Service Training

Self-study Programme 379

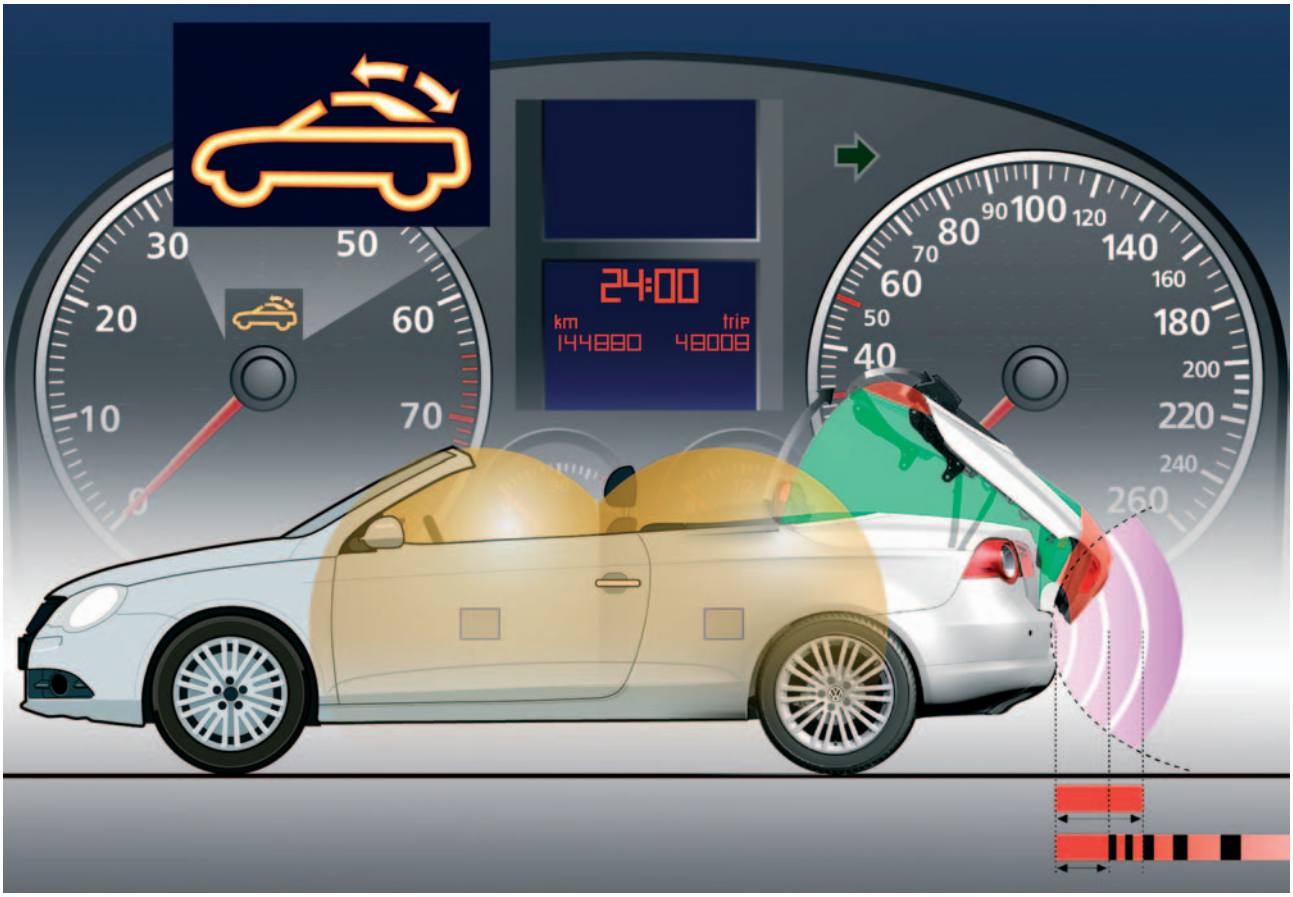
The Eos 2006 Electrical system

Design and function

The Volkswagen Eos takes a pioneering approach to convertible roof technology.
Besides the actual convertible roof control system, this also affects some of the vehicle's other electronic systems, such as e.g. the window convenience control system, the interior monitoring system or the parking aid function.

As a supplement to self-study programme 335 "The Eos 2006", we would like to focus on the function of the convertible roof control system and the electrical system in the Eos in this issue.

Please also note self-study programme SSP355 "The Eos 2006" under all circumstances.
Only by reading both programmes will you be able to obtain an overview of the complex roof structure and its function.



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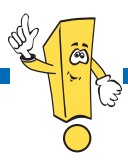


Important Note

The self-study programme shows the design and function of new developments.
The contents will not be updated.

For current testing, adjustment and repair instructions, refer to the relevant service literature.

Contents

Introduction

Modern motor vehicles are characterised by a multitude of electrical and electronic systems, which regulate the vehicle's operation, increase vehicle safety and driving comfort and support the driver in driving the vehicle.

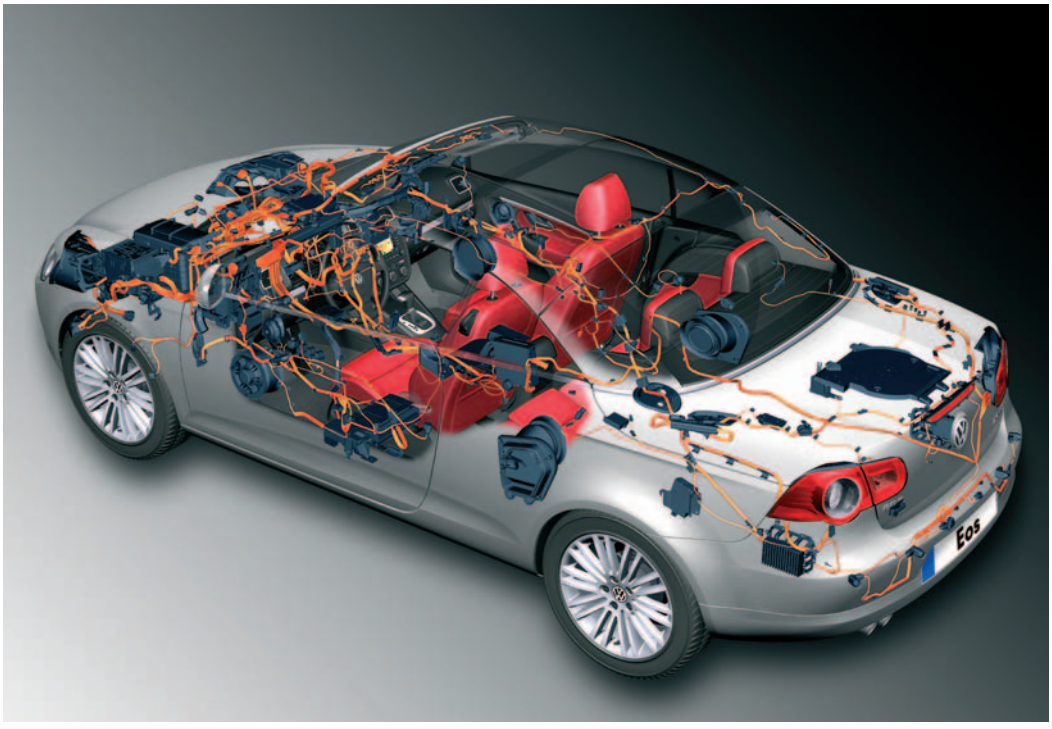
Interaction between these systems can only function if they respond to each other. For example, the ABS and ESP control unit must be able to instruct the engine control unit to reduce the engine's output if this is made necessary by a corresponding driving situation. Today, this information is extensively exchanged in digital form via fast data bus systems. As a result of this high technical standard, it is becoming increasingly important to update the vehicle systems' software via on-line workshop links and to ensure that this is kept up-to-date.

In view of this, the Eos, the most recent development in the convertible range, also reveals a multitude of vehicle systems which exchange information, as part of controlling the convertible roof, to ensure safe and flawless convertible roof operation. In the Eos, the new immobilizer IV is one of those systems which requires an on-line workshop link to download data to adapt the system.

S379_028

In terms of its electrical system, the Eos offers the following special features, some of which originate from the vehicle's conception as a coupé convertible:

- **Convertible roof control system**
  This contains the hydraulic and electric drive, the convertible roof sensor system and communication with other vehicle systems via CAN data bus.
- **Interior monitoring system**
  Modern microwave technology guarantees protection against theft even when the convertible roof is open.
- **Immobilizer**
  The Eos is equipped with the immobilizer IV with download function. An on-line link is the prerequisite for adapting this.
  In contrast to the Passat 2006, in which the system was fitted for the first time, the immobilizer IV is not equipped with an electric steering column lock.
- **Climate control system**
  This gives consideration to the influence of ambient conditions when the convertible roof is open.
- **The aerial concept**
  Thanks to a new installation concept in the rear lid, exterior and window aerials are no longer necessary.
- **Rear lid assist**
  An extended Park Distance Control function ensures that the space required behind the vehicle for the convertible roof's action is available.
- **Electric easy entry function**
  Comfortable entry and exiting to and from the rear seats thanks to an electric seat adjustment system.



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The vehicle electrical system

The structure of the vehicle electrical system

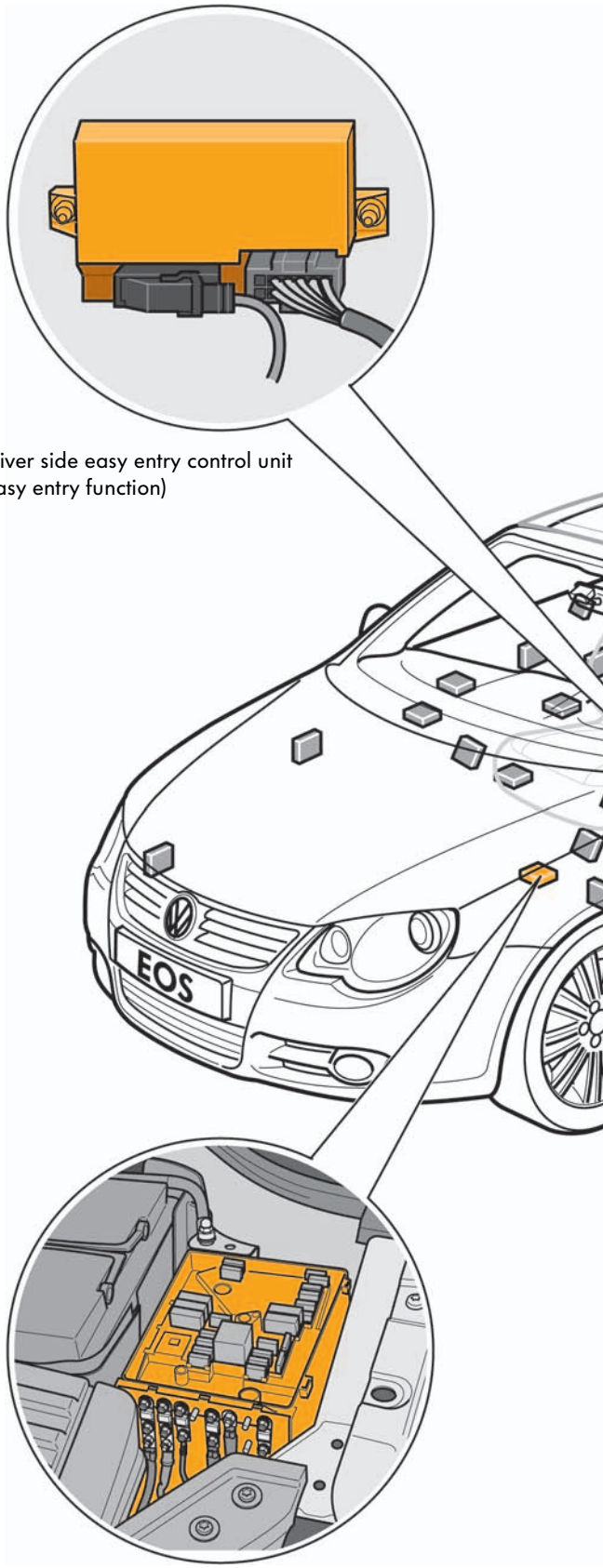
Installation locations of the electrical components

To implement the electrical functions, it was necessary to completely redesign certain control units and to accordingly adapt other control units originating from the Golf platform.

The vehicle electrical system's central component is the vehicle electrical system control unit. In the Eos, this is located beneath the dash panel on the driver's side. The electronics box in the engine compartment contains the main fuse holder and a relay carrier. Further relays are located on the vehicle electrical system control unit and the relay carrier on the vehicle electrical system control unit bracket. The thermo-fuse for the externally guided sliding roof is also located there.

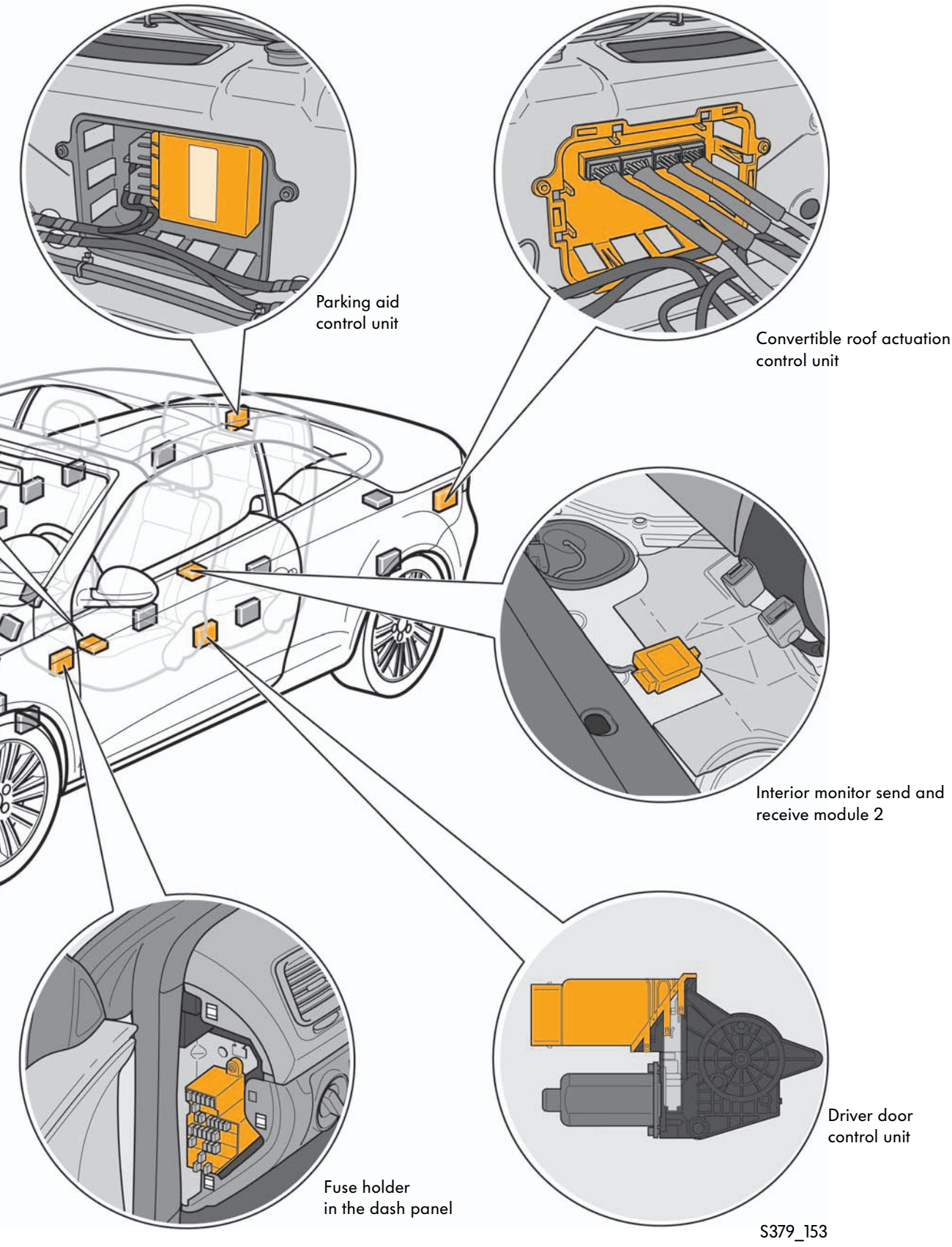
A further fuse holder is located at the left-hand side of the dash panel. The convertible roof actuation system fuses are located together on the main fuse holder in the electronics box.

Due to the vehicle-specific spatial conditions, the Eos is equipped with two 6V batteries instead of one 12V battery if the 6-cylinder engine is installed.



Driver side easy entry control unit (easy entry function)

Electronics box with relay carrier and fuse holder


Parking aid
control unit
Convertible roof actuation
control unit
Interior monitor send and
receive module 2
Driver door
control unit
Fuse holder
in the dash panel

S379_153

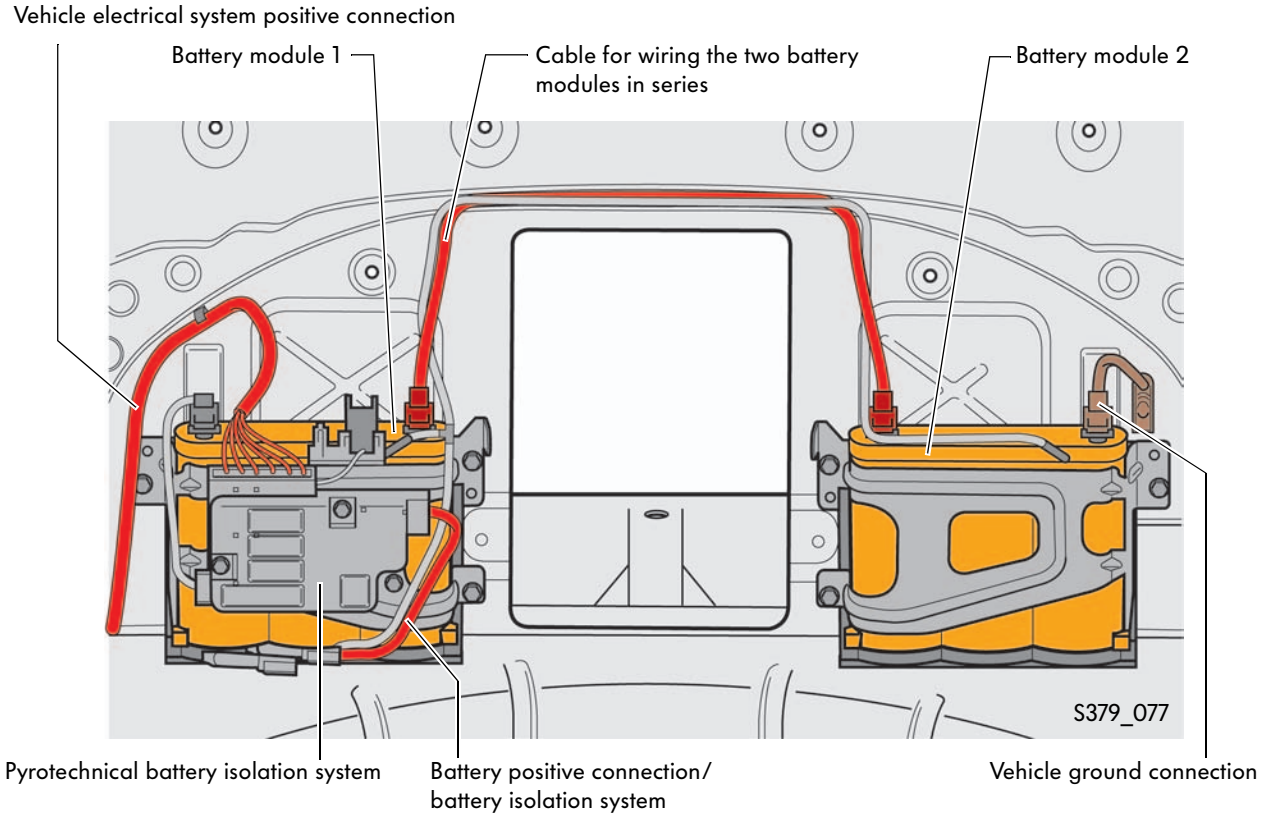
The vehicle electrical system

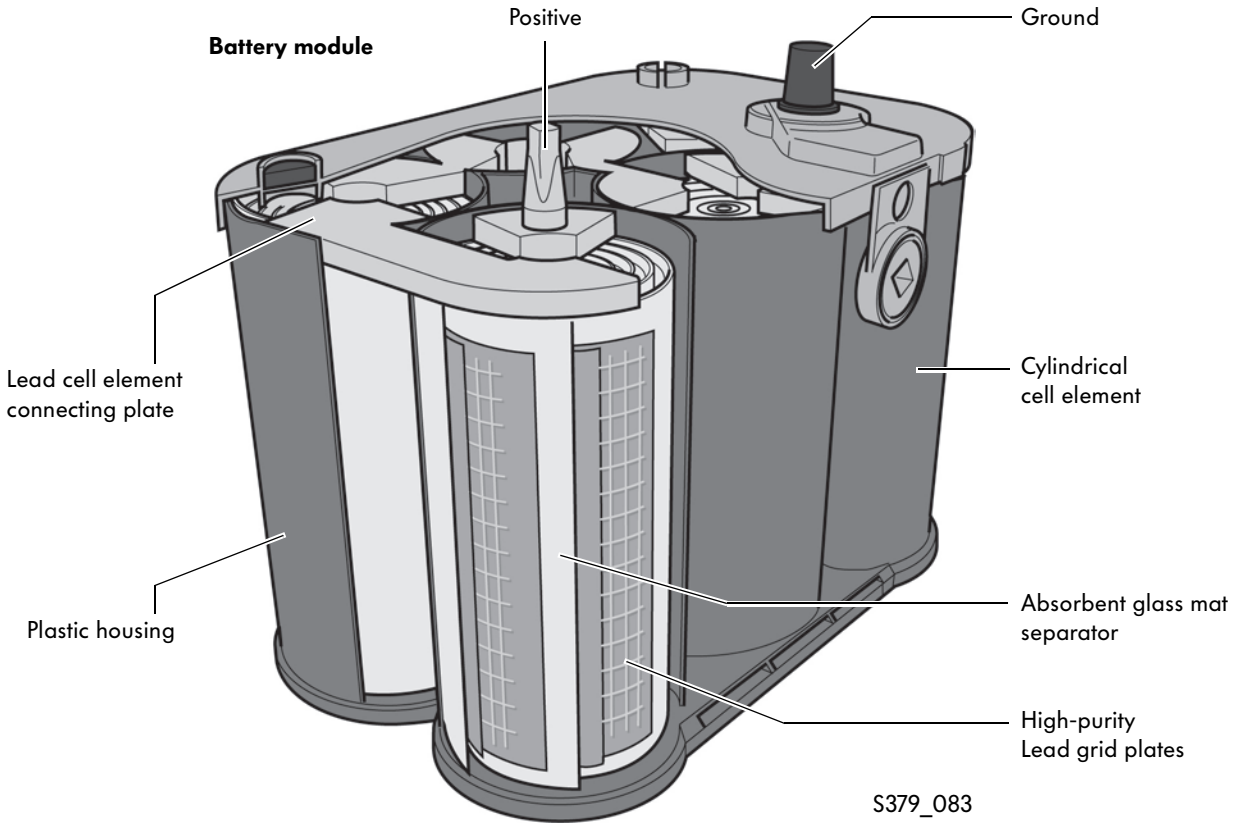
Voltage supply

Due to reasons of space depending on which engine is fitted, the Eos is equipped with two 6V absorbent mat batteries instead of the conventional 12V battery in the engine compartment. These are installed behind the rear seat backrest on the left and right-hand sides of the vehicle and wired in series via a connecting cable with degassing pipe. This battery concept is used if engines requiring large amounts of space, e.g. the V6 engine, are fitted in the Eos.

The following points must be observed under all circumstances in the event of repair and servicing:

- When charging, checking or renewing, both 6V batteries must be treated as one 12V unit.
- Only charge the modules to a maximum of 14.4V with voltage limitation.
- Never charge or renew a 6V module individually.
- 6V modules must always be evenly loaded. Never connect a consumer to just one module.
- On disconnection, always loosen the body-side negative terminal first, as there is otherwise a risk of one 6V module's short-circuiting due to ground contact.





Absorbent mat batteries

The structure of absorbent mat batteries differs significantly from that of conventional vehicle batteries.
Significant features of absorbent mat batteries include:

- The rolled, cylindrical structure of the positive and negative lead grid plates together with an absorbent glass mat separator to form a cell element results in a very compact battery module design with a simultaneous increase in output.
- The compact, pressed cell connection results in increased vibration resistance and therefore a longer service life.
- The battery acid is bound in the absorbent glass mat separator. The battery is therefore leak-proof.
- The absorbent mat battery has a higher cold-starting output than conventional vehicle batteries.
- The battery modules are maintenance-free.

When handling the 6V absorbent mat batteries in the Eos, note the information in the corresponding workshop manuals under all circumstances.

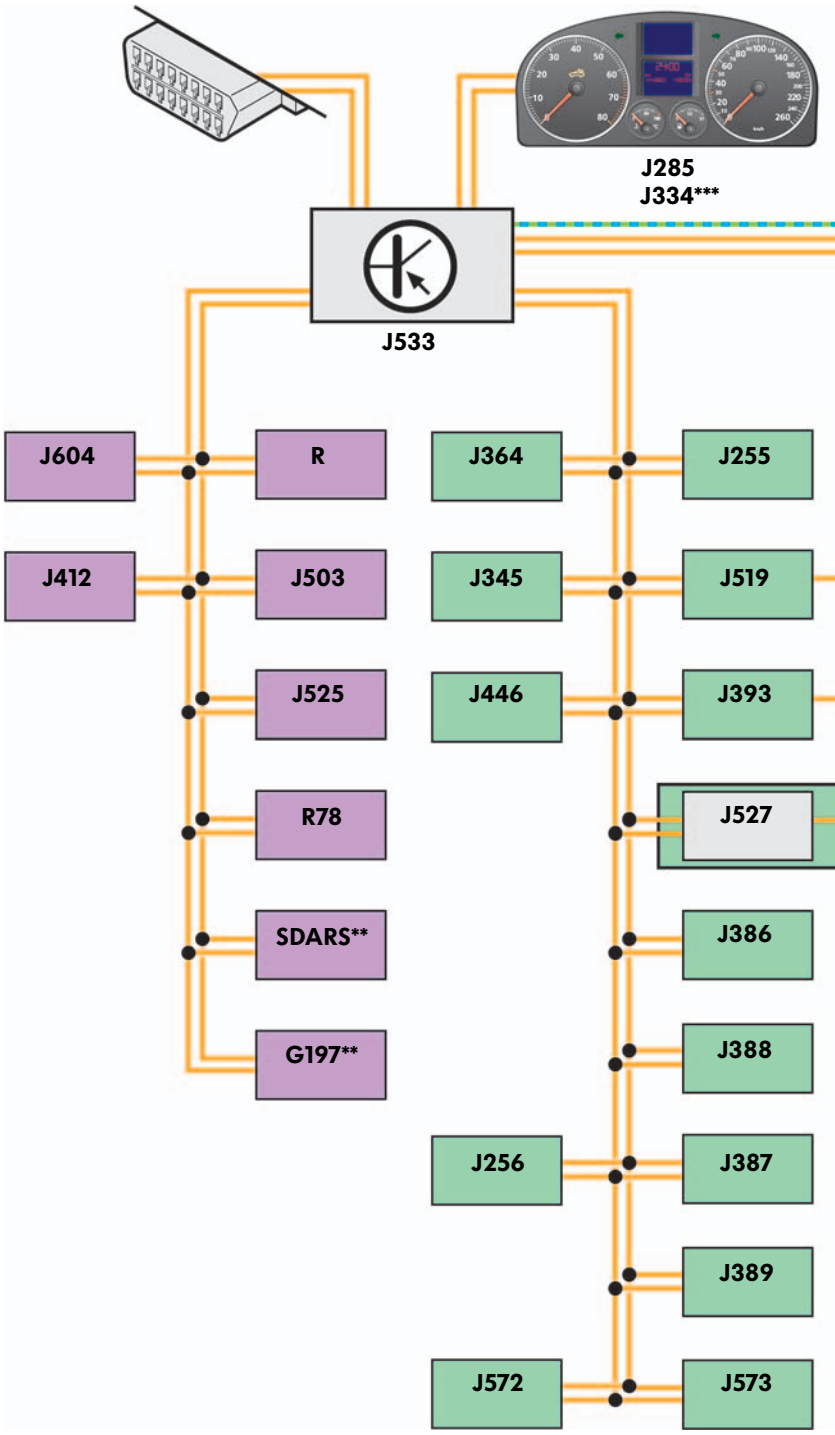
Data bus networking

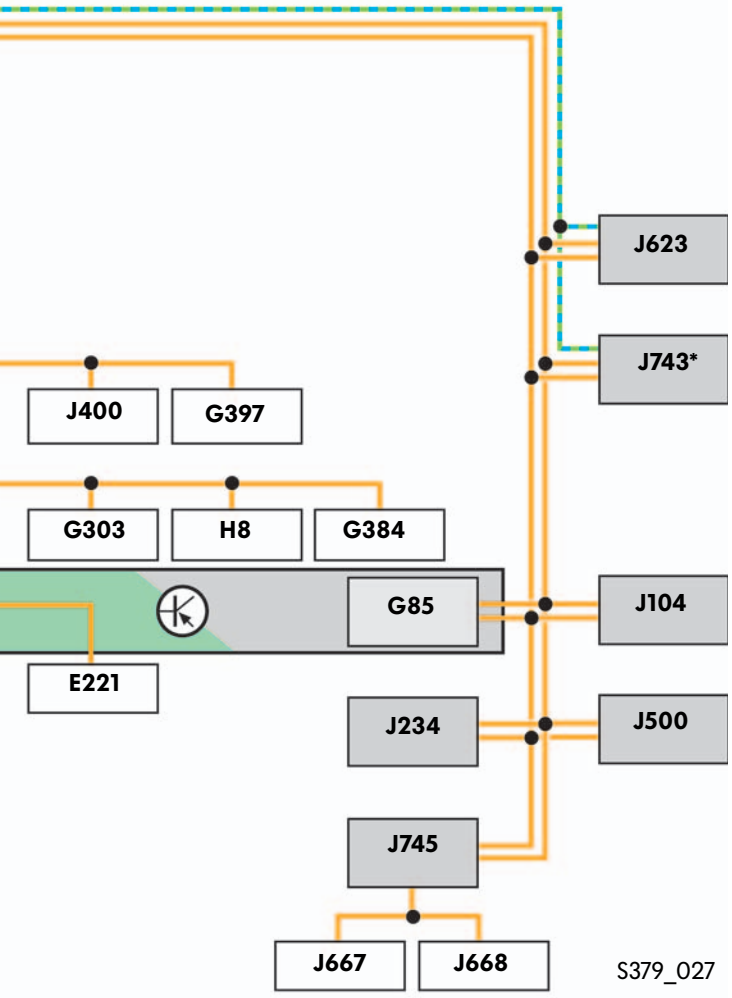
The vehicle electrical system in the CAN data bus

The block diagram shows you which control units in the vehicle electrical system communicate with each other via the CAN or LIN data bus, in order to implement the different vehicle systems.

The schematic which is shown is merely an example, as the precise number of control units in the CAN data bus systems is dependent on the vehicle's equipment. An example of this is the different sound packages or the vehicle's being equipped with a direct shift gearbox or a manual gearbox.

As will be described in detail at a later point, communication via the CAN data bus is also vital to actuation of the convertible roof. To obtain approval to open and close the roof, diverse pieces of information have to be exchanged between different vehicle systems, in order to guarantee maximum possible safety and functionality.





S379_027

Legend

E221 Operating unit in steering wheel
G85 Steering angle sender
G197 Magnetic field sender for compass **
G303 Interior monitor send and receive module 1
G384 Vehicle inclination sender
G397 Rain and light sensor
H8 Anti-theft alarm system horn
J104 ABS control unit
J234 Airbag control unit
J255 Climatronic control unit
J256 Convertible roof actuation control unit
J285 Control unit with display in dash panel insert
J334 Immobilizer control unit ***
J345 Trailer detector control unit
J364 Auxiliary heater control unit
J386 Driver door control unit
J387 Front passenger door control unit
J388 Rear left door control unit
J389 Rear right door control unit
J393 Convenience system central control unit
J400 Wiper motor control unit
J412 Mobile telephone operating electronics control unit
J446 Parking aid control unit
J500 Power steering control unit
J503 Control unit with display for radio and navigation
J519 Onboard supply control unit
J533 Data bus diagnostic interface
J525 Digital sound package control unit
J527 Steering column electronics control unit
J572 Driver side easy entry control unit
J573 Front passenger side easy entry control unit
J604 Auxiliary air heater control unit
J623 Engine control unit
J667 Power output module for left headlight
J668 Power output module for right headlight
J743 Mechatronic unit for direct shift gearbox *
J745 Cornering light and headlight range control unit
R Radio
R78 TV tuner

SDARS = **S**atelite **D**igital **A**udio **R**adio **S**ervices**
(digital audio satellite reception system)

* With direct shift gearbox only
** North America only
*** Immobilizer IV with download (without electric steering column lock in the Eos)

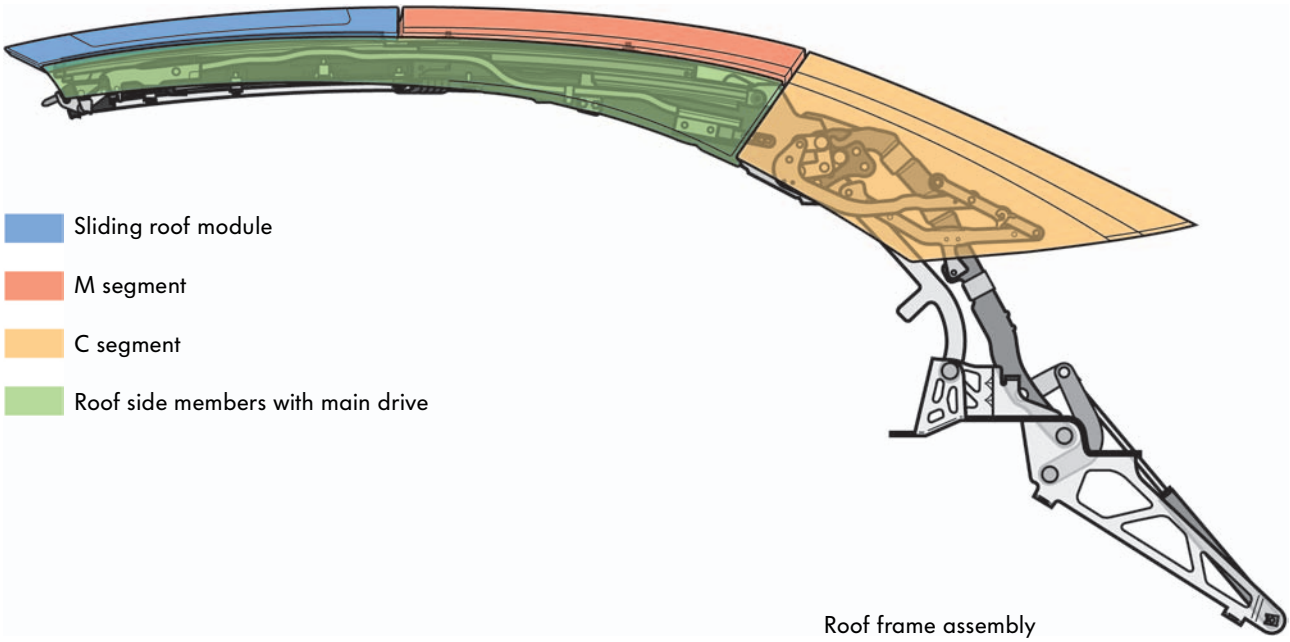
Electrohydraulic convertible roof actuation

CSC convertible roof structure

CSC convertible roof means **C**oupé **S**liding and **C**onvertible roof.
It is divided into five assemblies, which are moved independently of each other during convertible roof actuation:

- The sliding roof module
- The middle segment (M segment) with the sliding roof module's electric drive
- The C segment with the rear window
- The roof side members with the main drive.
  On each side of the vehicle, these are comprised of the main hinge, two hydraulic cylinders, the roof side member including its trim panels and the necessary mechanical actuations and locks.

Apart from the sliding roof module, all of the assemblies are moved with the aid of hydraulic cylinders. The operating pressure required for this is supplied by an electric hydraulic pump. The sliding roof module is driven by an electric motor, which is installed in the middle segment.



Roof frame assembly

S379_049

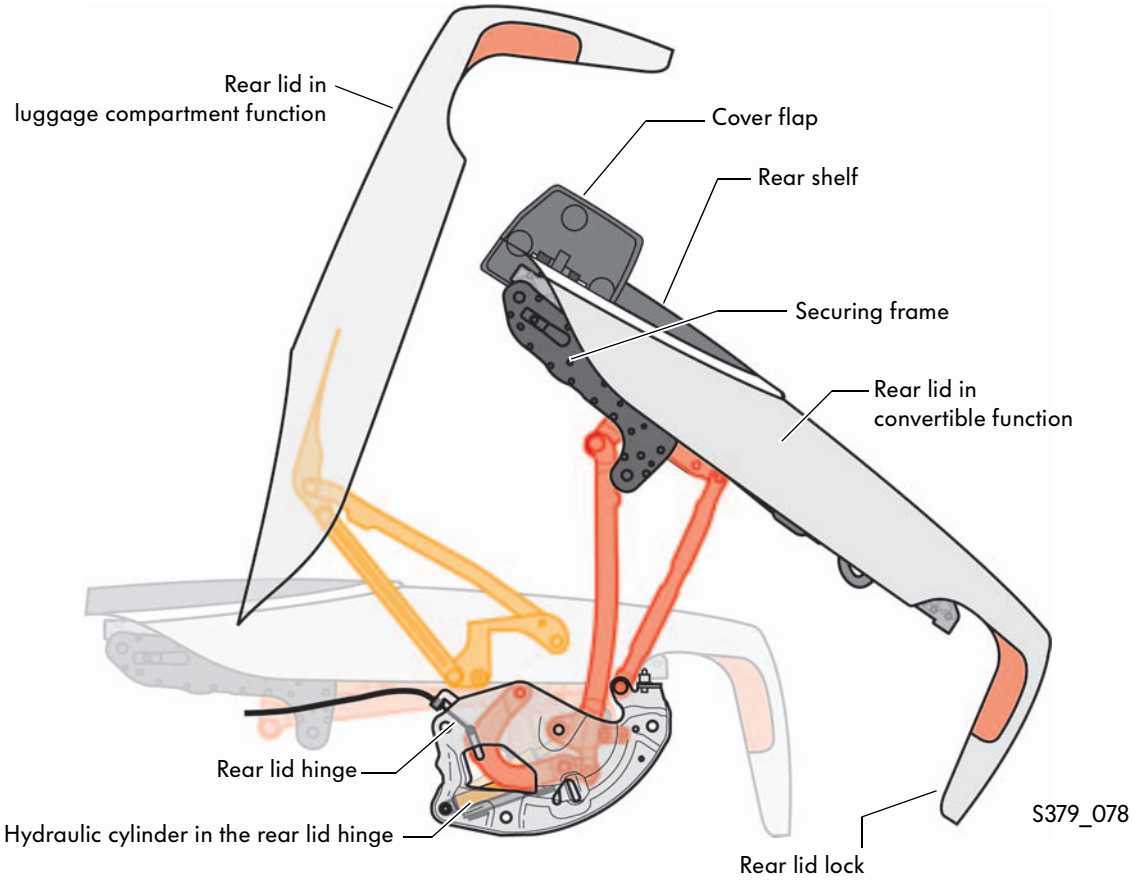
Rear lid structure

The rear lid is comprised of the two securing frames, the rear lid hinges, the rear shelf with cover flaps, the rear lid lock and the rear lid.

To open the luggage compartment to accommodate the roof package, the rear lid's movement is linked closely to the roof segments' movement sequence.

Two hydraulic cylinders on each side of the vehicle also undertake the necessary functions on actuation of the rear lid. A pair of cylinders in the rear lid securing frames releases the rear lid from the body and the C segment and locks the securing frames to the rear lid, so that the rear lid can pivot backwards, before the roof package is placed into the luggage compartment. This pair of cylinders also ensures that the cover flaps on the rear shelf are closed.

The second pair of cylinders is installed in each rear lid hinge. This carries out the rear lid and roof side member flap opening and closing movement.



Convenience electronics

Convertible roof control system

The involved electrical components

To guarantee flawless roof operation, not only do the CSC convertible roof's electronic components have to communicate with and react to each other, but extensive information also has to be exchanged with other control units and electronic components.

For example, the convertible roof control unit has to transmit the command "Lower windows" or "Raise windows" to the door control units. In turn, the door control units inform the convertible roof control unit of the position of the side windows. This is necessary, because the side windows have to be lowered before the roof begins to move so that they do not collide with the moving parts of the convertible roof.

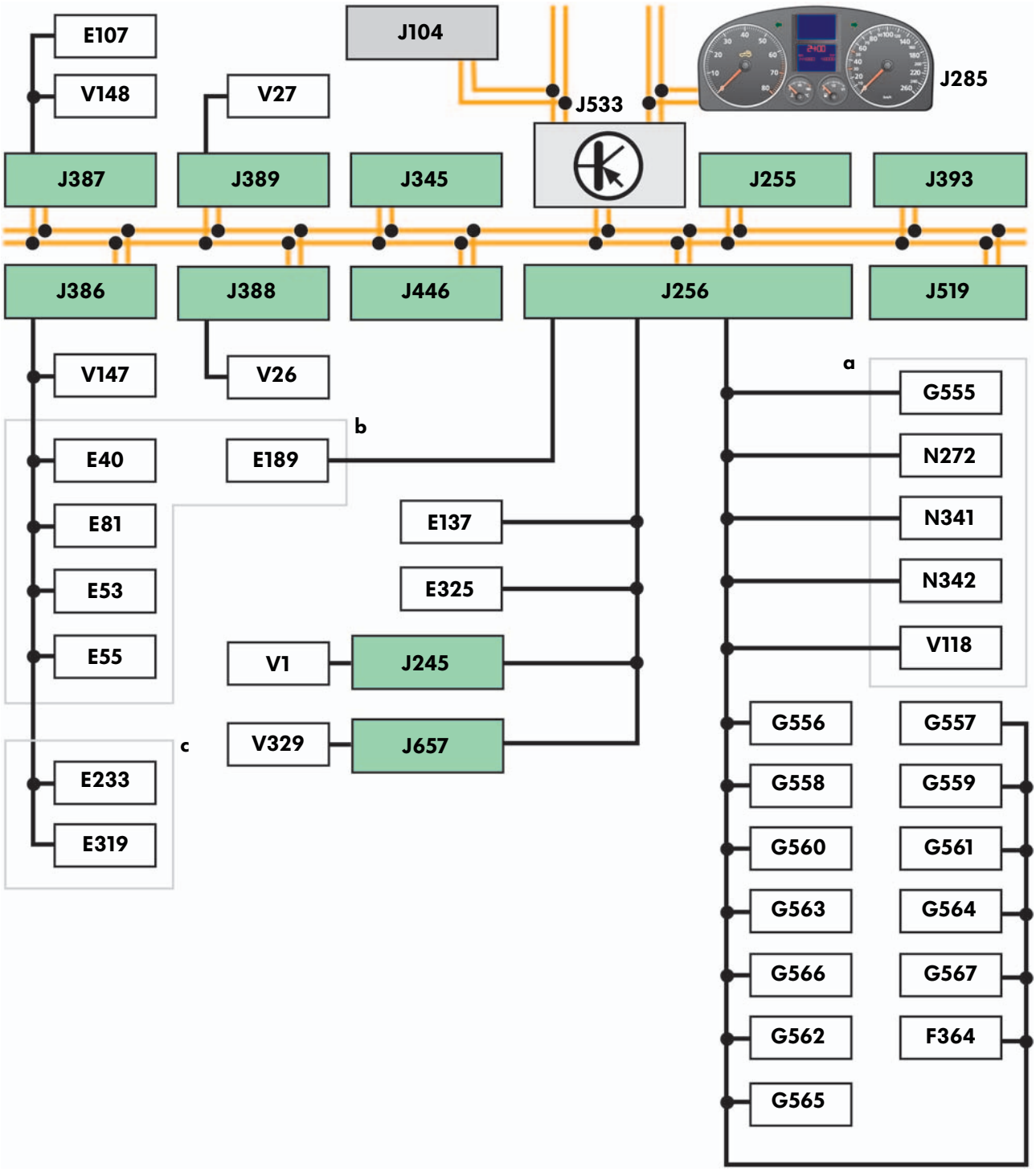
The adjacent schematic shows all of the electronic components and control units which communicate with each other as part of the convertible roof control system.

More detailed information on the operating conditions for roof movement can be found in this issue as of page 38.

Legend

E40 Front left window regulator switch
E53 Rear left window regulator switch, in driver door
E55 Rear right window regulator switch, in driver door
E81 Front right window regulator switch, in driver door
E107 Window regulator switch in front passenger door
E137 Convertible roof actuation button
E189 Central switch for window regulators in driver door
E233 Rear lid remote release button
E319 Fuel tank flap release button
E325 Sunroof button
F364 Luggage cover contact switch
G555 Hydraulic pump temperature sender
G556 Front sender for position of left roof member
G557 Front sender for position of right roof member
G558 Sender for left roof member locked
G559 Sender for right roof member locked
G560 Left sender for rear window frame locked
G561 Right sender for rear window frame locked
G562 Sender for rear window frame open
G563 Left sender for rear shelf locked
G564 Right sender for rear shelf locked
G565 Sender for roof stowed
G566 Sender for left roof member flap open
G567 Sender for right roof member flap open
J104 ABS control unit
J245 Sliding sunroof adjustment control unit
J255 Climatronic control unit
J256 Convertible roof actuation control unit
J285 Control unit with display in dash panel insert
J345 Trailer detector control unit
J386 Driver door control unit
J387 Front passenger door control unit
J388 Rear left door control unit
J389 Rear right door control unit
J393 Convenience system central control unit
J446 Parking aid control unit
J519 Onboard supply control unit
J533 Data bus diagnostic interface
J657 Power latching control unit
N272 Power operated convertible roof valve 1
N341 Power operated convertible roof valve 2
N342 Power operated convertible roof valve 3
V1 Sliding sunroof motor
V26 Rear left window regulator motor
V27 Rear right window regulator motor
V118 Convertible roof actuation hydraulic pump
V147 Driver side window regulator motor
V148 Front passenger side window regulator motor
V329 Power latching motor

a Hydraulic unit
b+c Driver door control panels


E107
V148
J104
V27
J533
J285
J387
J389
J345
J255
J393
J386
J388
J446
J256
J519
V147
V26
a
G555
b
E40
E189
N272
E81
E137
N341
E53
E325
N342
E55
V1
J245
V118
G556
G557
c
V329
J657
G558
G559
E233
G560
G561
E319
G563
G564
G566
G567
G562
F364
G565

S379_029

Convenience electronics

Controls and displays

The sliding roof module button

This is integrated into the convertible roof actuation button.
Pressing opens the sliding roof. Pulling closes the sliding roof. Depending on the length of time for which the button is pressed or pulled, movement is carried out either automatically or manually.

If, on opening, the button is held down for less than 0.5 seconds, automatic movement which brings the sliding roof to the ventilation position and ends there is started.
Further actuation of the button for less than 0.5 seconds starts a second automatic movement, which opend the sliding roof fully.

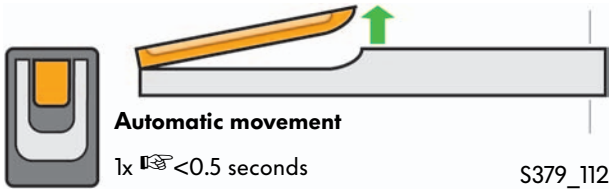
If, when the sliding roof is closed, the button is actuated for longer than 0.5 seconds, manual movement is started. Manual movement continues as long as the button is actuated. After passing the ventilation position, a switch can be made from manual to automatic mode by actuating the button again for less than 0.5 seconds. The sliding roof opens completely.

When closing the roof, automatic or manual movement is also possible. In this case, the sliding roof always stops at the ventilation position. Closing it completely is only possible in manual mode.

S379_040

Open sliding roof

Ventilation position.



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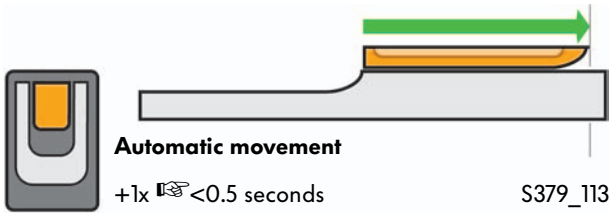

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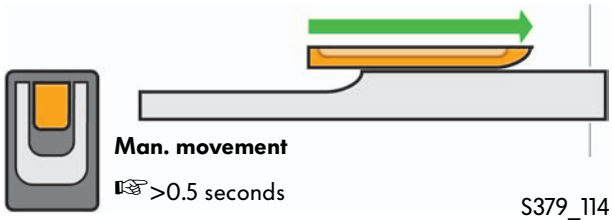
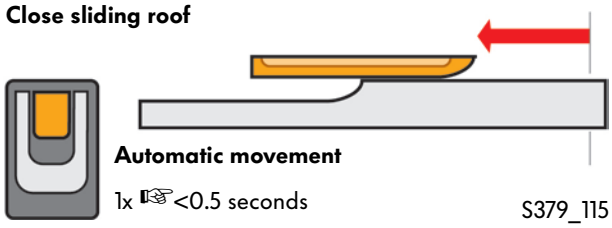


S379_114

Close sliding roof



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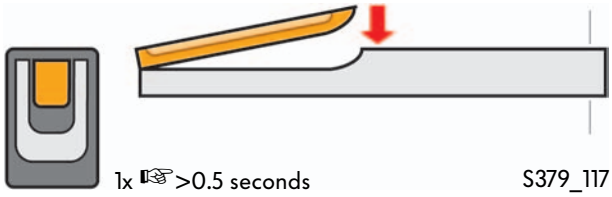
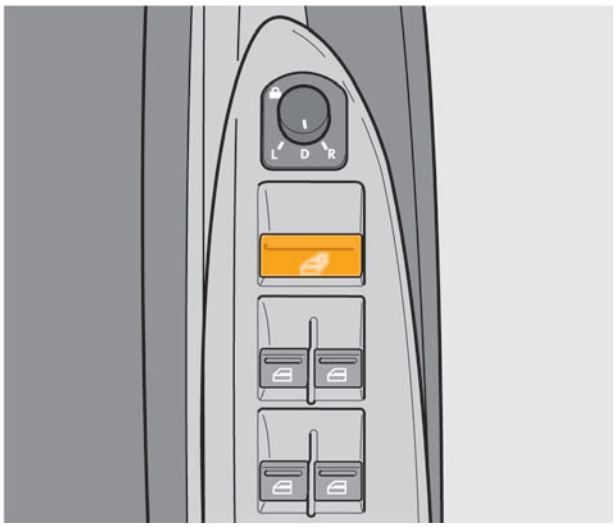


S379_117

S379_038

Convertible roof actuation button

The convertible roof actuation button can also be actuated in two directions. Pressing and holding opens the convertible roof if the conditions for movement are met. Pulling and holding closes the convertible roof. If the button is released during roof movement, the movement stops.
If the button is not actuated again within max. 8 minutes, only closing is then possible. After max. 9.5 minutes, the convertible roof is lowered automatically in clocked stages, accompanied by a continuous gong, in the direction of the nearest centre of gravity position. This means that, depending on the position which the roof has reached, lowering is carried out in the "opening" or "closing" direction, in accordance with gravity.



S379_041

Window regulator actuation

In convertible operation, it will often be the case that all window regulators have to be actuated simultaneously. A central switch for window actuation is therefore necessary. This central switch for window regulators in the driver door E189 is integrated into the window actuation button panel on the driver's side.
Its signal runs directly to the convertible roof actuation control unit, and from there to the individual door control units.

The side windows must be completely lowered so as not to impede or damage the convertible roof modules during their movement sequence.

Convenience electronics

Roof status indicator, low-line version

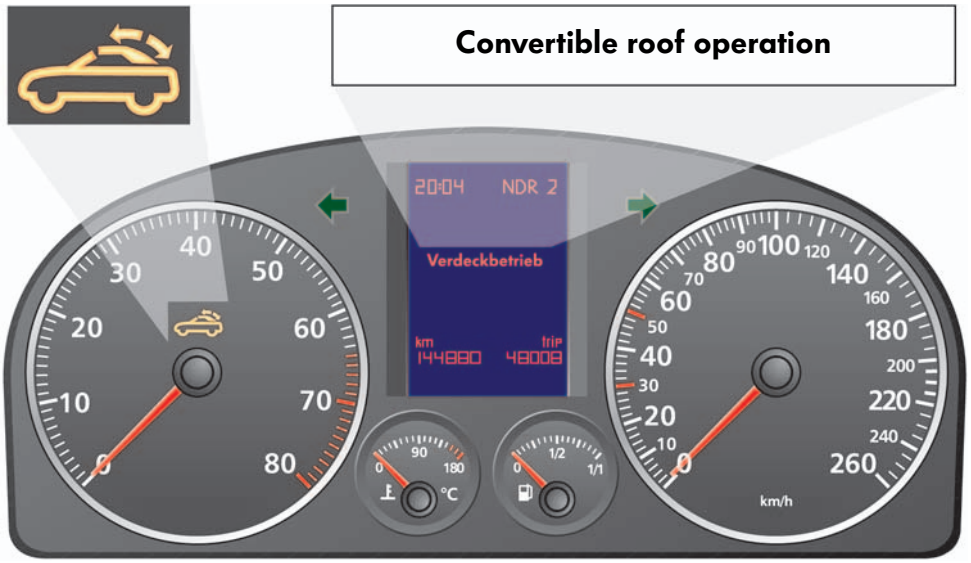
S379_042
S379_155

Gong

In this variant , communication between the convertible top control system and the driver takes place via an indicator symbol in the dash panel insert and an acoustic signal sender. The symbol lights up during roof movement. The driver is informed that the end position has been reached via a gong and extinguishment of the indicator symbol.
A flashing indicator symbol indicates a system fault in the convertible roof control system, e.g. an incorrectly inserted luggage cover.
During vehicle operation, a flashing symbol with repeated gong indicates that the convertible roof is not fully closed or stowed.

Convertible roof actuation control unit fault messages are only shown on the display when the convertible roof is actuated. The exception to this is a fault in the roof member locked senders. Failure of these is immediately displayed by setting the indicator symbol and with the "System fault – close convertible roof" message, to encourage the driver to check the situation.

Roof status indicator, mid-line and high-line version



S379_043
S379_155

Gong

Besides the indicator symbol and the acoustic signal sender, these two equipment variants contain a text field in the dash panel insert, in which the driver is shown information on convertible roof operation.
In addition to the illuminated symbol, the message "convertible roof operation" is also shown in the dash panel insert during roof movement. After reaching an end position, the gong is also sounded and the indicator symbol extinguished in this case. Depending on the status of the convertible roof, "convertible roof opened" or "convertible roof closed" is displayed in the text field.
During vehicle operation, a flashing symbol with repeated gong indicates that the convertible roof is not fully closed or stowed.

The following information is shown as notes or fault messages in the display:

Notes
- Close luggage cover
- Close rear lid
- Obstacle in rear area
- Convertible roof overheating
- Speed too high
- Sliding roof overheating
- Convertible roof open
- Convertible roof closed
- Convertible roof operation
- Continue convertible roof operation

Fault messages
- Close side windows
- Close sliding roof
- Trailer – no convertible roof operation
- Open rear lock
- System fault – close convertible roof
- System fault – open convertible roof
- System fault - no convertible roof operation
- Convertible roof defective!
  Operating instructions.