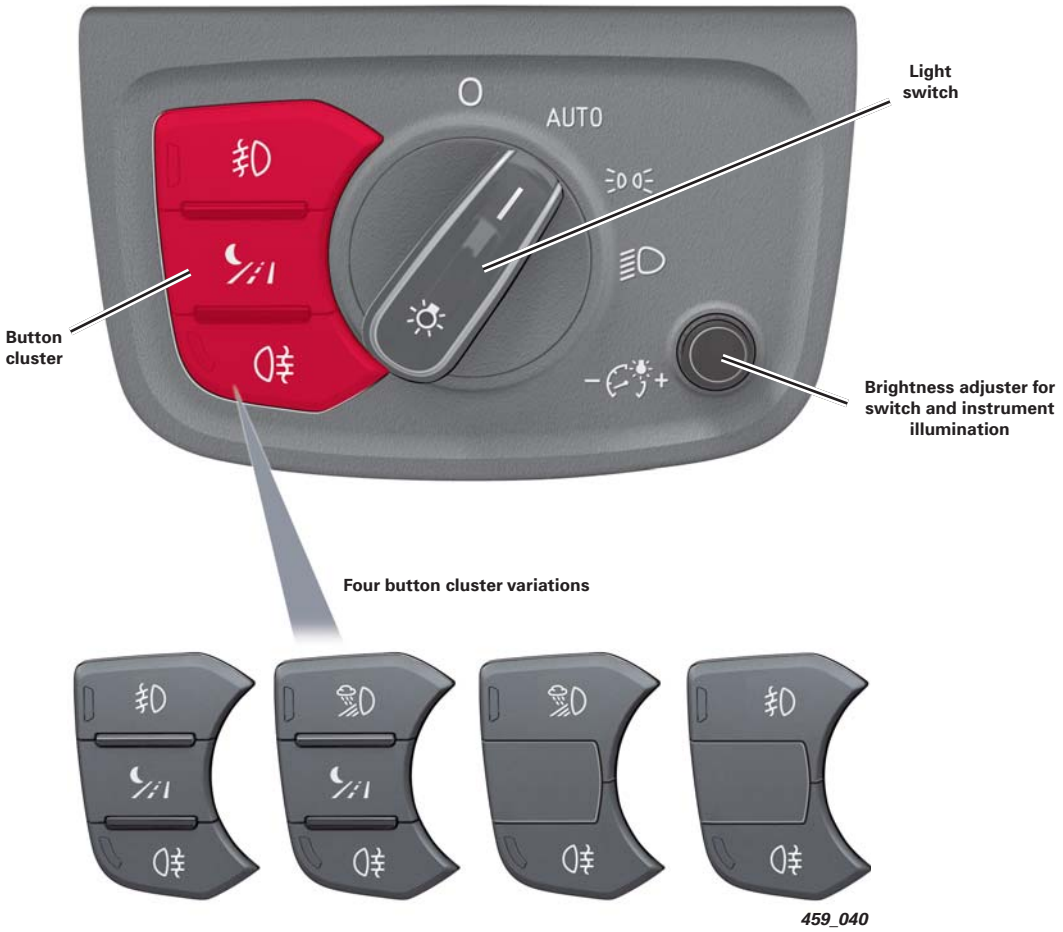


Connections:

- Pin 1 LIN (J519)
- Pin 2 “terminal 30”
- Pin 3 “terminal 31”
- Pin 4 Redundant back-up lead (J519)



Button Cluster



Button Functions

The appearance of the button cluster on the light switch can vary depending on the equipment level of the vehicle.

Reference

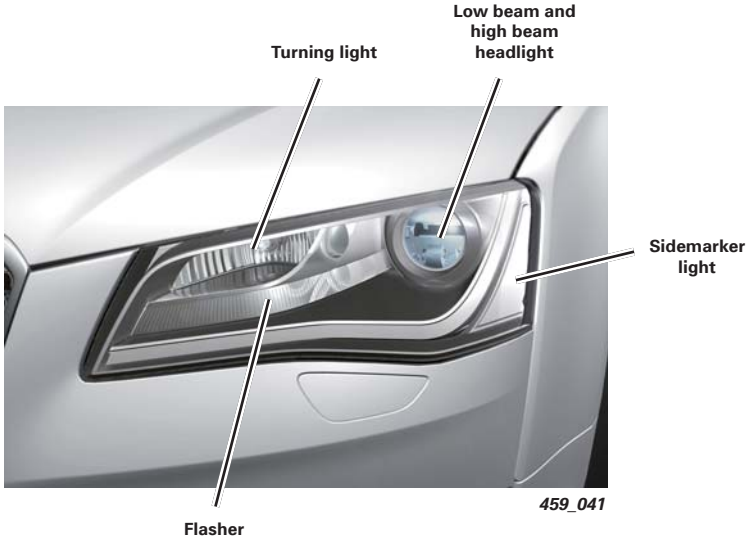
To learn more about the design and function of Night Vision Assist, refer to Self-Study Program 970203 *The 2011 Audi A8 Driver Assistance Systems*.

Headlights

Two types of headlights are available on the 2011 Audi A8:

– Xenon Plus with adaptive headlights
– LED headlights (delayed introduction)

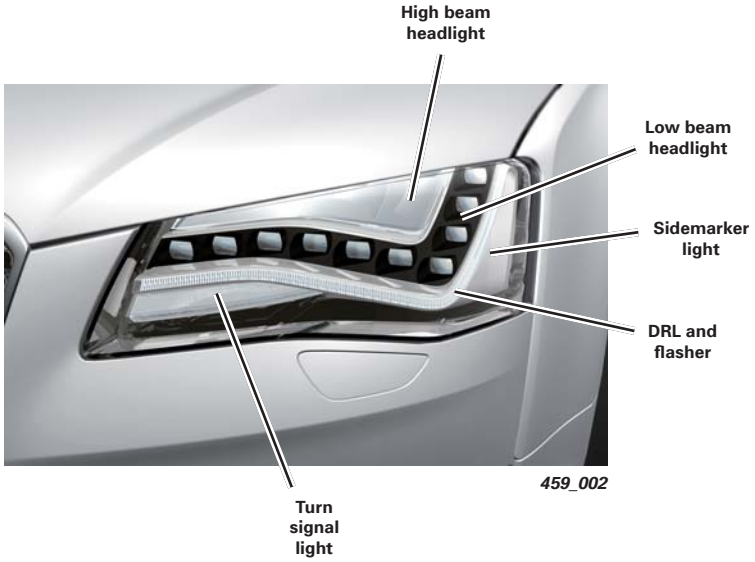
Xenon Plus with Adaptive Headlights



LED Headlights (delayed introduction)

LED lighting requires considerably less electrical draw from the vehicle's battery system than non-LED headlight systems.

The use of LEDs in headlights also offers entirely new solutions for all-weather and nighttime driving situations. Because the LED headlight unit is capable of all light functions, there are no separate fog lights.

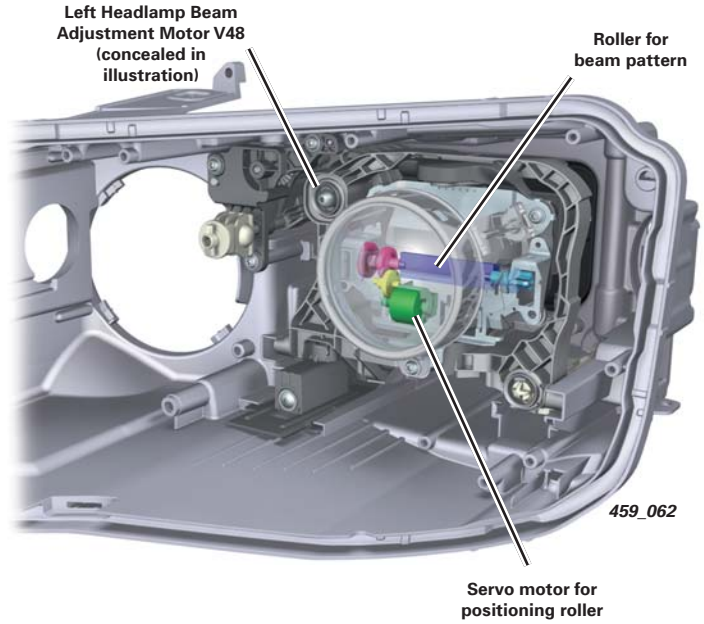


Xenon Plus with Adaptive Headlights Functions

Light Function	Type of Light Used	Power
Side light	20 LEDs, dimmed	4 watts
Daytime Running Light	20 LEDs	11 watts
Flasher	Light bulb (PSY24W)	24 watts
Low beam headlight	Gas discharge lamp (D3S)	35 watts
High beam headlight	Gas discharge lamp (D3S)	35 watts
Turning light	H7 light bulb (long life)	55 watts
Sidemarker light	3 LEDs	Approx. 1 watt

Implementation of Lighting Functions

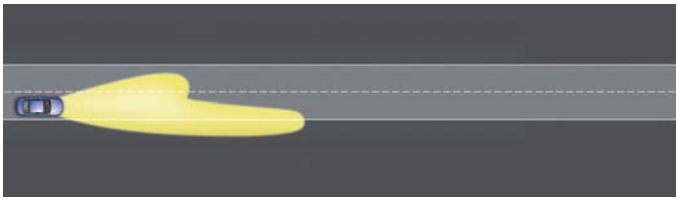
On vehicles with adaptive headlights, a roller is located in the headlight unit. The roller has different profiles around its circumference. A servo motor turns the roller to produce different headlight functions.



Implementation of Lighting Functions

Low Beam Headlights

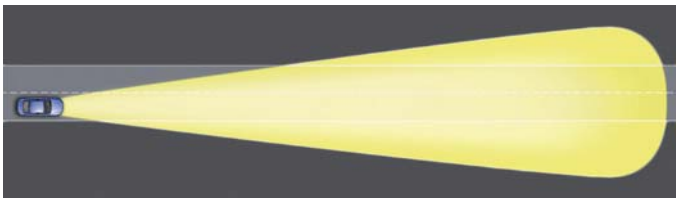
Asymmetrical low beam produced by gas discharge lamp and lens.



459_052

High Beam Headlights

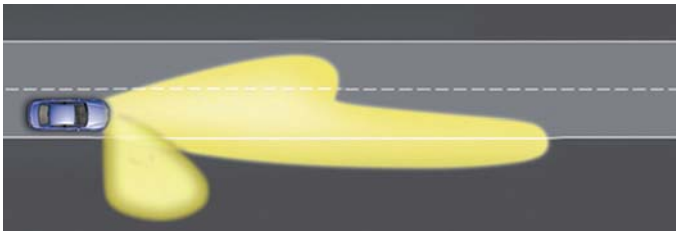
Symmetrical high beam produced by a gas discharge lamp, roller, and lens. Activated by operating the high beam stalk.



459_053

Turning Beam

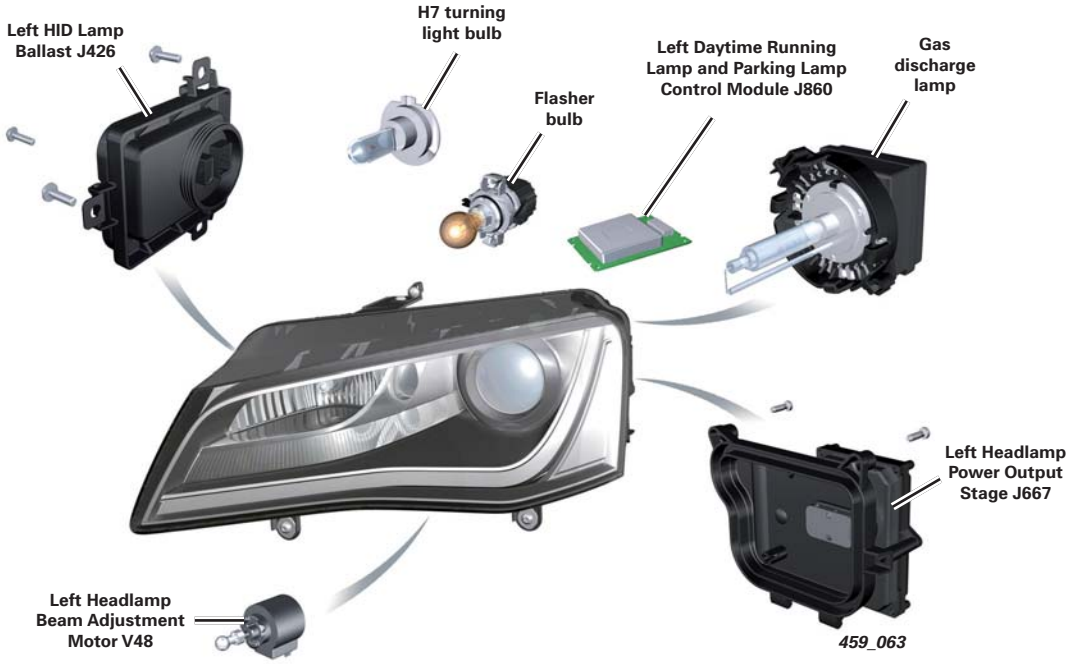
The turning beam is produced by an H7 bulb. It is activated at speeds under 43.4 mph (70 km/h) when the steering wheel is turned more than a pre-specified amount, or when the turn indicator is ON at speeds under 24.8 mph (40 km/h).



459_080

Components

In addition to replaceable headlight components such as caps, repair tabs, screws, and venting devices that are features of all headlight units, the adaptive headlights also have the specific replaceable components illustrated below.

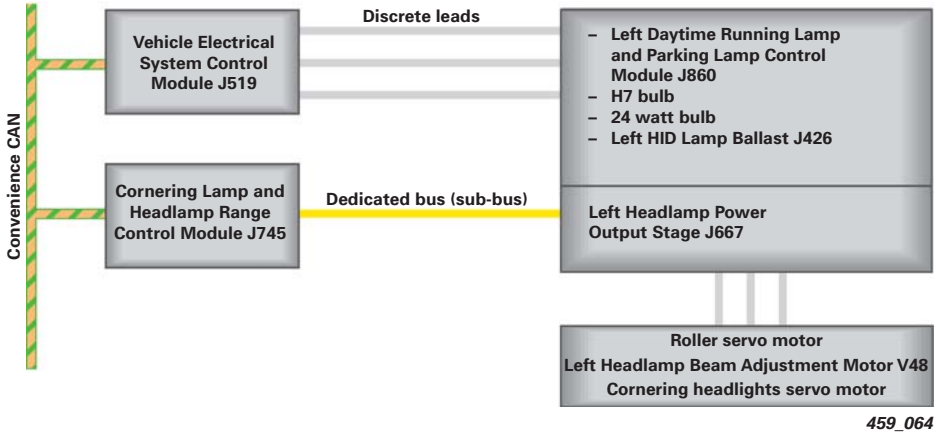


Operation

The LED control module, the H7 light bulb, and the 24-watt bulb are operated discretely by Vehicle Electrical System Control Module J519. Cornering Lamp and Headlamp Range Control Module J745 operates Left Headlamp Power Output Stage J667 via a dedicated CAN.

J667 operates the roller servo motor, the beam-height adjustment servo motor, and the cornering headlights servo motor via discrete leads.

Schematic Diagram of Operation



LED Headlights

Light Function	Type of Light Used
Side light	22 LEDs (white, dimmed)
Daytime Running Light	22 LEDs (white)
Flasher	22 LEDs (orange)
Low beam	16 LEDs (6 x twin LED chips + 4 individual LEDs)
High beam	8 LEDs (2 x quadruple LED chips)
Highway beam	4 LEDs (1 x quadruple LED chip)
Turning beam	4 LEDs (1 x quadruple LED chip)
All-weather beam	18 LEDs (14 from low beam + 4 from turning beam)
Driving abroad beam	13 LEDs (13 from low beam)
Sidemarker light	3 LEDs

Daytime Running Lights (DRL)

The daytime running lights and side lights are formed by 22 white LEDs. They are activated by a pulse-width modulation (PWM) signal.

459_065

Low Beam Headlights

The low beam headlight consists of 10 separate LED modules containing either single or twin LED chips.

459_066

Flasher

The flasher is comprised of 22 orange LEDs housed in the same space as the daytime running light LEDs. While the flasher is operating, the daytime running light LEDs are switched OFF.

The LEDs for the flasher are supplied with a higher current due to legal requirements. For this reason, Left LED Headlamp Power Output Module 5 A35 is also installed.

459_067

High Beam Headlights

The high beam function is performed by two reflector sections, each with a quadruple LED chip.

459_068

Highway Beam

To produce the highway beam, a separate section containing a quadruple LED is switched ON in addition to the low beam. The highway beam is activated if a vehicle speed of 68.3 mph (110 km/h) is exceeded for an extended period or immediately if a speed of 86.9 mph (140 km/h) is exceeded.

459_069

Turning Beam

The turning beam is produced by supplementing the low beam by switching ON a quadruple LED chip. This chip is located below the daytime running light, and illuminates the turning zone with the aid of a reflector.

The pre-condition for switching this chip ON is either the flasher is ON in conjunction with a vehicle speed under 24.8 mph (40 km/h), or the steering wheel is turned more than a pre-specified amount while vehicle speed is under 43.4 mph (70 km/h).

459_070

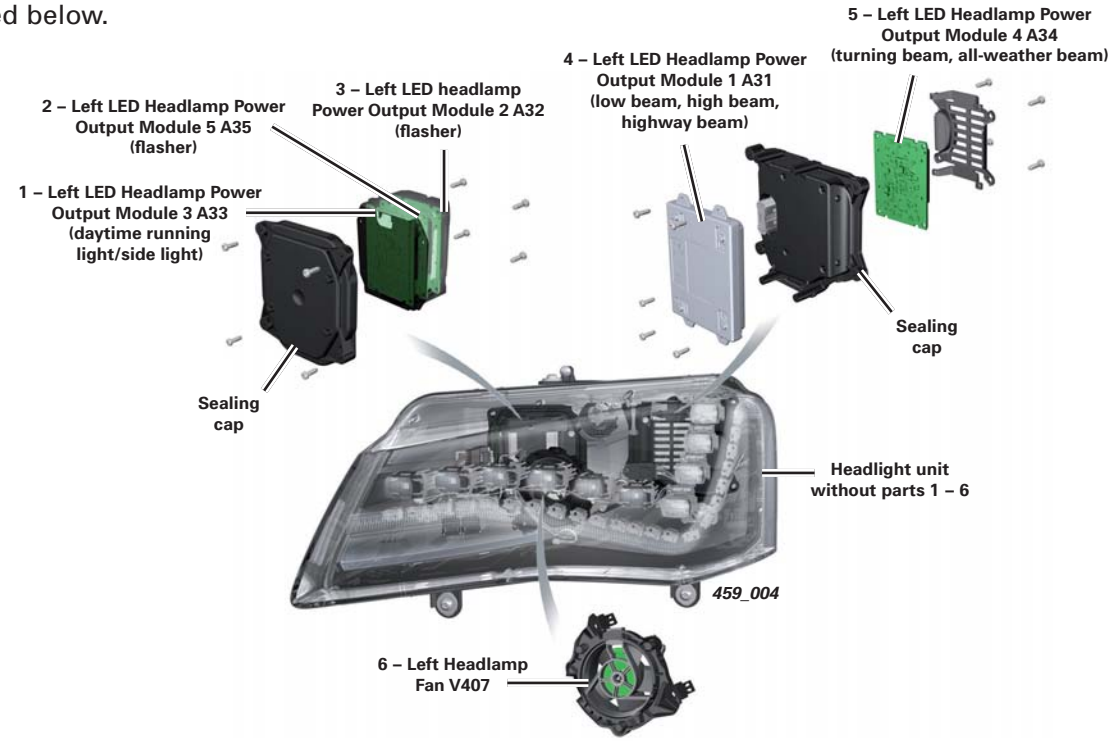
All-Weather Beam

The all-weather beam, which is activated by a button next to the light switch, is created by the same lights as the low beam. The only difference is that the top two low beam LEDs are switched OFF for this function.

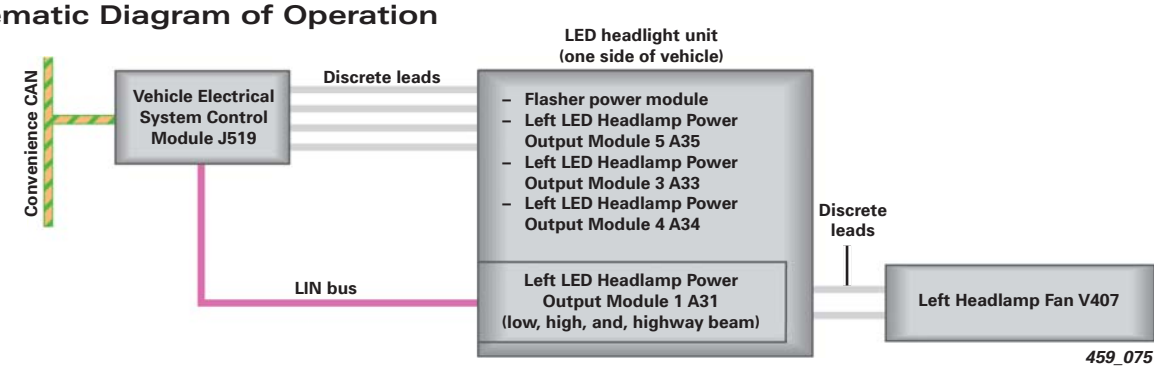
459_071

LED Headlight Components

In addition to the replaceable headlight components such as caps, repair tabs, screws, and venting devices that are features of all headlight units, the LED headlight units also have the specific replaceable components illustrated below.



Schematic Diagram of Operation



The function modules for flashers, daytime running lights/side lights, and turning/all-weather beam are controlled by Vehicle Electrical System Control Module J519 via discrete leads. Left LED Headlamp Power Output Module 1 A31 for low, high, and highway beam is a LIN slave of J519.

This power module operates the headlight unit fan, once again via discrete leads. The fan is activated by “terminal 15 on” and then runs constantly until “terminal 15” is switched OFF again.

Note

Caution! Electrostatic discharge (ESD) protection must be ensured when performing work of any kind on the headlight unit and especially when replacing the internal components. Special Tool VAS 6613 is available for this purpose, see page 60.

Rear Lights

All rear light functions of the 2011 Audi A8, except the back-up lights, are implemented by LED units. One-half of the rear light cluster is incorporated in the fender while the other half is mounted in the trunk lid.

Rear light operation is controlled by Comfort System Central Control Module J393.

The LED units of the tail lights cannot be replaced separately. Only the 16-watt (HP16W) back-up light bulb located in the outer portion of the light cluster can be replaced separately.

Tail Lights

The tail lights are formed by a total of 30 LEDs, of which 12 are in the fender mounted portion of the light cluster and 18 in the trunk lid half.

The LEDs are also supplemented by a fiber-optic conductor to reinforce the impression of a continuous strip of light from all angles.

459_048

Brake Lights

The brake lights are formed by a total of 72 LEDs.

459_049

Brake Light with Rear Fog Light

(not illustrated)

If the rear fog light is switched ON at the same time, the center section of the five brake light sections is switched OFF by Comfort System Central Control Module J393. This provides the legally stipulated separation of 3.9 in (100 mm) between brake light and fog light.

In addition, the top outer light strip section is switched OFF and the light strip dimmed to tail light level.

Flasher

All 72 of the LEDs are used for the flasher function.

459_050

Rear Fog Light

The seven LEDs in the upper strip perform the rear fog light function. If the rear flasher function is activated at the same time as the fog lights, only the flasher LEDs in the side panel half of the light cluster are activated in order to prevent thermal overload.

Back-Up Light

The back-up light with its conventional 16-watt long-life bulb is located in the fender mounted portion of the light cluster.

459_051

Description	Type and Power
Back-up light	1 x HP16W, 16 watts
Tail light	30 LEDs, approx. 10 watts
Rear fog light	17 LEDs, approx. 4 watts
Brake light	72 LEDs, approx. 23 watts
Turn signal indicator	72 LEDs, approx. 23 watts
Reflector	—
Sidemarker light	1 LED, approx. 3 watts

Ambient Lighting

Introduction

The 2011 Audi A8 features a completely new interior lighting design. The central interior light in the headliner has been replaced by several optical fibers and lights distributed throughout the vehicle. The new interior lighting ranges from the purely functional to emotional and timeless.

In the optional ambient lighting package, the light bands in the headliner come in two different colors, while the ambient lighting below the shoulder comes in three different colors. Depending on choice of light color (polar white, ivory white, or ruby red), different atmospheres are created inside the vehicle.

Overhead module with optical fiber *460_016*

Seat up-light (reading light) *460_033*

Optical fiber between grab handles *460_034*

Lighting Scenarios

The following three color profiles are available for the ambient lighting:

Color: Polar White (cool white tone)

Character of light: technical, formal, unemotional, and precise, accentuates high-quality design elements

460_010

Color: Ivory White (warm white tone)

Character of light: warm and inviting, creates a feel-good atmosphere

460_011

Color: Ruby Red (cool white and red tone)

Character of light: sporty and progressive, stark contrast between two different tones

460_012

Ambient Light Module

Comfort System Central Control Module 2 J773 is referred to as the ambient light module. It is the master controller of ambient light in the 2011 Audi A8, and is only installed if the vehicle is ordered with the optional ambient lighting package.

J773 activates various ambient lights. Other ambient lights are activated by the roof electronics and door control modules, which receive corresponding commands from J773 via the CAN bus.

The brightness level of the ambient lighting can be set by the driver on the MMI. The desired brightness level can be set by adapting the duty cycle of the pulse-width modulation (PWM) signal accordingly.

Diagnostics of the Ambient Lighting

LEDs are “warm-state” monitored by J773. They are diagnosed only when the ambient lighting is ON.

Diagnostics

J773 is accessed under Address Word 6F using the VAS Scan Tool. The following functions are available:

Output Check Diagnosis

– Selective output test for selected ambient lights
– Group output test for all ambient lights

Measuring Value Blocks

– Current duty cycle of PWM signal of ambient lights (given as a percentage)
– Measured electrical current of the ambient lights per control module output

DTC Fault Memory

The following diagnostic trouble codes can be stored in fault memory per control module output:

– Open circuit or short circuit to positive
– Short circuit to ground

Ambient Lights Connected to J773

The following table gives a summary of all lights connected to Comfort System Central Control Module 2 J773. All lights are available only in combination with the optional ambient lighting package.

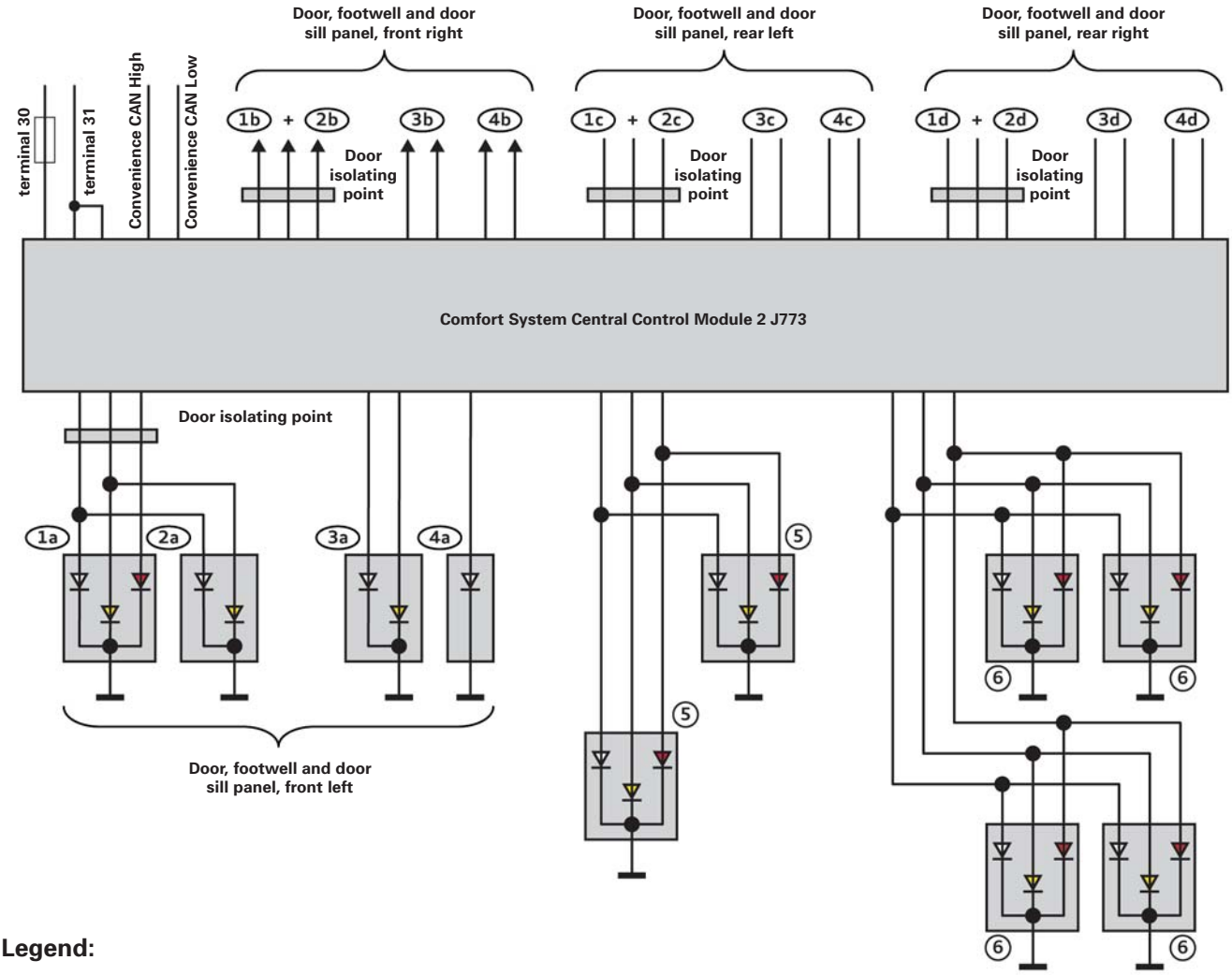
This table excludes the two front footwell lights, which are activated by Vehicle Electrical System Control Module J519 in vehicles without the optional ambient lighting package.

Service Designation	Short Designation	Tech Specs	Color(s)	Number of LEDs
Optical fiber for ambient lighting of front center console	W74	LED	Cool White, Warm White and Red	3x4[1]
Optical fiber for ambient lighting of rear center console[1]	W75	LED	Cool White, Warm White and Red	3x2
Optical fiber for ambient lighting of door sill panel, front left	W67	LED	Cool White	1
Optical fiber for ambient lighting of door sill panel, front right	W68	LED	Cool White	1
Optical fiber for ambient lighting of door sill panel, rear left	W69	LED	Cool White	1
Optical fiber for ambient lighting of door sill panel, rear right	W70	LED	Cool White	1
Lamp for ambient lighting in driver's door	L164	LED	Cool White, Warm White and Red	3[2]
Lamp for ambient lighting in front passenger door	L165	LED	Cool White, Warm White and Red	3
Lamp for ambient lighting in door, rear left	L166	LED	Cool White, Warm White and Red	3
Lamp for ambient lighting in door, rear right	L167	LED	Cool White, Warm White and Red	3
Lamp for door bin lighting, driver side	L160	LED	Cool White and Warm White	2
Lamp for door bin lighting, front passenger side	L161	LED	Cool White and Warm White	2
Lamp for door bin lighting, rear left	L170	LED	Cool White and Warm White	2
Lamp for door bin lighting, rear right	L171	LED	Cool White and Warm White	2
Footwell light, front left	L151	LED	Cool White and Warm White	2
Footwell light, front right	L152	LED	Cool White and Warm White	2
Footwell light, rear left	W45	LED	Cool White and Warm White	2
Footwell light, rear right	W46	LED	Cool White and Warm White	2

[1] Three LEDs in different colors which feed light into the optical fibers in four different positions.

[2] Three LEDs in different colors.

J773 Wiring Diagram



Legend:

- 1a Optical fiber in door
- 2a Door pocket light
- 3a Footwell lamp
- 4a Door sill panel light

Door, footwell and door sill panel, front left

- 1b Optical fiber in door
- 2b Door pocket light
- 3b Footwell lamp
- 4b Door sill panel light

Door, footwell and door sill panel, front right

- 1c Optical fiber in door
- 2c Door pocket light
- 3c Footwell lamp
- 4c Door sill panel light

Door, footwell and door sill panel, rear left

- 1d Optical fiber in door
- 2d Door pocket light
- 3d Footwell lamp
- 4d Door sill panel light

Door, footwell and door sill panel, rear right

- 5 Rear center console lighting (long wheelbase version of A8 only)
- 6 Front center console lighting

Roof Electronics Control Module J528

Other lights of the interior and ambient lighting system are connected to the outputs of Roof Electronics Control Module J528.

J528 communicates with Comfort System Central Control Module J393 via a LIN bus line.

Lights connected to the overhead module with ambient lighting:

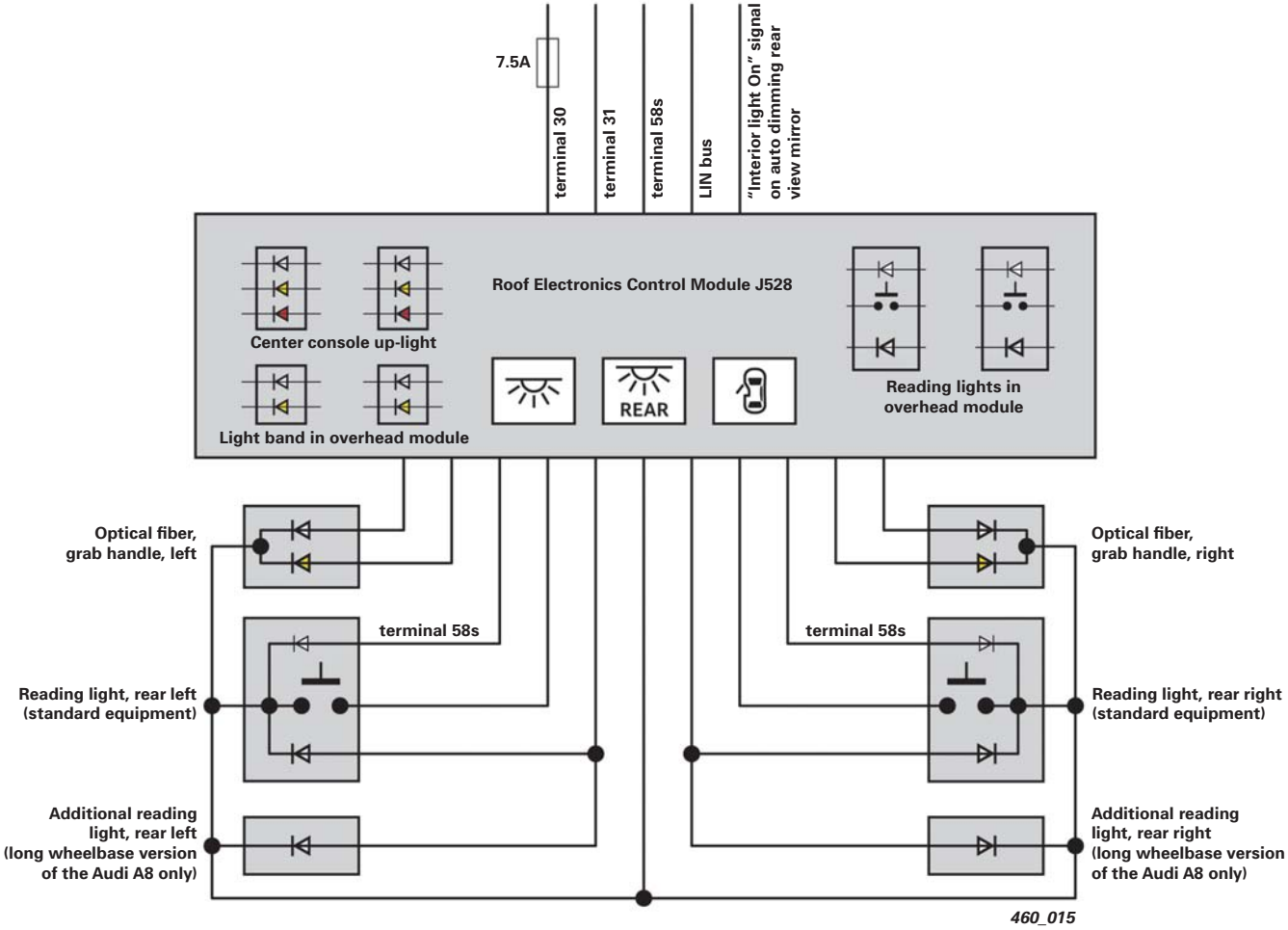
Service Designation	Technical Specs	Color(s)	Number of LEDs
Reading lights, front left	LED	Cool White	1
Reading lights, front right	LED	Cool White	1
Optical fiber for overhead module ambient lighting	LED	Cool White and Warm White	2x2
Center console up-light	LED	Cool White, Warm White and Red	3x2
Optical fiber between grab handles, left	LED	Cool White and Warm White	2
Optical fiber between grab handles, right	LED	Cool White and Warm White	2
Reading light 1, rear left	LED	Cool White	1
Reading light 1, rear right	LED	Cool White	1
Reading light 2, rear left	LED	Cool White	1
Reading light 2, rear right	LED	Cool White	1

J528 Wiring Diagram

Lights Integrated into the Overhead Module

Front right and left reading lights are mounted in the overhead module and are standard equipment. They each have a lighted button.

The light band in the overhead module and the center console up-light are also standard equipment. The light band for the ambient lighting is in two colors and the center console overhead light is in three colors. In the standard trim, both lights are a single color.



Ambient Lights Connected to the Overhead Module

Both rear reading light modules are connected to the overhead module. The long wheelbase version of the 2011 Audi A8 has two additional reading lights for the rear passenger compartment.

There are two additional optical fibers between the grab handles on the left and right sides. In combination with the ambient lighting, they come in two colors (polar white and ivory white). In standard trim, the optical fibers are in polar white only.

A discrete signal line runs from the overhead module to the auto dimming rear view mirror. The signal indicating whether the interior light is currently switched ON or OFF is sent via this line to the rear view mirror. The rear view mirror is not dimmed as long as the interior light is switched ON.

Door Control Modules J386-J389

Interior lights are also connected to the door control modules. All lights apart from the active door warning light are standard equipment.

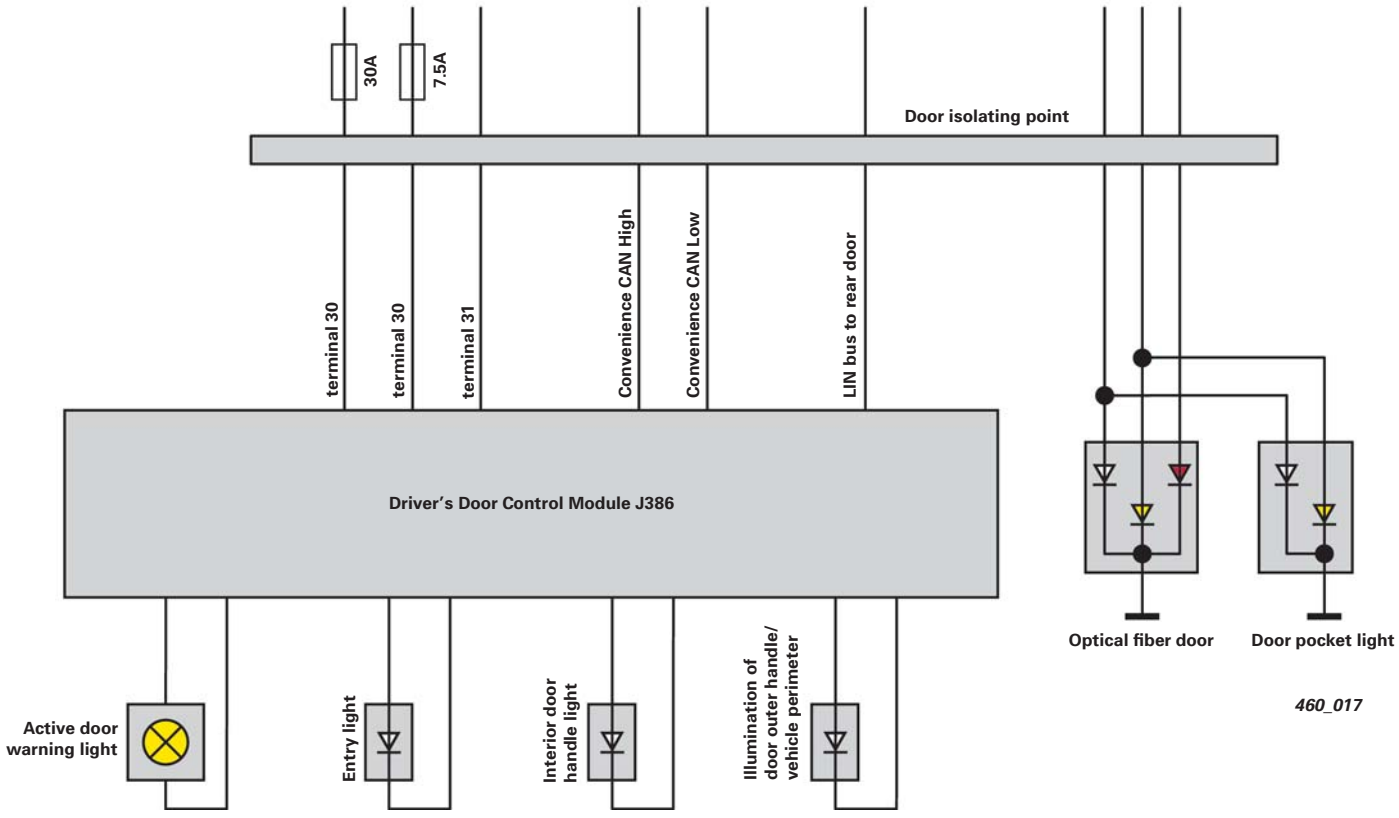
The driver door and driver side door control modules are used here as examples.

Service Designation	Tech Specs	Color	No. of Lights	Lighting Package
Door outer handle light and front lighting	LED	Cool White	1	Standard equipment
Interior door handle light	LED	Cool White	1	Standard equipment
Entry light	LED	Cool White	1	Standard equipment
Active door warning light	Lamp	Cool White	1	Ambient lighting package

Functional Diagram of Driver Door Control Module

The optical fibers and door pocket lighting are located in the driver's door, but are not activated by Driver's Door Control Module J386.

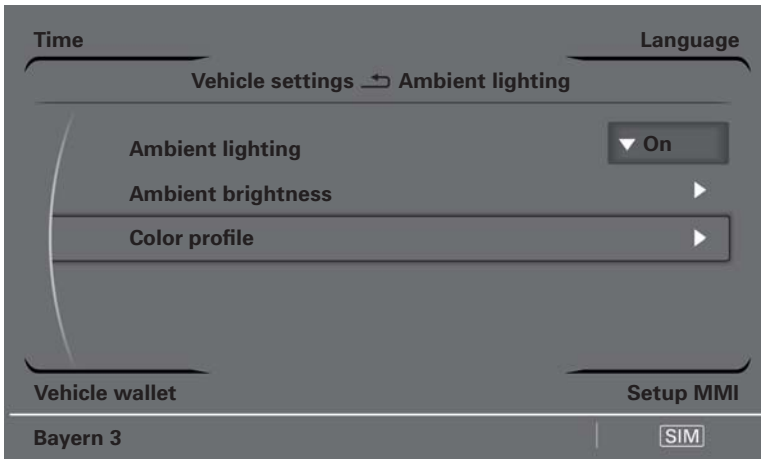
As part of the ambient lighting package, they are activated directly by Comfort System Central Control Module 2 J773.



Operating the Ambient Lighting

The ambient lighting is switched ON if the following conditions are met:

- Ignition is ON
- Low beam is ON
- Ambient Lighting menu option is set to ON at the MMI



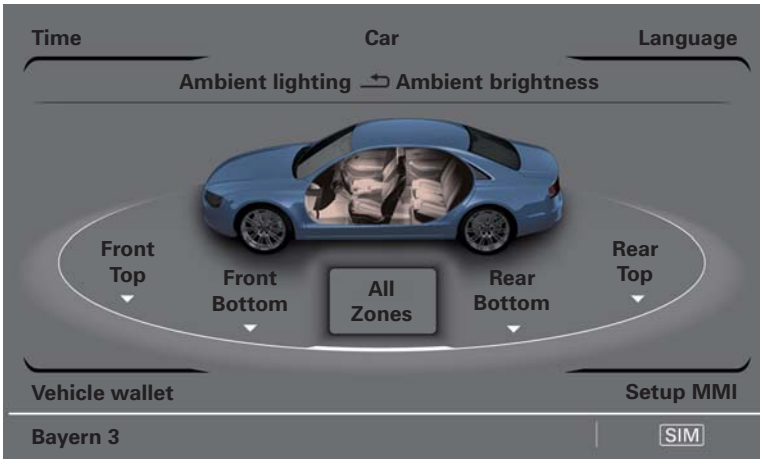
460_018

Setting the Brightness Level

The brightness of the ambient lighting can be set to different levels in four in-car zones. These are:

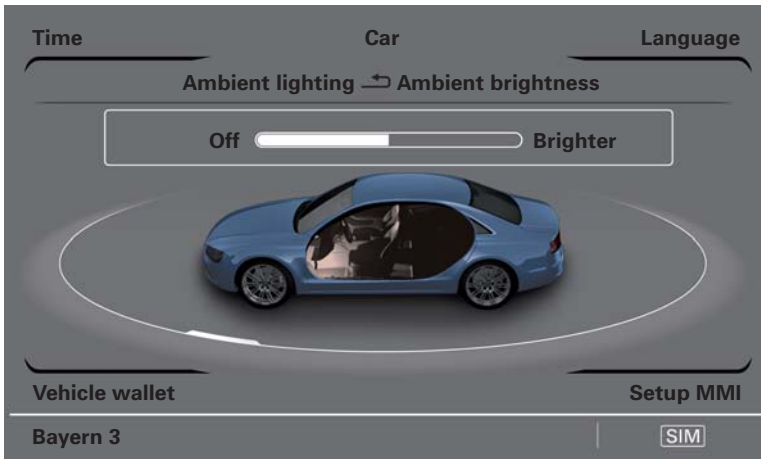
- Top front
- Bottom front
- Top rear
- Bottom rear

The All Zones menu option allows the brightness level to be synchronized in all in-car zones.



460_019

After one of the in-car zones is selected, the following brightness adjustment menu appears:

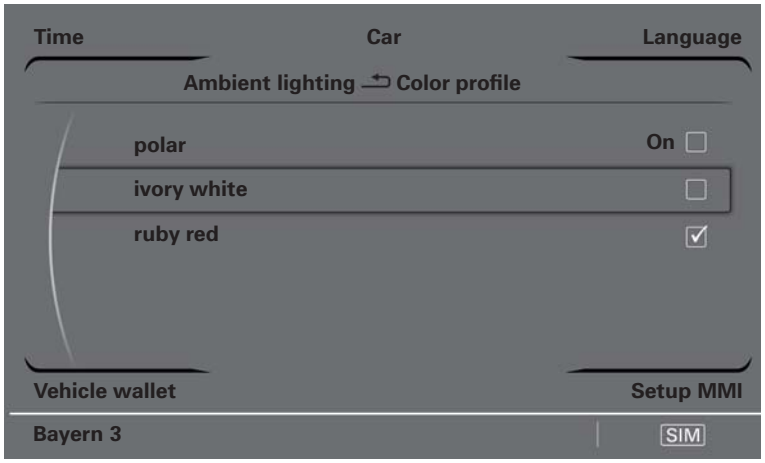


460_020

Setting the Color Profile

There is a choice of three color profiles: polar, ivory white, and ruby red. The selected color profile applies to all zones.

To ensure uniformity of appearance, the color profile cannot be adjusted separately for each in-car zone.



460_021

Customization

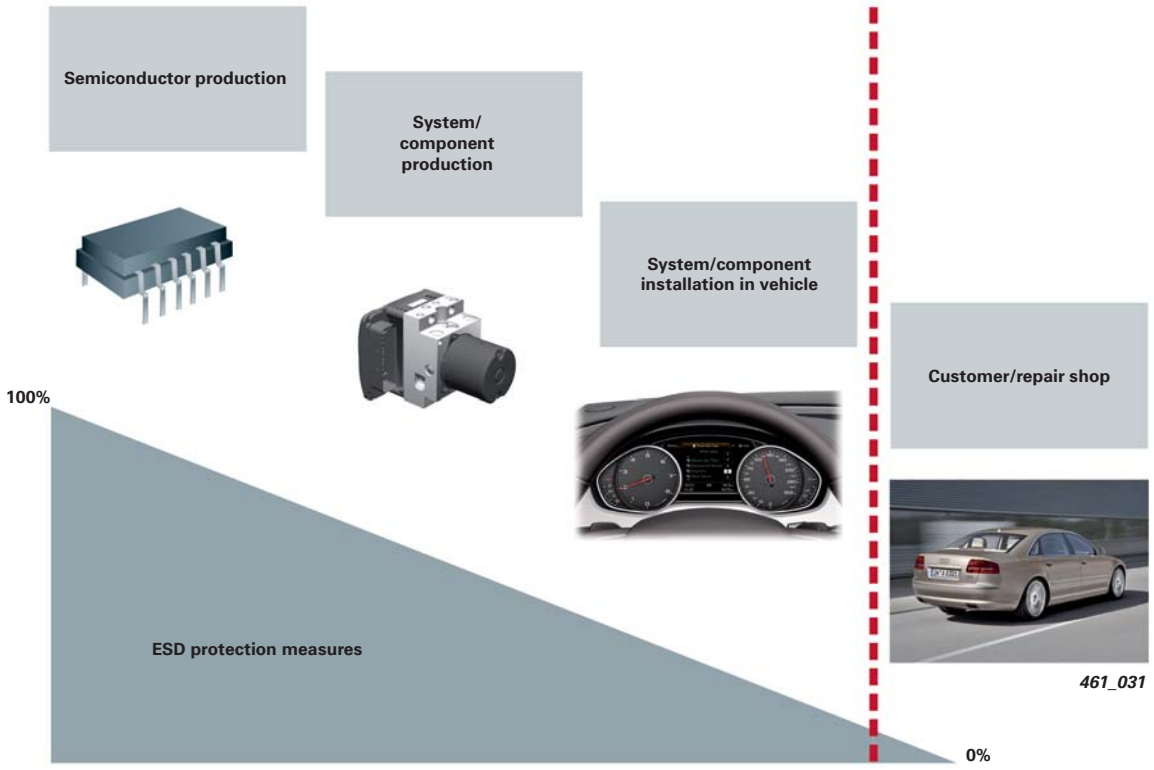
After switching OFF the ignition, the ON state, current brightness, and color profile settings of the ambient lighting are assigned to the ignition key in use and stored in Comfort Central Control Module 2 J773.

Repairing Electronic Components Using ESD Protection

Electrostatic discharge (ESD) is one of the most frequent causes of failure in semi-conductor components. Especially sensitive are integrated semi-conductor modules and LEDs which can only tolerate very low voltages.

Until now, electrostatically sensitive devices could only be replaced as complete units. The availability of Special Tool VAS 6613 now makes it possible to repair these devices.

ESD protection process chain



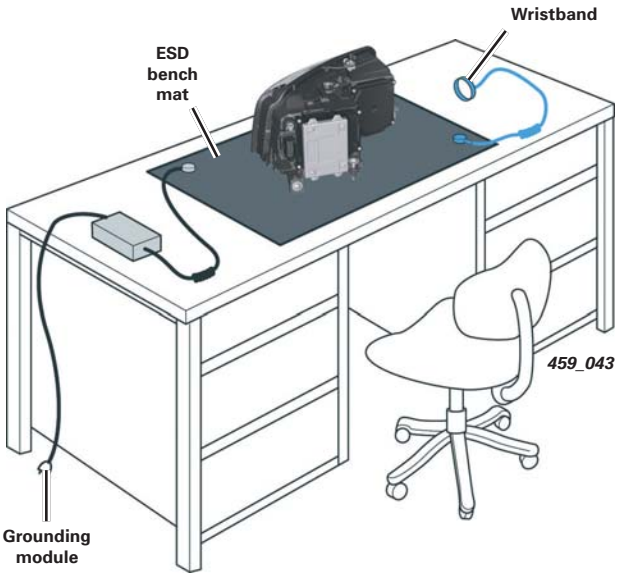
Special Tool VAS 6613

Beginning with the 2011 Audi A8, repairs to the following components will be allowed.

- LED headlight units
- Xenon Plus headlight units
- ABS Control Module J104

A pre-condition for carrying out such repairs, in addition to the greatest possible cleanliness and care, is the use of an ESD-protected workspace. This can be accomplished through the use of Special Tool VAS 6613.

The protected replacement of individual parts in electronic components is possible only in this type of “safe” workspace.

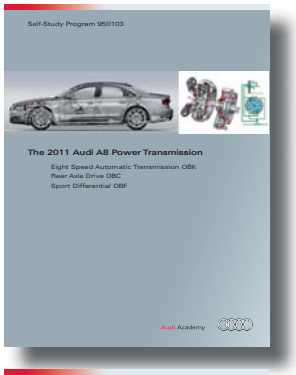


Notes

Self-Study Programs for the Audi A8

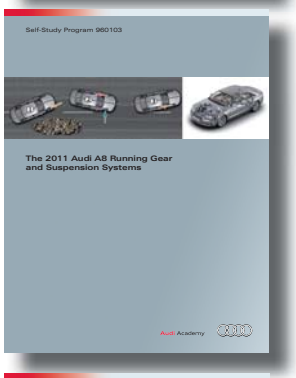
SSP 950103 The 2011 Audi A8 Power Transmission

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



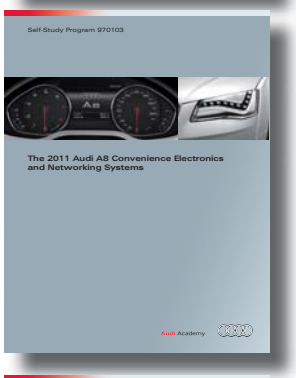
SSP 960103 The 2011 Audi A8 Running Gear and Suspension Systems

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



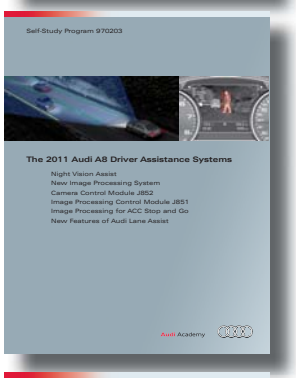
SSP 970103 The 2011 Audi A8 Convenience Electronics and Networking Systems

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



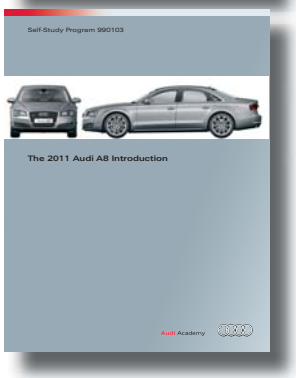
SSP 970203 The 2011 Audi A8 Driver Assistance Systems

- 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)



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 “970103 — The 2011 Audi A8 Convenience Electronics and Networking Systems”

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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