

Service.



Self-Study Programme 298

The Touareg Electrical System

Design and Function



Vehicles with off-road capability are no longer just utility vehicles for a limited group of people.

At all levels in the population they are now becoming more and more sought after.

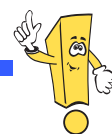
The off-road vehicle features a number of hi-tech convenience systems for improved comfort.

This Self-Study Programme is designed to help you learn about the electrical and electronic systems in the Volkswagen Touareg.



S298_052

NEW



Important Note



This Self-Study Programme explains the design and function of new developments. The contents will not be updated.

Please refer to the relevant Service Literature for current inspection, adjustment and repair instructions.

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Introduction

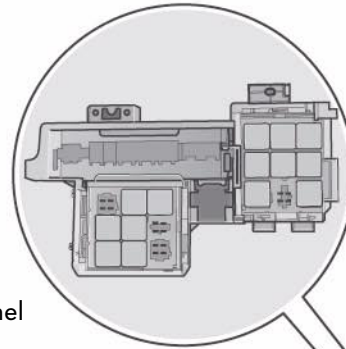


Fuse boxes and relay slots in vehicle's electrical system

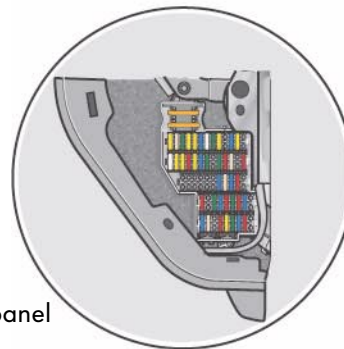
Fitting locations

The fuse boxes and relay slots can be found at various locations in the vehicle due to the fact that the onboard power supply does not have a central layout.

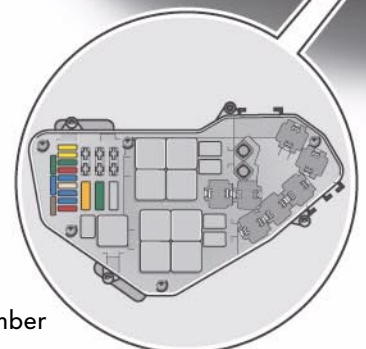
The illustrations here provide an overview of their fitting locations.



E-box
on left under dash panel



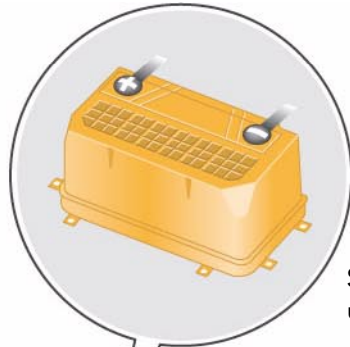
Fuse box
on right under dash panel



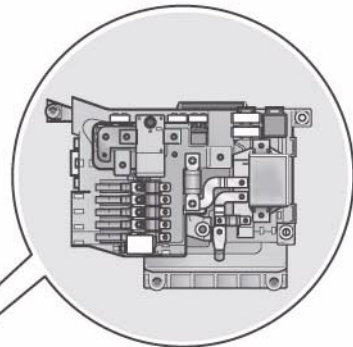
E-box
on left in plenum chamber



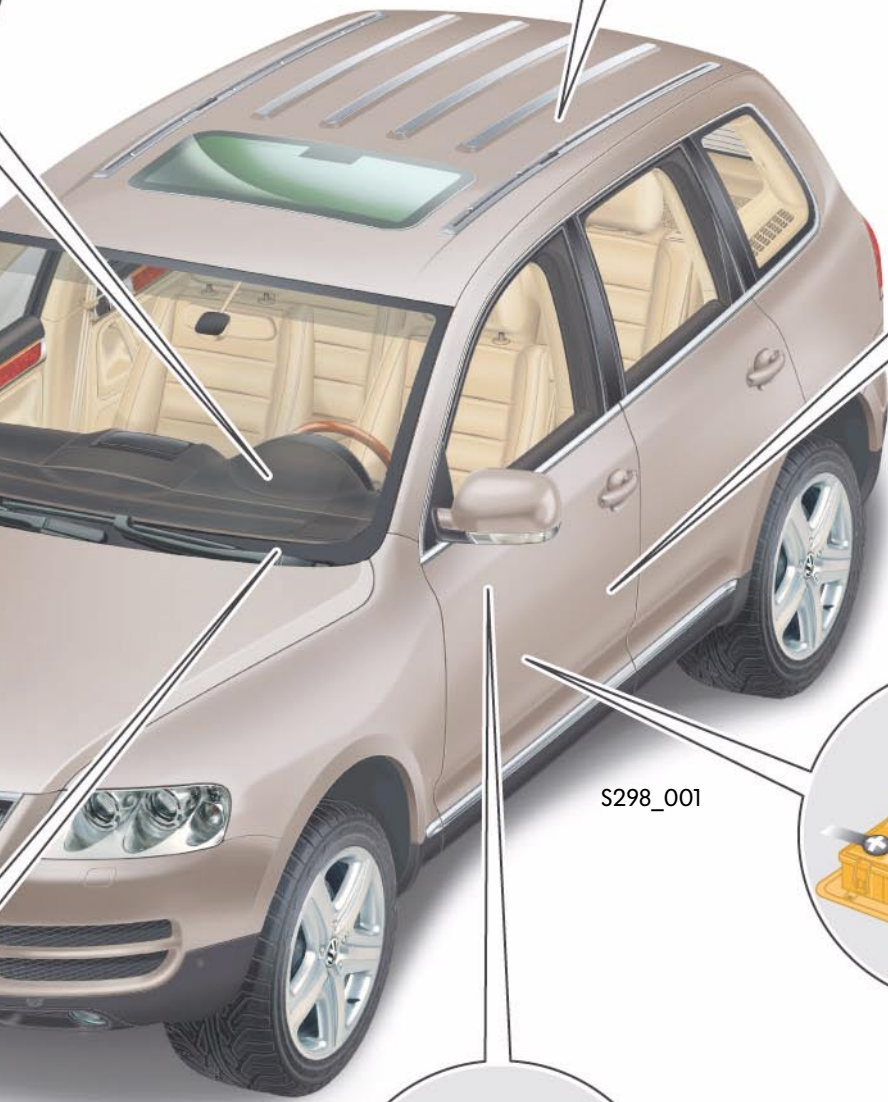
More detailed information can be found in the electronic service information system (ELSA).



Starter battery
under luggage compartment



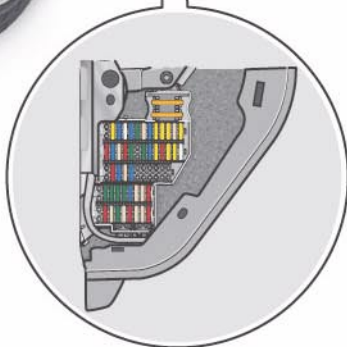
Back-up fuse box
under driver's seat



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Onboard power
supply battery
under driver's seat



Fuse box
on left of dash panel

Introduction



The data bus network

Networking

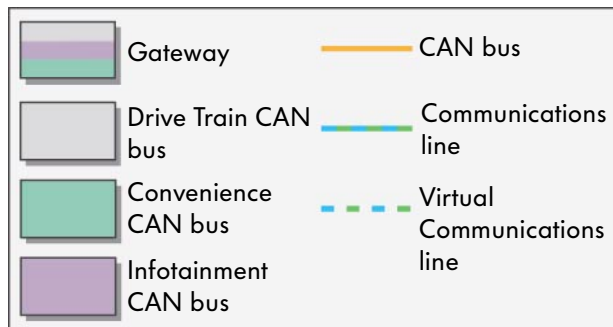
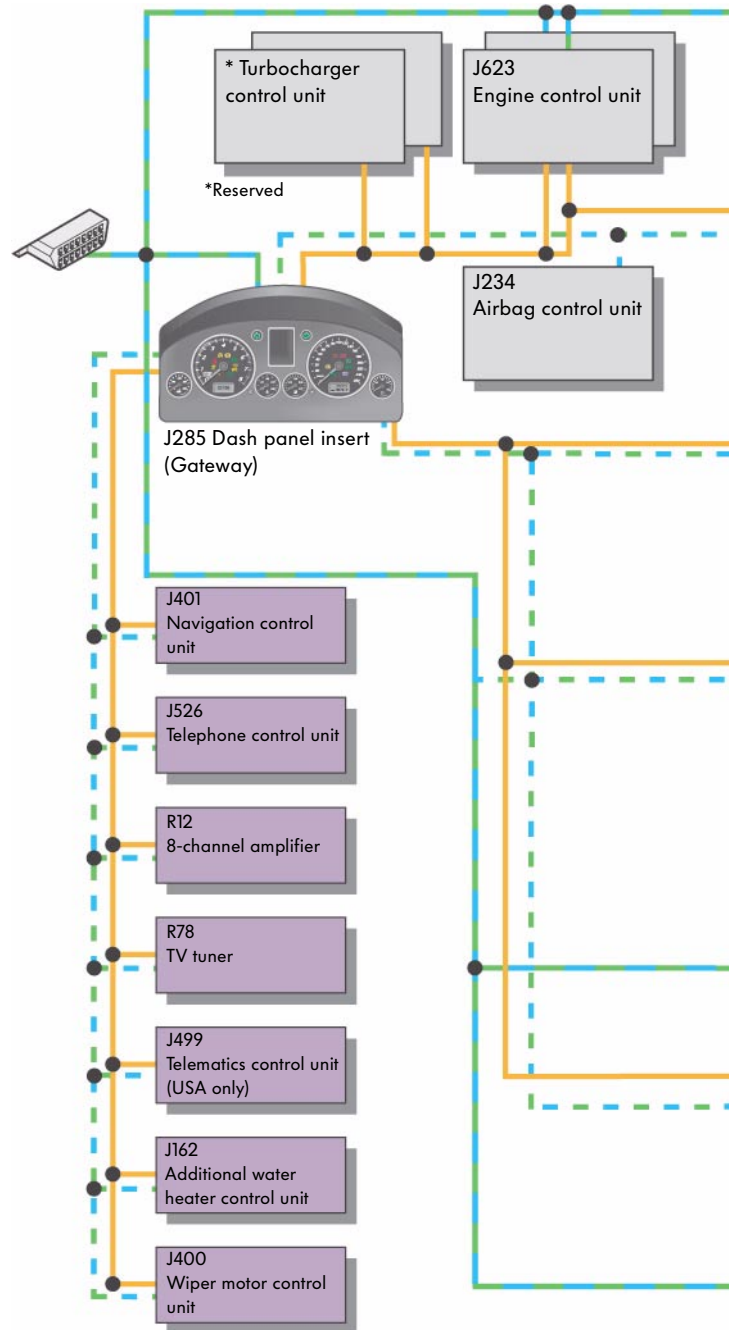
In order that the control units can exchange information between each other, they are connected in a network via the Gateway in the dash panel insert J285.

The data exchange allows the control units to access various kinds of information in the vehicle. The more information a control unit has about the current driving situation, the greater the level of safety and comfort.

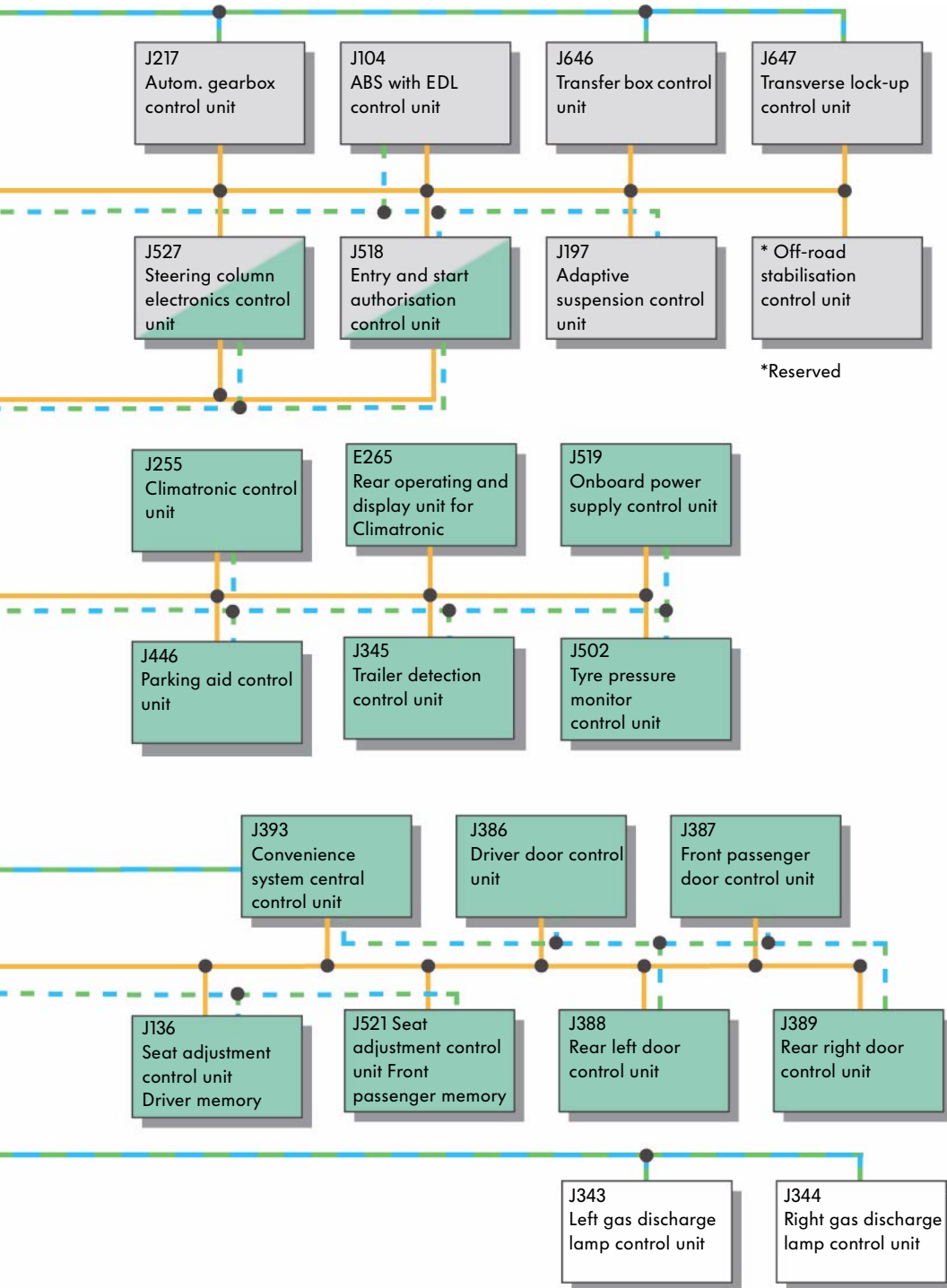
To ensure the exchange of data can take place, the control units are connected together in a network via a CAN bus system. Due to reasons of safety and because the data bus systems work at different rates of transfer, the control units are allocated to different CAN bus systems. If one data bus system should fail, the others can continue to function.

The CAN bus systems are separated as follows

- Drive Train CAN bus,
- Convenience CAN bus,
- Infotainment CAN bus.



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S298_003

Introduction



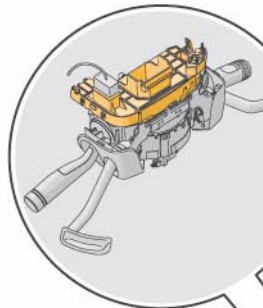
The control units in the Drive Train CAN bus

Control units

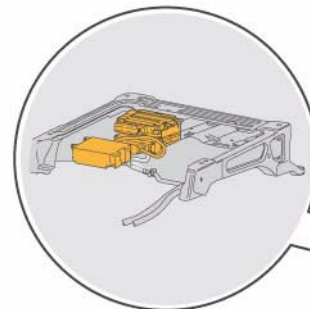
The illustrations here provide an overview of the fitting locations.

The Drive Train CAN bus operates at a data transfer rate of 500 kbit/s. The data is transmitted via the CAN High and CAN Low line. Both wires are entwined together. The cable colour for CAN High is orange/black and for CAN Low it is orange/brown.

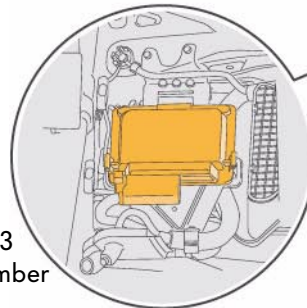
Steering column electronics control unit J527
on steering column



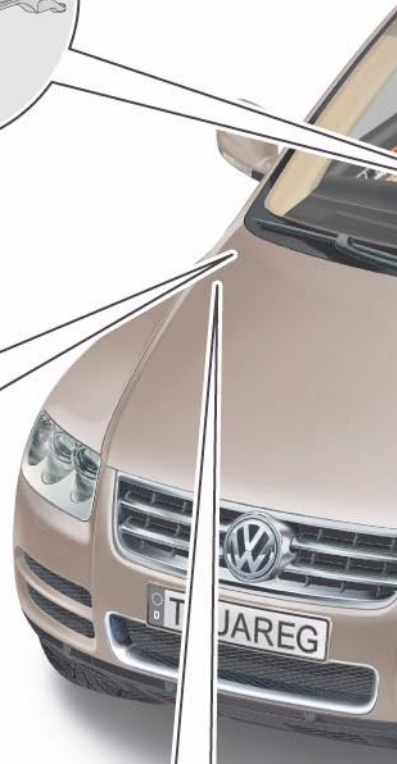
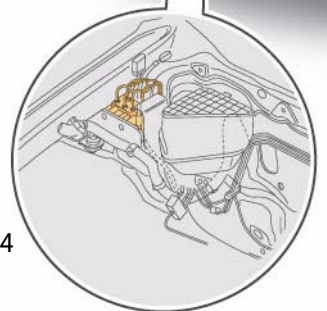
Autom. gearbox control unit J217
Transfer box control unit J646
under front passenger's seat

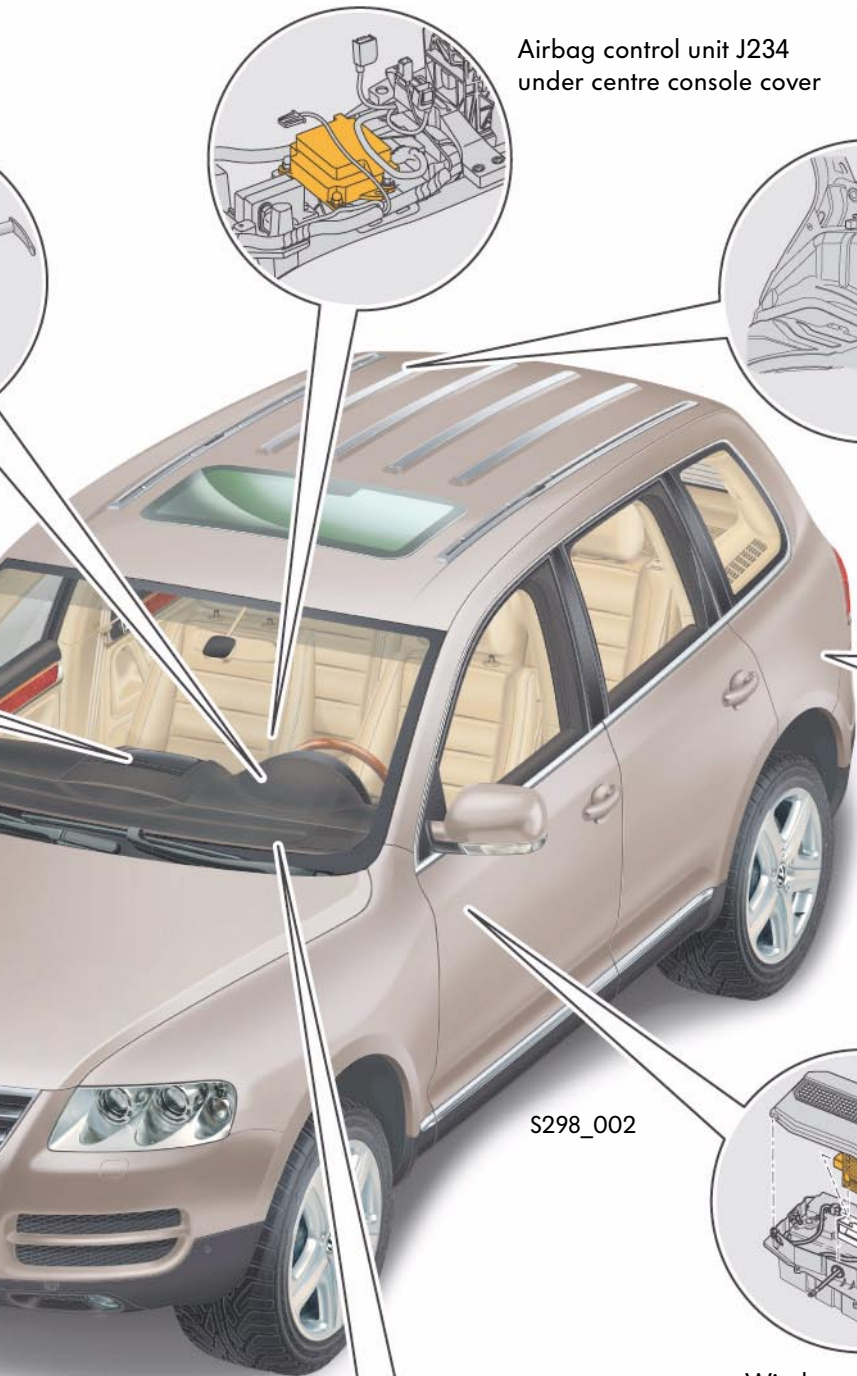


Engine control unit J623
in right of plenum chamber



ABS with EDL control unit J104
in right of plenum chamber

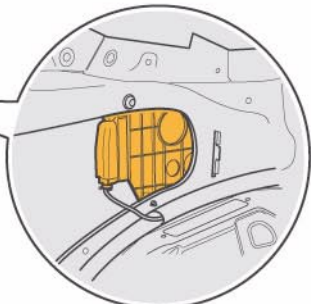




Airbag control unit J234
under centre console cover

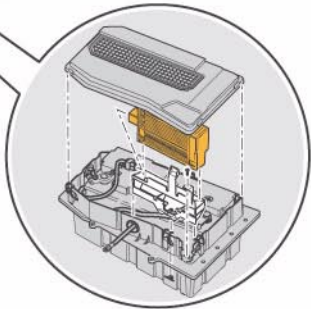


Adaptive suspension
control unit J197
on right in luggage
compartment

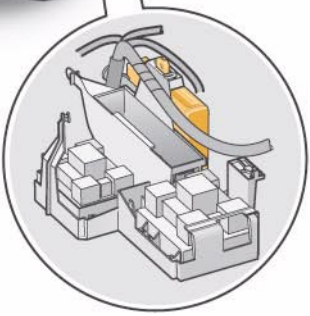


Transverse lock-up control unit J647
on left at rear in wheel housing

S298_002



Windscreen heater control unit J505
under driver's seat
Control unit is not connected to CAN bus



Entry and start authorisation control unit J518
on left under dash panel

Introduction



The Drive Train CAN bus control units

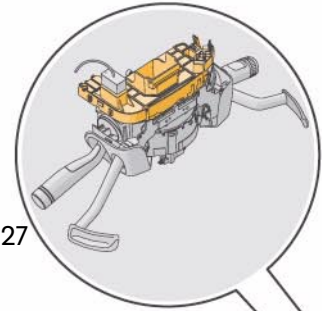
Control units

The illustrations here provide an overview of the fitting locations.

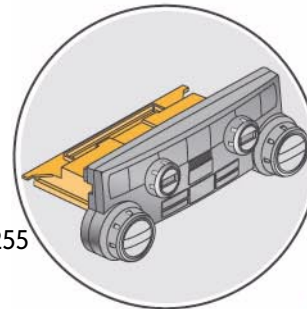
The Convenience CAN bus operates at a data transfer rate of 100 kbit/s.

The data is transmitted via the CAN High and CAN Low line. Both wires are entwined together. The cable colour for CAN High is orange/green and for CAN Low it is orange/brown. The CAN bus is single wire compatible, which means that if one CAN bus wire should fail, the CAN messages can be transmitted via the other wire.

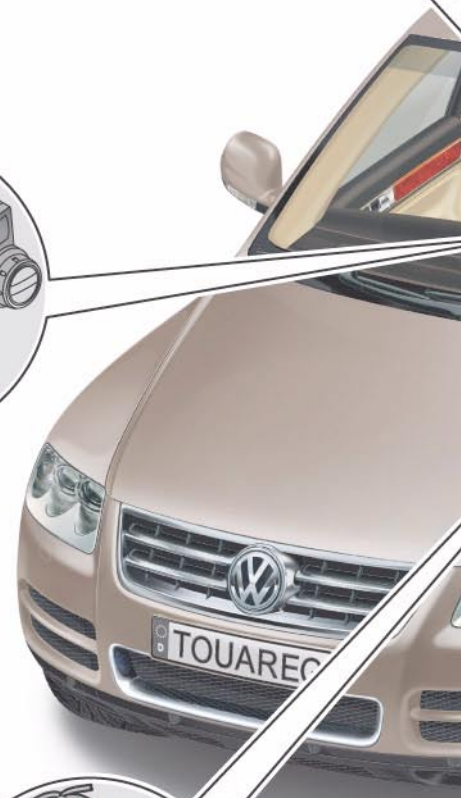
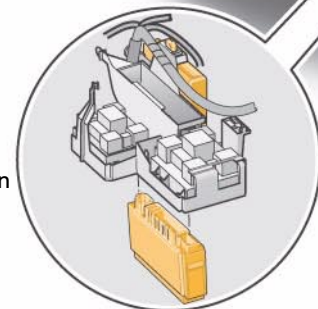
Steering column electronics control unit J527 on steering column

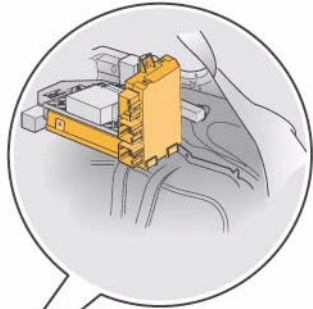


Climatronic control unit J255 in left of dash panel



Entry and start authorisation control unit J518
Onboard power supply control unit J519
on left under dash panel

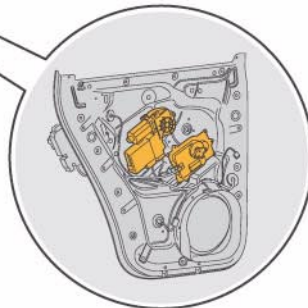




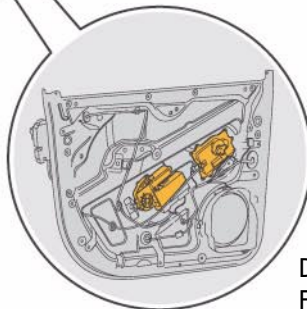
Convenience system central control unit J393
Trailer detection control unit J345
on right in luggage compartment



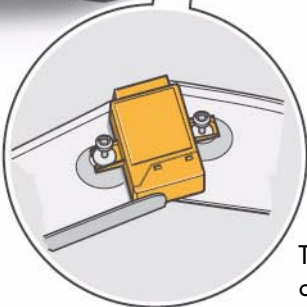
Parking aid control unit J446
on left at rear in wheel housing



Rear left door control unit J388
Rear right door control unit J389
behind door trim



Driver door control unit J386
Front passenger door control unit J387
behind door trim on left and right



Tyre pressure monitor control unit J502
on left A-pillar

S298_044

Introduction



The Infotainment CAN bus control units

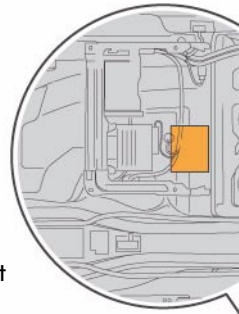
Control units

The illustrations here show the fitting locations of the control units for the Infotainment CAN bus.

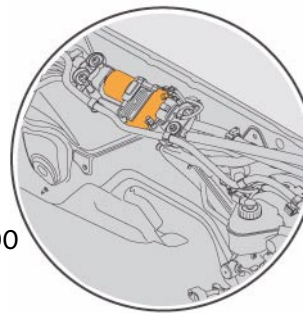
The Infotainment CAN bus operates at a data transfer rate of 100 kbit/s.

The data is transmitted via the CAN High and CAN Low line. Both wires are entwined together. The cable colour for CAN High is orange/violet and for CAN Low it is orange/brown.

The Infotainment CAN bus is single-wire compatible, which means that if one wire fails, data can be sent and received via the other wire.

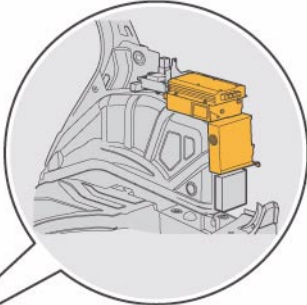
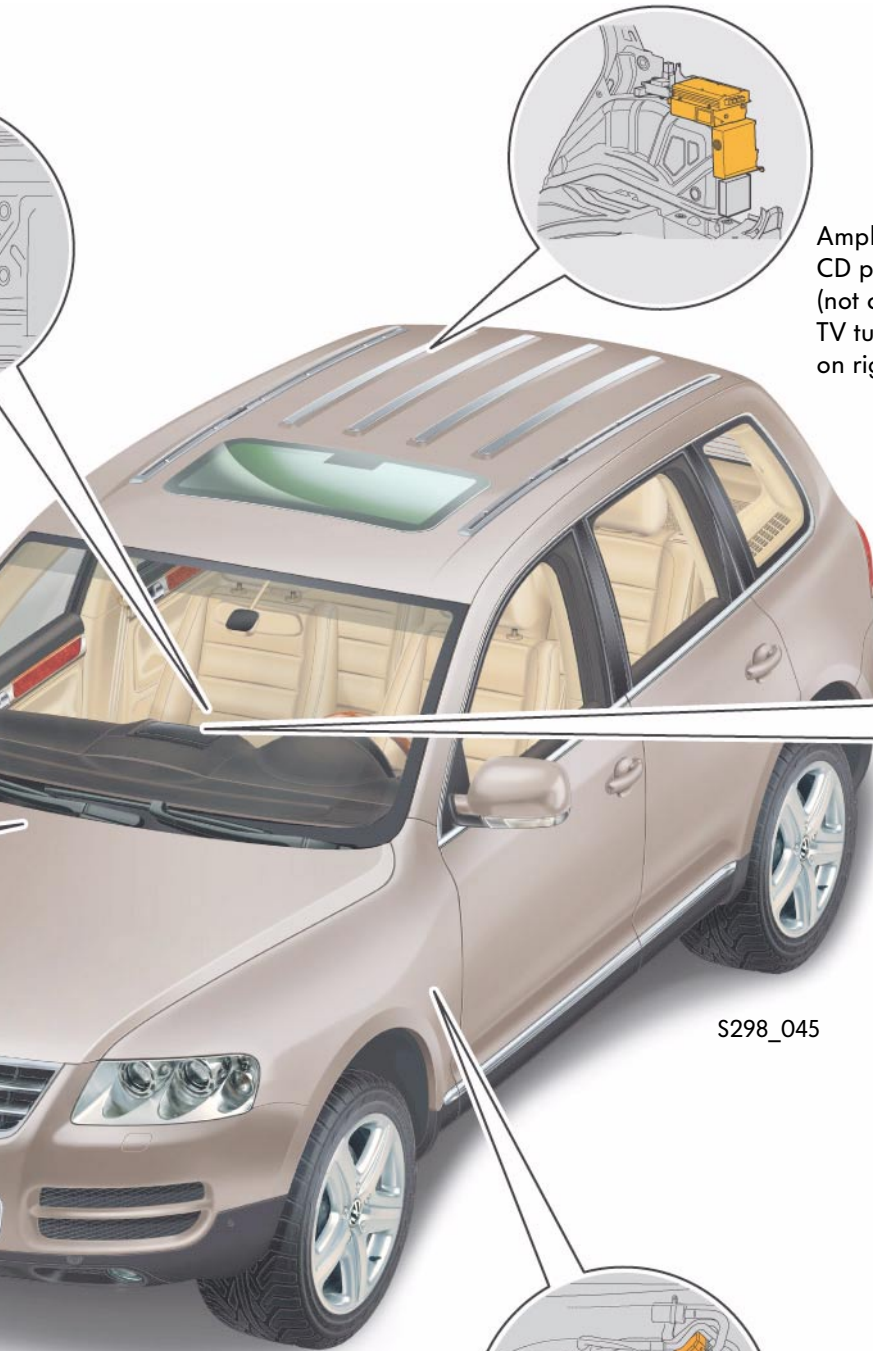


Telephone control unit J526
under front passenger's seat

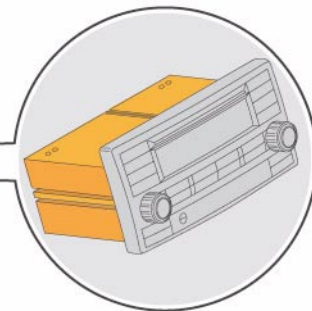


Wiper motor control unit J400
in plenum chamber



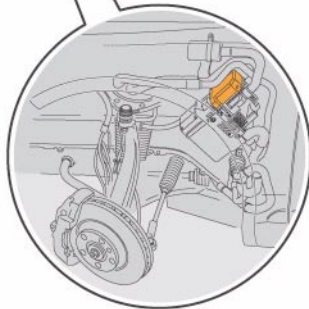


Amplifier R12
CD player R41
(not connected to CAN bus)
TV tuner R78
on right in luggage compartment



Radio R
Navigation control unit J401
in centre of dash panel

S298_045



Additional water heater J162
on left in wheel arch

Onboard power supply

The fuse and electrical boxes

The fuse boxes can be found in the dash panel on the left and right-hand side.

The back-up fuse box is under the driver's seat and the E-boxes can be found on the left in the plenum chamber and under the dash panel.

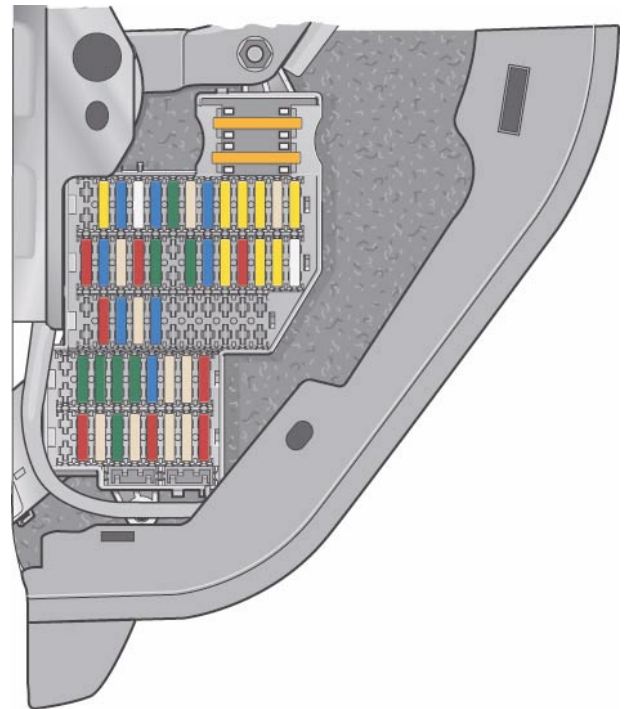


Fuse box on left of dash panel

The fuse box on the left of the dash panel, for example, houses the fuses for the following control units:

- Onboard power supply control unit
- Entry and start authorisation control unit
- Tyre pressure monitor control unit
- Engine control unit
- Airbag control unit
- ABS with EDL control unit
- Steering column electronics control unit
- Convenience system central control unit
- and fuses for other electrical consumers

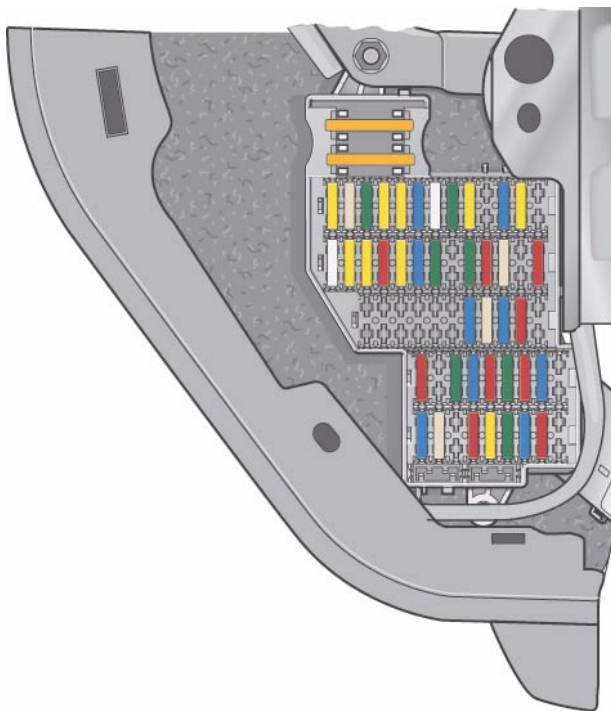
Fuse box on left of dash panel



S298_004



Fuse box on right of dash panel



S298_005

Fuse box on right of dash panel

The fuse box on the right of the dash panel houses the following fuses:

- Trailer detection control unit
- Parking aid control unit
- Telephone control unit
- ABS with EDL control unit
- Navigation control unit
- CD changer
- TV tuner
- Radio
- Radio amplifier
- Convenience system central control unit
- Adaptive suspension control unit
- Automatic gearbox control unit
- Convenience system central control unit
- Telephone
- and fuses for other electrical consumers



The exact fuse allocation can be found in the electronic service information system (ELSA).

Onboard power supply

Back-up fuse box under driver's seat

The following fuses and relays can be found in the back-up fuse box:

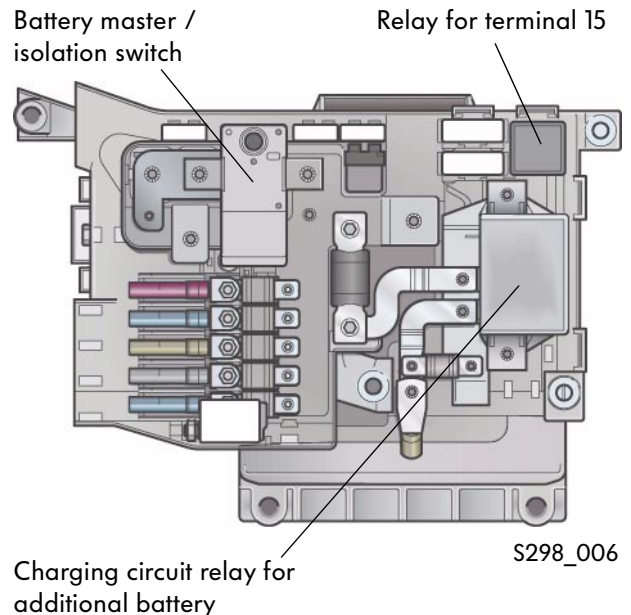
Fuses:

- Fuse sockets
- Fuse for terminal 15 relay
- Battery parallel circuit relay
- E-socket
- Fuse for onboard power supply control unit
- Starter lead diagnosis
- Fuse for adaptive suspension, compressor

Relays:

- Battery master / isolation relay E74
- Relay for terminal 15
- Charging circuit relay for vehicles with dual battery electrical system

Back-up fuse box under driver's seat

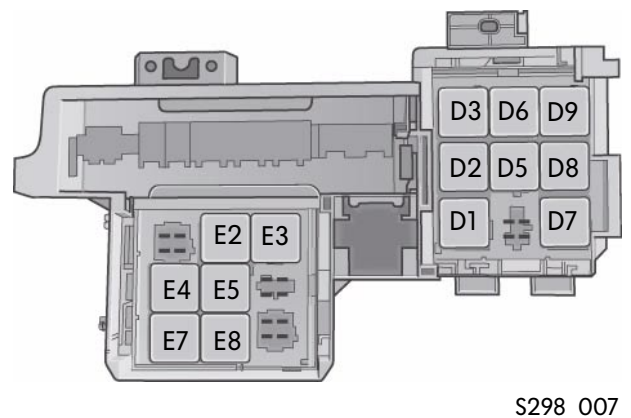


E-box under dash panel

The following relays can be found in the E-box:

- | | |
|--|----|
| - Servotronic relay | D1 |
| - Relay for tailgate closing aid | D2 |
| - Relay for adaptive suspension compressor | D3 |
| - Relay for power supply terminal 15 | D5 |
| - Relay for additional water heater | D6 |
| - Relay for heated rear windscreen | D7 |
| - Relay for seat heating | D8 |
| - Additional relay for brake lights | D9 |
| - Relay for spare wheel | E2 |
| - Relay for manual air-conditioning system | E3 |
| - Relay for circulation pump | E4 |
| - Relay for start-up consumers | E5 |
| - Relay for headlight washer system | E7 |
| - Relay for residual warmth | E8 |

E-box under dash panel



E-box on left of plenum chamber

The allocation of the fuses and relays is dependent on the engine type. This layout is specific to the AZZ engine and is shown here for demonstration purposes only.

Fuses:

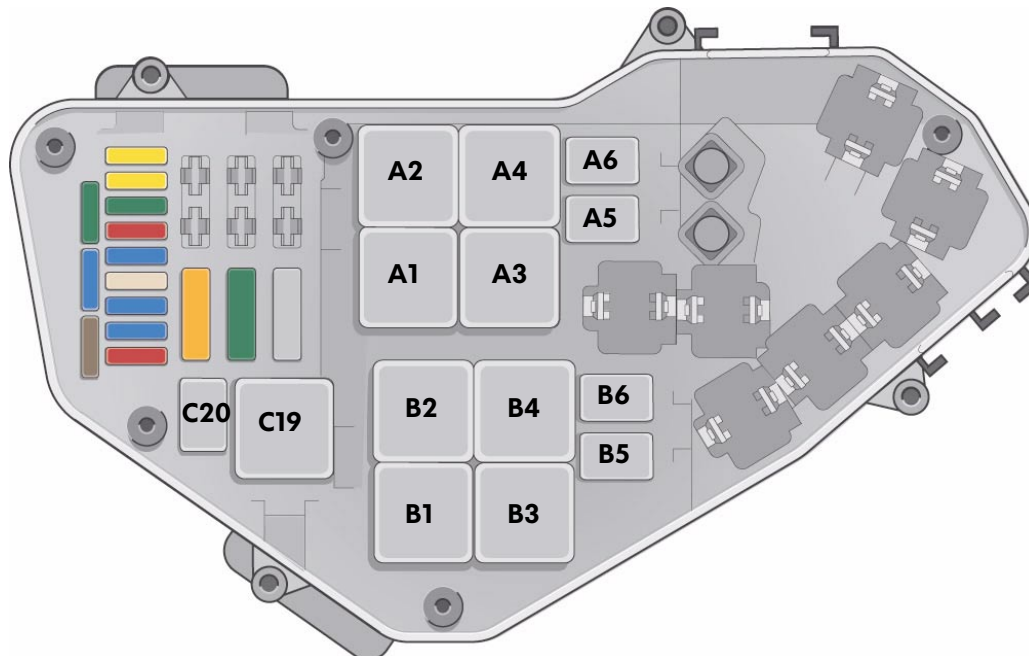
- Fan
- Secondary air pump
- Injectors
- Engine control unit, variable camshaft timing, intake manifold changeover valve, thermal heating
- Leak diagnosis of fuel tank, high pressure sender for air conditioning, radiator fan control unit

Relays:

- | | |
|----------------------------|----------|
| - Terminal 30 power supply | A1 / A3 |
| - Secondary air pump | A4 |
| - Additional coolant pump | A5 |
| - Fuel pumps | A6 / C19 |
| - Terminal 50 power supply | C20 |



E-box in plenum chamber



S298_008



Fuse boxes will vary depending on the vehicle and engine type. For precise details on the fuse boxes, please refer to the electronic service information system (ELSA).

Onboard power supply

Battery master / isolation relay E74

Battery isolation

In a crash, the battery is isolated from the starter lead via the battery master switch. This prevents a short circuit in the starter lead which could lead to a fire.

The isolation signal is received by the battery master switch from the airbag control unit J234 via a separate signal wire.

Recognition of isolation

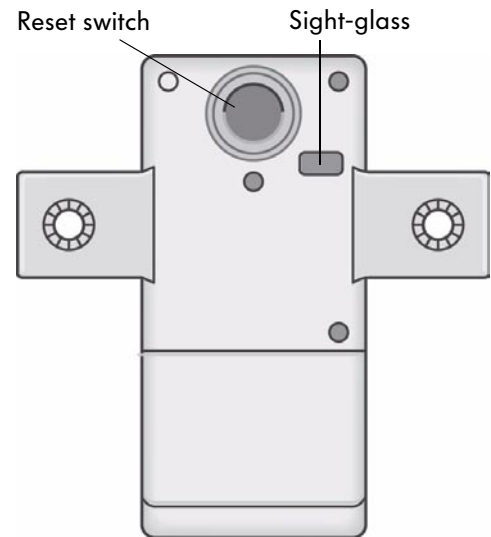
If the battery has been isolated, a white cover will be seen in the sight-glass instead of a copper winding. The relay should then be reset using the reset switch, otherwise starting the engine will not be possible.

If the onboard power supply has a twin battery concept, the onboard power supply control unit checks the position of the battery master switch. If the master switch is on, starting the vehicle using the starter battery will be prevented.

Key

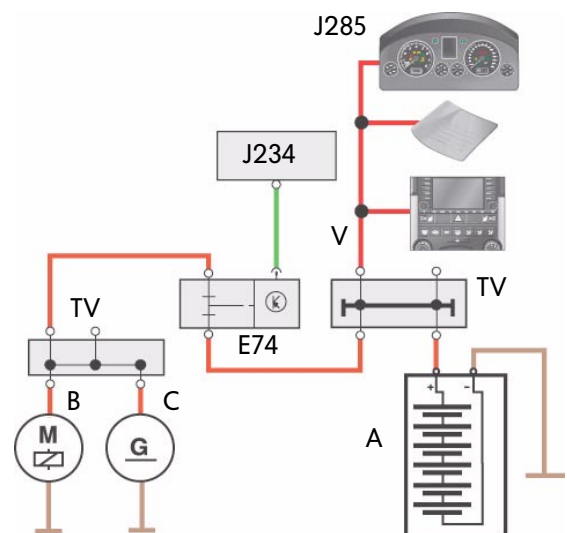
- A Battery
- B Starter motor
- C Alternator
- E74 Battery master / isolation switch
- J234 Airbag control unit
- J285 Dash panel insert
- TV cable distributor
- V Onboard consumers

Battery master / isolation switch



S298_017

Electrical circuit



S298_040



Before resetting, the starter lead must be checked for short circuits. For this reason, resetting should only be carried out by a specialist workshop.

The electrically folding towing device

Trailer recognition control unit

In addition to normal actuation of the lights on the trailer, the control unit also controls activation of the folding tow hitch.

Operation is via the control buttons in the interior.

The tow hitch is unfolded by an electric motor with a Hall sender and the procedure is monitored by the control unit. If the tow hitch encounters an obstacle, the unfolding procedure is stopped. For this purpose, the control unit monitors the power drawn by the motor. If the control button is actuated repeatedly, the unfolding procedure can be continued.

Conditions for switching off

The following conditions could lead to the folding procedure being stopped:

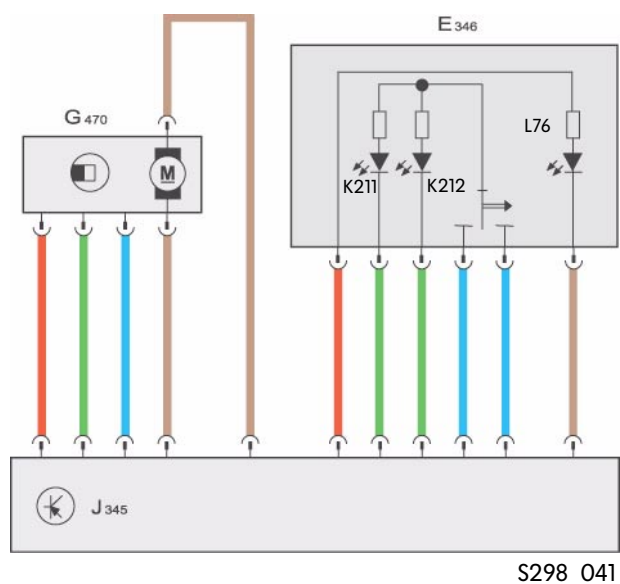
- Overload recognition as protection against entrapment
- The folding procedure will be stopped if there is a change in the power supply, i.e. if the voltage drops below 9 Volt or rises above 15 Volt for more than 300 ms
- Change in the conditions that permit activation

Activation conditions

- Terminal 15 off
- Terminal 15 on and road speed 0 km/h and engine off



Electrical circuit



Key

- J345 Trailer detection control unit
- G470 Tow bar coupling motor Hall sender
- E474 Button for electrically folding tow hitch
- K211 Tow hitch folding out warning lamp
- K212 Tow hitch folding in warning lamp
- L76 Switch illumination

Battery concept

The equipment with batteries

Overview

The Volkswagen Touareg can be fitted with different battery systems.

The following derivatives are possible:

- Single battery electrical system
- Single battery electrical system with second battery to supply additional water heater
- Twin battery electrical system for V10 TDI engine



Single battery electrical system

Vehicles with a single battery electrical system draw the power required for the onboard power supply and the starter from this one battery.

Single battery electrical system



Single battery electrical system with additional battery

The second battery supplies the additional water heater with power and is charged when the engine is running via a charging circuit relay.

S298_009

Dual battery electrical system

To ensure that the power required for starting is always available on vehicles with V10 TDI engines, a twin battery electrical system is fitted.

In this electrical system, one battery, the starter battery, has the role of supplying the starter with power and, if necessary, also the electrical consumers required for the starting procedure (start-up consumers). The second battery, the onboard power supply battery, provides the rest of the electrical consumers with power.

The batteries are switched in parallel to provide the necessary current to start the V10 TDI engine.



Dual battery electrical system



S298_010

Battery concept

Dual battery electrical system

Onboard power supply structure of twin battery electrical system

To prevent the starter battery from becoming discharged by electrical consumers, the consumers are split into two categories:

- Start-up consumers (e.g. glow plug system, engine control unit)
- Onboard consumers (e.g. radio, heated rear window)

The start-up consumers and the remaining electrical consumers are supplied from the onboard power supply battery.

Via the relay for start-up consumers, these can be supplied from the starter battery. Consumers that require a large amount of energy, such as the glow plugs on diesel engines, are always supplied from the starter battery.

In addition, both batteries can be connected via the additional/starter battery charger relay to charge the starter battery.

The actuation of the relays comes from the onboard power supply control unit. It monitors the voltage of both batteries when the vehicle is in motion and can thus detect when the starter battery needs recharging.

Stand-by

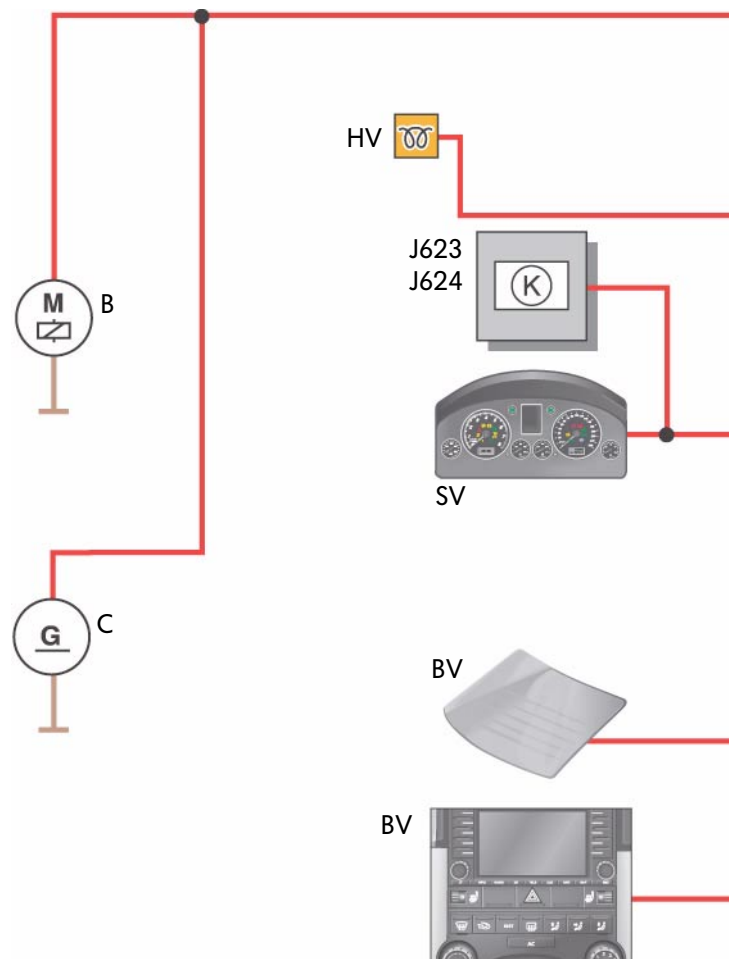
The system is on stand-by when the onboard power supply control unit is in sleep mode (terminal S not active).

If on stand-by, relay 1 for voltage supply J701 and second/starter battery charging circuit relay J713 are open.

Relay 2 for voltage supply J710 is closed.



Stand-by switch position

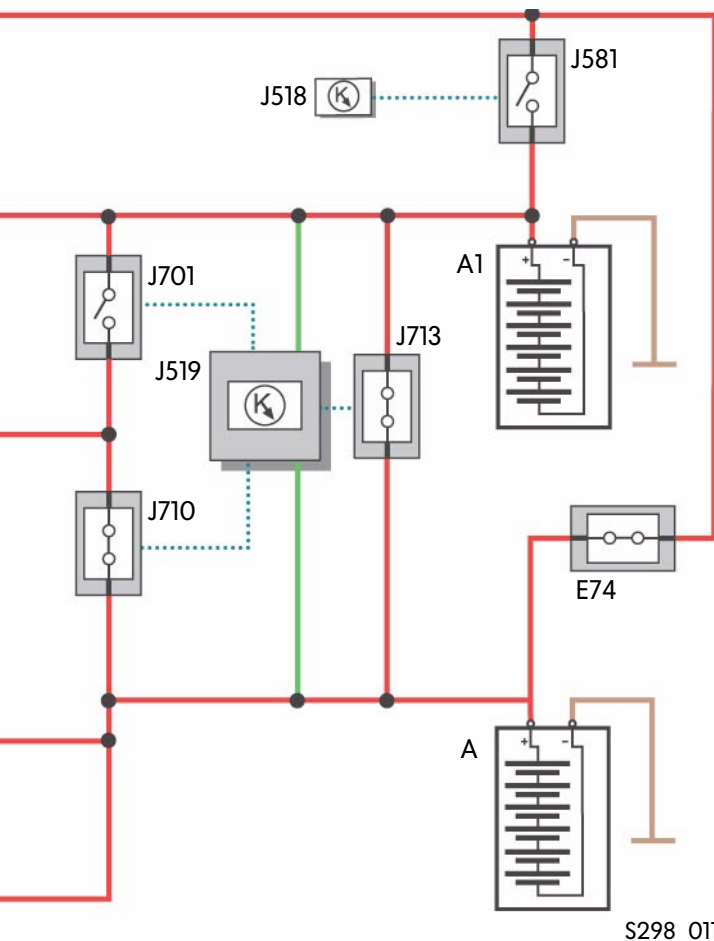


Starting procedures

When the ignition is switched on, the onboard power supply control unit J519 is activated (wake-up mode) and evaluates the charge status of the batteries. If the voltage reading of the onboard power supply battery is below 10.5 Volt, it is deemed to be discharged. The starter battery is deemed to be discharged if the voltage reading is below 11.5 Volt.

There are four different conditions that can be detected before the engine is started depending on the charge status of the batteries:

- Onboard power supply and starter battery charged
- Onboard power supply battery discharged, starter battery charged
- Onboard power supply battery charged, starter battery discharged
- Onboard power supply and starter battery discharged



S298_011

Key

- A Onboard power supply battery, battery
- A1 Additional battery, starter battery
- B Starter
- C Alternator
- E74 Battery master / isolation switch
- J518 Entry and start authorisation control unit
- J519 Onboard power supply control unit
- J581 Relay for parallel switching of batteries
- J623 Engine control unit
- J624 Engine control unit 2
- J701 Voltage supply relay 1
- J710 Voltage supply relay 2
- J713 Charger relay for additional and starter battery
- BV Onboard power supply consumers
- SV Start-up consumers
- HV HT consumers

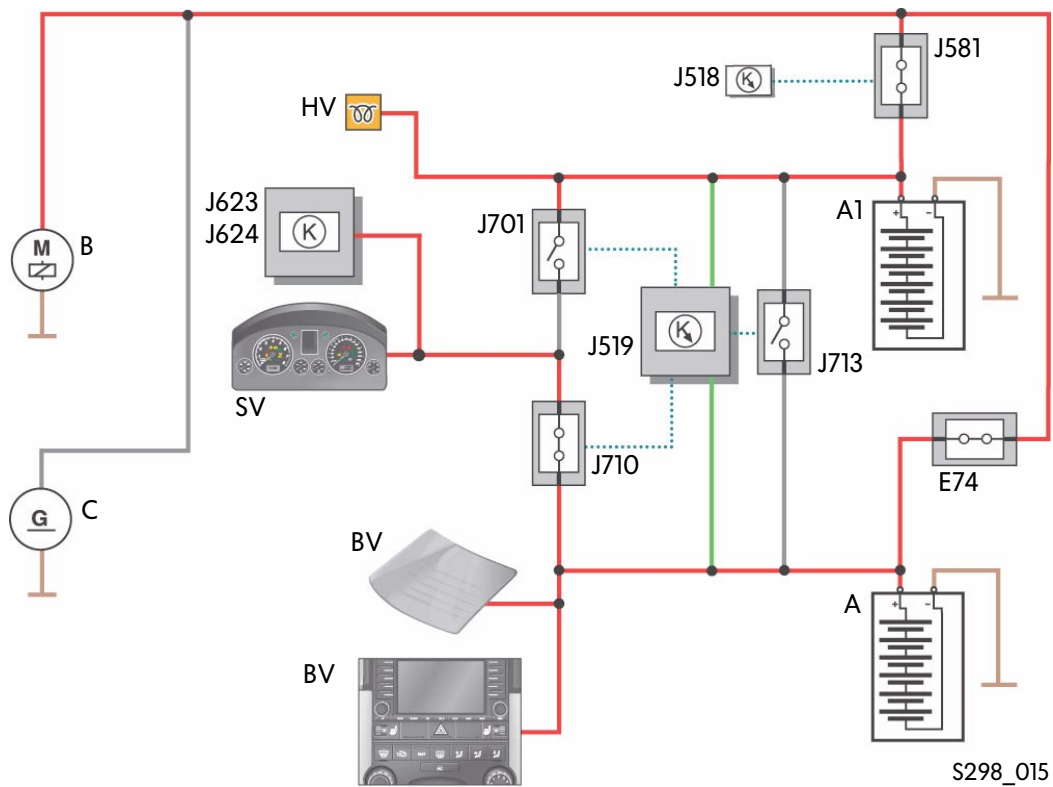
Battery concept

Start procedure with charged onboard power supply battery and starter battery

Start-up is in the normal relay switch position (stand-by). The charging circuit relay for the additional and starter battery J713 and voltage supply relay 1 J701 are open. Voltage supply relay 2 J710 is closed. The battery parallel circuit relay J581 is activated by the entry and start authorisation control unit in the same way as terminal 50.



Switch position with charged onboard power supply battery and starter battery



Key

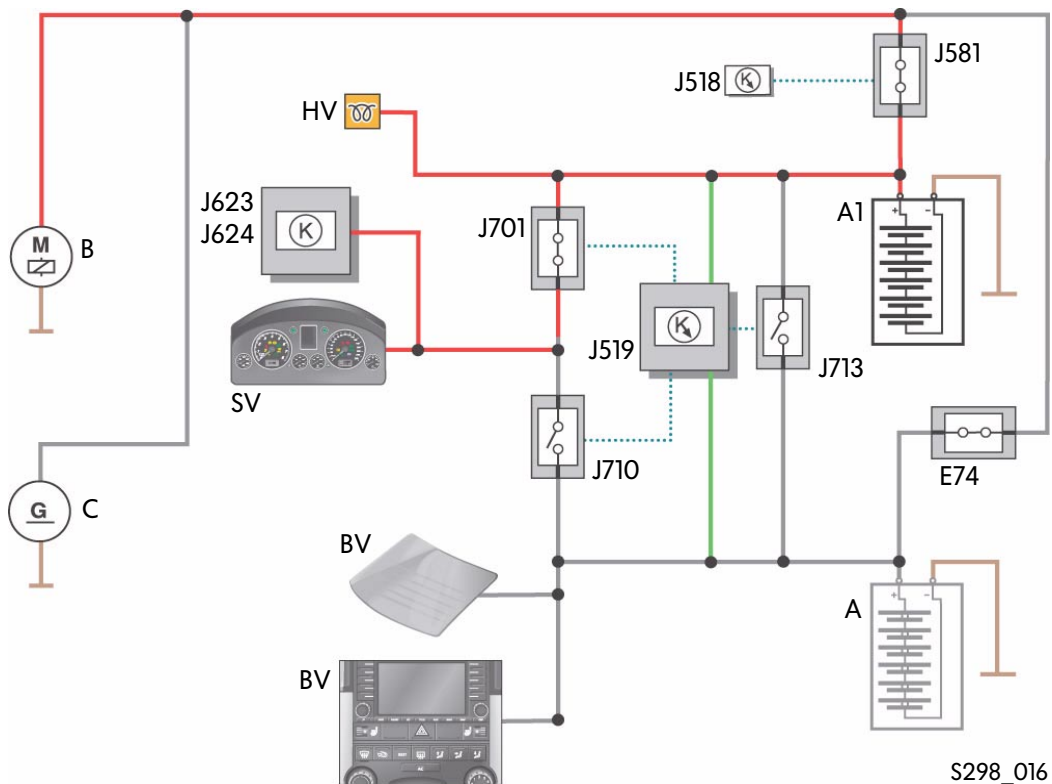
A	Onboard power supply battery, battery	J624	Engine control unit 2
A1	Additional battery, starter battery	J701	Voltage supply relay
B	Starter	J710	Voltage supply relay 2
C	Alternator	J713	Charging circuit relay for additional battery (starter battery)
E74	Battery master / isolation switch	BV	Onboard consumers
J518	Entry and start authorisation control unit	SV	Start-up consumers
J519	Onboard power supply control unit	HV	HT consumers
J581	Battery parallel circuit relay		
J623	Engine control unit		

Start procedure with discharged onboard power supply battery and charged starter battery

The start-up consumers are switched from the onboard power supply battery to the starter battery. To prevent voltage compensations between the two batteries, voltage supply relay 2 J710 is opened first and after about 100 milliseconds, voltage supply relay 1 J701 is closed. The second battery charging circuit relay J713 remains open. In this case, the vehicle cannot be opened using the radio remote control. Because the onboard power supply control unit detects a discharged onboard power supply battery when the ignition is switched on, an emergency start is activated.



Switch position with discharged onboard power supply battery and charged starter battery



The information is sent to the dash panel insert and the control unit for entry and start authorisation via the emergency mode cable connection. In the display of the dash panel insert, the warning message "Please start engine" will then be shown. If the onboard power supply control unit detects that the alternator is charging the batteries when the engine is running, the onboard consumers will be switched to the onboard power supply battery. The emergency start procedure is then complete. Only now, using the automatic gearbox selector lever, is it possible to select a gear and drive the vehicle. If the ESP warning lamp lights up, it will go out after the vehicle is set in motion when the steering angle sensor is rematched. Glow plug operation is inhibited, the glow plug system warning lamp will flash.

Battery concept

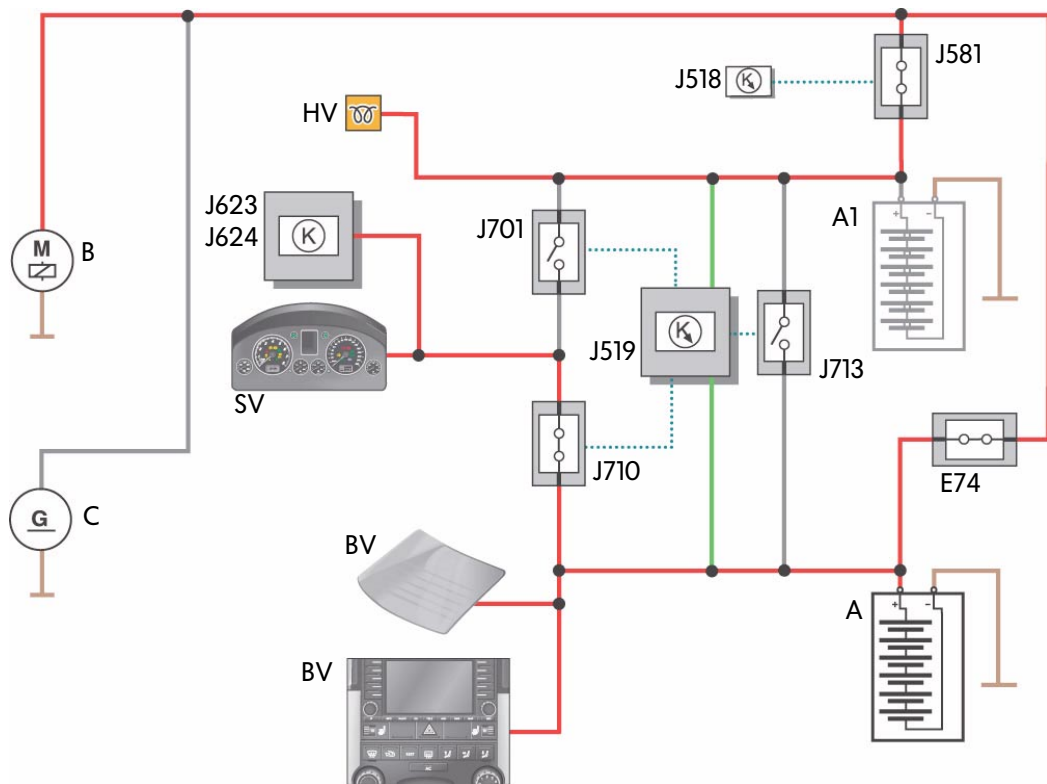
Start procedure with charged onboard power supply battery and discharged starter battery

The relay is in the same switch position as with starting procedures when both batteries are charged.

The charging circuit relay for the additional and starter battery J713 and voltage supply relay 1 J701 are open. Voltage supply relay 2 J710 is closed.



Switch position with charged onboard power supply battery and discharged starter battery



Key

A	Onboard power supply battery, battery	J624	Engine control unit 2
A1	Second battery, starter battery	J701	Voltage supply relay 1
B	Starter	J710	Voltage supply relay 2
C	Alternator	J713	Second battery charging circuit relay (starter battery)
E74	Battery master / isolation switch	BV	Onboard consumers
J518	Entry and start authorisation control unit	SV	Start-up consumers
J519	Onboard power supply control unit	HV	HT consumers
J581	Battery parallel circuit relay		
J623	Engine control unit		

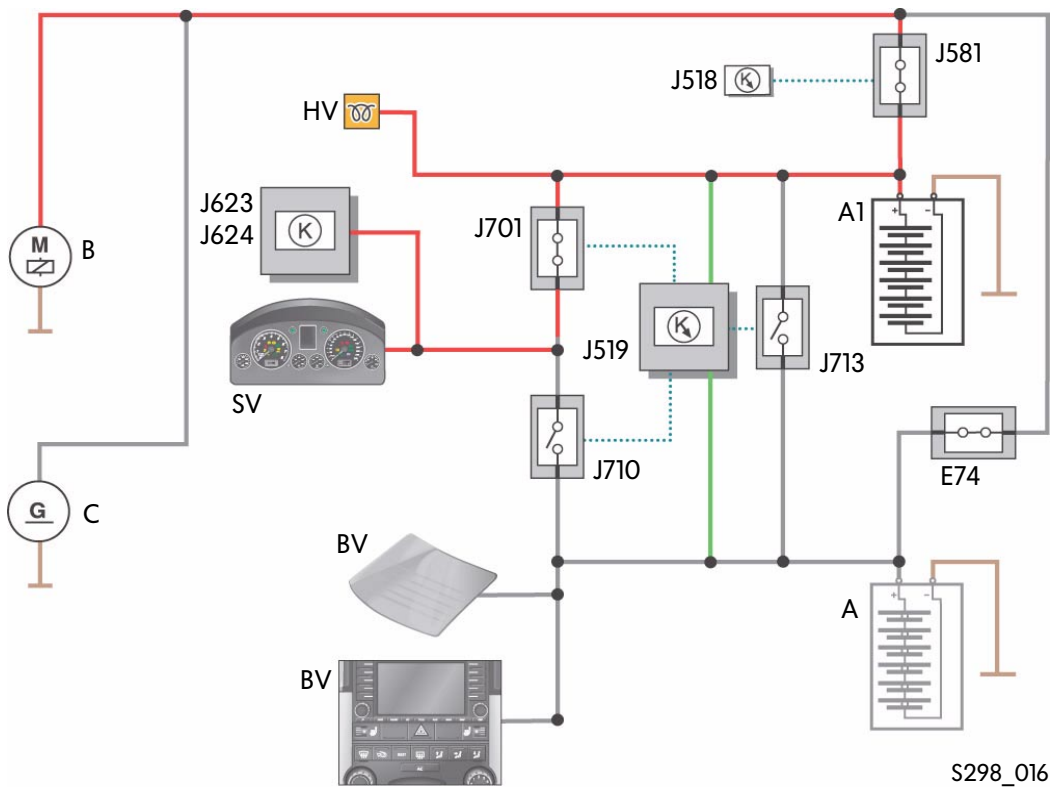
Starting procedure with weak starter battery and onboard power supply battery

If the voltage of the onboard power supply battery is less than 10.5 Volt and the voltage of the starter battery is less than 11.5 Volt, the voltage of both batteries is calculated following activation of the onboard power supply control unit wake-up mode.

If during this calculation, the starter battery voltage is found to be greater than that of the onboard power supply battery, the start procedure for discharged onboard power supply battery is selected. If the onboard power supply battery has the greater voltage reading, the start procedure is actuated without change in the relay switch position.



Switch position at high starter battery voltage



S298_016

Key

A	Onboard power supply battery, battery	J624	Engine control unit 2
A1	Second battery, starter battery	J701	Voltage supply relay 1
B	Starter	J710	Voltage supply relay 2
C	Alternator	J713	Second battery charging circuit relay (starter battery)
E74	Battery master / isolation switch	BV	Onboard consumers
J518	Entry and start authorisation control unit	SV	Start-up consumers
J519	Onboard power supply control unit	HV	HT consumers
J581	Battery parallel circuit relay		
J623	Engine control unit		

Power supply

Alternator

Drive layout

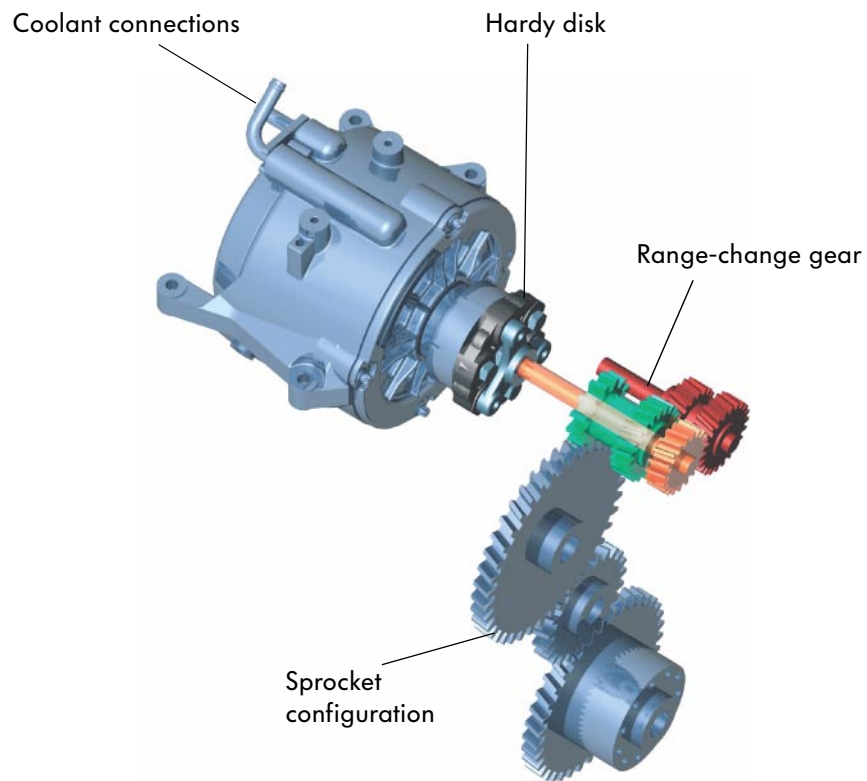
The drive layout of the alternator on the V10 TDI engine consists of a sprocket configuration, a range-change gear with a ratio of 3.6:1 and a Hardy disk.

The range-change gear increases the working speed of the alternator, which thereby improves performance. This is necessary to provide the large amount of voltage required by the electrical system, even at idling speed.

The alternator is cooled via the engine cooling circuit to protect it against overheating, which in turn ensures improved longevity and efficiency.



Alternator



S298_048

Charging

Charging of the starter and onboard power supply battery

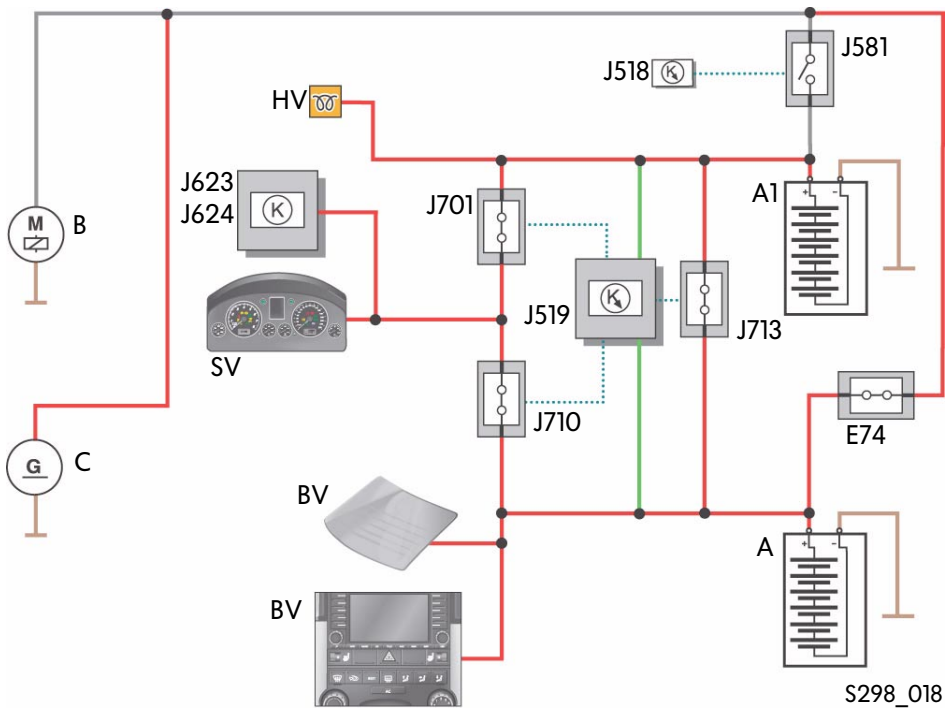
The onboard power supply battery is charged continuously. The starter battery is charged via the second battery/starter battery charging circuit relay J713. This is actuated by the onboard power supply control unit J519. The normal charging time is 20 minutes. After this period the relay will open. If the starter battery voltage drops below 12.8 Volt, a new charging cycle of 20 minutes maximum is started. While the glow plugs are active, the relay stays closed.

If voltage supply relay 1 J701 does not open after the engine has been started because the contacts are sticking for example, the charging circuit relay J713 will close after four minutes until the ignition is switched off.

The onboard power supply derives its power from both batteries which are connected in parallel and protected against overload by relay J701.



Switch position for charging



Key

A	Onboard power supply battery, battery	J624	Engine control unit 2
A1	Second battery, starter battery	J701	Voltage supply relay 1
B	Starter	J710	Voltage supply relay 2
C	Alternator	J713	Second battery charging circuit relay (starter battery)
E74	Battery master / isolation switch	BV	Onboard consumers
J518	Entry and start authorisation control unit	SV	Start-up consumers
J519	Onboard power supply control unit	HV	HT consumers
J581	Battery parallel circuit relay		
J623	Engine control unit		

Onboard power supply management

The onboard power supply control unit J519

Functions of onboard power supply control unit

Until now control units and relays functioned at different locations in the vehicle. In the onboard power supply control unit, these functions are now localised.

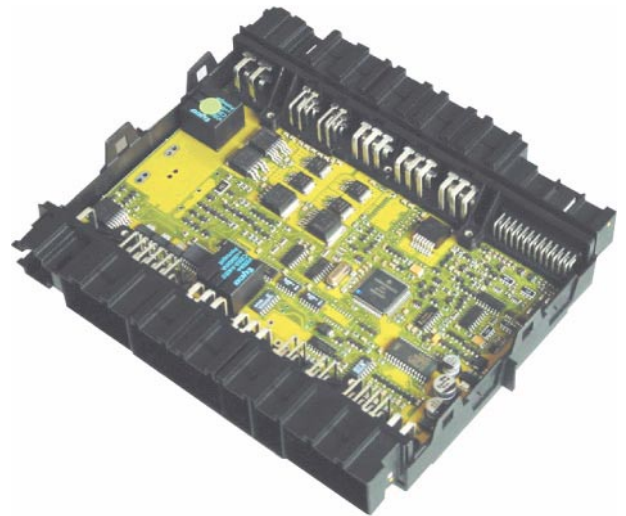
The onboard power supply control unit in the Touareg is responsible for the following functions:

- Load management
- Parking light
- Dipped beam headlights
- Side lights
- Turn signals (not in exterior mirrors)
- Main beam headlights
- Additional main beam headlights
- Fog lights
- Footwell lights
- Terminal 58d
- Indicator lamp for hazard warning lights
- Relay for headlight washer system
- Fuel pump priming action
- Horn
- Twin washer pump
- Interior lights
- Rain and light sensor voltage supply

Furthermore, the following switches and signals are processed and sent via the CAN bus to other control units.

- Bonnet contact switch
- Exterior mirror adjustment switch
- Hazard warning lights button
- Light switch
- Voltage supply at starter and onboard power supply battery

Onboard power supply control unit



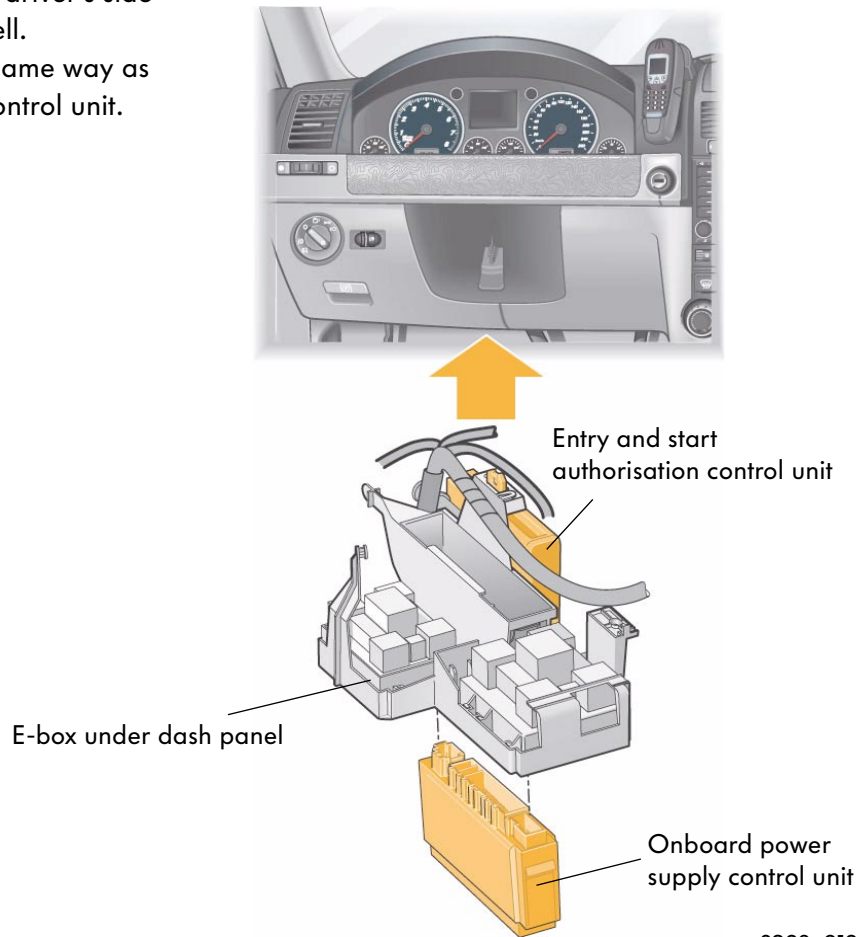
S298_012



Fitting location

The onboard power supply control unit can be found in the vehicle interior on the driver's side under the dash panel in the footwell. It is connected to the E-box in the same way as the entry and start authorisation control unit.

Fitting location of onboard power supply control unit and entry and start authorisation control unit



S298_019

Load management

Furthermore, the onboard power supply control unit deactivates convenience system consumers and long-term HT consumers e.g. heated rear windscreen, so that heavy discharging of the battery is avoided. If the onboard power supply is placed too much under load, the idling speed is also increased. This ensures that there is always sufficient energy to start the engine. Switching off is inline with the guidelines for the Volkswagen Phaeton and is described in Self-Study Programme 272.

Onboard power supply management

Priming function of electrical fuel pump

The petrol engines of the Volkswagen Touareg all feature a priming function of the fuel pump so that enough pressure in the fuel lines can be built up.

Function:

When the driver's door is opened and terminal 15 is closed, a signal is sent via the CAN bus from the entry and start authorisation control unit J518 (terminal 15 off), a signal is also sent from the driver's door control unit J386 (driver's door opened) and, for reasons of safety, a discreet signal (status of terminal 15) is sent to the onboard power supply control unit J519. This then actuates the relay to prime the fuel pump for approx. 2 seconds. The priming function of the fuel pump is stopped when the ignition is switched on. Continued actuation is done through the engine control unit.

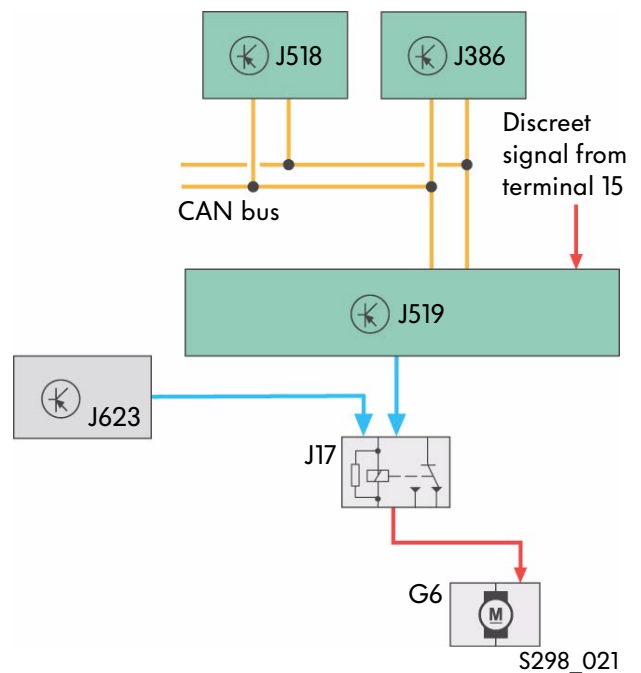
If the driver's door stays open, the actuation is repeated a maximum of three times in intervals.

Timed actuation from the onboard power supply control unit prevents continued actuation of the fuel pump if the driver's door is opened and closed a number of times in short intervals.

Crash shut-off

If with the ignition switched on a crash is detected, a signal is sent from the airbag control unit J234 via the CAN bus and the fuel pump is switched off immediately. After about 5 seconds it can be activated again by switching the ignition off and on.

Electric circuit



Key

- G6 Fuel pump
- J17 Fuel pump relay
- J386 Driver's door control unit
- J518 Entry and start authorisation control unit
- J519 Onboard power supply control unit
- J623 Engine control unit

Interior light actuation

The interior lighting is actuated by the onboard power supply control unit. The voltage supply comes from terminal 30G.

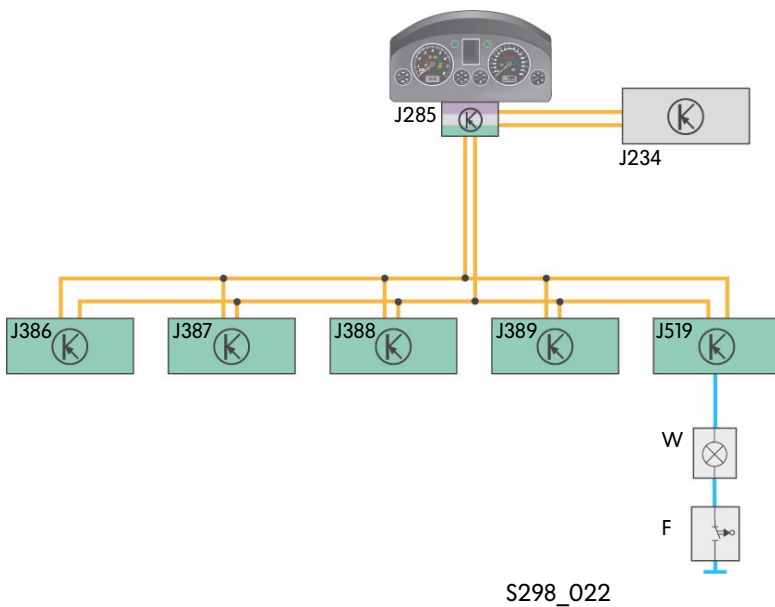
To prevent discharge of the vehicle battery when the interior lights are switched on, power supply from terminal 30G is interrupted in the following circumstances:

- the ignition is switched off,
- the vehicle is locked from the outside and all doors are locked.

Terminal 30G is activated under the following circumstances:

- the interior light switch is actuated,
- the ignition is switched on,
- the vehicle is unlocked, a door, the bonnet or the tailgate is opened,
- the bonnet contact switch.

Data transfer



Key

- F Interior light switch
- J234 Airbag control unit
- J285 Dash panel insert (Gateway)
- J386 Driver door control unit
- J387 Front passenger door control unit
- J388 Rear left door control unit
- J389 Rear right door control unit
- J519 Onboard power supply control unit
- W Interior lights



If a crash is detected, the interior light is switched on immediately. After the ignition is switched on and off and after it has been switched on again, the cut-off function from terminal 30G is reactivated.

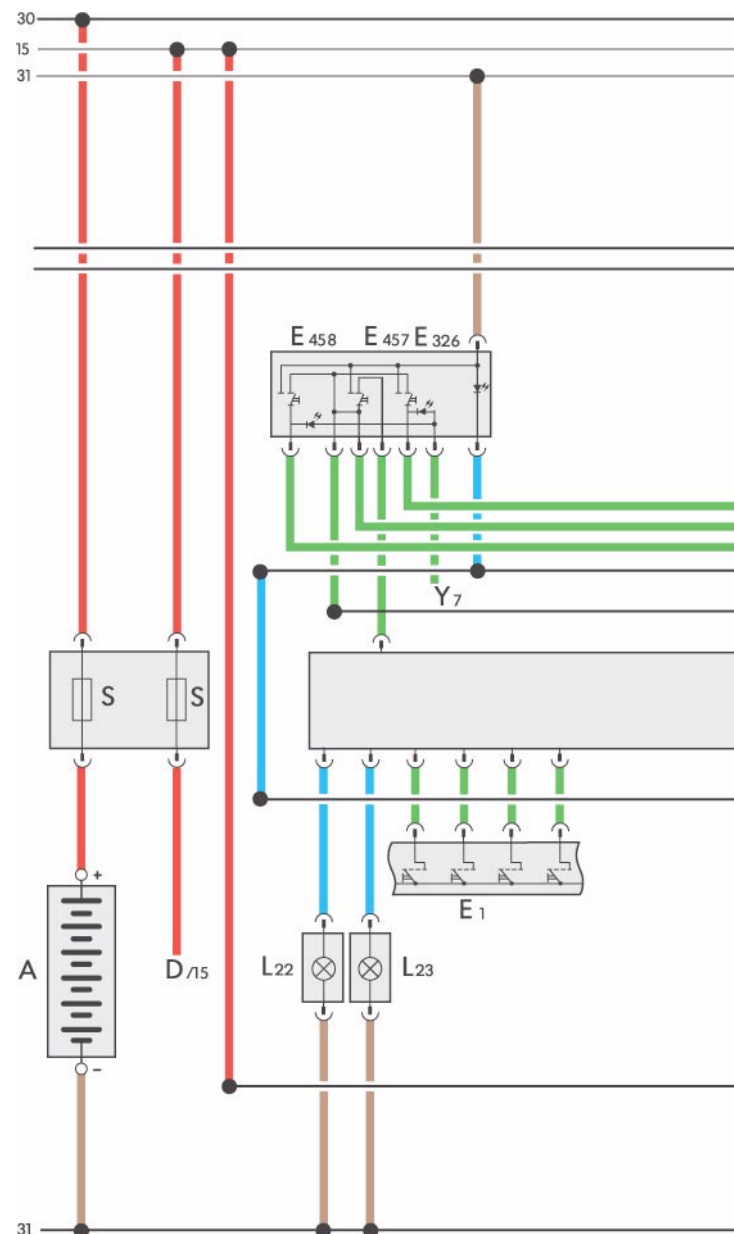


Onboard power supply management

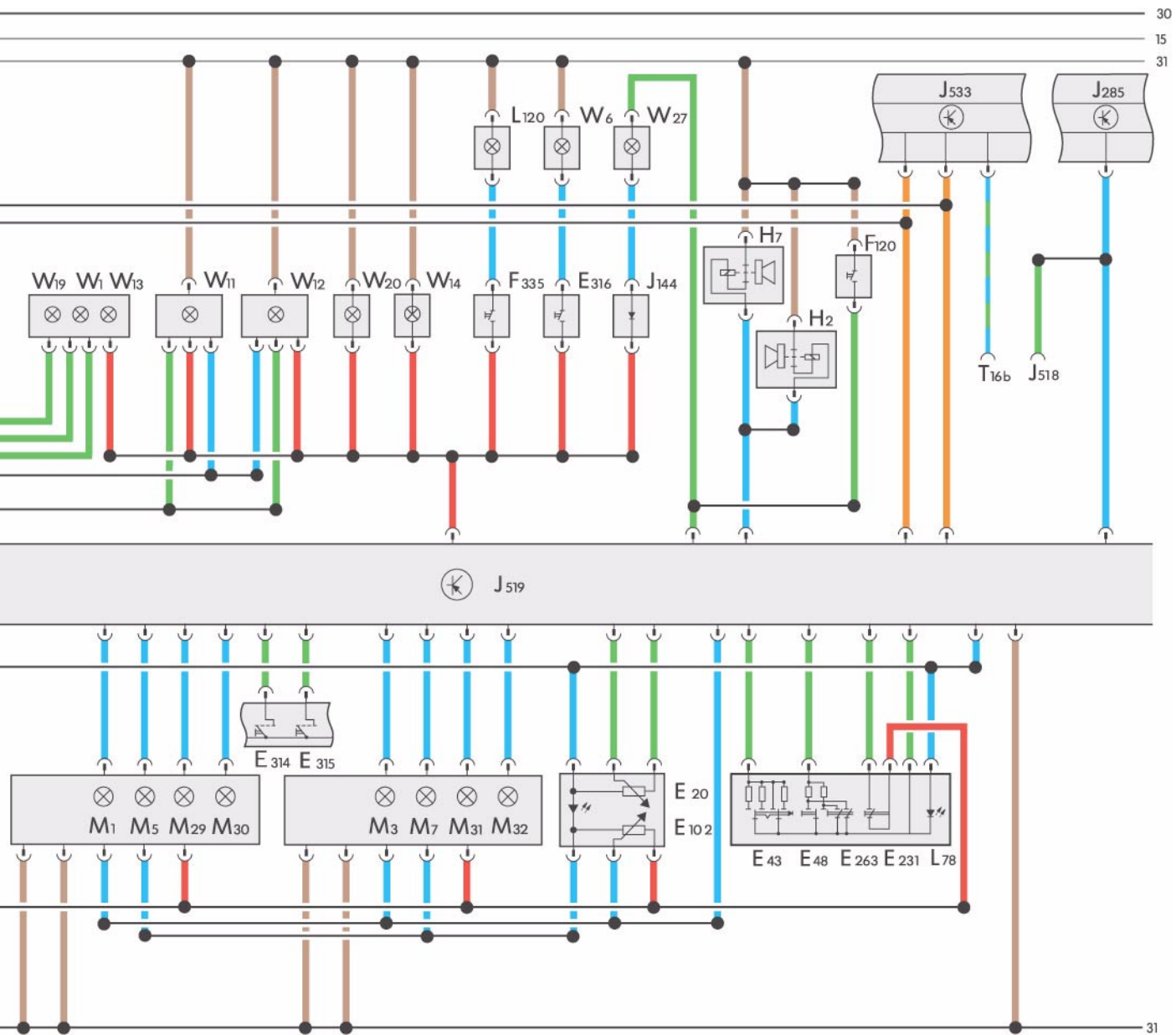
The function layout

Key

A	Battery
D	Ignition switch
E1	Light switch
E3	Hazard warning light switch
E20	Light regulator for lighting switches and instruments
E43	Exterior mirror adjustment switch
E48	Mirror adjustment change-over switch
E102	Headlight range control adjuster
E231	Exterior mirror heating button
E263	Mirror fold system switch
E314	Rear fog light button
E315	Fog light button
E316	Glove box button
E326	Interior light button, front
E457	Driver reading light button
E458	Front passenger reading light button
F120	Anti-theft alarm/ vermin repellent system contact switch
F335	Stowage compartment illumination switch
G213	Rain sensor
H2	High tone horn
H7	Low tone horn
J39	Relay for headlight washer system
J144	Interior light switch-off delay blocking diode Interior lighting
M1	Side light bulb, left
M3	Side light bulb, right
M5	Turn signal bulb, front left
M7	Turn signal bulb, front right
M29	Dipped beam bulb, left
M30	Main beam bulb, left
M31	Dipped beam bulb, right
M32	Main beam bulb, right
U1	Cigarette lighter
U9	Cigarette lighter, rear



- █ Signal output
- █ GND
- █ Signal output
- █ Positive
- █ CAN bus



S298_013

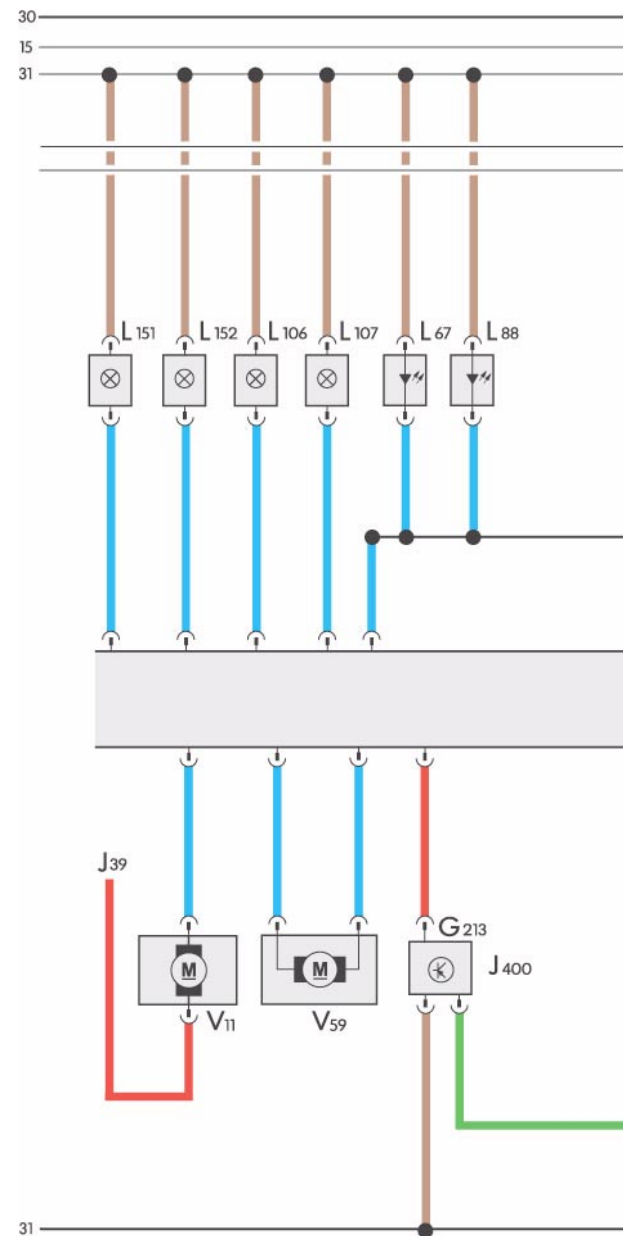


Onboard power supply management

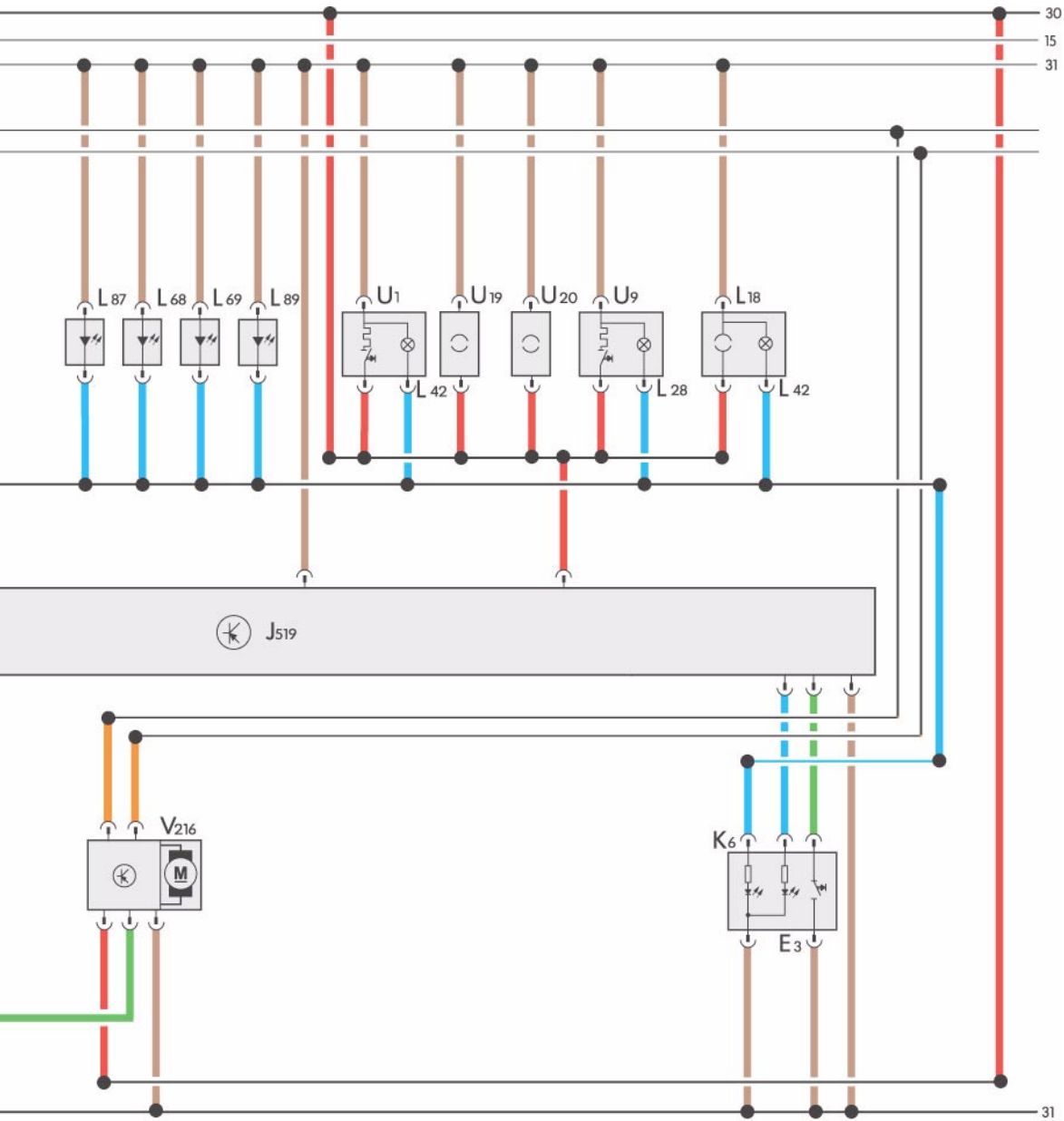
The function layout

Key

J285	Control unit with display in dash panel insert
J400	Wiper motor control unit
J518	Entry and start authorisation control unit Start authorisation
J519	Control unit for onboard power supply
J533	Diagnosis interface for data bus
K6	Hazard warning light system warning lamp
L22	Foglight bulb, left
L23	Foglight bulb, right
L28	Cigarette lighter light bulb
L42	Socket light bulb
L67	Dash panel left vent illumination
L68	Dash panel central vent illumination
L69	Dash panel right vent illumination
L78	Mirror adjustment switch illumination
L87	Central rear vent illumination
L88	Rear left vent illumination
L89	Rear right vent illumination
L106	Footwell illumination, rear left
L107	Footwell illumination, rear right
L120	Shelf illumination
L151	Front left footwell illumination
L152	Front right footwell illumination
U19	12 V socket -3-
U20	12 V socket -4-
V11	Headlight washer system pump
V59	Windscreen and rear window washer pump
V	Windscreen washer motor
W1	Front interior light
W11	Reading lamp, rear left
W12	Reading lamp, rear right
W13	Front passenger reading light
W14	Illuminated vanity mirror (front passenger side)
W19	Reading lamp, driver side
W20	Illuminated vanity mirror (driver side)
Y7	Automatic anti-dazzle interior mirror



	Signal output
	GND
	Signal output
	Positive
	CAN bus



S298_050



Lighting

The headlights

Main headlights

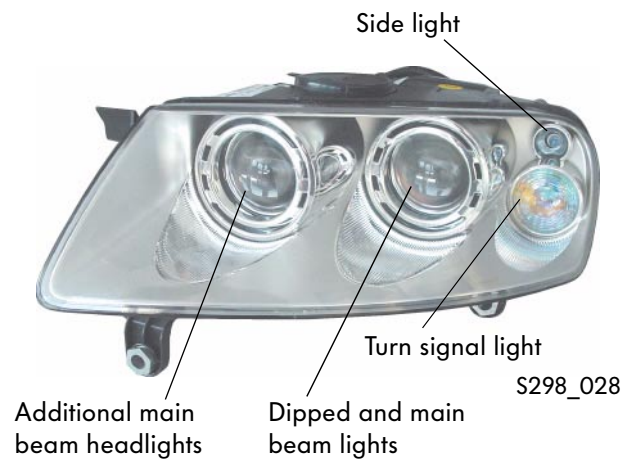
The basic equipment comprises a DE headlight with H7 halogen bulb and a H9 halogen bulb for main beam.

Headlights without additional main beam



The "M" equipment level features bi-xenon headlights for main and dipped beam and additional DE headlights with H7 bulbs for main beam. On this version, only the headlights for additional main beam flash when the flasher unit is actuated and the dipped beam is not switched on. A brief actuation of the xenon lamps, e.g. when flashing lights as a signal, shortens their useful life. The turn signals are cool blue in appearance but flash yellow when they are switched on.

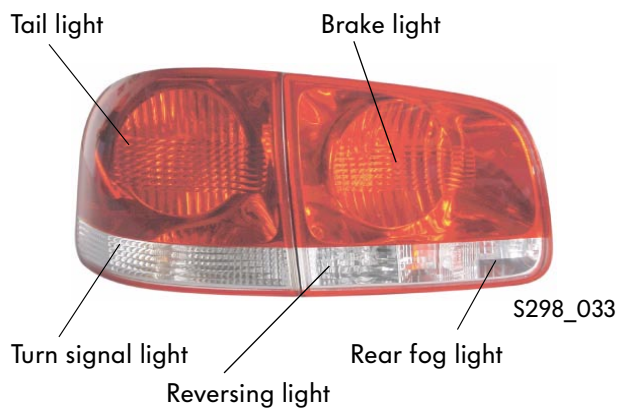
Headlight with additional main beam



The rear light

For the rear lighting of the vehicle, rear light clusters with bulbs are used. The rear light clusters are split into two parts. One part is fixed to the sidewall and the second part can be found on the tailgate.

Rear light cluster



Vehicle at normal level



Vehicle raised



Rear fog light

Due to the Touareg's off-road capability, the adaptive suspension of the vehicle allows greater changes in vehicle height than on normal automobiles. Government regulations require, in Japan for example, that the rear fog light is switched off when the vehicle is in the highest position.

This function is available for other countries as a code in the onboard power supply control unit.



Lighting

Surround lighting

The lights integrated in the exterior mirrors illuminate the area around the vehicle.

Conditions for activation:

The lights are actuated simultaneously with:

- the interior lights,
- the coming home/leaving home lighting function.

The surround lights are controlled by the onboard power supply control unit via the CAN bus and actuated by the driver's and front passenger's door control units.

To prevent the surround lights from becoming damaged by long periods of activation, a protection feature is integrated in the onboard power supply control unit which switches off the lights after a prescribed duration to allow them to cool down.

Surround lights



S298_023

The convenience lighting

Lighting settings

In the set-up menu of the dash panel insert, various adjustments can be made to the lighting:

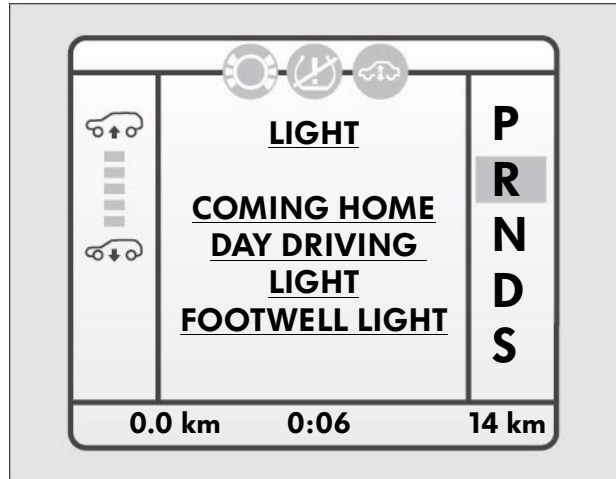
- Duration of coming-home lighting,
- Day driving light,
- Brightness of footwell lighting.

The duration of the coming-home lighting can be set between 0-90 seconds. After 90 seconds, the lights are switched off automatically to avoid discharging of the battery.

In the set-up menu, the day driving light function can be switched on or off. This option is only available in countries where day driving lights are not a legal requirement.

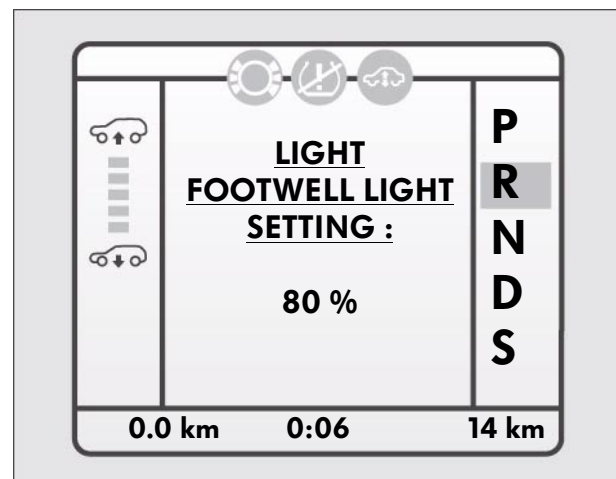
The footwell lighting can be adjusted from 0 %-100 %.

Display in instrument panel insert



S298_031

Display in instrument panel insert



S298_032



Networked functions

The lighting

Functions:

Turn signals

The main function of the turn signals is set in the onboard power supply control unit.

Signal sequence:

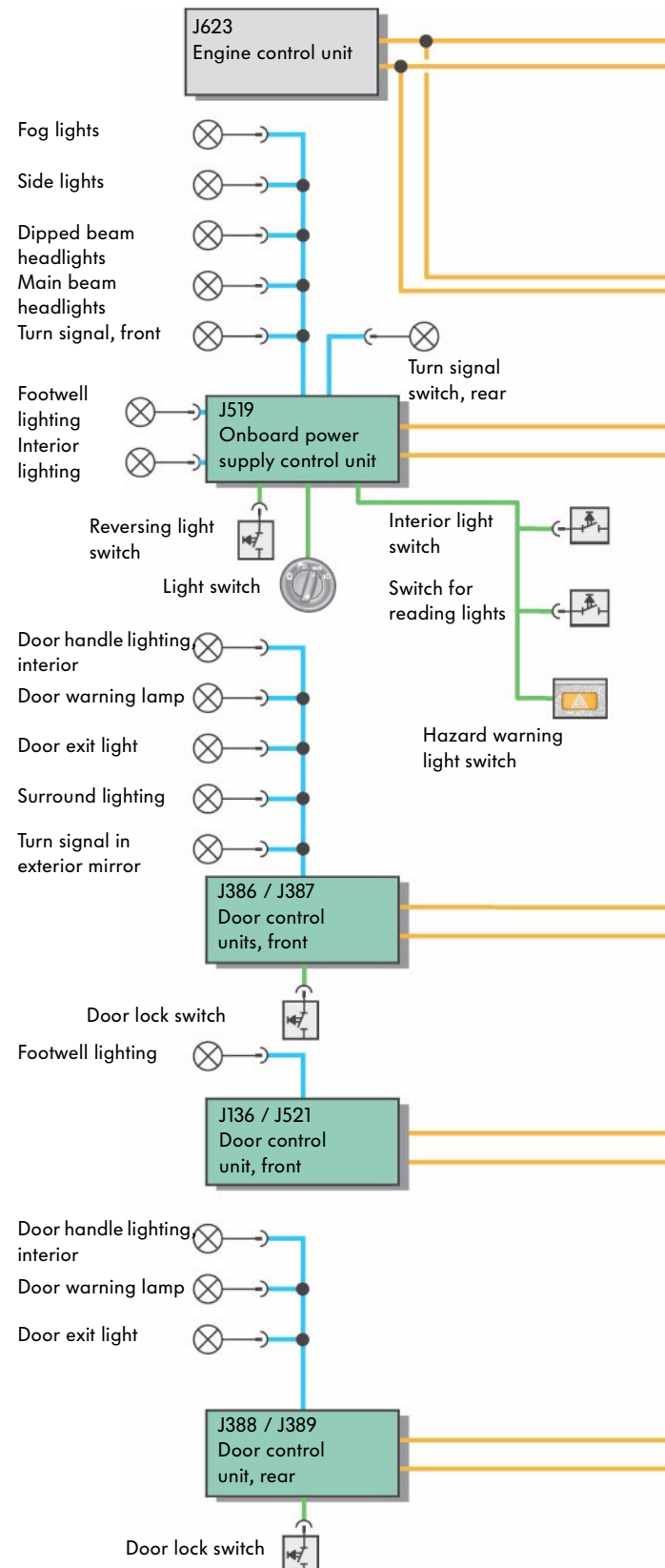
- Turn signal switch
- Steering column electronics control unit
- Onboard power supply control unit (actuation of turn signals)
- Trailer detection control unit (actuation of turn signals on trailer)
- Driver and front passenger door control units (actuation of turn signals in exterior mirrors)
- Dash panel insert (actuation of warning lights and display of warning messages)

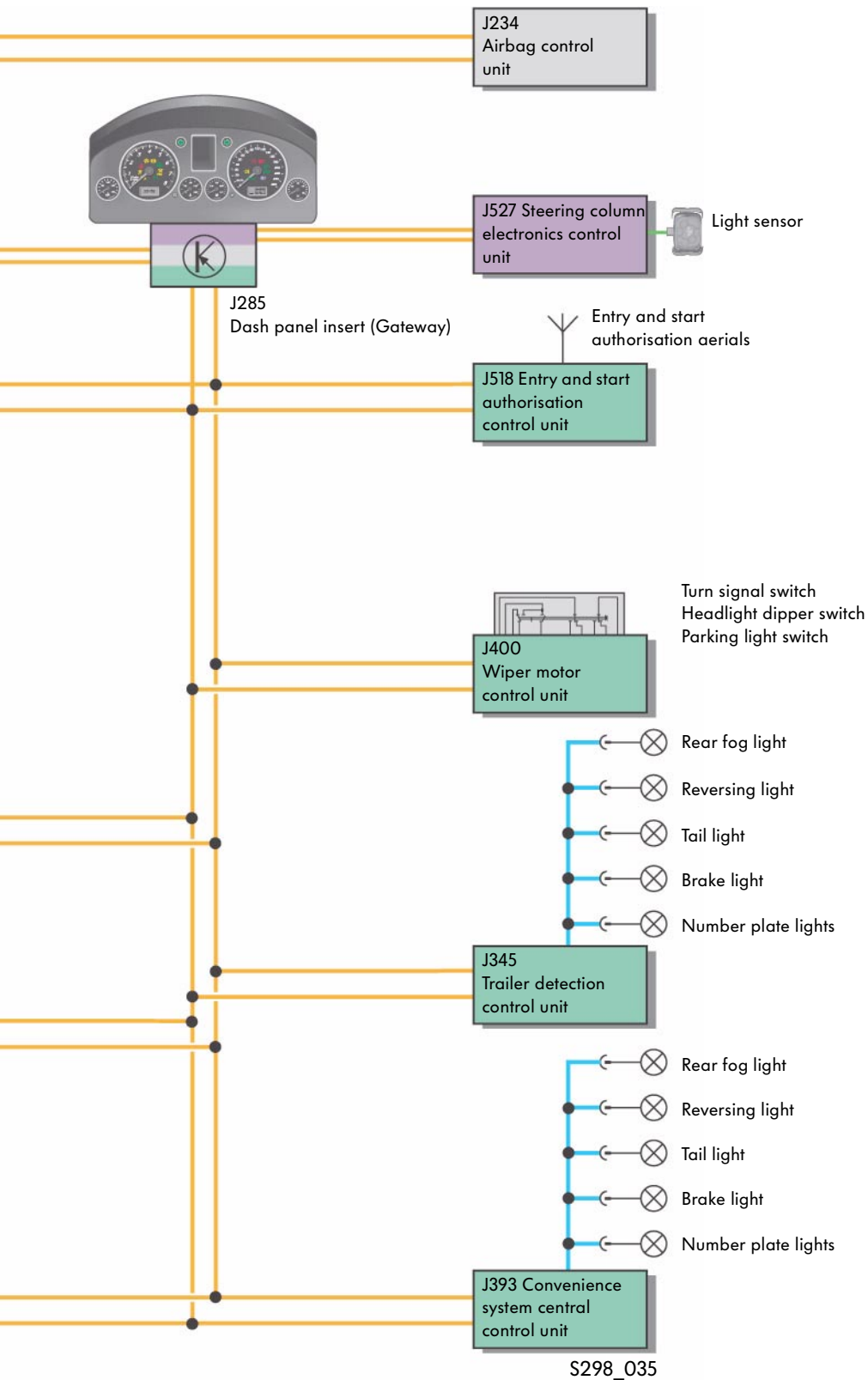
Side lights

The main function of the side lights is also set in the onboard power supply control unit.

Signal sequence:

- Light switch
- Onboard power supply control unit (actuation of front lights)
- Convenience system central control unit (actuation of rear lights)
- Trailer detection control unit (actuation of turn signals on trailer)
- Dash panel insert (actuation of warning lights and display of warning messages)





S298_035

Networked functions

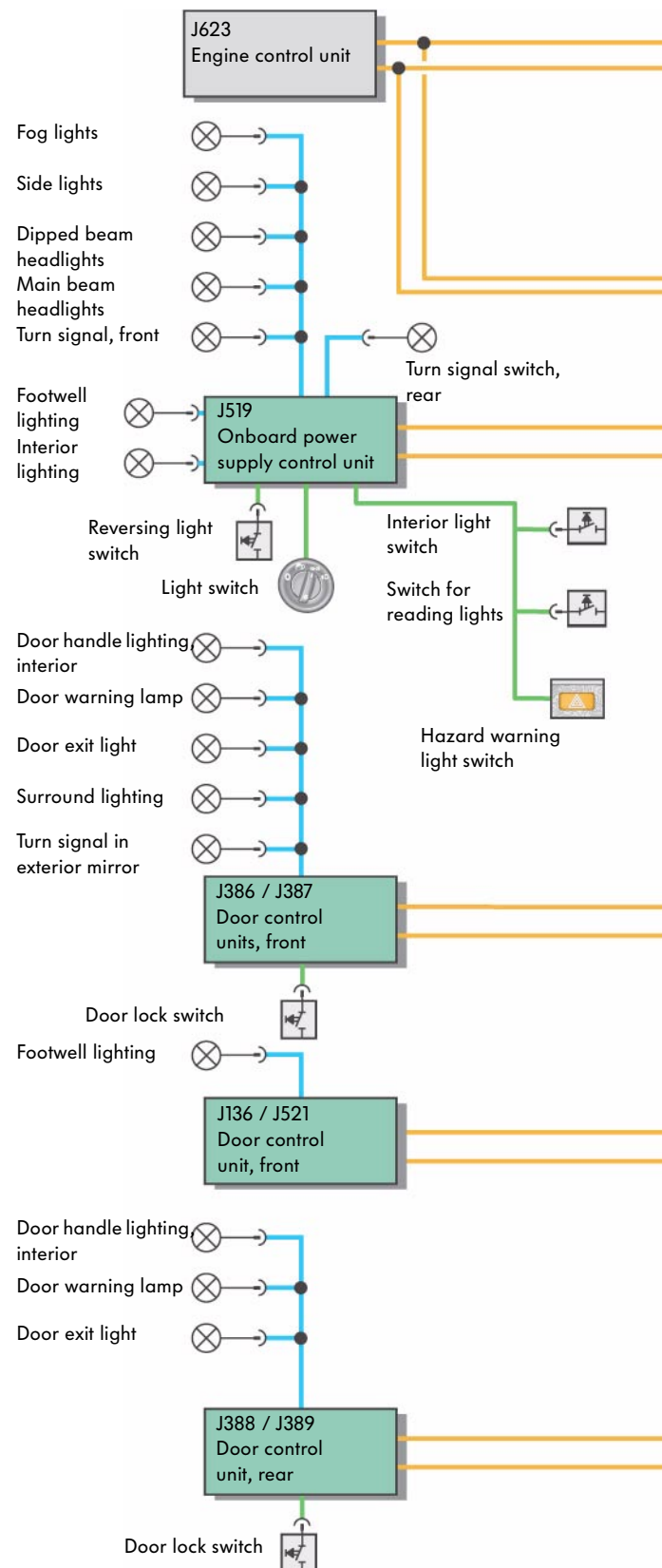
Driving lights

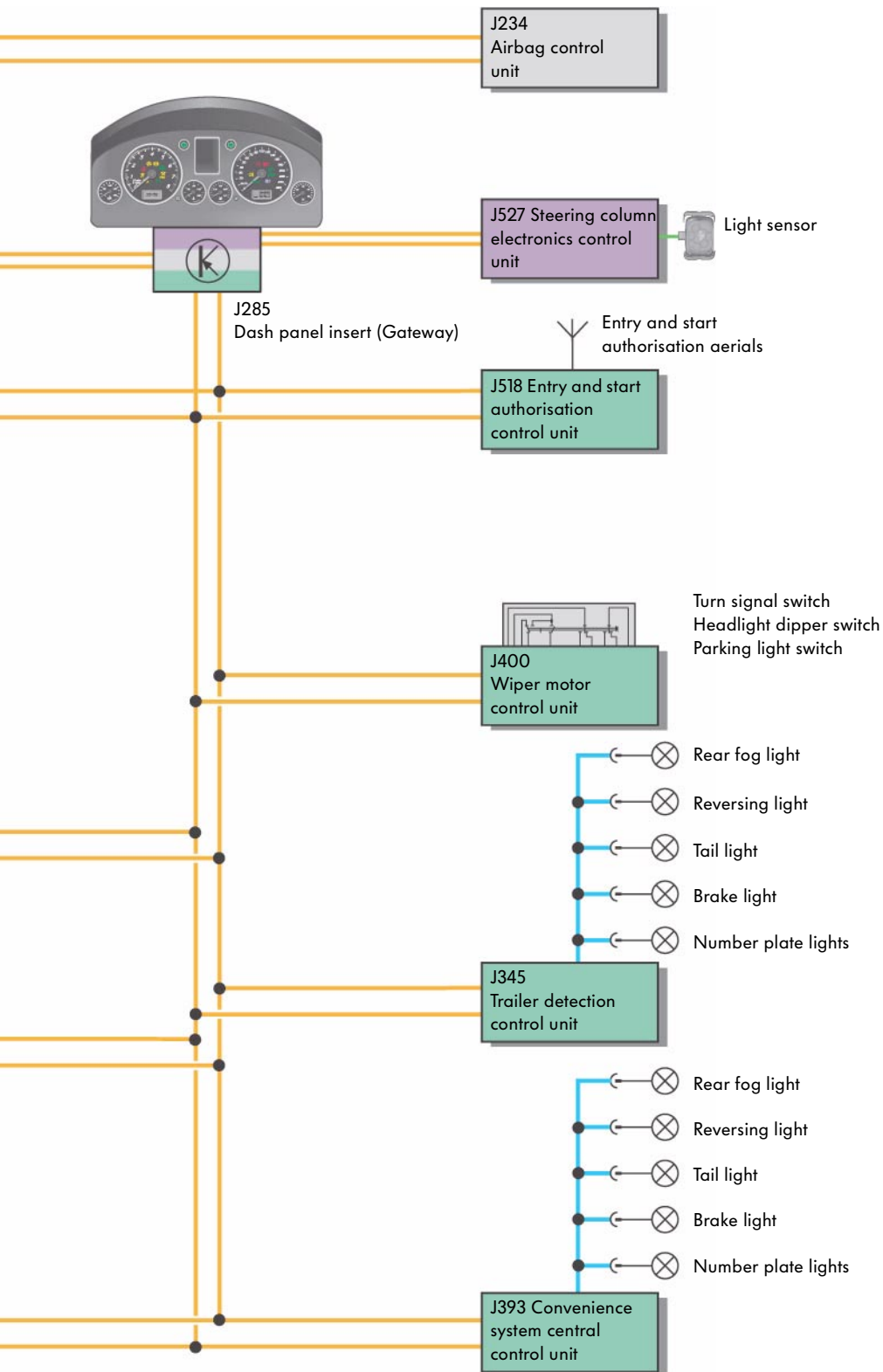
The main function of the driving lights is also set in the onboard power supply control unit.

Signal sequence:

- Light switch
- Onboard power supply control unit (actuation of headlights)
- Dash panel insert (actuation of warning lights and display of warning messages)

An additional switching option in the onboard power supply control unit permits activation of the headlights if the onboard power supply control unit should fail or the side light and dipped beam light switches should cease to function.





S298_035



Networked functions

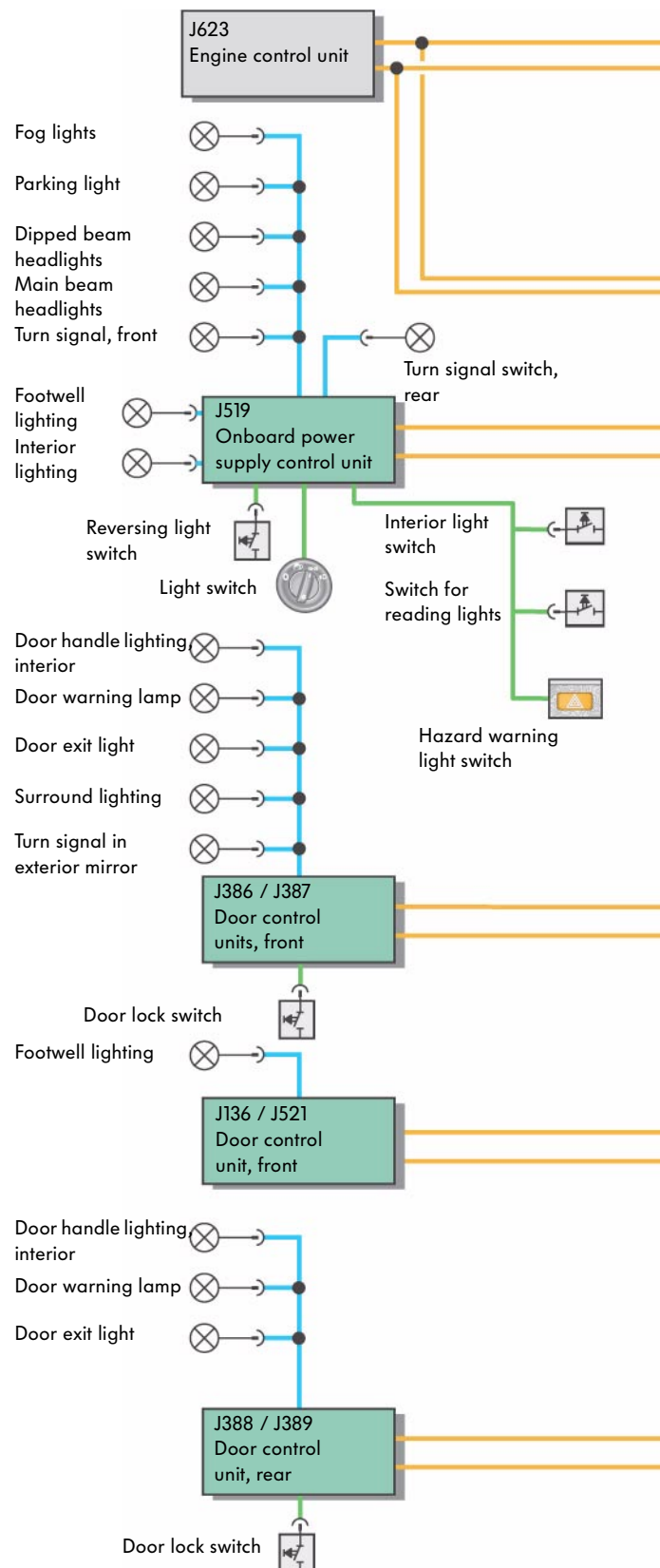
Automatic driving light control

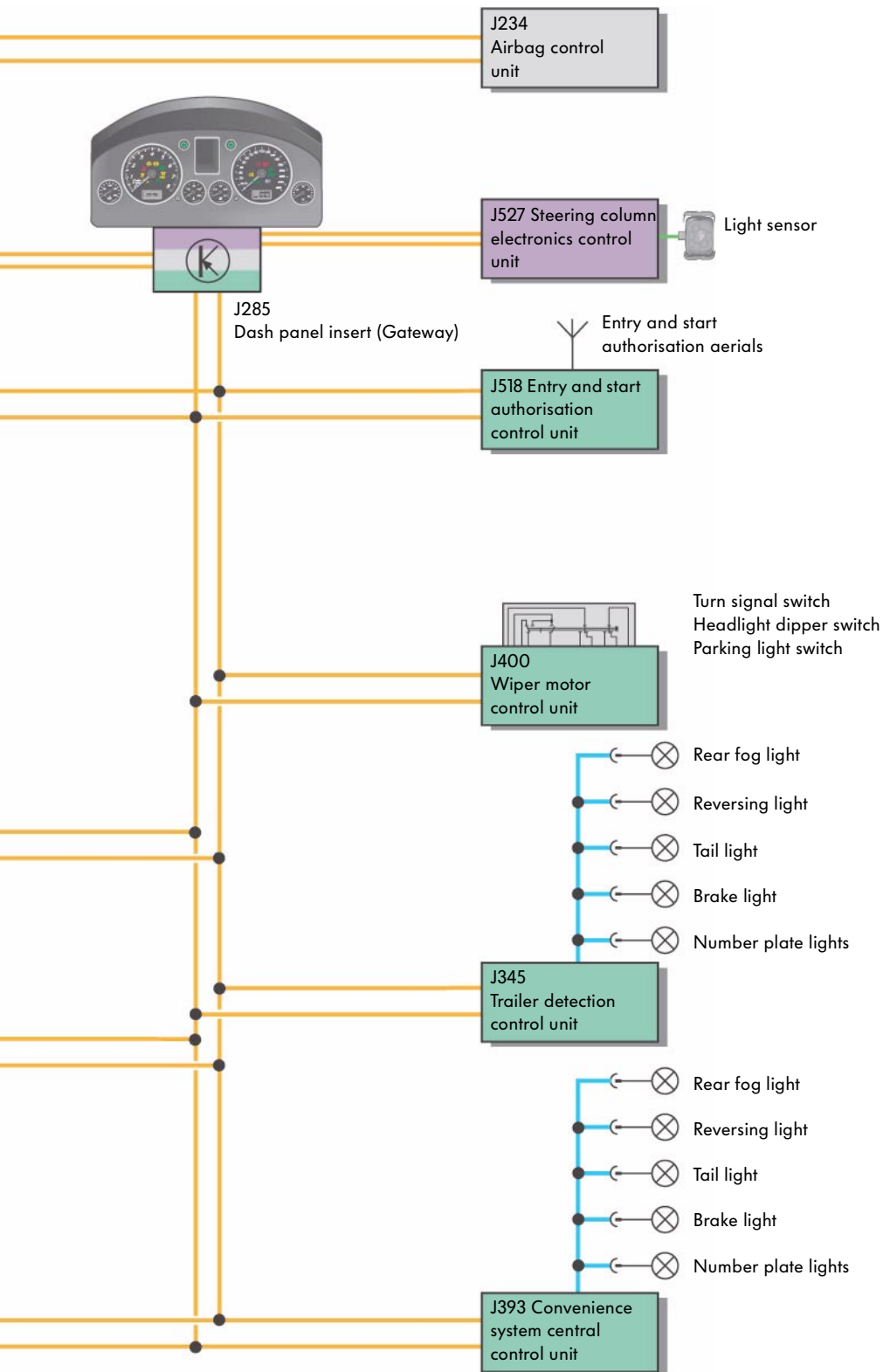
The automatic driving light control is set in the onboard power supply control unit as normal.

Signal sequence:

- Light switch in automatic driving light position
- Input signal from light sensor via wiper motor control unit, Infotainment and Gateway CAN bus
- Onboard power supply control unit (actuation of front lights)
- Convenience system central control unit (actuation of rear lights)
- Trailer detection control unit (actuation of turn signals on trailer)
- Dash panel insert (actuation of warning lights and display of warning messages)

The automatic driving light control is only active when the light switch is in the relevant position.





S298_035



Networked functions

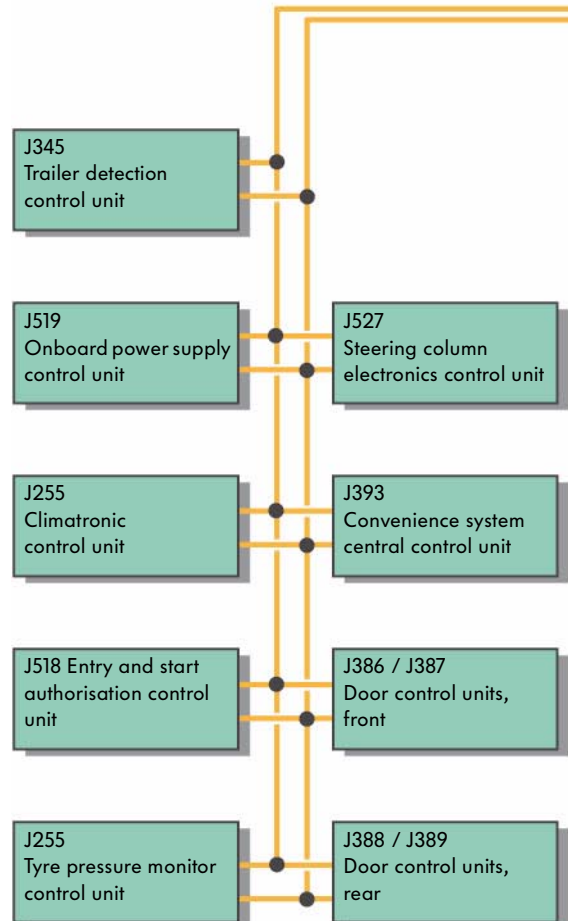
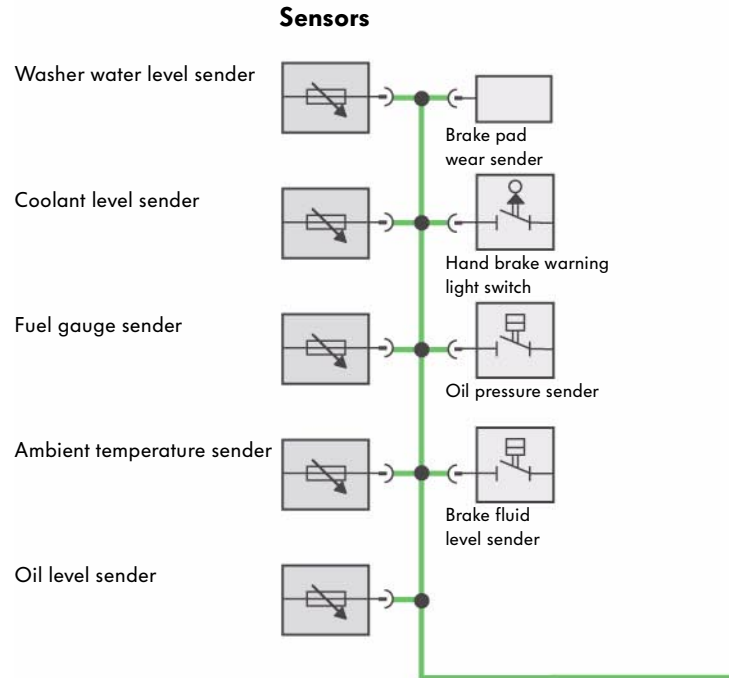
Driver information

Function:

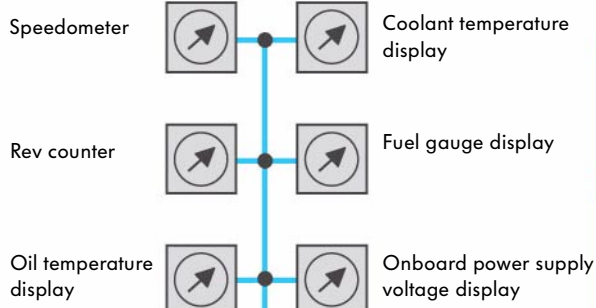
The warning lights and instruments in the dash panel insert receive their information from the control units via the CAN bus or discreet wiring from their own sensors.

Signals that are sent via the CAN bus from the control units make their way to the processor in the dash panel insert via the Gateway.

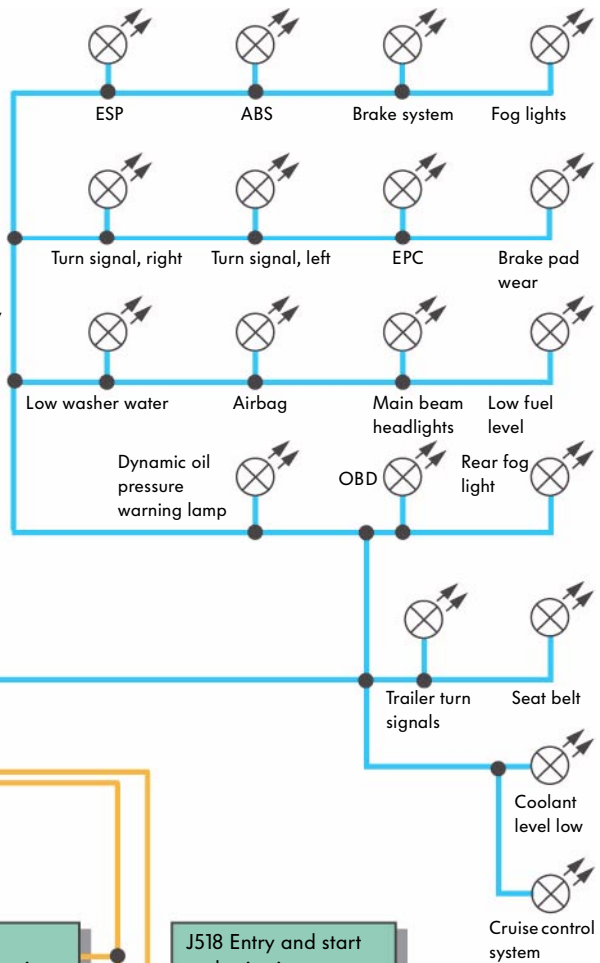
The control units can be adapted in the Gateway using the vehicle diagnosis system VAS 5051. If the control units are not adapted, the warning lights and instruments cannot be actuated.



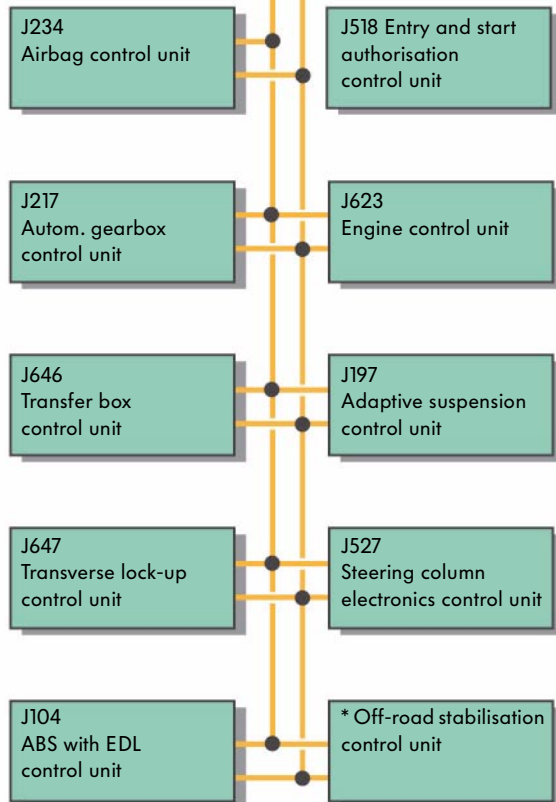
Display instruments



Warning lamps



J285 Dash panel insert (Gateway)



*Reserved

S298_036



Networked functions

Entry and start authorisation

Function:

Central locking in general

The central locking of the vehicle is controlled by the convenience system central control unit. The doors and the tailgate are locked. The lock positions of the doors are unlocked, locked and secured or not secured. In the tailgate the lock positions are locked and unlocked.

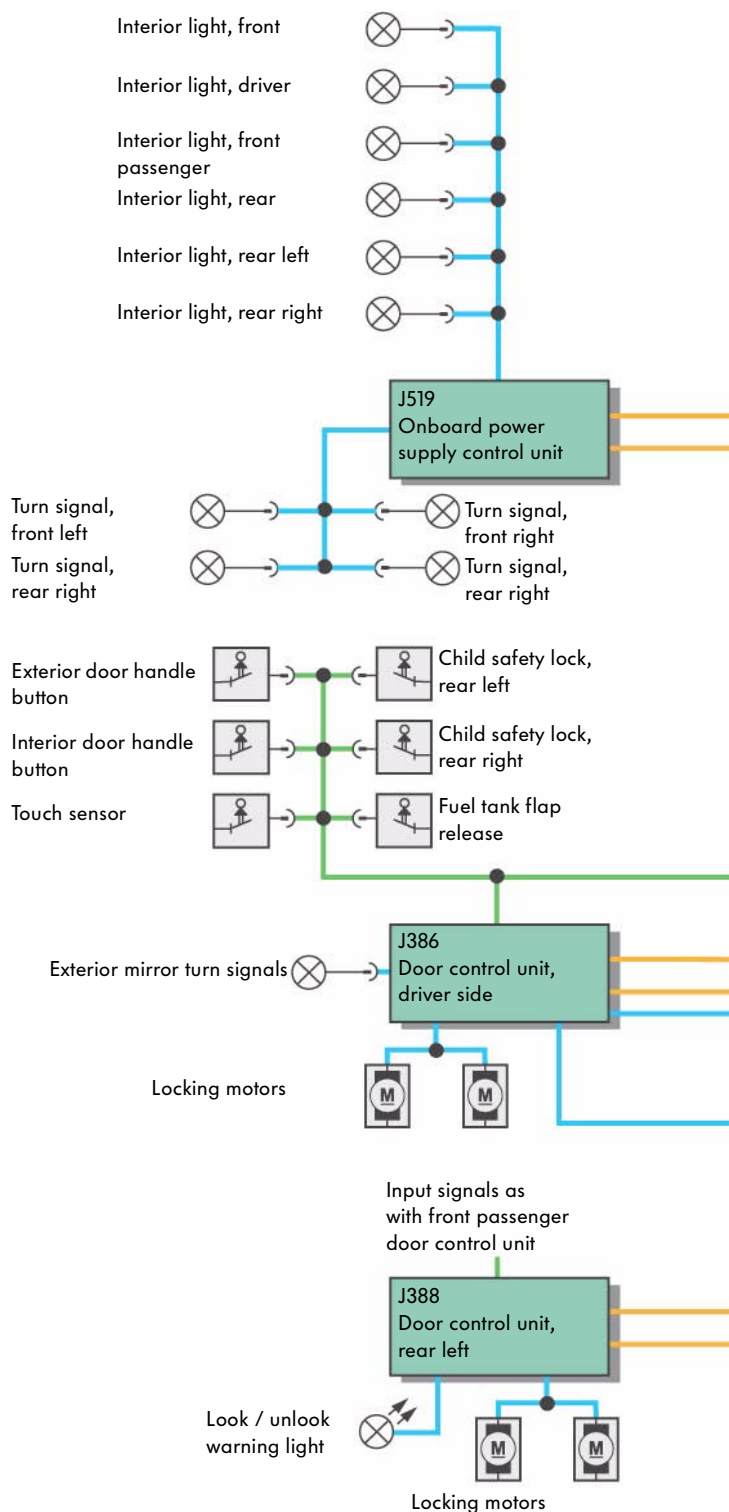
If the vehicle is locked and secured, the LEDs in the driver and front passenger doors will be actuated. Actuation lasts for about 5 seconds and is controlled by the convenience system central control unit. Thereafter it is controlled by the door control units.

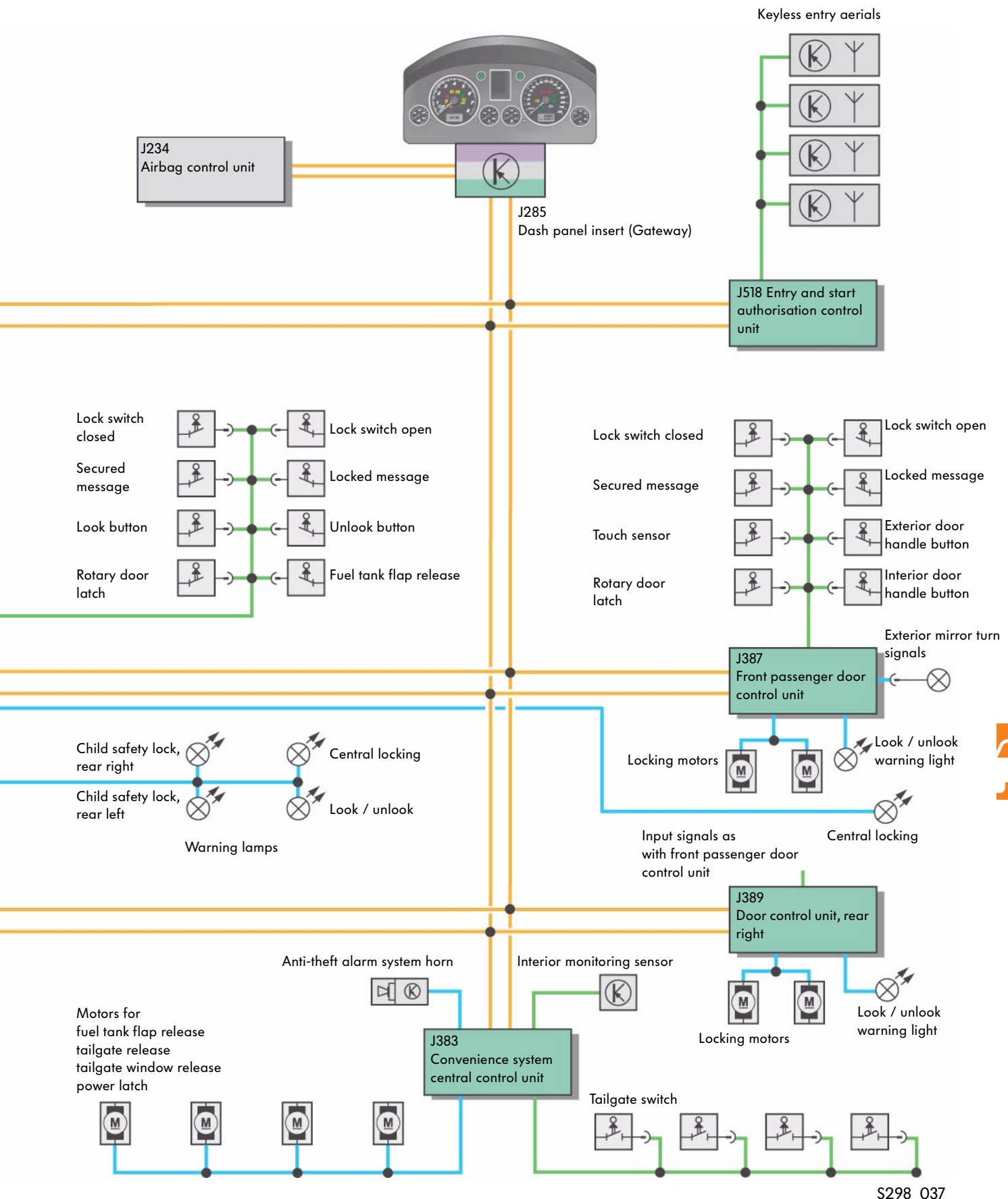
If the convenience system central control unit should fail, the driver's door control unit will take over in emergency operation mode. A difference in operation cannot be detected.

Operation via radio remote control

The information from the radio remote control is received by the aerial of the entry and start authorisation control unit.

The entry and start authorisation control unit passes the information on via the convenience CAN bus to the convenience system central control unit. This in turn actuates the door control units.





S298_037

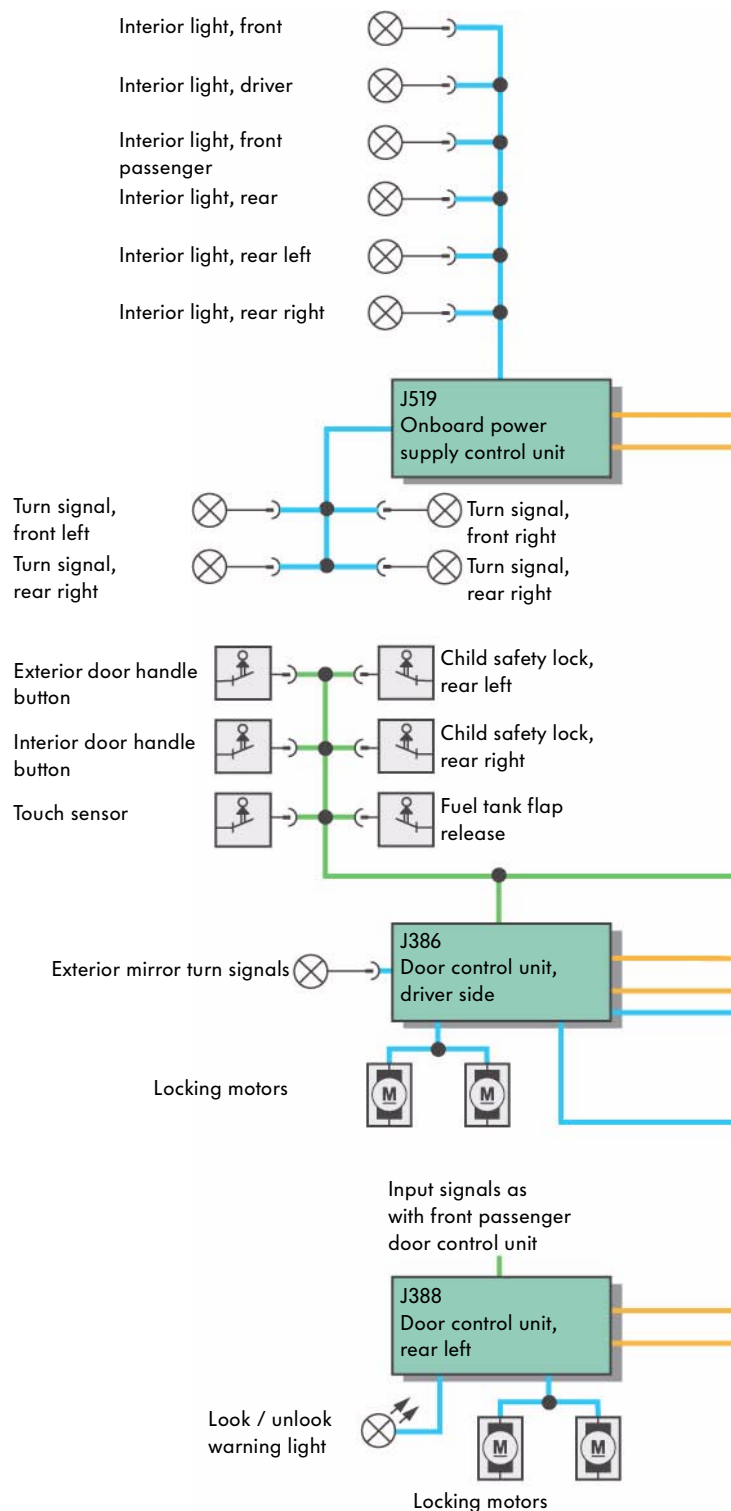
Networked functions

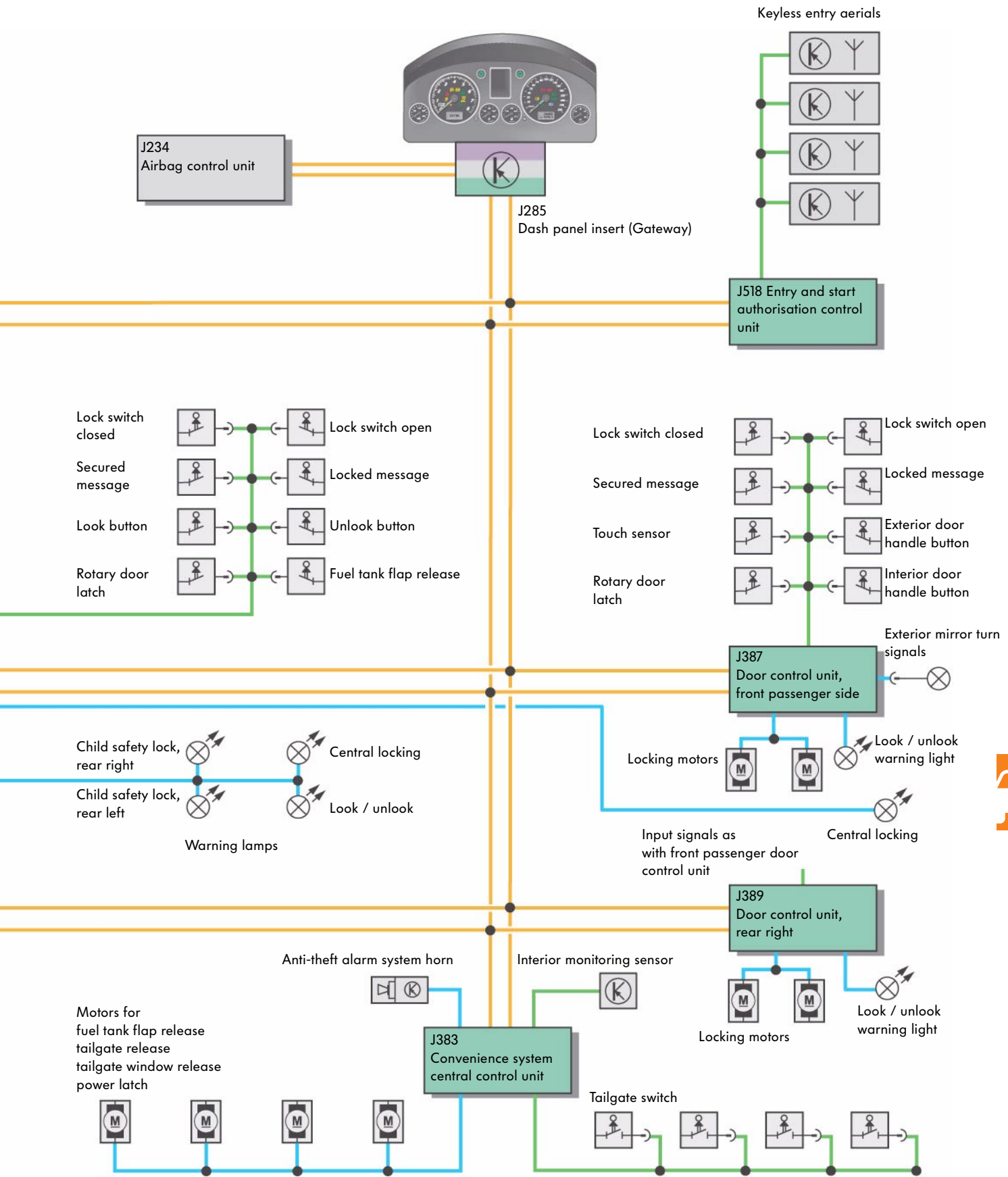
Operation via proximity sensors

Apart from opening the door, no other action is necessary. The entry and start authorisation control unit detects the transponder in the ignition key. When the door handle is actuated, the action is detected by the entry and start authorisation control unit by means of a signal. A signal is then also sent via the convenience CAN bus to the convenience system central control unit. This actuates the relevant door control unit.

Activating and deactivating the anti-theft alarm system

The anti-theft alarm system is activated in positions locked or secured. If the ignition is switched on, the anti-theft alarm system cannot be activated. An active anti-theft alarm system is displayed by the central locking warning lights in the front doors for a maximum of 28 days.





S298_037

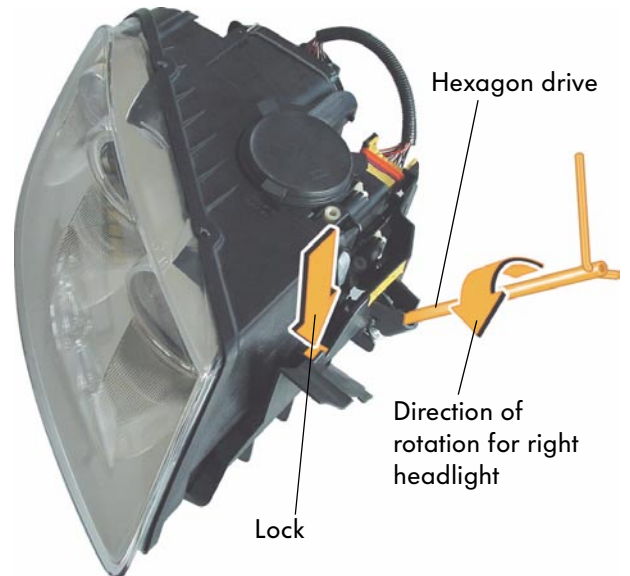
The lighting

Removing headlights

The headlights are designed based on the principle of sliding drawers. They can be pulled out. To do this, a socket must be used on a hexagon drive to unscrew the headlights. This releases the lock and the headlight can be removed.

The direction of rotation differs on the left and right.

Headlights with safety locks



S298_030

Rear lights

On the fixed part of the rear light cluster, the lamp must be removed to replace the bulb.

The bulbs of the rear light in the tailgate can be replaced by changing the lamp holder.

Rear lights



S298_046

Fixed part

Lamp holder in tailgate



Diagnosis

Guided fault finding

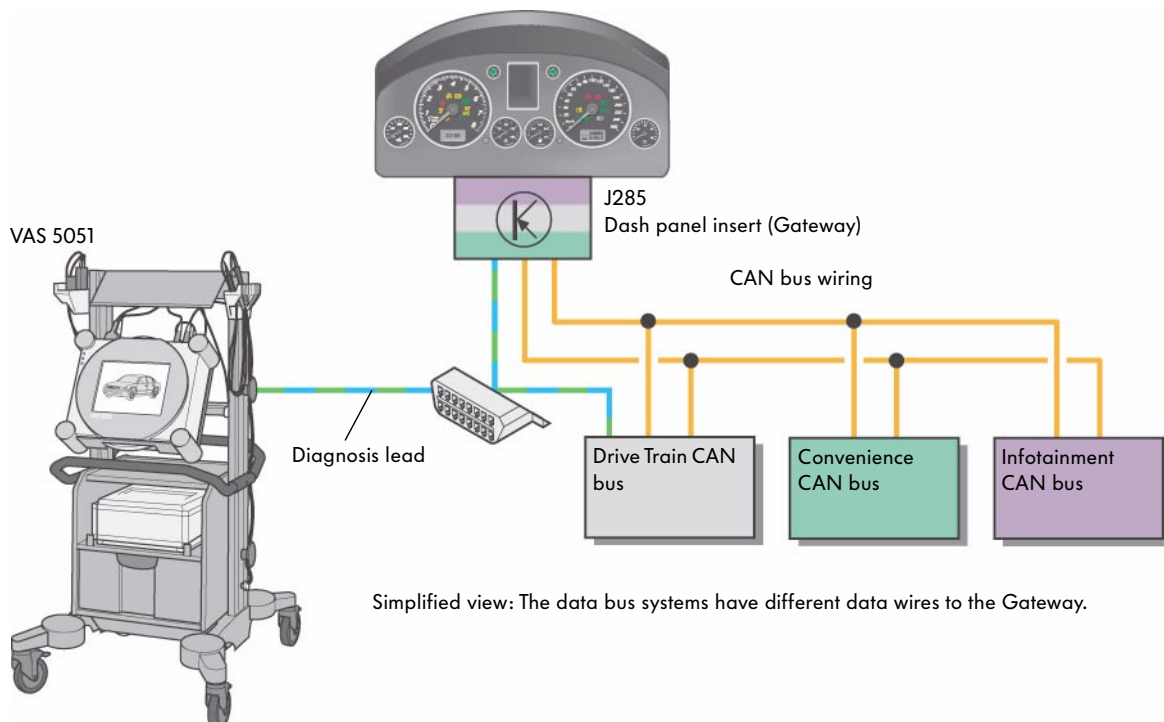
The data from the guided fault finding function is interrogated by the vehicle diagnosis, testing and information system VAS 5051.

To do this, the guided fault finding function must be selected. All the necessary information can be found there.

The data is interrogated via a diagnosis interface for the data bus in the dash panel insert.

A wired communication connection is only necessary to some control units in the drive train CAN bus, to control units for gas discharge lamps and to the convenience system central control unit.

Signal sequence



S298_047



Glossary

CAN bus

Bi-directional data wire between control units. The data can be sent in both directions (bi-directional). Data buses work at different rates of data transfer. 500 kBit/s means that 500 000 binary figures, that is 0 or 1, can be sent per second.

Discreet signal

This is a voltage signal which is sent via a normal cable.

Gateway

This is a data interface (connection), which allows different data signals to be sent from one CAN bus to another.





Test yourself

1. Which control units belong to the Drive Train CAN bus?

- a) The airbag control unit, the convenience system central control unit, the tyre pressure monitor control unit.
- b) The steering column electronics control unit, the entry and start authorisation control unit, the engine control unit, the airbag control unit.
- c) The wiper motor control unit, the door control units, the rear blind control unit, the airbag control unit.

2. Where can the battery main / isolation switch E 74 be found?

- a) In the luggage compartment, next to the starter battery.
- b) In the engine compartment, near the alternator.
- c) In the back-up fuse box, under the driver's seat.

3. If the voltage of the onboard power supply battery is below 11.2 Volt,

- a) it is discharged.
- b) it is weak, but not discharged.
- c) the alternator is defective and must be replaced.



4. Which functions are controlled by the onboard power supply?

- a) The parking light, fog lamps, twin washer pump.
- b) The brake lights, the rear turn signals, the power latch function in the tailgate.
- c) The wiper motor, the central locking, the sliding/tilting sunroof.

5. Which lighting settings can be carried out in the set-up menu of the dash panel insert?

- a) Change in the flash frequency of the turn signals.
- b) Day driving light in countries where there is no legal requirement for them to be on permanently.
- c) The brightness of the footwell lighting.

6. Which control units play a role in the "Automatic driving light" function?

- a) The onboard power supply control unit, the wiper motor control unit, the convenience system central control unit.
- b) The steering column electronics control unit, the onboard power supply control unit, the trailer detection control unit.
- c) The entry and start authorisation control unit, the onboard power supply control unit, the convenience lighting control unit.





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