

Convenience electronics

Operating conditions

Various conditions have to be met to enable roof movement to be carried out. This applies to opening and closing the convertible roof. One vital element of roof movement release is the detection of a plausible roof assembly position. This applies to the position of the roof assembly within its own movement sequence (e.g. identical signal from the sensor pair) and to the position of the roof assembly within the entire roof movement sequence.

The release conditions also include the position of the rear lid (e.g. the C segment must not pivot down before the rear lid is closed).

Accordingly, the information "C segment is locked" and "rear lid is open" would be implausible.



Conditions for opening the roof

1	Terminal 15 ignition is "on".
2	The convertible roof position is plausible.
3	The CAN data bus reports "communication is possible".
4	The sliding roof reports "communication is possible".
5	The position of the sliding roof has been recorded.
6	Sliding roof not overheated.
7	The microswitch detects the engaged luggage cover.
8	The engine control unit (or ABS ECU/dash panel insert) reports "vehicle speed is less than 1 km/h".
9	The convertible roof actuation control unit detects that roof movement has not yet been completed, i.e. the information "roof open" is not yet available.
10	The sensors report "rear lid is closed".
11	The convertible roof actuation switch supplies a plausible signal.
12	The hydraulic pump temperature sender reports "temperature below 95 °C". *
13	The hydraulic unit reports a valve operating time of less than 8 minutes. **
14	No trailer operation detected.
15	The vehicle electrical system control unit reports a system voltage of over 10.8 V.
16	The door control units report that the necessary window position has been reached.

17	The power latching system reports "closed" after the convenience system control unit has output the signal "convertible roof box main catch closed".
18	The control unit with display in dash panel insert reports "exterior temperature greater than minus 15 °C". ***
19	The heated rear window is switched off. It is automatically deactivated on actuation of the convertible roof switch.
20	As a parking aid function (special equipment), rear lid assist reports "no obstacle in rear area".

- * If the temperature of the hydraulic fluid exceeds 95°C, only the "close convertible roof" command is possible. If the temperature of the hydraulic fluid exceeds 105°C, actuation of the convertible roof is blocked completely until the temperature falls below the threshold value again.
- ** If the hydraulic unit's valves are operated for longer than 8 minutes, e.g. due to repeated opening and closing, the convertible roof control system only permits the roof to be closed. Opening is then no longer possible. This measure also serves to prevent overheating, etc.
- *** If the temperature falls below minus 15°C, it is assumed that the viscosity of the hydraulic fluid is too high to enable roof movement.



Conditions for closing the roof

The pre-conditions are essentially identical to those of opening. Exceptions include:

2	At least one sensor must supply a plausible signal (logical 0/1) for each partial convertible roof movement.
7	The microswitch signal that the luggage cover is in position is not vital as regards closing the roof.
9	The convertible roof must not already be fully closed for the "close" command.
12	A hydraulic fluid temperature of over 95 ° but below 105 °C does not influence the close command.
13	The total actuation time of the hydraulic pump valves must be less than 9.5 minutes so that the close function is released.

Convenience electronics

Convertible roof movement abort conditions

Different conditions, which lead to the abortion of roof movement, apply to prevent damage to the roof. The convertible roof responds in different ways depending on which abort condition has occurred.

These range from stopping roof movement and the options of only being able to open or close the convertible roof to clocked lowering of the roof package in the event of a timeout. One further possibility is complete failure in the event that operating voltage is absent.

The following conditions lead to the abortion of convertible roof movement:



1	The vehicle electrical system voltage falls below 9.0 V.
2	The ignition (terminal 15) is switched off.
3	Communication via the CAN data bus is interrupted.
4	The convertible roof actuation control unit determines that at least one hydraulic valve is defective.
5	The convertible roof actuation control unit determines a defect in the hydraulic unit.
6	The sensors report that the rear lid is not closed.
7	The sensors report that the power latching system is not closed.
8	A trailer is detected via the trailer socket.
9	The sensors do not supply plausible signals regarding the convertible roof position.
10	The speed is higher than 1km/h.
11	The temperature of the hydraulic pump rises above 105°C .
12	The terminal stage of the convertible roof actuation control unit is overheated (overheating protection).
13	The convertible roof actuation control unit fails due to an internal fault.
14	The door control units supply implausible signals regarding the window position or are reported as having failed.
15	The convenience system control unit supplies implausible or no signals.
16	The gateway supplies implausible or no signals.
17	The gearbox control unit supplies implausible or no signals.

18	The total hydraulic valve operating time exceeds 9.5 minutes.*
19	The convertible roof actuation switch signal is interrupted.**
20	The convertible roof actuation control unit generates a timeout.***
21	During the opening process, the luggage cover microswitch reports that the convertible roof guard is not engaged.
22	During roof movement, the exterior temperature falls below the threshold value of minus 15 °C.
23	The convertible roof actuation control unit determines that the temperature sender in the hydraulic unit has failed.

* Convertible roof movement is interrupted if a period of 8 min is exceeded.

** The convertible roof actuation switch may be defective, or the operator releases the switch.

*** Under certain circumstances, the hydraulic pump runs although certain of the preceding steps in the mechanical sequence have not yet been carried out or completed. The convertible roof actuation control unit registers this and switches the hydraulic pump off after a few seconds.



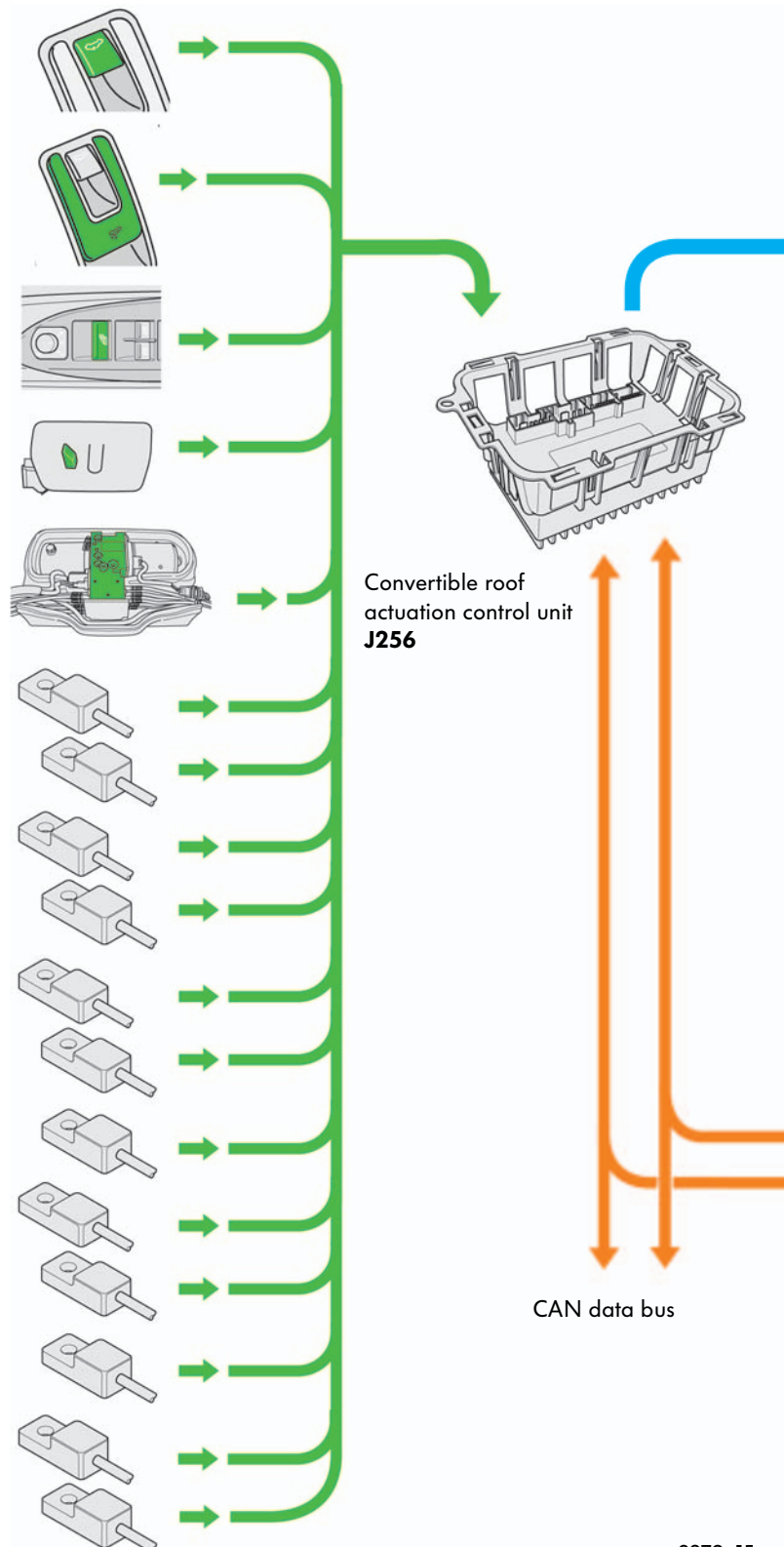
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Roof control system overview

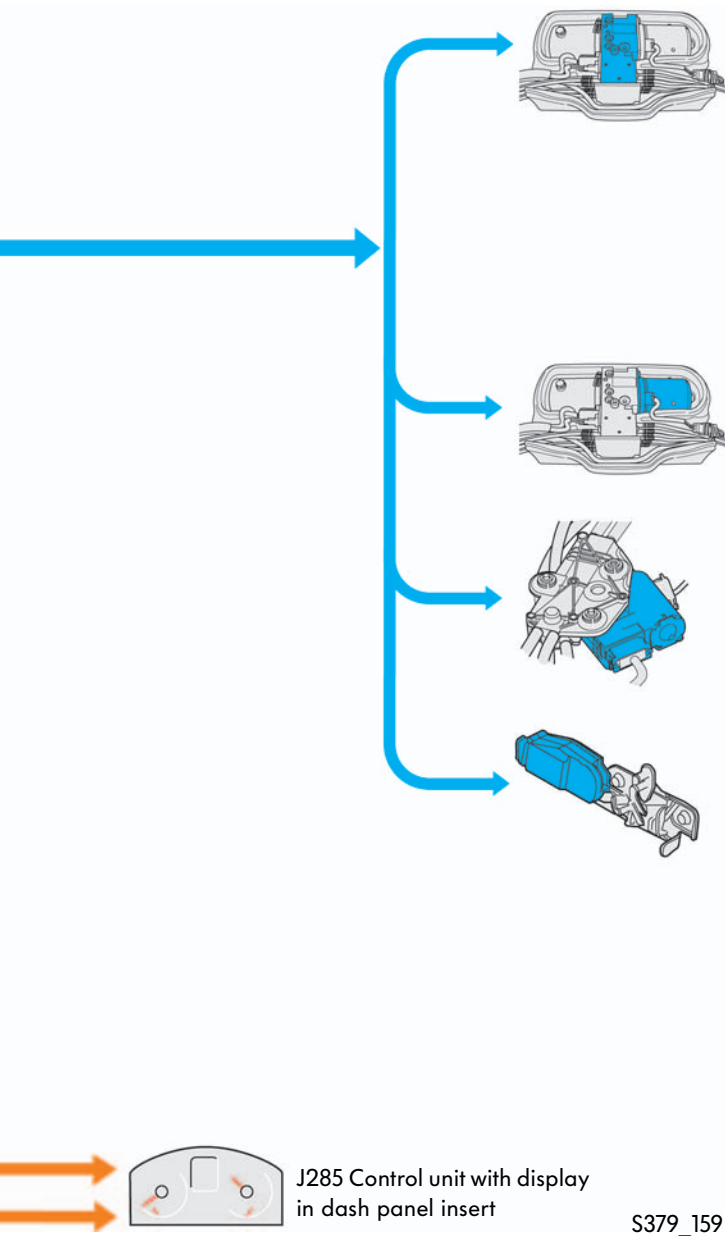
Sensors



- Convertible roof actuation button **E137**
- Sunroof button **E325**
- Central switch for window regulators in driver door **E189**
- Luggage cover contact switch **F364**
- Hydraulic pump temperature sender **G555**
- Front sender for position of left roof member **G556**
- Front sender for position of right roof member **G557**
- Sender for left roof member locked **G558**
- Sender for right roof member locked **G559**
- Left sender for rear window frame locked **G560**
- Right sender for rear window frame locked **G561**
- Sender for rear window frame open **G562**
- Left sender for rear shelf locked **G563**
- Right sender for rear shelf locked **G564**
- Sender for roof stowed **G565**
- Sender for left roof member flap open **G566**
- Sender for right roof member flap open **G567**



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Control elements

Power operated convertible roof valve **N272**,
Power operated convertible roof valve 2 **N341**
Power operated convertible roof valve 3 **N342**

Convertible roof actuation hydraulic pump **V118**

Sliding sunroof motor **V1**

Power latching control unit **J657**
Power latching motor **V329**

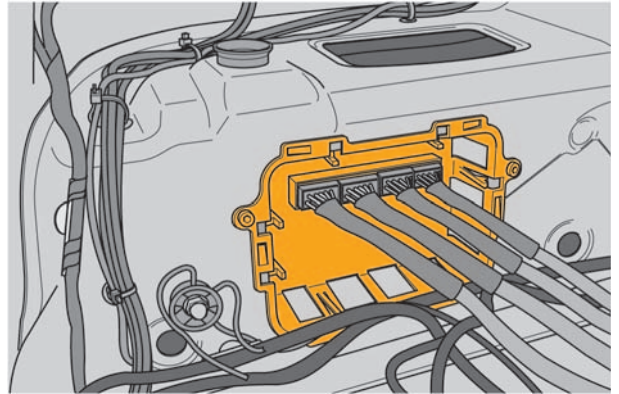


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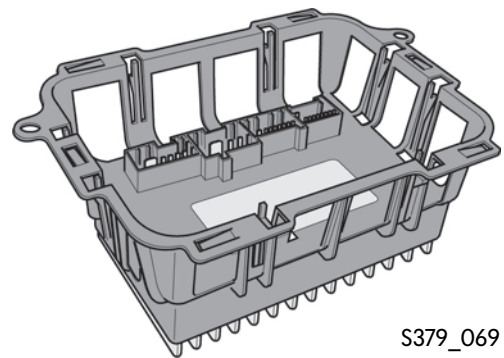
Electrical components

Convertible roof actuation control unit J256

The striking feature of the convertible roof actuation control unit is its basket-shaped bracket. This guarantees that the control unit's heat sink is adequately ventilated (forced ventilation). In addition, an integrated temperature sensor monitors the temperature in the control unit.



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Redundant sensors

Redundant means that something is fitted more than once. In technical systems, redundant components serve to maintain operation even if one of these multiply fitted components should fail. The second sensor's signal can also be used to determine the plausibility of the signal.

The control unit thereby monitors the function of the redundant sensors.

The convertible roof sensors' installation in pairs ensures that the locked end positions can be detected in convertible roof movement, thereby enabling safe operation.

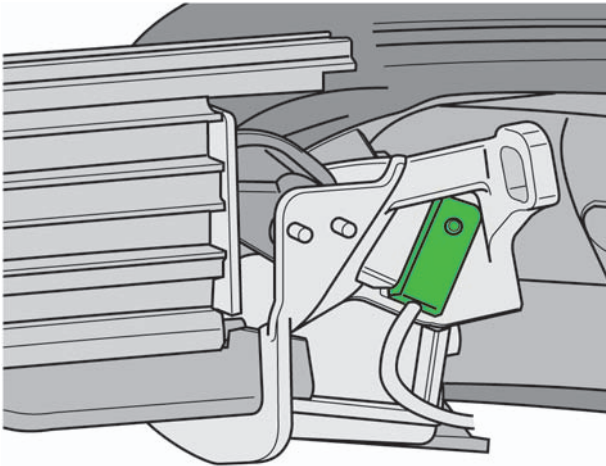
The following sensors are fitted in pairs in the CSC convertible roof sensor system:

- The front senders for the position of left/right roof member G556 and G557,
- The left/right senders for rear window frame locked G560 and G561,
- The left/right senders for rear shelf locked G563 and G564,
- The senders for left/right roof member locked G558 and G559 and
- The senders for left/right roof member flap open G566 and G567.

Electrical components - sensors

Front sender for position of left roof member **G556**

Front sender for position of right roof member **G557**



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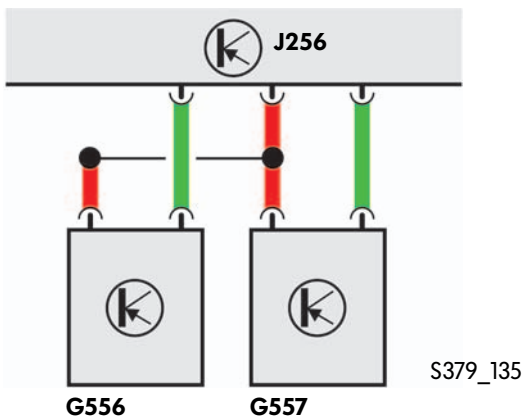
Both sensors are Hall senders with an integrated reference magnet. They are installed on the left and right sides of the cowl panel above the windscreen. They are electrically connected to the vehicle wiring harness via the A-pillars.



Signal use

The sensors indicate that the CSC convertible roof has docked onto the cowl panel.

Electrical circuit



Effect in the event of failure

If one of the two sensors fails (short-circuit or open circuit), the other sensor's value serves to check whether the CSC convertible roof has docked onto the cowl panel and is therefore closed.

If the side members have already docked onto the A-pillars, subsequent sensor failure has no effect unless roof movement is started again.

If a sensor fails when the convertible roof is closed, roof movement cannot be started. If both sensors fail, roof movement is no longer possible.

Convenience electronics

Sender for left roof member locked G558 Sender for right roof member locked G559

The sensors are located at the front in the roof side members at the locking mechanisms for locking the roof side members to the A-pillars. These are Hall senders with integrated magnets, whereby the locking hook acts on the sensor.



Signal use

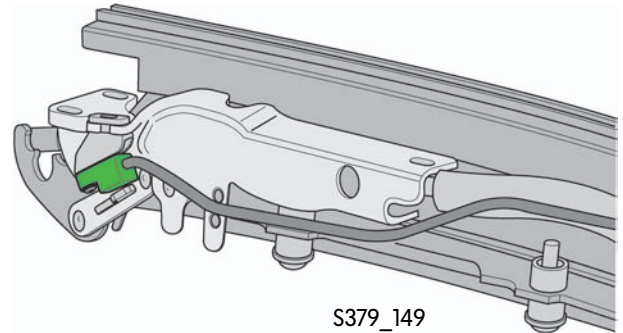
The signal from these sensors indicates that the CSC convertible roof and the A-pillars are locked or released.

If the sensor detects that the lock is open, this means that the roof side members are released and that roof package lowering can be released from this point of view. The signal additionally indicates that roof movement has commenced or that the convertible roof is no longer located in the "closed" position.

Effect in the event of failure

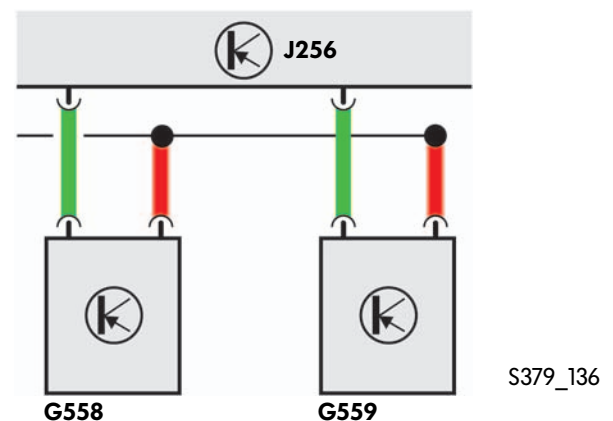
If one of the two sensors fails when the convertible roof is not completely closed, the other sensor's value serves to check whether the CSC convertible roof and the A-pillars are locked or released.

In this case, the convertible roof actuation control unit increases the hydraulic cylinder actuation time slightly, to rule out the fact that a mechanical blockage in the roof mechanism is delaying lock engagement and that this is the reason why the anticipated sensor signal has not been received.



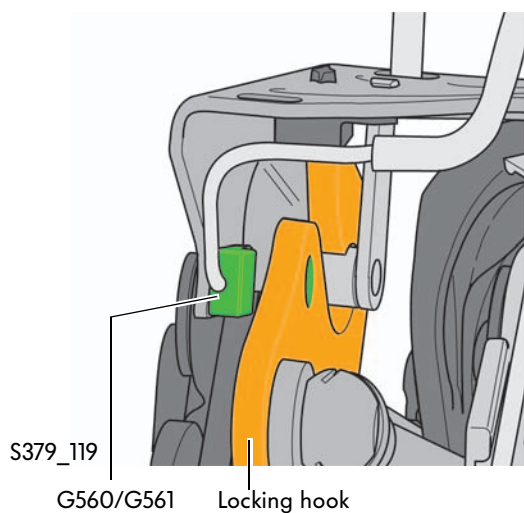
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Electrical circuit

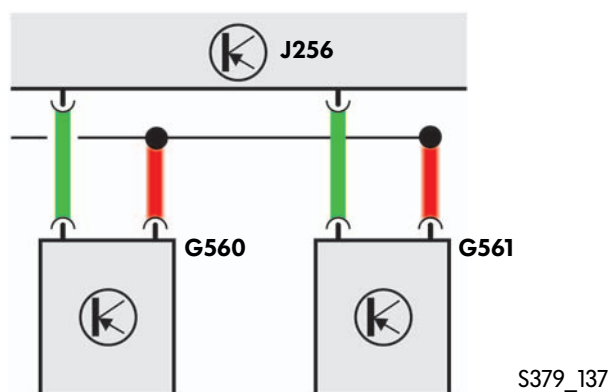


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Left sender for rear window frame locked G560 Right sender for rear window frame locked G561



Electrical circuit



Effect in the event of failure

If one of the two sensors fails when the convertible roof is not completely closed, the other sensor's value serves to check whether the C segment is locked to the side member.

In this case, the convertible roof actuation control unit slightly increases the actuation time for the hydraulic cylinders in the roof side members, to rule out the fact that a mechanical blockage in the roof mechanism is delaying lock engagement and that this is the reason why the anticipated sensor signal has not been received.

The sensors are positioned at the height of the C segment locking hooks in the left and right roof side members. With the aid of two external magnets on the locking hooks, these determine the locking status of the C segment to the roof side members and therefore the M segment.

Signal use

These sensors' signal indicates that the C segment is in the "closed" position and is locked to the roof side members.

If the sensor detects that the lock is open, this means that the C segment is free to pivot over the M segment.

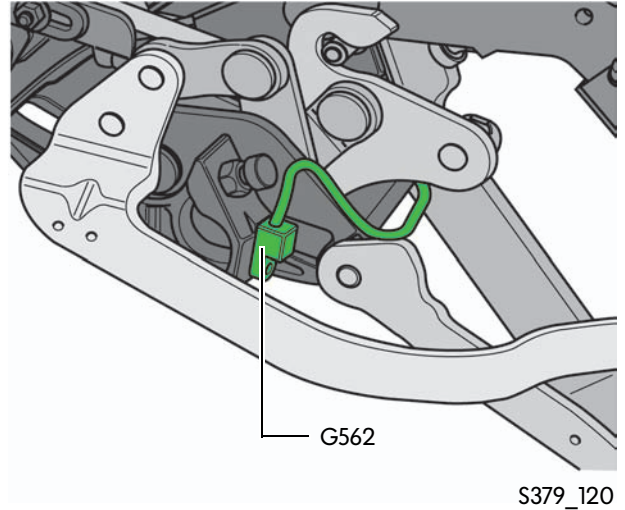
However, only one sensor's signal cannot be used to determine whether the C segment on both sides of the vehicle is correctly released or locked. If this fault occurs when the convertible roof is already partially open, convertible roof operation can be continued until the "roof closed position" is detected.



Convenience electronics

Sender for rear window frame open G562

This Hall sender with integrated magnet is located in the left roof side member in the vicinity of the hydraulic cylinder for actuating the C segment.



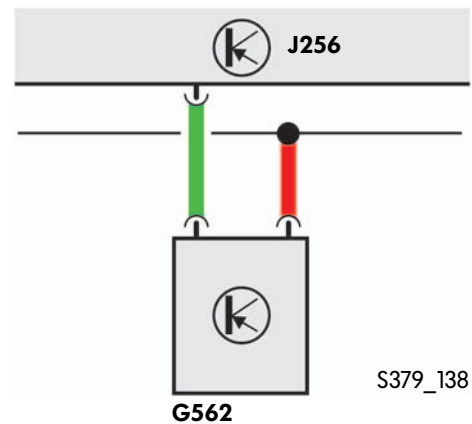
Signal use

The signal indicates that the C segment is located in the "open" position and C segment movement over the M segment is therefore completed.

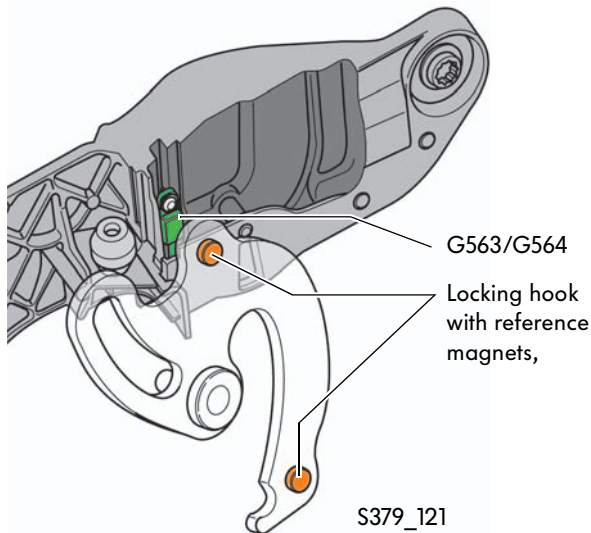
Effect in the event of failure

Without this sensor's signal, the convertible roof actuation control unit is unable to directly determine whether the hydraulic cylinders have opened the C segment completely. Via the other sensors, it only knows that the C segment is not closed. As it cannot be ensured, without this signal, that the C segment has reached its end position over the M segment, roof movement is interrupted.

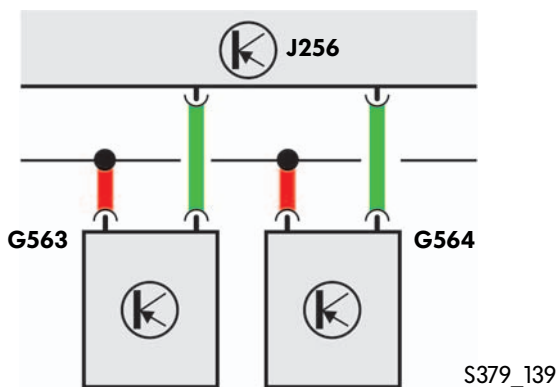
Electrical circuit



Left sender for rear shelf locked G563 Right sender for rear shelf locked G564



Electrical circuit



Effect in the event of failure

If one of the two sensors fails when the convertible roof is not completely closed, the other sensor's value serves to check whether the rear lid and the C segment are located in the locked/released position.

In this case, the convertible roof actuation control unit slightly extends the initialisation time for the hydraulic cylinders in the rear lid securing frames, in order to rule out the fact that a mechanical blockage in the roof mechanism is delaying lock engagement and that this is the reason why the anticipated sensor signal has not been received.

The sensors are positioned at the height of the hooks which lock the rear lid to the body on the left and right sides of the vehicle. With the aid of two external magnets on each locking hook, they determine the components' locking status.

Signal use

The signal from these sensors indicates that the rear lid is located in the "locked" position and is therefore linked to the body or is located in the "released" position and can therefore be pivoted open. If the sensor detects that the lock is open when the roof is closed, this also means that the lower C segment is no longer locked to the rear lid. It can therefore pivot over the M segment. When the roof is closed, this signal additionally indicates that the C segment is locked to the rear lid. This signal is additionally used to check the plausibility of the fact that the rear lid is moving in the "open" direction.

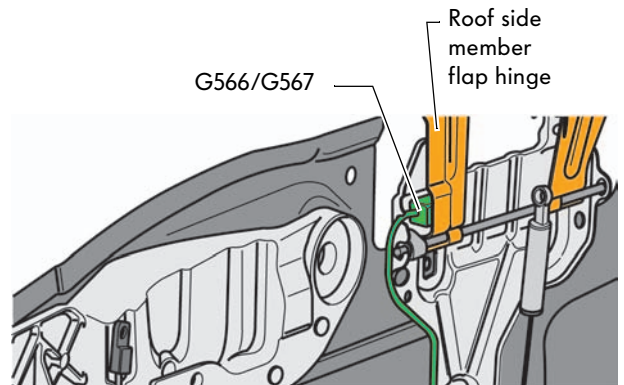


However, it is not possible to determine with the signal from just one sensor whether the rear lid and, in certain cases the C segment, is locked on both sides. If this fault occurs when the convertible roof is already partially open, the convertible roof can only be closed.

Convenience electronics

Sender for left roof member flap open G566 Sender for right roof member flap open G567

G566 and G567 are also Hall senders with integrated reference magnets. They are located at the hinges of the left and right roof side members. If a roof side member flap opens, the flap carrier moves into the detection range of the Hall sender. This leads to a change in signal voltage and indicates to the convertible roof actuation control unit that the roof side member flap is open.

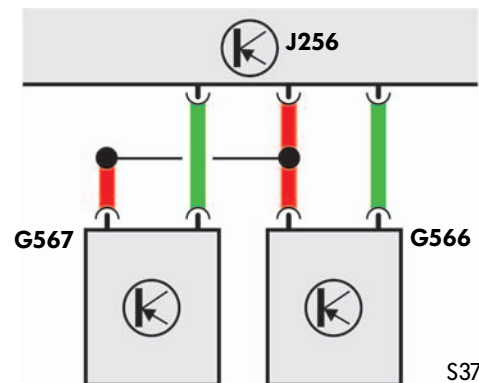


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Signal use

This signal indicates that the rear lid is open and the roof side member flaps are in the "open" position. The path for stowing the roof package in the luggage compartment or for lifting the roof package out of the luggage compartment is free.

Electrical circuit



S379_135

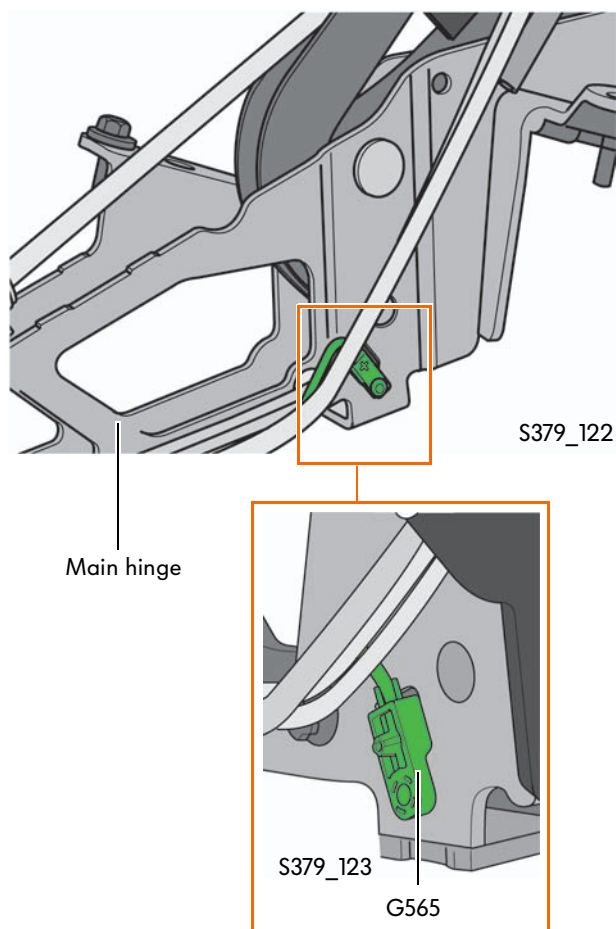
Effect in the event of failure

If one of the two sensors fails when the convertible roof is not completely closed, the other sensor's value serves to check whether the roof side member flaps and the rear lid are open or closed.

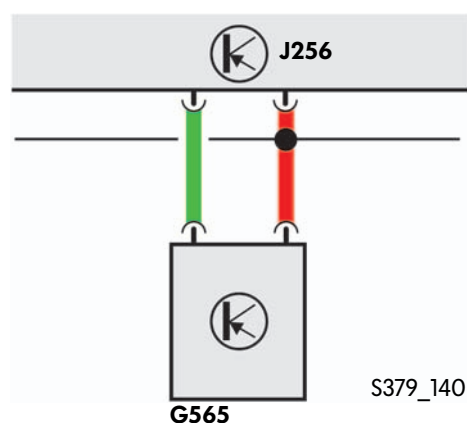
In this case, the convertible roof actuation control unit slightly increases the actuation time for the hydraulic cylinders in the rear lid securing frames, in order to rule out the fact that a mechanical blockage in the roof mechanism is delaying flap contact and that this is the reason why the anticipated sensor signal has not been received.

However, only one sensor's signal cannot be used to determine whether both roof side members are open or closed. If this fault occurs when the convertible roof is already partially open, convertible roof operation can be continued "roof closed position" is detected. The signals from sensors G563 and G564 serve the convertible roof actuation control unit as a substitute signal for "rear lid closed".

Sender for roof stowed G565



Electrical circuit



This Hall sender also has an integrated magnet. This is located on the left-hand main hinge in the vicinity of the hydraulic cylinder for stowing the roof package.

Signal use

This signal indicates that the roof package is stowed in its end position in the luggage compartment and that the convertible roof is therefore open. In addition, the rear lid and the roof side member flaps can be closed or opened again.

On closing the convertible roof, the sender's signal indicates that roof movement is taking place and that the roof package has left its position in the luggage compartment.



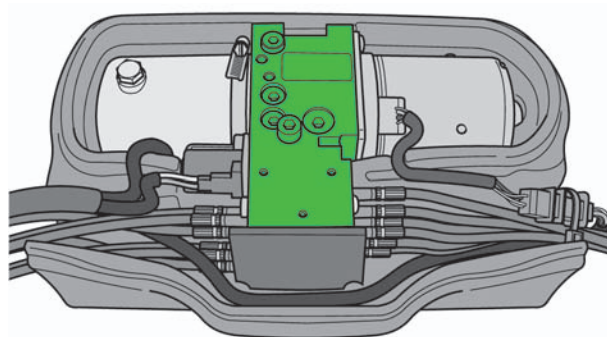
Effect in the event of failure

On failure of the sensor, roof movement is only prevented if the convertible roof is fully open or closed, as the convertible roof actuation control unit cannot be certain that the roof package has reached its end position in the luggage compartment. If the sensor fails in an intermediate roof package position, the roof package is moved in the intended direction, either to stow or to close it. Convertible roof movement which is commenced after this is not continued. This means, for example, that the rear lid remains open.

Convenience electronics

Hydraulic pump temperature sender G555

The temperature sender is integrated into the hydraulic pump and cannot be renewed. It measures the temperature of the hydraulic unit.



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Signal use

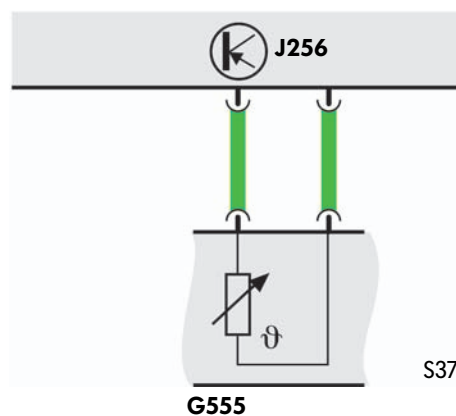
The temperature signal protects the pump drive from overheating.



Effect in the event of failure

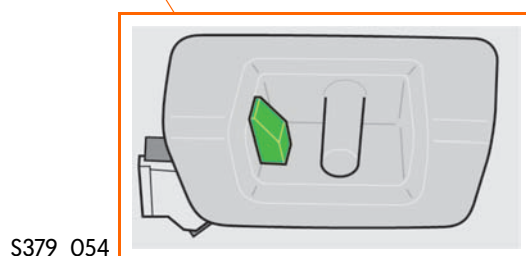
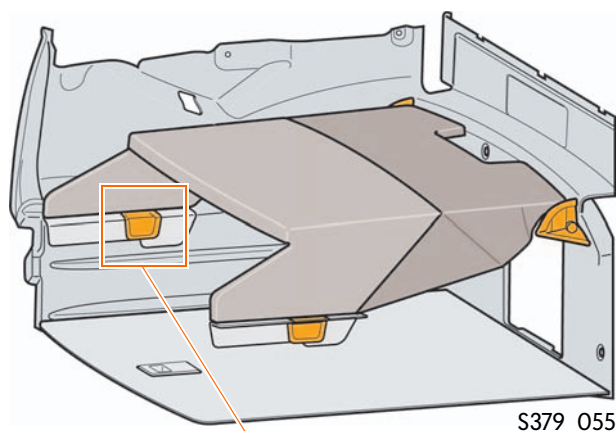
If the defect occurs when the convertible roof is completely closed, no further movement is possible. If the fault occurs when the convertible roof is already partially open, operation can be continued until the convertible roof "closed" position is reached. Of course, timeout checks (max. 8min, and max. 9.5min) by the convertible roof actuation control unit continue to be carried out.

Electrical circuit



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Luggage cover contact switch F364



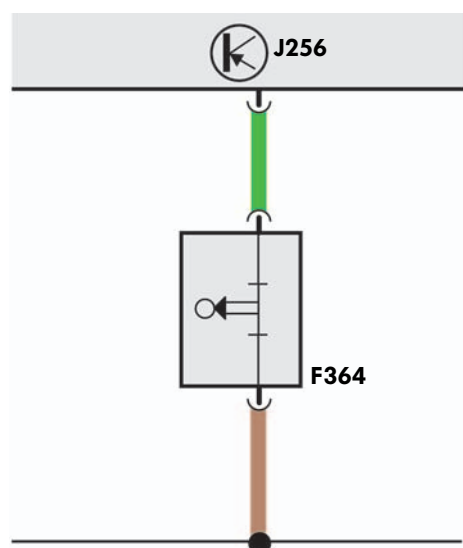
Contact switch F364 is located in the left-hand luggage cover mounting. The switch is designed so that it is open when the luggage cover is correctly engaged and closed if the luggage cover is missing or not correctly engaged.

Signal use

This signal indicates that the luggage cover is engaged and that roof movement can therefore be released.



Electrical circuit



Effect in the event of failure

If a contact switch defect occurs when the convertible roof is closed or during convertible roof movement in the "open" direction, the convertible roof actuation control unit can no longer determine whether the luggage cover has been engaged. Convertible roof movement is not therefore released or aborted by the control unit.

If the convertible roof is completely open, the luggage cover contact switch signal is irrelevant and the convertible roof can be closed.

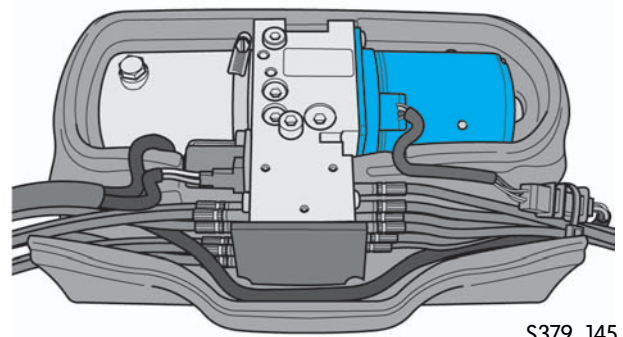
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Convertible roof actuation hydraulic pump V118

Hydraulic pump V118 is part of the hydraulic unit.

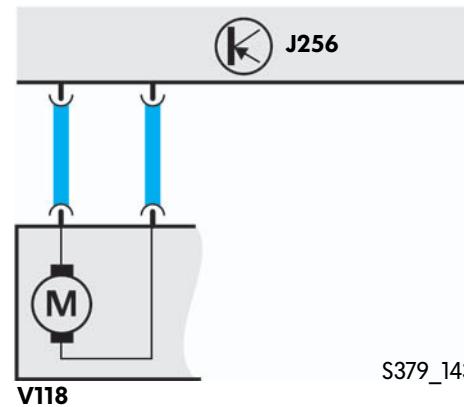
Task

The convertible roof actuation hydraulic pump is driven by an electric motor. This supplies the convertible roof mechanism's eight hydraulic cylinders with hydraulic fluid and a maximum pressure of 160 bar. As required, the convertible roof actuation control unit actuates the pump to the left or the right.



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Electrical circuit

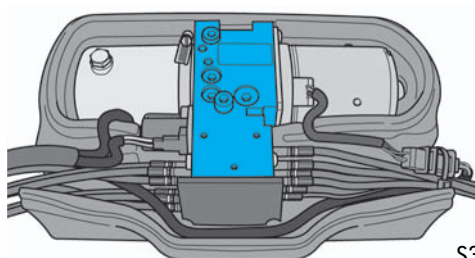


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Effect in the event of failure

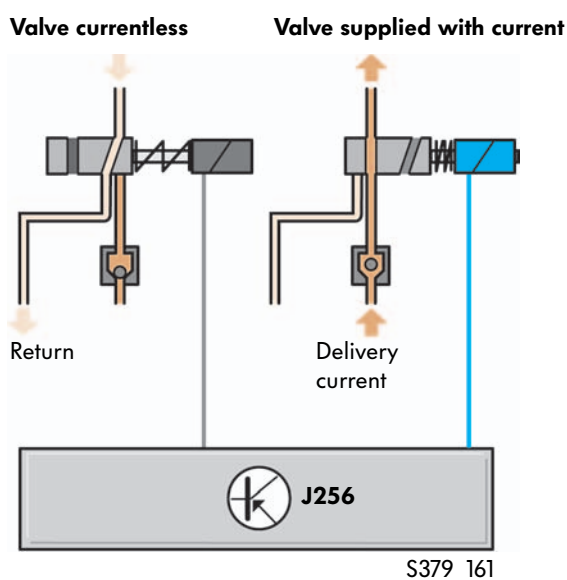
Convertible roof operation is not possible if the hydraulic pump is defective. Only the sliding roof can still be opened when the convertible roof is closed, as this is equipped with a separate, electric drive.

Power operated convertible roof valve 1 N272
Power operated convertible roof valve 2 N341
Power operated convertible roof valve 3 N342



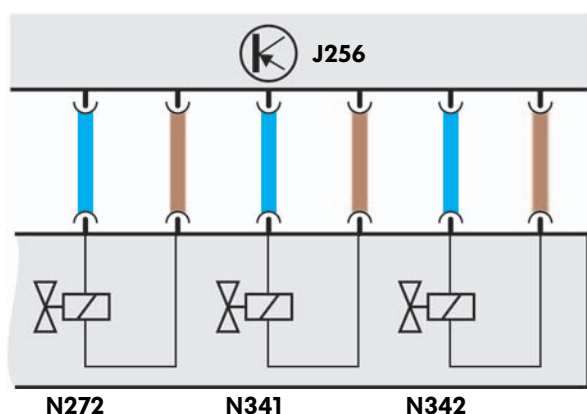
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All three valves are seated in the hydraulic unit's valve block.



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Electrical circuit



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Task

With the aid of the three power operated convertible roof valves, the convertible roof actuation control unit operates the convertible roof mechanism's eight hydraulic cylinders.

In their currentless state, hydraulic fluid is able to flow back into the reservoir. If a valve is actuated, it allows the delivery current coming from the hydraulic pump to pass.



Effect in the event of failure

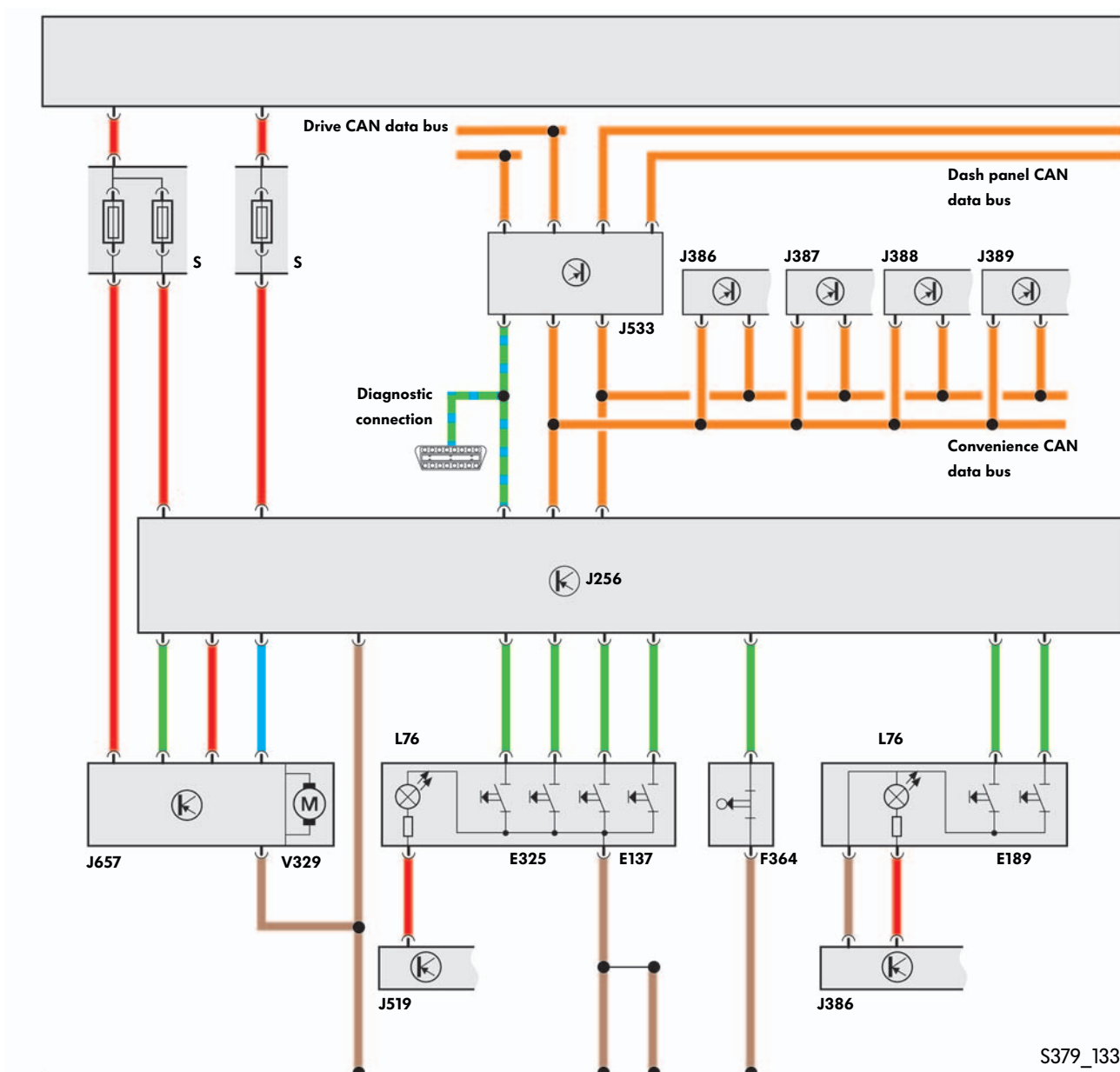
If the convertible roof actuation control unit determines one or more defective valves, convertible roof operation is prohibited and the failure is stored in the convertible roof actuation control unit's fault memory.

Like the pump, the valves are provided with two-fold protection against overheating:

- By the hydraulic pump temperature sender G555 and
- By the run time calculated by the convertible roof actuation control unit.

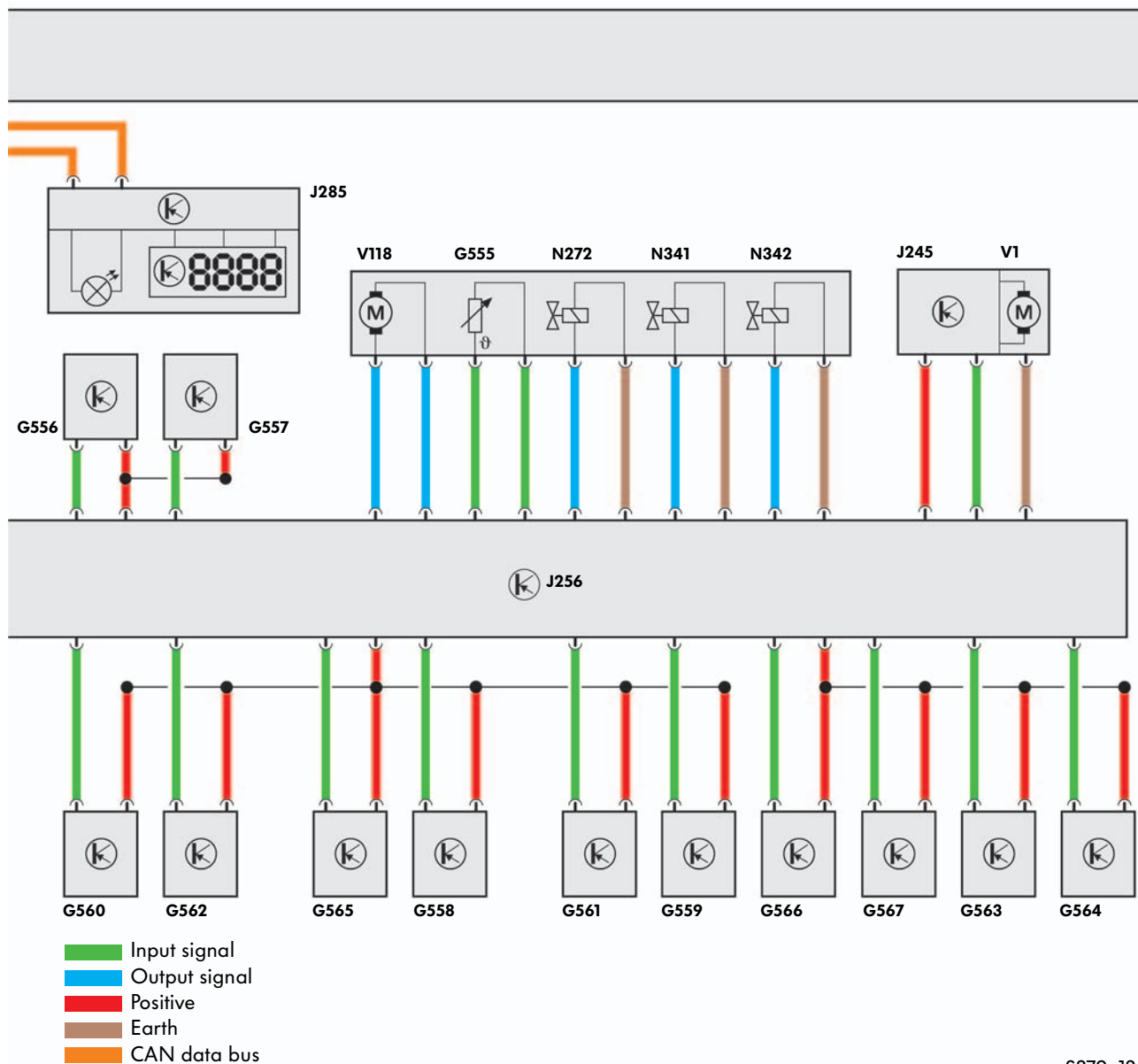
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Functional diagram



- E137** Convertible roof actuation button
- E325** Sunroof button
- E189** Central switch for window regulators in driver door
- F364** Luggage cover contact switch
- J245** Sliding sunroof adjustment control unit
- J256** Convertible roof actuation control unit
- J285** Control unit with display in dash panel insert
- 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 supply control unit
- J533** Data bus diagnostic interface
- J657** Power latching control unit

- L76** Button illumination bulb
- S** Fuse
- V1** Sliding sunroof motor
- V118** Convertible roof actuation hydraulic pump
- V329** Power latching motor



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- 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
- N272** Power operated convertible roof valve 1
- N341** Power operated convertible roof valve 2
- N342** Power operated convertible roof valve 3



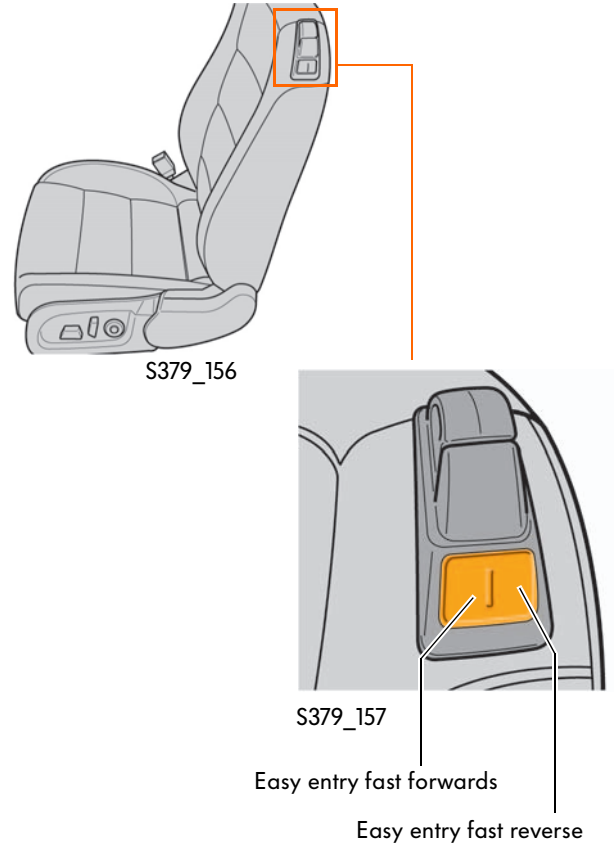
Convenience electronics

Electric easy entry function

An electrically activated entry assistant, the easy entry function, is fitted in the Eos for the first time. This is an extension of the seat functions and is available as special equipment.

Design

Besides the release lever for the backrest, a seat with electric easy entry is fitted with a rocker switch, which can be actuated to move the seat quickly. The front area of the switch serves to move the seat forwards, the rear surface to move the seat backwards. This function enables passengers to reach the rear seats in comfort.

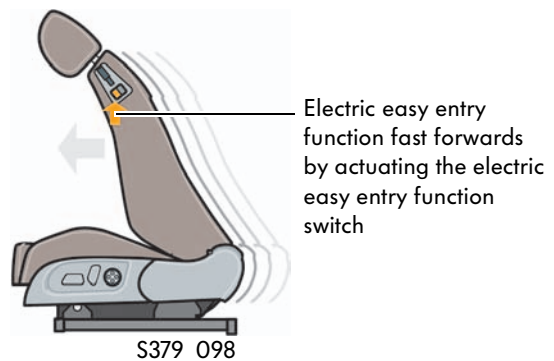
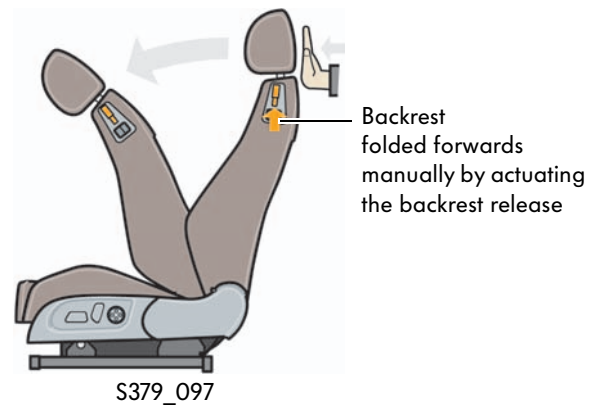


Function

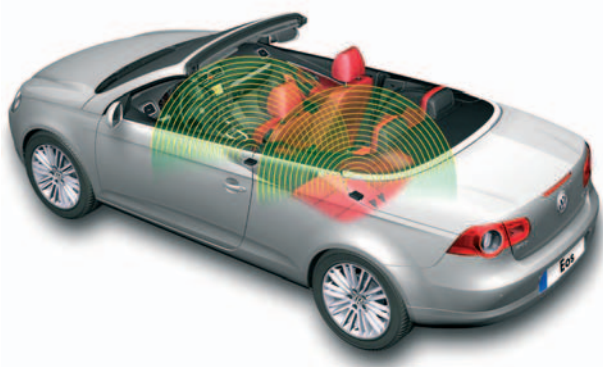
By actuating the front area of the switch, the seat is moved forwards rapidly (2.5 times faster than via standard seat longitudinal adjustment). In this case, the previous seat position is retained in the relevant easy entry control unit. By actuating the rear area of the switch, the seat is rapidly moved backwards to its original position again.

Fast adjustment functions independently of the backrest position. The backrest is folded forwards by hand.

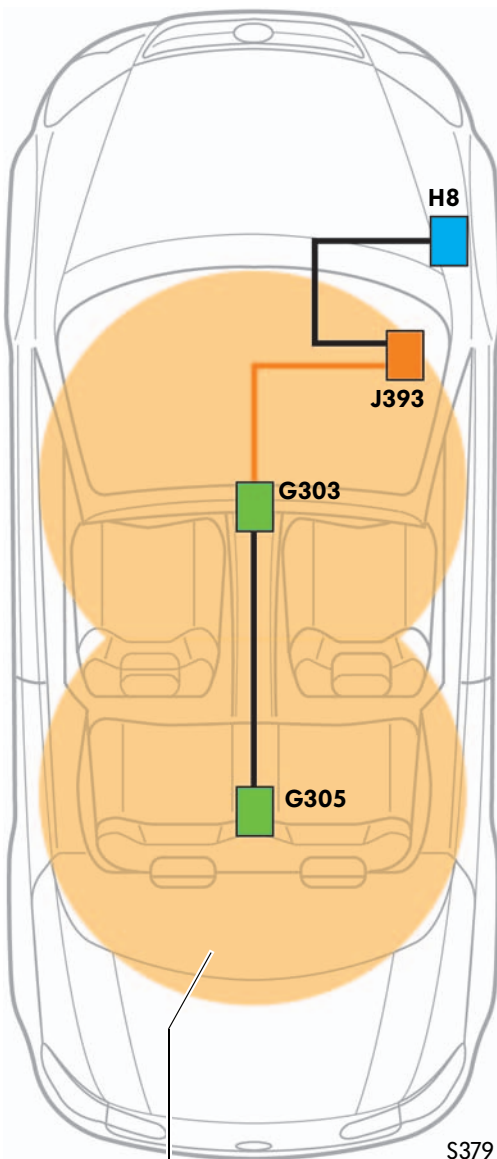
To protect persons sitting in the front, the electric easy entry function can only be operated at a speed of less than 5km/h and with the doors open within 10 minutes after opening the doors.



Interior monitor



S379_032



S379_096

Monitored range

So that efficient interior monitoring is also guaranteed when the Eos is open, the vehicle is equipped with an interior monitor system based on microwave technology. This technology is necessary to negate ambient conditions or electromagnetic interference as far as possible. The interior monitor can be deactivated via a button in the driver door's storage compartment.

Design

The system is essentially comprised of the two interior monitor send and receive modules 1 and 2 (G303 and G305) and the anti-theft alarm system horn H8. The send and receive modules are installed in the front of the passenger compartment on the centre tunnel and beneath the rear seat bench at the rear of the passenger compartment. The modules are control units, which are linked in master-slave formation. As the master, the front module communicates with the convenience system central control unit J393 via the LIN data bus. The slave module is linked to the master module via a further 1-wire data bus.

Both modules are equipped with a microwave sender and microwave receiver and each monitor their own area, whereby these intersect.

The microwave technology enables precise adjustment of the radius of the monitored range. In the Eos, 75 centimetres are set for the passenger compartment in the factory.



Convenience electronics

Microwave technology

The use of microwaves instead of thermal radiation in monitoring the passenger compartment has the advantage that electromagnetic waves in the microwave range are less susceptible to interference and are more precise than ultrasonic monitoring.

In the Eos, microwave technology has the advantage of insensitivity:

- To movements outside of the vehicle, e.g. a passing lorry or wind movements
- To interfering radio signals, mobile telephone networks (GSM)
- To interfering electromagnetic fields which may be caused, e.g. due to the electric charge carried by keys or coins (passive inter-modulation)



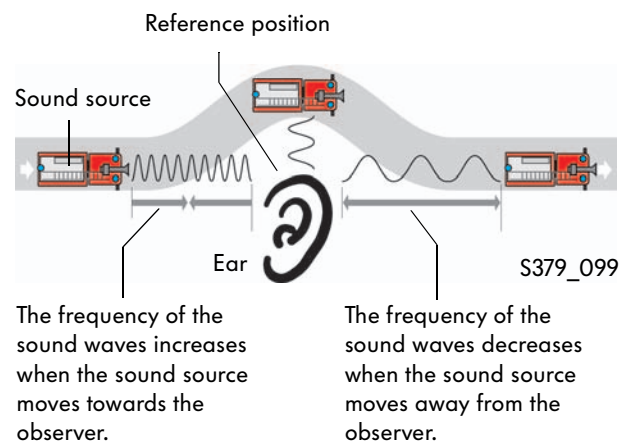
The functional principle of interior monitoring using microwaves is based on the Doppler effect, and corresponds to the manner in which a depth sounder or radar functions.

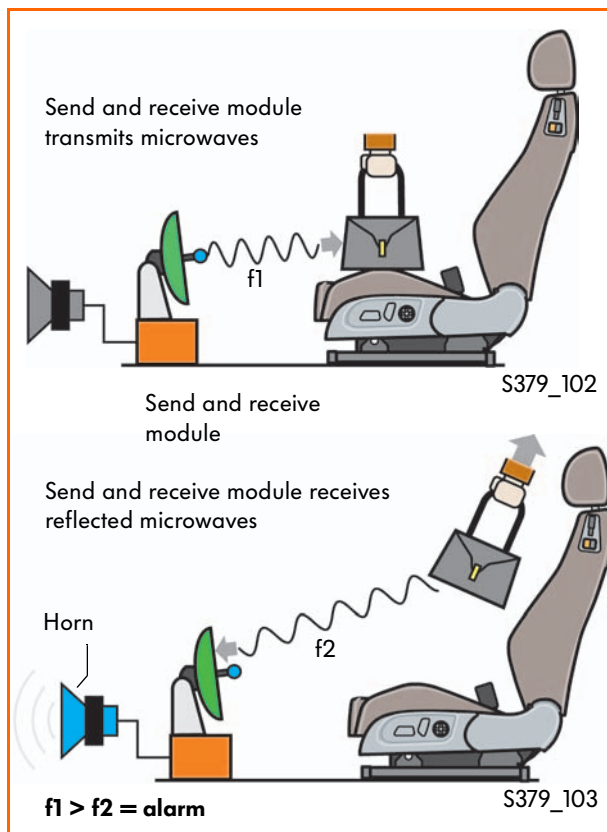
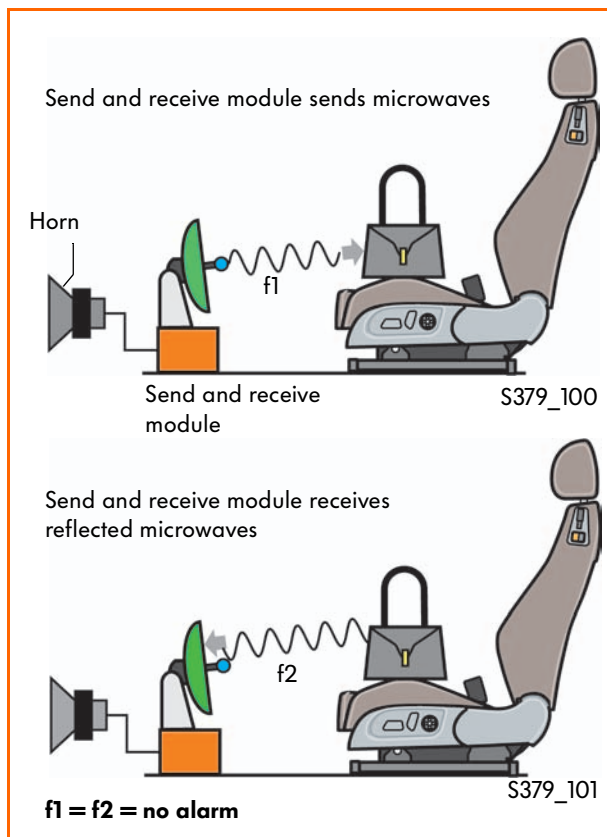
The Doppler effect

This is named after the Austrian physicist and mathematician, Christian Doppler, who predicted this effect in 1842 for determining the movement of stars. The principle of the Doppler effect is based on the fact that the frequency of waves (sound waves, electromagnetic waves) between an observer and an object changes when this object moves towards or away from the observer.

If the object moves towards the observer, the frequency increases; if it moves away, the frequency decreases. A common example is the change in the pitch of sound waves, e.g. when an emergency vehicle with its siren sounding moves towards a pedestrian. The pitch increases for the pedestrian until the vehicle has passed him. The pitch then decreases as the vehicle moves away.

In the case of electromagnetic waves, the increase in frequency when the object moves towards the observer is referred to as blue shift, and the decrease in frequency when the object moves away from the observer as red shift.





The interior monitor send and receive module shown here in schematic form emits microwaves. If they encounter an object in the monitored range, they are reflected and return to the send and receive module. There, they are acquired and evaluated. This means that the send and receive module compares the frequencies of the microwaves which are sent and received. If the object does not move, the frequencies of the sent ($f1$) and received waves ($f2$) are identical.



If the object is moved away from the send and receive module as shown the Doppler effect occurs. This means that the frequency of the reflected microwaves ($f2$), which the send and receive module acquires, is lower than the frequency of the microwaves which have been sent ($f1$). An alarm is triggered.

As movement parallel to the transmitter does not generate a Doppler effect, because the distance between the object and transmitter does not change, the Eos is fitted with two send and receive modules, which are positioned in relation to each other so that an object in the interior of the vehicle changes its distance from at least one of the transmitters when it moves and therefore causes a Doppler effect.

Radio and navigation

The aerial concept

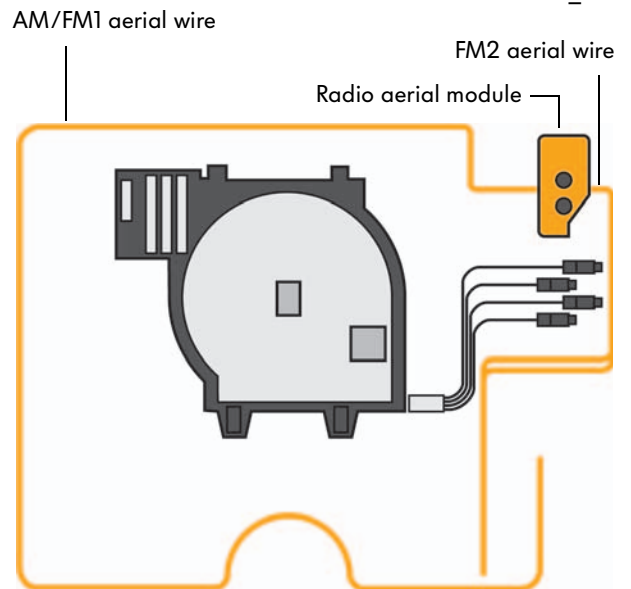
The Eos' aerial system is housed in the rear lid. To guarantee interference-free reception, the rear lid is therefore manufactured from plastic. The system's main components are the aerial module carrier, the radio aerial module and, depending on equipment, further receiver modules plus the FM/AM aerial structure, which is firmly bonded in the rear lid. Depending on the equipment level, 2-6 Fakra connectors round off the system.



S379_104

Radio aerial module

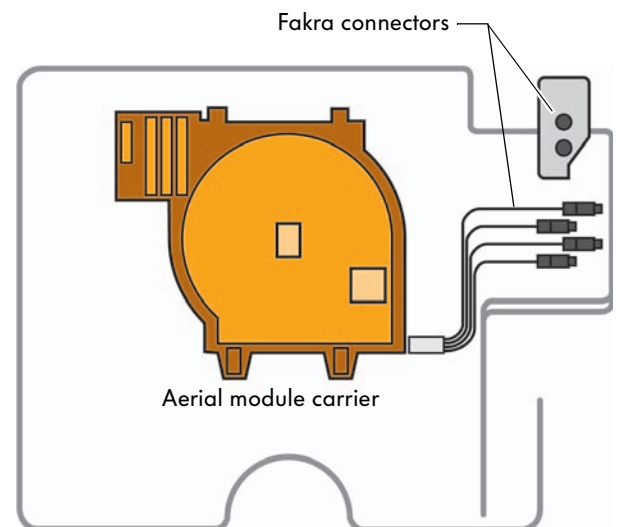
The radio aerial module contains the amplifiers for FM, AM and TV**. If the vehicle is equipped with an auxiliary heater, the aerial structure for telestart is additionally housed on the module's printed circuit board. By bolting the radio aerial module on, the FM/AM aerial structure is simultaneously connected to the module. Two to a maximum of four Fakra connectors are provided on the module as pick-ups for the aerial signals.



S379_109

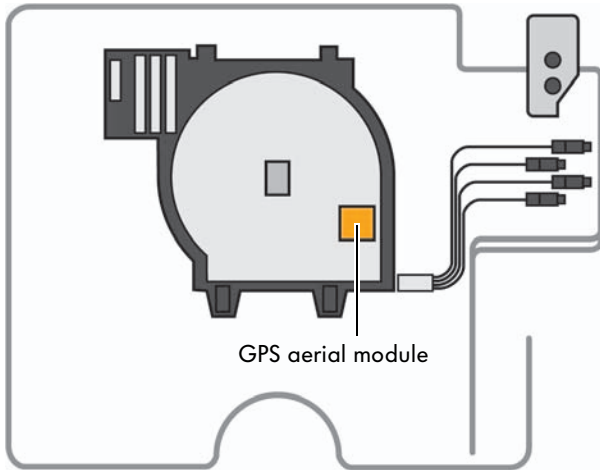
Aerial module carrier

The aerial system's most striking component is the central, plate-shaped aerial module carrier. This carries the aerial modules for GPS/GSM/SDARS*. The aerial module carrier is located centrally in the rear lid.



* North America only, ** Japan only

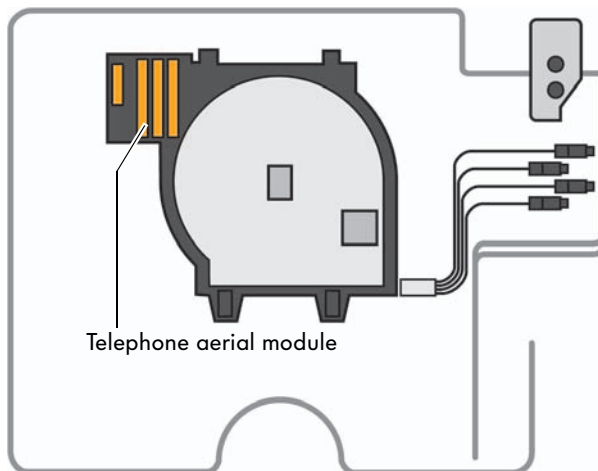
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S379_107

GPS aerial module

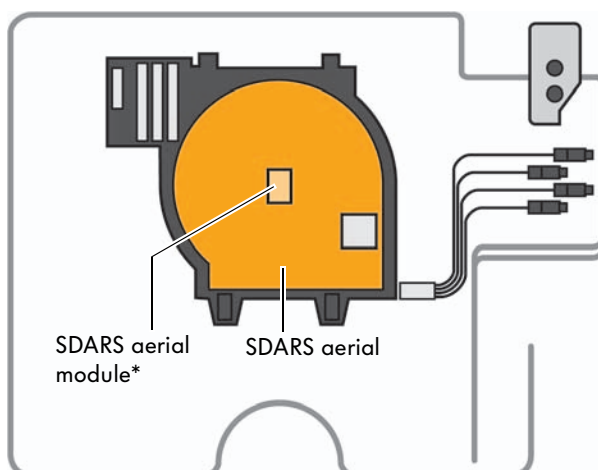
GPS means "**G**lobal **P**ositioning **S**ystem". The GPS module, which also contains the aerial, is housed as an autonomous unit, galvanically separated, on the central aerial module carrier. The module is connected via a separate supply cable with a Fakra connector.



S379_108

Telephone aerial module (GSM)

GSM means "**G**lobal **S**ystem for **M**obile communications". The aerial for the GSM network is also housed on the aerial module carrier and is electrically separated. This module is also connected via a separate supply cable with a Fakra connector.



North America only*

S379_106

SDARS aerial module*

SDARS means: "**S**atellite **D**igital **A**udio **R**adio **S**ervices" (digital audio satellite reception system). The aerial is formed by the copper film which is extensively applied onto the aerial bracket. Contact with the aerial module is established directly on installation of the module onto the film. Depending on the tuner variant, connection to the SDARS tuner is carried out via 1 or 2 Fakra connectors.

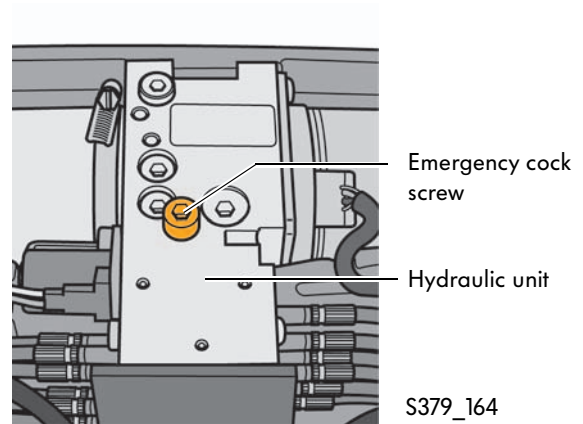
Emergency operation strategies

Manual opening/closing

If the electrohydraulic convertible roof actuation system fails during roof movement, the Eos' convertible roof can be moved to one of the two end positions from any position.

To do this, the emergency cock screw on the hydraulic unit must first be loosened.

The convertible roof components can now be moved individually with the assistance of a second person. A second person is required to move the convertible roof components in parallel.



Closing/opening with VAS 5051

If the convertible roof can no longer be moved from the secure "closed" or "open" positions due to an electrical fault, e.g. defective Hall sender, (hydraulic system is OK), this can be carried out using a corresponding programme in VAS 5051.

Closing force limitation

The movement sequences on opening and closing the convertible roof are very complex. Depending on the position of the convertible roof, different lever forces occur at the convertible roof's components. As a result of these different lever forces, the convertible roof control system does not limit the force. This means that there is a risk of injury if persons are located in the path of roof movement due to improper use of the convertible roof control system.

Only the sliding roof has a separate force limitation system as part of the sliding roof function due to its separate, electric drive.



Under all circumstances, observe the current work instructions in ELSA during all repair, installation or adjustment work. Improperly executed work may extensively damage the complex convertible roof mechanical and control systems.

Which answers are correct?

One or several of the given answers may be correct.

1. Which Hall sender designs occur in the roof sensor system in the Eos?

- ☐ a) Hall senders without magnets
- ☐ b) Hall senders with integrated magnet
- ☐ c) Hall senders with an external magnet
- ☐ d) Hall senders with two external magnets.

2. On which of the following paths is the signal from the central switch for window regulators in driver door E189 transmitted?

- ☐ a) From the switch to the driver door control unit via the convenience system central control unit to the individual door control units
- ☐ b) From the switch directly to the convertible roof actuation control unit, and from there to the individual door control units
- ☐ c) From the switch directly to the driver door control unit, and from there to the other door control units



3. Which statement about the luggage cover contact switch is correct?

- ☐ a) The luggage cover contact switch is actuated by the correctly engaged luggage cover.
- ☐ b) If the contact switch is not actuated, the convertible roof cannot be opened.
- ☐ c) If the contact switch is not actuated, the convertible roof cannot be closed.

Test yourself

4. How is the position of the convertible roof detected in the Eos?

- ☐ a) Via incremental senders at the relevant rotational axes
- ☐ b) Via Hall senders located in key positions
- ☐ c) Via contact switches at the relevant roof locks

5. How are the hydraulic cylinders actuated?

- ☐ a) The power operated convertible roof valves are always actuated simultaneously so that the operating pressure of 150 bar is achieved.
- ☐ b) The hydraulic pump is able to actuate all 4 power operated convertible roof valves simultaneously.
- ☐ c) The convertible roof actuation control unit controls the eight hydraulic cylinders via three power operated convertible roof valves and the convertible roof actuation hydraulic pump's delivery direction.

6. Which of the following statements are pre-conditions for closing the convertible roof?

- ☐ a) The temperature of the hydraulic pump is less than 105°C.
- ☐ b) The total hydraulic valve operating time is less than 9.5 minutes.
- ☐ c) All Hall senders report a plausible signal regarding the positions of the convertible roof's sensed components.
- ☐ d) The vehicle speed must be less than 1km/h.
- ☐ e) The side windows must be in the "closed" position.
- ☐ f) The luggage cover contact switch is actuated.



7. Rear lid assist stops convertible roof movement ...

- ☐ a) If an obstacle is detected in the rear area at the start of convertible roof movement.
- ☐ b) If an obstacle arises in the rear area during convertible roof movement before the rear lid moves into the rear lid assist detection range.
- ☐ c) If the rear lid is open and an obstacle is detected in the rear area.

8. When are the convertible roof's Hall senders referred to as redundant?

- ☐ a) The signal is redundant when the signal voltage is sufficiently high to be reliably detected by the convertible roof actuation control unit.
- ☐ b) The signal is redundant when the convertible roof actuation control unit saves the signal to have it available for the next stage of control.
- ☐ c) The signal is redundant when there are at least two Hall senders which monitor the correct position of a convertible roof assembly.





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✿ This paper was manufactured from pulp that was bleached without the use of chlorine.