eSelf Study Program 970343

The 2015 Audi A3 Vehicle Electronics and Driver Assistance Systems

Audi Academy

Audi of America, LLC
Service Training
Created in the U.S.A.
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Course Number 970343

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

Contents

This eSelf Study Program teaches a basic knowledge of the design and functions of new models, new automotive components or technologies.

It is not a Repair Manual! All values given are intended as a guideline only.

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

Note

Reference

Introduction

Today, Audi is already setting new standards for driver assistance systems in the A3 – introducing technologies from the luxury class into the premium compact segment. Several optional systems and one standard solution are offered in the new 2015 Audi.

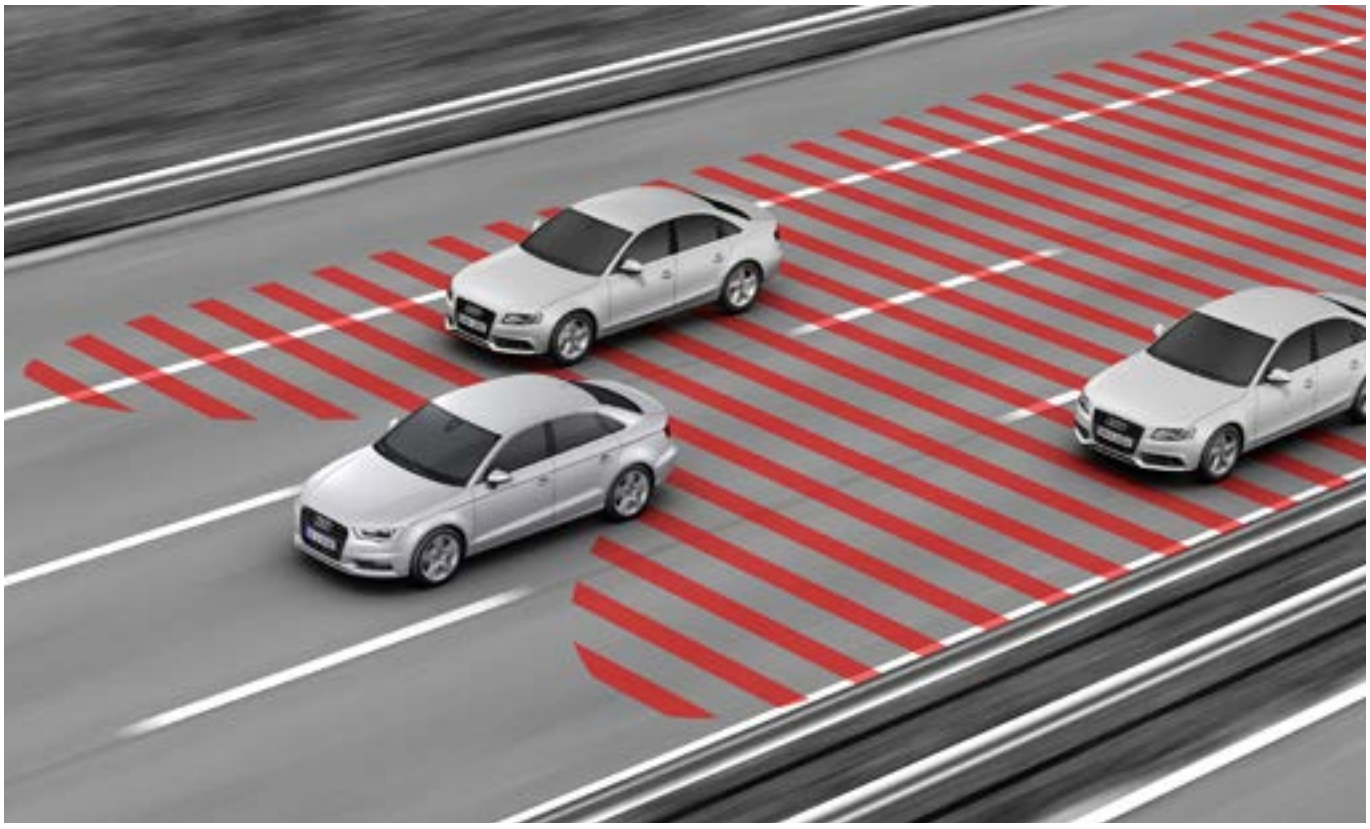
The optional Audi side assist supports the driver in changing lanes. From a vehicle speed of 18 mph (30 km/h), radar sensors at the rear monitor what is happening behind and to the sides of the A3. A yellow LED in the door mirror housing lights if another vehicle is driving in the blind spot or is rapidly approaching from the rear. If the driver still activates the turn signal for a lane change, the indicator turns bright and flashes at a high frequency – a very effective warning signal.

Audi active lane assist becomes active at a speed of 40 mph (65 km/h). It detects lane markings on the roadway based on images from a small video camera mounted on the rear-view mirror. If the vehicle approaches a lane marking without activating the turn signal, the system assists the driver in steering back into the lane by making a slight intervention in the electromechanical power steering system.

Of the optional driver assistance systems in the new A3, adaptive cruise control (ACC) is the most complex. This radar-based system maintains the desired distance to the vehicle ahead by autonomously accelerating and braking within certain limits over speeds ranging from 18 – 93 mph (30 to 150 km/h). The driver can set the distance and the control dynamics over four levels. If the car has the assistance package, which combines several systems, the control range is extended to 125 mph (200 km/h).

In the North American region vehicles, the system intervenes just before crossing over a detected lane marking. This function can help to prevent the car from leaving the driving lane unintentionally, for example, due to driver inattentiveness.

This new generation of lane-keeping assistance can offer continuous relief to the driver, enhancing driving comfort.



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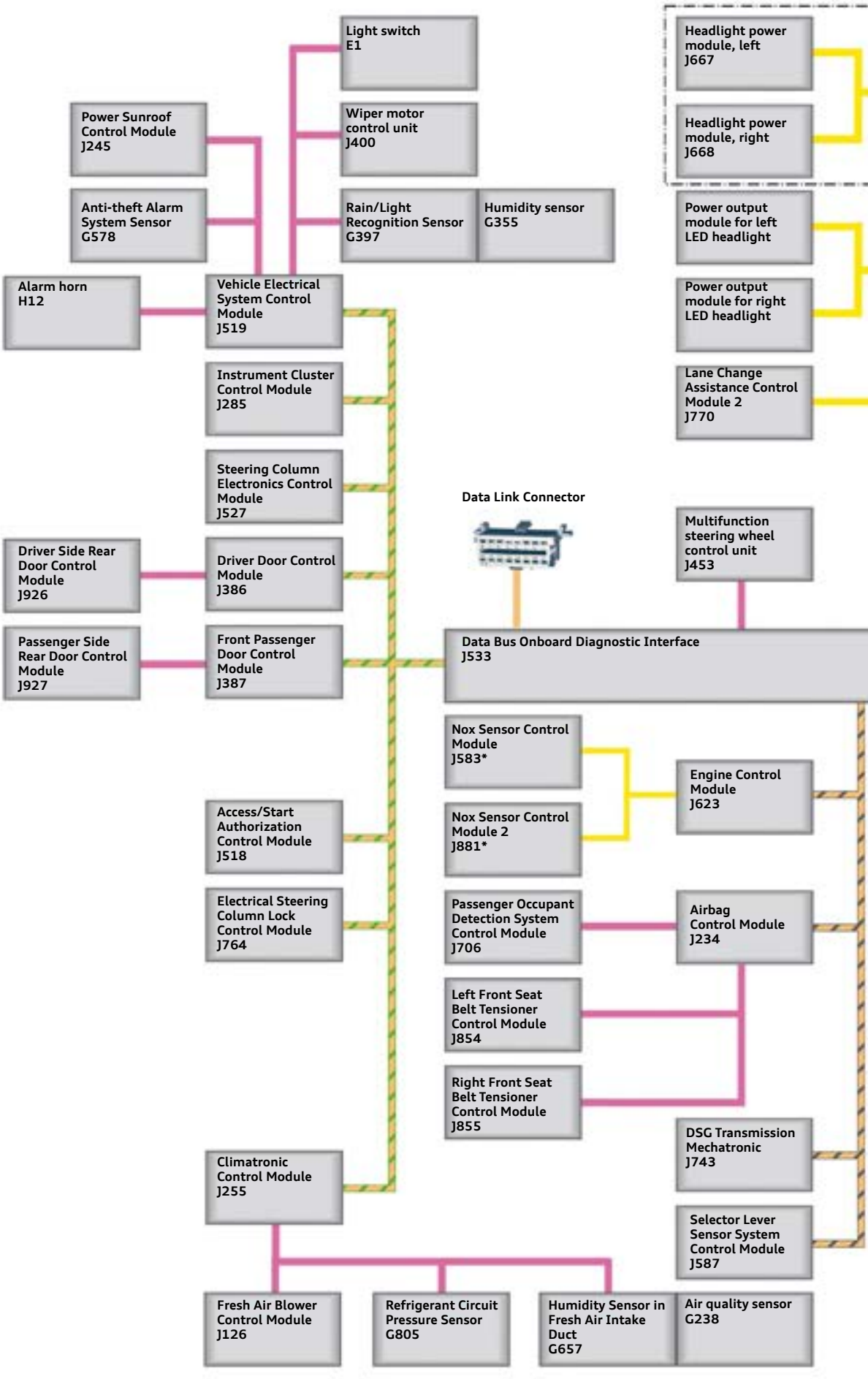
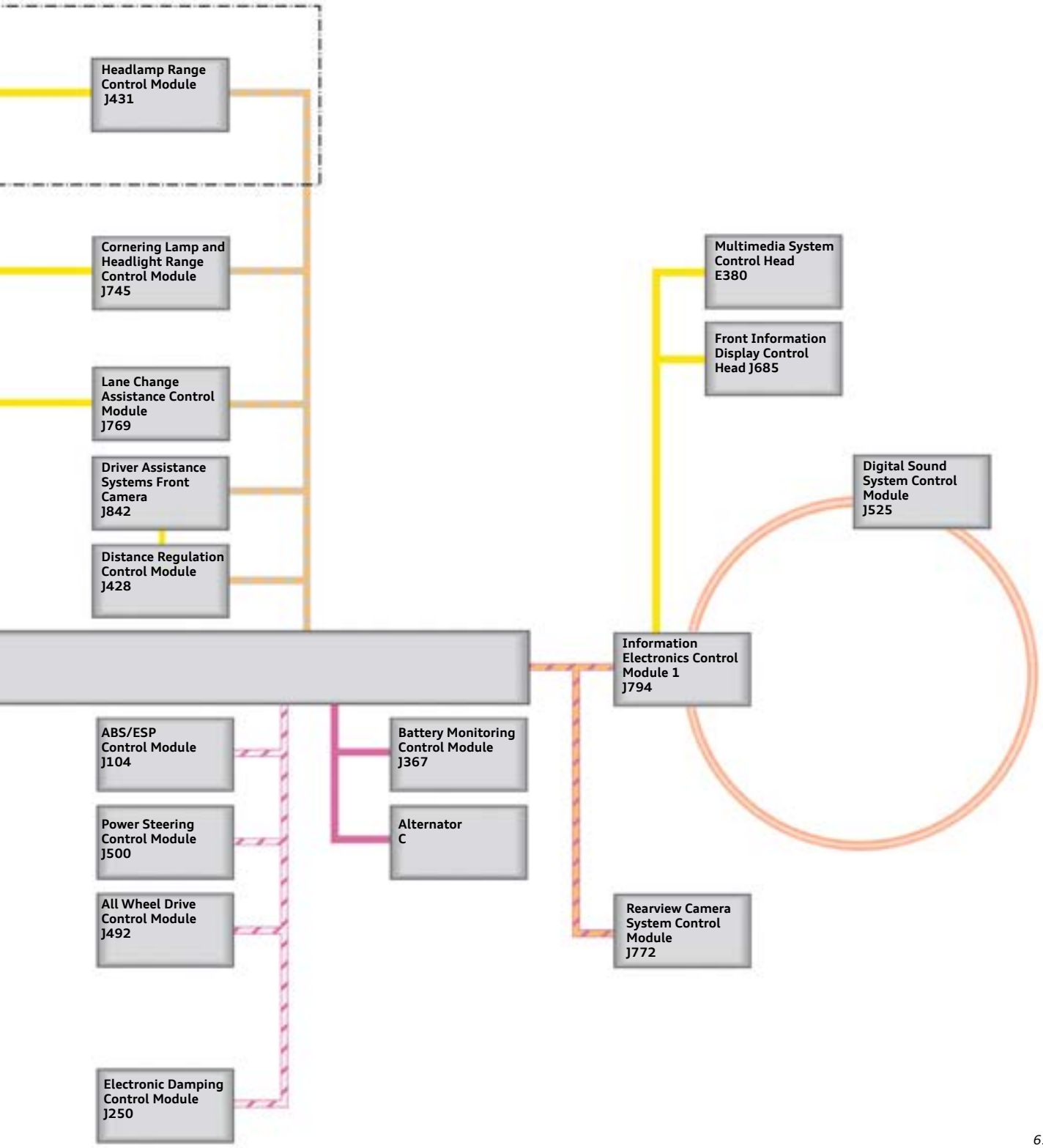
Topology the 2015 Audi A3

The topology shows all control modules with connectivity to the data bus system. Some of the control modules shown here are optional, country-specific equipment, or will be introduced at a later date. Be aware that all the modules shown will not be installed on every vehicle.



*2.0L TDI engine only

For example, Cornering Lamp and Headlight Range Control Module J745 would never be installed on the same vehicle as Headlamp Range Control Module J431.



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Key:

- Powertrain CAN bus
- Convenience CAN bus
- Extended CAN bus
- Infotainment CAN bus
- Diagnostics CAN bus
- Suspension CAN bus
- LIN bus
- Sub-bus systems
- MOST bus

Vehicle electronics

Instrument Cluster Control Module J285

Instrument cluster with monochrome Driver Information System

The monochrome Driver Information System has a resolution of 320 x 240 pixels.

611_003a

The process for navigating through the various menus is the same as that of the A6, A7, and A8 models.

Instrument cluster with color Driver Information System

The color display also has a resolution of 320 x 240 pixels. Any vehicle with ACC will also have this type of instrument cluster.

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Instrument cluster electrical connections

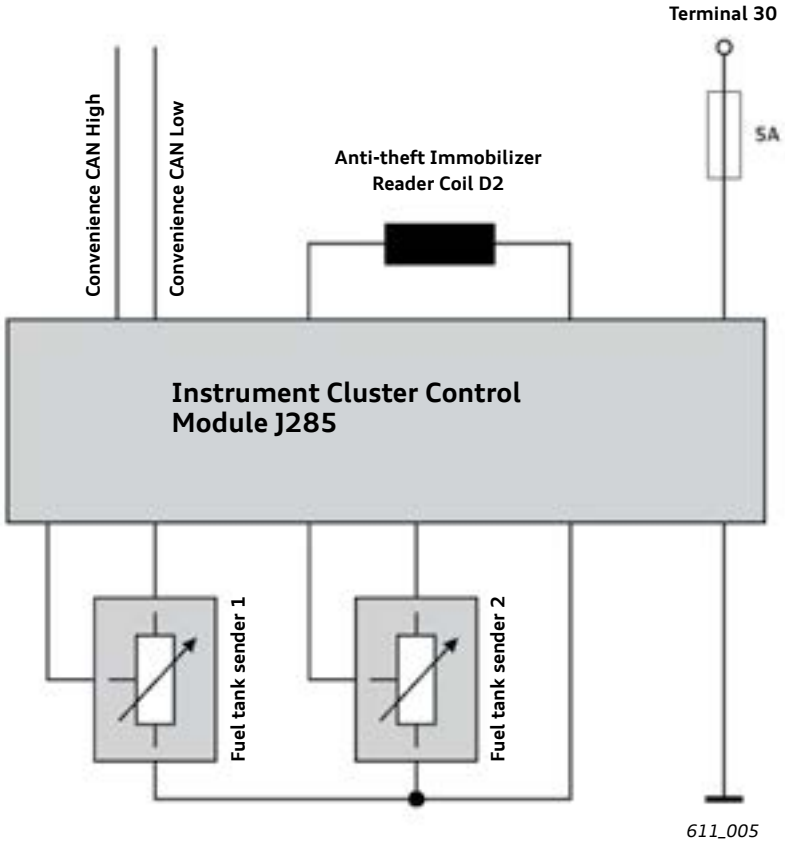
A fused terminal 30 wire and discrete terminal 31 wire are routed to Instrument Cluster Control Module J285.

The module communicates with other modules via two twisted CAN bus wires over the Convenience CAN.

In addition, J285 reads the signals from two fuel tank senders and the Immobilizer Coil D2. The fuel senders use three-wire technology. (Only quattro modules have two fuel senders.)

On vehicles without Advanced key, Immobilizer Coil D2 is located around the ignition switch and exchanges data with the key when it is inserted.

In vehicles with Advanced key, Immobilizer coil D2 is located in the approximate area where the ignition switch would be. The position is marked for identification in case an emergency start must be performed.



Immobilizer master function

Instrument Cluster Control Module J285 is the master module for the immobilizer system. The following control modules have immobilizer functions:

- Engine Control Module J623
- Electronic Steering Column Lock Control Module J764
- DSG Transmission Mechatronic J743

Door electronics

Driver Door Control Module J386

Installation location

611_006

Tasks and characteristics of the control module

- Convenience CAN participant
- LIN bus master for Driver Side Rear Door Control Module
- Monitoring the central power window button status
- Monitoring the door contact switch, the central locking button and child lock button status
- Monitoring the mirror adjustment switch and anti-theft alarm deactivation button status
- Monitoring the status of the micro-switch in the driver door locking unit
- Activating the indicator in the door mirror and the lights of the optional interior light package
- Activating the window motor and the mirror adjustment motors
- Activating the locking and SAFE motor in the driver door locking unit*
- Activating the door mirror heater
- Substitute master for the central locking system

* Not used in the North American region

Pin assignments Driver Door Control Module J386

Power supply

Terminal 30

B19	"Terminal 30" supply; protected by a 30A fuse

Terminal 31

B20	Ground circuit

Other supply voltages

C3	Voltage supply circuit for mirror heater and indicator in door mirror
C4	Ground circuit of mirror adjustment potentiometer
C14	Voltage supply of mirror adjustment potentiometer
D5	Ground line of driver door button

Bus lines

CAN bus

B14	Convenience CAN Low
B15	Convenience CAN High

LIN bus

B10	LIN bus to door electronics in driver side rear door

Inputs

Switch

B5	Driver Door Contact Switch F2
D24	Mirror Adjusting Switch E43
D25	Mirror Selector Switch E48

Button

D20	Alarm System Deactivation Switch E217
D23	Rear Lid Remote Release Button E233
D27	Child Safety Lock Button E318
D28	Driver Interior Locking Switch E150
D29	Passenger Side Rear Power Window Button in Driver Door E714
D30	Driver Side Rear Power Window Button in Driver Door E712
D31	Front Passenger Power Window Button in Driver Door E715
D32	Driver Power Window Button E710

Signals

B1	Driver Lock Cylinder Contact Switch F241
B6	Driver door microswitch locked / SAFE*
B7	Ground circuit of microswitch in driver door locking unit
B8	Input signal for door mirror dimming function
B17	Input signal for door mirror dimming function
C13	Voltage signal of the horizontal mirror adjustment potentiometer, driver side
C16	Voltage signal of the vertical mirror adjustment potentiometer, driver side

* Not used in the North American region

Outputs

Lights

B3	Lamp for Driver Side Door Speaker Trim L223
C1	Ambient light in door mirror
C11	Driver Exterior Rearview Mirror Turn Signal bulb L131
D1	Central Locking -Safe- Indicator Lamp K133
D3	Passenger Side Interior Door Handle Illumination Lamp L220
D4	Driver door button locating light - terminal 58xs
D16	Front door warning light, driver side W30 and front left entry light W31

Function LEDs in buttons

D10	Function light in anti-theft alarm button
D11	Function light in rear right electrical child lock*
D12	Function light in rear left electrical child lock*
D13	Function light in interior locking button, driver side

Motors

A3	Driver Window Regulator Motor V142
A6	Driver Window Regulator Motor V142
B11	Ground of SAFE function and central locking motors in the driver door locking unit*
B12	Driver Door Central Locking -SAFE- Motor V161*
B13	Driver Door Central Locking System Motor V56*
C5	Shared connection of both mirror adjustment motors V17 and V149
C7	Driver Mirror Adjustment Motor V17
C8	Driver Mirror Adjustment Motor
C9	Driver Exterior Rearview Mirror Folding Motor V121
C10	Driver Exterior Rearview Mirror Folding Motor V121

Other actuators

C2	Output signal for door mirror dimming function
C6	Output signal for door mirror dimming function
C15	Heated Driver Exterior Rearview Mirror Z4

* Not used in the North American region

Driver Side Front and Rear Door Control Modules J386 and J926

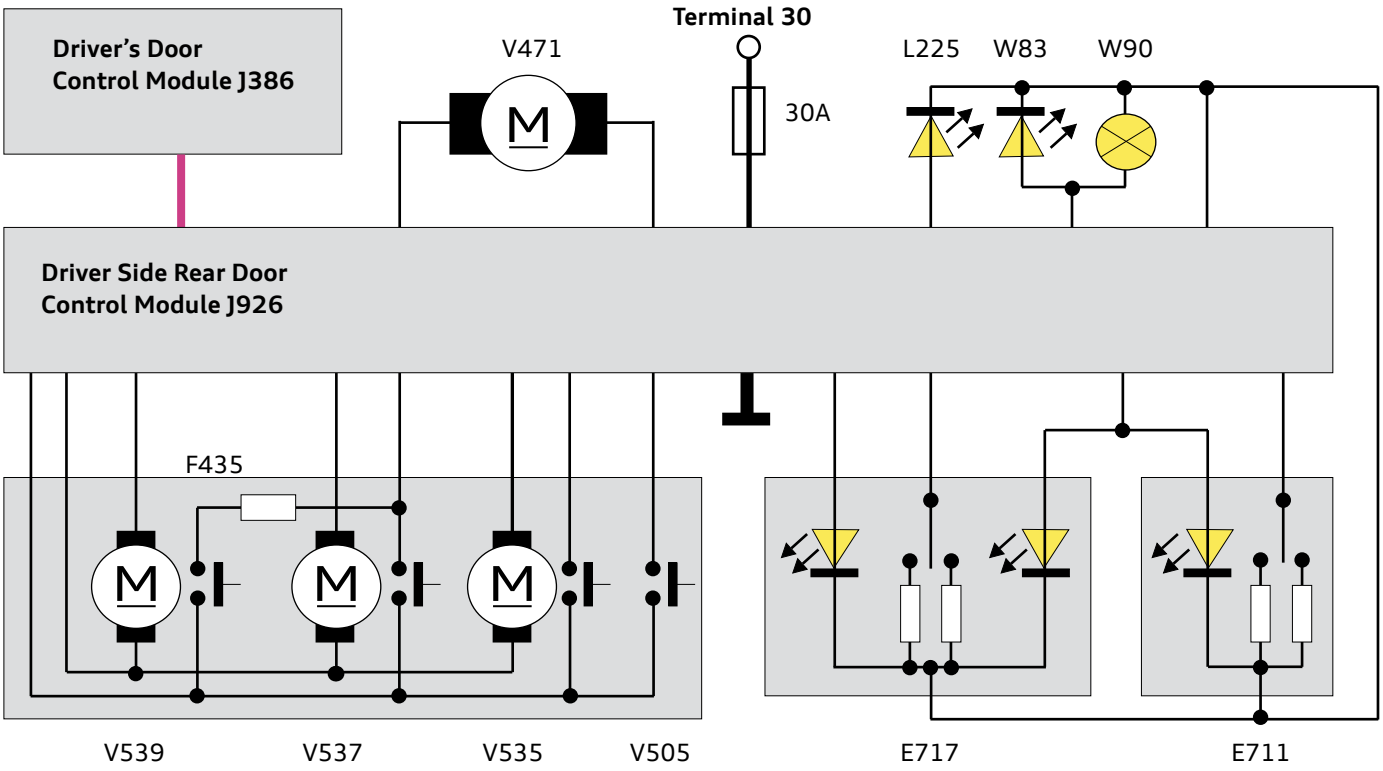
Some component designations for service will be updated with the introduction of the 2015 Audi A3. The designations will include information on locations and will be written in a more clear manner. Such terms as “rear left” or “rear right” will be replaced with descriptions such as “rear driver side” and “rear passenger” side.

The rear door control modules for the 2015 A3 have new designations as well as being new in design.

These door control modules will be installed in all five door iterations of the Audi A3 model for North America. This version provides a locking and unlocking button in the door.

Tasks of J386 and 926

- Communicating with the corresponding front door control module via LIN bus
- Self-diagnosis and the transfer of diagnostic information
- Monitoring the door contact switch, the window regulator button and the central locking button
- Activating the lights for the optional interior light package
- Activating the window regulator motor, locking and SAFE motor and the child lock motor*



Key

E711	Driver Side Rear Power Window Button
E717	Driver Side Rear Interior Locking Button
F435	Driver Side Rear Central Locking Unit
F505	Driver Side Rear Door Contact Switch
J386	Driver Door Control Module
J926	Driver Side Rear Door Control Module
L225	Lamp for Driver Side Rear Door Speaker Trim
V471	Driver Side Rear Window Regulator Motor
V535	Driver Side Rear Child Safety Lock Motor
V537	Driver Side Rear Central Locking –SAFE– motor
V539	Driver Side Rear Central Locking System Motor
W83	Driver Side Rear Entry Lamp
W90	Driver Side Rear Door Warning lamp

* SAFE and Child lock motor not used in the North American region

Pin assignments Driver Side Rear Door Control Module J926

Power supply

Terminal 30

B19	"Terminal 30" supply; protected by a 30A fuse

Terminal 31

B20	Ground circuit
C13	Ground circuit of the rear door button, driver side

Bus lines

LIN bus

B10	LIN bus to Driver Door Control Module J386

Inputs

Switches and buttons

B5	Driver Side Rear Door Contact Switch F505
C9	Driver Side Rear Power Window Button E711
C10	Driver Side Rear Interior Locking Button E717

Signals

B4	Child lock microswitch, rear driver side activated / deactivated*
B6	Rear door microswitch, rear driver side locked / SAFE*
B7	Ground circuit of microswitch in locking unit, rear driver side

Outputs

Lights

C1	Lamp for Driver Side Rear Door Speaker Trim L225
C2	Rear door button locating light, driver side - terminal 58xs
C11	Function light in rear interior locking button, driver side
C12	Door warning light, Driver Side Rear Door Warning Lamp W90, Driver Side Rear Entry Lamp W83

Motors

A3	Driver Side Rear Window Regulator Motor V471
A6	Driver Side Rear Window Regulator Motor V471
B9	Driver Side Rear Child Safety Lock Motor V535*
B11	Ground for central locking motors in the door locking unit, rear driver side
B12	Central locking SAFE function Driver Side Rear Door Central Locking -SAFE- Motor V537*
B13	Driver Side Rear Central Locking System Motor V539

* SAFE and Child lock motor not used in the North American region

Vehicle Electrical System Control Module J519

Installation location

611_010

Tasks and characteristics of J519

- Communicating with other control modules via the convenience CAN bus
- LIN bus master for multiple LIN bus systems
- Central locking system master
- Exterior light master; activation of front headlights and tail lights
- Interior light master; generation of terminals 58xs, 58xt and 58xd (locating light)
- Activating the "terminal 15" relay, rear window heater relay and horn relay
- Activating the driver and front passenger seat heaters as well as the heated windshield washer spray jets.
- Activating the windshield washer and head light washer (if equipped) pumps
- Monitoring the signals of various switches and buttons
- Monitoring the ambient temperature sensor and the seat heater temperature sensors

Vehicle Electrical System Control Module J519

Power supply

Terminal 30

A1	"Terminal 30" supply; protected by a 30A fuse
A66	"Terminal 30" supply; protected by a 40A fuse
A73	"Terminal 30" supply; protected by a 40A fuse
C1	"Terminal 30" supply; protected by a 40A fuse
C12	Switched "terminal 30"
C73	"Terminal 30" supply; protected by a 30A fuse

Ground lines

A12	Vehicle ground - "terminal 31"
A63	Vehicle ground - "terminal 31"
C63	Vehicle ground - "terminal 31"

Bus lines

CAN bus

A16	Convenience CAN High
A17	Convenience CAN Low

LIN bus

A15	LIN bus line to Anti-theft Alarm System Sensor G578, Power Sunroof Control Module J245 (LIN bus 3)
B30/C28	LIN bus line to Wiper Motor Control Module J400, Power Sunroof Control Module J245, Rain/Light Recognition Sensor G397 (LIN bus 1)
B31	LIN bus line to Alarm Horn H12 (LIN bus 2)

Inputs

Switch

A29	Redundancy line to Light Switch E1
A33	Rear door microswitch, passenger side locked / SAFE*
A35	Rear door microswitch, rear driver side locked / SAFE*
A48	Passenger Side Rear Door Contact Switch F506
A50	Driver Side Rear Door Contact Switch F505
A52	Microswitch for fully closed position of door lock mechanism (rear trunk lock)
A53	Microswitch for partially closed position of door lock mechanism (rear trunk lock)
B11	Open
B13	Brake Fluid Level Warning Switch F34
B14	Engine Hood Contact Switch F266 and Hood Contact Switch 2 F329
B16	Engine Coolant Level Sensor G32
B19	Ground circuit for various level sensors
B28	Windshield Washer Fluid Level Sensor G33
C58	Brake Light Switch F

Button

A32	Rear Lid Lock Cylinder Unlock Button F248 (soft touch)
C34	Driving Profile Selection Switch Module E592
C42	Emergency Flasher Button E229

* SAFE and Child lock motor not used in the North American region

Sensors

B12	Right Front Brake Pad Wear Sensor G35
B27	Ambient Temperature Sensor G17
C40	Right Front Seat Temperature Sensor G345
C43	Left Front Seat Temperature Sensor G344
C56	Ground circuit to both front seat temperature sensors

Signals

A44	"Terminal 15" request 1; supplied by Electronic Steering Column Lock Control Module J764 if the vehicle is equipped with the optional advanced key, otherwise by Electronic Steering Column Lock Control Module J527
A47	"Terminal 15" request 2; supplied by the Electronic Steering Column Lock Control Module J764 J764 if the vehicle is equipped with the optional advanced key, otherwise by Electronic Steering Column Lock Control Module J527
A51	Open
A54	"NO contact" signal; supplied by Steering Column Electronics Control Module J527 if the vehicle is not equipped with the optional advanced key, otherwise by Electronic Steering Column Lock Control Module J764 if the vehicle is equipped with the optional advanced key
C14	Wake-up signal of Access/Start Authorization Control Module J518

Outputs

Relays

A13	Activation of Terminal 15 Power Supply Relay J329
B24	Activation of Horn Relay J413
C24	Activation of Rear Window Defogger Relay J9

Lights in vehicle interior

C21	Function light in driving profile selection button (Drive Select)
C48	Emergency Flasher Indicator Lamp K6
C51	Open
C62	Power supply to locating light terminal 58xs
C72	Activation of Front Left and Right Footwell Lamps L151 and L152; Rear Left and Right Footwell Lamps L106 and L107

Tail lights

A57	High Mounted Brake Lamp
A59	Left and Right License Plate LEDs X4 and X5
A60	Left Brake /Turn Signal Lamp M56
A64	Right Back-up Lamp Bulb M17 (rear lid light)
A65	Right Tail Lamp Bulb M38 (rear lid light)
A71	Open
A72	Left Rear Fog Lamp Bulb L46 (rear lid light in comb. with LED tail light)
C3	Right Brake Lamp/Turn Signal Bulb 2 (rear lid light in comb. with LED tail light)
C6	Right Rear Fog Lamp Bulb L47 (rear lid light in comb. with LED tail light)
C8	Open
C9	Left Brake Lamp/Turn Signal Bulb 2 M84 (rear lid light in comb. with LED tail light)
C10	Left Rear Side Marker Lamp M37
C11	Left Back-up Lamp Bulb M16 (rear lid light)
C31	Right Brake Lamp/Turn Signal Bulb (side light)

Headlights

B1	Open
B2	Open
B4	Left Daytime Running Lamp and Position Lamp Control Module J860 (with bi-xenon lights)
B5	Open
B10	Left Daytime Running Lamp and Position Lamp Control Module J860 (with bi-xenon lights)
B20	Right Front Turn Signal Bulb M7
B21	Right Daytime Running Lamp and Position Lamp Control Module J861 (with bi-xenon lights)
B22	Right Low Beam Headlamp Reflector Motor V295 (with bi-xenon lights without AFS)
B23	Left Low Beam Headlamp Reflector Motor V294 (with bi-xenon lights without AFS)
B32	Right Daytime Running Lamp and Position Lamp Control Module J861 (with bi-xenon lights)
B36	Left Front Turn Signal Bulb M5
B39	Open
B45	Open
C5	Open

Motors

A3	Open
A4	Open
A6	Ground of SAFE function and central locking motors in the door locking unit, rear passenger side*
A7	Passenger Side Rear Central Locking System Motor V540
A9	Rear Lid Central Locking System Motor V53
A36	Driver Side Rear Door Central Locking -SAFE- Motor V537
A37	Passenger Side Rear Door Cental Locking - SAFE- Motor V538*
A68	Ground of SAFE function and central locking motors in the door locking unit, rear driver side
A69	Driver Side Rear Central Locking System Motor V539

Other actuators

A2	Driver Seat Heating Element Z6, Driver Backrest Heating Element Z7
A5	Passenger Seat Heating Element Z8, Passenger Backrest Heating Element Z9
B7 / A61	Control line for washer pump V5 and rear window wiper motor V12
B8 / A62	Open
B9	Left and Right Washer Nozzle Heaters Z20 and Z21
B46	Headlamp Washer Pump V11

Signal lines

A14	"Terminal 15" signal for various control module
C67	Door contact signal for interior light control on overhead module

* Not used in the North American region

Electronic Steering Column Lock Control Module J764

Only installed with the Advanced key option.

Installation location

611_012

Tasks and characteristics of the control module

- Communicating with other control modules via the Convenience CAN bus
- Locking and unlocking the steering column
- Terminal management master
- Monitoring the signal from Access/Start Authorization Button E408
- Immobilizer participant

Unlocking the steering column

The steering column is unlocked after actuating Access/Start Authorization Button E408 if a key belonging to the vehicle has been detected inside the vehicle. After unlocking the steering column, the NO contact and terminal 15 are activated and terminal 50 is requested.

Locking the steering column

Locking of the steering column can be initiated by the following two events:

- Opening the driver's door

or

- Locking the vehicle with the remote control key, the Advanced key or the door lock

The steering column is only locked if all of the following conditions have been met:

- The steering column is unlocked
- The vehicle is travelling at speed of 0 mph (0 km/h)
- The engine is not running
- Terminal 15 and the NO contact have been deactivated
- The selector lever is in position “P”

Note

The steering column lock is still implemented mechanically on models ordered without the optional Advanced key. In these models, the terminals are managed by Electronic Steering Column Lock Control Module J527.

Access/Start Authorization Control Module J518

J518 is only installed on vehicles with Advanced key.

Installation location

611_013

Tasks and characteristics of the control module

- Communicating with other control modules via the convenience CAN bus
- Activating the five antennas for entry and start authorization
- Monitoring both capacitive sensors in the driver and passenger door handles
- Activating the locating light in Access/Start Authorization Button E408
- Waking up Vehicle Electrical System Control Module J519 via a wake-up line after contact with the door handle sensors is detected

Advanced Key

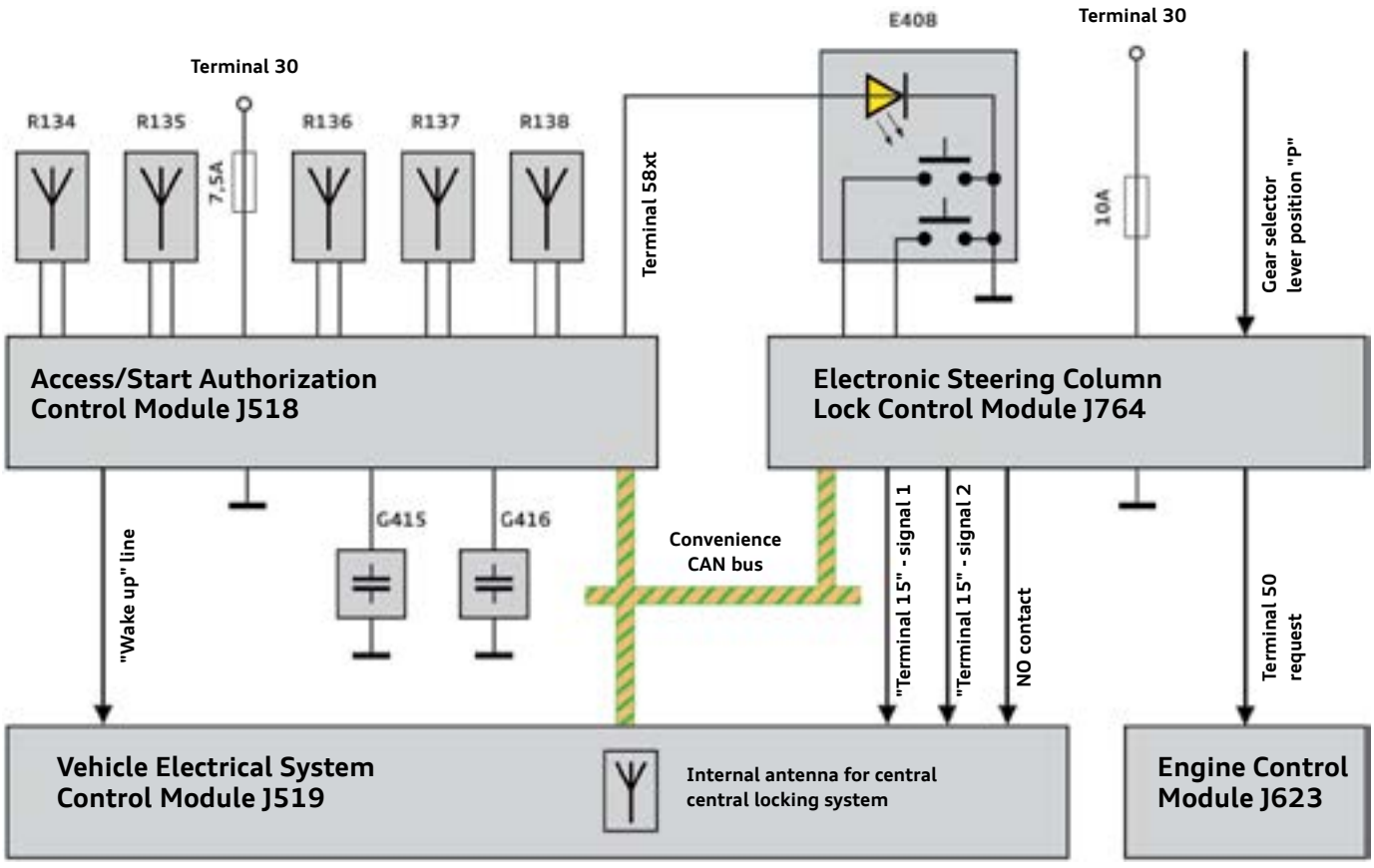
The optional Audi advanced key is available for the first time on an A3 model with the introduction of the 2015 A3 sedan.

If Advanced key has been installed in the vehicle, it has the following additional control modules:

- Access/Start Authorization Control Module J518

and

- Electronic Steering Column Lock Control Module J764



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Key:

E408	Access/Start Authorization Button
G415	Driver Exterior Door Handle Touch Sensor
G416	Passenger Exterior Door Handle Touch Sensor
R134	Driver Access/Start System Antenna
R135	Front Passenger Access/Start System Antenna
R136	Access/Start System Antenna in Rear Bumper
R137	Access/Start System Antenna in Luggage Compartment
R138	Access/Start System Antenna 1 in Vehicle Interior

Access/Start Authorization antennas

All five Access/Start System antennas are activated by Vehicle Electrical System Control Module J519.

They are installed in the following positions:

611_016

Driver Access/Start System Antenna R134. On body under 'B' pillar area.

611_019

Access/Start Antenna in Luggage Compartment R137. Located under seat.

611_017

Front Passenger Access/Start Antenna R135. On body under 'B' pillar area.

611_020

Access/Start System Antenna 1 in Interior R138.

611_018

Access/Start System Antenna in Rear Bumper R136.

Unlocking/locking a vehicle with Audi advanced key

Access/Start Control Module J518 monitors Driver Exterior Door Handle Touch Sensors G415 and G416. Unlocking and locking input can be sent to the Advance key system via these sensors. The sensors are located in the driver and front passenger door handles. No door handle sensors are installed on the rear doors.

To unlock the vehicle, the driver or passenger must grip the respective door handle. To lock the vehicle, contact must be made with the marked surface (framed rectangle) on the door handle.

After the system has detected an unlocking or locking input, a scan of the ignition key is initiated. The system activates the five antennas and receives a reply form the vehicle key via the central locking antenna. The system uses this reply to check whether the key is authorized and within the radius of the operating point.

If all the conditions are met, Vehicle Electrical System Control Module J519 initiates the corresponding operation. J519 transfers the unlock or lock commands to the Convenience CAN bus. The commands are received by door control modules and subsequently unlock or lock the doors.

Switching the ignition on

To switch the ignition on, Access/Start Authorization Button E408 must be pressed.

If all the condition for switching on the ignition are met, the system first unlocks the steering column. After the column is unlocked, Terminal 15 Power Supply Relay J329 is activated and the ignition is switched on.

If the conditions for starting the engine have been met during this process, Engine Control Module J623 activates both starter relays. The starter is energized, the fuel injection cycle begins and the engine starts.

Terminal management

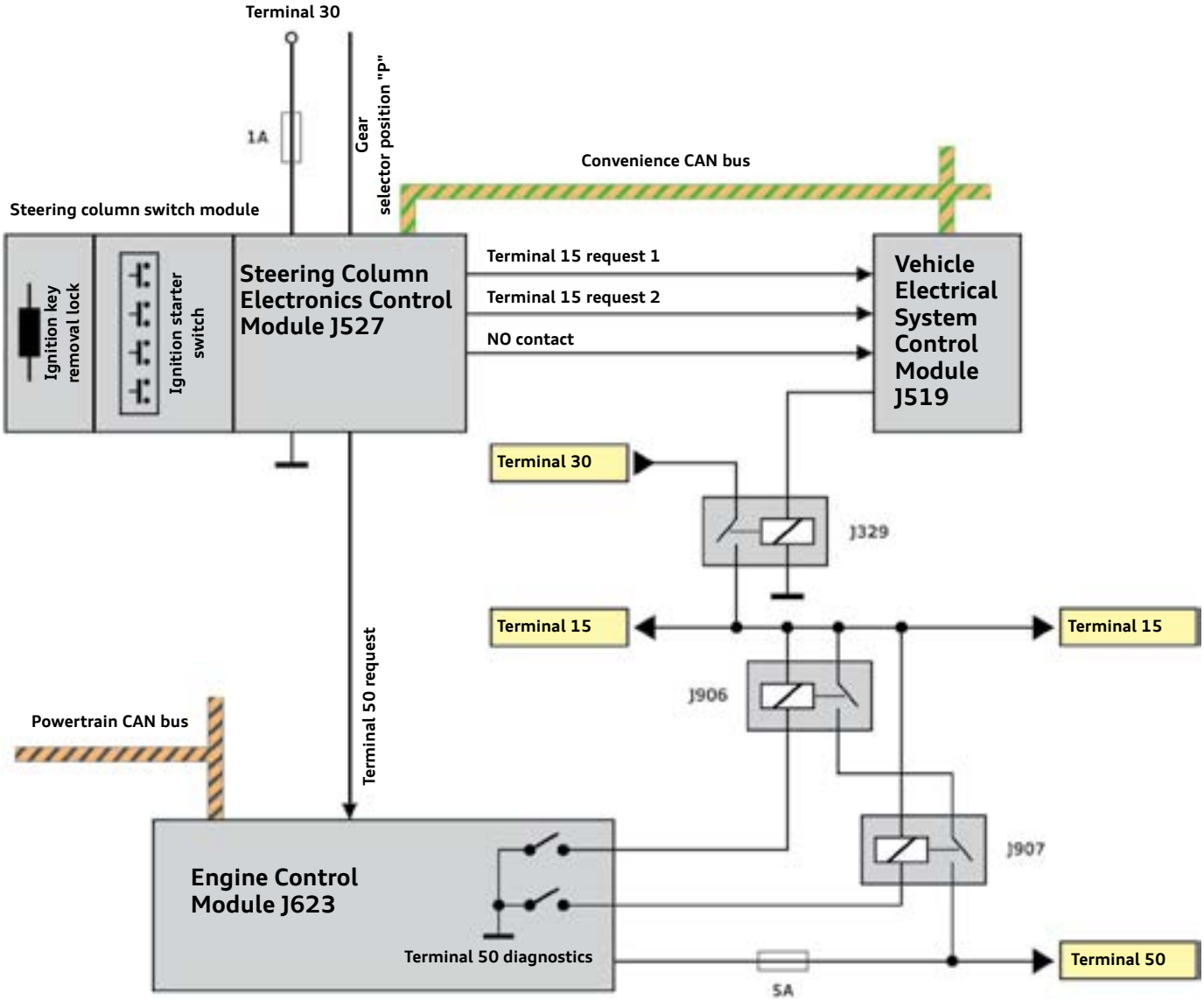
Terminal management without Audi advanced key

Terminal management functionality depends on whether the 2015 A3 is equipped with the optional Advanced key system or not.

On models without the Advanced key system, Steering Column Electronics Control Module J527 is the terminal management master.

On models with Advanced key, this task is performed by Steering Column Electronics Control Module J764.

Terminal management without Audi advanced key



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Key:

J329 Terminal 15 Power Supply Relay

J906 Starter relay 1

J907 Starter relay 2

Steering column switch module

The ignition key removal lock, ignition switch and Steering Column Electronics Control Module J527 are all components of the steering column switch module. J527 monitors the ignition switch continuously and activates the ignition key removal lock as required.

Generating the individual terminal status signals

To generate the various terminal status signals, J527 continuously monitors the sensors in the ignition switch. The switch has four sensors:

- NO contact sensor
- Terminal 15 request sensor 1
- Terminal 15 request sensor 2
- Terminal 50 request sensor

J527 continuously generates the current status signals for terminals 15, 50 and 75 on the NO contact based on the input from the sensors. The current terminal status is transmitted to other control modules through the Convenience CAN bus.

NO contact

The NO contact is activated by inserting the vehicle key into the ignition switch. When this is detected, J527 transfers the information 'NO contact on' to the CAN bus and to Vehicle Electrical System Control Module J519 by a discreet wire. There is no 'NO contact' wire for supplying consumers.

The NO contact is deactivated by removing the ignition key from the switch.

Terminal 15

The task of Steering Column Electronics Control Module J527 (terminal management master) is to determine the status of terminal 15. To do this it monitors the status of the NO contact and both 'terminal 15 request' sensors.

However, it is the task of Vehicle Electrical System Control Module J519 to activate the terminal 15 voltage supply relay. To do this, J519 monitors the following three signals:

- Terminal 15 request 1
- Terminal 15 request 2
- NO contact

The information is transferred by J527 and reflects the status of the three sensors in the ignition switch. If voltage is measured in two of the three signals wires from Vehicle Electrical System Control Module J519, Terminal 15 Relay J329 is activated and the ignition is switched on. With this configuration, it is still possible to start the vehicle even if a fault occurs in one of the three sensors in the ignition switch.

Terminal 50

The Engine Control Module receives the requests to start the engine from J527. This request is sent both by discrete wires and via the CAN bus. The Engine Control Module activates both starter relays J906 and J907.

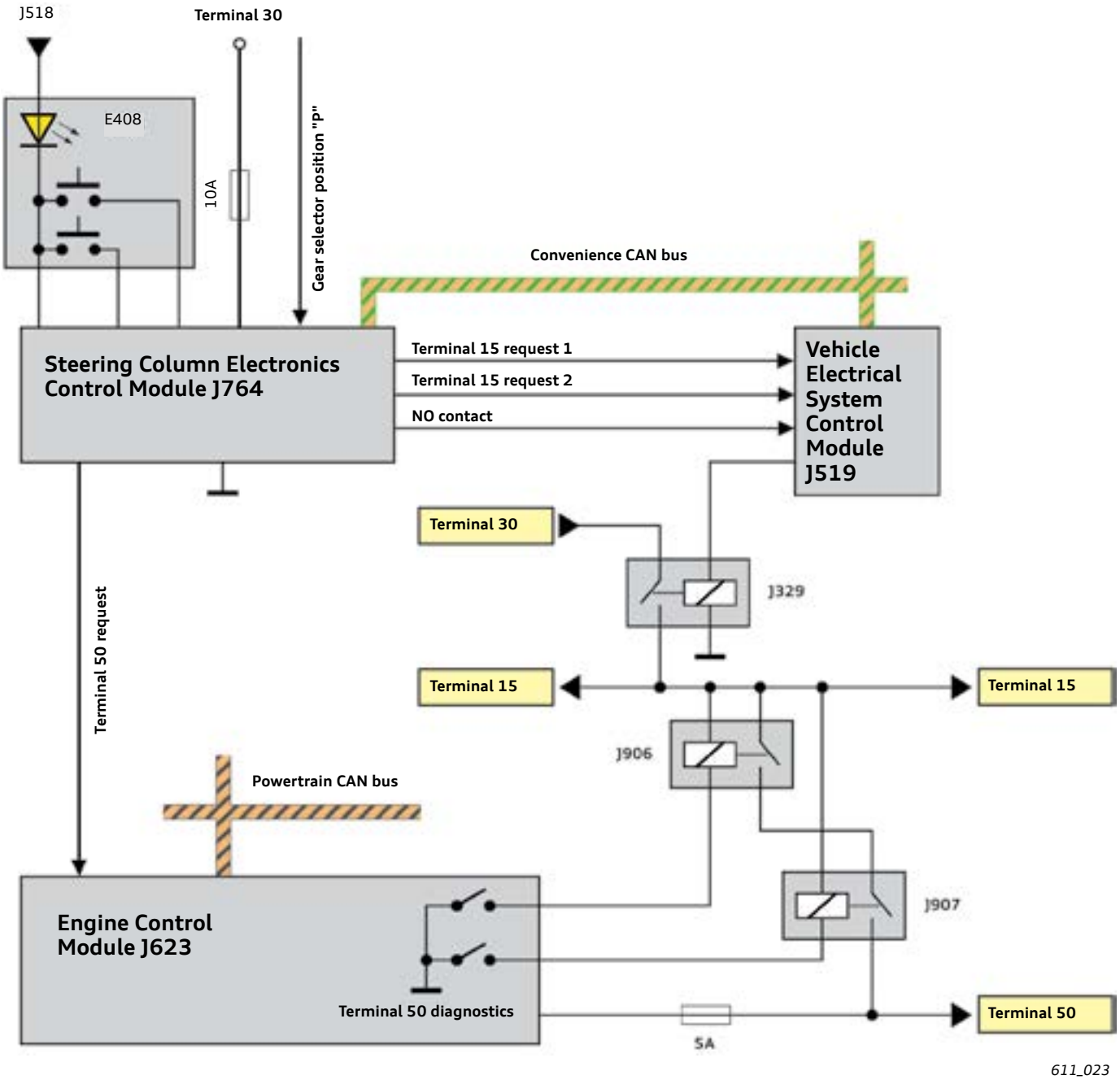
To this end, the ECM closes internal switches and connects both relays to ground. The relays then close their switching contacts and terminal 50 is supplied to the starter.

A protected diagnostic line allows the Engine Control Module to check whether terminal 50 has actually been switched.

Terminal 75

No separate terminal 75 relay is installed in the 2015 Audi A3. Other control modules receive the current status of terminal 75 from Steering Column Electronics Control Module J527.

Terminal management with Audi advanced key



Key:

E408	Access/Start Authorization Button
J329	Terminal 15 Power Supply Relay
J906	Starter relay 1
J907	Starter relay 2

Steering Column Electronics Control Module J764

When the vehicle has Audi advanced key, Access/Start Authorization Button E408 is installed in place of the ignition switch. The ignition is switched on and off and the engine started or switched off with this button.

Access/Start Authorization Button E408

E408 has two micro-switches. Both are monitored by Steering Column Electronics Control Module J764. The micro-switches are actuated as long as the button is pressed. J764 determines the current status of terminals 15, 50, 75 and the NO contact by continuously monitoring the micro-switches. The status of these terminals is transmitted to other control modules over the Convenience CAN bus.

If either of the micro-switches in E408 becomes faulty, the ignition can no longer be switched on nor the vehicle engine started. If this occurs while the ignition is switched on and the engine running, it can be switched off one more time only.

NO contact and terminal 15

After pressing Access/Start Authorization Button E408, a check is made of the key. If the check is successful, Steering Column Electronic Control Module J764 activates the NO contact and the ignition switches on.

To switch on the ignition, voltage is applied to the following three signal lines:

- Terminal 15 request 1
- Terminal 15 request 2
- NO contact

Vehicle Electrical System Control Module J519

The three signal wires are monitored by J519. If voltage is present in at least two of the three, Terminal 15 Start Relay J329 is activated and the ignition switches on. It is still possible to start the engine in the event of and open circuit in one of the three signal wires.

Terminal 50

The Engine Control Module receives the request to start from J764. The request is sent across discrete wires as well as on the Convenience CAN bus. The ECM activates both Starter Relays J906 and J907.

To do this, the ECM closes its internal switches and connects both relays to ground. Both relays then close their switching contacts and terminal 50 is available to the starter.

A protected diagnostic wire allows the ECM to check whether terminal 50 has been switched.

Terminal 75

A separate ‘terminal 75’ relay is no longer installed in the A3. Other control modules receive the current status of terminal 75 from Electronic Steering Column Lock Control Module J764 via the Convenience CAN bus.

Interior lighting

Two interior lighting scenarios are possible for the 2015 A3 depending on model and option choices.

1. Basic interior lights (QQ5), standard on Premium and Premium Plus models.

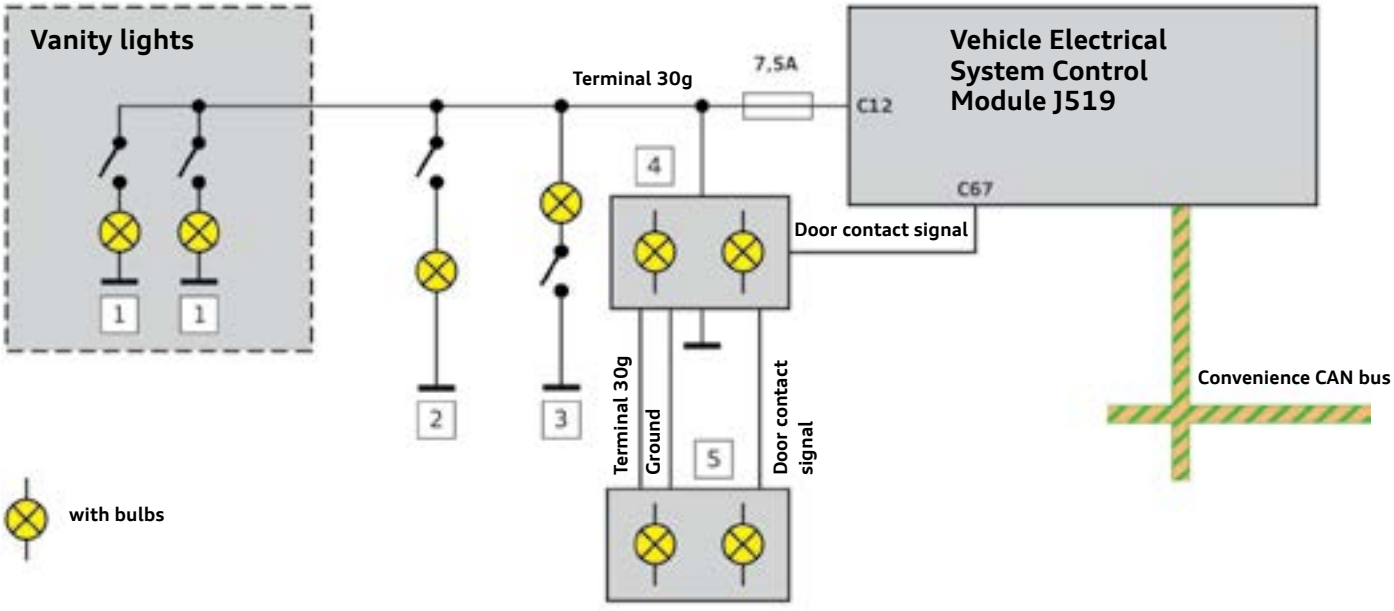
and

2. Interior light package (QQ4), available with the Convenience package of the A3 Premium Plus and standard equipment on the A3 Prestige model.

Standard interior light trim (QQ5)

In the basic trim, the lights in the vehicle interior use bulb technology. The lights are located in the overhead module, luggage compartment and glove compartment. The lights are powered by a switched terminal 30.

There are no door warning lights. Red reflectors are installed in their place.



611_024

Key:

1	Vanity lights, left or right
2	Light in glove compartment
3	Luggage compartment light
4	Interior lights in overhead module
5	Rear lights

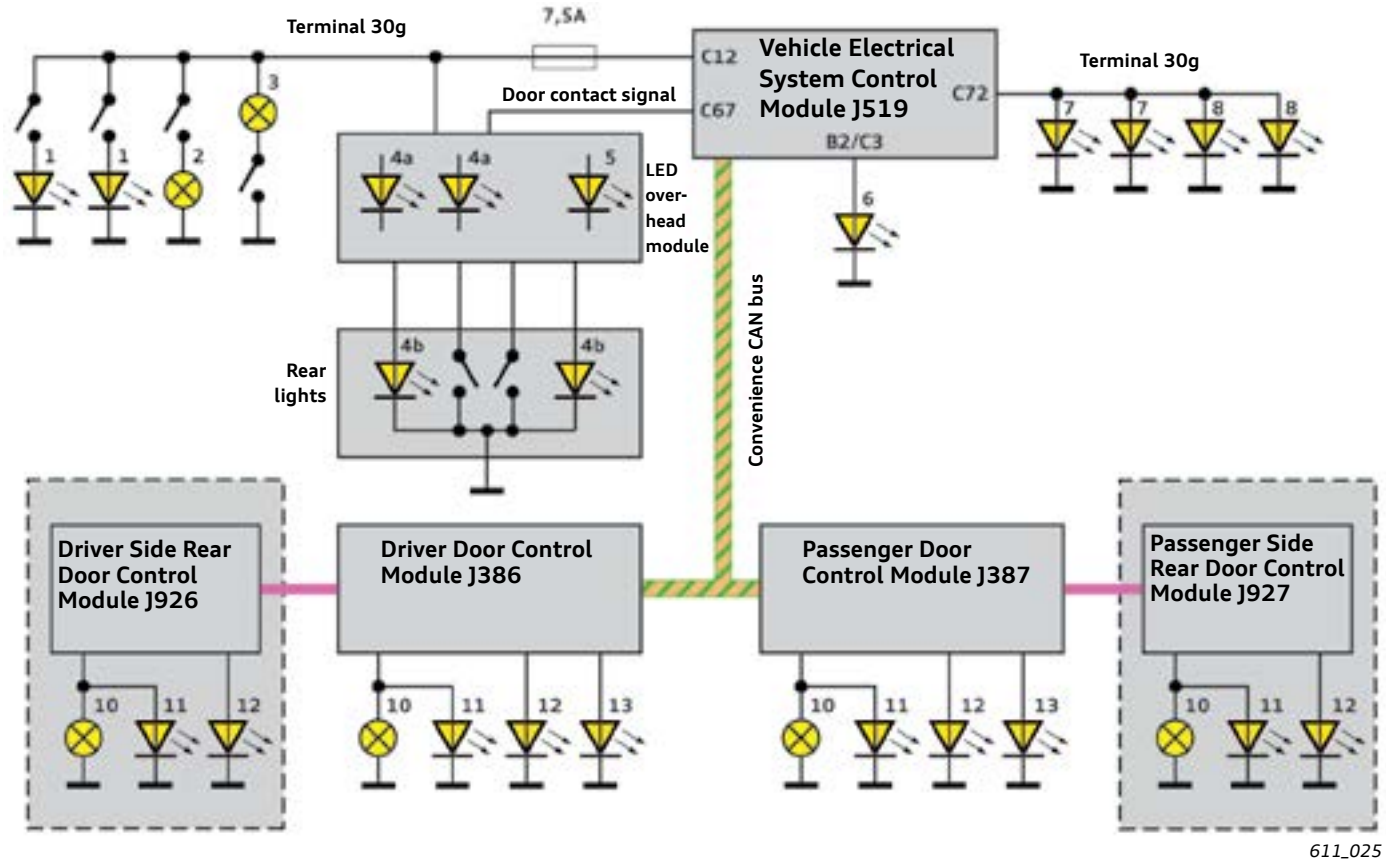
Interior light package QQ4

Interior light package QQ4 is available on the Premium A3 model when the optional Convenience package is installed. It is standard equipment on the A3 Prestige model. When this light package is installed on a vehicle with MMI Navigation plus or MMI Navigation plus with Audi connect, the interior lights can regulated via the MMI under the Car menu.

When interior light package QQ4 is ordered, an LED module is installed in the front and rear light housings. The LED overhead module has two reading lights and a central background light. In addition, the vehicle is equipped with four LED footwell lights and a cupholder light. The vanity lights also use LED technology.

Active door warning lights using conventional bulbs and door entry lights using LED are installed in the doors. The inner door handle on the driver's door is also illuminated.

The speaker lighting is only available when MMI Navigation plus or MMI Navigation plus with Audi connect is ordered.



with LED technology

with bulbs

Key:

1	Vanity lights, left or right	7	Front footwell lights
2	Light in glove compartment	8	Rear footwell lights
3	Luggage compartment light	10	Active door warning light
4a	Reading lights in LED overhead module	11	Door entry light
4b	Rear lights	12	Inner door handle light
5	Background light in LED overhead module	13	Sound loudspeaker lighting
6	Cupholder light		

On vehicles equipped with bi-xenon headlights, the Cupholder light is activated via pin B2 of J519.

Setting options in the Car menu

A customer can adjust the brightness of the background lights via the MMI Car menu. It is located under Vehicle settings, Background lighting. There are three adjustable zones:

- Front zone
- Footwell zone
- Door zone

The actual zones displayed in the MMI menu depends on what optional equipment has been ordered.

The following optional equipment displays the following zones in the MMI menu:

1. Interior light package ⇨ "Front" & "footwell" zones
2. Premium Sound ⇨ "Door" zone

If at least two zones are available as options in the MMI menu, the setting option "All zones" is offered and allows all zones to have the same setting.

611_027a

Only the background lights react to brightness adjustments made via the Car menu.

The following lights are integrated in the background lighting:

- Footwell lights
- Cupholder light
- Speaker lights

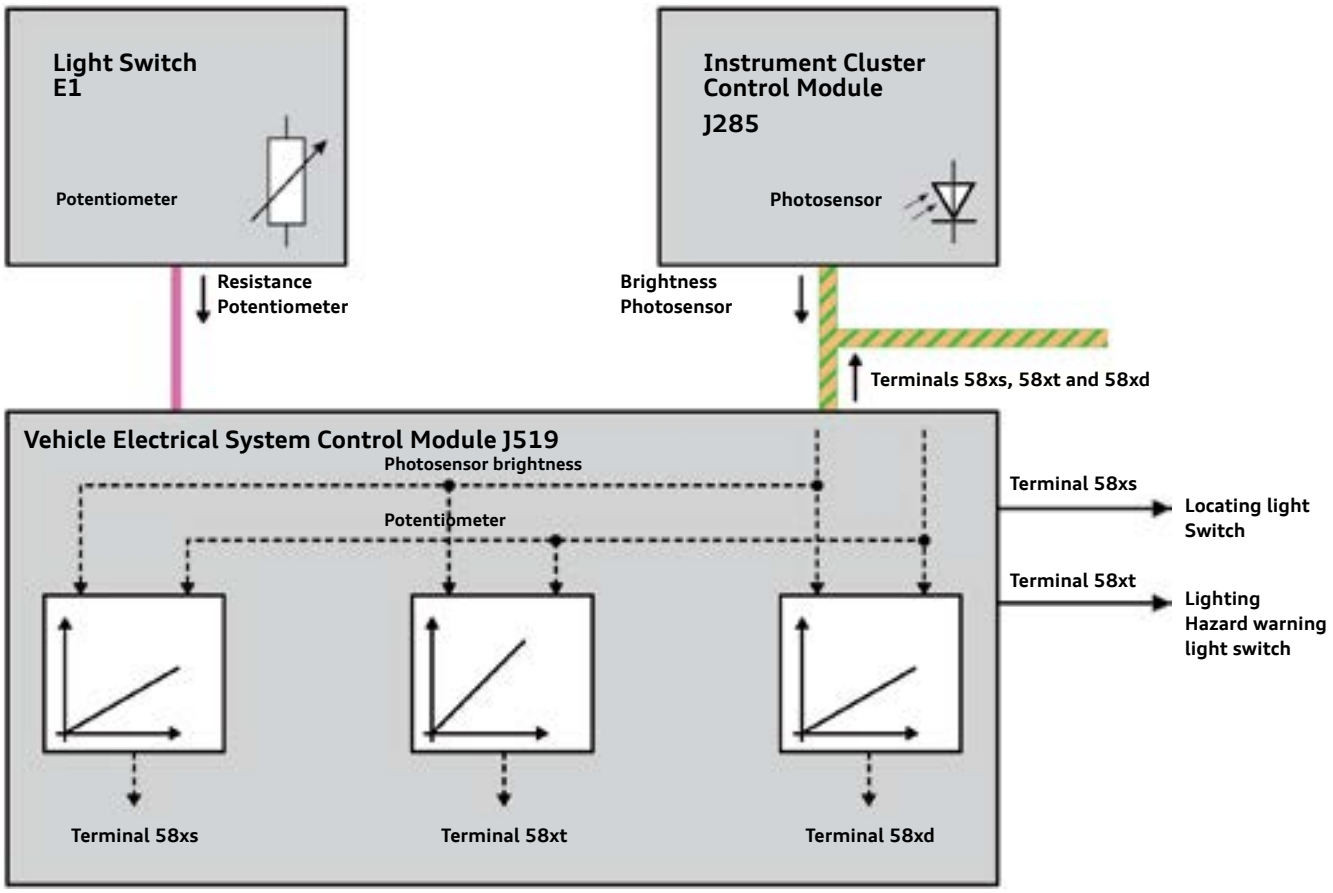
Power supply to interior and background lights

Terminal 58

The task of terminal 58 is to control the instrument lighting, display lighting and the locating lights in the buttons and switches. The lighting effect is dependent on the current brightness level of the vehicle and the customer setting.

The brightness of the vehicle interior is measured by a photosensor in the Instrument Cluster. The photosensor signal is sent to Vehicle Electrical System Control Module J519 via the Convenience CAN bus.

The customer can set the desired basic brightness of the interior lighting using the retractable control button on the light switch. The setting is by the LIN bus to J519. The duty cycle of the pulse width modulated (PWM) signals of terminals 58xs, 58xt and 58xd are calculated from both input variables.



611_028

A distinction is made between three different versions of terminal 58:

Terminal 58xs (formerly terminal 58s):	Switch locating light
Terminal 58xt (formerly terminal 58t):	Switch locating light with when door opened/when key removed from ignition
Terminal 58xd (formerly terminal 58d):	Display and instrument lighting

Terminals 58xs and 58xd are active as long as the side lights or low beam headlights are switched on.

Terminal 58xt corresponds to terminal 58xs with additional advance and trail function. It is pre-activated if, for example, one of the following events occurs:

- Vehicle is unlocked
- A vehicle door is opened
- The ignition is switched on

Terminal 58xt is deactivated if, for example, the following event occurs:

- The ignition is switched off.

Vehicle Electrical System Control Module 1 J519 transfers the values calculated for terminals 58xs, 58xt, and 58xd to other control modules via the CAN bus. The control modules to which lights or displays are connected generate a corresponding PWM signal from the values to control the brightness.

The light intensity is based on the duty cycle of the PWM signal.

Switched terminal 30 (terminal 30g)

The signal for switched terminal 30 is generated by Vehicle Electrical System Control Module 1 J519. This is used only to power lights in the vehicle interior.

The following events lead to the activation of terminal 30g:

- Switching on the ignition
- Manual activation of lights powered via terminal 30g
- Unlocking a vehicle door or the rear trunk lid
- Opening a vehicle door or the rear trunk lid
- Removing the ignition key
- Turning the rotary light switch

The following events lead to the deactivation of terminal 30g:

- The after-run time of terminal 30g has expired (timer starts when ignition is switched off)
- The vehicle is locked:
  - no vehicle door is open

    and
  - the rear trunk lid is closed

    and
  - the interior light is dimmed

The following lights are powered by a switched terminal 30 from J519:

- Light in glove compartment
- Luggage compartment light
- Footwell lights
- Vanity lights in the sun visors
- Interior light bulb in overhead module
- Reading lights

Driver assistance systems

Rearview Camera R189

A back-up camera is optional for the A3 model line up for the first time.

611_030

Installation location of Rearview Camera System Control Module J772

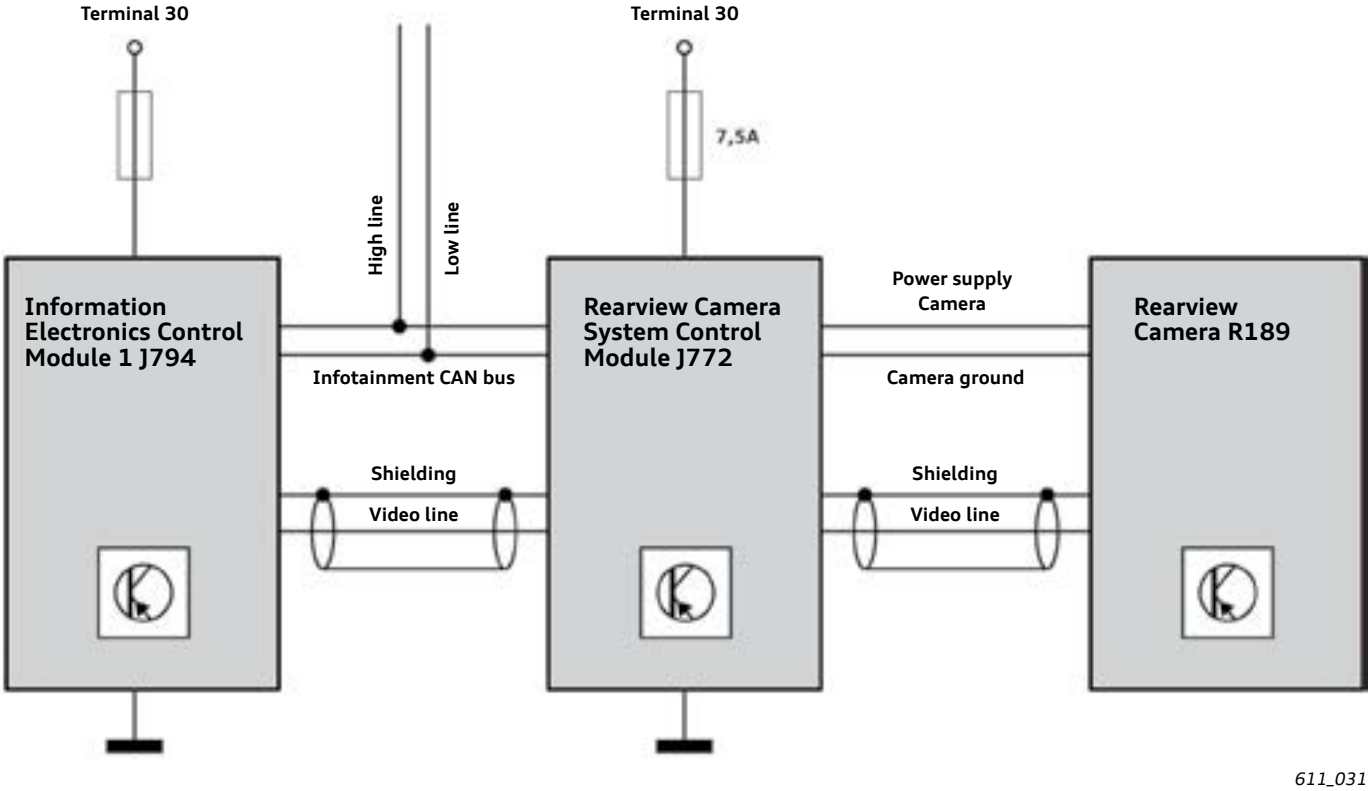
The back-up camera is located in the rear trunk lid handle where it monitors the area behind the vehicle.

A semi-conductor chip in the camera is used to capture the images. The image capture sensor uses CMOS technology and captures color images with a horizontal resolution of 64 pixels and vertical resolution of 492 pixels.

The camera lens has a dirt repellent coating. The driver can tell if the lens is dirty by the deterioration of the image quality in the display. It is the responsibility of the driver to ensure the lens is cleaned when dirty.

611_029

System implementation



Rearview Camera R189 is powered by Rearview Camera System Control Module J772. The camera image is transferred from R189 to J772 by a shielded wire.

The incoming raw image is distorted due to the shape and position of the camera lens. It is corrected by control module J772. J772 also adds guide lines and areas to the camera image.

The corrected image is then transferred to Information Electronics Control Module 1 J794 by video line. To transfer control commands and required vehicle information, both J772 and J794 are connected to the Convenience CAN.

In order to maintain a high quality image display for the customer it is necessary after certain repairs to calibrate the system.

Reference

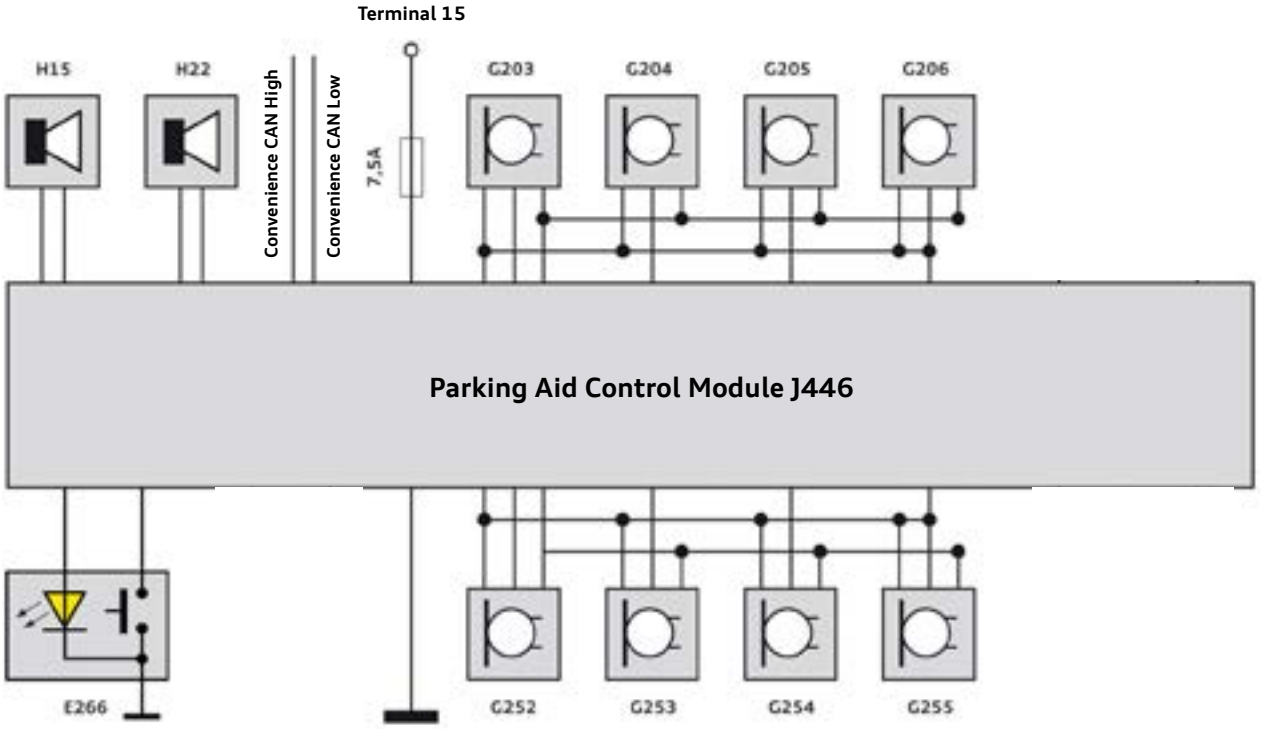
For further information on the back-up camera, refer to eSelf Study Program 996603 *The Audi Q7 - Driver's Assistance Systems."*.

Audi parking system

The Audi parking system for the 2015 A3 consists of front and rear acoustic sensors. The feature (7X2) is optional on the A3 Premium plus with the Driver assistance package and standard equipment on the A3 Prestige.

611_032

System implementation



611_033a

Key:

E266	Parking aid button
G203	Left Rear Parking Aid Sensor
G204	Left Rear Center Parking Aid Sensor
G205	Right Rear Center Parking Aid Sensor
G206	Right Rear Parking Aid Sensor
G252	Right Front Parking Aid Sensor
G253	Right Front Center Parking Aid Sensor
G254	Left Front Center Parking Aid Sensor
G255	Left Front Parking Aid Sensor
H15	Rear Parking Aid Warning Buzzer
H22	Front Parking Aid Warning Buzzer
J791	Parallel Parking Assistance Control Module J791

Audi side assist

611_036

The purpose of the Audi side assist is to monitor the areas behind and to the sides of the vehicle using radar sensors. There is a dedicated radar sensor on each side of the vehicle.

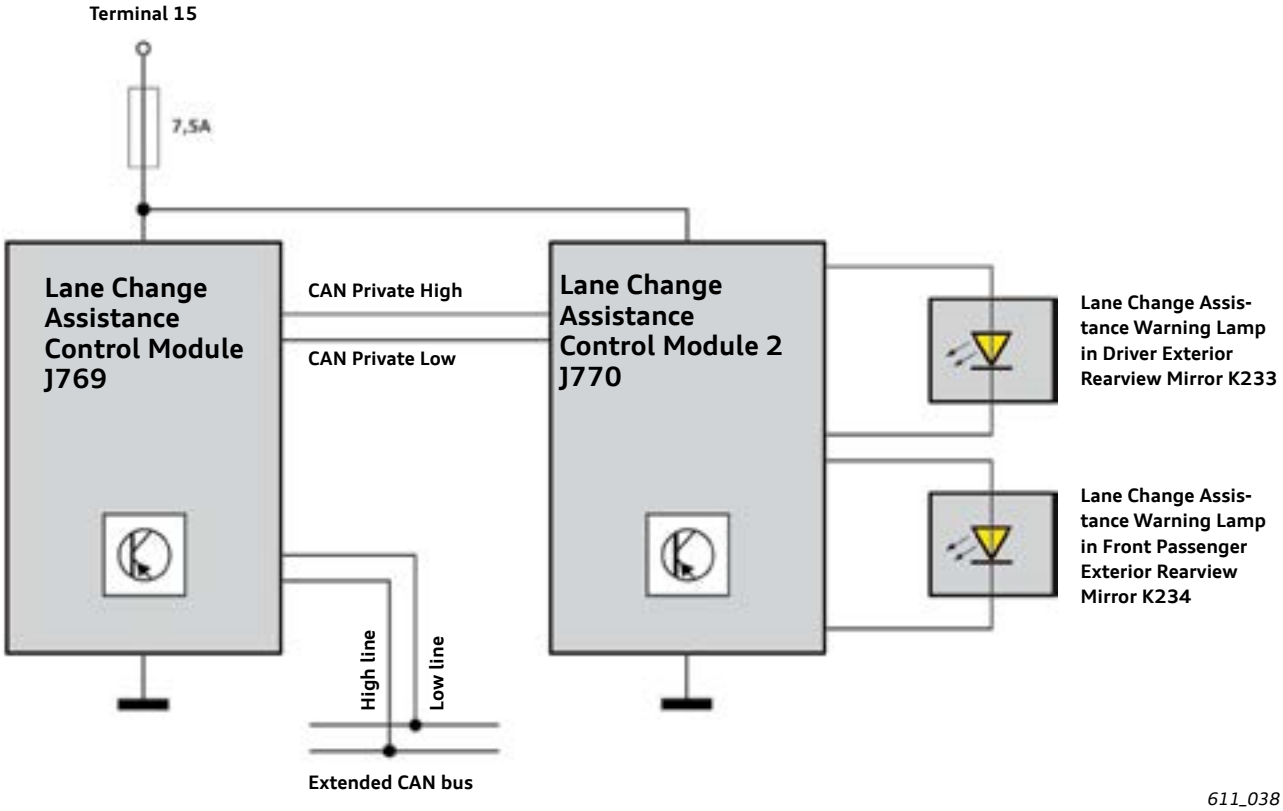
If Audi side assist detects a critical situation which could result in an accident if the driver were to change lanes, the system warns the driver by intensive flashing of warning lights in the outside door mirror. The warning light in the mirror of the side where the hazard has been detected flashes.

Reference
For more information about Audi side assist, please see eSelf-Study Program 996603, *Audi Q7 - Driver's Assistance Systems*.

System operation

Lane Change Assistance Control Module J769 is the master control module for the system function. It participates on the Extended CAN bus. J769 monitors the right side of the vehicle.

Lane Change Assistance Control Module 2 J770 is a slave module and communicates with J769 via a private CAN bus. J770 is responsible for activating both Audi side assist warning lamps in the door mirrors.



611_038

Audi side assist is activated and de-activated through the MMI. There is no separate switch.

System preferences are saved to the driver's key.

611_039a

Driver Assistance Systems Front Camera R242

R242 has been upgraded. It now has an additional red light detector. The camera has a resolution of 1024 x 512 pixels and an aperture angle of 46 degrees. It is supplied by Bosch.

The camera also has a new internal image processing control unit that eliminates the need for an additional processing module.

611_040

In the North American region, Driver Assistance Systems Front Camera R242 is used for the following systems:

- Audi active lane assist
- Adaptive cruise control (ACC)

Note

After making certain repairs to the vehicle or replacing Driver Assistance Systems Front Camera R242, it must be calibrated using VAS6430. Please refer to the current repair literature for complete details.

Influence of R242 on the ACC function

Driver Assistance Systems Front Camera R242 allows the Adaptive cruise control system to respond predictively to traffic situations.

This improvement is achieved by monitoring the positions of vehicles driving ahead. By continuously monitoring the traffic, the system can tell when a vehicle driving ahead in the same lane is about to change lanes.

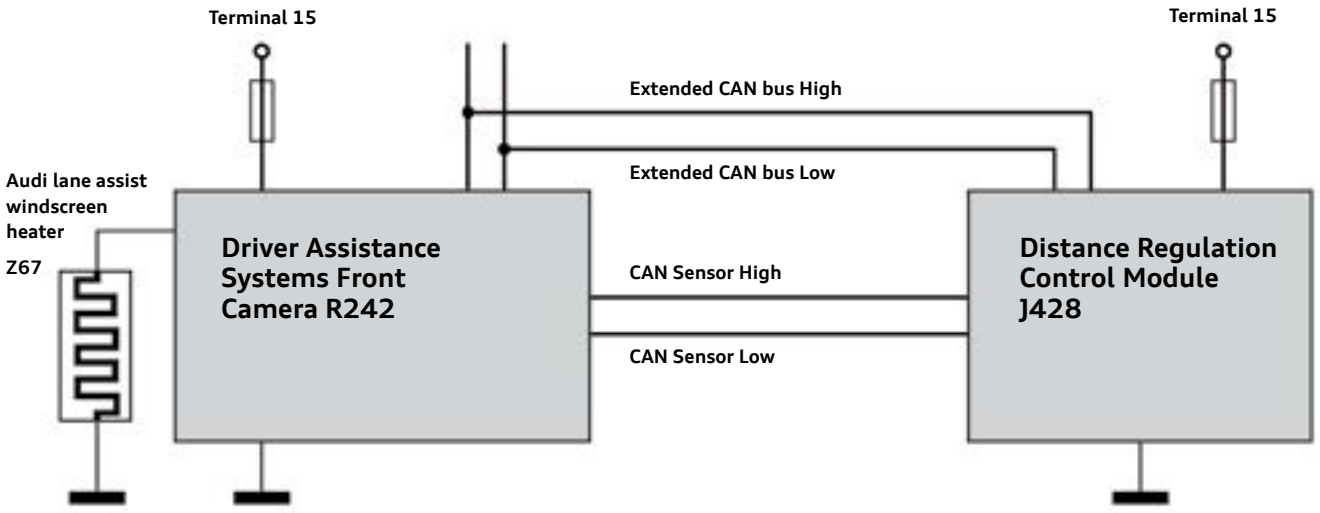
The system can tell whether a vehicle driving ahead is about to change from an adjacent lane to its own lane. This information is factored into the ACC control algorithm, resulting in smoother and more predictive control response.

R242 electrical connections

A new CAN bus called CAN sensor is used for exchanging data between R242 and Distance Regulation Control Module J428.

Control units R242 and J428 are also extended CAN bus users.

Directional Stabilization Assistance Windshield Defogger Z67 is also connected to R242. It is used to remove condensation and ice from the camera lens when needed.



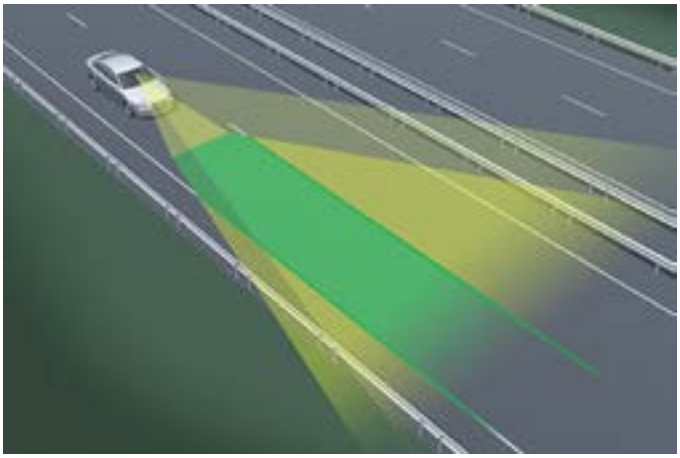
611_041

Audi lane assist and active lane assist

Overview

Audi lane assist was first introduced in 2007. Lane departure systems warn the driver if their vehicle approaches a detected lane boundary marker (lane marker) and is likely to leave its lane. Lane markers are detected using a windshield mounted camera. In the first generation Audi lane departure system, which is still used on some Audi models, the driver is warned through steering wheel vibration. However, if a turn signal indicator is set before crossing the lane marker, the warning is suppressed. The system assumes the lane change is deliberate. The system is designed for driving on larger highways or expressways at speeds greater than 40.3 mph (65 km/h).

In some situations, Audi lane assist may not detect lane markers or activate warnings. In poor ambient conditions, dirty or snow covered roads can prevent the system from issuing warnings. Ambiguous lane markings that might be expected in areas of road construction may also prevent the system from issuing warnings.



483_022

Further development

A next generation Audi lane assist system debuted on the 2011 A8. Functionality was enhanced so that lane departure warnings are issued even if only one lane marker is detected. Turning into a corner sharply no longer led to a warning, even if a lane marker was touched or briefly crossed.

In addition, a higher resolution camera capable of distinguishing between yellow and white lane markers is now part of the Audi lane assist system.

461_002

Active lane assist

Audi active lane assist is made possible through the development of electro-mechanical steering. Active lane assist becomes active at a speed of 40mph (65 km/h). It detects lane markings on the roadway based on images from a small video camera mounted on the rear-view mirror. If a vehicle approaches a lane marking without activating the turn signal, the system assists the driver in steering back into the lane by making a slight intervention through the electromechanical power steering system.

612_017

Active lane assist features of the A3 Sedan

The Audi active lane assist system in the 2015 Audi A3 sedan has the following features:

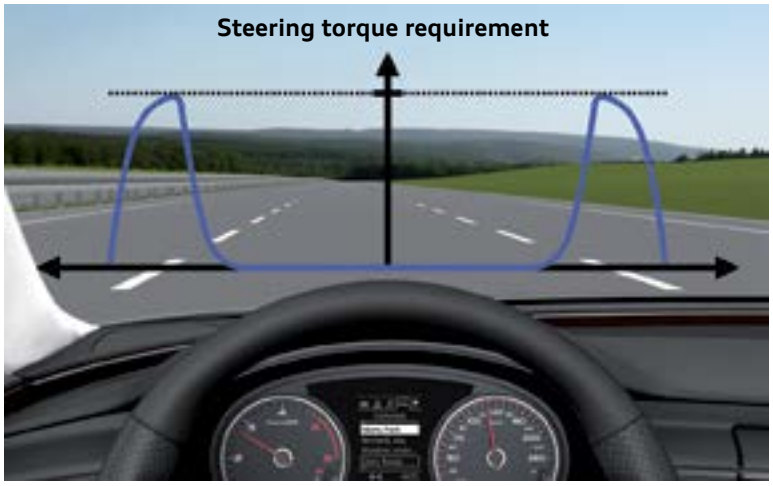
- Steering intervention through the electromechanical power steering system motor
- Steering wheel vibrations can be enabled/disabled through the MMI
- A system mode that uses continuous steering intervention to assist the driver in keeping the vehicle in the center of their lane
- A system mode that assists the driver in preventing inadvertent lane departures when approaching a lane marker
- Warning vibrations are generated by the electromechanical power steering system motor
- The master control function of the system is through Driver Assistance Systems Front Camera R242

Audi lane assist and Audi active lane assist are driver assistance systems. They support the driver in preventing inadvertent lane departures but ultimately, it is the driver's responsibility for remaining in their lane.

Audi steering intervention

Steering intervention on the Audi A3 sedan is based on a control module response referred to as “corrective steering input late.” With this steering mode, corrective inputs are not made until the vehicle has already moved close to a lane marker. This is the only mode available on A3 sedan models sold in the North American region.

Corrective steering input "late"



611_043

Additional functions

483_031

Audi active lane assist requires the driver to keep their hands on the steering wheel at all times. Recognition of hands-free driving is made based on signals from Steering Torque Sensor G269. If hands-free driving is recognized, the lane assist function is deactivated temporarily, and the function lamp in the DIS changes color from green to yellow. Once the driver grips the wheel again, the system is reactivated.

Operation

Active lane assist is switched on and off using the button on the end of the turn signal stalk.

611_043a

When the system is switched on and is active, the green highway symbol will appear in the instrument cluster.

611_043b

The vibration warning can be switched on or off via the MMI.

611_043c

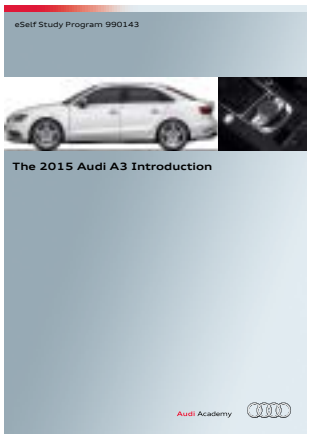
Self Study Programs

For further information about the technology in the Audi A3 ’13, refer to the following eSelf Study Programs.

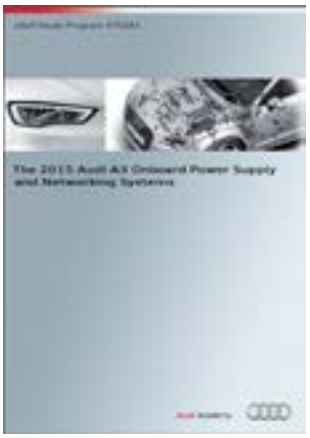
SSP 970203
The 2011 Audi A8 Driver Assistance Systems

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

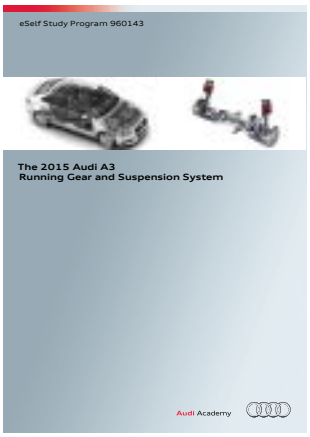
SSP 990503
The 2012 Audi A7 Convenience Electronics and Audi Active Lane Assist



SSP 990143
The Audi 2015 A3 Introduction



SSP 970243
The 2015 Audi A3 Onboard Power Supply and Networking Systems



SSP 960143
The 2015 Audi A3 Running Gear and Suspension System

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