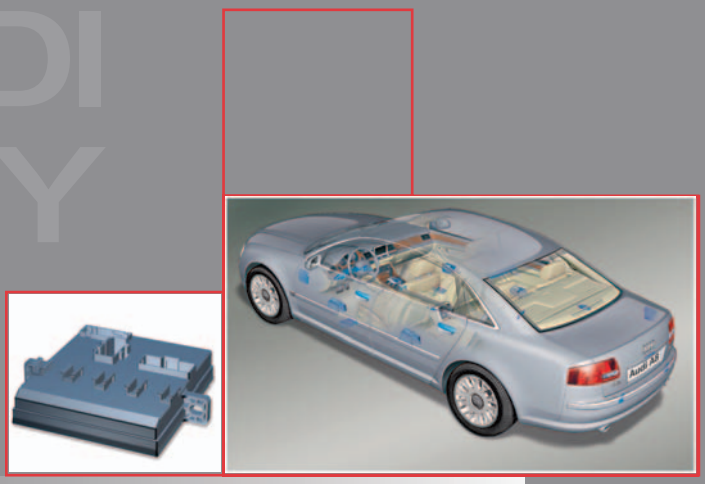
A8L Electrical Components SSP

AUDI ACADEMY



Audi Academy

Self-Study Program
Course Number 999303

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Printed in U.S.A.
Printed 03/2003
Course Number 998303

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This Self- Study Program (SSP) is not a Repair Manual!

Its purpose is to describe new design features and functions of the VAS 5051. All values given in this program are intended to facilitate your understanding of the program, and are based on the software version that was valid at the time the SSP was developed.

For service and repair work, use the current technical literature.

New!



Caution/Note!



Introduction

There are numerous new and updated electrical systems on the 2004 Audi A8L. This Self-Study Program covers changes to the following components and systems:

Data Bus Diagnostic Interface

Energy Management System

Display in Instrument Panel Insert

Comfort Systems

Rear Lid Open/Close

Inclination/Anti-Theft System

Vehicle Electrical System Module

Vehicle Electrical System Module 2

Door Control Modules

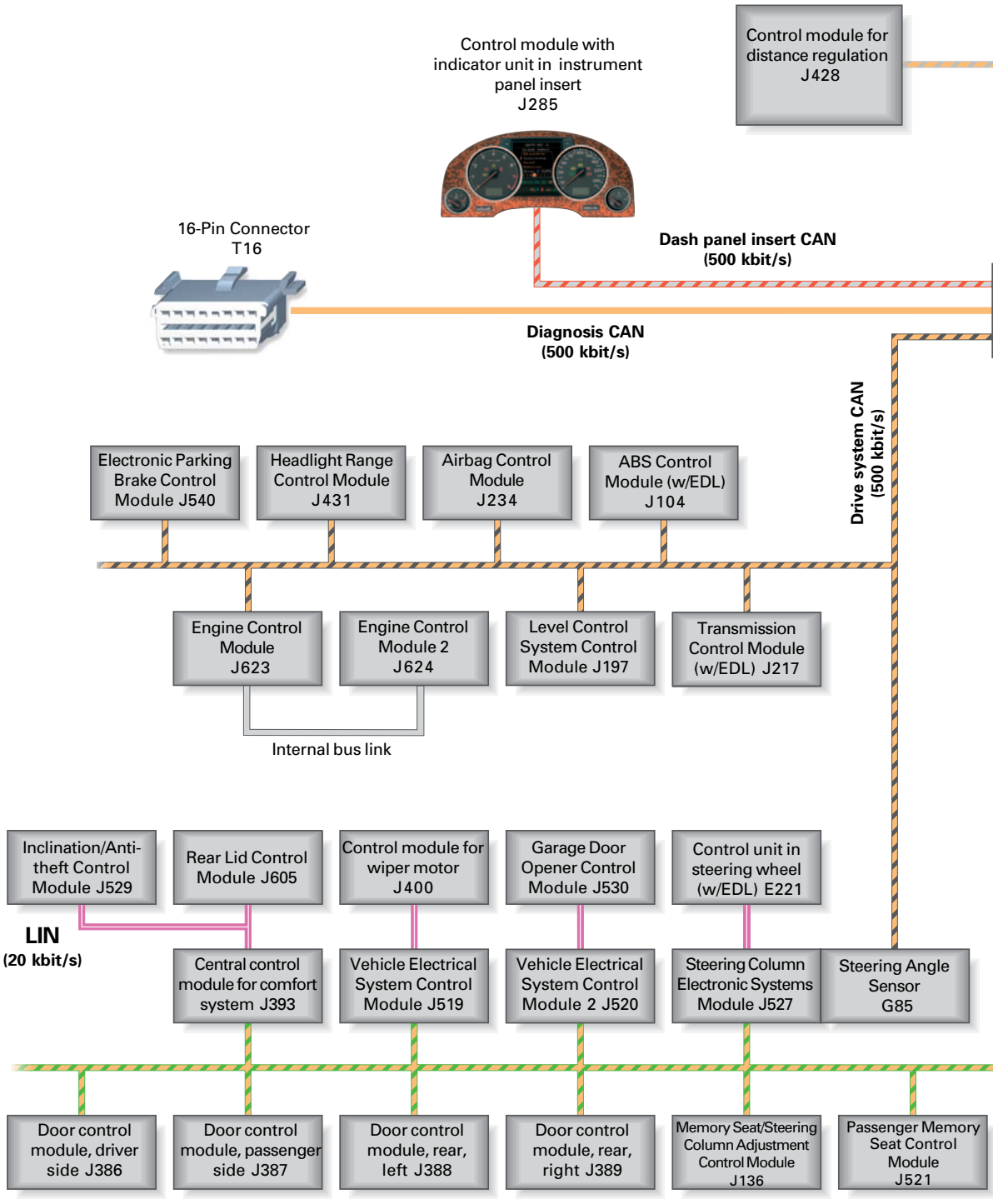
Roof Electronics

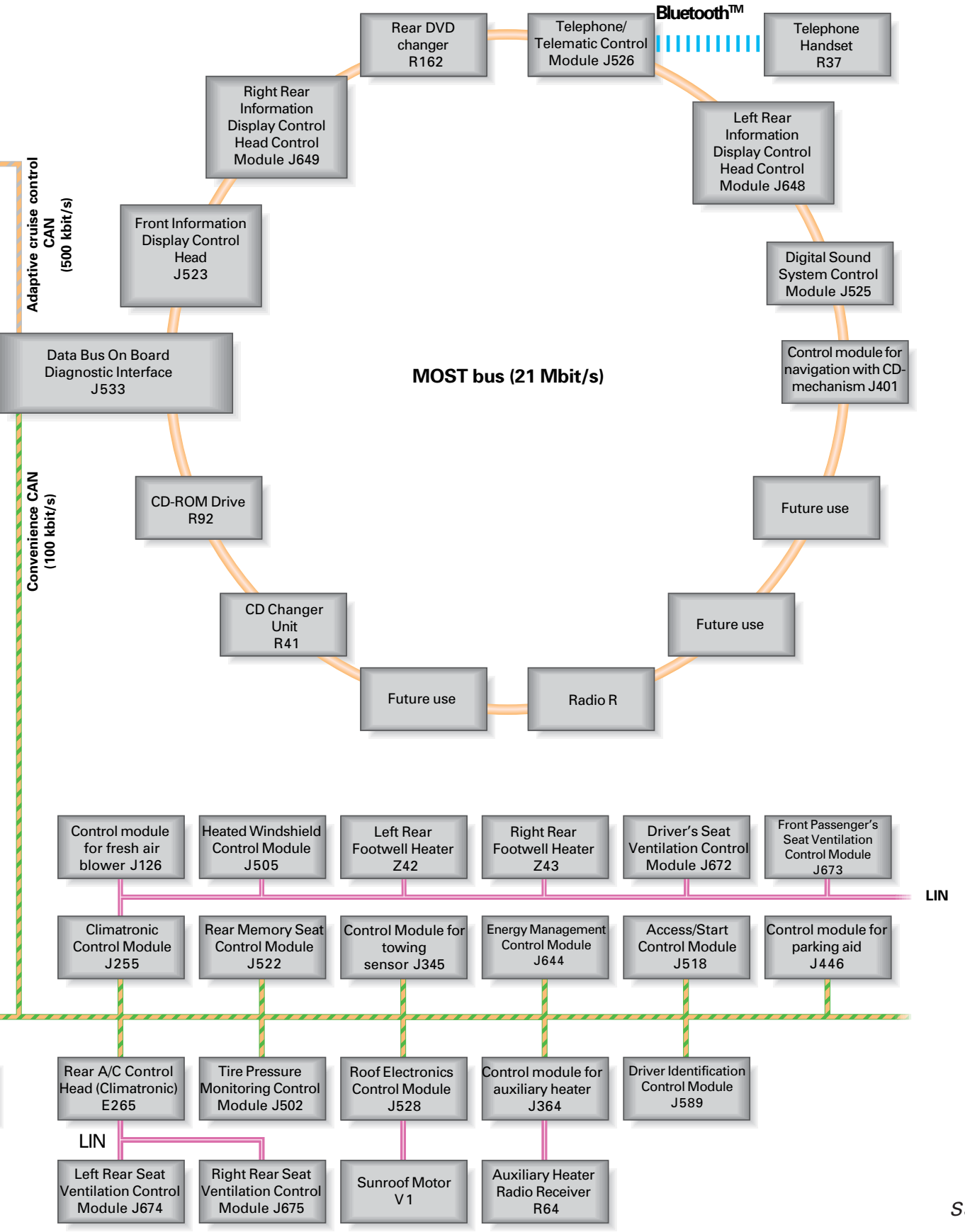
Garage Door Opener

Access/Start Control

Introduction

Bus Arrangement

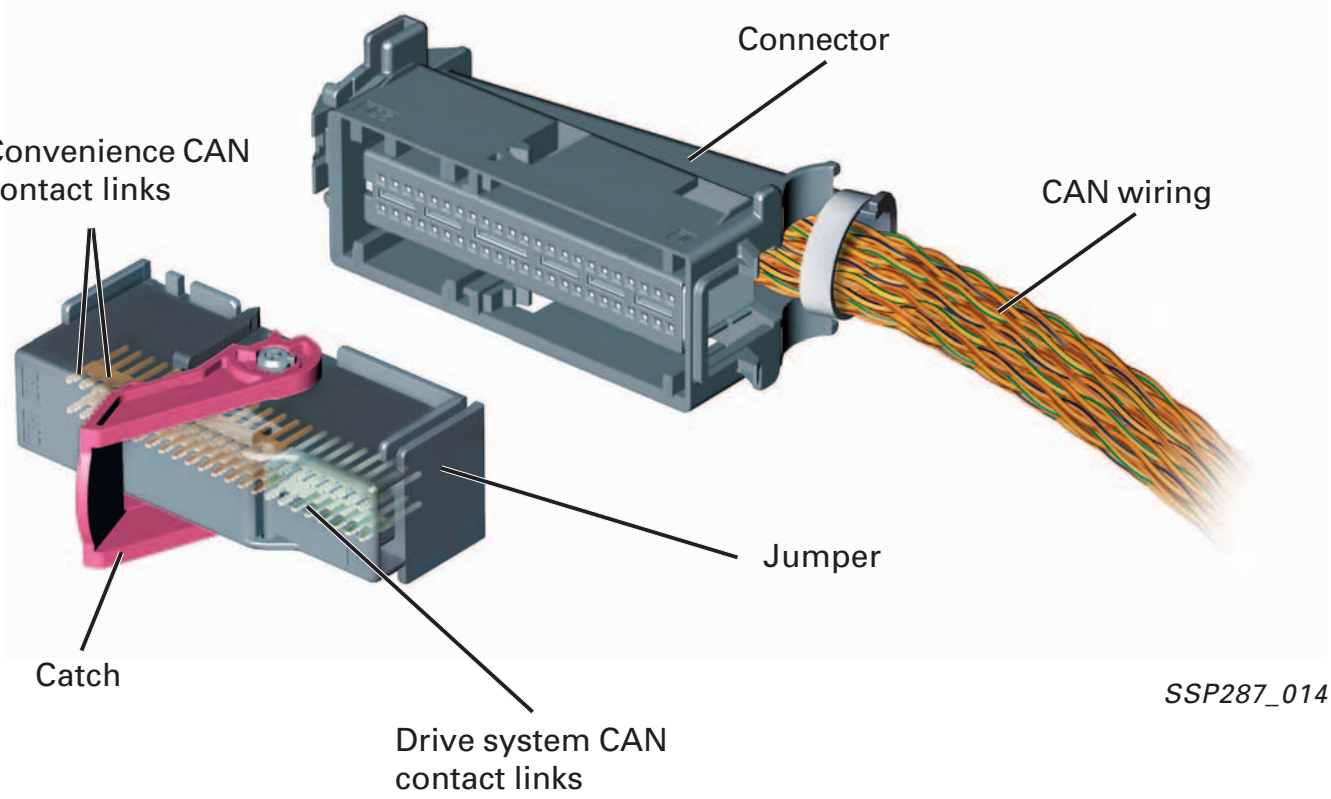



Bluetooth™
Rear DVD changer R162
Telephone/ Telematic Control Module J526
Telephone Handset R37
Right Rear Information Display Control Head Control Module J649
Left Rear Information Display Control Head Control Module J648
Front Information Display Control Head J523
Digital Sound System Control Module J525
Adaptive cruise control CAN (500 kbit/s)
Data Bus On Board Diagnostic Interface J533
MOST bus (21 Mbit/s)
Control module for navigation with CD-mechanism J401
Convenience CAN (100 kbit/s)
CD-ROM Drive R92
Future use
CD Changer Unit R41
Future use
Future use
Radio R
Control module for fresh air blower J126
Heated Windshield Control Module J505
Left Rear Footwell Heater Z42
Right Rear Footwell Heater Z43
Driver's Seat Ventilation Control Module J672
Front Passenger's Seat Ventilation Control Module J673
LIN
Climatronic Control Module J255
Rear Memory Seat Control Module J522
Control Module for towing sensor J345
Energy Management Control Module J644
Access/Start Control Module J518
Control module for parking aid J446
Rear A/C Control Head (Climatronic) E265
Tire Pressure Monitoring Control Module J502
Roof Electronics Control Module J528
Control module for auxiliary heater J364
Driver Identification Control Module J589
LIN
Left Rear Seat Ventilation Control Module J674
Right Rear Seat Ventilation Control Module J675
Sunroof Motor V1
Auxiliary Heater Radio Receiver R64

SSP287_057

CAN Connectors

Drive System CAN/Convenience CAN Connectors



SSP287_014

Two CAN bus connectors are used in the 2004 Audi A8L. The connectors form the main intersection for both the Convenience and Drive System CANs.

All CAN wires of the control Modules are attached to the connectors.

CAN Connectors

The connectors are mounted on the right and left sides of the instrument panel behind the end trim. The catch must be released before a jumper can be separated.



SSP287_015

The pin assignments are in the Workshop Manual and under “Vehicle Information” in Guided Fault-Finding.



SSP287_016

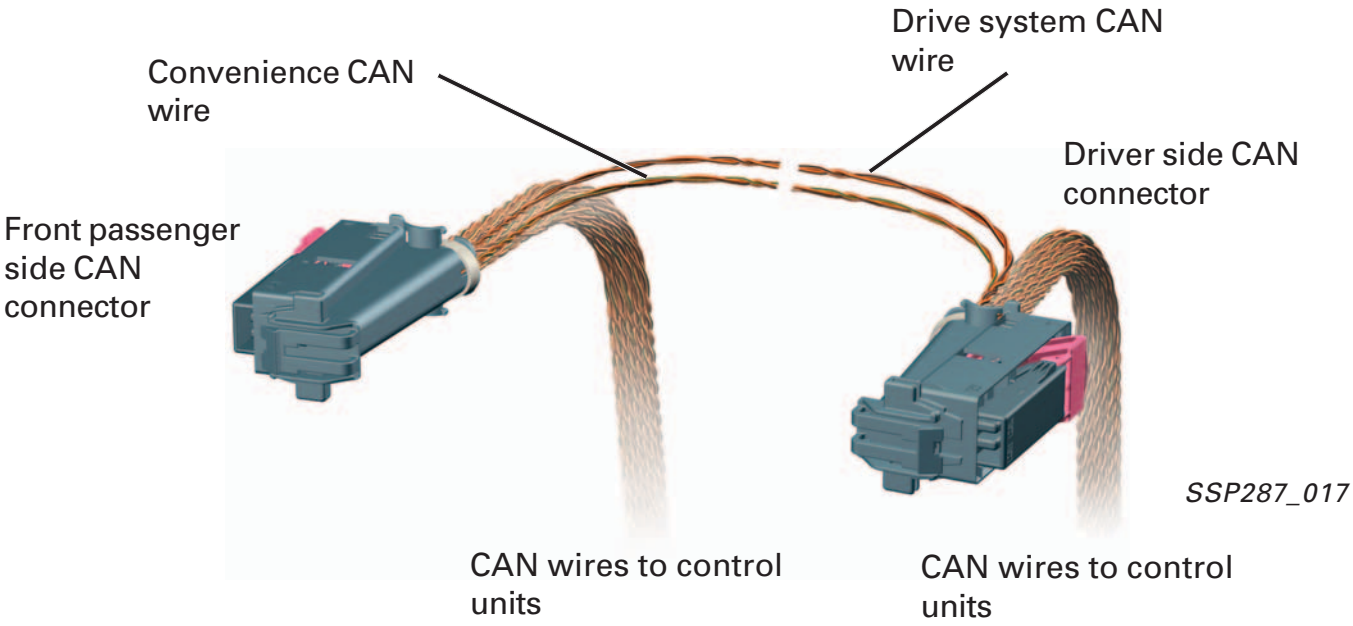
CAN Connectors

Star Connection

All Drive System and Convenience CAN Control Modules are linked to a matching connector in a star pattern.

Some of the control Modules of a bus system are linked to the right connector, and others are linked to the left connector.

The left and right connectors are linked by a CAN wire so that in the end, all Convenience CAN and Drive System CAN control modules are connected.

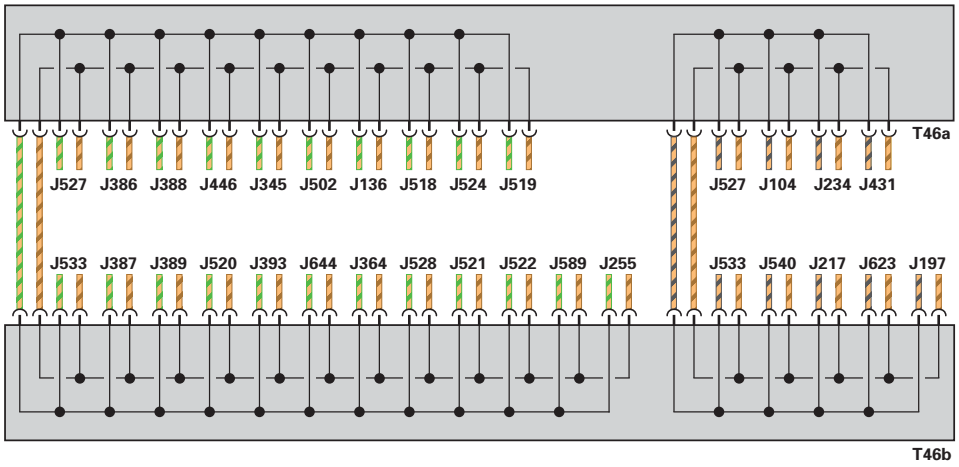


Test Box

The Test Box 1598/38 can be used with CAN connectors.

The Test Box can access individual Drive System and Convenience CAN Control Module wires with the VAS 5051 Digital Storage Oscilloscope. Individual control modules can also be disconnected from the bus system, for example when trying to localize CAN bus short circuits. The link connecting the CAN wires of the individual control modules is inserted at the test box.

Block Diagram



SSP287_018

Key

- J104 ABS Control Module w/EDL
- J136 Memory Seat/Steering Column Adjustment Control Module
- J197 Level Control System Control Module
- J217 Transmission Control Module (TCM)
- J234 Airbag Control Module
- J255 Climatronic Control Module
- J345 Control Module for towing sensor
- J364 Control module for auxiliary heater
- J386 Door control module, driver side
- J387 Door control module, passenger side
- J388 Door control module, rear, left
- J389 Door control module, rear, right
- J393 Central control module for comfort system
- J431 Headlight Range Control Module
- J446 Control module for parking aid
- J502 Tire Pressure Monitoring Control Module
- J518 Access/Start Control Module
- J519 Vehicle Electrical System Control Module
- J520 Vehicle Electrical System Control Module 2
- J521 Passenger Memory Seat Control Module
- J522 Rear Memory Seat Control Module
- J524 Rear Information Display Control Head
- J527 Steering Column Electronic Systems Control Module
- J528 Roof Electronics Control Module
- J533 Data Bus On Board Diagnostic Interface
- J540 Electronic Parking Brake Control Module
- J623 Engine Control Module (ECM)
- J644 Energy Management Control Module
- T46a 46-Pin, Black Connector at Left CAN Breaker
- T46b 46-Pin, Black Connector at Right CAN Breaker

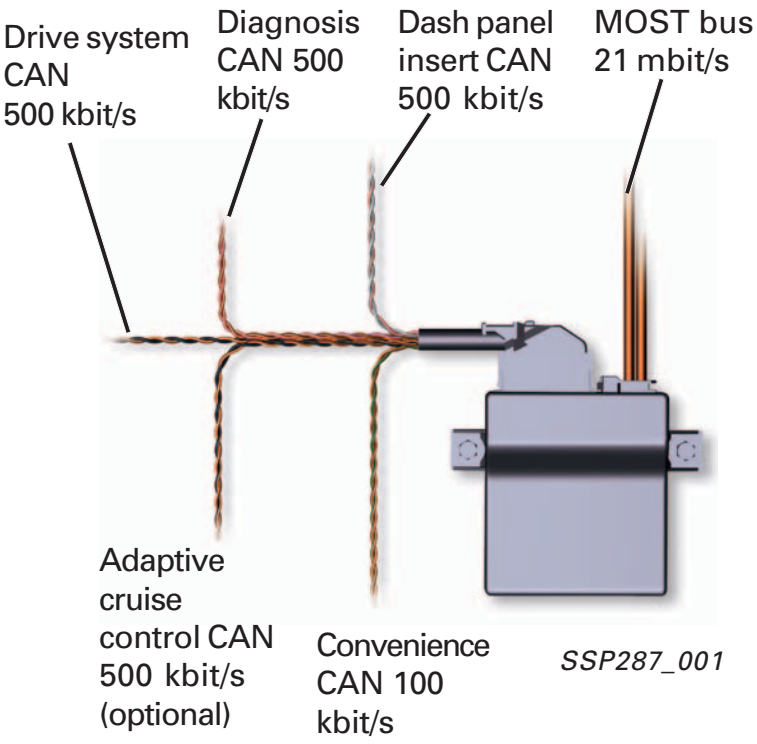
Color Code

= Convenience CAN High
= Convenience CAN Low

= Drive System CAN High
= Drive System CAN Low

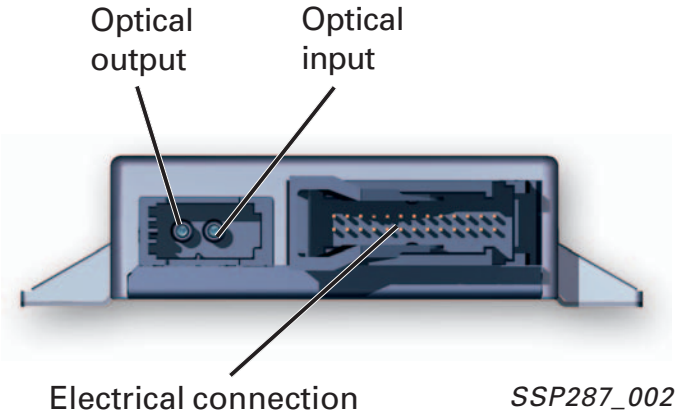
Data Bus Diagnostic Interface (J533)

The Data Bus On Board Diagnostic Interface is a network gateway for data bus systems. Its main function is to form the connection between independent data buses. In the past, the gateway function was integrated into the Instrument Panel Insert, however in the 2004 Audi A8L, a separate control module is used to handle the many functions of the various control modules.



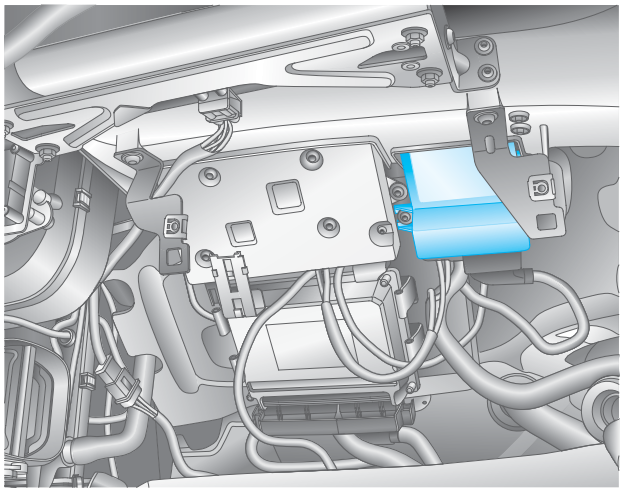
Data Bus On Board Diagnostic Interface Versions

Two different Data Bus On Board Diagnostic Interface versions are used in the 2004 Audi A8L: One is connected to the optional Adaptive Cruise Control (ACC) system and the other is not. Both versions however have a standard connection for the MOST Optical Data Bus.



Data Bus Diagnostic Interface (J533)

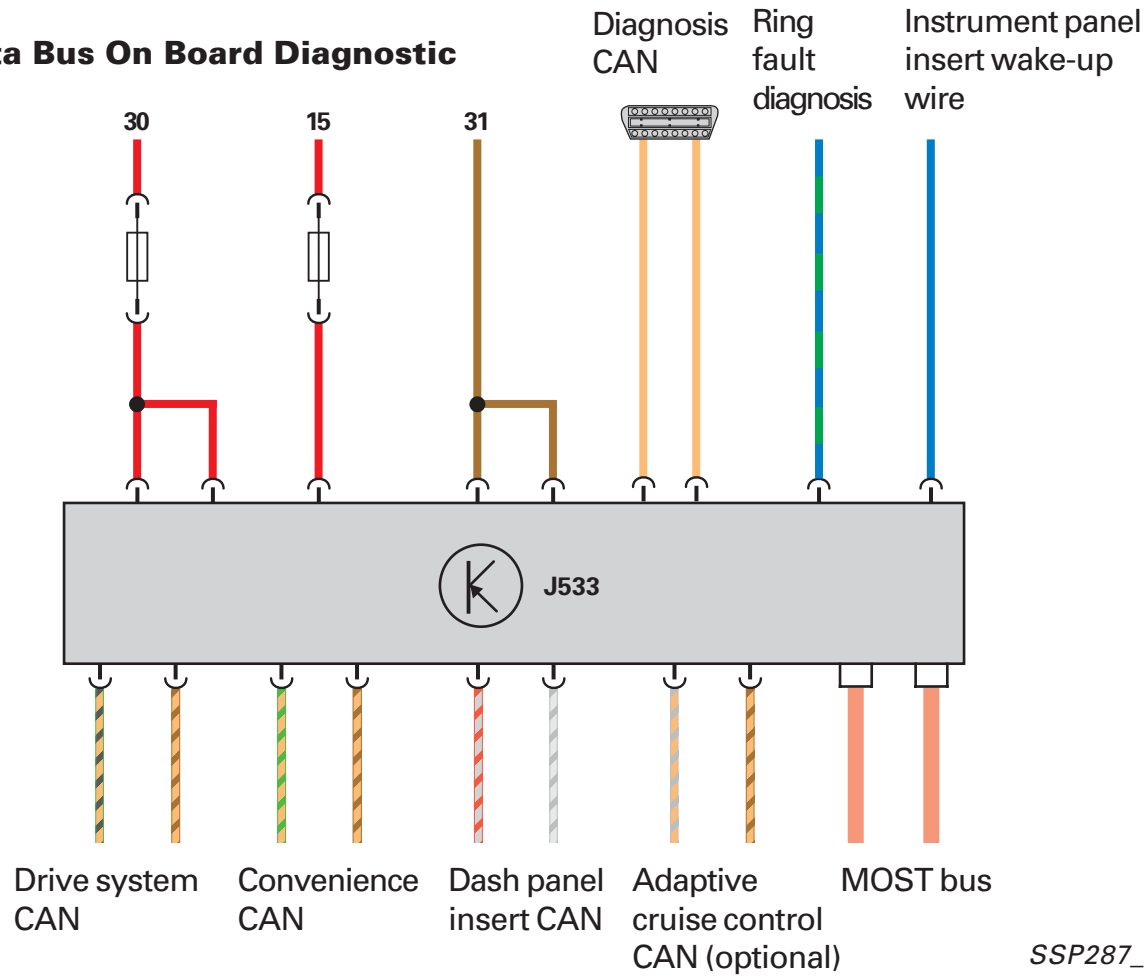
In the 2004 Audi A8L, the Data Bus On Board Diagnostic Interface is mounted at the module holder behind the glove box.



SSP287_004

Block Diagram

J533 Data Bus On Board Diagnostic Interface

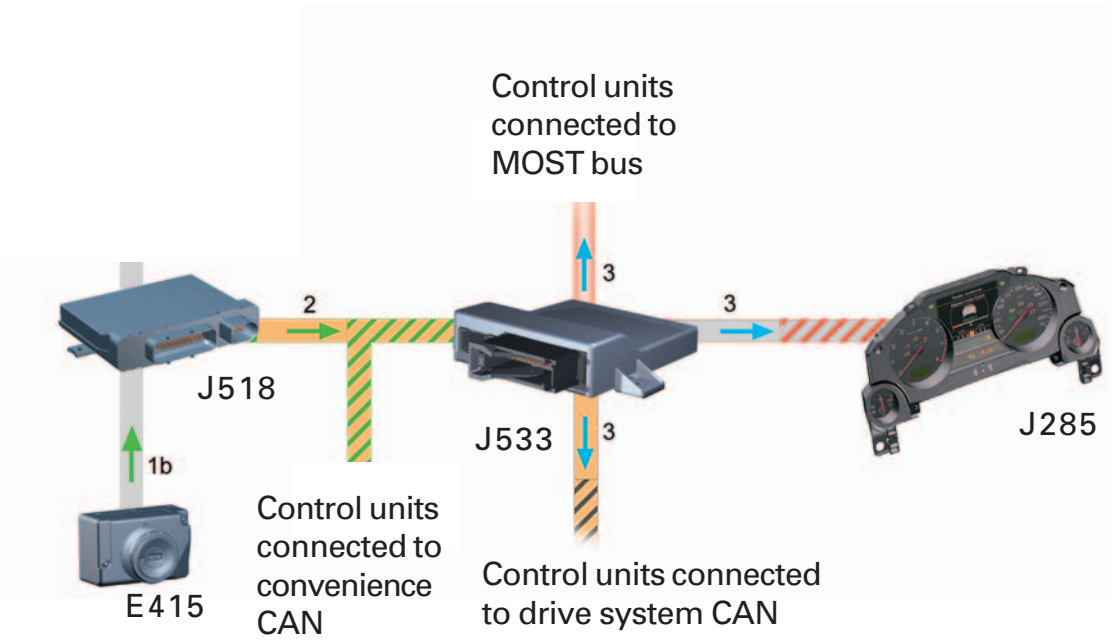


SSP287_003

Data Bus Diagnostic Interface (J533)

Data Exchange

Example: Transmission from the Ignition



SSP287_006

The Data Bus On-Board Diagnostic Interface manages the exchange of data between the various data bus systems.

To do so, it transmits data within a short time frame from one data bus system to another. In this process, only the data required by the system concerned is transmitted.

1 Transmission from the ignition to the Access/Start Control Module is actuated by a discrete wire that activates the Access/Start Authorization Switch (E415). The Control Module transmits data with a short broadcast time from one data bus system to the other. In this process, not all data from one bus system are sent to the next, but only the data required.

2 The Access/Start Control Module relays the information over the Convenience CAN to the Data Bus On Board Diagnostic Interface.

3 The information is read by the Data Bus On Board Diagnostic Interface and transmitted to the Drive System CAN, Instrument Panel Insert CAN and MOST Bus. The information is available to all the control modules on the bus.

Data Bus Diagnostic Interface (J533)

Master Functions

The Data Bus On Board Diagnostic Interface is the master for:

- Drive System CAN Continued Operation
- MOST Ring Fault Diagnosis
- Data Bus System Sleep and Wake-Up Operation

Drive System CAN Continued Operation

Ignition operation for several control modules is active until the Data Bus On Board Diagnostic Interface broadcasts a command to end the operation to the Drive System CAN.

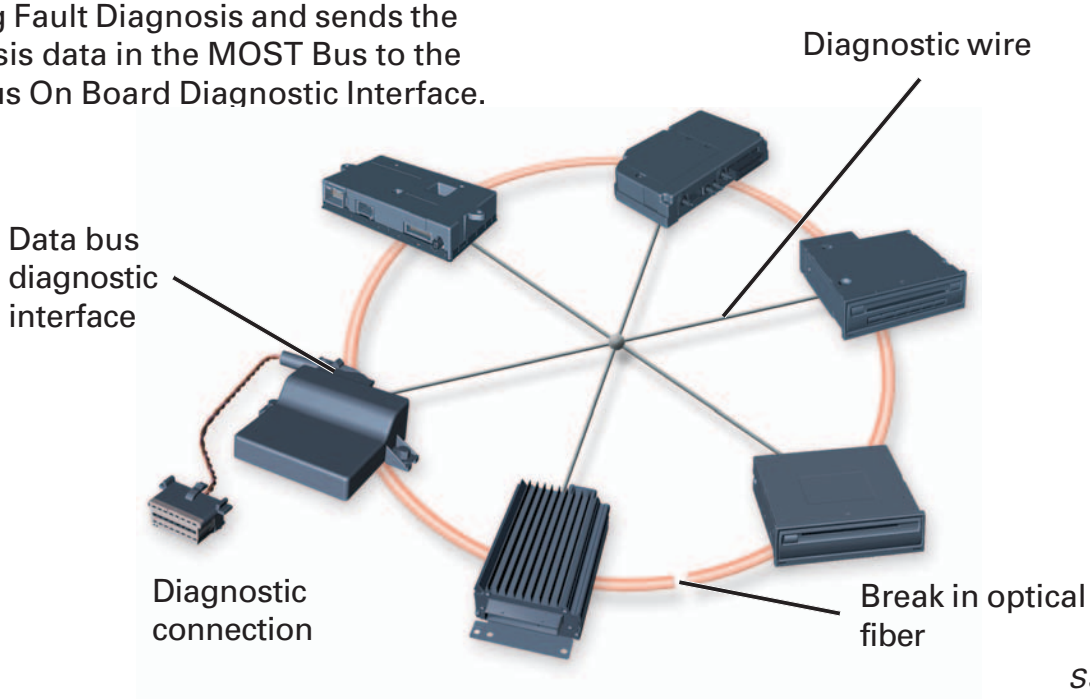
MOST Ring Fault Diagnosis

The Data Bus On Board Diagnostic Interface is the diagnosis manager for the MOST Bus. The interface is responsible for Ring Fault Diagnosis and sends the diagnosis data in the MOST Bus to the Data Bus On Board Diagnostic Interface.

Ring Fault Diagnosis for the MOST Bus is initiated with the final control diagnosis in the Data Bus On Board Diagnostic Interface. Refer to SSP 971303 – New Data Bus Systems.

Data Bus System Sleep and Wake-Up Operation

The Data Bus On Board Diagnostic Interface is the master for Sleep and Wake-Up Modes. When all the control modules on the Convenience CAN indicate "sleep readiness," the gateway sends the sleep command to the CAN Bus and the control modules change to sleep status. The sleep status of the individual control modules and Bus systems can be read in the Measured Value Blocks on the Data Bus On Board Diagnostic Interface.



SSP287_007

Data Bus Diagnostic Interface (J533)

Diagnosis

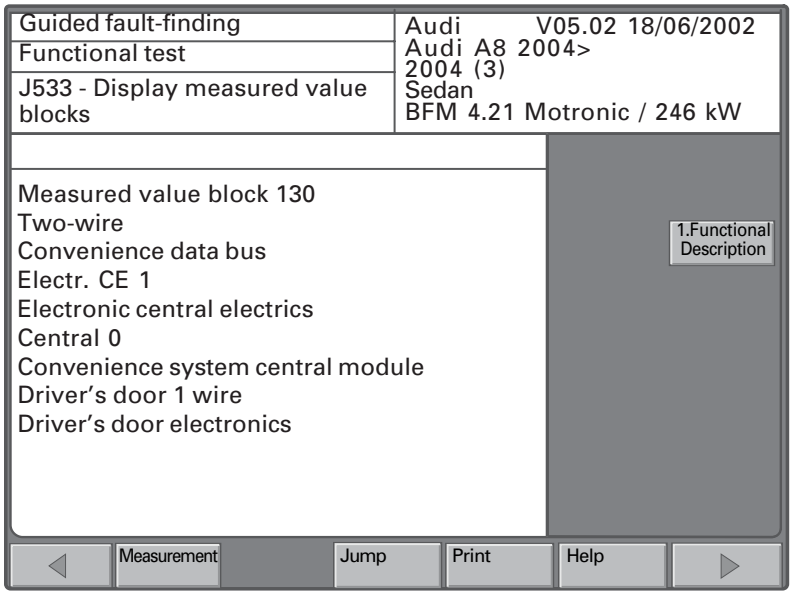
The Data Bus On Board Diagnostic Interface provides data exchanged between the VAS5051 and individual control modules. In the process, the control module data are sent over the corresponding data bus to the Diagnostic Interface and then over the diagnostic connector to the VAS5051. Refer to SSP 971303, under "Diagnosis CAN."

The Data Bus On Board Diagnostic Interface maintains diagnostic capability even when the ignition is off, however no write operations such as encoding, can occur. The ignition must be on to start diagnosis because the 500 kbit/s Diagnosis CAN does not have wake-up capability.

Measured Value Blocks

The Data Bus On Board Diagnostic Interface is provided with Measured Value Blocks in which communication, one-wire diagnosis and sleep mode are displayed. If there is communication with a control module installed in the vehicle, this is shown in the Measured Value Block by a one. If there is no communication with a control module installed in the vehicle or encoded, it is shown as a zero.

If a control module is in one wire mode, it is indicated by "1 Wire." The Measured Value Block for one-wire diagnosis is only available in the Diagnostic Interface. The "Sleep Readiness" of the control modules is indicated by "S." If the vehicle is in Diagnosis Mode, the bus systems do not switch to sleep mode, even if all control modules are indicating "Sleep Readiness."



SSP287_010

Control Element Test

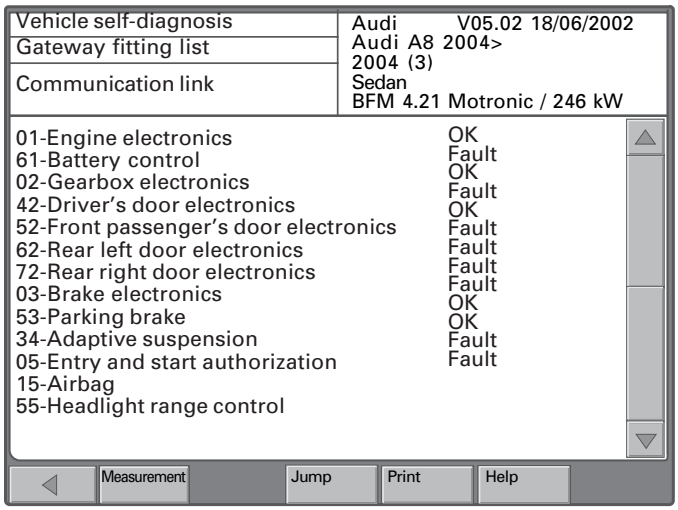
The following control element tests are available in the Data Bus On Board Diagnostic Interface as part of Guided Fault-Finding:

- Start of Ring Fault Diagnosis (Refer to SSP 971303)
- Start of Ring Fault Diagnosis with dB Reduction (Refer to SSP 971303)
- Transmission of Sleep Command

When the sleep command is sent by the Final Control Diagnosis (the ignition off), the Drive System CAN and Convenience CAN are changed to Sleep Mode by the Data Bus On Board Diagnostic Interface. However changing the Convenience CAN to Sleep Mode is possible only if no other control module is keeping the bus awake, for example because of a fault.

Gateway Installation List

When Diagnosis Mode is entered, a Gateway Installation List containing the control modules installed in the vehicle and their status is read out from the Data Bus On Board Diagnostic Interface. The list can be displayed in the self-diagnosis main menu or with Guided Fault-Finding. The list (also called the Configuration Table) shows whether all control modules have been properly encoded, as well as their fault status.



SSP287_012

If, for example, a control module has been installed but not encoded, it is indicated in the installed list as "Not Registered." If a control module has been encoded, but there is no communication with it, it may be because of a fault or non-installation. This control module is labeled "Not Obtainable."

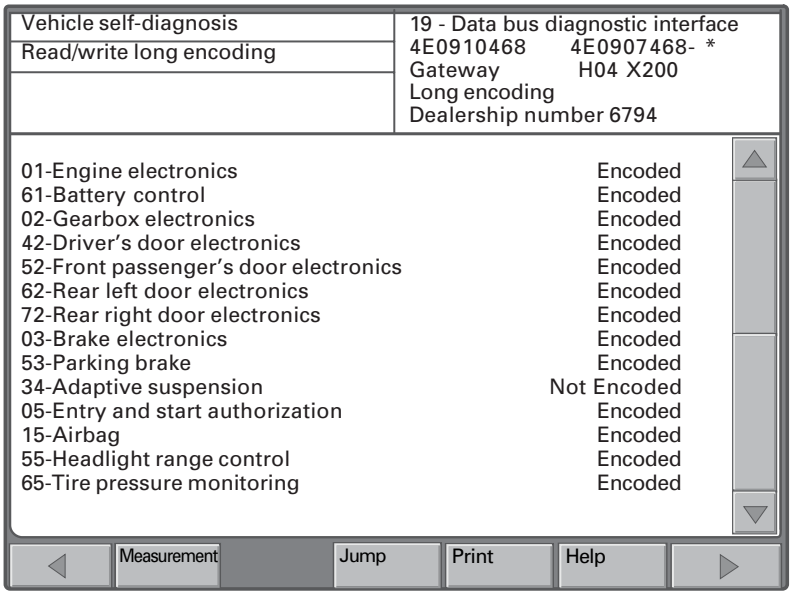
VAS Display	Significance
OK	Communication OK.
Cannot be reached	The control module is registered (coded) in the gateway, but there is no communication with it.
Malfunction	A fault entry has been stored in the Control Module.
Not Registered	The Control Module is not registered in the gateway (not coded), but it is installed. There is communication with this Control Module.

Data Bus Diagnostic Interface (J533)

Encoding

Encoding tells the Data Bus On Board Diagnostic Interface which control modules are installed in the vehicle. In addition to the usual encoding, the function “Read/Write Long Encoding” is included in the Diagnostic Interface. After selecting this function, a list containing the address words of all possible control modules in the vehicle is called up in the diagnosis tester in the usual sequence.

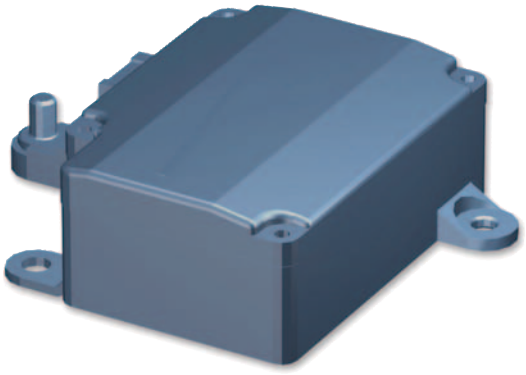
Control modules are then selected or rejected. When “Continue” is pressed, the encoding is transferred to the control module. After encoding the diagnostic interface with “Long Encoding,” the installation list should be checked for accuracy.



SSP287_013

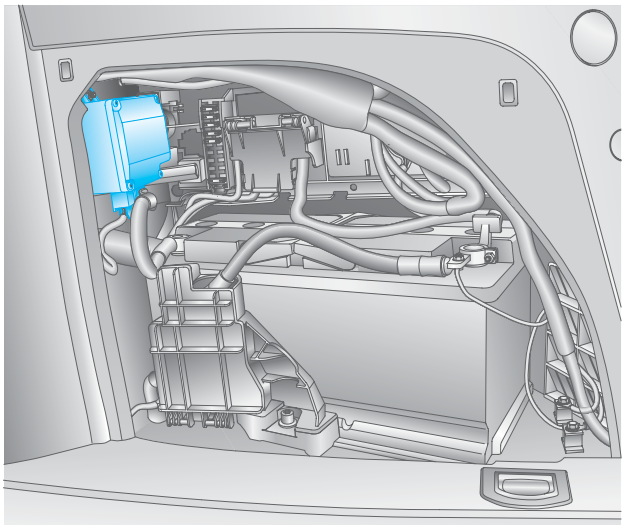
Energy Management (J644)

A Battery and Energy Management Control Module (J644) monitors the battery charge, regulates loads over the CAN in extreme circumstances, minimizes current consumption and ensures optimum charging voltage. The goal is to avoid excessive battery discharge and ensure that the vehicle can always be started.



SSP287_039

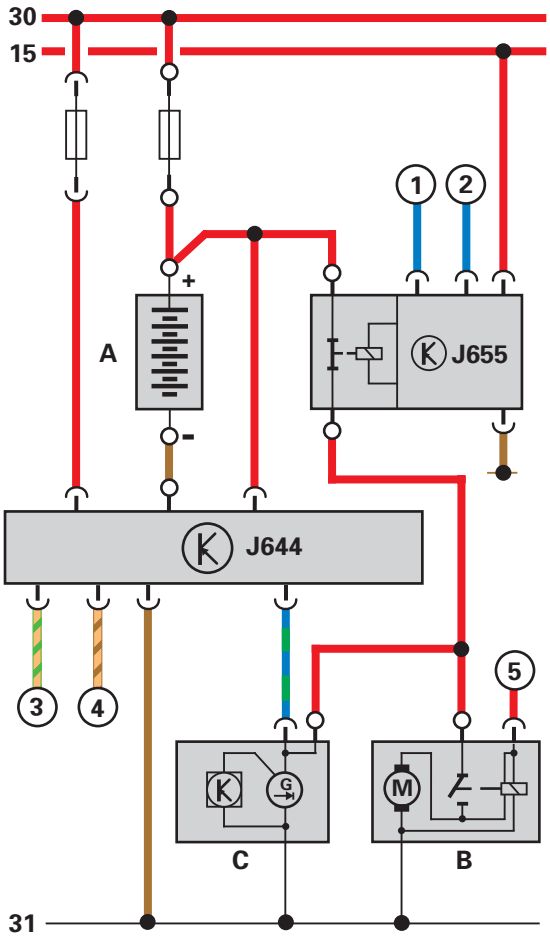
The Energy Management Control Module is mounted in the trunk near the battery. The Control Module constantly monitors the battery. It checks the State of Charge (SOC), starting capability and regulates the optimum alternator charging voltage with the engine running. It can apply load shedding and increase idling speed. To reduce the closed circuit current with the engine OFF, the Control Module deactivates loads over the CAN Bus which prevents excessive battery discharge.



SSP287_025

Energy Management (J644)

Block Diagram



SSP287_041

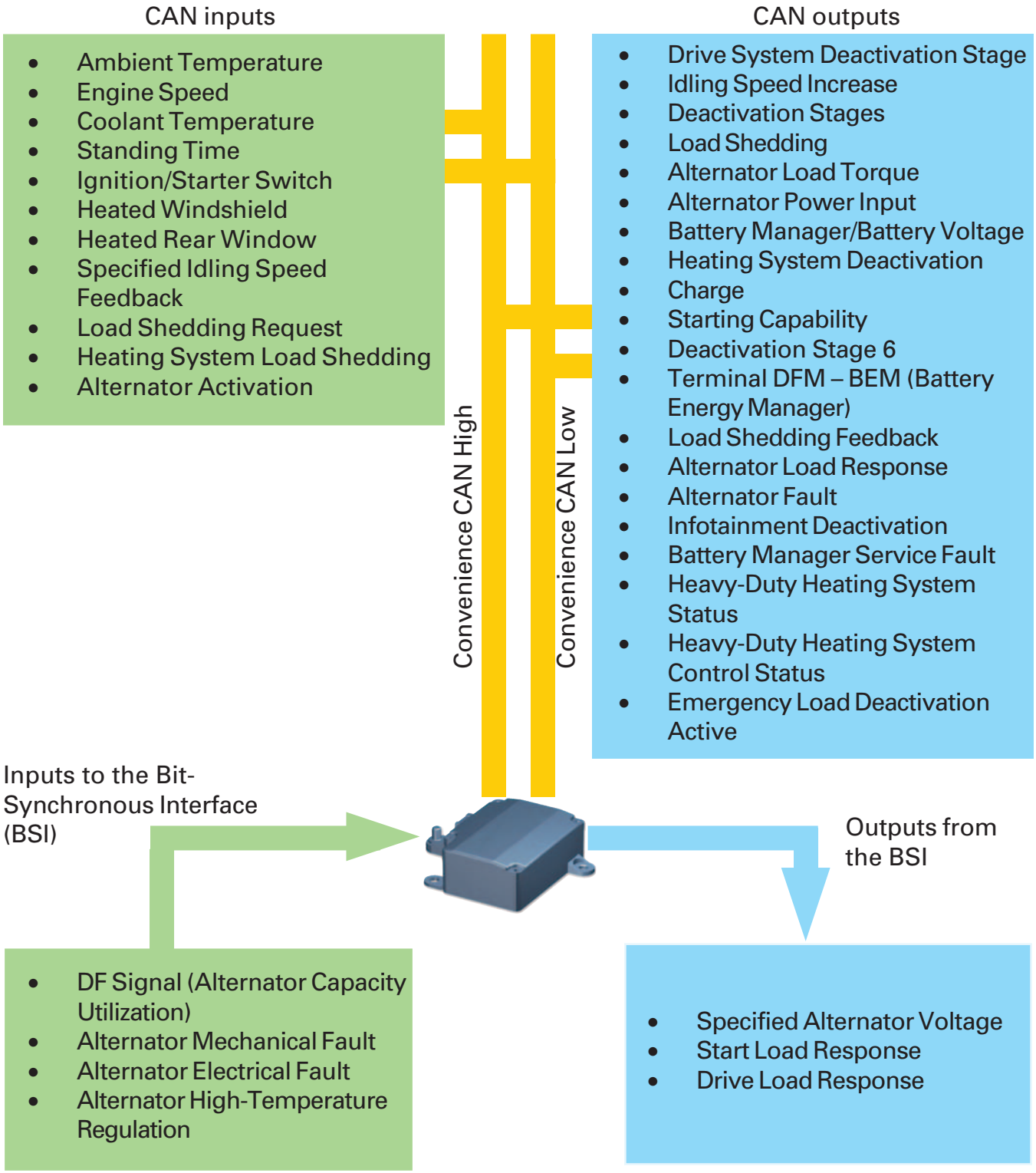
Key

A	Battery
B	Starter
C	Alternator
J644	Energy Management Control Module
J655	Battery Switch-Off Relay

Additional Signals

1	Airbag Control Module (234)
2	Airbag Control Module (234)
3	Convenience CAN High
4	Convenience CAN Low
5	Terminal 50 (from Starter Relay 2) (695)

System Layout

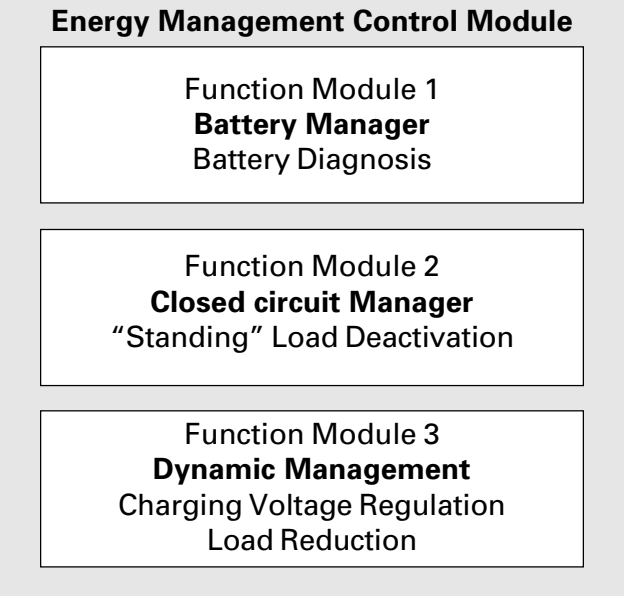


Energy Management (J644)

Function Modules

The tasks of the Energy Management Control Module are distributed over three function modules, which are active in different vehicle situations.

- Function Module 1 is a battery manager that is responsible for battery diagnosis. It is always active.
- Function Module 2 is a Closed Circuit Manager that deactivates "standing" loads as required when the engine is off.
- Function Module 3 is a Dynamic Management that regulates charging voltage and reduces engine load when the engine is running.



Function Module Action

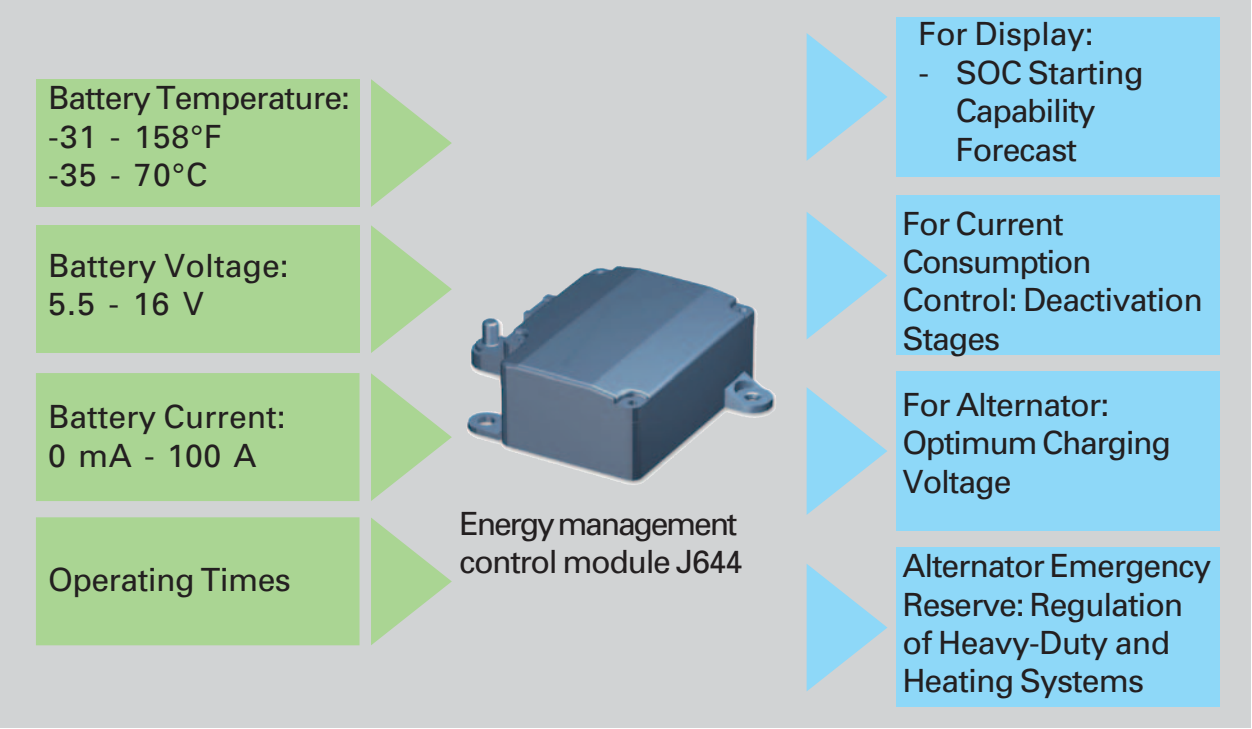
The three function modules are active in three specific vehicle states.

Vehicle Status	Battery Manager	Closed Circuit Manager	Dynamic Management
Ignition off	Active	Active	
Ignition on, engine off	Active	Active	
Ignition on, engine on	Active		Active

Battery Manager

For battery diagnosis, the Battery Manager in the Energy Management Control Module must establish the following data:

- Battery Temperature
- Battery Voltage
- Battery Current
- Operating Times



The battery current and battery temperature are measured in the control module. Battery temperature is converted into the battery voltage by an algorithm. The battery voltage is measured at the battery positive terminal.

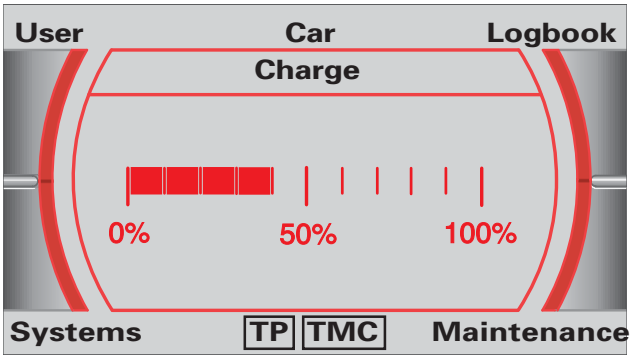
Energy Management (J644)

Battery Status Display

The starting capability and current charge are displayed in the Instrument Panel Insert. These two measurements form the basis for Closed Circuit and Dynamic Management. The alternator is provided with the optimum charging voltage from the Data Bus On Board Diagnostic Interface.

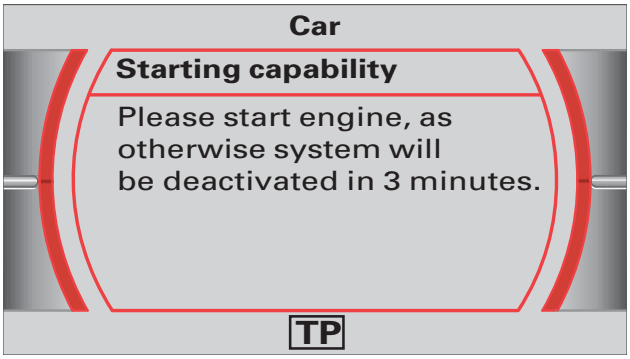
MMI Displays

The battery charge can be retrieved from the CAR function in the MMI. The display is a bar with 10% increments. A charge of between 60 and 80% is normal.



SSP287_042

Operating electrical loads over a long period with the engine off discharges the battery. If the starting capability of the engine is being jeopardized by this discharge, the MMI displays a request to start the engine to prevent automatic system deactivation within the next three minutes.



SSP287_121

Charge Warning Lamp (Alternator Lamp)

The charge warning lamp is located in the tachometer in the Instrument Panel Insert. The lamp is actuated by the Energy Management Control Module.



SSP287_102

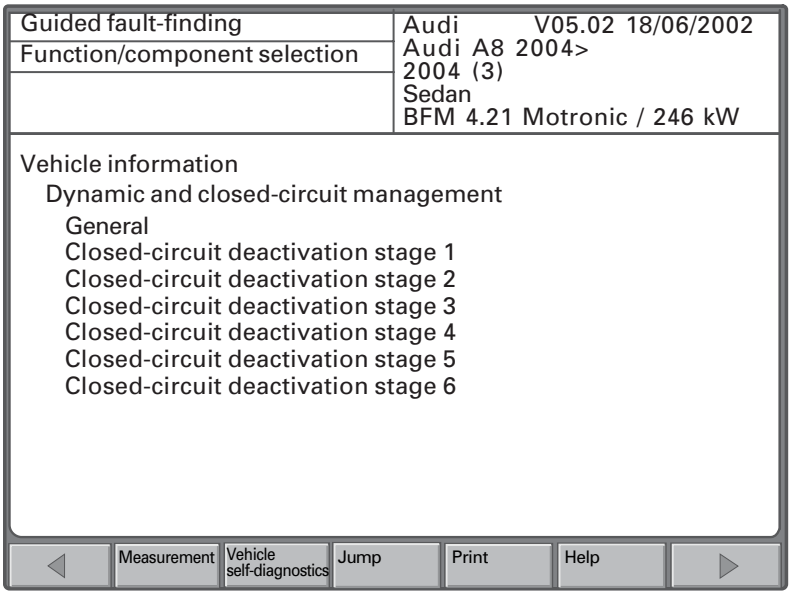
Closed circuit Manager

The purpose of the Closed circuit Manager in the Energy Management Control Module is to request control modules to deactivate loads as required. It is active with the ignition on and the ignition on/Engine off.

If the vehicle is stationary, the closed circuit current must be reduced to such an extent that the battery is only slightly discharged and starting is possible even after a prolonged standing time. If the battery charge is not sufficient to supply all “standing” loads, convenience and Infotainment load functions are deactivated. The loads, which are deactivated by a control module, are specified in deactivation stages. The deactivated loads and functions are designated under “Vehicle information” in the Guided Fault-Finding routine.

Control module loads are deactivated in six stages. The lower the battery charge, the higher the deactivation stage. The necessary deactivation stage is provided by the Energy Management Control Module over the data bus systems. The Instrument Panel Insert informs the driver of restrictions to functions.

Regarding diagnosis, an activated deactivation stage may be the cause of a restricted function. Activation of a deactivation stage is stored as a DTC in the Energy Management Control Module.



SSP287_061

Deactivation Stages

The individual deactivation stages are initiated by the Energy Management Control Module according to the charge of the vehicle battery.

The deactivation stages result in the following:

- Deactivation Stage 1
  Convenience CAN loads are deactivated.
- Deactivation Stage 2
  Deactivation of additional Convenience CAN load. Certain Infotainment System restrictions are implemented.
- Deactivation Stage 3
  Reduction of the closed circuit current is initiated.
- Deactivation Stage 4
  This deactivation stage is activated by the VAS5051 and cannot be initiated independently by the Energy Management Control Module.
- Deactivation Stage 5
  The auxiliary heater is deactivated.
- Deactivation Stage 6
  Bus system wake-up action is reduced.

Deactivation Stages 1 - 3

In Stages 1 - 3, loads are deactivated by the control modules in the vehicle to prevent further battery discharge.

Examples of Deactivation Stages for the Vehicle Electrical System Control Module 2:

Load	Stage 1	Stage 2	Stage 3
MMI Opening/Closing	Active	Inactive	Inactive
Headlight Washing	Inactive	Inactive	Inactive
Washer Fluid Heating	Inactive	Inactive	Inactive

Deactivation Stage 4

Stage 4 is the Transportation Mode, which can be initiated from the VAS5051. The Transportation Mode reduces the battery discharge when the vehicle is stationary for a long time.

An Adaptation Channel for activation is provided in the Energy Management Control Module. In Channel 1 "Transportation Mode," select either zero for Normal Mode or one for Transportation Mode.

Almost all convenience functions are deactivated in Transportation Mode to ensure maximum standing time without battery discharge. This is necessary for example, during transportation overseas.

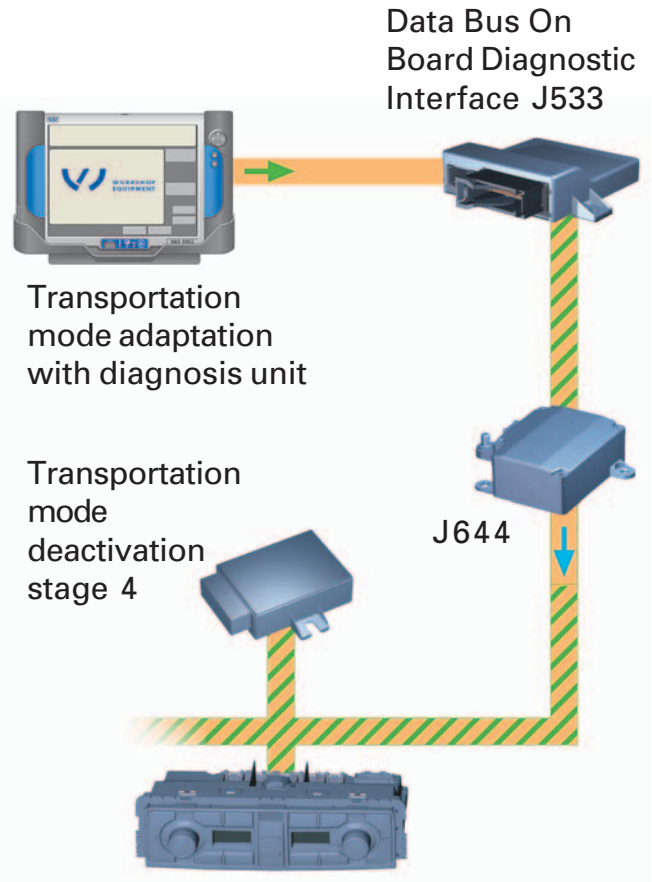
Deactivation Stage 5

In this stage, the auxiliary heater is deactivated.

Deactivation Stage 6

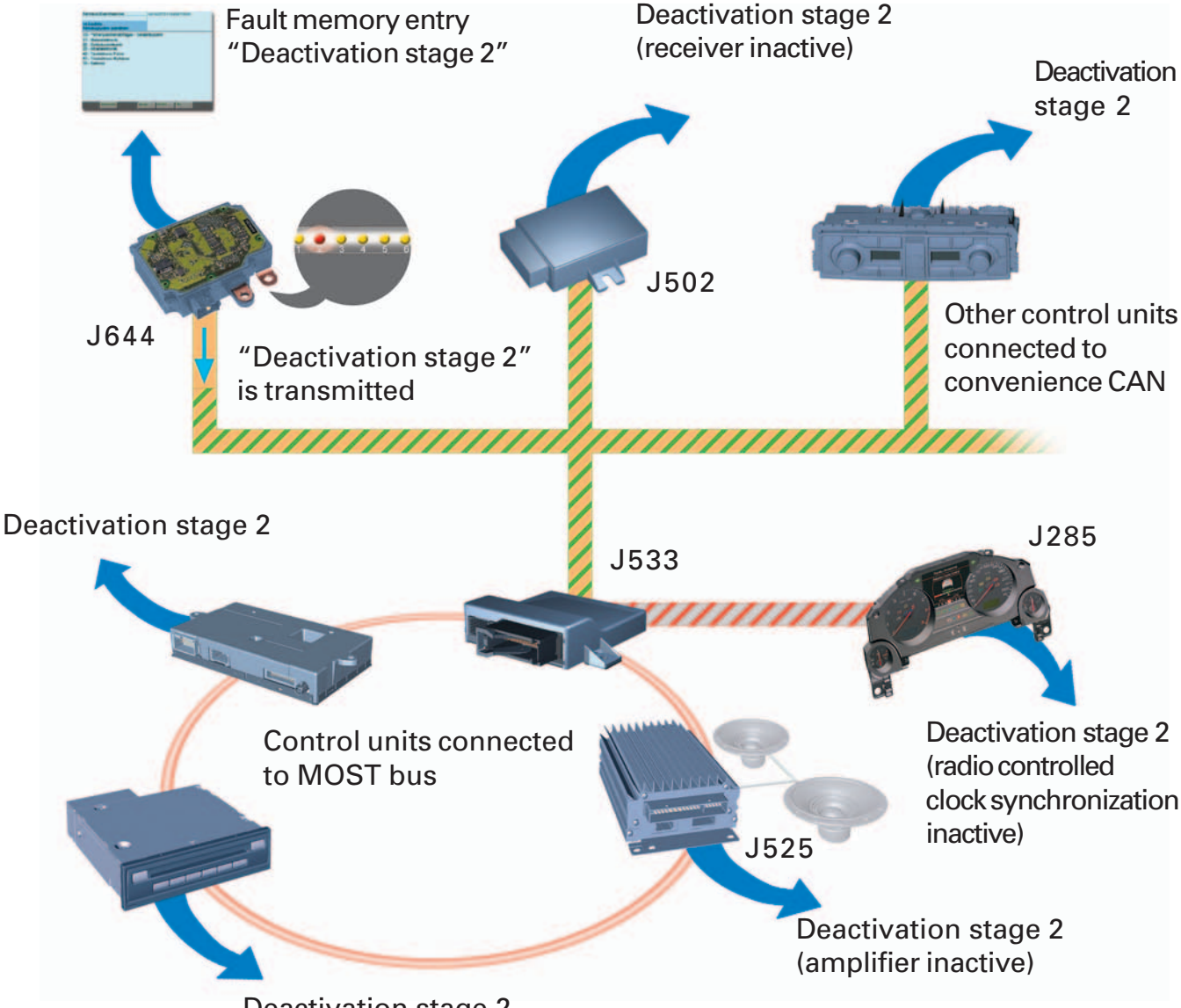
In Stage 6, the bus system control modules are only awakened when the vehicle is entered and when the ignition is on. All other sources of bus system wake-up are suppressed.

Since only the starting capability is retained in Deactivation Stage 6, it is not possible for every source to activate control module wakeup to save power. This also applies to Infotainment components and means that the telephone cannot be used in Stage 6. However, the reserve battery in the telephone holder assures that emergency and breakdown calls can still be made.



SSP287_040

Operating Principle



SSP287_043

The Energy Management Control Module transmits the necessary deactivation stage to the data bus as required.

After reading in the information, the control modules deactivate the loads specified for each deactivation stage. The loads in the corresponding deactivation stage are stored in each control module.

In the example, the Energy Management Control Module transmits Deactivation Stage 2 to the Convenience CAN. The Convenience CAN control modules then deactivate the predetermined loads/ functions for Deactivation Stage 2. These are specified in the software of the corresponding control module. For example, the Tire Pressure Monitoring Control Module (J502) deactivates the antenna receiver to save power.

The Data Bus On Board Diagnostic Interface distributes the information "Deactivation Stage 2" to the other bus systems. In turn, the control modules connected to the other bus systems all react by deactivating the loads specified for Deactivation Stage 2.

The control module with display in the Instrument Panel Insert (J285), which is connected to the Instrument Panel Insert CAN, deactivates the radio controlled clock receiver to save power. In addition, the Digital Sound System Control Module (J525) which is connected to the MOST Bus, deactivates the audio amplifier.

Gradual Closed Circuit Current Reduction

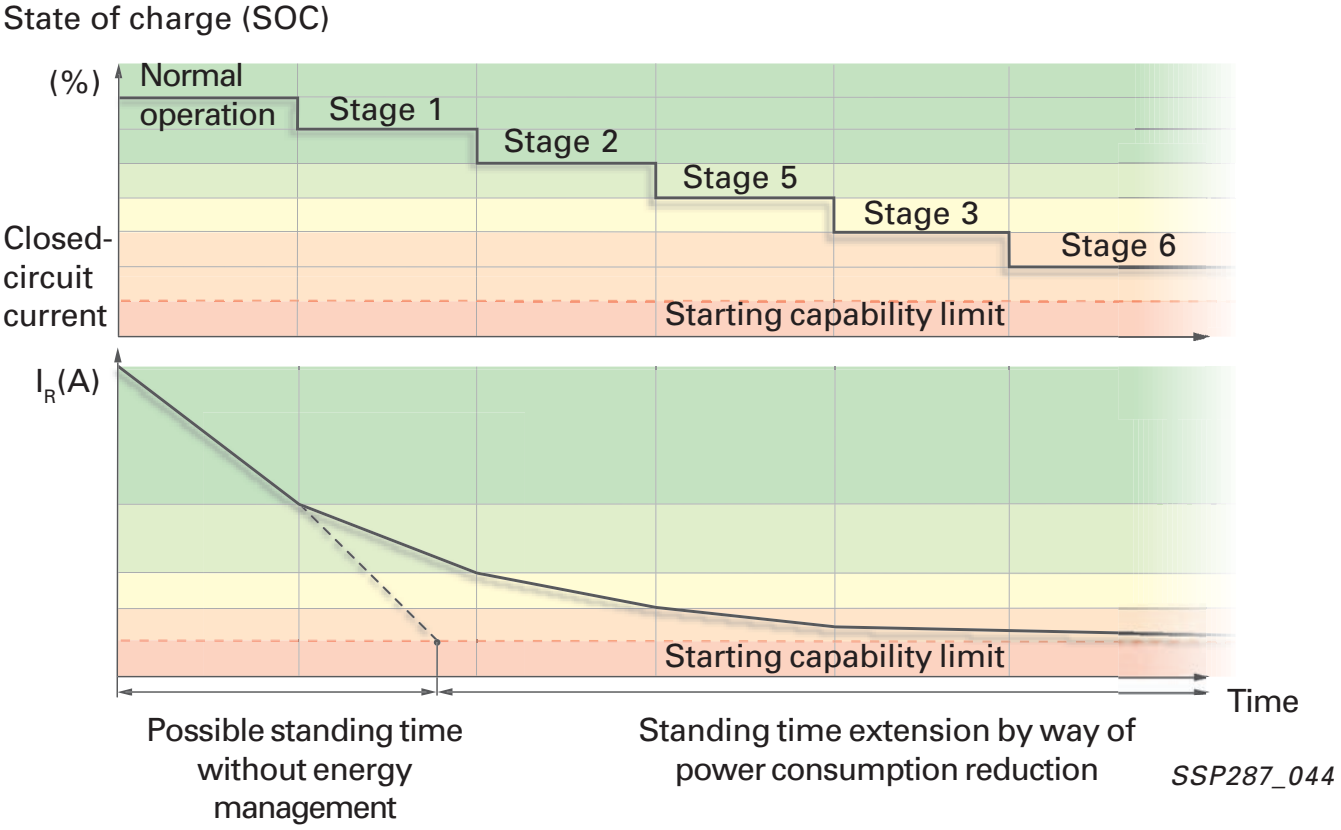
The closed circuit current reduction stages extend the vehicle standing time. The closed circuit current decreases with each deactivation stage. There is however, no calculation to extend the standing time.

When the driver enters the vehicle, all functions are quickly reestablished. Deactivation Stage 4, however, is a special case. It cannot be initiated by the vehicle alone; use must be initiated with the VAS5051.

Deactivation Stage 2 is activated immediately if a closed circuit current of more than 50mA is determined after a standing time of three hours.

Turning on the engine resets all previously active deactivation stages. Connecting a battery charger to the battery also deactivates all deactivation stages. Refer to Battery Charging. This does not apply to Deactivation Stage 4.

The priority setting for the deactivation stages is 1-2-5-3-6.



Systems Involved

The following systems are involved in load deactivation by the closed circuit manager module in the Energy Management Control Module:

- MOST Bus
  - Front Information Display Control Head (J523)
  - CD ROM Drive (R92)
  - CD Changer (R41)
  - TV Tuner (R78)
  - Digital Radio (R147)
  - Radio Module (R)
  - Control Module for Navigation with CD Mechanism (J401)
  - Digital Sound System Control Module (J525)
  - Telephone/Telematics Control Module (J526)
  - Antennas
  - Chip Card Reader Control Module (J676)

The deactivated loads/functions are included in the Guided Fault-Finding routine under "Vehicle Information" as part of the "Function and Component Selection" section.

Alternator

The 2004 Audi A8L is equipped with a Hitachi, water-cooled, 190A, alternator.

The rated currents of the alternator in the engine cooling circuit are as follows:

- At alternator speed n = 1800 rpm (corresponding to engine idling) I_n = 130A
- At alternator speed n = 6000 rpm n = 130A

- Convenience CAN
  - Roof Electronics Control Module (J528)
  - Memory Seat/Steering Column Adjustment Control Module (J136)
  - Passenger Memory Seat Control Module (J521)
  - Rear Memory Seat Control Module (J522)
  - Climatronic Control Module (J255)
  - Control Module for Auxiliary Heater (J364)
  - Central Control Module for Comfort System (J393)
  - Vehicle Electrical System Control Module
  - Vehicle Electrical System Control Module 2 (J520)
  - Door Control Module, Driver Side (J386)
  - Door Control Module, Passenger Side (J387)
  - Door Control Module, Rear, Left (J388)
  - Door Control Module, Rear, Right (J389)
  - Access/Start Control Module (J518)
  - Tire Pressure Monitoring Control Module (J502)
  - Control Module with Display in Instrument Panel Insert
  - Roof Electronics Control Module (J528)



SSP287_122

More information about this water-cooled alternator is in SSP 268, "6.0 l W12 Engine - Part 2."

Dynamic Management

The Dynamic Management System distributes the power generated to the individual systems and provides sufficient charging current to the battery. The system is active when the engine is running.

Main tasks:

- Battery Voltage Regulation
- Load Shedding
- Regulation of Heavy-Duty Heating Systems
- Idling Speed Increase
- Alternator Activation
- Alternator Control Dynamics

The Dynamic Energy Manager monitors electrical system capacity by measuring electrical system voltage, battery current and alternator capacity.

To ensure a stable power supply, the power available in the electrical system is distributed as required.

Three control stages are available for this purpose.

Control Stages	Control Output	Heating System Control Conditions
1	Continuous Power Regulation	Electrical system overload due to full alternator capacity along with a drop in battery charging voltage to below specified values.
2a	Partial Emergency Shutdown	Only in case of a fault (or briefly, less than 10 seconds, with no DTC): Permanent power overload (more than 10 seconds), electrical system cannot be stabilized with simple regulation as part of continuous heating system control, battery charged (starting jeopardized). Alternator Fault (Fault Code 02252). Alternator High-Temperature Regulation (Fault Code 02253) Load Shedding by Engine Control Module (e.g. high alternator load is reduced on speed dip); only possible for 10 seconds -> No Fault Storage.
2b	Full emergency shutdown	Only in case of a fault (or briefly, less than 15 seconds, with no DTC): Severe under-voltage in electrical system (less than 11.5 V for more than 1.5 seconds, or less than 10.8 V for more than 0.5 seconds) Note: Full emergency shutdown on starting is also set up to 15 seconds after starting, depending on ECM release. There is no DTC in this case as deactivation is only for a very restricted period and is not registered by the driver.

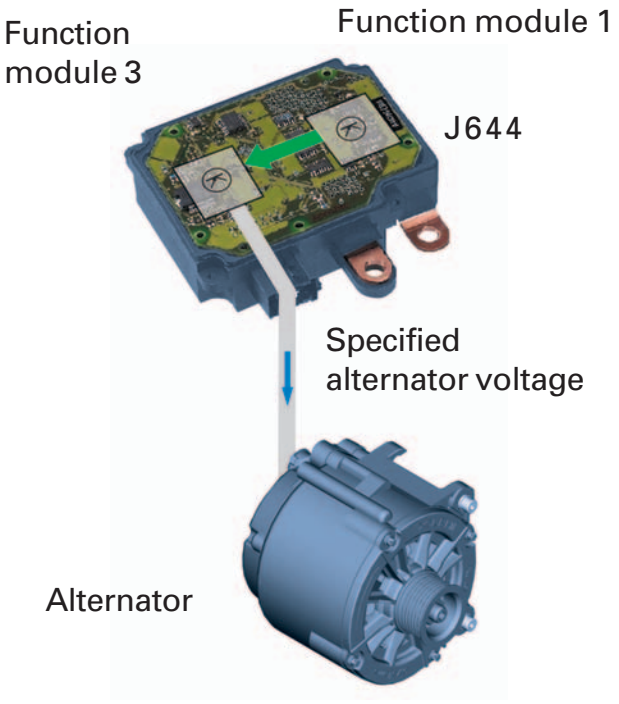
		Control Stages		
		1 Continuous Power Regulation	2a Partial Emergency Shutdown	2b Full Emergency Shutdown
Heating System	Maximum Power	Minimum Power	Minimum Power	Minimum Power
Heated Rear Window	Approximately 320 W	0W	0W	0W
Heated windscreen	1000W	250W	250W	0W
Seat heating	Front: 2 x 100W Rear: 2 x 80 W	Front 2 x 25 W Rear: 2 x 20 W	Front: 2 x 25 W Rear: 2 x 20 W	0W
Rear Additional Heating	2 x 250 W	2 x 50 W	2 x 50 W	0W
Steering Wheel Heating	Approximately 100 W	No Restriction	0W	0W
Jet and Fluid Hose Heating	20 to 100 W	No Restriction	0W	0W
Mirror Heating	2 x 30 W	No Restriction	0W	0W

Energy Management (J644)

Battery Voltage Regulation

The Energy Management Control Module sends the alternator of the required voltage over a data wire (Bit-Synchronous Interface). The alternator sets the voltage.

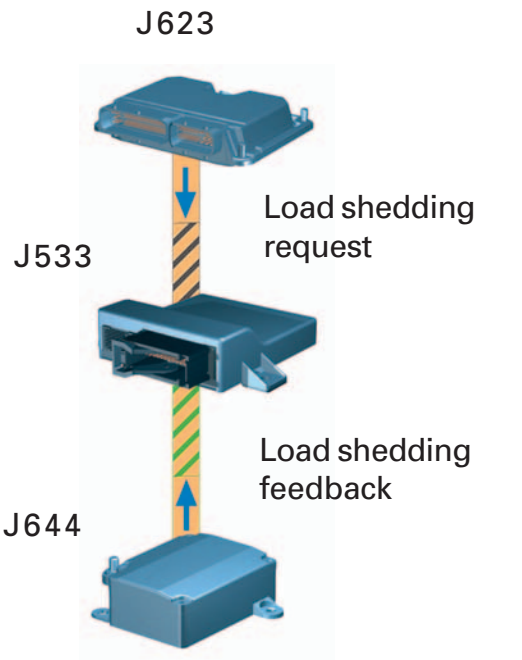
The Battery Manager (Function Module 1) determines the specified value from battery temperature and battery charge. The value is transferred from the Control Module to the Dynamic Management (Function Module 3), which relays the value to the alternator. The Guided Fault-Finding routine contains Measured Value Blocks for checking the specified alternator voltage and communication over the data wire. The specified alternator voltage can be changed for diagnosis purposes as part of final control diagnosis.



SSP287_020

Load Shedding

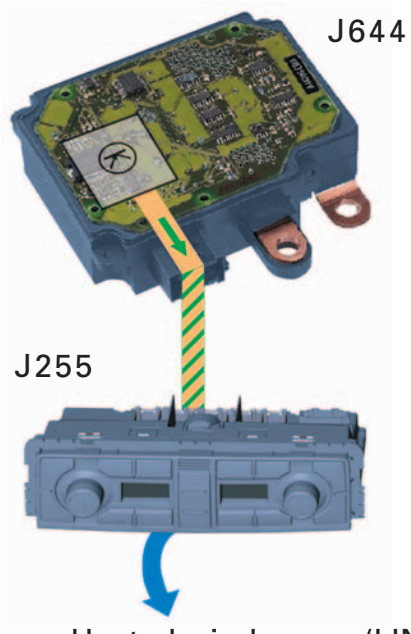
The Energy Management Control Module can reduce the engine load (e.g. during acceleration) if requested by the ECM. If the ECM requests load shedding, the Energy Management System reduces heavy-duty loads in the first stage and alternator voltage in the second stage to lower the level of alternator power input. The Energy Management Control Module sends a request over the Convenience CAN to the Climatronic Control Module (J255), which regulates various heating systems, such as the windshield, seats, rear window and additional rear heater.



SSP287_062

Regulation of Heavy-Duty Heating Systems

The Energy Management Control Module regulates the heat output of the windshield, rear window, seats and additional rear heater with the Climatronic Control Module. The Energy Management Control Module determines the maximum heat output that is available.



SSP287_021

Heated windscreen (LIN bus)
Rear additional heater (LIN bus)
Seat heating (hard wire)
Headed rear window

Idling Speed Increase

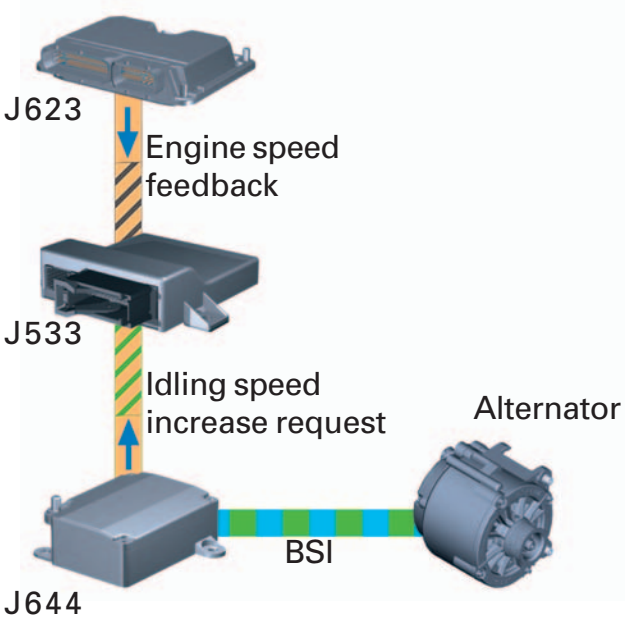
To ensure optimum electrical system supply and battery charging, the Energy Management System can request the ECM to increase the idling speed in stages (7% and 12%).

Alternator Activation (Start Load Response)

On starting the engine, the alternator power input is minimized to optimize the starting process.

Alternator Control Dynamics (Drive Load Response)

When the heated rear window is turned on, the alternator voltage is not increased immediately, but adjusted within 3, 6 or 9 seconds as a function of engine speed and temperature. This continuous, infinitely variable regulation of alternator torque results in uniform engine loading.



SSP287_115

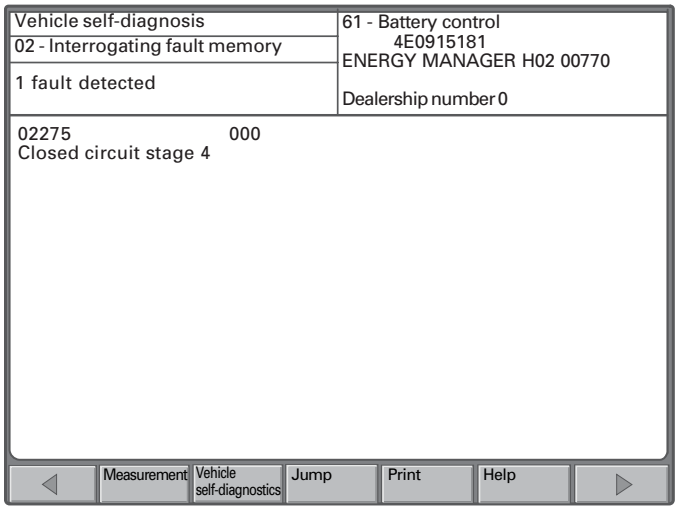
DTC Entry

When the Energy Management Control Module actuates a deactivation stage, it restricts the function of certain other systems and a DTC is set.

Other examples of Energy Management Control Module DTCs include:

- Alternator Mechanical Fault
- Alternator Electrical Fault
- Alternator High-Temperature Regulation

The data for the DTC includes information such as mileage or date at/on which a DTC was stored

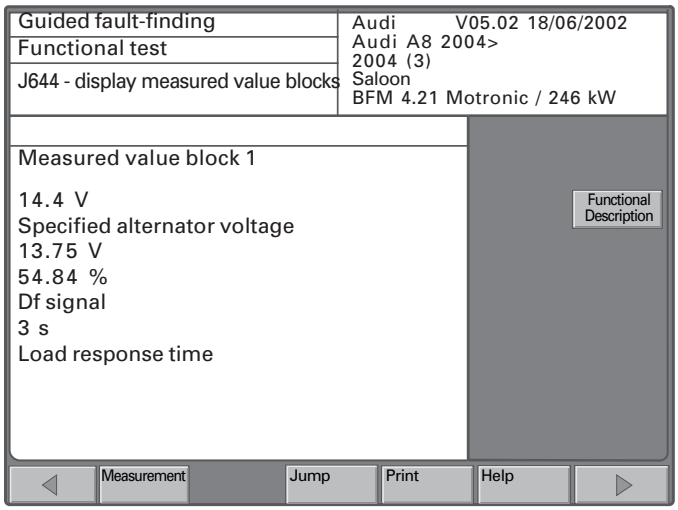


SSP287_022

Measured Value Blocks

Guided Fault-Finding allows call-up of measured values in the Measured Value Blocks, such as:

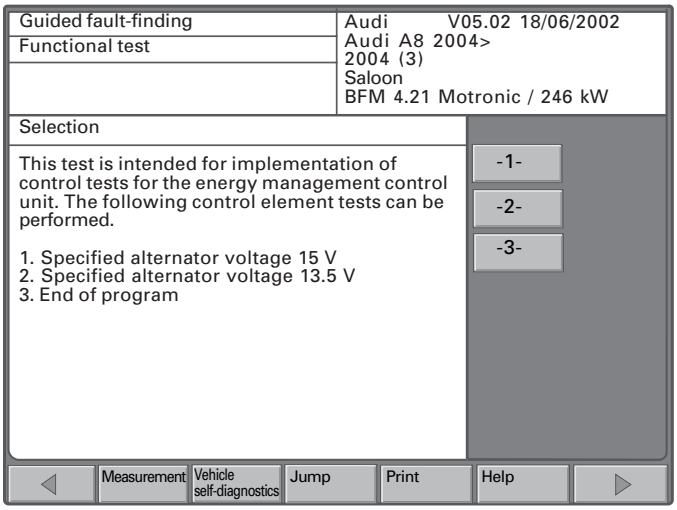
- Specified Alternator Voltage
- Battery Voltage
- Busbar Temperature
- Battery Temperature
- SOC
- Communication with Alternator
- Mean Closed circuit Current Value
- Emergency Shutdown
- Closed Circuit Deactivation
- Internal Battery Resistance, Charge Loss



SSP287_023

Final Control Diagnosis

Final control diagnosis can be used to alter the specified alternator voltage for diagnosis purposes. Specified alternator voltages of 15 V and 13.5 V can be set. The value set as alternator specification can then be measured at the alternator terminal.



SSP287_054

Service Work

Battery Diagnosis

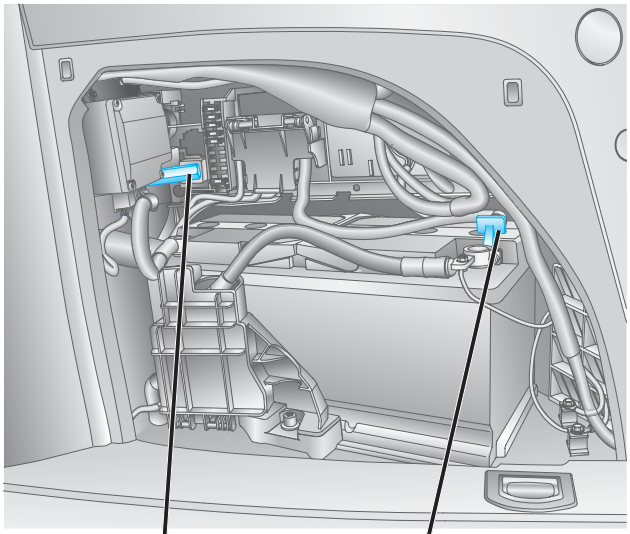
The battery is tested by the Energy Management Control Module. Checking the battery with a load test is not necessary. Guided Fault-Finding allows the "Function and Component Selection" menu to be called up, from which the battery test is started. The Control Module determines the SOC; internal battery resistance and energy flow and uses these values to calculate if the battery is OK, charged, or needs replacement.

Battery Charging

The battery charger must be connected to the battery positive terminal and the negative terminal at the external starting pin. The battery should always be recharged in the vehicle, which enables the Energy Management Control Module to include the charging current into the battery value calculations. When working on the vehicle with the ignition on and the engine off, always connect a battery charger. If a battery charger is not used, some functions may be deactivated because of excessive current draw. The charger must supply at least a 30A stabilized current.

Do not rapid-charge the battery in the vehicle. Use the slow charge setting.

When charging the battery, follow the manufacturers' instructions on the battery and the charging equipment.



SSP287_068

External starting pin

External starting tap

Battery Replacement

When a battery is replaced, the new battery must be adapted by the diagnosis tester. The menu item "Battery manager encoding" is provided in the Guided Fault-Finding routine in the list of systems with self-diagnosis capability in the battery manager. The battery serial number has to be entered for encoding. This is marked on the battery.

External starting

For external starting, the starter cable ground is to be connected to the external starting pin and the positive cable to the external starting tap.

Display in Instrument Panel Insert (J285)



SSP287_077

Instrument illumination controls

Auto-Check system

Reset button for trip recorder

Certain functions of the 2004 Audi A8L Instrument Panel Insert have been changed. The new features include:

- No Gateway
- Immobilizer Function is No Longer in the Instrument Panel Insert
- Modified Vehicle-Speed Signal Input
- No Immobilizer Warning Lamp
- Modified Fuel Gauge G1
- Modified Coolant-Temperature Gauge

Gateway

Because of added functions, the Data Bus On Board Diagnostic Interface (Gateway) is now designed as a separate, external control module.

Immobilizer

The Immobilizer function has been incorporated into the Access/Start Control Module. Adaptation to the Immobilizer is no longer necessary when replacing the Instrument Panel Insert.

There is no connection between an Immobilizer fault and the Instrument Panel Insert.

Display in Instrument Panel Insert J285

Immobilizer Warning Lamp

The Immobilizer Warning Lamp has been eliminated. In case of a key identification fault, a signal is sent by the Access/Start Control Module. "SAFE" appears in the mileage display. This display is also used to show the number of keys to be matched and the number already matched on vehicle key adaptation.

Vehicle-Speed Signal

The vehicle-speed signal is now supplied by the ABS Control Module (w/EDL) (J104) over the Drive System CAN.



The wheel circumference must be available to the Instrument Panel Insert to ensure correct evaluation of the vehicle-speed signal.

The allowable wheel circumferences are included in the encoding and selected by Guided Fault-Finding.

Fuel Gauge (G1)

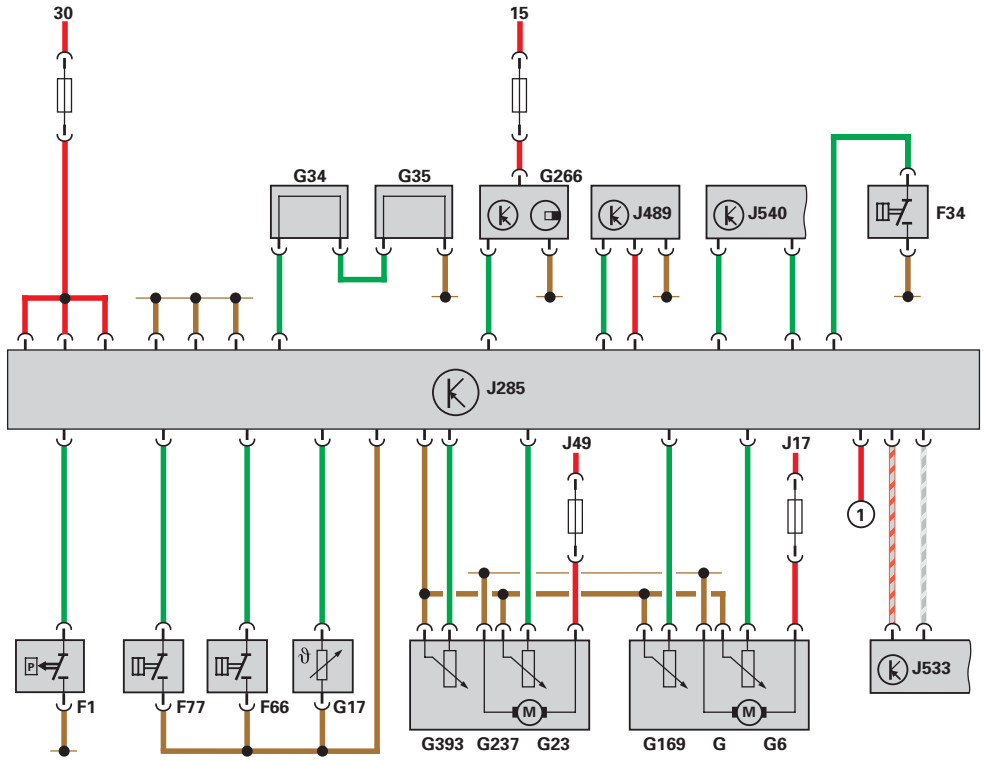
The input signal is now provided by four fuel gauge senders in the fuel tank, all of which are evaluated separately. Fuel gauge sender operation is described in SSP 282 – 2004 Audi A8L Technical Features.

Engine Coolant Temperature (ECT) Gauge (G3)

The input signal for the Engine Coolant Temperature (ECT) Gauge is not supplied by the Engine Coolant Temperature (ECT) Sensor G62, but rather it is sent by the ECM to the Instrument Panel Insert.

Display in Instrument Panel Insert J285

Block Diagram



SSP287_036

Key

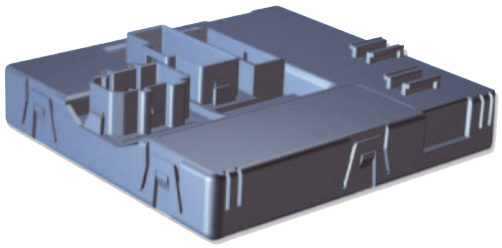
F1	Oil Pressure Switch
F34	Brake Fluid Level Warning Switch
F66	Engine Coolant Level (ECL) Warning Switch
F77	Windshield Washer Fluid Warning Switch
G	Fuel Gauge Sender
G6	Fuel Pump (FP)
G17	Outside Temperature Sensor
G23	Transfer Fuel Pump
G237	Fuel Supply Sensor 3
G34	Left Front Brake Pad Wear Sensor
G35	Right Front Brake Pad Wear Sensor
G169	Fuel Level Sensor 2
J17	Fuel Pump Relay
J49	Fuel Pump 2 Relay
J285	Control Module with Display in Instrument Panel Insert
J489	Radio Frequency Controlled Clock Receiver
J533	Data Bus On Board Diagnostic Interface
J540	Electronic Park Brake Control Module

Additional Signal

(1)	Terminal 58s

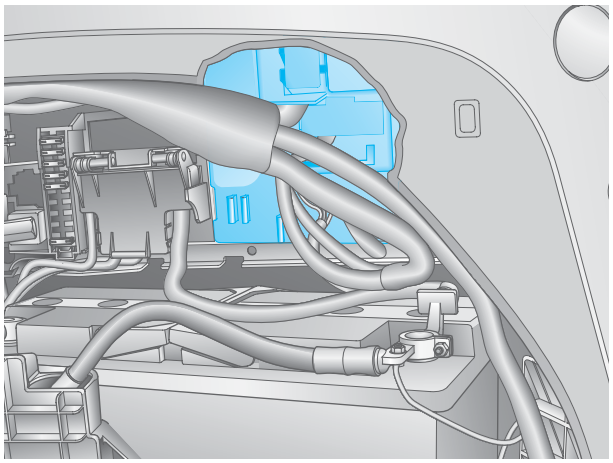
Notes

The 2004 Audi A8L is equipped with the same Central Control Module for Comfort System used in the Audi A2 and Audi A4. The tasks and functions have been adapted to suit the requirements of the Audi A8L. The Control Module is connected to the Convenience CAN.



SSP287_048

The Central Control Module for Comfort System is mounted at the rear right of the luggage compartment above the battery.



SSP287_069

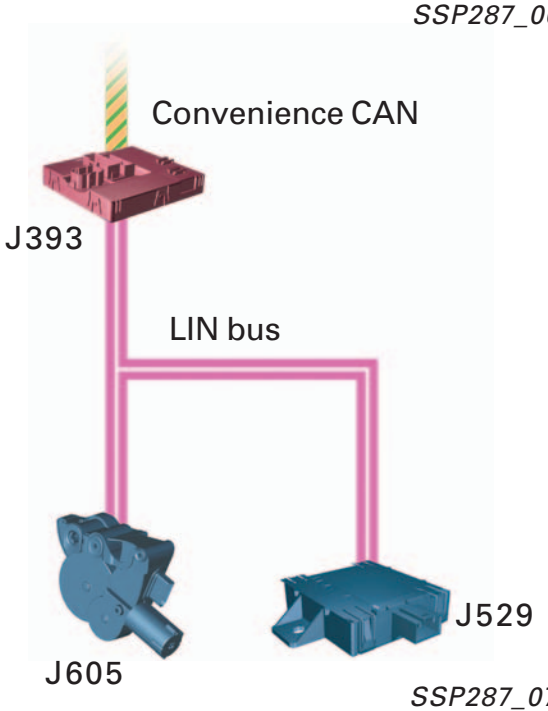
Master functions

The master functions of the Central Control Module for Comfort System are as follows:

- LIN Master for Rear Lid Control Module and Inclination/Anti-Theft Control Module
- Central Locking Master
- Flashing Signal Master
- Anti-Theft Alarm Master

LIN Master

The Central Control Module for Comfort System is the LIN master. It provides the information required by the LIN slaves (Rear Lid Control Module and Inclination/ Anti-Theft Control Module), to perform and to retrieve the data to implement functions from the LIN slaves.



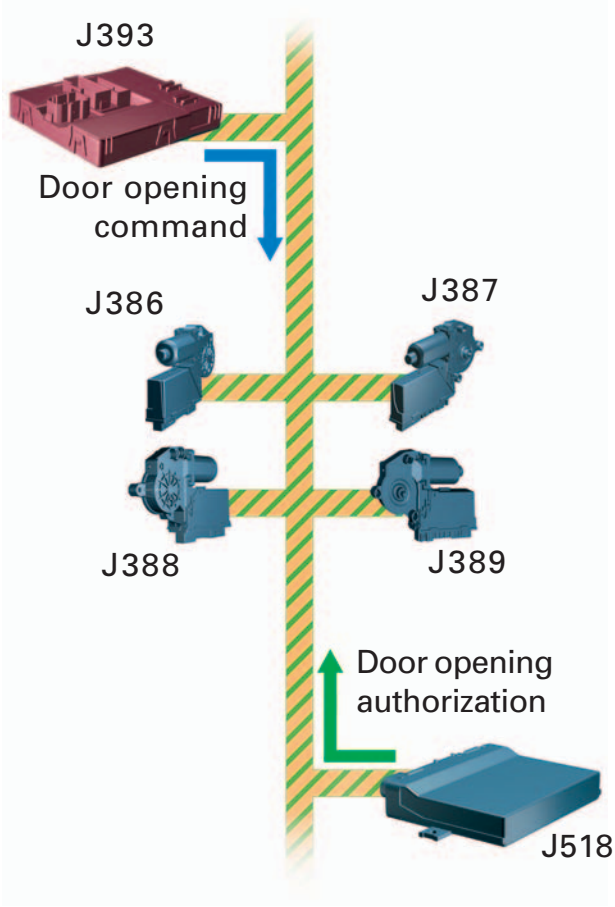
SSP287_070

Comfort System (J393)

Central Locking Master

As central locking master, the Central Control Module for Comfort System controls the central locking function. The Control Module deciphers the door opening authorization from the Access/ Start Control Module over the Convenience CAN. The Control Module then transmits the command over the Convenience CAN for opening and/or closing the doors to the Door Control Modules.

Central Locking Control is described in SSP 996303 – Distributed Functions.



SSP287_071

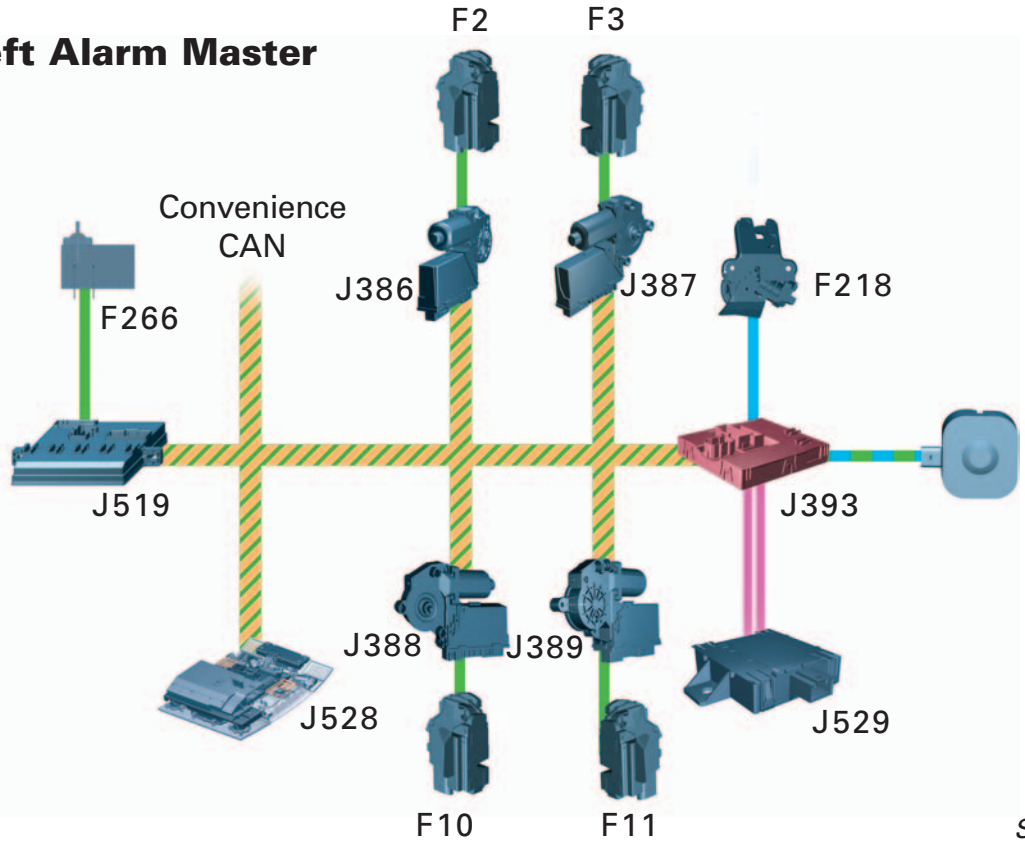
Flashing Signal Master

The Central Control Module for Comfort System is the flashing signal master. It evaluates the incoming flashing mode requests and passes the corresponding flashing mode to the Convenience CAN in line with the internal priority list. Flashing modes include turn signals, motorway signaling, anti-theft alarm flashing and central locking system flashing.

As several flashing requests may be received at the same time, priorities are assigned to the flashing modes. The control modules involved in the flashing function receive the flashing mode from the Convenience CAN and activate their outputs according to the preset priority.

Control of the flashing signal system is also described in SSP 996303 – Distributed Functions.

Anti-Theft Alarm Master



SSP287_075

The Central Control Module for Comfort System is the anti-theft alarm master. It evaluates the corresponding vehicle monitoring information and actuates the anti-theft output media.

All components are simultaneously primed/ deactivated. When the anti-theft alarm system is primed, all door contacts, hood contact, trunk lid contact, passenger compartment and vehicle tilt are monitored.

F2	Door Contact Switch – Driver Side
F3	Door Contact Switch – Passenger Side
F10	Left Rear Door Contact Switch
F11	Right Rear Door Contact Switch
F218	Switch for Central Locking, Trunk Lid
F266	Front Hood Switch
H12	Alarm Horn
J386	Door Control Module, Driver Side
J387	Door Control Module, Passenger Side
J388	Door Control Module, Rear, Left
J389	Door Control Module, Rear, Right
J393	Central Control Module for Comfort System
J519	Vehicle Electrical System Control Module
J528	Roof Electronics Control Module
J529	Inclination/Anti-Theft Control Module

Comfort System (J393)

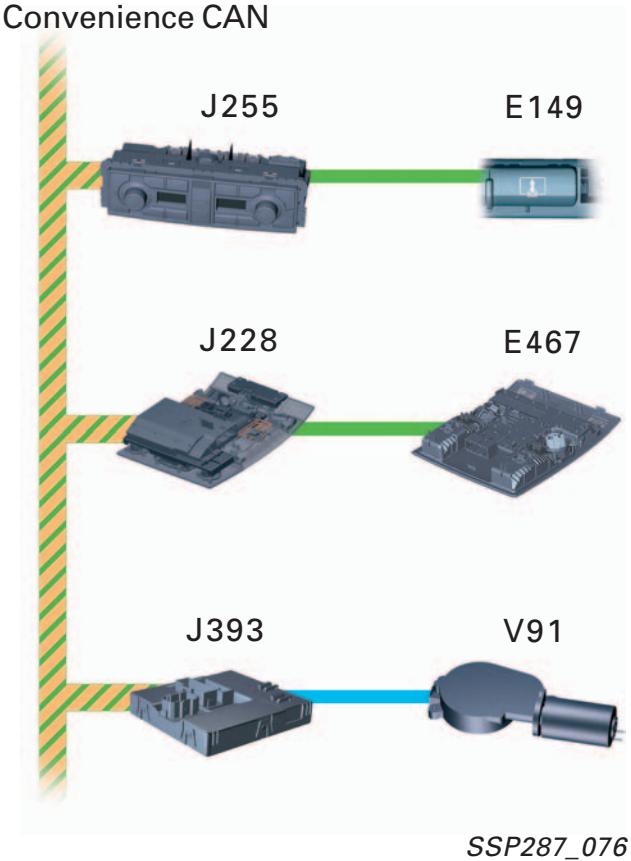
Activation of Rear Left and Right Footwell Lights

The Central Control Module for Comfort System activates the rear footwell lights. The activation time and brightness value are specified by the Roof Electronics Control Module (J528).

Rear Roller Blind

The rear roller blind is operated by the Rear Window Shade Switch or switches in the Rear Roof Module Control Head. The input is interpreted by the Climatronic Control Module and sent over the Convenience CAN to the Roof Electronics Control Module which sends it to the Central Control Module for Comfort System. The Control Module actuates the blind motor.

E149	Rear Window Shade Switch
E467	Rear Roof Module Control Head
J255	Climatronic Control Module
J393	Central Control Module for Comfort System
J528	Roof Electronics Control Module
V91	Rear Window Shade Motor



SSP287_076

Luggage Compartment Lights

Then the trunk is opened, the Central Control Module for Comfort System activates the luggage compartment lights. The lighting is switched off with the ignition ON when the trunk lid is closed or the vehicle speed is more than 1 mph (2 km/h).

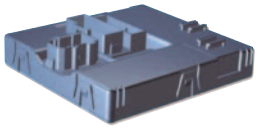
With the ignition off, the lighting is turned off again by the control Module when the trunk lid is closed or after the maximum operating time of 10 minutes. Following time-based deactivation, the lighting can only be re-activated if the driver or front passenger door and the trunk lid are opened or the ignition is activated.

Heated rear window Z1

The Central Control Module for Comfort System actuates the heated rear window over the Rear Window Defogger Relay J9. The relay activation information is supplied to the Central Control Module for Comfort System by the Climatronic Control Module.

The Central Control Module for Comfort System receives the following input signals:

- Trunk Lid Soft Touch
- Lock Cylinder CLOSED
- Brake Light Switch
- Brake Light Signal from ABS Control Module (w/EDL) J104
- Crash Input
- Trunk Lid Switch
- Tank Filler Flap Detection
- Trunk Lid Power Latching System Feedback

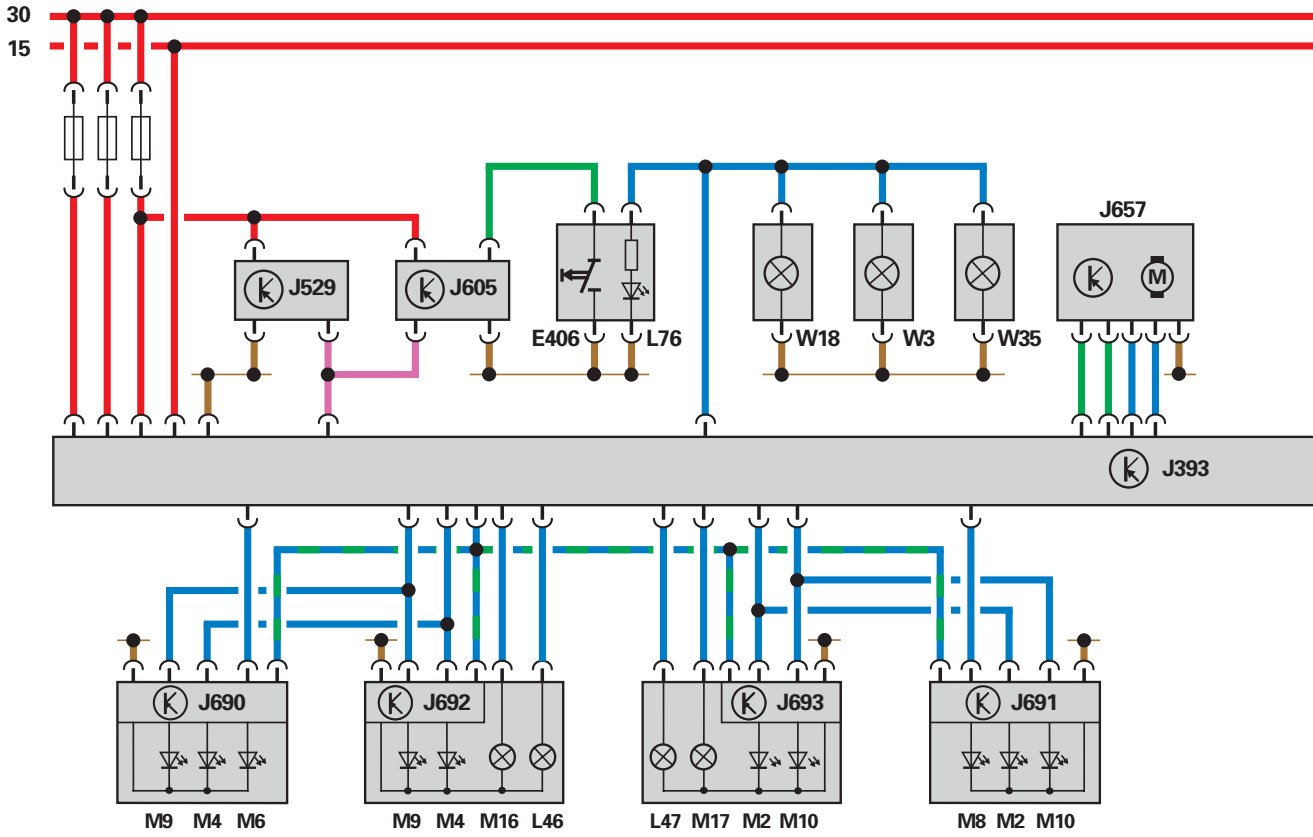


The Central Control Module for Comfort System actuates the following loads:

- Rear Left and Right Footwell Lights
- Luggage Compartment Lights
- Rear Window Shade Motor (V91)
- Actuator for Central Locking, Fuel Tank Cap (F219)
- Rear Lid Control Module (J605)
- Trunk Lid Power Latching System
- Motor to Unlock Rear Lid (V139)
- Left And Right Turn Signal Indicator (LED)
- High-Level Brake Light (LED)
- Left and Right Tail Light (LED)
- Left and Right Brake Light (LED)
- Rear Left and Rear Right Brake Light LED)
- Left and Right Reversing Light
- Left and Right Rear Fog Light
- License Plate Light
- Heated Rear Window (Z1)
- Alarm Horn (H12)

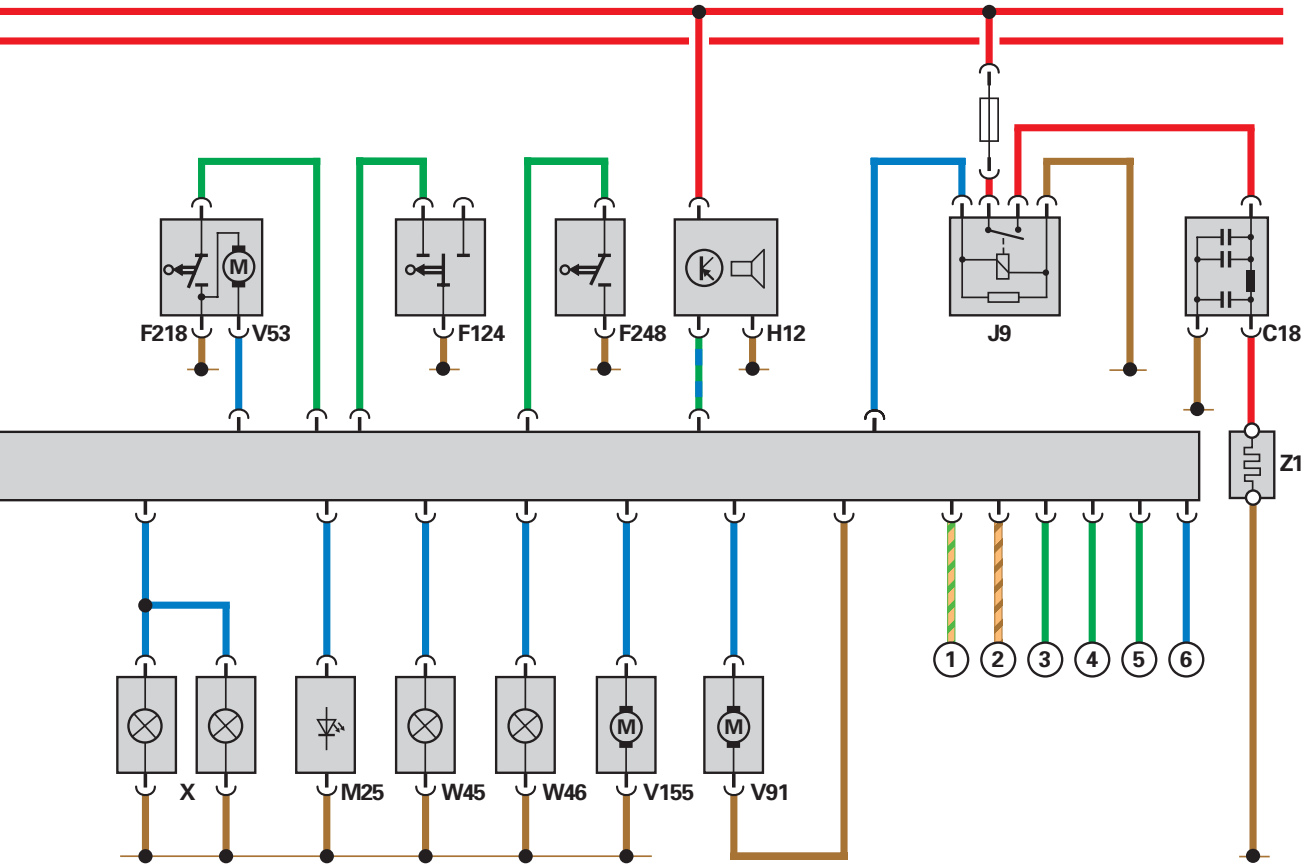
Comfort System (J393)

Block Diagram



Key

C18	Windshield Antenna Suppression Filter
E406	Rear Lock Lid Button (in luggage compartment)
F218	Switch for Central Locking, Trunk Lid
F124	Trunk Lid/Alarm/Central Locking Switch
F248	Switch for Unlocking, Rear Lid Lock Cylinder
H12	Alarm Horn
J9	Rear Window Defogger Relay
J393	Central Control Module for Comfort System
J529	Inclination/Anti-Theft Control Module
J605	Rear Lid Control Module
J657	Door Closing Control Module
J690	Left Tail Light Control Module
J691	Right Tail Light Control Module
J692	Left Rear Lid Tail Light Control Module
J693	Right Rear Lid Tail Light Control Module
L46	Left Rear Fog Light
L47	Right Rear Fog Light
F218	Trunk Lid Central Locking Switch
F248	Switch for Unlocking, Rear Lid Lock Cylinder
L76	Push Button Light
M2	Right Tail Light Bulb
M4	Left Tail Light Bulb
M6	Left Rear Turn Signal Bulb
M8	Right Rear Turn Signal Bulb



SSP287_035

M9	Left Brake Light
M10	Right Brake Light
M16	Left Back-Up Light
M17	Right Back-Up Light
M25	High-Mount Brake Light
V53	Decklid Central Locking System Motor
V91	Rear Window Shade Motor
V155	Motor for Fuel Tank Lid Unlock
W3	Luggage Compartment Light
W18	Left Luggage Compartment Light
W35	Right Luggage Compartment Light
W45	Left Rear Footwell Light
W46	Right Rear Footwell Light
X	License Plate Light
Z1	Heated Rear Window

Additional signals

1. Convenience CAN High
2. Convenience CAN Low
3. Brake Light Switch (F)
4. ESP Brake Signal from ABS Control Module (w/EDL) J104
5. Crash Signal from Airbag Control Module J234
6. “Doors OPEN” Signal to Level Control System Control Module J197

Taillight Activation



SSP287_030

Some of the rear light modules (turn signal indicators, taillights and brake lights) are the diode type. Each light is activated by an integrated microprocessor. The microprocessor regulates when the red LED operates as a taillight (approximately 10% Pulse Width Modulated [PWM] signal) or as brake light (approximately 97% PWM signal).

The diodes are arranged in a matrix. If one diode fails, the other diodes for this function continue to light. This simplifies the wiring and several emergency functions can be implemented. Total failure or malfunctioning of the internal transistor is detected by the microprocessor, which transmits a fault message to the Central Control Module for Comfort System.

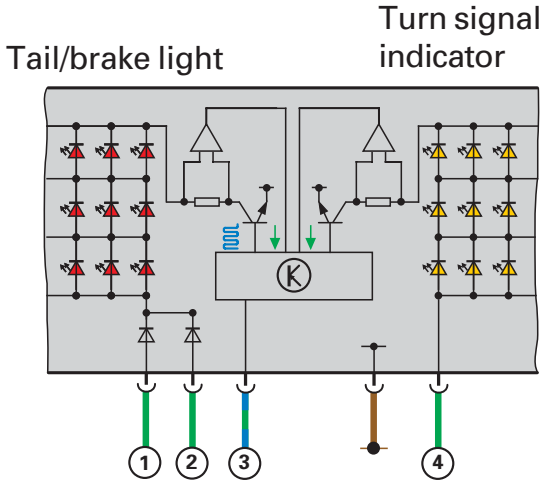
The turn signal LEDs are actuated the same way as the taillight LEDs, however there is no PWM control.

(1) Tail Light Signal

(2) Brake Light Signal

(3) Bi-directional Wire from Central Control Module for Comfort System

(4) Indicator Signal



SSP287_117

The Rear Lid Control Module provides extra convenience when opening and closing the trunk lid. The electromechanical drive system has a motor and magnetic clutch that responds to requests from the Central Control Module for Comfort System. The current position and the switching status of the trunk lid closing button are sent to the Central Control Module for Comfort System.

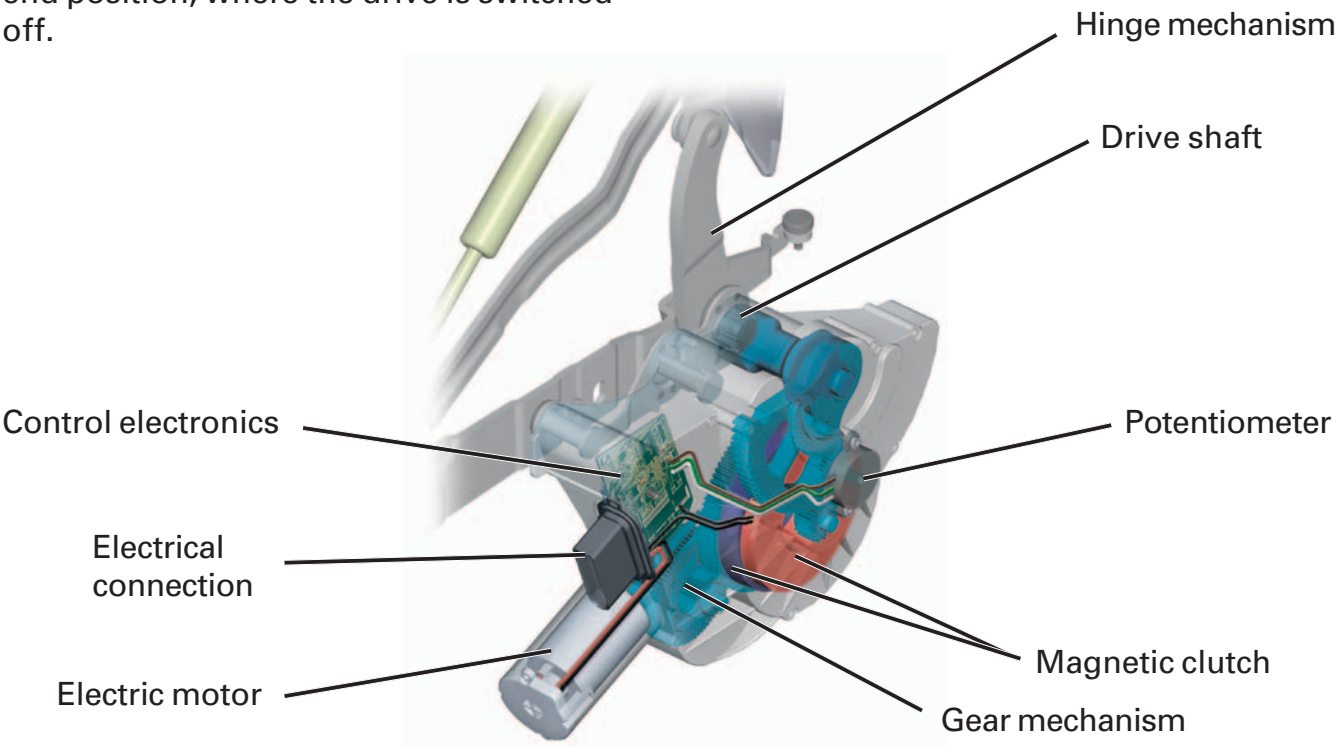
The trunk lid control sequence is measured by an integrated potentiometer. This permits

- Detection of the end positions
- Detection of excess force and thus implementation of obstruction safeguard through evaluation of the rate of change

Operation

Opening/closing involves engagement of the magnetic clutch and starting the motor. During movement, the current position of the trunk lid is detected over the potentiometer and compared to the previous value. If there are no problems, the trunk lid is moved into the desired end position, where the drive is switched off.

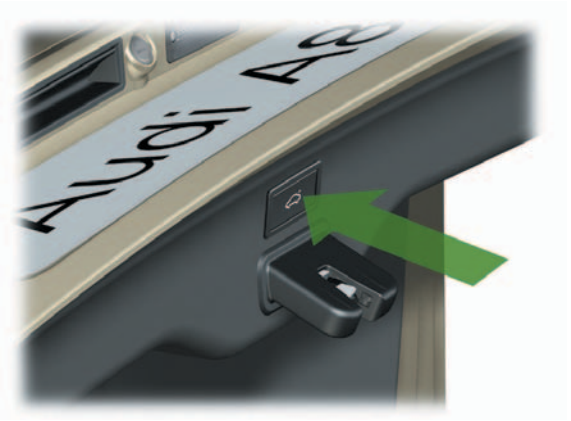
In case of an obstruction or opposing force during opening or closing, the magnetic clutch is disengaged and the motor stops. If the trunk was being closed, the lid is opens again (obstruction safeguard).



SSP287_080

Rear Lid (J605)

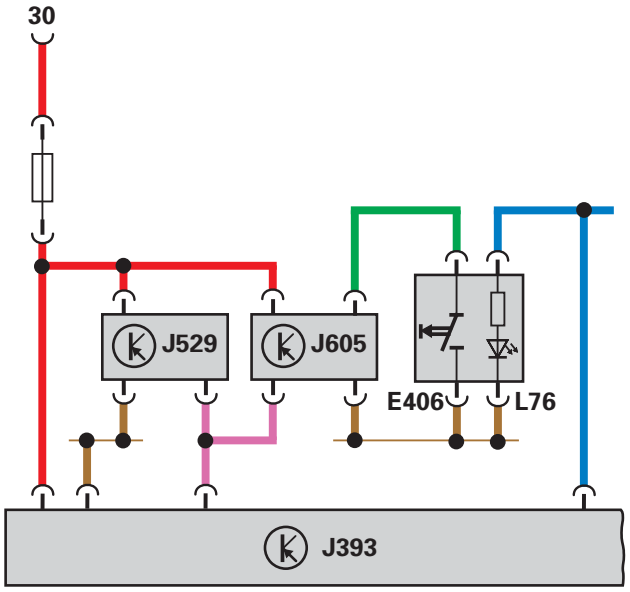
The Rear Lid Control Module receives the input signal from the Rear Lid Lock Button (E406).in the luggage compartment



SSP287_081

Block Diagram

E406	Rear Lid Lock Button
J393	Central Control Module for Comfort System
J529	Inclination/Anti-Theft Control Module
J605	Rear Lid Control Module
L76	Push Button Light



SSP287_082

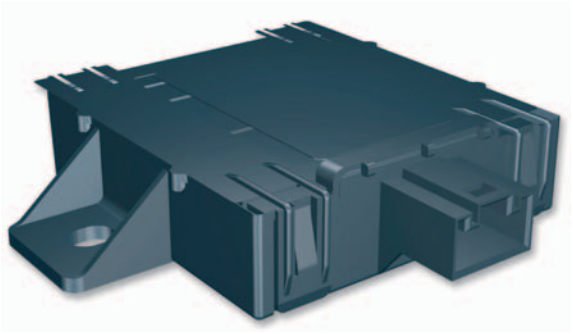
The Rear Lid Control Module is located behind the quarter panel at the top right, and is attached to the right trunk lid hinge.



SSP287_083

Inclination/Anti-Theft (J529)

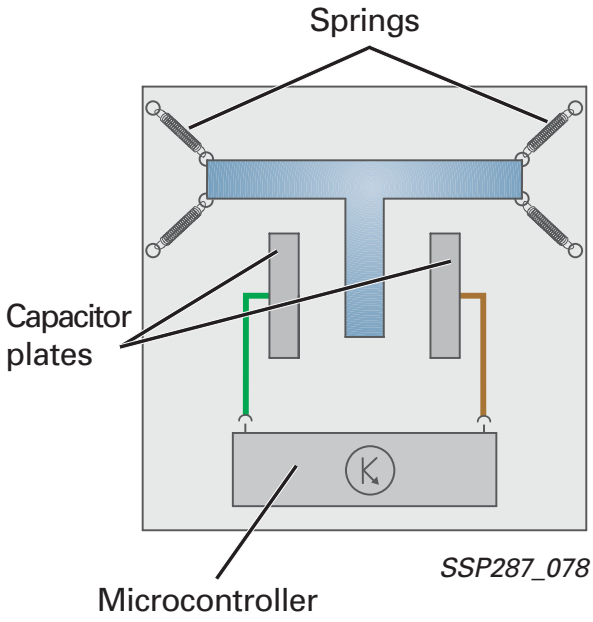
As in the 2001 Audi A4, a tilt sensor is used to prevent unauthorized towing. However, the tilt sensor in the 2004 Audi A8L is an independent control module. The Inclination/Anti-Theft Control Module is connected to the Central Control Module for Comfort System over a LIN Bus link.



SSP287_047

Design

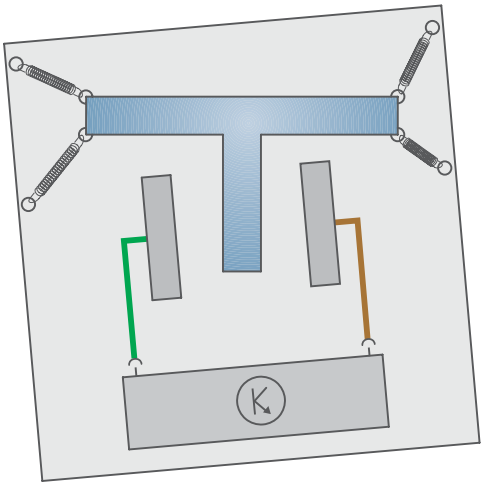
The internal design and mode of operation have been modified compared to the tilt sensor in the 2001 Audi A4. The Control Module contains the sensor element, the microcontroller and a LIN transceiver. The sensor consists of a moving ground suspended by springs between two capacitor plates. The capacitor plate connections are routed into the Control Module.



SSP287_078

Operation

A change in the horizontal position of the Control Module moves the ground between the capacitor plates within the spring travel range. A voltage is applied to the capacitor plates. Movement of the ground plate produces a change in capacitance between the plates. This voltage signal is recognized as a change in vehicle attitude by the Control Module. The measuring range of the sensor is ± 25°. The change in capacitance is evaluated with an accuracy of 0.1°.

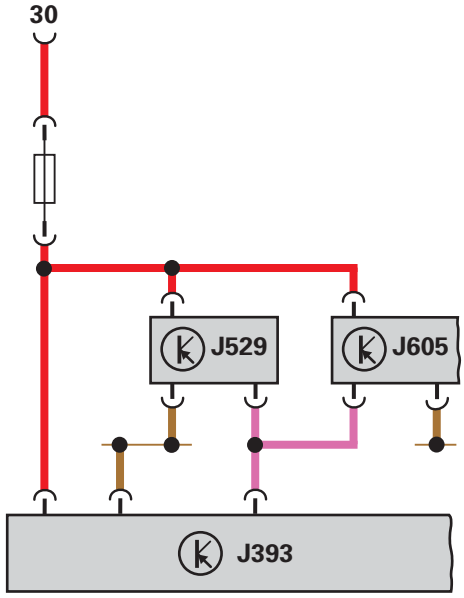


SSP287_079

Inclination/Anti-Theft (J529)

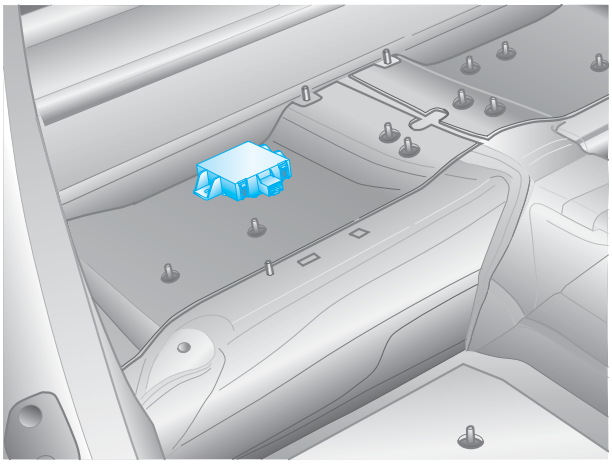
Block Diagram

J393 Central Control Module for Comfort System
J529 Inclination/Anti-Theft Control Module
J605 Rear Lid Control Module



SSP287_074

The Inclination/Anti-Theft Control Module is mounted under the right rear seat.



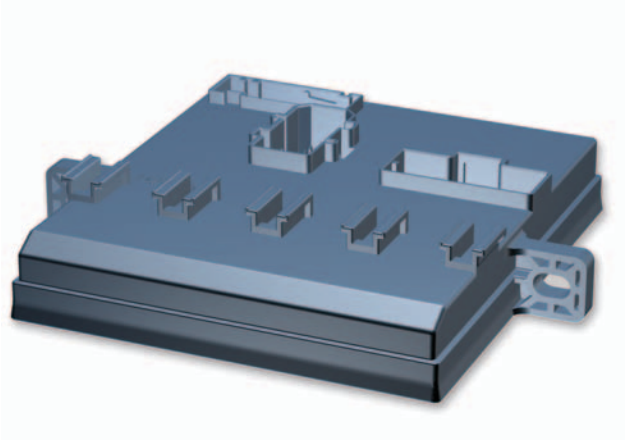
SSP287_029

Diagnosis

The absolute tilt angles can be displayed in the Measured Value Blocks. In addition, with the anti-theft alarm primed, the change in angle can be read with respect to the angle on priming the anti-theft alarm. Diagnosis for the Inclination/ Anti-Theft Control Module is performed by the central convenience electronics.

Functions

The Vehicle Electrical System Control Module was first used in the 2001 Audi A4. For the 2004 Audi A8L, it is equipped with modified functions and activation processes. The Control Module is designed to read in various switches and actuate certain outputs.



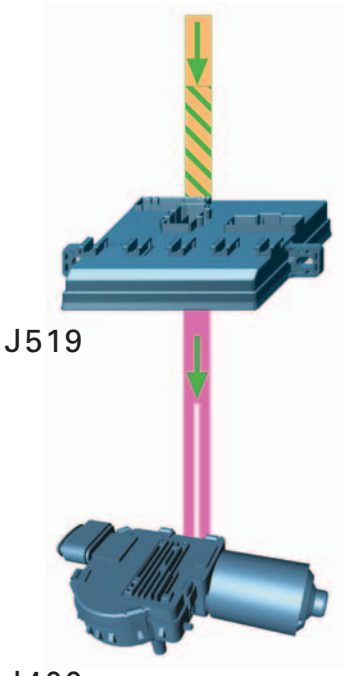
SSP287_045

Master Functions

The master functions of the Vehicle Electrical System Control Module are:

- Control Module for Wiper Motor (J400)
- Light Master

As lighting master, the Vehicle Electrical System Control Module provides all control modules with the required type of lighting to enable the control modules to activate certain control elements. In addition, it monitors operation of the front external vehicle lights by cold and warm lamp monitoring. Exterior lighting control is described in SSP 996303 – 2004 Audi A8L - Distributed Functions.



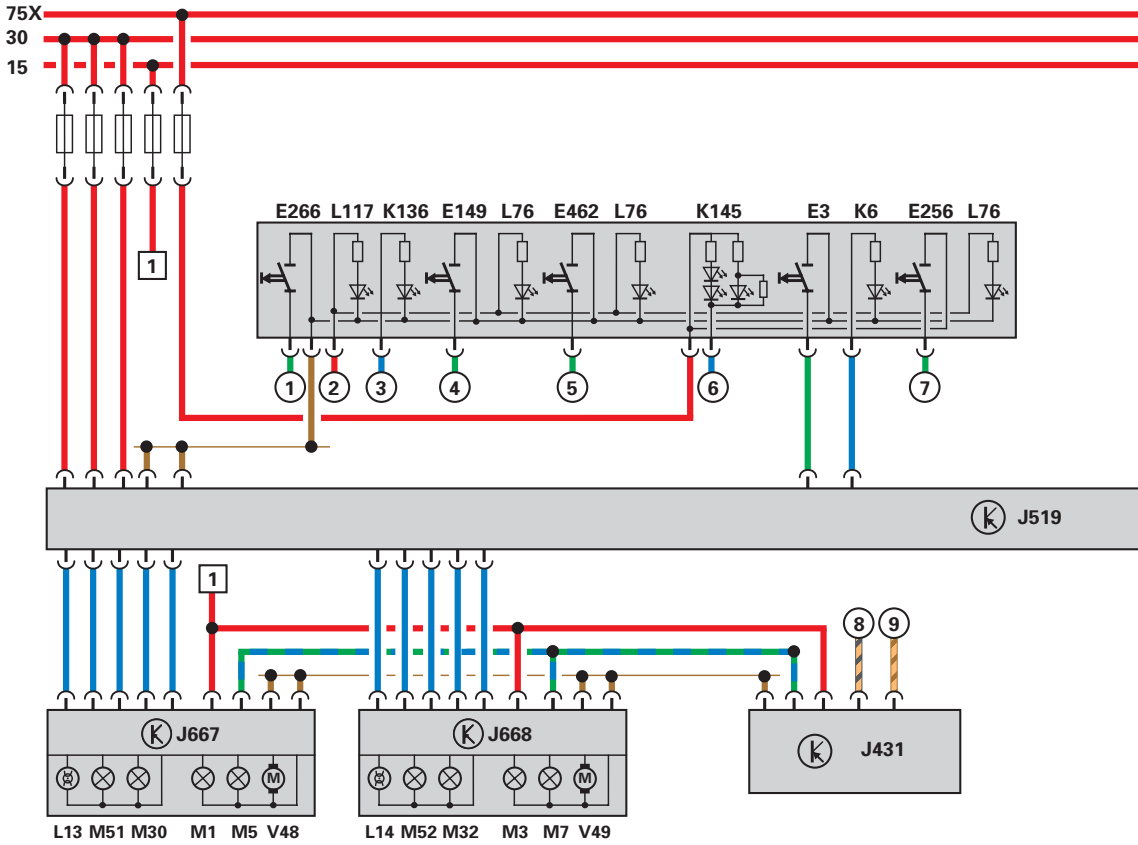
SSP287_032

Substitute Master Function

The Vehicle Electrical System Control Module assumes the substitute master function for the Central Control Module for Comfort System. If the Central Control Module for Comfort System is disconnected from the CAN Bus or defective, the Vehicle Electrical System Control Module transmits the flashing signal information to the CAN Bus. Refer to SSP 996303 – 2004 Audi A8L Distributed Functions.

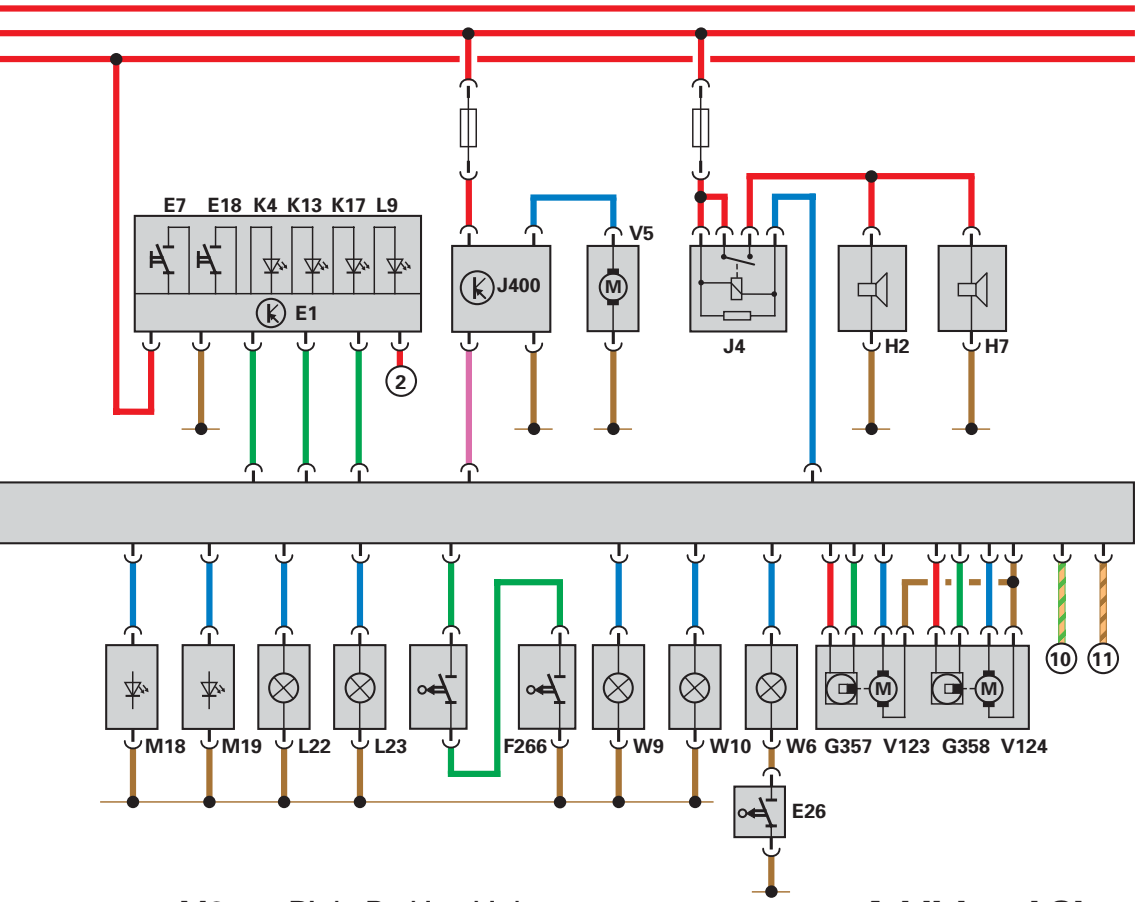
Vehicle Electrical System (J519)

Block Diagram



Key

E1	Light Switch
E149	Rear Window Shade Switch
E18	Rear Fog Light Switch
E256	ASR/ESP Button
E26	Glove Compartment Light
E266	Parking Aid Button
E3	Emergency Flasher Switch
E462	Front Display Open/Close Button
E7	Fog Light Switch
F266	Hood Contact Switch
G357	Steering Column Vertical Adjustment Sender
G358	Steering Column Axial Adjustment Sender
H2	High-Tone Horn
H7	Low-Tone Horn
J4	Horn Relay
J400	Control Module for Wiper Motor
J431	Headlight Range Control Module
J519	Vehicle Electrical System Control Module
J667	Left Headlight Power Output Stage
J668	Right Headlight Power Output Stage
K13	Rear Fog Light Indicator Light
K136	Warning Light for Parking Aid
K17	Fog Light Indicator Light
K4	Park Light Indicator Light
K6	Indicator Light for Emergency Flasher System
L117	Parking Aid Switch Illumination
L13	High Intensity Gas Discharge Lamp
L14	High Intensity Discharge Lamp
L22	Left Fog Light Bulb
L23	Right Fog Light Bulb
L76	Push Button Light
L9	Headlight Switch Light
M1	Left Parking Light
M18	Left Side Turn Signal Light
M19	Right Side Turn Signal Light



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M3	Right Parking Light
M5	Left Front Turn Signal Light
M7	Left Rear Turn Signal Light
M30	Left High Beam Headlight
M32	Right High Beam Headlight
M51	Left Cornering Light
M52	Right Cornering Light
V5	Windshield Washer Pump
V48	Left Headlight Beam Adjusting Motor
V49	Right Headlight Beam Adjusting Motor
V123	Steering Column Vertical Adjustment Motor
V124	Steering Column Axial Adjustment Motor
W6	Glove Compartment Light
W9	Left Footwell Light
W10	Right Footwell Light

Additional Signals

1. Control Module for Parking Aid J446
2. Terminal 58s
3. Control Module for Parking Aid J446
4. Climatronic Control Module J255
5. Multimedia Control Head E380
6. Airbag Control Module J234
7. ABS Control Module (w/EDL) J104
8. Drive System CAN High
9. Drive System CAN Low
10. Convenience CAN High
11. Convenience CAN Low

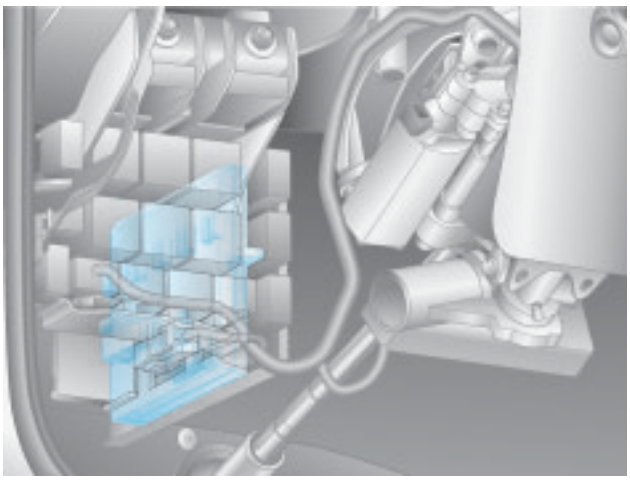
Vehicle Electrical System (J519)

Versions

There are two versions of the Vehicle Electrical System Control Module:

- Low-Line
- High-Line (with Electrical Steering Column Adjustment)

The Vehicle Electrical System Control Module is mounted at lower front left behind fuse box.



SSP287_053

Energy Management

Deactivation Stages

In case of a low battery charge, load deactivation is performed by the Energy Management Control Module. The necessary deactivation stage is sent on the CAN Bus and received by the Vehicle Electrical System Control Module.

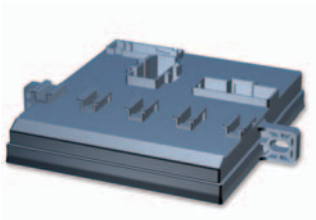
Transportation Mode

If Transportation Mode is activated by the VAS5051 in the Energy Management Control Module, the Vehicle Electrical System Control Module deactivates various loads and functions to minimize closed circuit current.

System Layout

The Vehicle Electrical System Control Module receives the following input signals:

- Hall Sensor 1 for Steering Column Adjustment Height
- Hall Sensor 2 for Steering Column Adjustment Depth
- Hood Switch for Anti-Theft Alarm
- Rotary Light Switch
- Hazard Warning Button
- Reverse Light Switch (Manual Transmission)



The Vehicle Electrical System Control Module activates the following outputs:

- Front Left and Right Turn Signal Indicators
- Left and Right Side Turn Signal Indicators
- Front Left and Right Side Lights
- Left and Right Low Beams
- Left and Right High Beams
- Left and Right Fog Light
- Front Left and Right Footwell Lights
- Horn
- Steering Column Adjustment
- Hazard Warning Button Illumination
- Glove Compartment Light

Diagnosis

Measured Value Blocks

Measured Value Blocks are available, for example, for the following functions:

Inputs	Remarks
Terminal 30	
Rotary Light Switch	Positions
Hazard Warning Button	OFF/ON
Steering Column Adjustment	Axial/Vertical Position Status (up, down, etc.)
Hood Contact	OFF/ON

Inputs Over CAN	Remarks
High Beam	OFF/ON
Headlight Flasher	OFF/ON
Turn Signal	OFF/ON
Vehicle-Speed Signal	km/h
Wipe/Wash	Status
Ignition	OFF/ON
Terminal X	OFF/ON
Terminal 50	OFF/ON

Outputs	Remarks
Light Control	e.g., Left Side Light
Front Footwell	OFF/ON
Horn	OFF/ON Lights

Inputs Over LIN	Remarks
Wipe	OFF/ON
Wash	OFF/ON
Park Position	OFF/ON

Basic Settings

Basic steering column adjustment setting are made with the High-Line Version.

Control Element Test

The Control Element Test can be used to check the following:

- Indicator Light for Emergency Flasher System (K6)
- Left Parking Light (M1)
- Right Parking Light (M3)
- Left Low Beam Light (M29)
- Right Low Beam Light(M31)
- Left High Beam Light (M30)
- Right High Beam Light (M32)
- Left Fog Light (L22)
- Right Fog Light (L23)
- Left Turn Signal Indicators
- Right Turn Signal Indicators
- Left Footwell Light (W9)
- Right Footwell Light (W10)
- Wiper Upper Reversing Position
- Wiper Lower Reversing Position
- Windshield Washer Pump (V5)
- Horn Relay

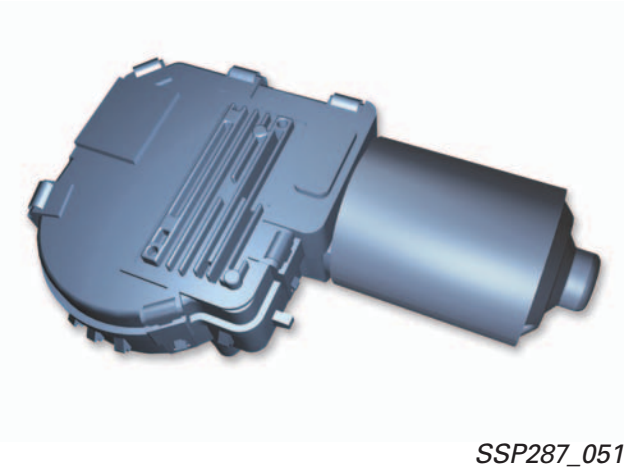
Encoding

Encoding must be performed in the Vehicle Electrical System Control Module for:

- Daytime Driving Light
- Assistant Lighting System
- Type of Headlight
- Footwell Lighting

Wiper Motor (J400)

The Control Module for Wiper Motor combines the control electronics for the individual wiper functions and the wiper motor in one component. As LIN Slave Control Module, it is connected to the Vehicle Electrical System Control Module.



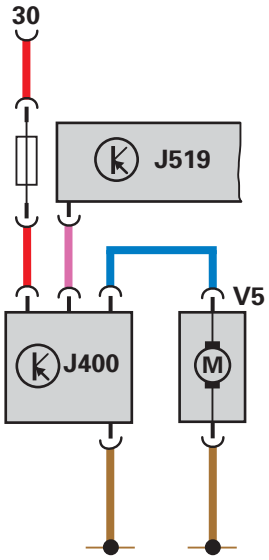
SSP287_051

Functions

- Activation of Windshield Washer Pump (V5)
- Control of Wipe Angle Functions

Block Diagram

J400	Control Module for Wiper Motor
J519	Vehicle Electrical System Control Module
V5	Windshield Washer Pump



SSP287_063

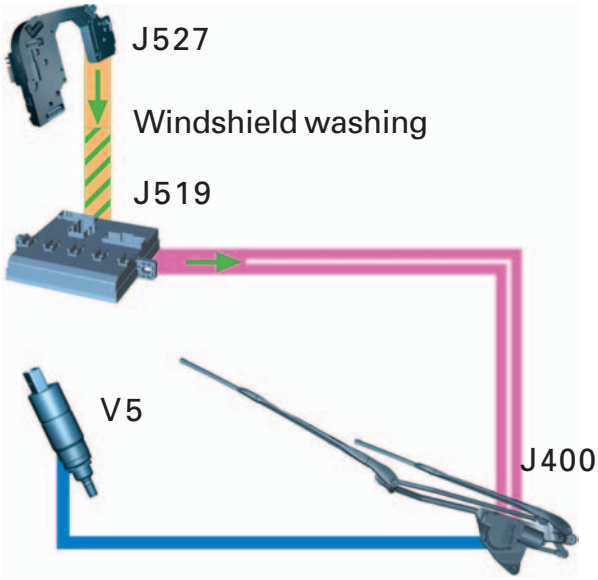
Front Hood Switch (F266)

If the hood is opened when the wiper motor is running, the motor stops immediately. If the windshield washer pump is on when the hood is opened, it also stops. Two contact switches connected to the Vehicle Electrical System Control Module are used to detect opening the hood.

Operation

By the LIN Bus, the Vehicle Electrical System Control Module provides the Control Module for Wiper Motor with all the information required to implement the wiper function.

The Steering Column Electronics Control Module (J527) sends a signal to the Windshield Washer Pump (V5) over the Convenience CAN. The Vehicle Electrical System Control Module receives the information and relays it over the LIN Bus to the Control Module for Wiper Motor. The Control Module for Wiper Motor then activates the Windshield Washer Pump and if necessary, activates the wipers.

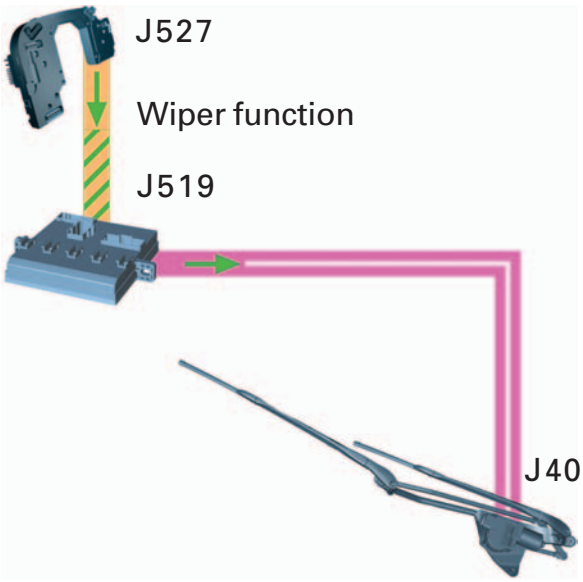


SSP287_064

The wiper functions are

- Intermittent
- Intermittent Speeds
- Mist Wipe
- Wipe speed 1
- Wipe speed 2

The functions are available to the Vehicle Electrical System Control Module by the Steering Column Electronics Control Module over the Convenience CAN. The Vehicle Electrical System Control Module sends a message with the desired wiper function over the LIN Bus to the Control Module for Wiper Motor.

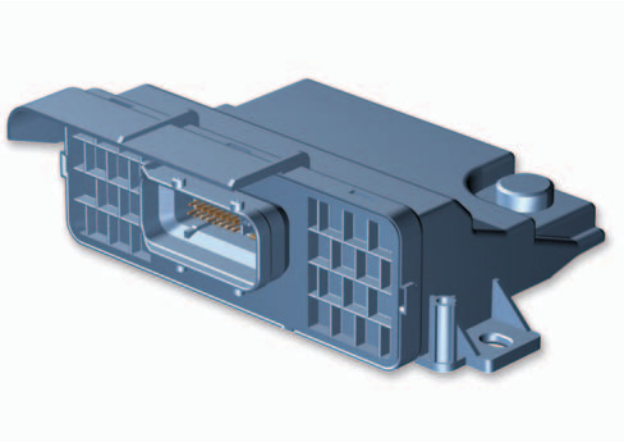


SSP287_065

Electrical System Module 2 (J520)

The following components are activated:

- Servotronic Solenoid Valve (N119)
- Hose Heater for Windshield Washer System
- Relay for Headlamp Cleaning System (J39)
- Garage Door Opener Control Module (J530)
- Left and Right Headlight Washer Jet Motors (V248, V249)
- Display Opening Mechanism for Front Information Display Control Head Control Module (J685)
- Terminal 58d (Gate Illumination)

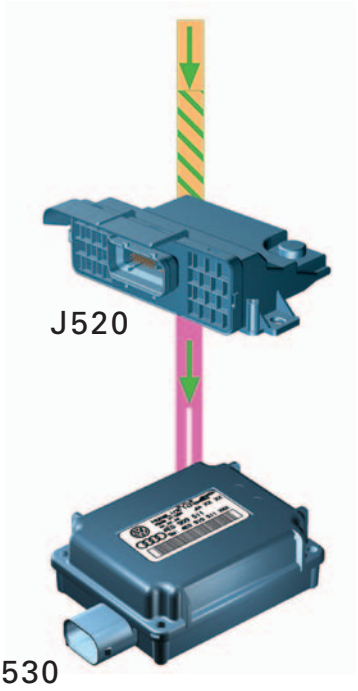


SSP287_046

Master Functions

The master functions of the Vehicle Electrical System Control Module 2 are as follows:

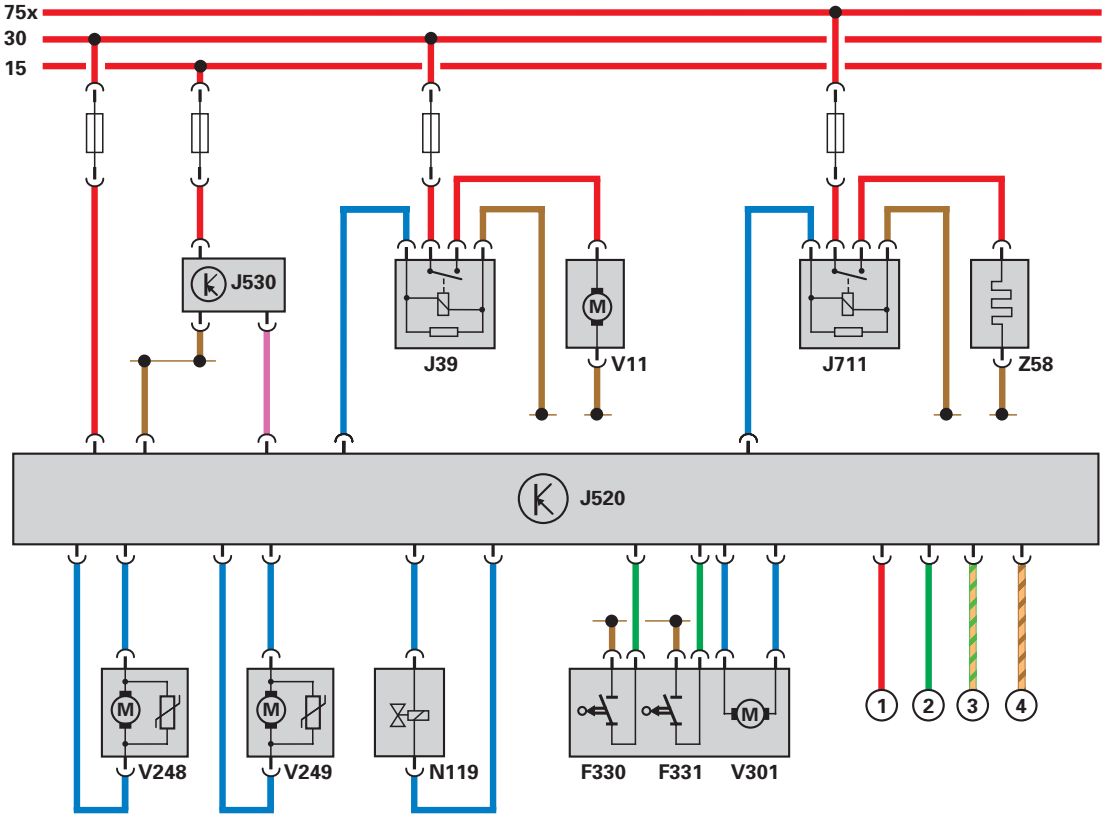
- LIN master for Garage Door Opener Control Module (J530)



SSP287_056

Electrical System Module 2 (J520)

Block Diagram



SSP287_058

Key

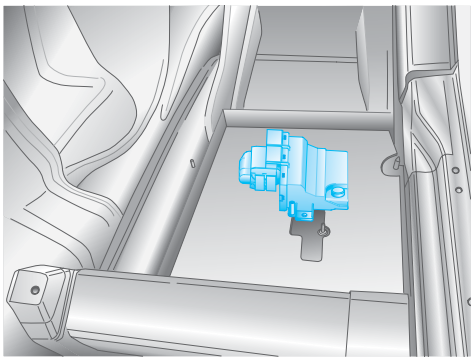
F330	Display Open Stop Switch
F331	Display Closed Stop Switch
J39	Relay for Headlamp Cleaning System
J520	Vehicle Electrical System Control Module 2
J530	Garage Door Opener Control Module
J711	Windshield Washer Fluid Heating Relay
N119	Servotronic Solenoid Valve
V11	Headlight Washer Pump
V248	Left Headlight Washer Jet Motor
V249	Right Headlight Washer Jet Motor
V301	Open-Close Display Motor
Z58	Heated Washer Hoses

Additional Signals

1. Selector Lever Illumination (Terminal 58d)
2. Multimedia Control Head (E380) (signal for MMI display "OPEN/ CLOSE")
3. Convenience CAN High
4. Convenience CAN Low

Electrical System Module 2 (J520)

The Vehicle Electrical System Control Module 2 is mounted under the front passenger seat.



SSP287_028

System Layout

The Vehicle Electrical System Control Module 2 receives the following input signals:

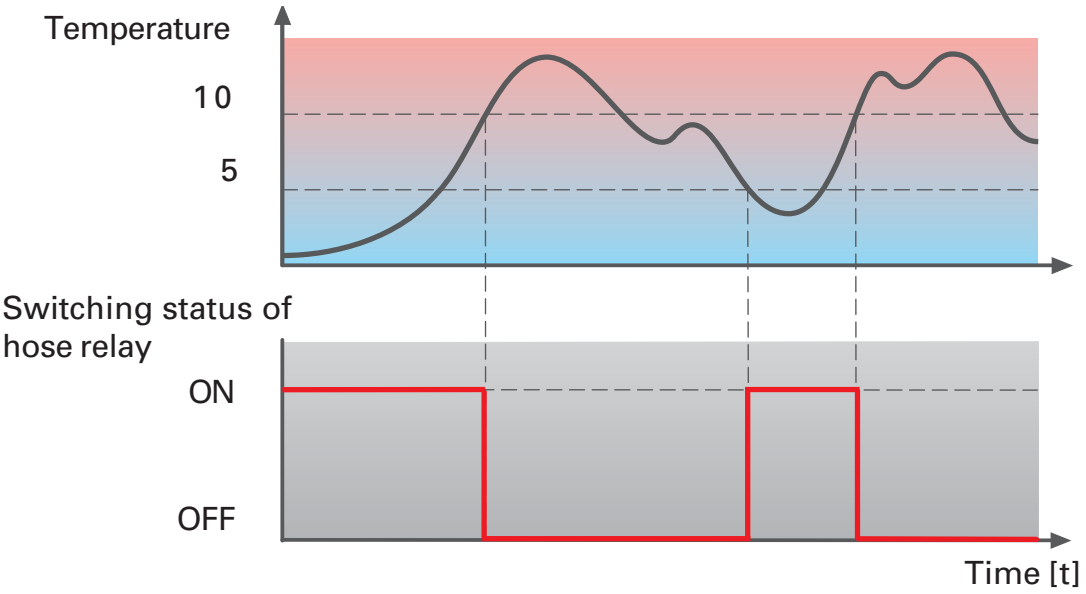
- Display Open/Closed Stop Switches: Open display during wake-up of Bus (F330 and F331) for Front Information Display Control Head Control Module (J685). Refer to SSP 993303 – Infotainment.



The Vehicle Electrical System Control Module 2 actuates the following loads:

- Servotronic Solenoid Valve (N119). Refer to SSP 994303 – Adaptive Air Suspension.
- Hose Heater for Windshield Washer System
- Relay for Headlamp Cleaning System (J39) (Fluid Pump), Left and Right Headlight Washer Jet Motor (V248 and V249)
- Opening of display for Front Information Control Head Control Module. Refer to SSP 993303 – Infotainment
- Terminal 58d for gate illumination

Hose Heater for Windshield Washer System



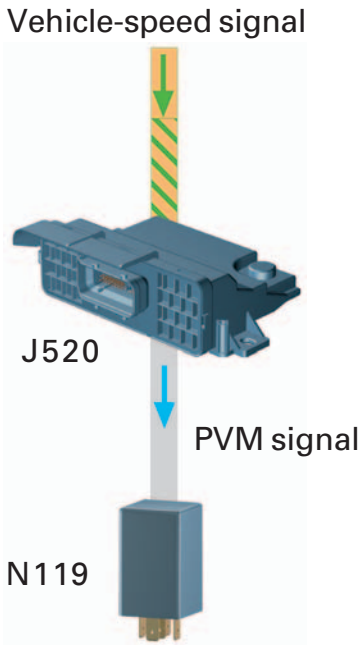
SSP287_059

The Windshield Washer System Hose Heater is actuated by a relay energized by the Vehicle Electrical System Control Module 2.

The Hose Heater is switched as a function of ambient temperature. It is off at 50°F (10°C). If the temperature drops below 41°F (5°C), the heater is switched on again.

Servotronic Solenoid Valve (N119)

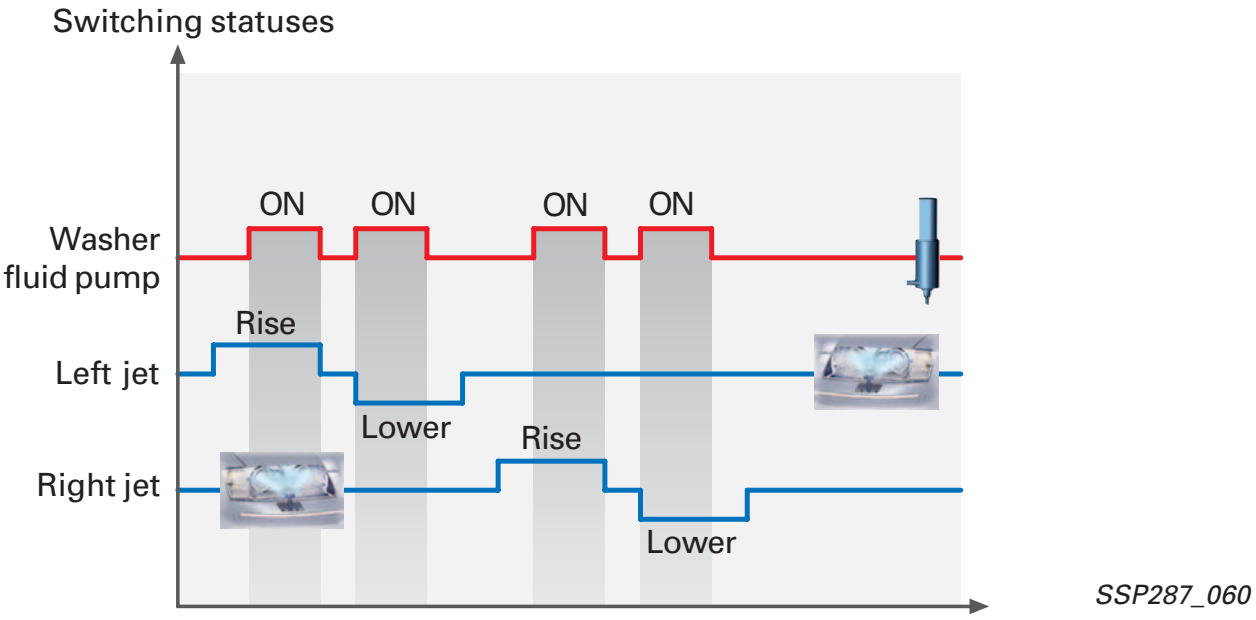
The Servotronic Solenoid Valve is actuated by the Vehicle Electrical System Control Module 2 by a PWM- signal. Current measurement is performed in the Control Module on the ground side for pulse width regulation. Depending on vehicle speed, the current flowing through the solenoid valve (corresponds to voltage at resistor) is regulated to 0 - 800 mA by the Control Module. The Vehicle Electrical System Control Module 2 receives the vehicle-speed signal from the Convenience CAN.



SSP287_099

Electrical System Module 2 (J520)

Headlight Washer System



SSP287_060

The Vehicle Electrical System Control Module 2 actuates one washer fluid pump and two Headlight washer jet motors. The washer fluid pump is actuated by the headlight Relay for Headlamp Cleaning System (J39), which is energized by the Vehicle Electrical System Control Module 2.

The Headlight washer jet motors are switched directly by the Control Module. As washing takes place during raising and lowering, the fluid is thoroughly distributed.

The headlight washer system jets clean the twin lights one at a time to prevent any loss of lighting power.

Energy Management

Deactivation Stages

The Vehicle Electrical System Control Module 2 also deactivates loads/functions if the Energy Management Control Module sends a corresponding deactivation stage over the CAN Bus by. The deactivated functions are indicated under “Vehicle information” in the Guides Fault-Finding routine.

Transportation Mode

Transportation Mode causes loads/ functions to be deactivated in the Vehicle Electrical System Control Module 2. The information for initiation of the Transportation Mode is supplied to the Vehicle Electrical System Control Module 2 over the bus systems by the Energy Management Control Module.

Diagnosis

Measured Value Blocks

Measured value blocks are available, for example, for the following functions:

- Display opening/closing function for Front Information Display Control Head Control Module
- Headlight Washer System
- Hose Heater
- Garage Door Opening
- Energy Manager Deactivation Stages
- Servotronic
- Component Protection
- Communication

Control Element Test

The Control Element Test can be used to check the following functions:

- Opening/Closing Display for Front Information Control Head Control Module
- Terminal 58d
- Servotronic Full/No Power Assistance
- Raise Left Headlight Washer Jet
- Raise Right Headlight Washer Jet
- Headlight Washer System Fluid Pump
- Hose Heater
- Garage Door Opener Buttons 1/2/3

Encoding

Encoding must be performed in Vehicle Electrical System Control Module 2 for example, for the following

- Servotronic (with/without)
- Garage Door Opening (with/without)
- Headlight Washer System (with/without)
- Heated Wipe/Wash Fluid Reservoir (with/without)
- Terminal 58d (Type of Transmission)

Door Control Modules J386 to J389

Door Control Modules were first used on the Audi A2. They are fitted with appropriately modified functions and actuation processes for the 2004 Audi A8L. The Door Control Modules read all switches in the corresponding door and activate the door motors, lights and heaters.

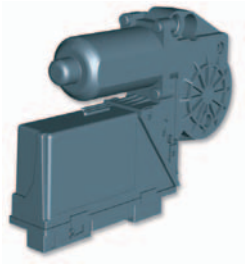
Substitute Master Function

The Door Control Module, Driver Side (J386) assumes control of the Central Locking System if there is a failure of the Central Control Module for Comfort System. If the Door Control Module, Driver Side (J386) detects a break in communication with the Central Control Module for Comfort System, the information of the Door Control Module, Driver Side is evaluated directly by the other door control modules. In this case, the vehicle cannot be opened by the remote control or Advanced Key function.

"Ambient" Lighting in Doors (Optional)

"Ambient" lighting refers to lights that are active while driving. Certain ambient lighting components are also integrated into the interior door trim, for example the light strip in the door pocket and the vertical light in the interior trim.

The light strip in the door pocket is actuated by the Door Control Module with the Terminal 58 function. The level of the variable "ambient" lighting is set by the MMI and stored in the Roof Electronics Control Module. As interior light master, the Roof Electronics Control Module supplies the Door Control Modules with these settings over the Convenience CAN. The Door Control Modules actuate the vertical light in the door trim as PWM signal.

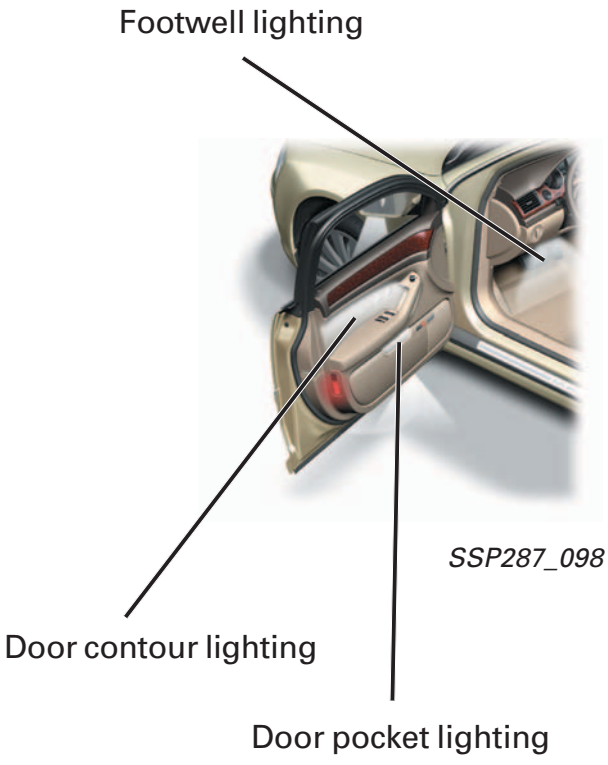


SSP287_087

Versions

Low-line and high-line versions are available. The high-line version features the following additional functions

- Automatic Anti-Glare Mirror
- Mirror Folding



SSP287_098

Diagnosis

Address Words 42, 52, 62 and 72 "Door Electronics" are available for diagnosis.

Door Control Modules J386 to J389

The door control modules receive the following input signals:

- Power Window Switch
- Interior Locking Switch
- Door Contact Switch
- Central Locking Actuators
- Central Locking Actuators (Safe)
- Outer Door Handle Switch (Optional)
- Contact Sensor, Outer Door Handle (Optional)

Additionally for front doors:

- Memory Operating Module (optional)
- Mirror Position Sender
- Mirror Disengaging Switch

Additionally for driver door:

- Contact Switch for Lock Cylinder, Driver Side F241
- Luggage Compartment Release Switch E164
- Switch for Remote Fuel Tank Door E204
- Child Safety Lock Switch E254
- Mirror Selector Switch (E48)
- Mirror Adjustment Switch (E43)
- Switch for Mirror Adjustment with Fold-away Function (E168)
- Alarm System Off Switch (E217) (Optional)
- Switch for Passenger Compartment Monitoring (E183) (Optional)
- Passenger Seat Remote Control Button (Optional) (E351)



The Door Control Modules activate the following loads:

- Central Locking Motors
- Central Locking Motors (Safe)
- Door Warning Lights
- Entry Lights
- Door Opener Lighting
- Door Pocket Light Strips (Optional)
- Vertical Light for Door Trim (Optional)
- Outer Door Handle Lighting (Optional)

Additionally For Rear Doors:

- Rear Ashtray Light

Additionally For Front Doors:

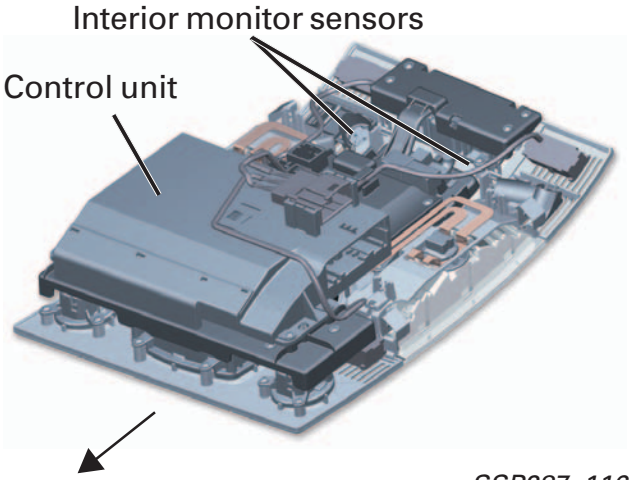
- Mirror Adjustment Motors
- Mirror Folding Motors
- Heated Exterior Mirrors
- Automatic Anti-Glare Exterior Mirror
- Ambient Lighting

Additionally for Driver Door:

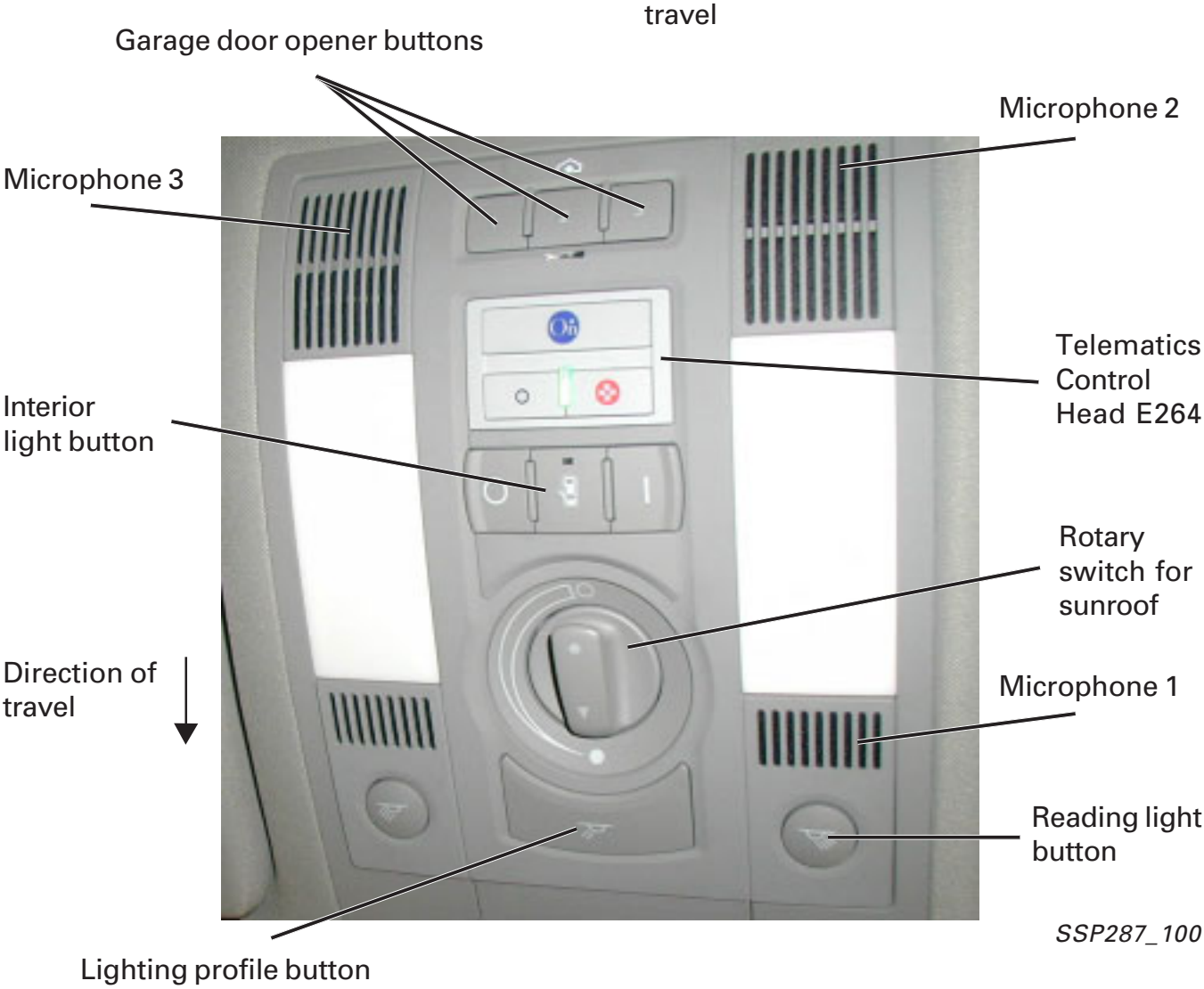
- Central Locking Warning Lamps
- Vehicle Inclination Sensor Indicator Lamp (Optional) K188
- Interior Monitoring Off Indicator Lamp (Optional) K162

Roof Electronics (J528)

The Roof Electronics Control Module is connected to the Convenience CAN to exchange data with other control modules. There is a link with the Sliding Sunroof Motor (V1) over the LIN Bus.



SSP287_116



SSP287_100

Function

The Roof Electronics Control Module is the function master for the interior lighting distributed function. There is no substitute master.

It assumes the following control functions in the 2004 Audi A8L:

- Control of Lighting Profiles (Interior Lighting)
- Sunroof Control Signals

The control module reads in the following signals and sends them over the Convenience CAN:

- Interior monitor without anti-theft alarm is relayed to the Central Control Module for Comfort System
- EC interior mirror is relayed to all Door Control Modules
- Light sensor signal is relayed to Vehicle Electrical System Control Module
- Humidity and windshield temperature sender signal is relayed to Climatronic Control Module
- Garage door opener button is relayed to Vehicle Electrical System Control Module 2

In addition, interior lighting control signals are transmitted over discrete wires to the Rear Roof Module Control Head.

Lighting Profiles

Certain preset profiles can be selected for the interior lighting by the MMI (CAR function). These profiles provide vehicle lighting conditions to suit the driving situation and individual requirements.

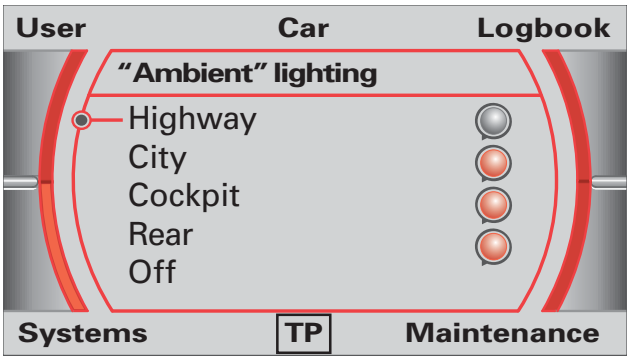
If lighting profile “OFF” has been selected in the MMI, the interior lighting does not come on when the light button in the Roof Module is pressed.



SSP287_100

Roof Electronics (J528)

The following lighting profiles are available:



SSP287_114

Highway Profile

Activation of:
- Front Right and Left Door Trim Vertical Light
- Rear Right and Left Door Trim Vertical Light

City Profile

Activation of:
- Driver Footwell Light (50%)
- Front Passenger Footwell light (50%)
- Rear Footwell Lights (30%)
- Front, Rear Right and Rear Left Door Trim Vertical Light (100%)
- Front and Rear Interior Lights (15%)

Cockpit Profile

Activation of:
- Driver Footwell Light (50%)
- Front Passenger Footwell light (50%)
- Front, Rear Right and Rear Left Door Trim Vertical Light (100%)

Rear Profile

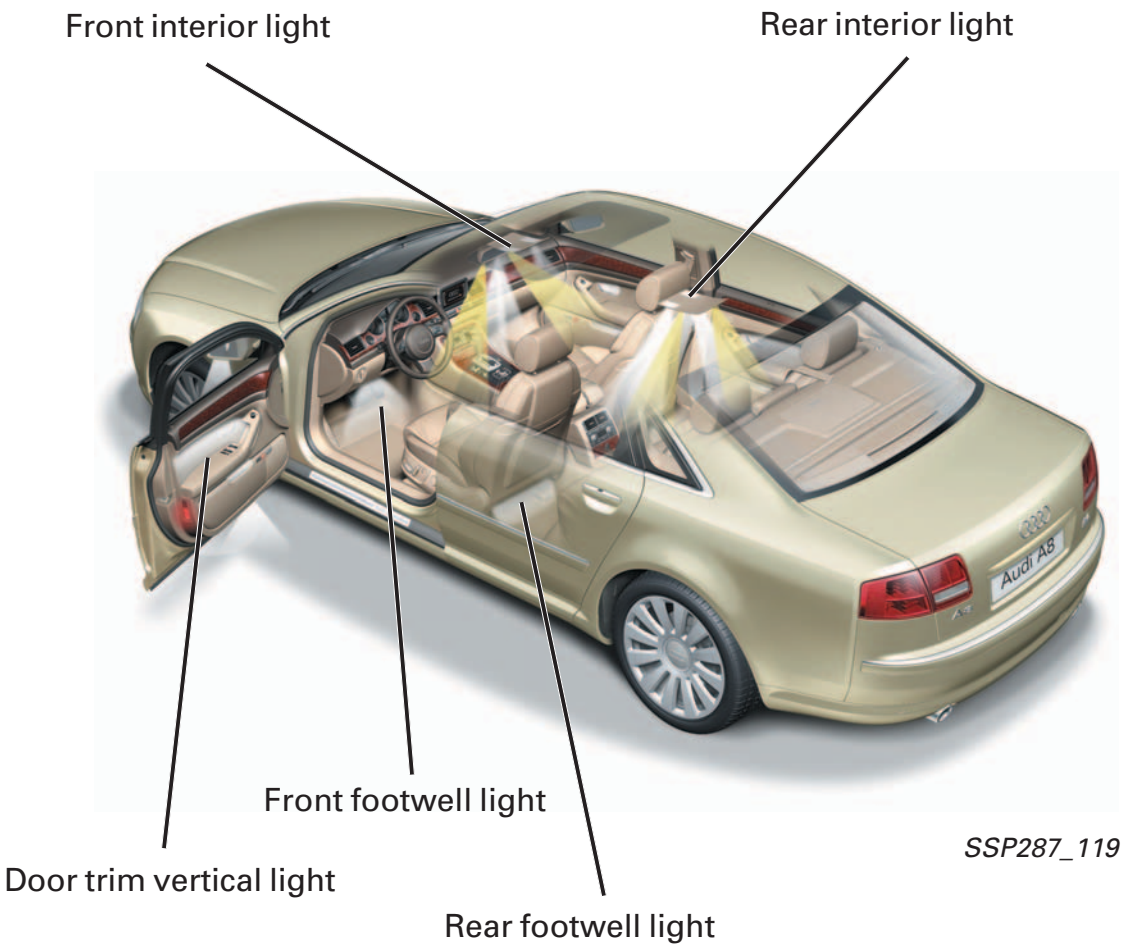
Activation of:
- Rear Footwell Lights (30%)
- Rear Right And Left Door Trim Vertical Light (100%)
- Rear Interior Lights (15%)

Restriction of Functions

The following are deactivated in case of active load intervention by the Battery and Energy Management System:

- Interior Lighting
- Sunroof
- Light/Humidity Sensor
- Interior Mirror

Interior Lights Actuated by Lighting Profiles



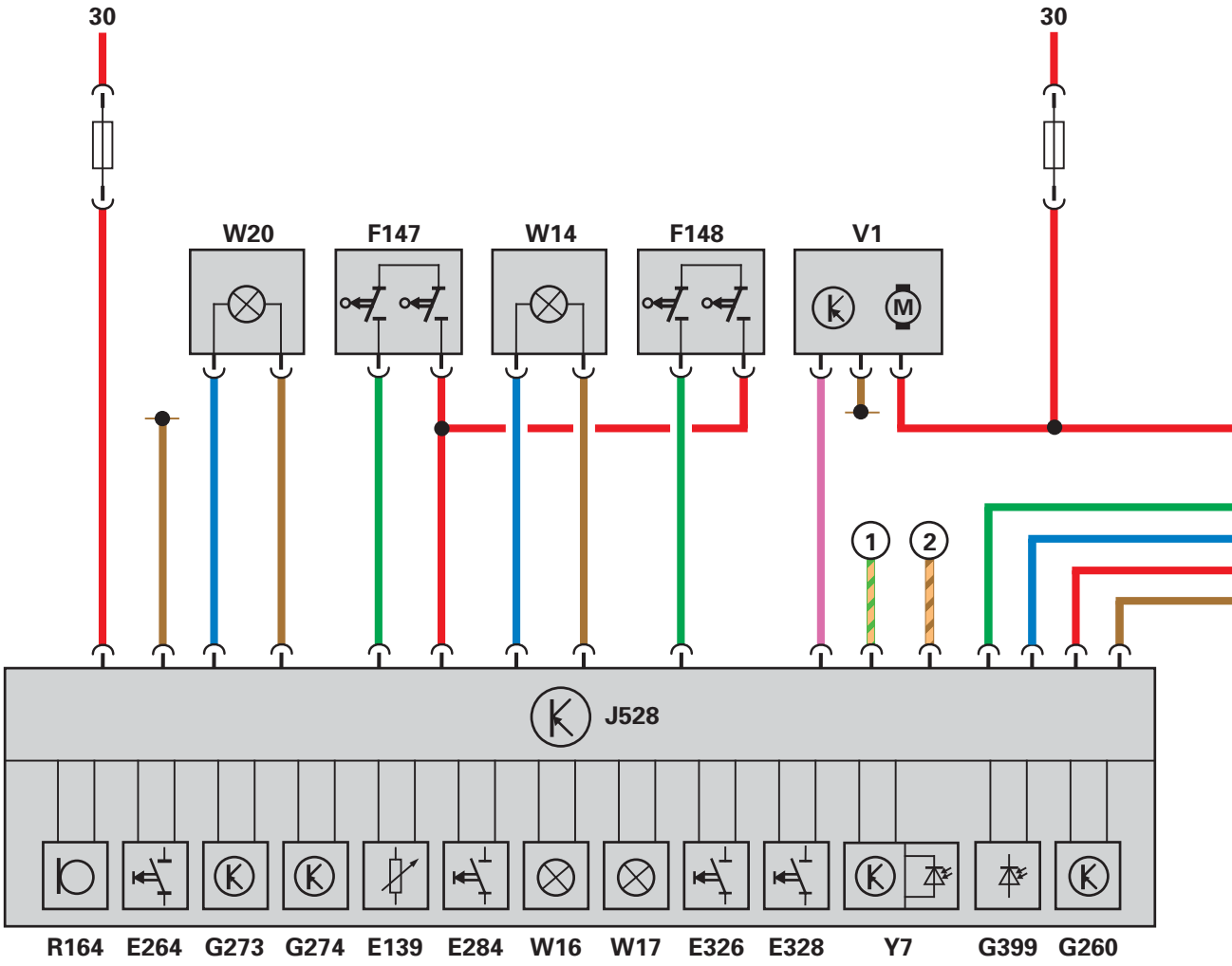
Diagnosis

The Roof Electronics Control Module is incorporated into the vehicle self-diagnosis function by Address Word 38. Individual encoding can be performed with VAS 5051 with Guided Fault-Finding and based on vehicle equipment.

All input and output signals can be displayed with the Measured Value Block function. The VAS5051 only indicates the last five faults. In each case, the oldest fault code is overwritten.

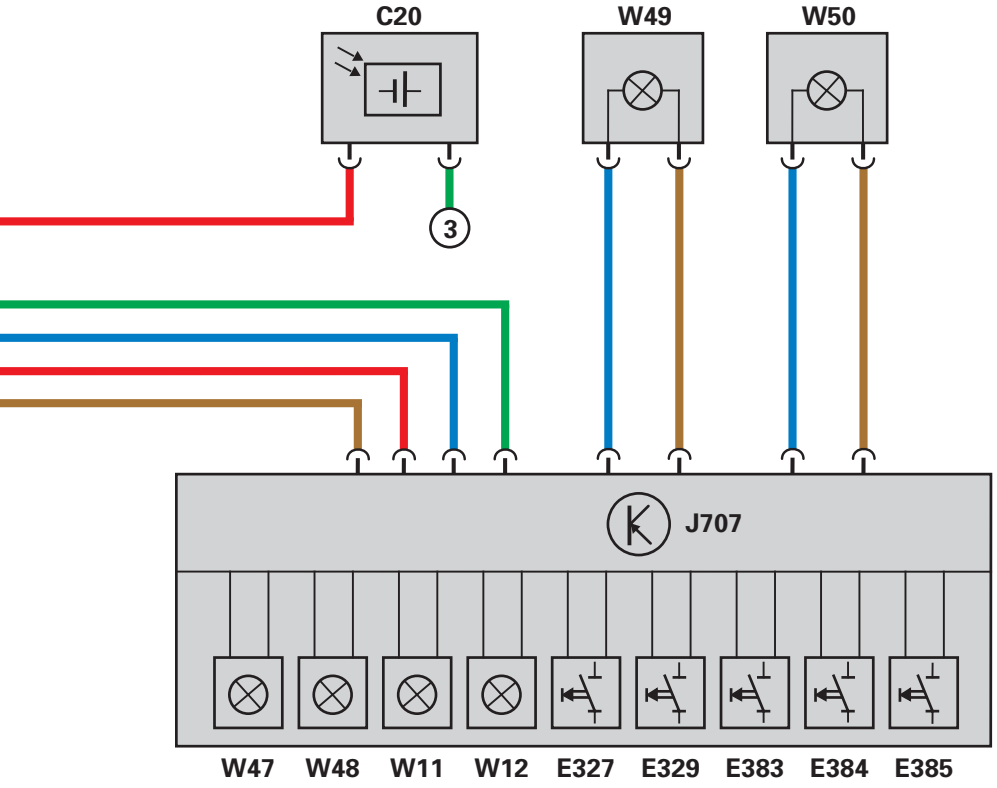
Roof Electronics (J528)

Block Diagram



Key

C20	Solar Cells
E139	Sunroof Regulator
E264	Telematics Control Head
E284	Garage Door Opener Module
E326	Front Interior Light Button
E327	Rear Interior Light Button
E328	Front Reading Light Button
E329	Rear Reading Light Button
E383	Left Rear Window Shade Button
E384	Right Rear Window Shade Button
E385	Rear Window Shade Switch
E467	Rear Roof Module Control Head
F147	Left Make-up Mirror Light Switch
F148	Right Make-up Mirror Light Switch
G260	A/C Humidity Sender
G273	Interior Monitoring Sensor
G274	Interior Monitoring Transmitter
G399	Light Recognition Sensor
J528	Roof Electronics Control Module
R164	Microphone Unit
V1	Sunroof Motor



SSP287_066

W11 Left Rear Reading Lamp
W12 Right Rear Reading Lamp
W14 Right Illuminated Make-up Mirror
W16 Left Interior Light
W17 Right Interior Light
W20 Left Illuminated Make-up Mirror
Y7 Automatic Day/Night Interior Mirror

Additional Signals

(1) Convenience CAN High W47 Left Rear Interior Light W48 Right Rear Interior Light
(2) Convenience CAN Low W49 Left Rear Illuminated Make-up Mirror W50 Right Rear Illuminated Make-up Mirror
(3) Control Module for Fresh Air Blower J126

Garage Door Opener (J530)

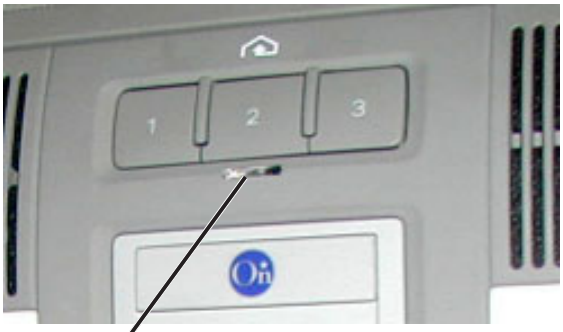
The Garage Door Opener Control Module allows remote control of the garage door drive mechanism by using the controls in the vehicle. Up to three different garage door drive mechanisms (or other compatible systems) can be matched to three buttons in the Roof Module.



SSP287_052

Control

Three buttons in the Roof Module control the module. The system is matched to the manufacturers' remote control module. The indicator light in the roof module must flash. The vehicle turn signal indicators provide feedback on the matching procedure.



SSP287_111

Indicator lamp

The Garage Door Opener Control Module is mounted behind the front left bumper.



SSP287_113

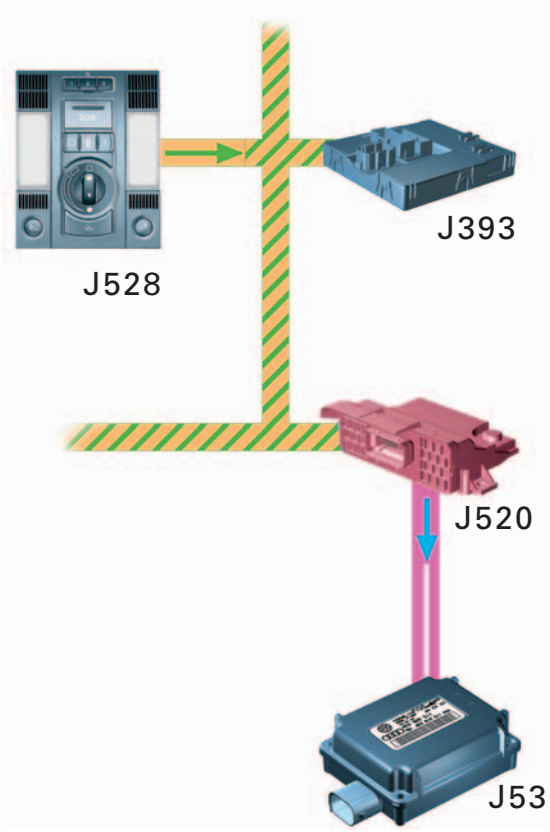
Garage Door Opener (J530)

Function Master

The master control module for the Garage Door Opener Control Module is the Vehicle Electrical System Control Module 2 (J250). Both Control Modules are linked by the LIN. There is no substitute master function.

Operation

The garage door operation buttons can be activated by the sunroof electronics. The Roof Electronics Control Module transmits the information "Button 1," "Button 2" or "Button 3" on the Convenience CAN. The information is read in by the Vehicle Electrical System Control Module 2 and relayed over the LIN to the Garage Door Opener Control Module. The corresponding command stored in the Garage Door Opener Control Module is sent by radio waves and the matching garage door or other compatible system, opens.



SSP287_112

Distributed Functions

The signals learned and the remote control encoding for the garage doors are stored in the Garage Door Opener Control Module. The confirmation flashing function is stored in the Central Control Module for Comfort System. The Vehicle Electrical System Control Module 2 is the LIN master for the Garage Door Opener Control Module.

Restriction of Functions

If the Battery Management System intervenes, the system is not deactivated.

Component Protection

The Garage Door Opener Control Module forms part of the component protection system by the Master Control Module J520; this must be released. What must be released?

Self-Diagnosis

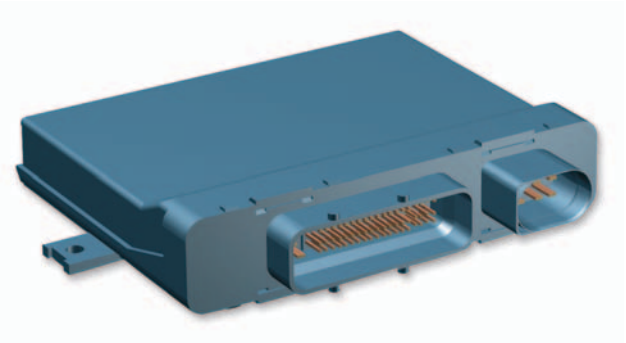
The Control Module is provided with self-diagnosis capability by address word 4F (Electronic Central Electrics 2).

Access/Start Control (J518)

Functions

The Access/Start Control Module is the central control module for

- Key Recognition
- Evaluation of Ignition/Starter Switch (Entry and Start Authorization Switch
- Remote Control
- Immobilizer
- Component Protection
- Advanced Key Functions
- Ignition Continued Operation



SSP287_050

Terminal Control

The Access/Start Control Module controls the terminal functions relating to:

- S-Contact
- P-Contact
- Ignition
- Terminal 75
- Terminal 50

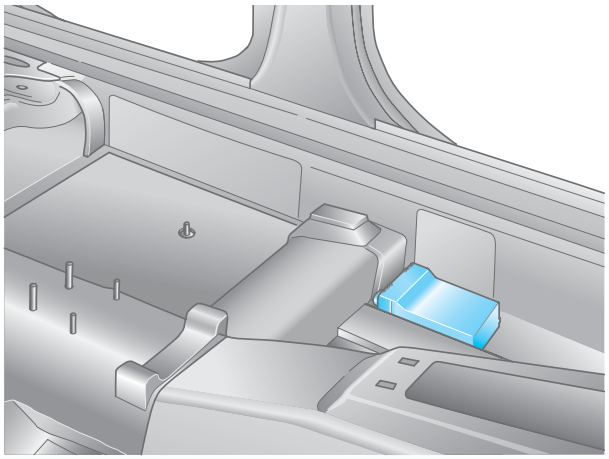
The signals “S-Contact,” “P-Contact” and “Ignition Continued Operation” are only available as CAN information.

Versions

Two versions of the Access/Start Control Module may be installed.

- With or without Advanced Key Functions, and
- For various country-specific remote control radio frequencies

The Access/Start Control Module is mounted in the footwell, under the driver seat.



SSP287_033

Diagnosis

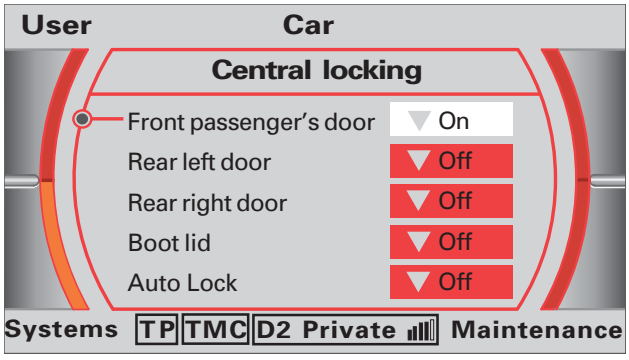
The Access/Start Control Module has diagnosis capabilities even when ignition is off.

CAR Systems

The driver can choose between

- Simultaneous unlocking of all doors, and
- Separate unlocking of each door in the MMI.

The “Immobilizer” and “Component Protection” functions are described in SSP 998303 – VAS 5051 Online Connection.

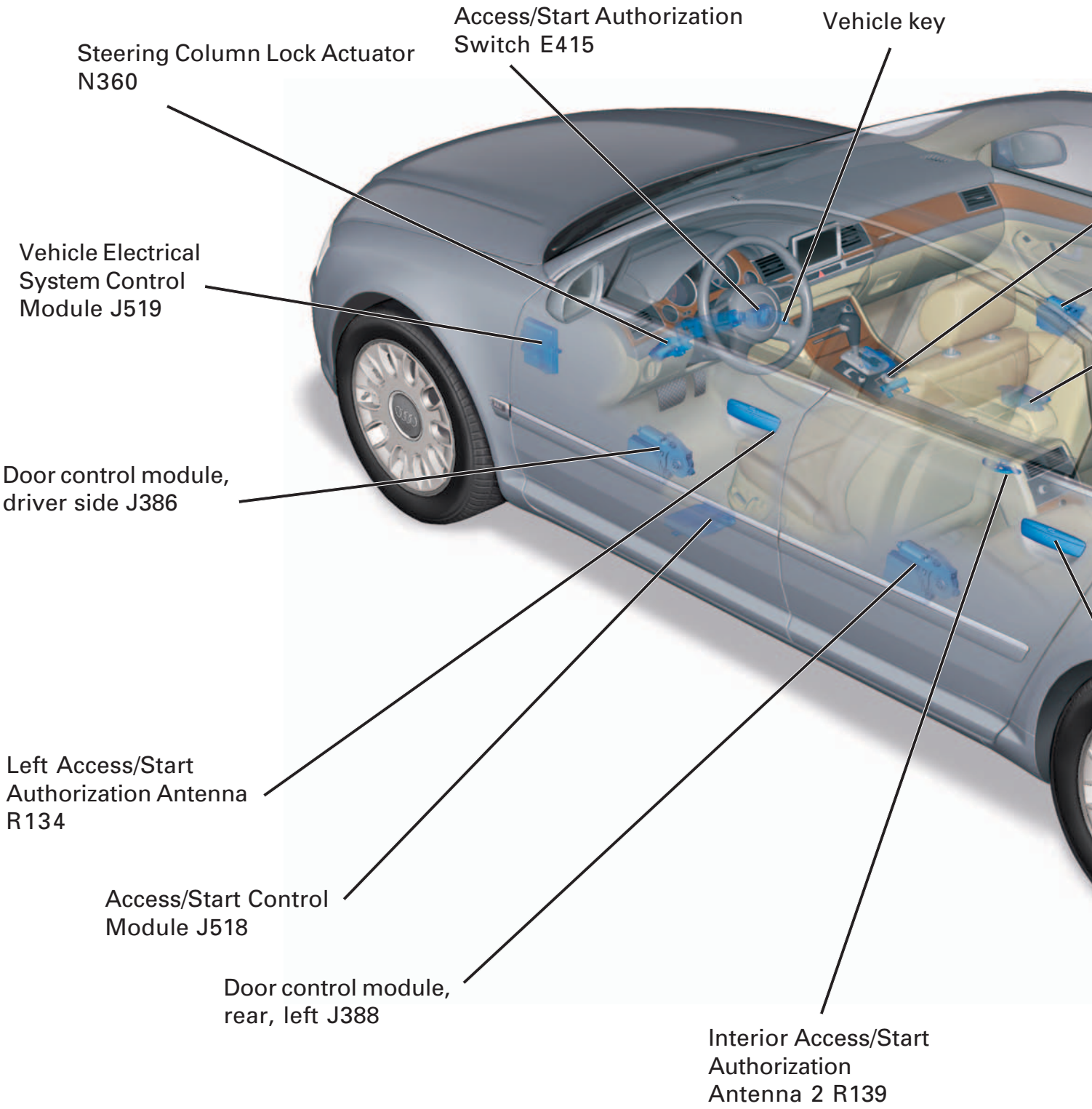




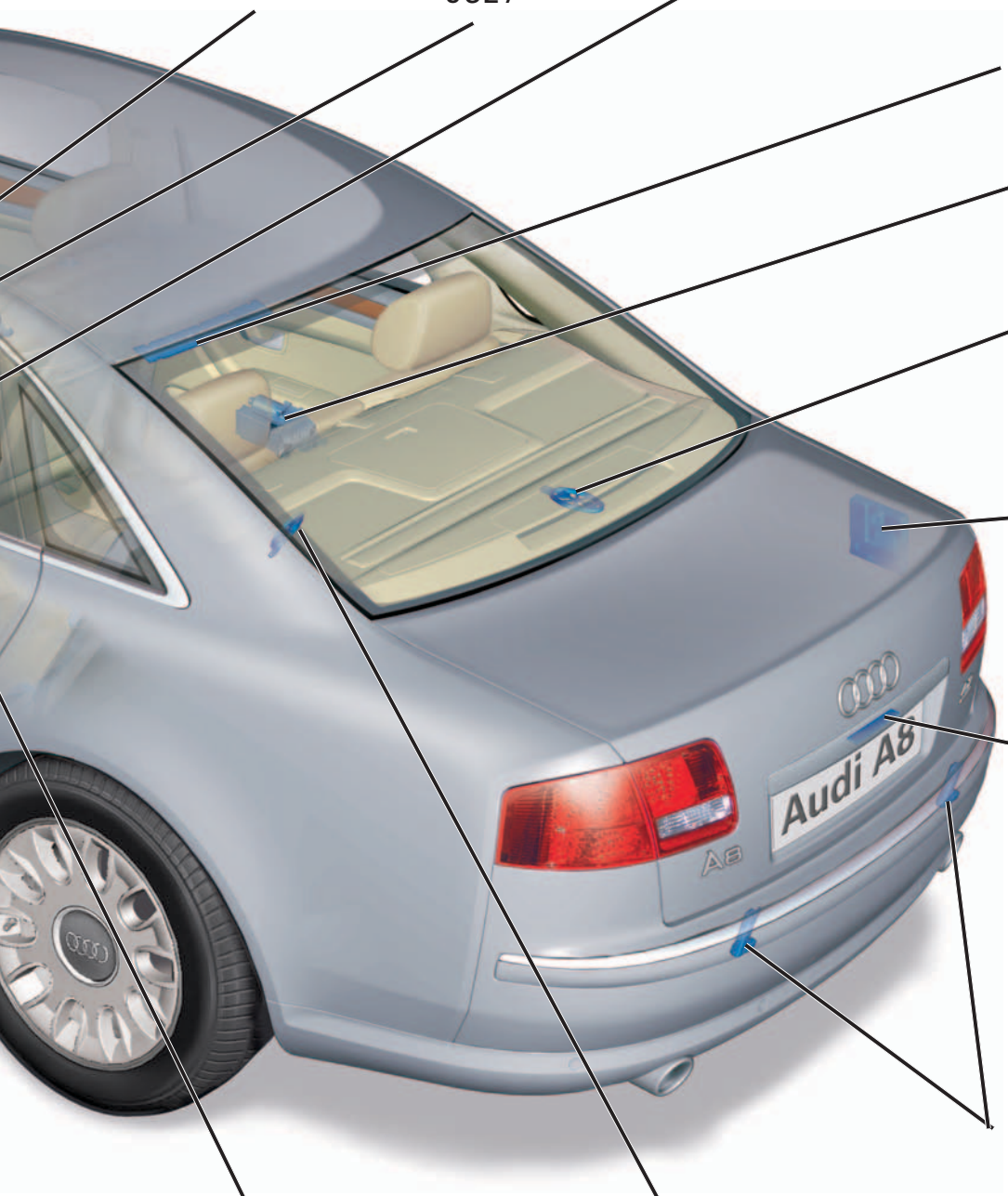
SSP287_093

Access/Start Control (J518)

System Layout



Access/Start Control (J518)



Interior Access/ Start Authorization Antenna 1 R138

Door control module, passenger side J327

Vehicle Electrical System Control Module 2 J520

Central Locking and Anti-theft Alarm System Antenna R47

Door control module, rear, right J389

Luggage Compartment Access/Start Authorization Antenna R137

Central control module for comfort system J393

Switch for unlocking, rear lid lock cylinder F248

Access/Start Authorization Antenna (in rear bumper R136

Left Rear Access/ Start Authorization Antenna R155

Interior Access/Start Authorization Antenna 3 R154

SSP287_088

NOTES:

Block Diagram

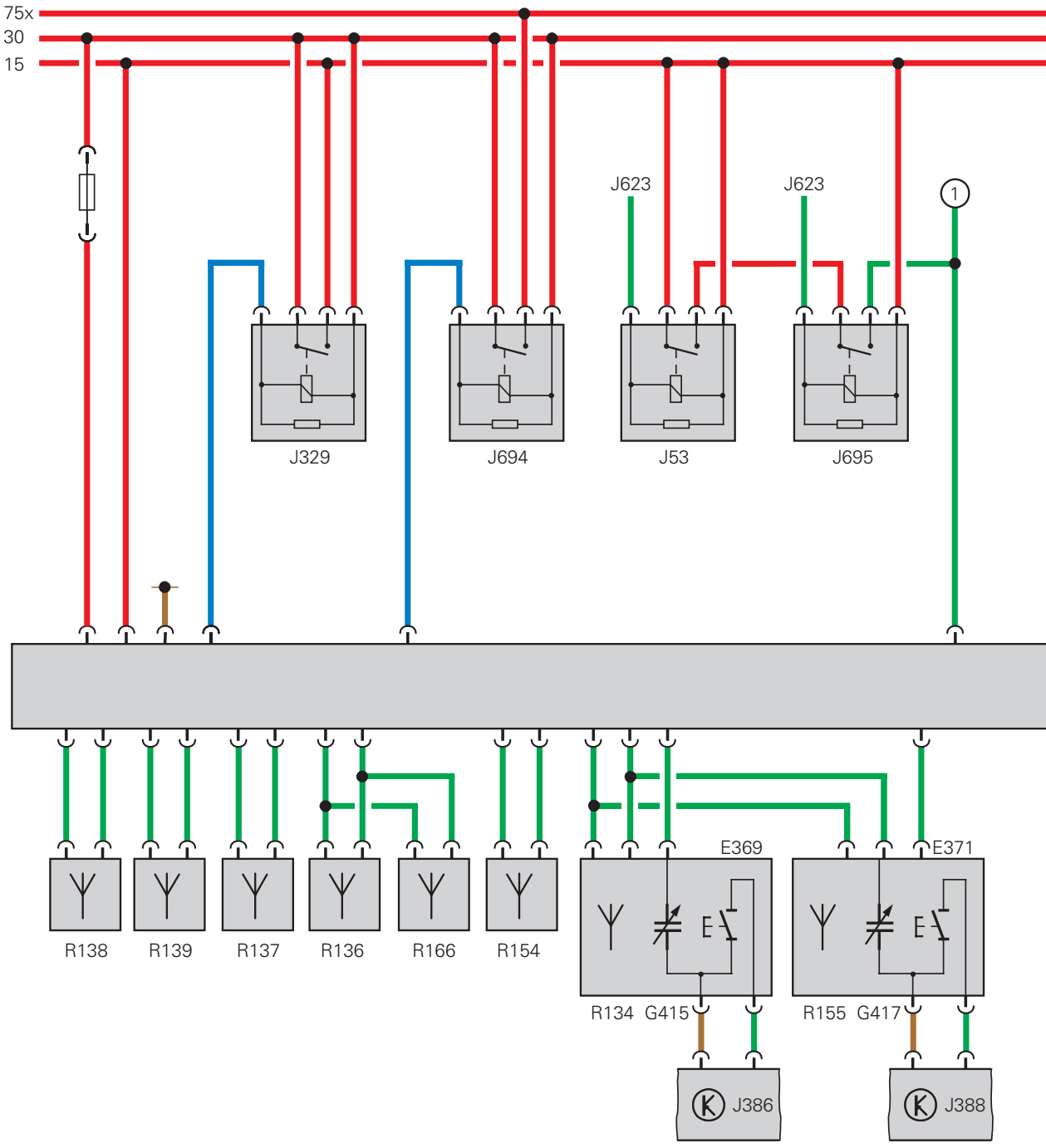
Key

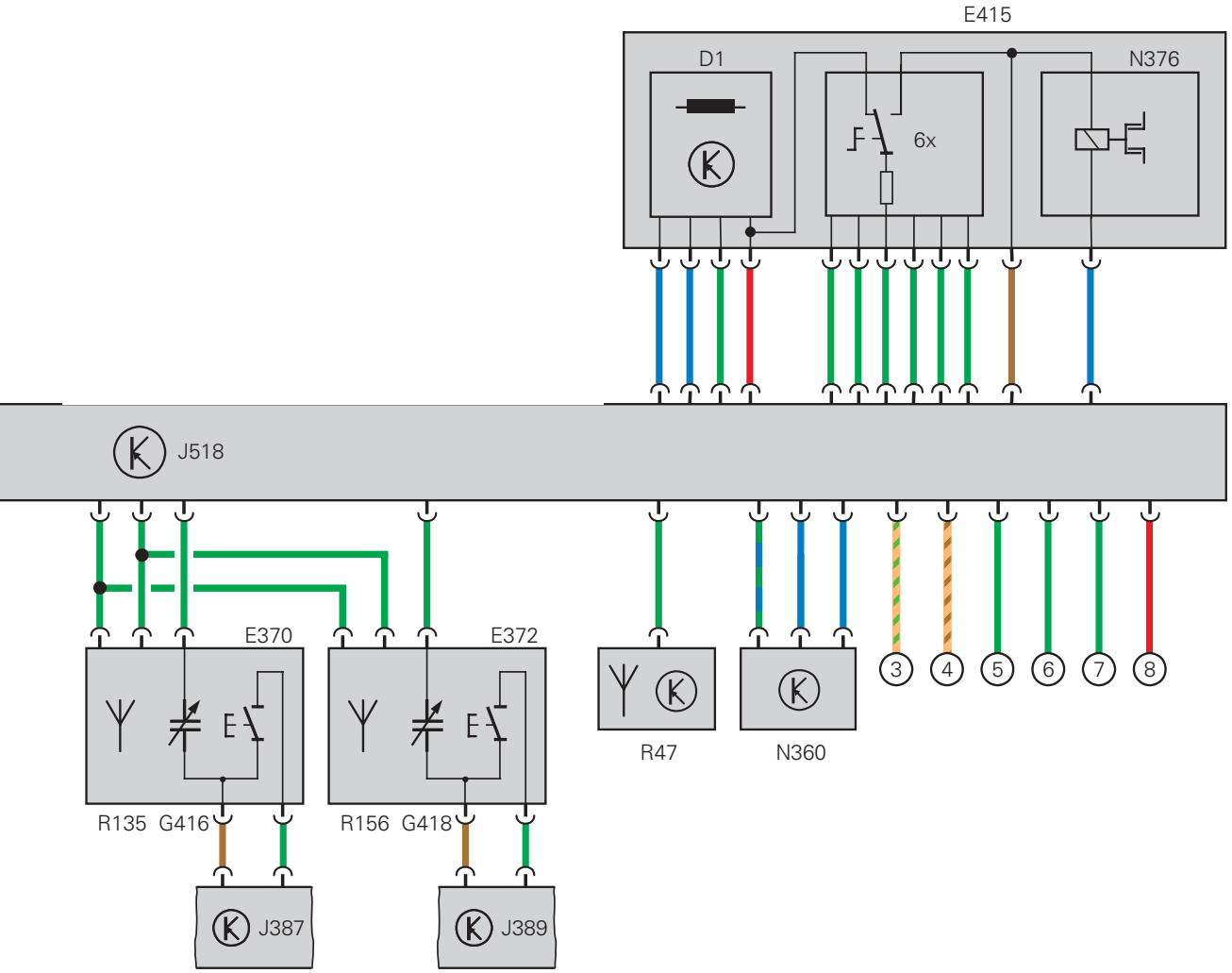
D1 Anti-Theft Engine Disable Sensor
E369 Outer Door Handle Central Locking Button, Driver Side
E370 Outer Door Handle Central Locking Button, Front Passenger Side
E371 Outer Door Handle Central Locking Button, Rear Left Door
E372 Outer Door Handle Central Locking Button, Rear Right Door
E415 Access/Start Authorization Switch
G415 Exterior Door Handle Touch Sensor, Driver Side
G416 Exterior Door Handle Touch Sensor, Front Passenger Side
G417 Exterior Door Handle Touch Sensor, Rear Left
G418 Exterior Door Handle Touch Sensor, Rear Right
J53 Starter Motor Relay
J329 Ignition Voltage Supply Relay
J386 Door Control Module, Driver Side
J387 Door Control Module, Front Passenger Side
J388 Door Control Module, Rear, Left
J389 Door Control Module, Rear, Right
J518 Access/Start Control Module
J623 Engine Control Module (ECM)
J694 Terminal 75x Voltage Supply Relay
J695 Starter Relay 2
N360 Steering Column Lock Control Element
N376 Ignition Key Withdrawal Lock Magnet
R47 Central Locking and Anti-Theft Alarm System Antenna
R134 Driver Side Antenna for Entry and Start Authorization
R135 Front Passenger Side Antenna for Entry and Start Authorization
R136 Rear Bumper Antenna for Entry and Start Authorization
R137 Luggage Compartment Antenna for Entry Start Authorization
R138 Interior Antenna 1 for Entry and Start Authorization, at Multimedia Control Head
R139 Interior Antenna 2 for Entry and Start Authorization, Rear Center
R154 Access/Start Authorization Interior Antenna 3, Rear Center Armrest
R155 Access/Start Authorization, Driver Side Rear Antenna
R156 Access/Start Authorization, Front Passenger Side Rear Antenna
R166 Access/Start Authorization Antenna, Rear Right
S Fuse

Additional Signals

① Terminal 50 (to Starter B or ECM J623)
② Terminal 58s (Illumination)
③ Convenience CAN High
④ Convenience CAN Low
⑤ Brake Light Switch F
⑥ Terminal P/N from Transmission Control Module (TCM) (J217 – Automatic Transmission Only)
⑦ Parking Lock Auxiliary Terminal (Automatic Transmission Only)
⑧ Ignition (CAN)

Access/Start Control (J518)




E415
D1
N376
6x
J518
E370
E372
R135
G416
R156
G418
J387
J389
R47
N360
3
4
5
6
7
8

SSP287_009

Access/Start Control (J518)

Entry and Start Authorization (E415)

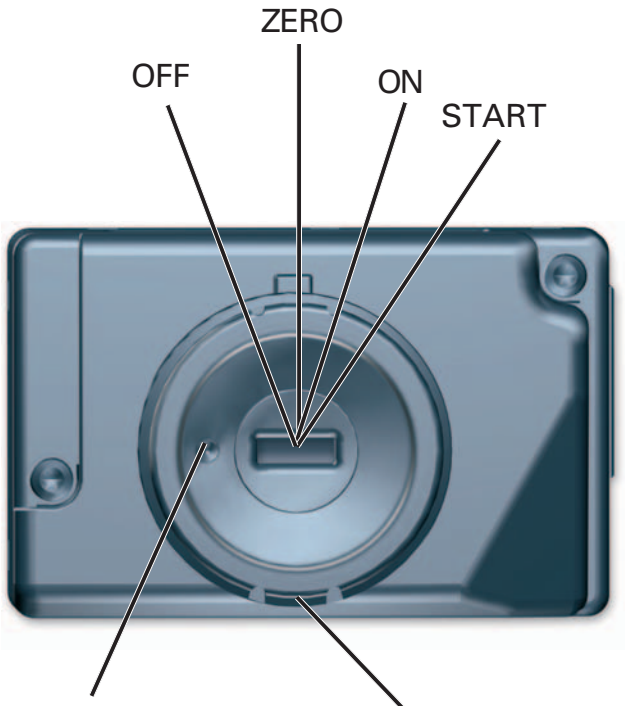
The Entry and Start Authorization Switch performs as an ignition/starter switch. The lock cylinder has no mechanical encoding. It can be turned with any key. The key is identified by Anti-Theft Engine Disable Sensor D1 with transponder interrogation. The transponder information is sent in encoded form over a three-wire bus to the Access/Start Control Module, where it is evaluated.

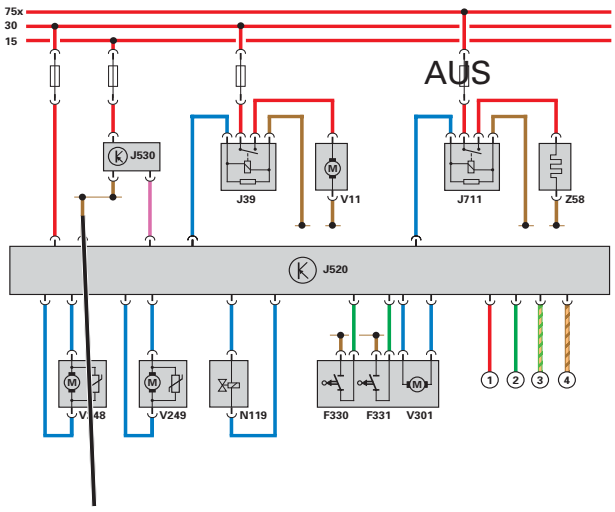
The switch has three non-locking positions. In the same way as an ignition/starter switch, the switch can be turned to the right with the key to ON and START positions. Turning the key to the left turns off the ignition. If the key is not actuated, the lock returns to the ZERO position.

The four switch positions (OFF, ZERO, ON, START) are verified by six switches. All six signals are evaluated by the Access/Start Control Module. This ensures that the system remains operational if one switch fails. In case of a fault, a message appears on the center display and a DTC is set.

The switch positions can be verified with the Control Element Test.

The key removal lock that is integrated into the switch, locks the key bit in position. A mechanical emergency release is provided for removing the key in an emergency. Release involves turning the key to OFF and pressing the release button with a ballpoint pen.



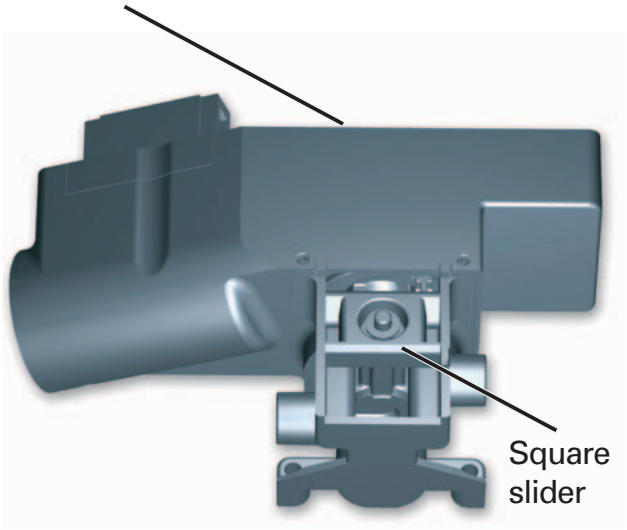


Ignition key removal lock

Steering Column Lock Control (N360)

To lock and release the steering column, the Steering Column Lock Control Element is actuated over a bi-directional bus by the Access/Start Control Module. The steering column lock control element is only supplied with voltage when the ignition is off. The integrated electronics activate a motor. A worm drive and a swash plate move the locking pin sideways.

The locking pin engages in the steering mechanism at a square slider that has beveled inner splines. The linear movement causes the inner splines to lock the steering column. The steering column lock is connected to the steering column by shear bolts and cannot be replaced separately.



Notes

Knowledge Assessment

An on-line Knowledge Assessment (exam) is available for this SSP.

The Knowledge Assessment may or may not be 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

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1-877-AUDI-LMC (283-4562)

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