



**Self-study programme 329**

**Volkswagen Motorhome  
California 2004**



Based on the Transporter 2004, the new California fulfils the needs of both leisure and business travellers.

In this generation, the interior layout with the kitchen unit under the window and the linen cupboard at the rear left remains the same.

The new California does, however, feature numerous refinements and even more comfort and flexibility.

Some highlights in the new California:

- Transporter 2004 technology with diesel engines
- electrohydraulic aluminium pop-up roof with a maximum load of 50 kg
- very variable seat bench or bed
- roof bed with slatted frame
- variety of flexible furniture



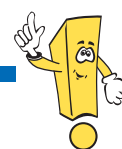
S329\_003



This book presents the new features in the California. For information on the technology taken from the Transporter 2004, please read:

- SSP 210 "Transporter 2004"
- SSP 211 "Transporter 2004 – Electrical System"

**NEW**



**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.





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# Brief overview



## Proven technology

The Volkswagen California uses a large part of the technology from the Transporter 2004 Multivan with medium-height roof.

For example, the chassis with the following components has been used:

- McPherson front axle
- anti-roll bars front and rear
- vented disc brakes front and rear
- Conti-Teves MK 25 with ABS with EDL, TCS and EBD, ESP system with brake assist
- crash-optimised pedal cluster

Further optional equipment taken from the Transporter 2004:

- sliding door and tailgate with power latching system
- anti-theft alarm with interior monitoring sensor
- Park Distance Control
- 3C Climatronic (with ventilation of passenger compartment)
- airbags in driver's cab
- multifunction steering wheel
- radio systems




S329\_050

## Engine/gearbox combinations

The engines and gearboxes listed in the table also originate from the Transporter 2004. They are available in the following combinations.



	5-speed manual	6-speed manual	6-speed automatic with Tiptronic
	 S329_075	 S329_079	 S329_076
1.9 l/77 kW TDI engine with unit injector system  S329_073			
2.5 l/96 kW TDI engine with unit injector system  S329_074			
2.5 l/128 kW TDI engine with unit injector system  S329_074			



# Brief overview



## Clever details

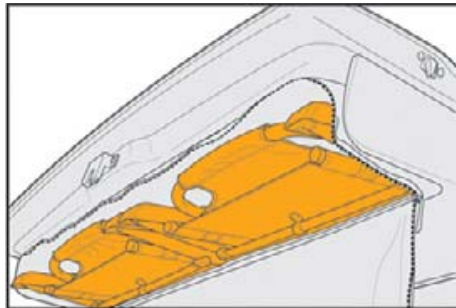
The California 2004 features some clever solutions. Some examples:

- roof load up to 50 kg (e.g. a surfboard)
- gooseneck lamp and safety net on roof bed
- fold-down overhead storage compartment
- drawers and toolbox in the rear bench
- option of adding a fifth seat
- adjustable bed in luggage compartment for easy loading

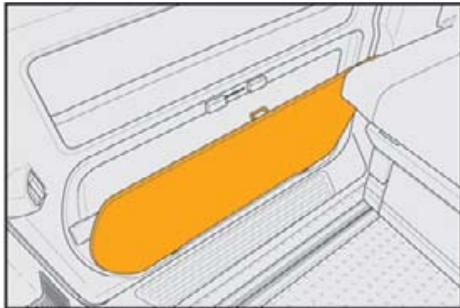
- Electrohydraulic pop-up roof

- Aluminium strip for attaching awning on both sides

S329\_022



- Two camping chairs in the tailgate



S329\_023

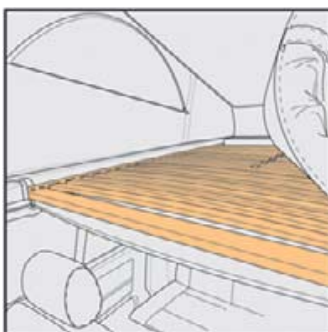
- Camping table with adjustable legs in the sliding door



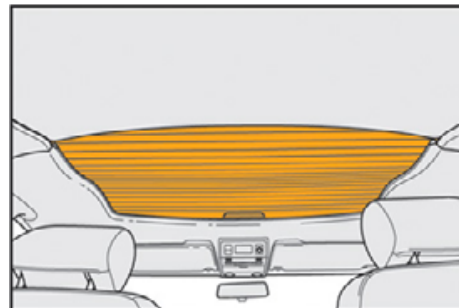
## Improvements made to tested technology

Tried and tested technology has basically been improved for the new California. The following should be emphasised in particular:

- the lightweight construction of the cupboard
- the improved feel and appearance through the use of new materials
- further practical features, e.g. the camping table and camping chairs
- increased comfort, e.g. thanks to the roof bed with slatted frame

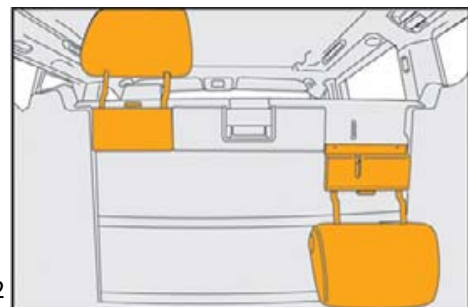


- Roof bed with slatted frame



- Two-room concept with blind used to separate passenger compartment and driver's cab and also to store the roof bellows safely

- Clever darkening possibilities:  
blinds on front windscreen, rear windscreen and side windows  
screens for the windows in the driver's and front passenger door



- Folding head restraints on the rear bench (Comfortline version)



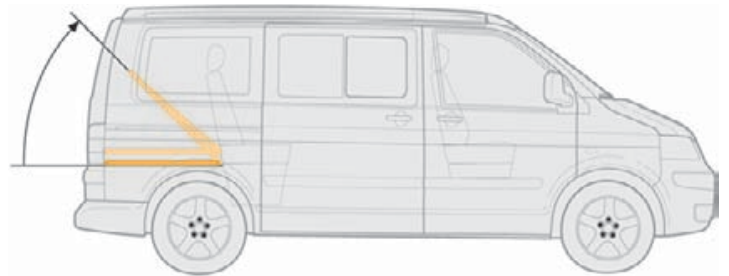
# Vehicle concept

## Usage of the motorhome

### Easy loading



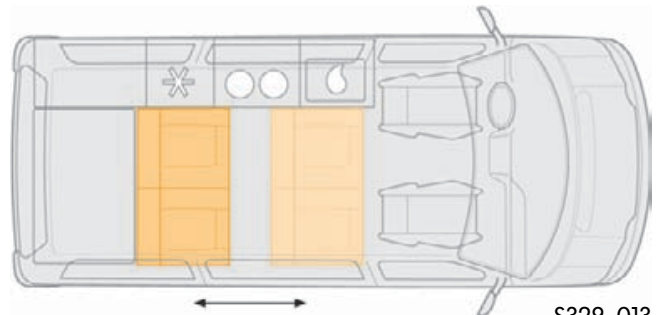
The rear bed base can be fitted on two levels. The bed base can be folded up so that the luggage compartment is easy to access.



S329\_010

### Legroom in the rear

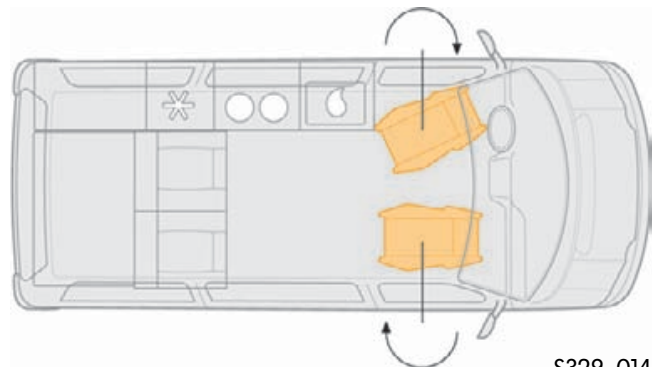
On the road, substantial legroom can be provided for the rear passengers as the rear bench slides back and forth.



S329\_013

### Rotating front seats

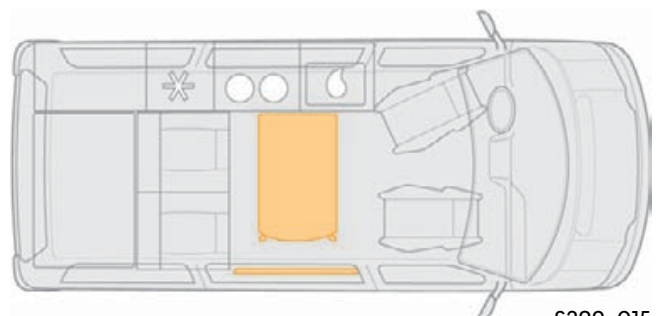
The front seats can be turned approx. 180°. The longitudinal position and the backrest of the seats may need to be adjusted to provide enough space.



S329\_014

### Tables

The California comes with up to two tables: a camping table in the sliding door (standard equipment) and a multipurpose table on the kitchen unit (Comfortline version). The camping table can also be attached to the kitchen unit using a hook and thus set up securely inside the vehicle.

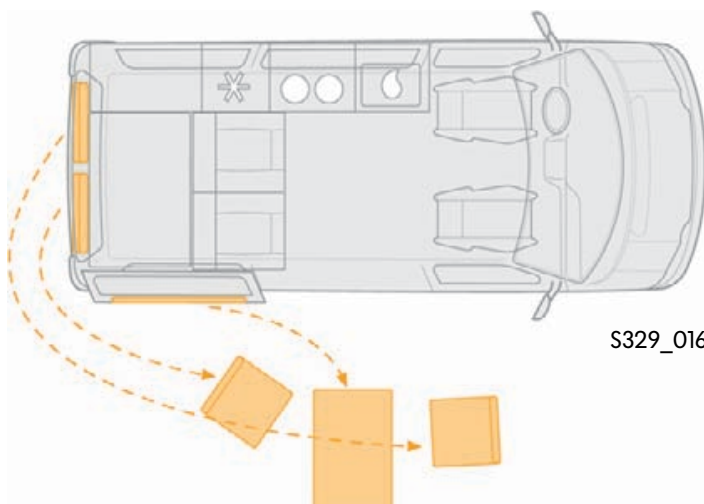


S329\_015



## Camping furniture

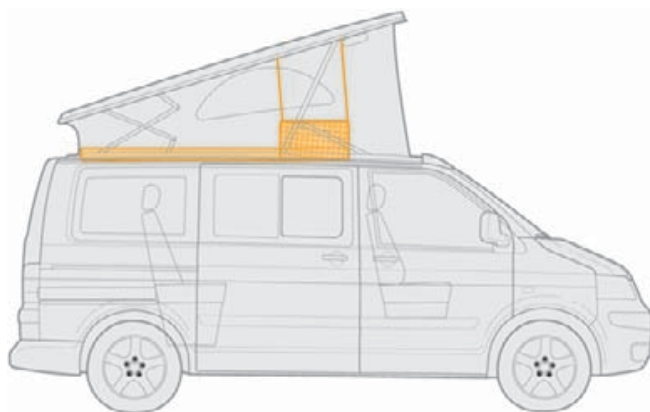
The camping table in the sliding door and the two camping chairs in the tailgate can be set up quickly outdoors. The camping table has an adjustable leg to compensate uneven ground.



S329\_016

## Sleeping places in the roof

The roof bed sleeps two comfortably.  
A safety net can be fitted to prevent children falling out.



S329\_011

## Beds in the rear

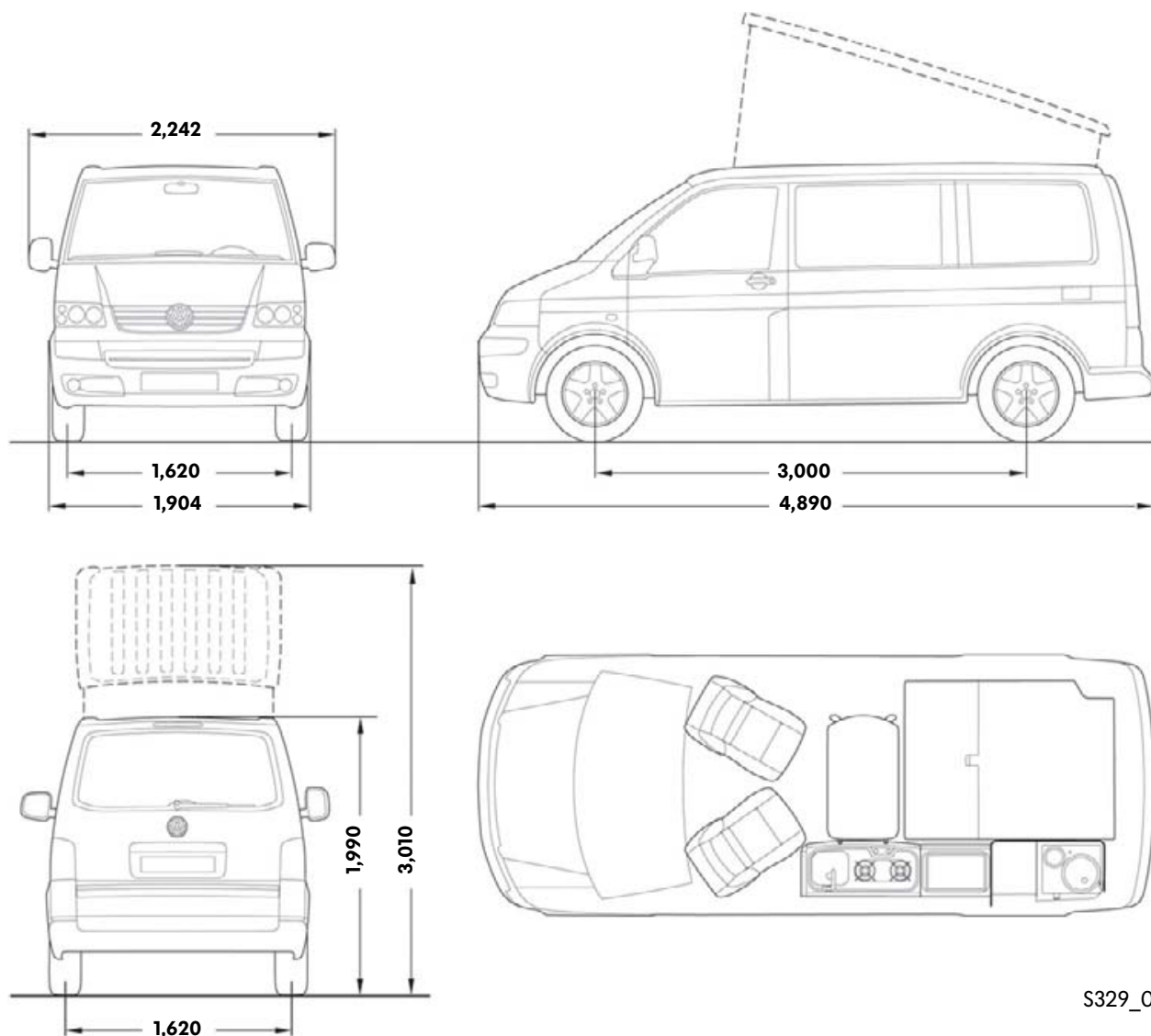
Two further beds can be set up in the rear when the rear seat backrest is folded down.



S329\_012

# Vehicle concept

## Technical data



S329\_017

## Dimensions and weights

Length	4,890 mm
Width	1,904 mm
Height	1,990 mm
Height with elevated roof	3,010 mm
Wheelbase	3,000 mm
Roof load	50 kg
Braked towing capacity	2,220 – 2,500 kg*
Tank capacity	approx. 80 l

Lower bed	200 x 114 cm
Roof bed	200 x 120 cm
Fresh water tank volume	30l
Waste water tank volume	30l
Refrigerator box volume	42l

\* Depending on engine

## California and California Comfortline\*

	California	California Comfortline
Side airbags and head airbags at front	✗	✓
Dual-tone horn	✗	✓
Auxiliary heating with timer switch and remote control	✗	✓
Fog lights integrated in bumper	✗	✓
Heated driver and front passenger seats	✗	✓
Sliding multi-purpose table, mounted on kitchen unit	✗	✓
Power latching sliding door, power latching tailgate	✗	✓
Bumpers and outside mirrors	Not painted	Painted in body colour
Stove and sink cover	Aluminium	Glass
Double-reflector headlights	✗	✓
Head restraints on the rear bench	Removable	Folding
Window regulator	Mechanical	Electrical
Outside mirrors	Mechanical adjusted	Electrically adjusted
All-round trim strip	✗	✓

✗ Not included

✓ Included

\* The equipment may vary from country to country.



# Body

## Body

The Transporter 2004 Multivan with medium roof forms the basis for the California.

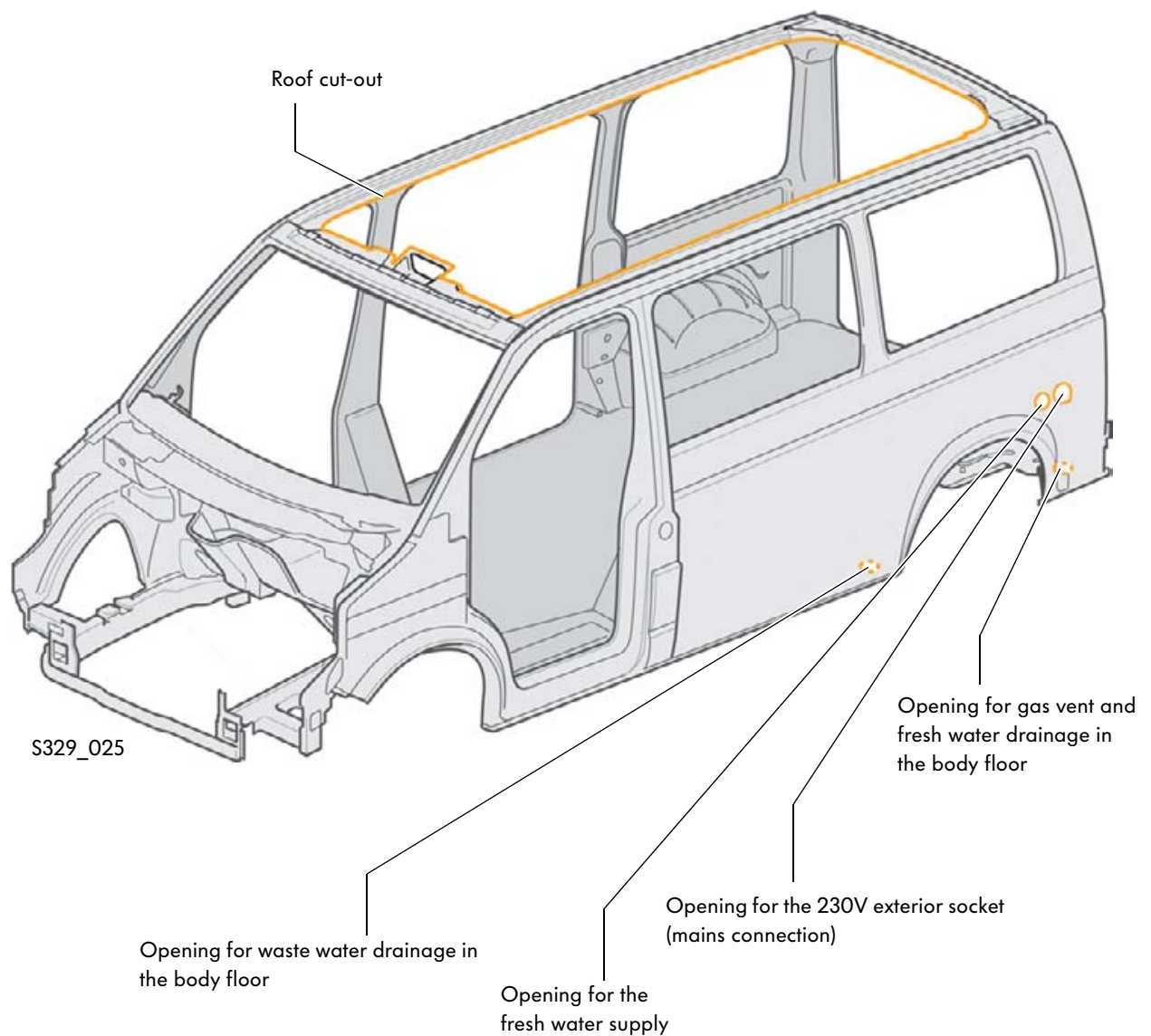
For the electrohydraulic pop-up roof, the roof is removed with the rails.

Furthermore four openings have been cut into the body:

- two openings at the rear left for the fresh water supply and the 230 V exterior socket (mains connection),
- one opening in the body floor for venting gas and draining the fresh water tank
- another opening in the body floor for waste water drainage.



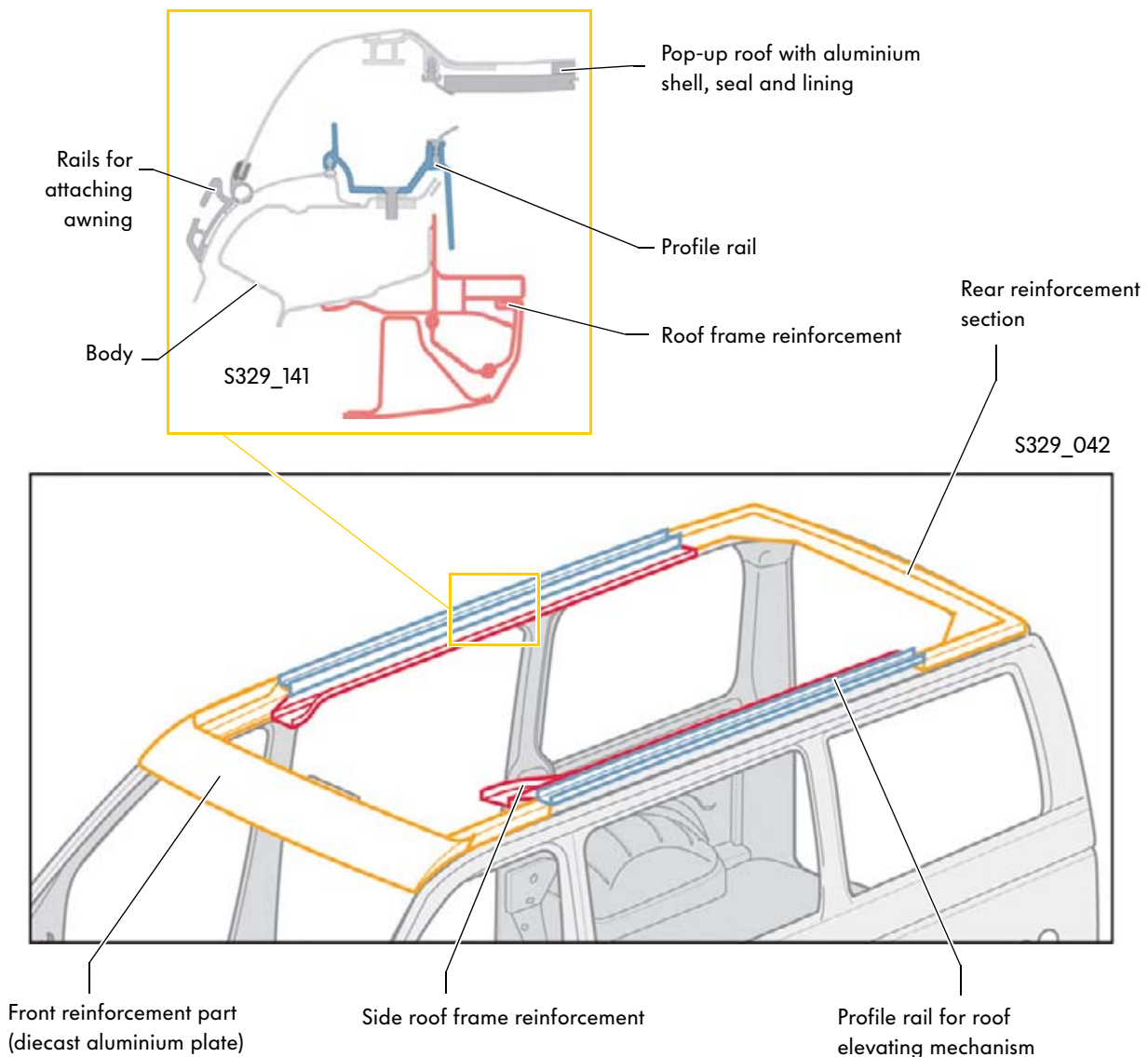
The openings are cut out at the factory in Hanover using the Plasma cutting technique.



## Roof opening reinforcement

While the four small cut-outs do not affect the rigidity of the body, the roof opening has been strengthened with reinforcing parts to maintain the crash safety:

For this purpose, there are diecast aluminium plates at the front and rear, roof frame reinforcements at the sides and a profile rail on the roof-elevating mechanism. All of these parts are glued, screwed and riveted.





## Electrohydraulic pop-up roof

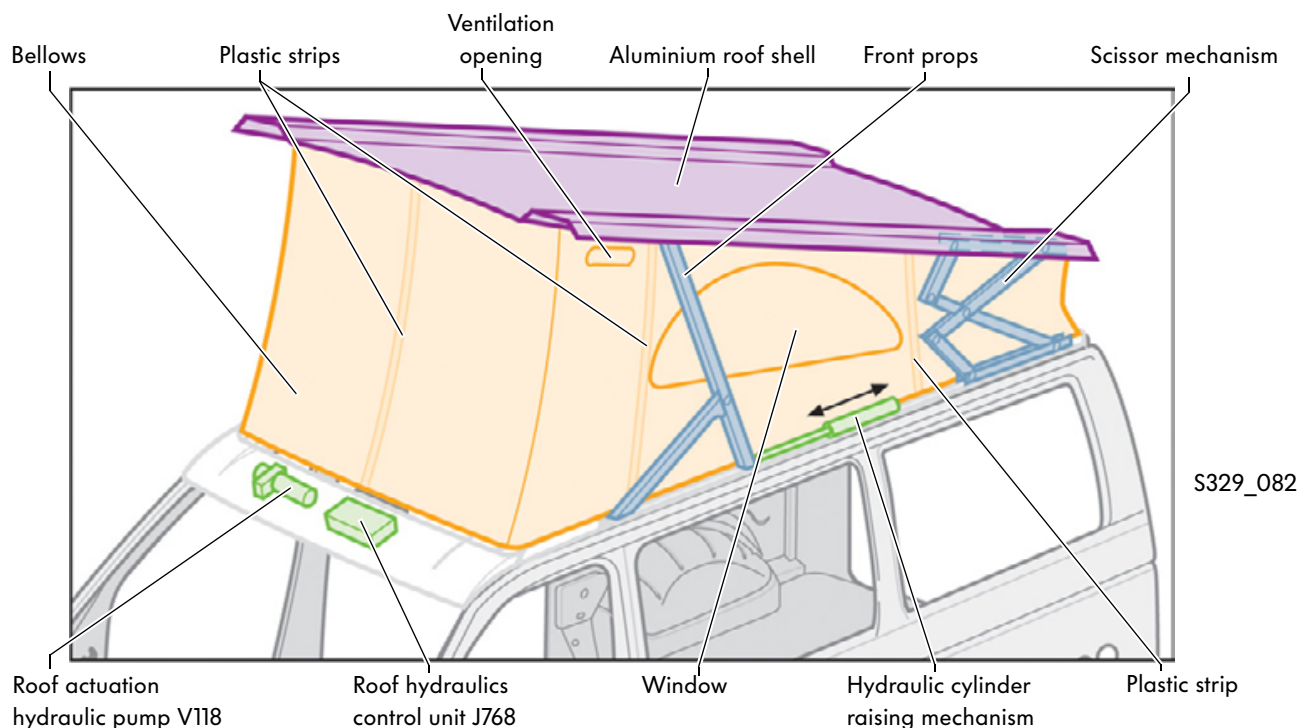
The electrohydraulic pop-up roof consists of the aluminium roof shell, the roof bellows, the front props, the scissor mechanism and the following electrohydraulic components:

- roof actuation hydraulic pump V118
- roof hydraulics control unit J768
- two hydraulic cylinders for the elevating mechanism each with two roof hydraulics senders G491 - G494
- electrical cables and hydraulic lines



The bellows are fitted with plastic strips that ensure that they are not trapped when the electrohydraulic roof is lowered. The bellows therefore stow themselves away automatically. They are fastened along the roof cut-out and the aluminium roof shell. The bellows including the window and ventilation openings are rainproof.

The hydraulic cylinders move the front props. The force is transferred via the aluminium roof shell to the rear scissor mechanism that open and close evenly and steadily thanks to their construction.



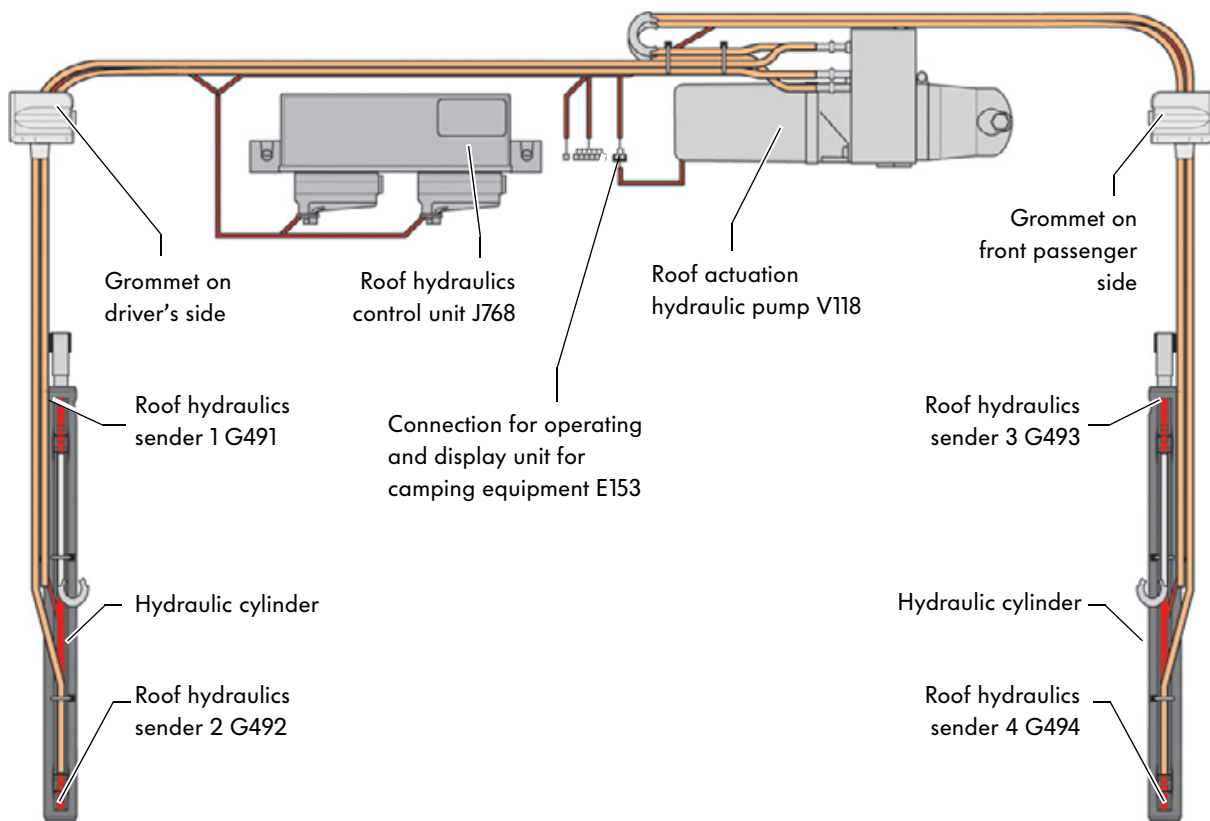
All parts in the roof area are glued, screwed and riveted.

## Pop-up roof electrohydraulics

The electrohydraulic pop-up roof is operated by the roof hydraulics control unit J768 that controls the roof actuation hydraulic pump V118. The roof actuation hydraulic pump is connected to two hydraulic cylinders. Each hydraulic cylinder moves the props up on both sides.

Roof hydraulics senders G491 - G494 are fitted at the front and rear end stops.

They indicate to the roof hydraulics control unit whether the electrohydraulic pop-up roof is completely open or closed. Two grommets seal the openings in the front reinforcement section of the roof cut-out.



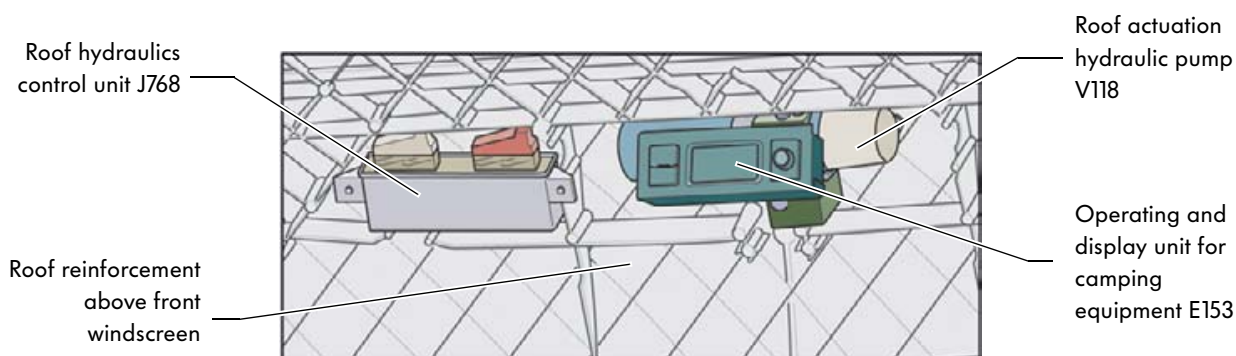
S329\_081

The electrohydraulic pop-up roof is raised using a menu function with the rotary press knob on the operating and display unit for camping equipment E153. To lower the roof, you need to hold down the rotary press knob on the operating and display unit for camping equipment. Just after the lowering procedure is started the user will be asked whether the roof bed has been lowered, the blind opened and at least one window is open. You then press the knob again to continue the procedure.

# Body

## Location of the control unit and the pump

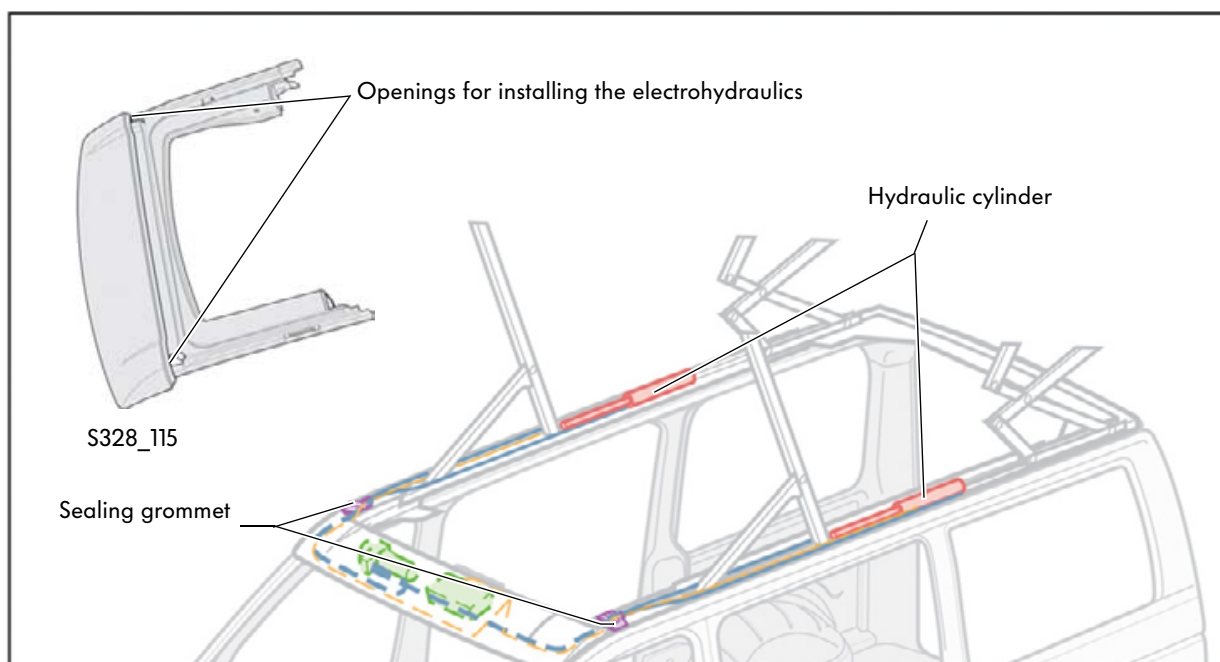
The roof hydraulics control unit J768 as well as the roof actuation hydraulic pump V118 are mounted on the inside of the front reinforcement on the roof cut-out. The pump is embedded in a foam cushion to dampen the noise. The operating and display unit for camping equipment E153 is located in front of the hydraulic pump.



S329\_083

## Installing the electrohydraulics

The electrohydraulic cylinders for the pop-up roof are pushed through the openings on the left and right in the front roof cut-out reinforcement and then fastened. The openings are sealed with grommets.



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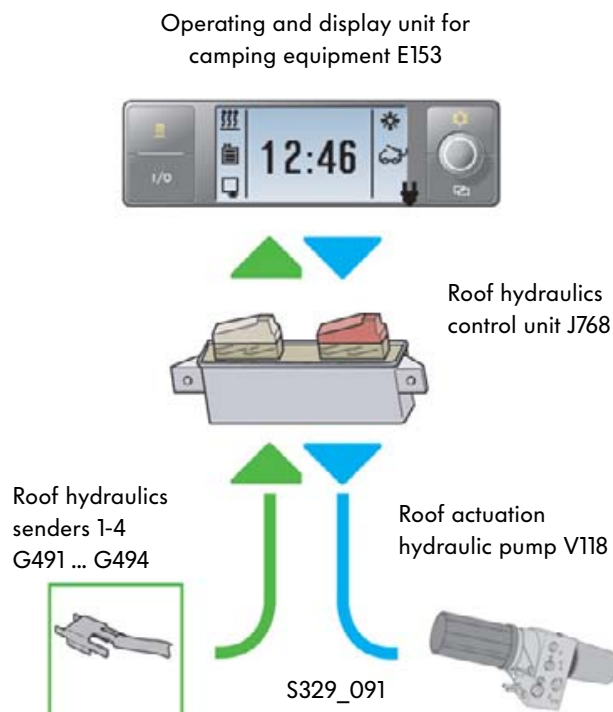
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## System overview of the electrohydraulics

The roof hydraulics senders G491 - G494 in the hydraulic cylinders indicate the opening state of the electrohydraulic pop-up roof to the roof hydraulics control unit J768. The "closed" and "open" states are recognised.

The roof hydraulics control unit sends the current state to the operating and display unit for camping equipment E153.

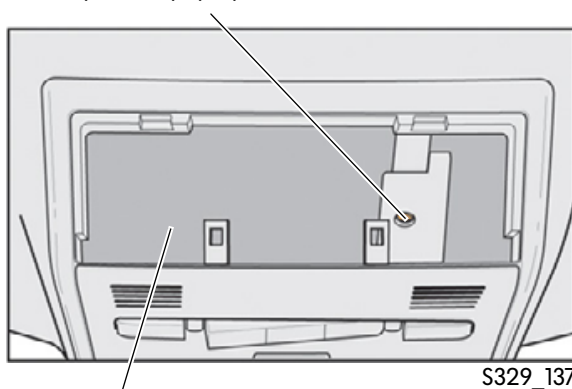
This is used to open and close the electrohydraulic pop-up roof.



## Emergency operation of the electrohydraulic pop-up roof

If the roof hydraulics fail, you can close the electrohydraulic pop-up roof using a backup system. There is a screw behind the panel underneath the operating and display unit for camping equipment E153 that releases the pressure on the hydraulics. Once this has been released, the aluminium roof shell can be closed by hand.

Screw for emergency operation of the electrohydraulic pop-up roof



Opening for the operating and display unit for camping equipment E153



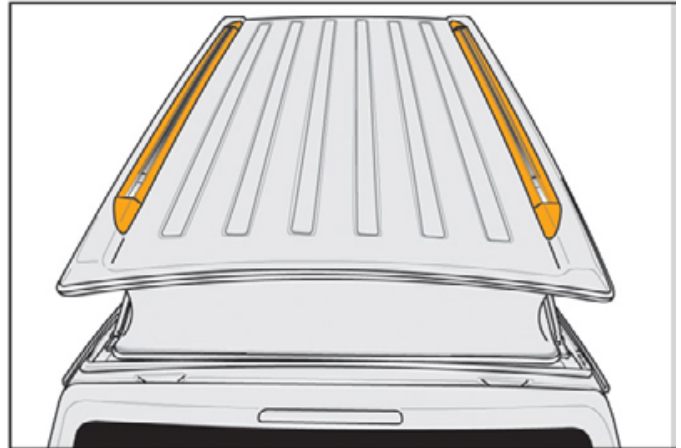
# Body

## Further special features

### Fastening systems

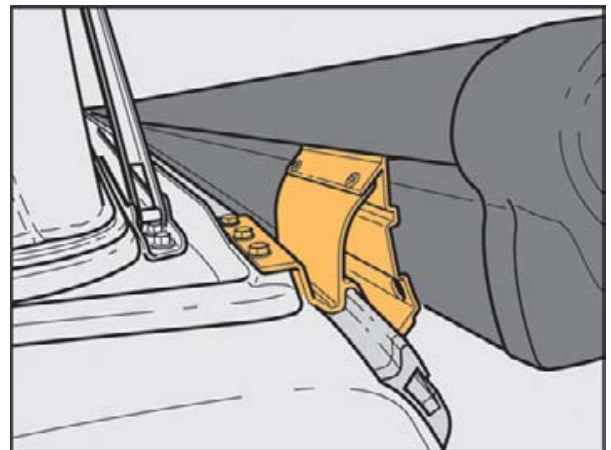
C-rails have been mounted on the body for the roof rack and the awning rails.

Roof-rack rails can be fitted in the C-rails for the roof rack without screws. The roof-elevating mechanism also works when the roof is loaded to maximum of 50 kg.



S329\_056

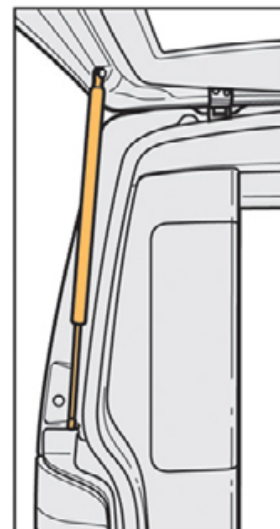
Special fastening adapters are used for the awning that screw into the awning rail and onto the roof frame reinforcements.



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### Tailgate

The gas prop on the tailgate is reinforced in comparison with the Transporter basic model to compensate the increased weight of the tailgate due to the camping chairs.

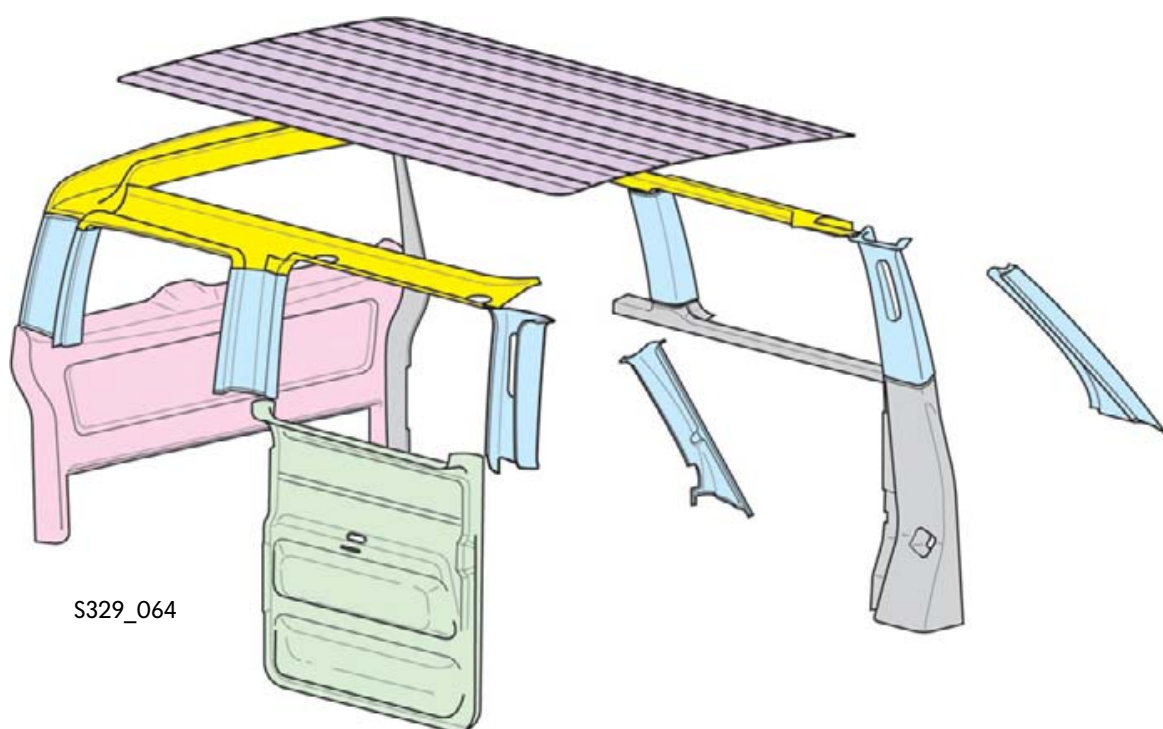


S329\_084



## Interior panels

The panels are partly taken from the Transporter 2004 Multivan basic model as well as the 1991 California.



### Legend

- The lining of the electrohydraulic pop-up roof is glued into the aluminium roof shell.
- The sliding door panel has been redesigned to hold the camping table.
- Two camping chairs are held in the tailgate panel.
- All pillar lining parts have been adapted from the window up to hold and guide the blinds.  
The B-pillar lining has been formed from the side wall panel on the middle as the cupboard replaces the panel. Slots for blinds have been added to the right-hand B-pillar lining. The vents in the B-pillar have been omitted to allow the blinds to be fitted.
- The roof lining has been omitted due to the roof bed. Instead there are roof frame panels.

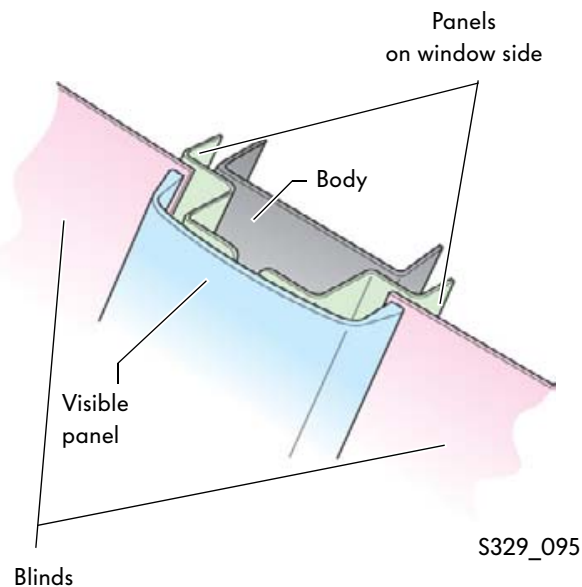


# Body

## A, B and C-pillar lining

These panels are made up of two shells: Firstly a panel is clipped to the body on the body and then screwed on. The blind is already fitted to this panel on the window side. The visible panel is clipped on top.

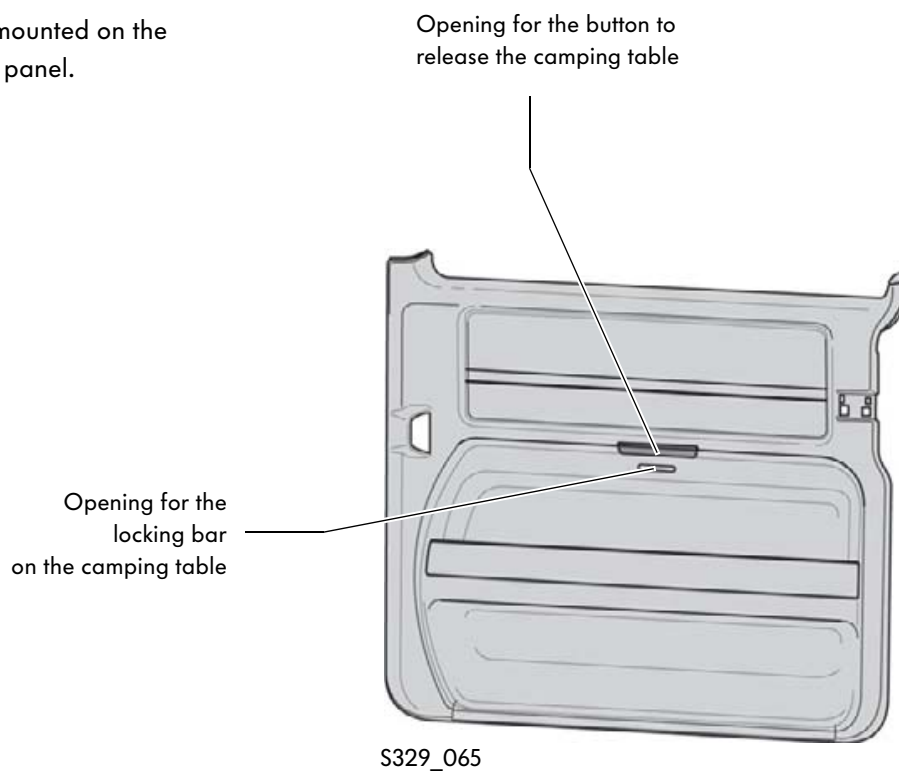
To reach the belt components, the visible panel needs to be removed.



## Sliding door panel

The sliding door panel has been designed to hold the camping table.

The lock mechanism is mounted on the sliding door behind the panel.

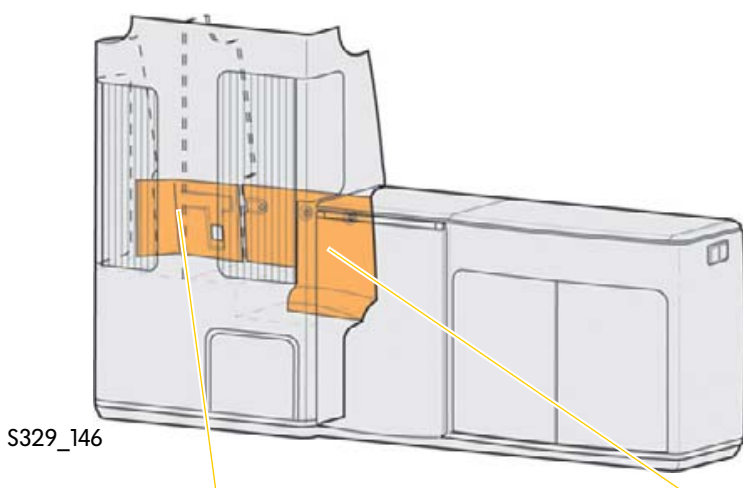


## Panels inside the cupboard

Two panels are fitted inside the cupboard on the body side and are separated by the cupboard partition.

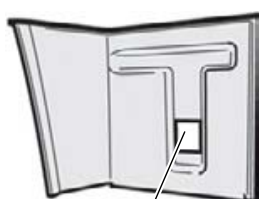
The panel in the washing compartment slots into the cupboard floor. The automatic personal protection circuit-breaker (residual-current-operated circuit-breaker) is screwed to the back of the panel. The panel is fastened to the body-in-white with adhesive.

The second cupboard panel is inside the wardrobe above the battery for special vehicle and clips in.



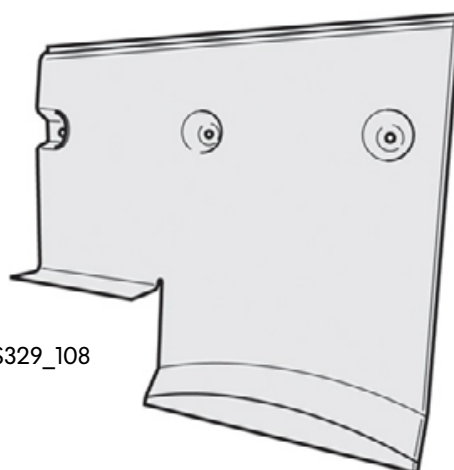
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S329\_109



Opening for inserting  
the automatic personal  
protection circuit-  
breaker

S329\_108



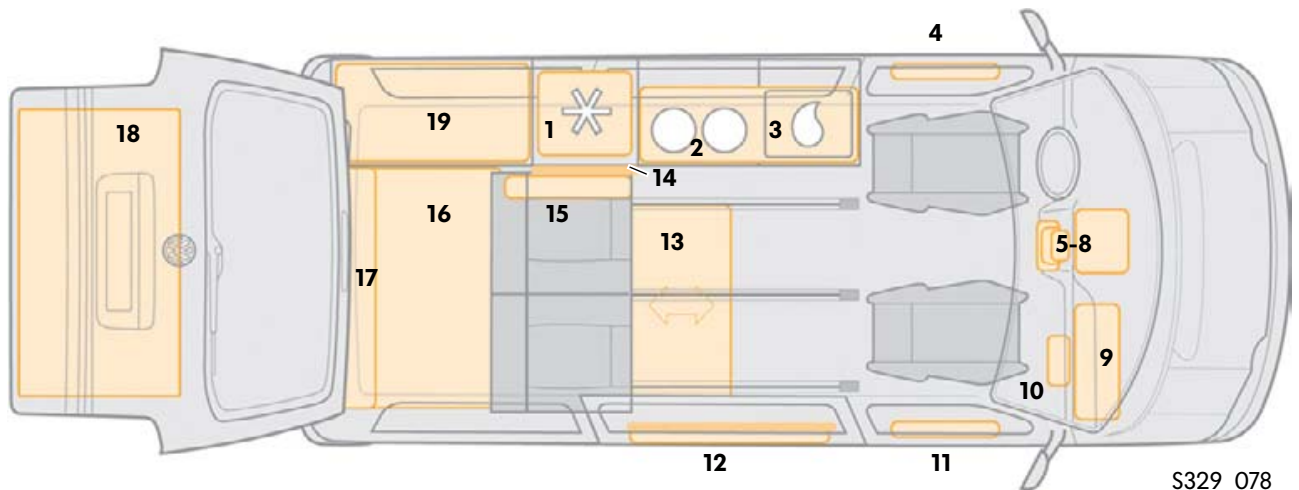
The panels in the cupboard need to be removed before the cupboard can be taken out.

# Equipment

## Storage compartments in the California

### Storage

The California features a wide range of storage facilities.

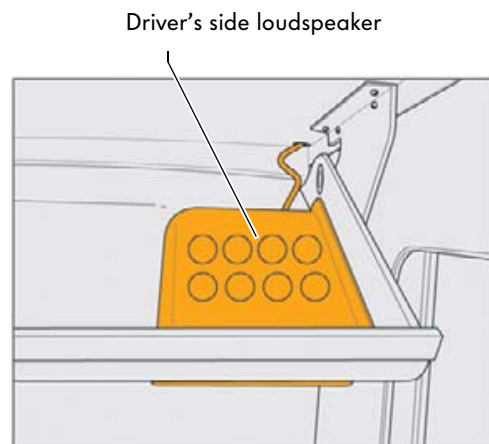


#### Legend:

- |  |  |
|--|--|
| 1 Refrigerator box                               | 11 Storage compartment in front passenger door                       |
| 2 Stove, storage compartment underneath          | 12 Camping table in the sliding door                                 |
| 3 Sink unit, cutlery drawer and shelf underneath | 13 Drawer in seat bench  |
| 4 Storage compartment in driver's door           | 14 Multiple-purpose table hung on the cupboard (Comfortline version) |
| 5 Storage compartment with coin holder           | 15 Through-load aperture in seat bench                               |
| 6 Storage compartment with tank card holder      | 16 Luggage compartment   |
| 7 Cup holder, ashtray and coin holder            | 17 Overhead storage compartment (with loudspeakers)                  |
| 8 Bottle holder to 1.5l / rubbish bin            | 18 Two camping chairs in the tailgate                                |
| 9 Glove compartment, cooled and illuminated      | 19 Washing cupboards   |
| 10 Newspaper holder                              |  |

### Loudspeakers in overhead storage compartment

The loudspeakers are inside the overhead storage compartment and are made up of a mid-range and treble speaker and a bass speaker. They are fastened inside the roof storage compartment and are covered with a plastic housing that is glued on.



S329\_135

## Cupboard material

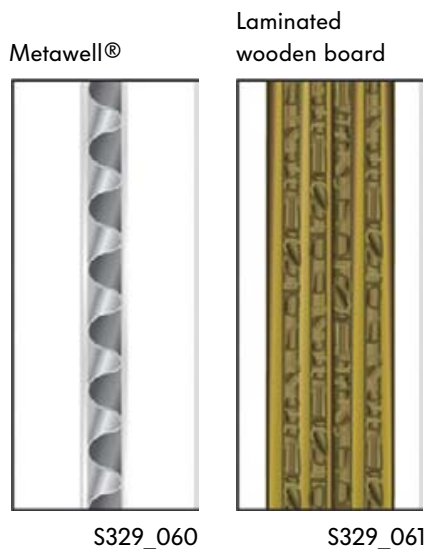
The cupboard in the new California is made from Metawell®, a material that is mainly used in boat building and aeronautics.

This material is considerably thinner and lighter than the wooden laminated panels usually used and has a greater rigidity.

In comparison: The cupboard material in the California 1991 is 18 mm thick and only 5 mm in the California 2004. This creates more useful space. At the same time, the new cupboard weighs a third of the previous one.

Metawell® is made up of two aluminium outer plates with a corrugated aluminium sheet glued between them. The plates and also the corrugated sheet are each 0.5 mm thick.

A wooden décor sheet is attached to the outside, and the plates are painted on the inside.



When you drill through the Metawell® material, e.g. to fasten accessories, the special material properties need to be taken into consideration.



Abrasive detergents and aggressive solvents (like Aceton or turpentine) are not suitable for cleaning the cupboard.



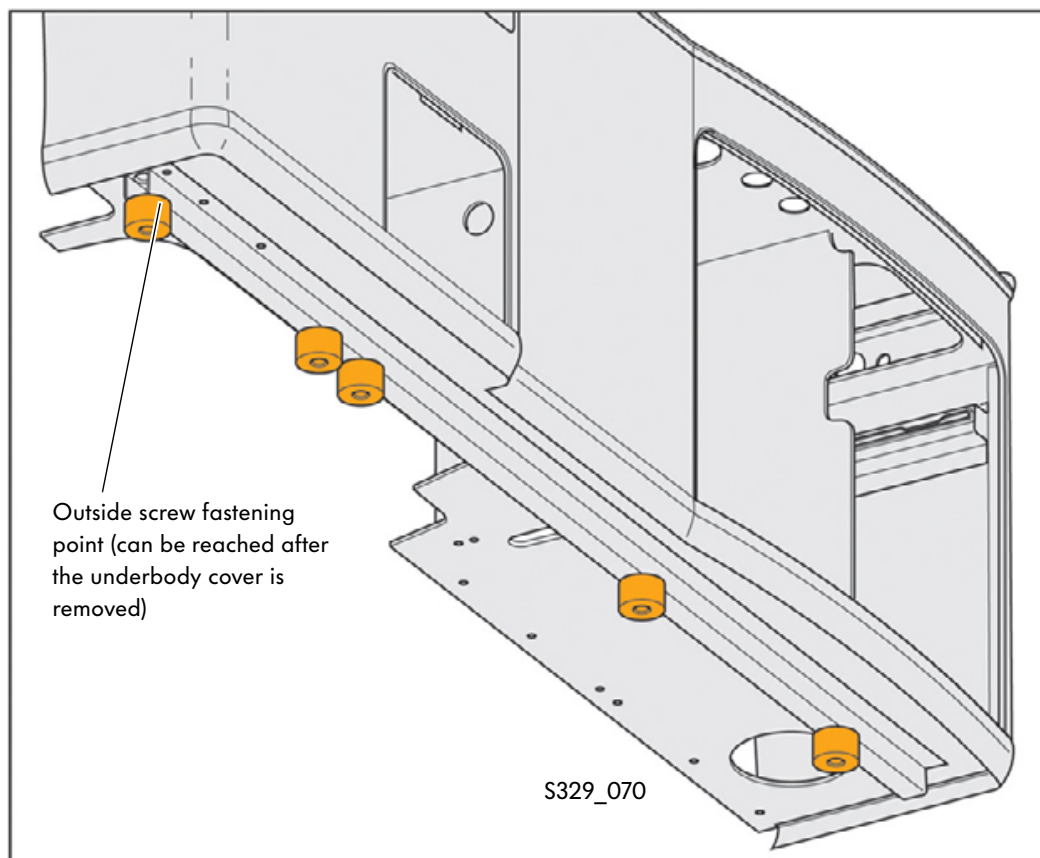


# Equipment

## Cupboard mounting points to the body

The cupboard is screwed to the body floor at five points. Four screws are reached from inside and one from outside.

To reach the screw from the outside, the underbody covering needs to be removed.

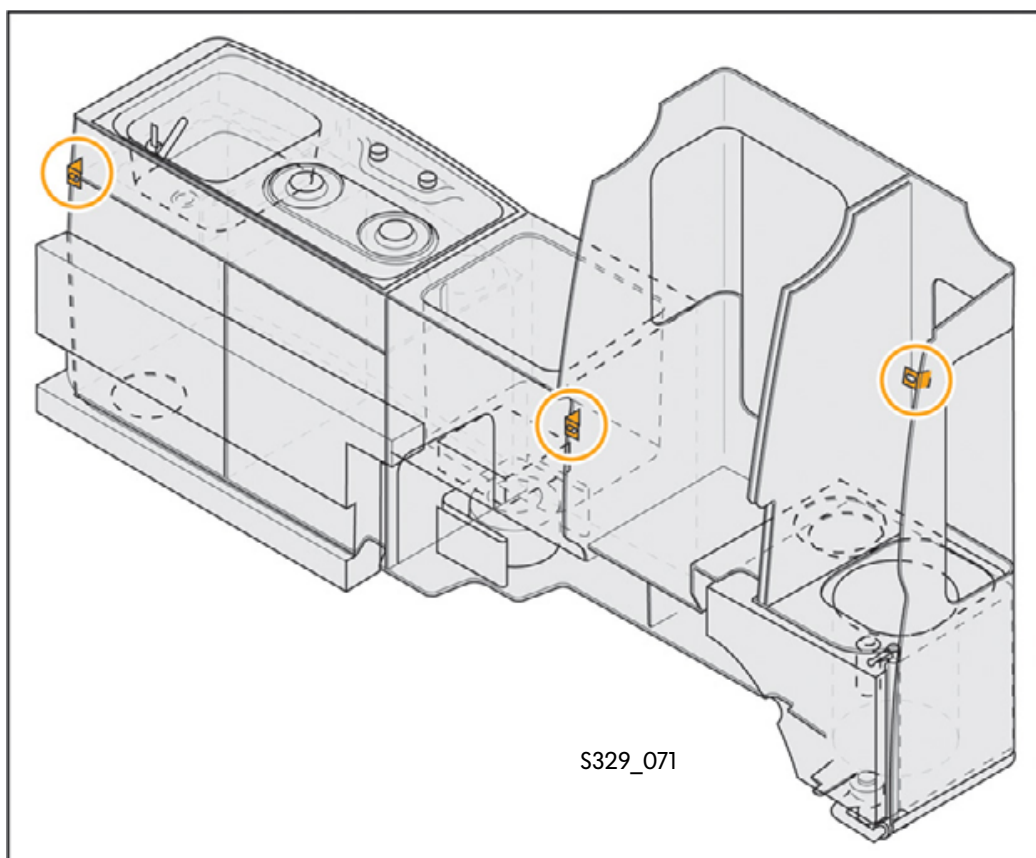


You will find the instructions for removing the underbody panel in the latest repair guide for the Transporter 2004 Multivan.

The cupboard is screwed to the body side panel at three points using brackets.



To reach the rear brackets, the panels in the washing compartments need to be removed.



# Equipment

## Roof bed

The roof bed is made from a slatted frame with an additional bed board and a front and rear bed support.

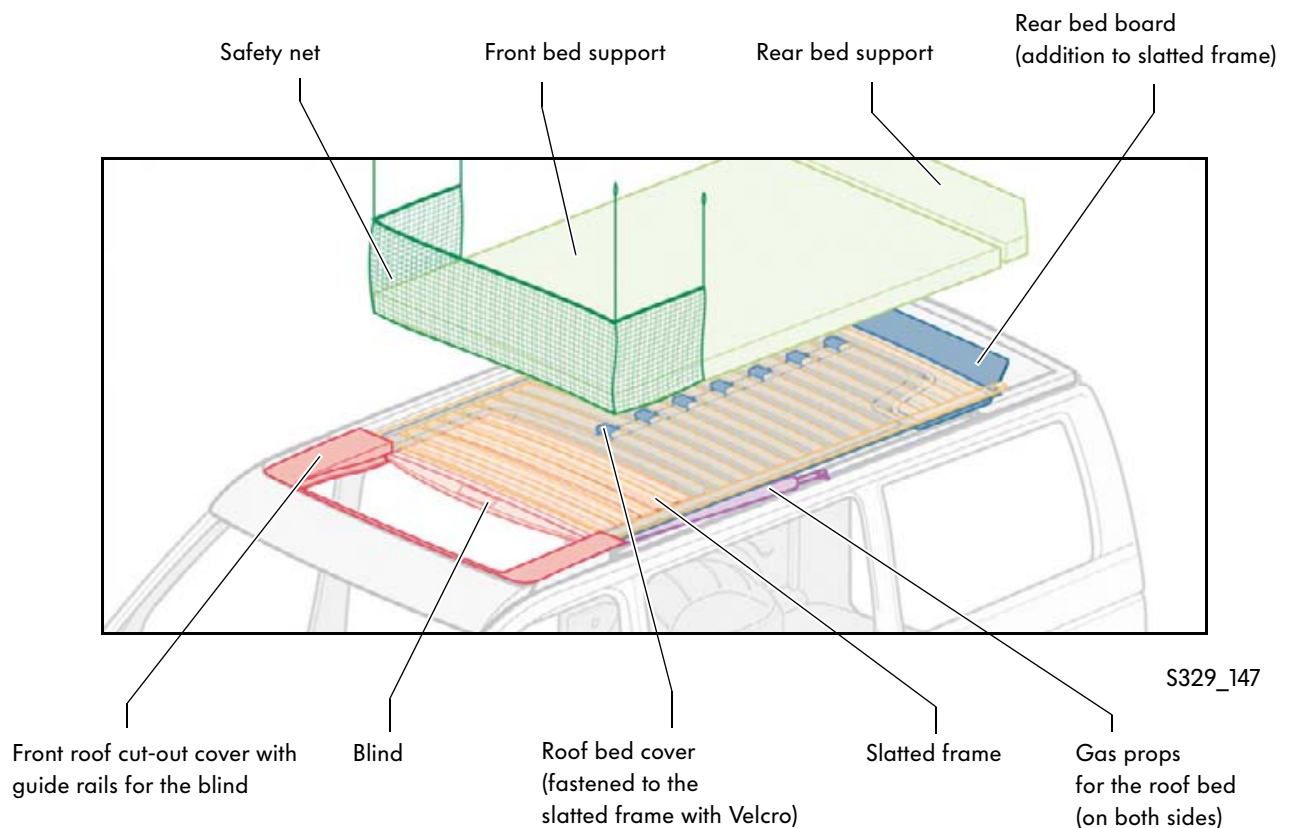
There is also a blind separating it from the driver's cab to prevent the bellows hanging into the interior when the roof is folded down.

The guides for the blind are underneath the slatted frame and in the front roof cut-out panel.

A safety net can be attached to prevent children or objects falling down.

The slatted frame is equipped with two gas props so it is easy to raise.

Underneath the slatted frame, there is a cover separating it from the interior.

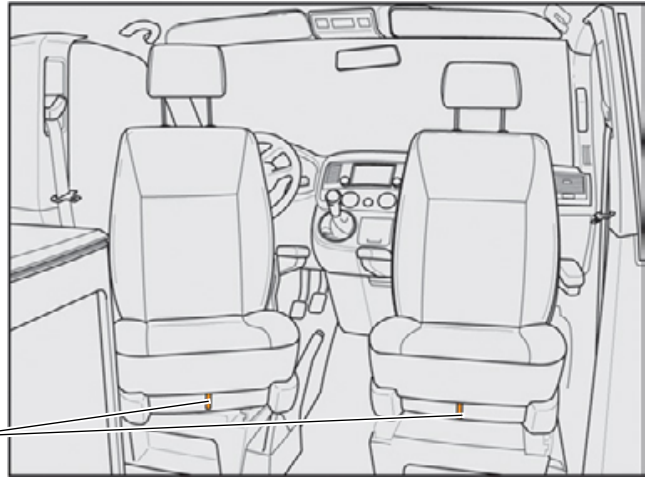


## Front seats

Both front seats can be turned approx. 180°.

To do so, the backrests need to be set to the vertical position. The longitudinal position also needs to be adjusted. The steering column needs to be pushed in as far as possible and set as high as possible.

Lever for releasing the lock  
and turning the seats

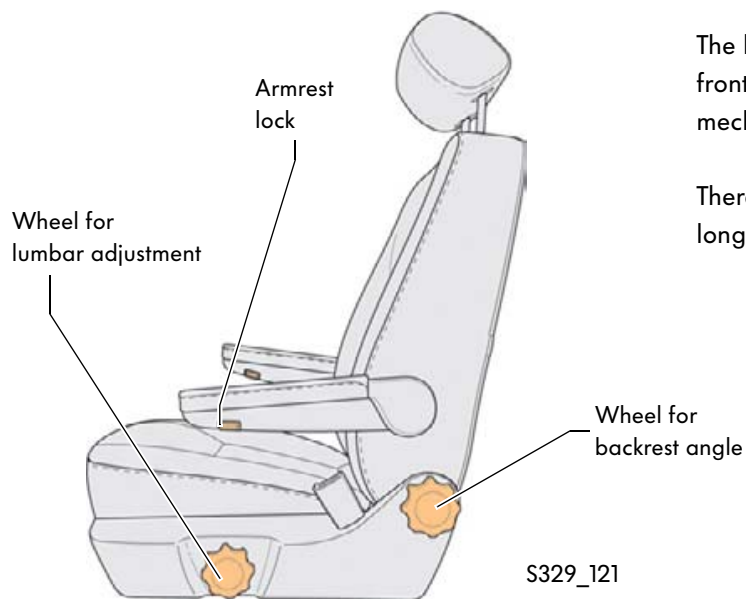


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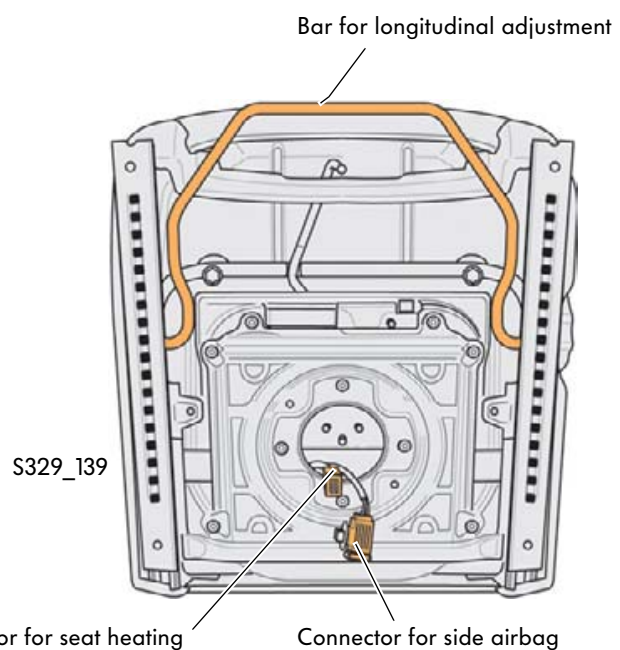


The backrest, lumbar support and armrests on the front seats in the California 2004 are adjusted mechanically.

There are rails and a bar underneath the seats for longitudinal adjustment.



Underneath each seat there is a connector for the side airbags and the bar for longitudinal adjustment. There is also an optional connector for connecting the seat heating.



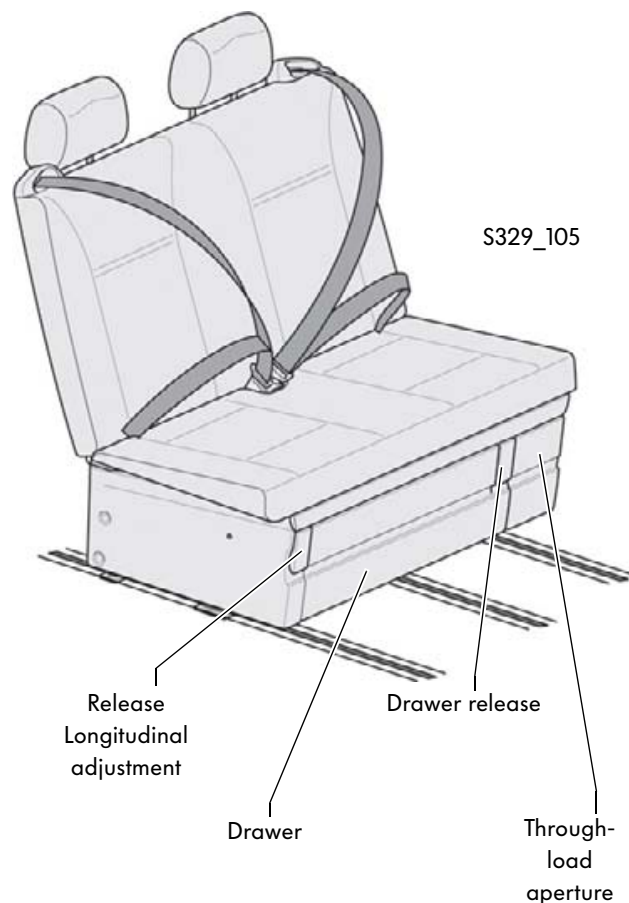
# Equipment

## Rear bench

The seat bench is anchored to the floor on the two outer rails and can be moved lengthways in 12-mm steps. It has been fitted with integrated three-point seat belts. The lock for the longitudinal adjustment of the seat bench is located underneath the seat base along with a spacious drawer with its own lock and a through-load aperture to the luggage compartment.

The drawer is connected to the bench subframe and can be removed when necessary.

The two right-hand rails can also be used to install an optional fifth seat.

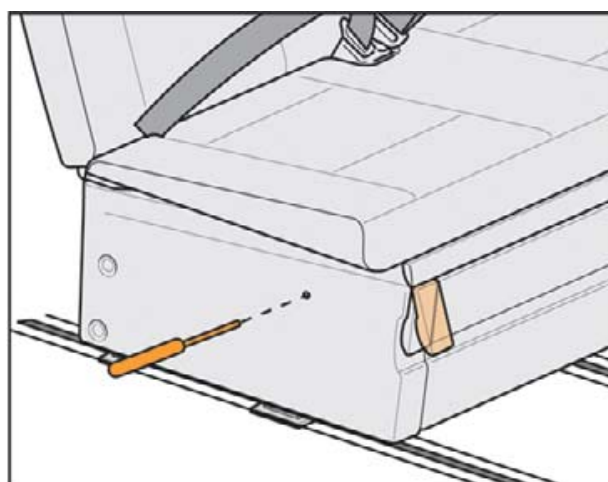


## Removing the bench

To remove the bench from the rails, the release lever should be held.

To make this work easier, a release mechanism can be accessed on the side of the bench:

You can insert a screwdriver to hold the release. You can then let go of the lever and push the bench to the furthest position forward and remove it.





The lever for adjusting the bench backrest is located in the middle of the top backrest edge.

The backrest angle can be adjusted in three steps (15°, 20° and 25°) and folded down completely.

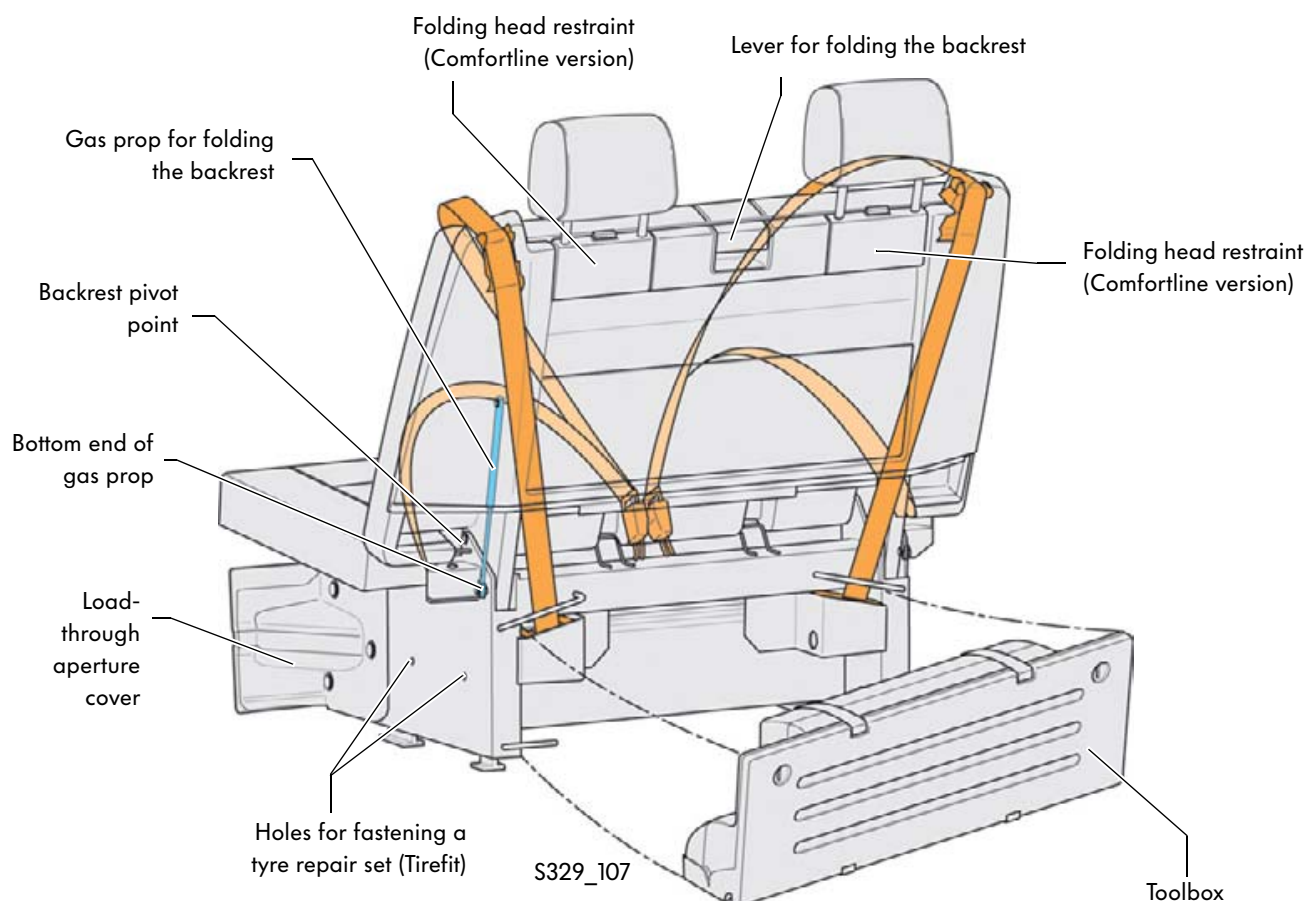
If you fold over the backrest, the seat base is tilted 5° to create a level surface. The belt locks attached to steel wires are then automatically moved downwards. When the backrest is folded up, they appear again or can easily be pulled out.

The backrest has a gas prop on the side next to the cupboard to make it easier to move.

A toolbox is attached to the back of the seat bench. It contains the standard tool set and has space for the removable tow bar (optional equipment).

In the Comfortline version, the head restraints can be folded down. The head restraints lock into the usage position. When folded down, the head restraints lock automatically due to the spring tension.

On the driver's side of the bench, two holes have been provided near to the through-load aperture to secure a tyre repair kit (Tirefit).



# Water supply

## Fresh water system

The fresh water system is made up of:

- the fresh water tank at the rear left
- water level sender G120
- the water pump V36
- the water pump switch E80  
(built into the water tap)

The pipe system also includes the supply line from the tank to the water tap a breather or overflow pipe next to the fresh water filler neck and a pipe for emptying the fresh water tank underneath the tank.

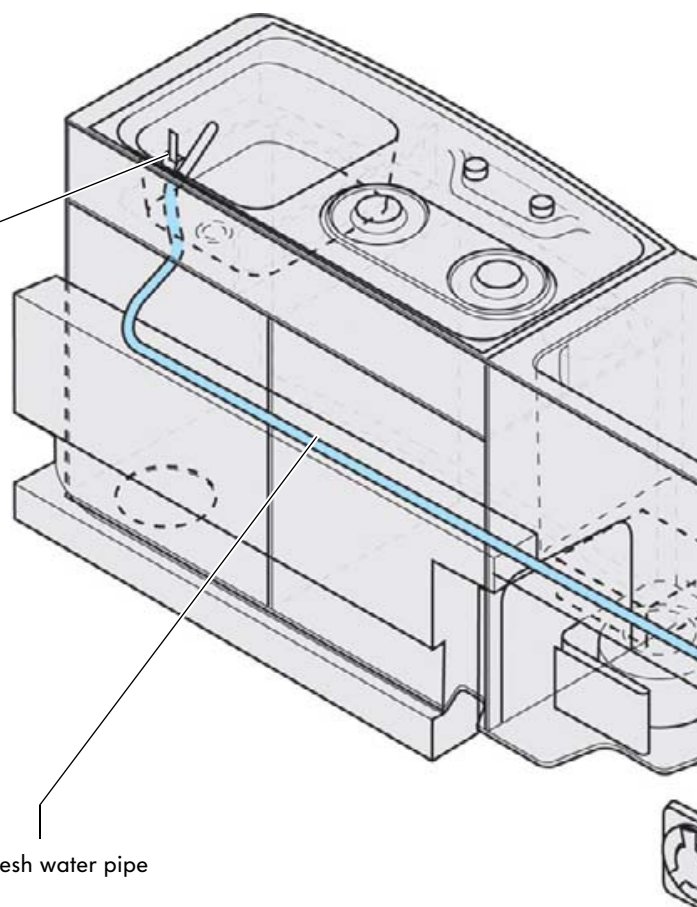
The fresh water tank holds 30l.

The water level sender has three steps and indicates the level of the fresh water tanks on the operating and display unit for camping equipment E153.

The tank and all pipes are made from plastic.



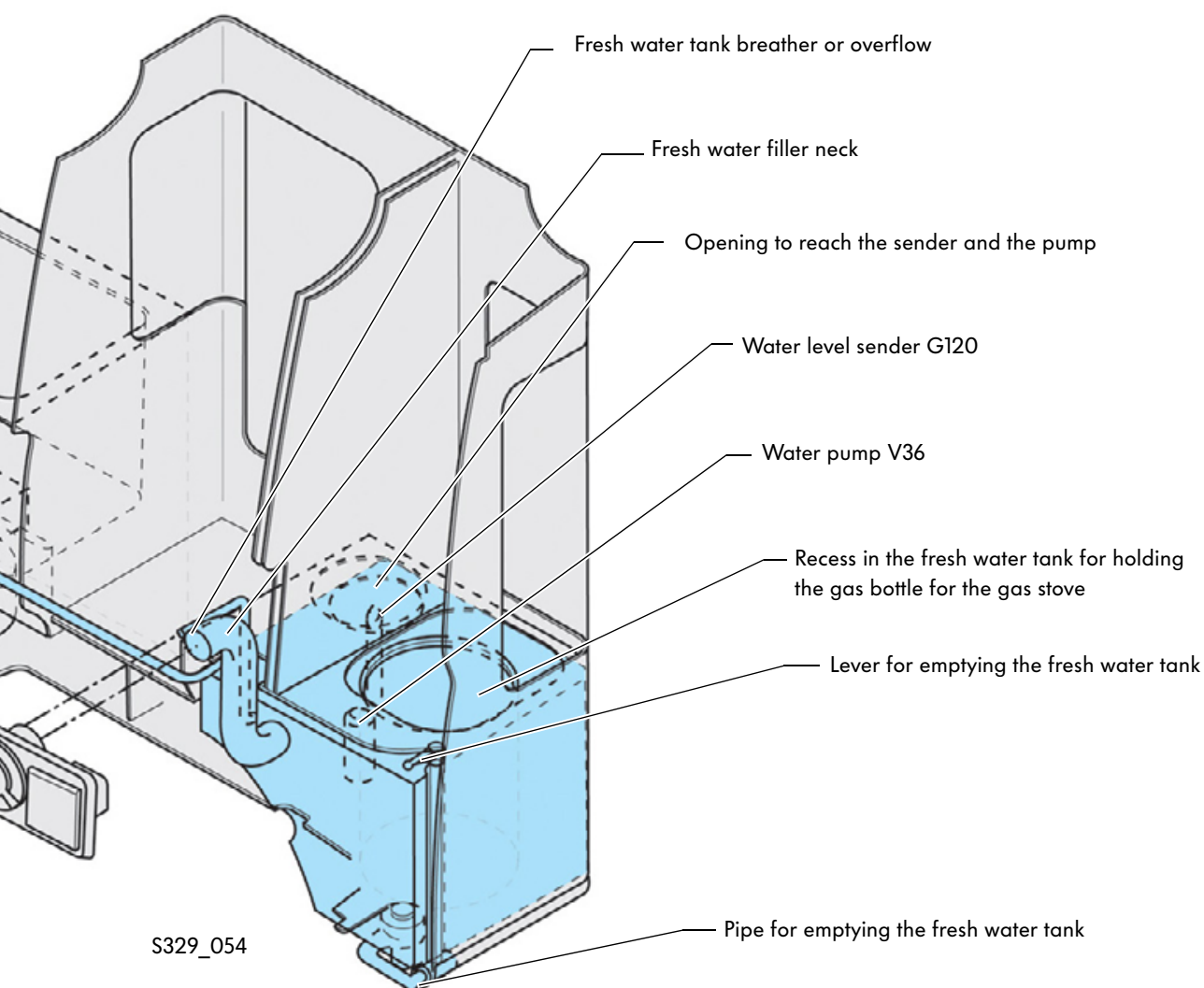
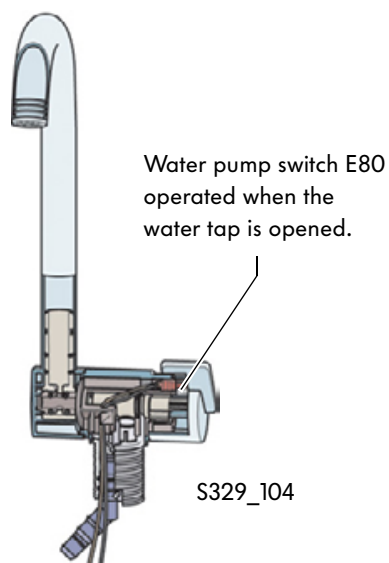
Water pump switch E80  
(built into the water tap)



The fresh water system is winterproof to a certain extent. The water in the fresh water tank should not freeze as the pump and the electric system could be damaged.

## Non-pressurised water pump

Inside the fresh water system, pressure is not built up to transport the water from the tank to the tap. A switch is built into the water tap that is activated when the water tap is opened and sends a signal to the water pump to start pumping.



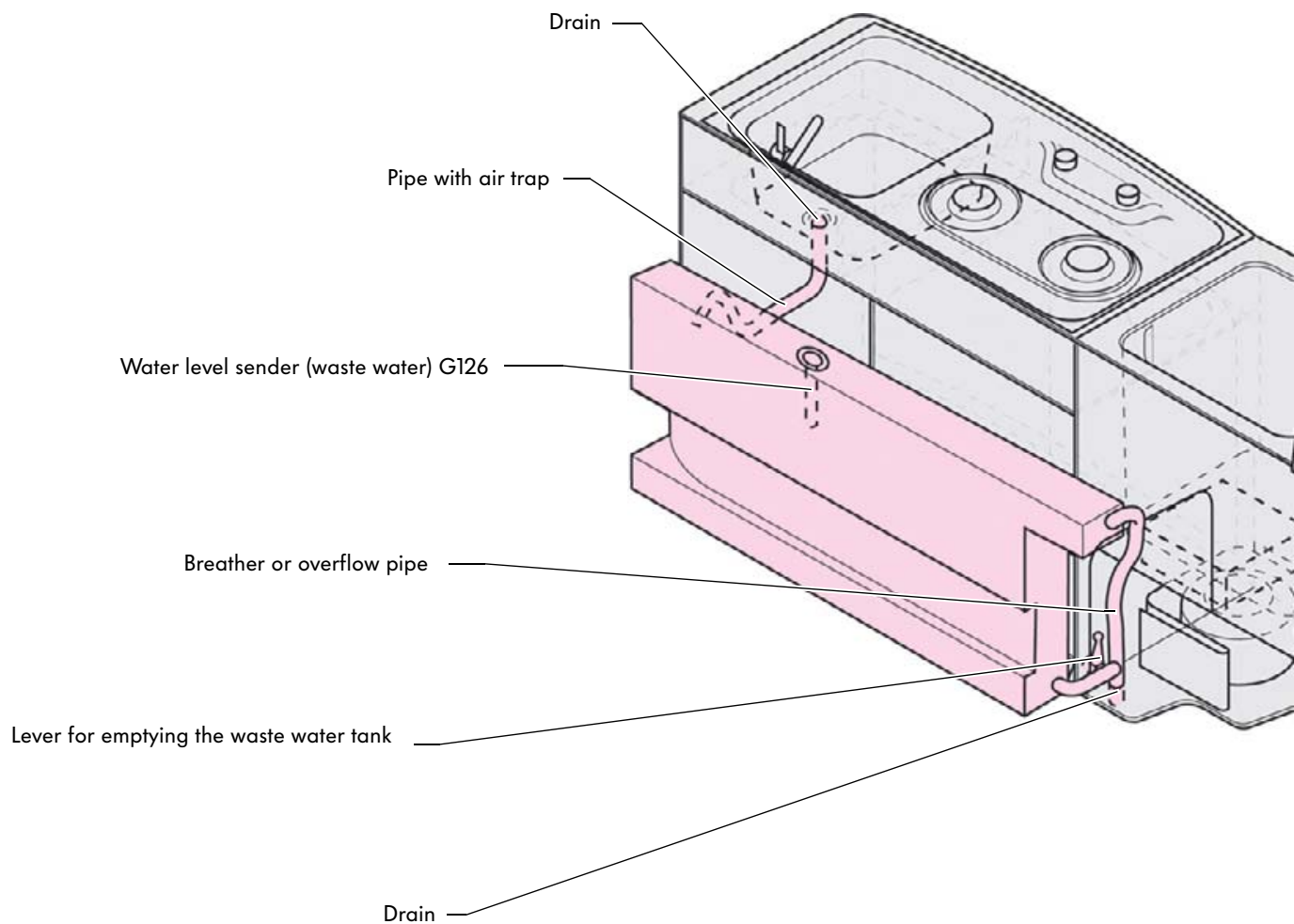
# Water supply

## Waste water system

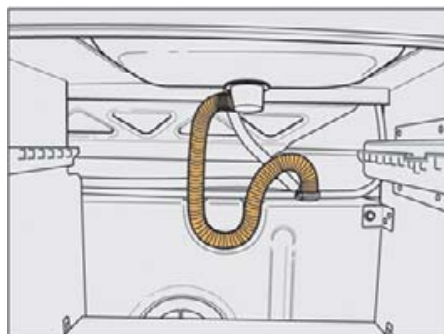
The water system is made up of the waste water tank as well as the sender for the water level (waste water) G126. In addition, the pipe system includes the pipe from the sink unit to the tank, the drain pipe and a breather or overflow hose. The waste water tank holds 30l.

The sender for the water level (waste water) signals the waste water tank level (full or empty) to the operating and display unit for camping equipment E153.

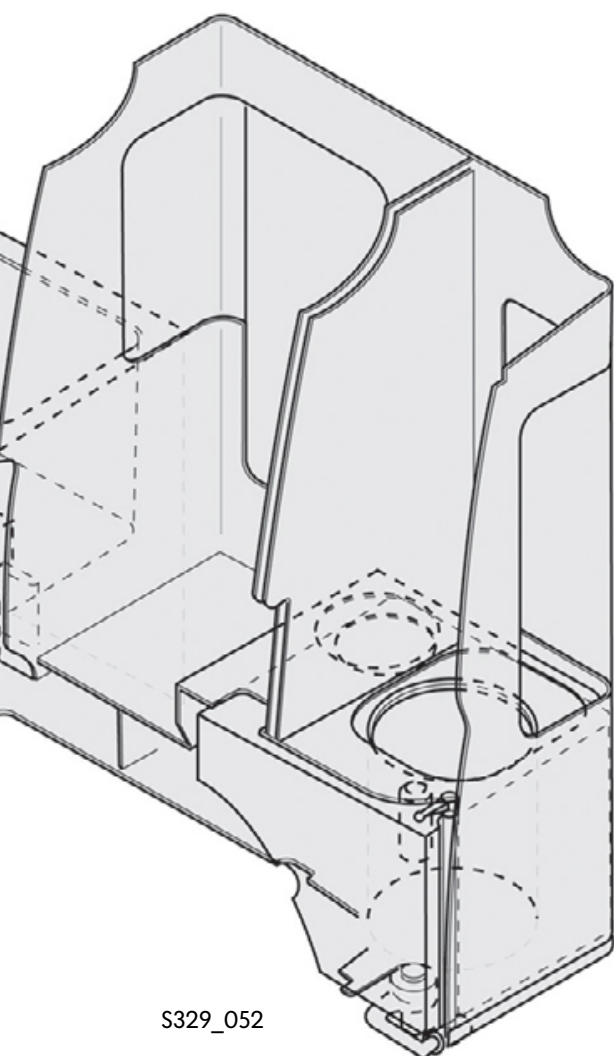
The tank as well as all pipes are made from plastic.



The waste water pipe from the sink unit to the waste water tank uses a siphon-type air trap. Water remains in the U-bend to prevent gases and odours getting from the tank into the interior.



S329\_142



S329\_052



# Gas system

## Gas system

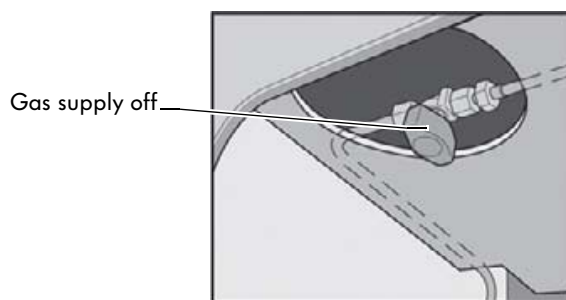


Work on the gas system may only be carried out by authorised personnel.

The gas system consists of:

- the gas bottle (integrated in the water tank)
- the pressure regulator
- a flexible gas hose
- a steel pipe for the supply to the gas stove
- the gas shut-off valve
- the gas stove
- the gas vent

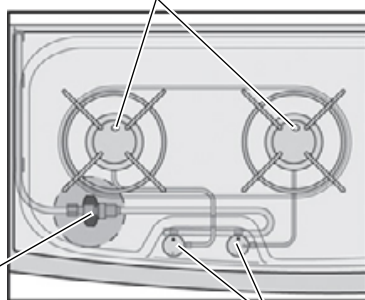
The gas shut-off valve is located in the storage compartment underneath the gas stove.



S329\_068

## Gas stove

Ignition safety device



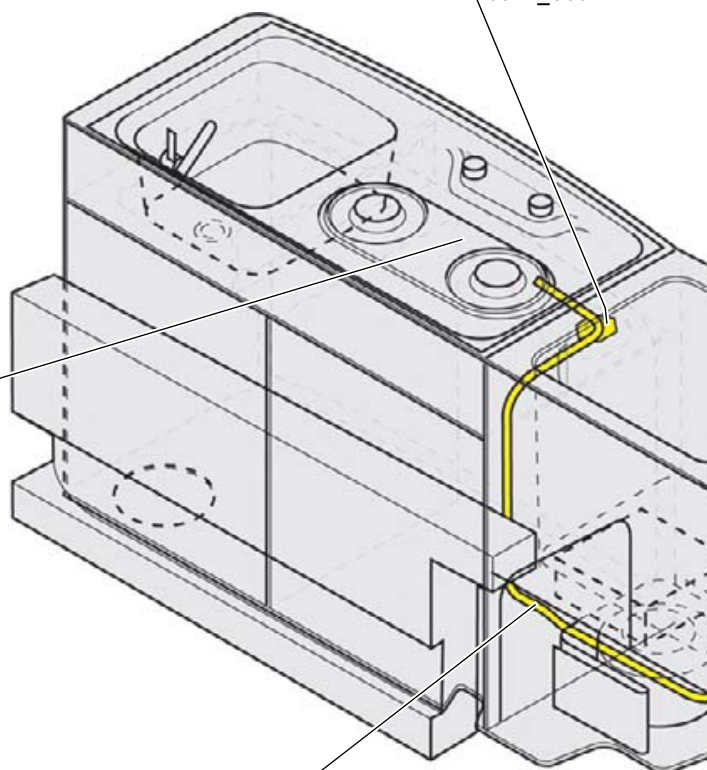
S329\_067

Gas shut-off valve  
(closed)

Flame control



Please refer to the current repair guide for information on exchanging the gas stove components and the gas shut-off valve.

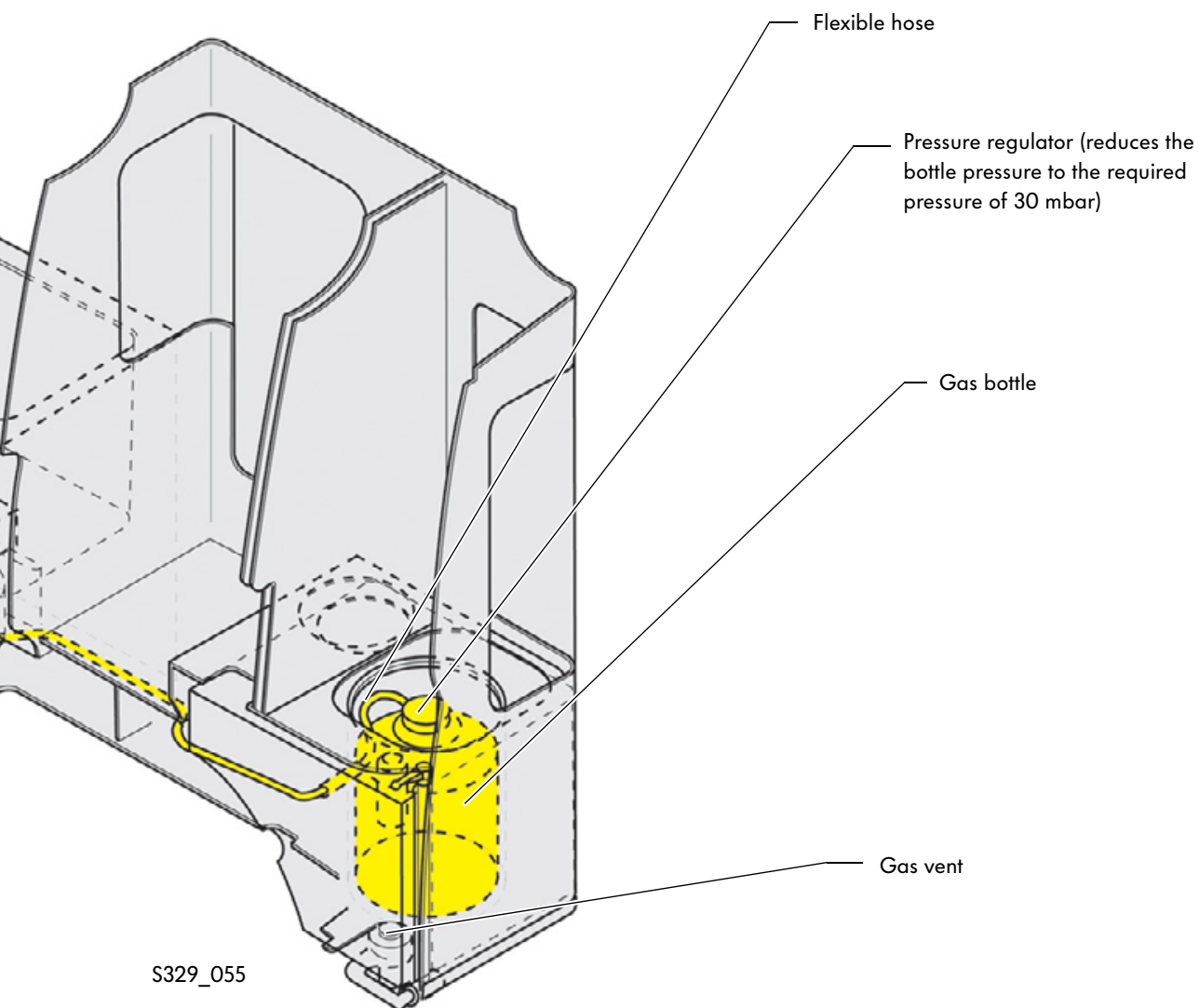


Steel pipe





- If the liquid gas pipe system is opened when repair work is carried out, a leak test should always be performed before the system is used again.
- In Germany, this leak test may only be carried out by a DVFG expert (DVFG = German Association for Liquid Gas) in accordance with "Work sheet G 607" and "DIN EN 1949" from "DVGW German Technical and Scientific Association for Gas and Water".
- Local national regulations should be observed.



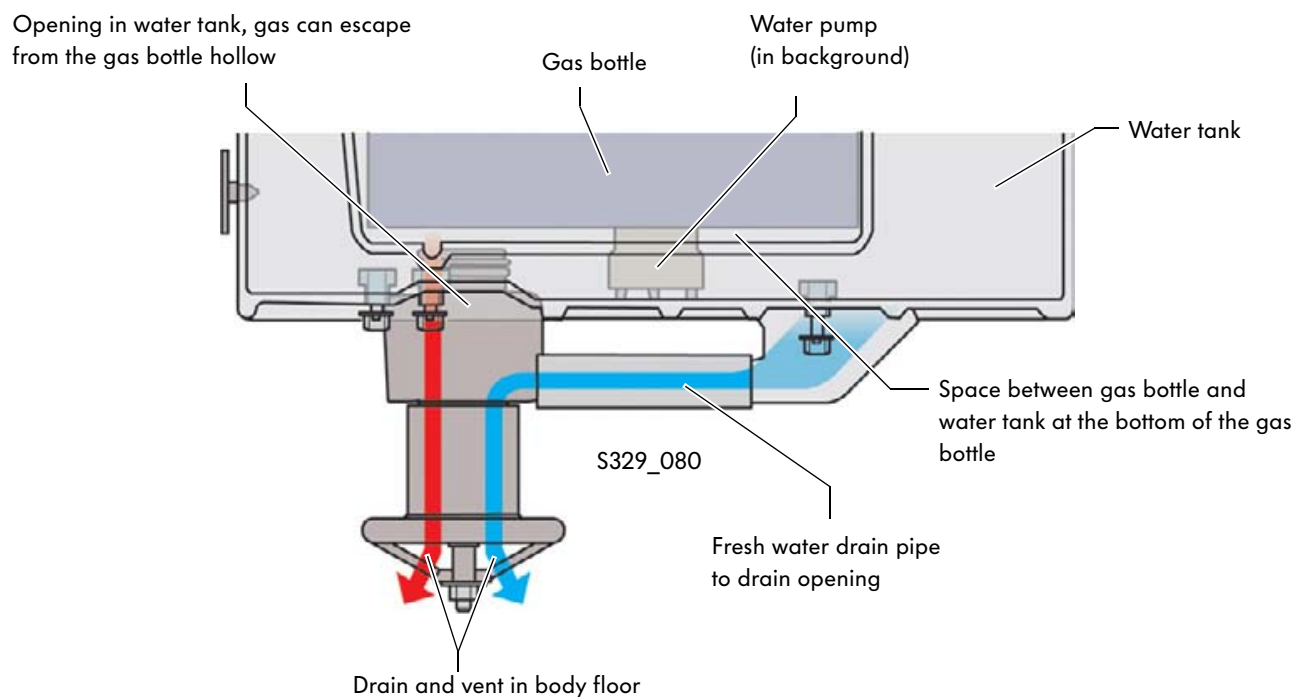
S329\_055

# Gas system

## Gas venting

If leaks occur around the gas bottle and gas escapes, a gas vent is necessary. This prevents the gas entering the vehicle interior.

As gas is heavier than air, it will sink downwards. Therefore the gas system will be vented at the same time as the fresh water tank is drained through the same opening in the body floor. A combined drain vent opening is also located on the bottom of the fresh water tank. It is designed so that gas can escape and water can drain at the same time.



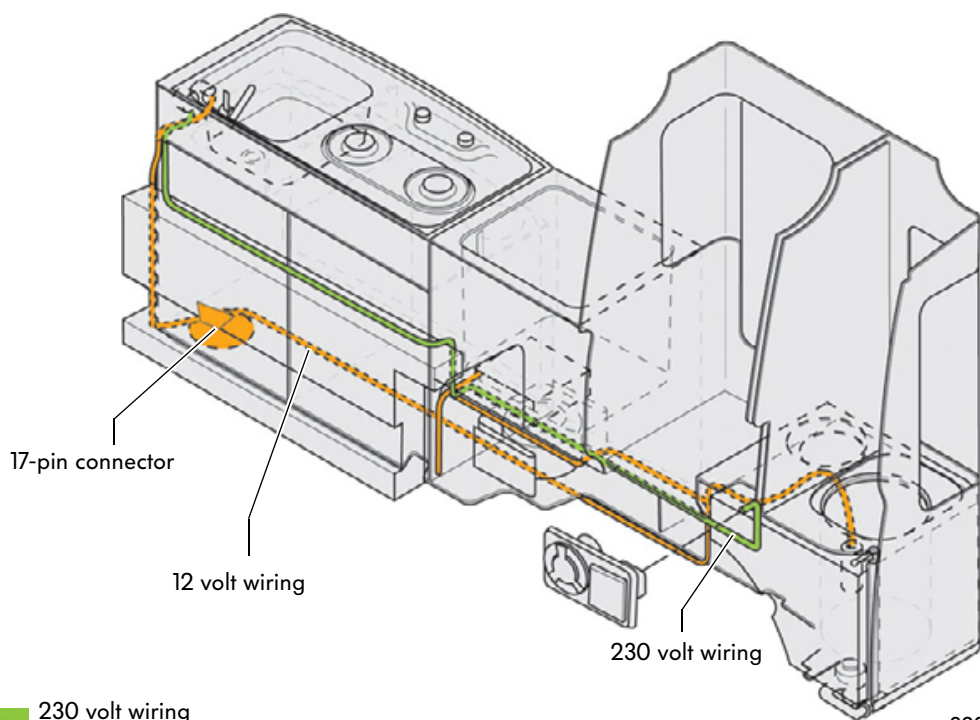
To reach the gas vent, the underbody cover needs to be removed.  
Please see the latest repair guide for the Transporter 2004 Multivan for instructions.

## California 2004 electrical system

The onboard supply in the California 2004 is made up of the Transporter 2004 onboard supply taken from the Multivan and a special onboard supply system for the California. The California onboard supply consists of a 12 volt wiring harness and a 230 volt wiring harness.

### Wiring in cupboard

The consumers in the cupboard are supplied by the 12 volt California onboard supply. Furthermore the whole 230 volt onboard supply is located inside the cupboard. The wiring for this section of the onboard supply is shown below. The 12 volt California wiring harness in the cupboard is connected to the rest of the onboard supply via a connector in the cupboard underneath the sink unit.



When repair work is carried out, the 230V voltage supply should never be connected at the exterior socket.



Work may only be carried out on the 230 volt onboard supply by authorised personnel.

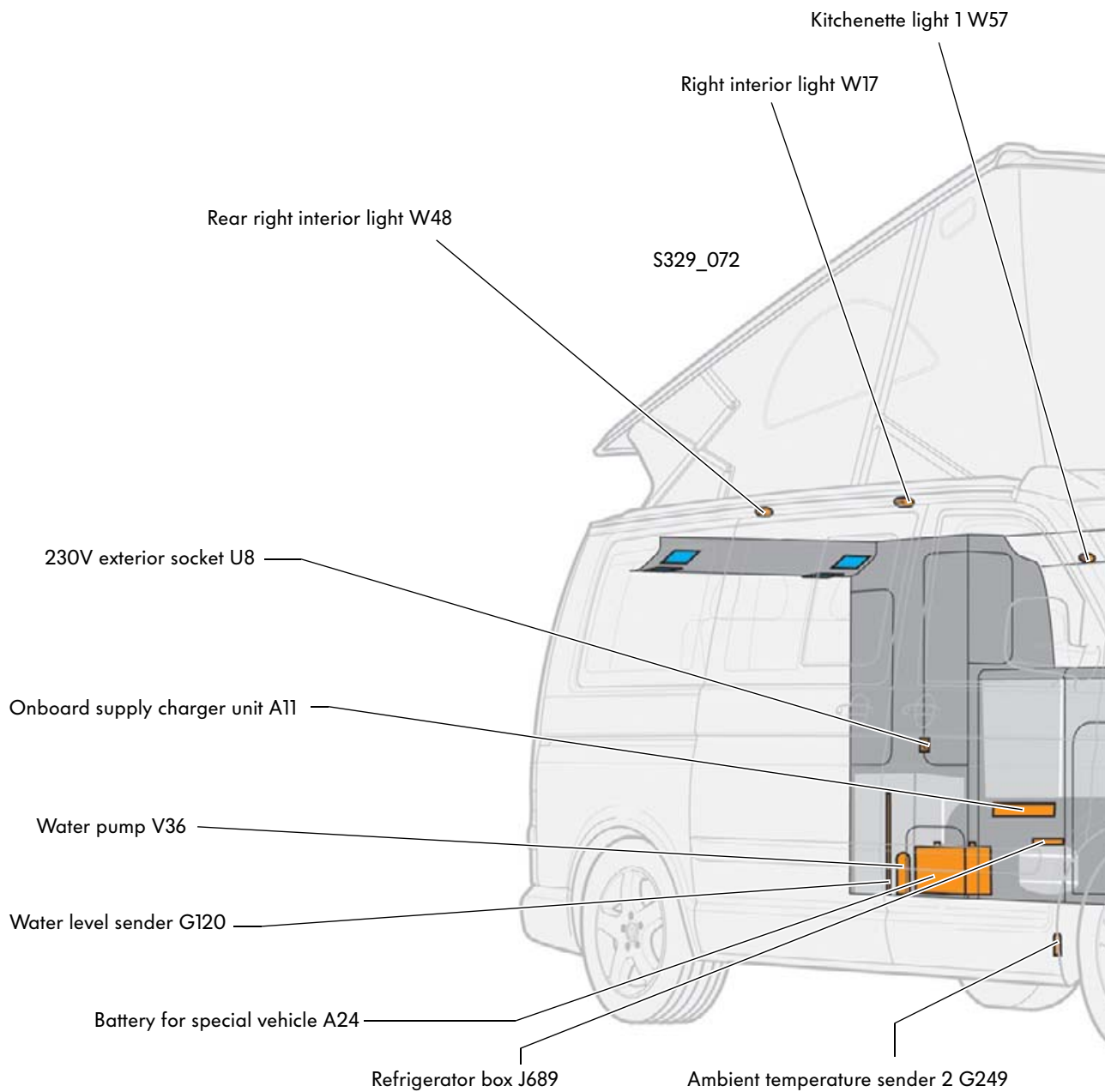
# Electrical system

## California 12-Volt onboard supply

The California onboard supply has been taken from the Transporter 2004 Multivan.

The power for the equipment and components is supplied via a special California onboard supply, however.

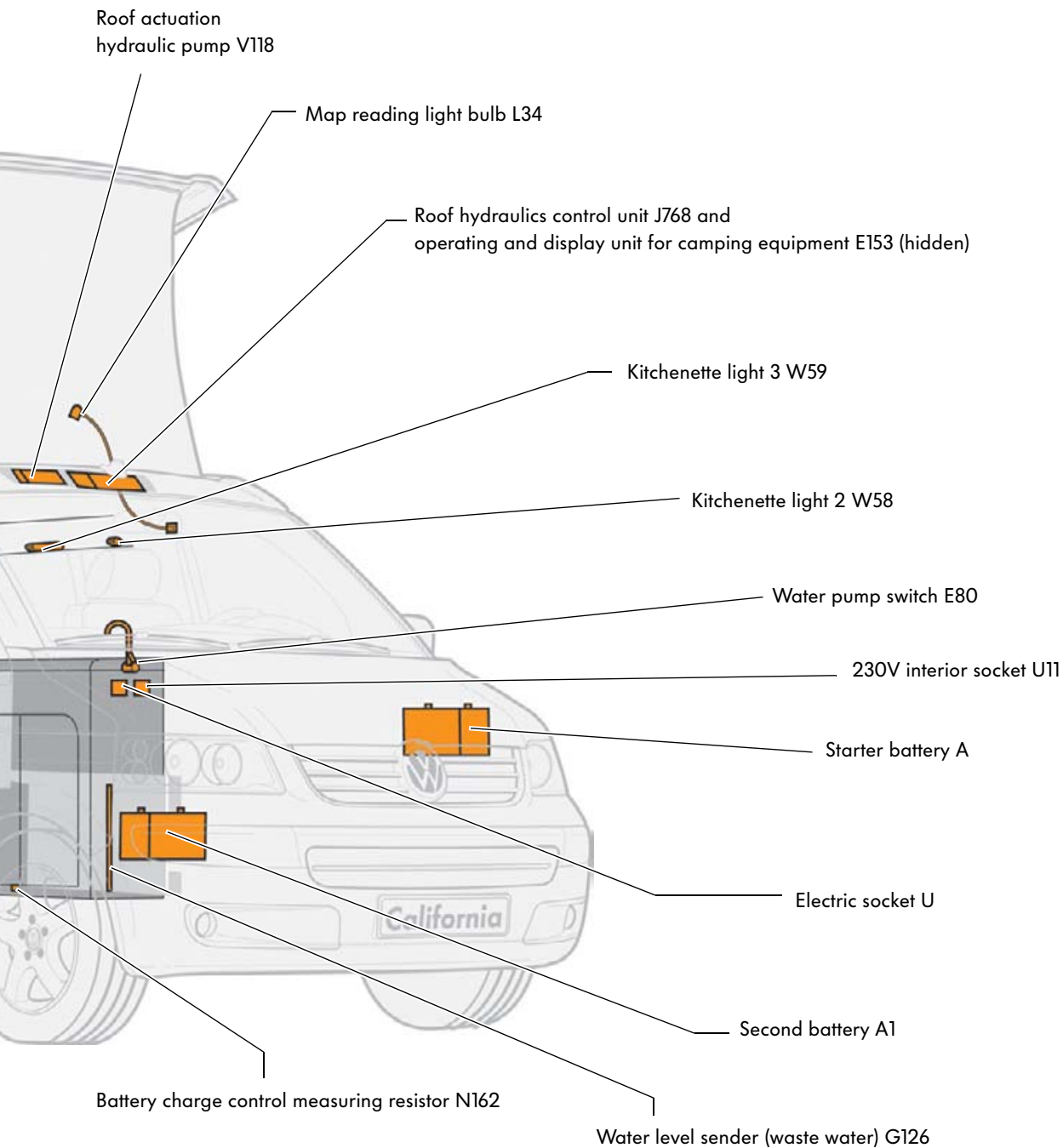
This system is not CAN-compatible.





The radio loudspeakers are not part of the special California onboard supply. However, they are still connected via this wiring harness. The following are shown in blue in the diagram:

- Rear left mid-range and treble loudspeaker R34 and rear left bass loudspeaker R15
- Rear right mid-range and treble loudspeaker R35 and rear right bass loudspeaker R17



# Electrical system

## Battery concept

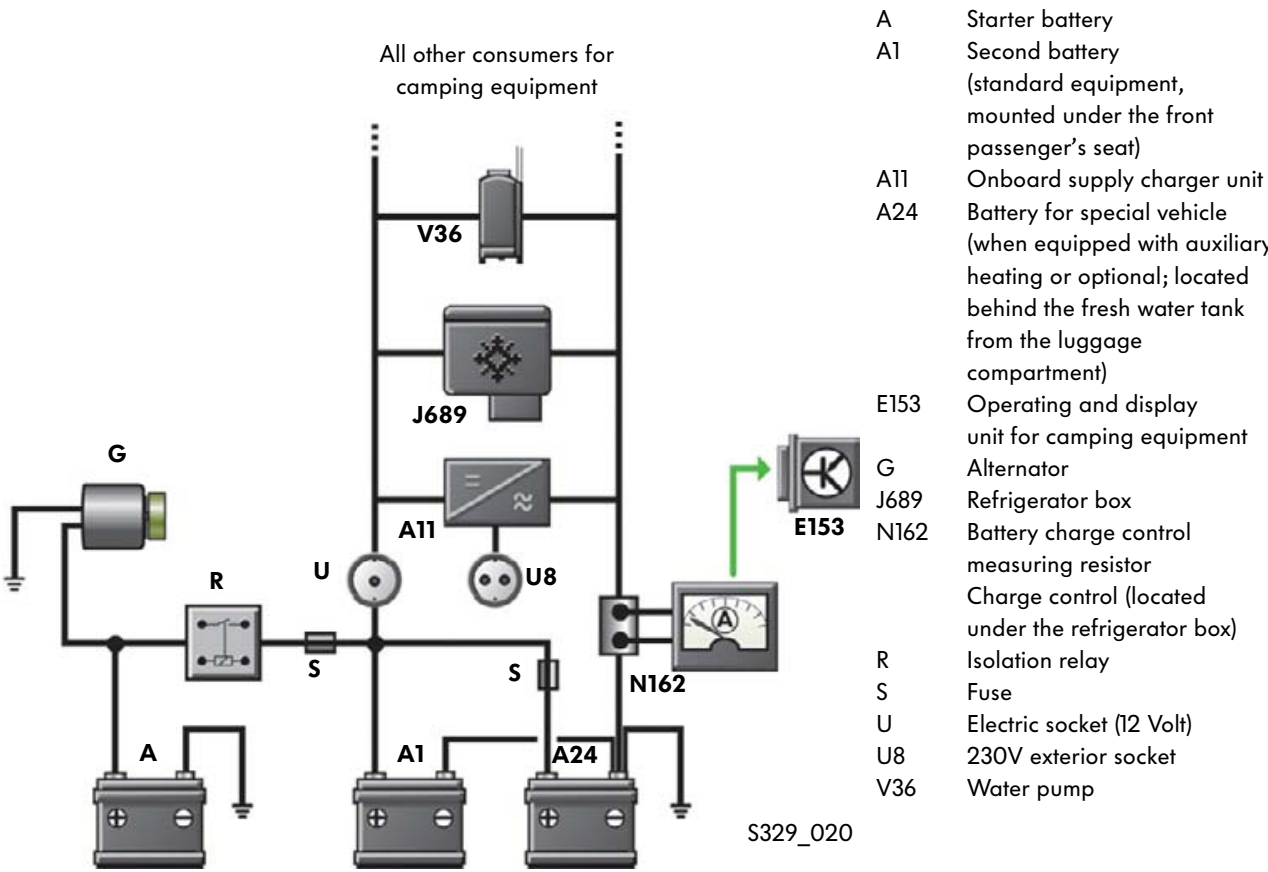
### Two auxiliary batteries

When fully equipped with the starter battery A, a second battery A1 and a battery for special vehicle A24, the second battery and the special vehicle battery are connected parallel to each other and to the starter battery (and thus the alternator) via an isolation relay. The starter battery is a lead acid battery, the other two are valve-regulated lead batteries. All batteries have an output of 75AH.

When charged by the alternator, the starter battery is charged first and then the second battery or the special vehicle battery. The second battery and the special vehicle battery can also be charged with the charging unit. In this case, the isolation relay for the starter battery is open.



The second battery and the special vehicle battery should be charged with the charging unit (instead of just with the alternator) as this increases their life.



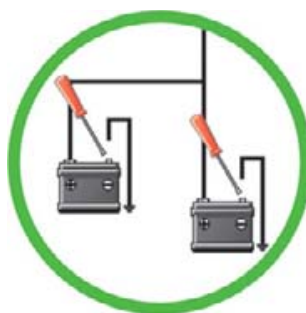




When work is carried out on the onboard supply, the earth cables on the second battery and the special vehicle battery should always be disconnected. Only then should you disconnect the plus leads. Otherwise short-circuits could be caused.



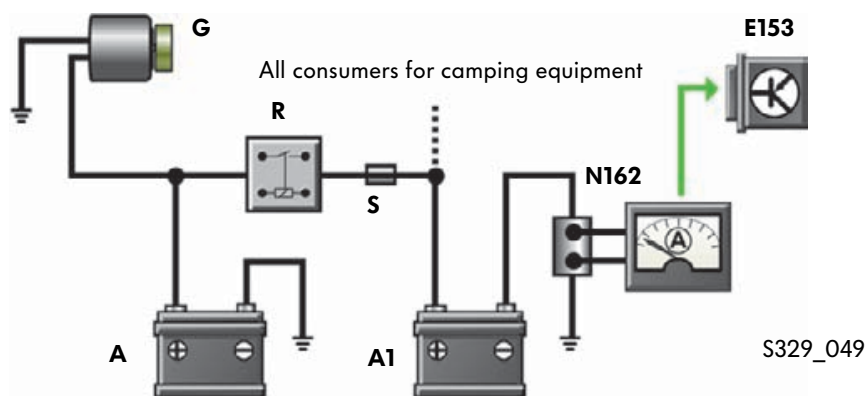
S329\_048



S329\_021

## Version without battery for special vehicle

When the special vehicle battery is not included, the battery charge control measuring resistor N126 is located near the second battery under the front passenger seat.



- A Starter battery
- A1 Second battery (standard equipment, mounted under the front passenger seat)
- E153 Operating and display unit for camping equipment
- G Alternator

- N126 Battery charge control measuring resistor (near the second battery under the front passenger's seat)
- R Isolation relay
- S Fuse

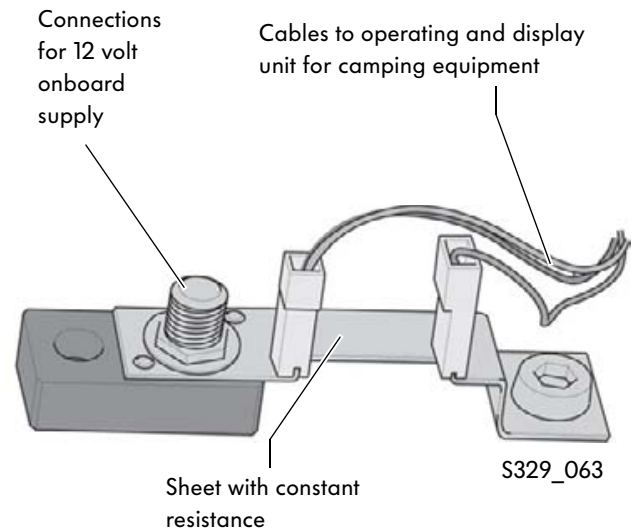


# Electrical system

## Battery charge control measuring resistor N162

When the special vehicle battery A24 is not included, the battery charge control measuring resistor N126 is located near the second battery under the front passenger seat in the seat box. When equipped with the starter battery A, the second battery A1 and the battery for special vehicle A24, the measuring resistor is located in the cupboard under the refrigerator box. The measuring resistors, also called “shunts”, are used to determine the actual current flowing through the wires.

The values obtained are used to calculate the percentage that is shown as the remaining battery capacity on the operating and display unit for camping equipment E153.



## Arrangement and operation

The battery charge control measuring resistor N126 measures the current using a constant resistor on which the voltage drop can be recorded.

The measuring resistor has a piece of sheet metal with a constant resistance via which the current is conducted.

The voltage is measured at two pins. If the current changes, the voltage drop will also vary when the resistance is constant. The voltage difference is recognised by the operating and display unit for camping equipment E153. Using the data the operating and display unit for camping equipment calculates the value of the current.

It is also possible to calculate how long the capacity of the batteries will last for the respective current load.

### Basic formula “Ohm’s Law”

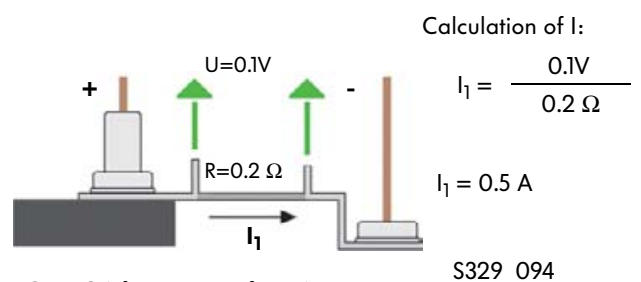
$$R = \frac{U}{I} \quad U = R \cdot I \quad I = \frac{U}{R}$$

U = Voltage

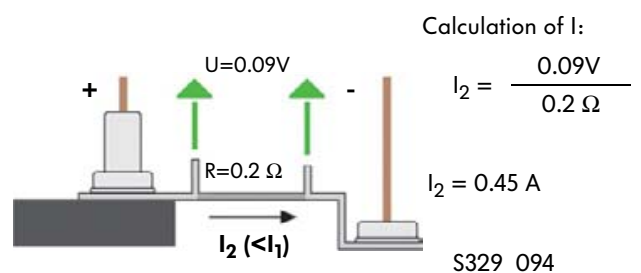
R = Resistance

I = Current (in this case: the current actually flowing)

### Case 1:

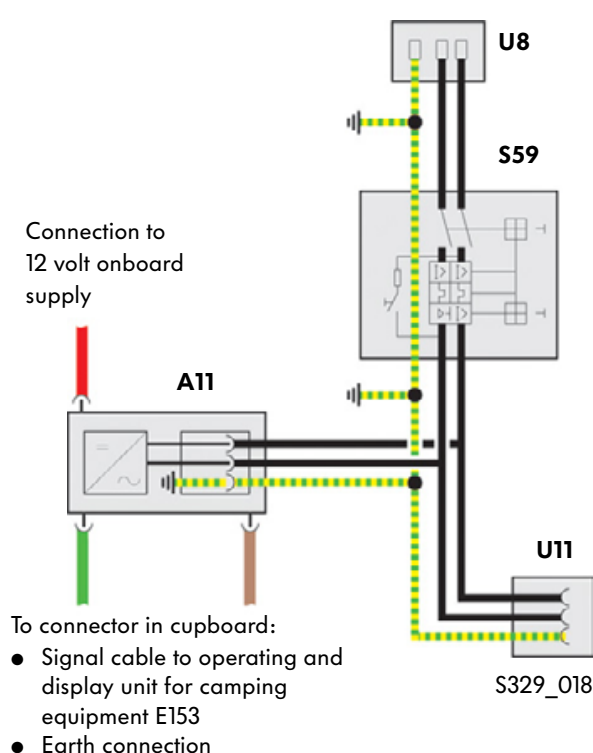


### Case 2 (change to voltage):



## 230-volt onboard supply

A 230-volt onboard supply has been installed in the California. The 230-volt onboard supply consists of a 230V exterior socket (mains connection) U8, an automatic personal protection circuit-breaker S59 (also known as a residual-current-operated circuit-breaker), a 230-volt interior socket U11 and a connection to the battery charging unit.



- Alternating voltage 230V
- Earth conductor
- A11 = Onboard supply charger unit
- S59 = 230V automatic personal protection circuit-breaker
- U8 = 230V exterior socket (mains connection)
- U11 = 230V interior socket



The automatic personal protection circuit-breaker has a switch that has to be pressed approx. once per quarter to check it is working properly.



- When repair work is carried out, the 230V voltage supply should never be connected at the exterior socket.
- Any repair work on the 230V system should only be carried out by an electrician or under the instruction of an electrician.
- Local national regulations should be observed.

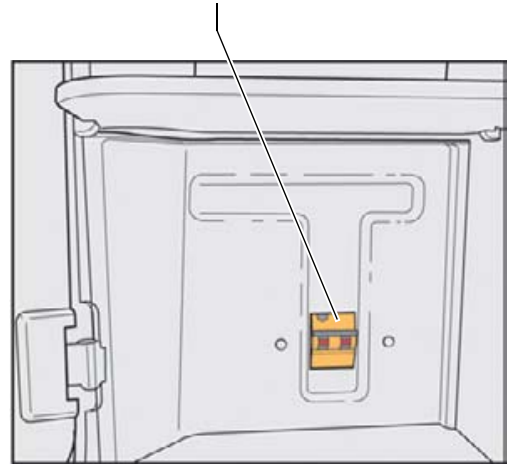


# Electrical system

## Automatic personal protection circuit-circuit S59

The automatic personal protection circuit-breaker S59 (also known as a residual-current-operated circuit-breaker) is located at the back of the cupboard in the middle compartment. It is used to protect people and also the electrical cables. For personal protection, it shuts off the 230 volt power supply when there is a fault current over 10mA and, for line protection, at a load of 13A or short-circuit.

Automatic personal protection circuit-breaker S59 with switch for function check

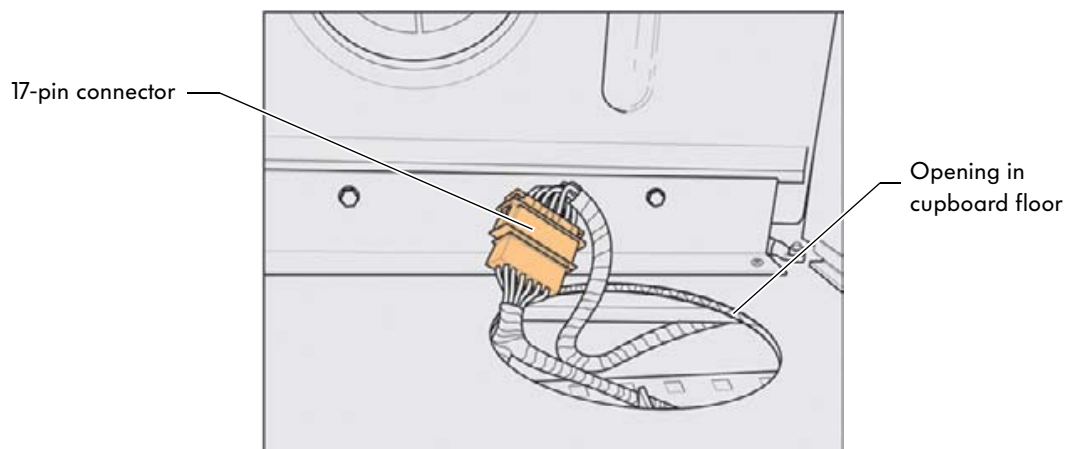


S329\_093

## Connectors for the 12-volt onboard supply

### Cupboard connector

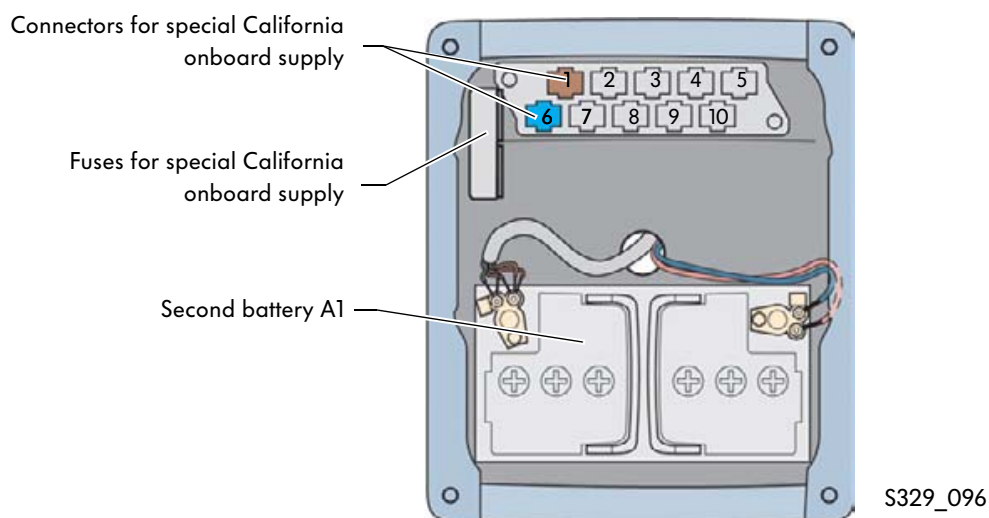
To isolate the 12V wiring inside the cupboard, for example, when you remove the cupboard, there is a central connector in the cupboard under the sink unit. When this is disconnected, the electrical 12V cables in the cupboard are completely isolated from the rest of the 12V onboard supply. The earth connection should also be disconnected.



S329\_136

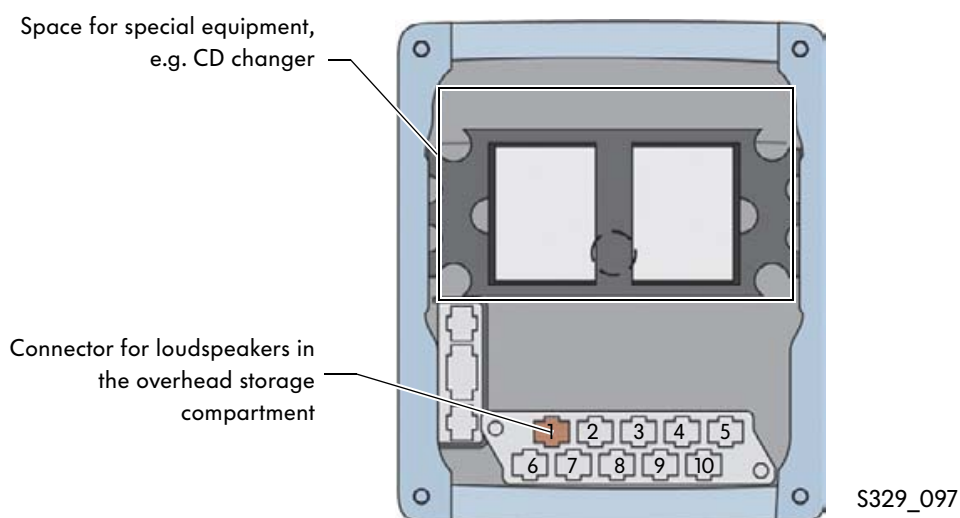
## Connectors under driver's seat

In the seat box under the driver's seat, there is a connector for the special California onboard supply wiring. The second battery A1 is also in the seat box.



## Connectors under the front passenger seat

In the seat box under the front passenger seat, there is a connector for the loudspeakers in the overhead storage compartment. There is also space for special equipment like a CD changer and a digital sound package in the seat box.

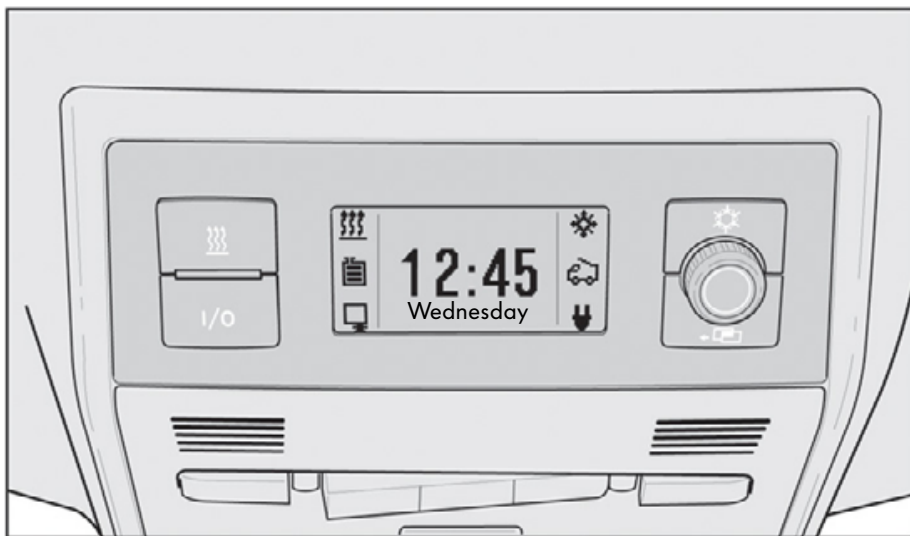


# Electrical system

## Operating and display unit for camping equipment E153

The operating and display unit for camping equipment, the central electronics for the special California onboard supply, is located in the roof of the driver's cab. It controls the components specific to the California, evaluates information and is the interface with the occupants. The menu in the display unit has been prepared for use of a solar module. The following components are connected or the following data is evaluated:

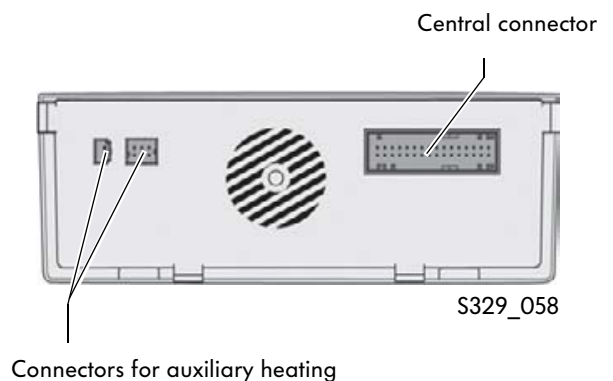
- the pop-up roof electrohydraulics
- the refrigerator box
- the auxiliary heating
- the status of the batteries
- the level of the fresh water and waste water tanks
- the ambient temperature



S329\_026

The following connections are located on the back of the operating and display unit for camping equipment:

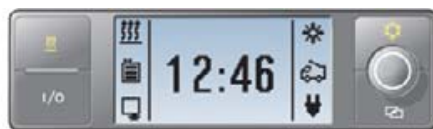
- a 32-pole central connector
- two connectors for the auxiliary heating, which is also controlled via the operating and display unit for camping equipment.



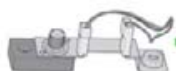


## System overview

Operating and display unit for camping equipment E153



Battery charge control measuring resistor N162



Onboard supply charger unit A11



Ambient temperature sender 2 G249



Water level sender (waste water) G126



Water level sender G120



Roof hydraulics control unit J768



Refrigerator box J698 (temperature gauge)



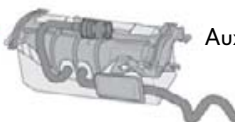
Roof hydraulics control unit J768



Refrigerator box J689 (temperature control)



Auxiliary heating



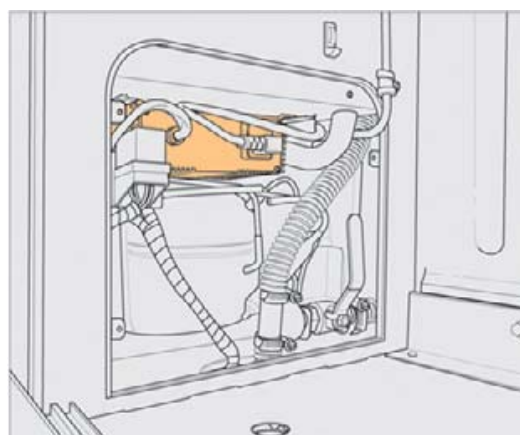
S329\_039

→ Input signal  
→ Output signal



## Onboard supply charger unit A11

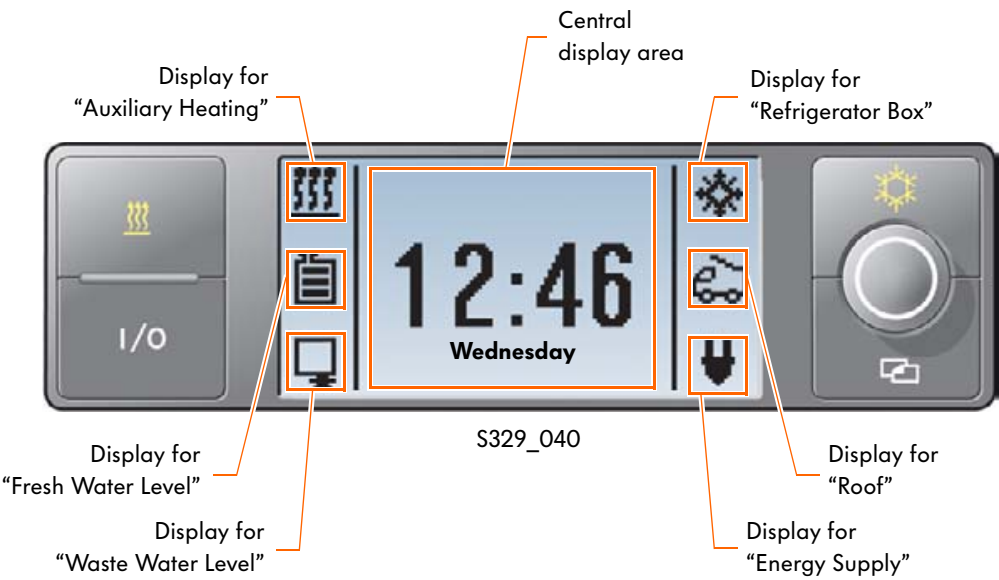
The onboard supply charger unit A11 is located between the refrigerator box and its compressor. It can be accessed by removing a cover in the cupboard under the gas stove. When the onboard supply unit is connected, the onboard supply charger unit ensures that the second battery A1 and the battery for special vehicle A24 are charged.








S329\_138

# Electrical system

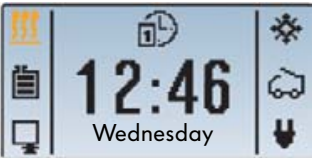
## Layout of the operating and display unit for camping equipment E153.



## Controls

Button	Function
 S329_043	This button switches the display of the operating and display unit for camping equipment on and off. It also switches off all special California consumers (refrigerator box and auxiliary heating).
 S329_047	This rotary press knob is used to select menu options by turning it to select and pressing to confirm entries.
 S329_046	The Escape button cancels without saving.
 S329_045	This button controls the refrigerator box. If the refrigerator box is turned off when you press the button, the temperature setting will be called up. Once you have set the required temperature, you can turn on the refrigerator box by pressing the rotary press knob. When the refrigerator box is switched on, this button will switch it off.
 S329_044	This button controls the auxiliary heating. If it is turned off when you press the button, the temperature setting will be called up. Once you set the required temperature, switch on the auxiliary heating by turning the rotary press knob. When the auxiliary heating is switched on, this button will switch it off. (This button is also present when auxiliary heating is not installed in the vehicle. In this case, it will have not any function.)

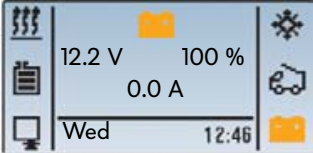
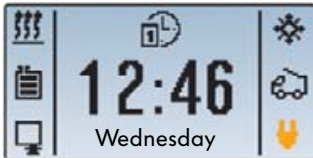


## Display functions

Icon	Function
 <p>S329_123</p>	<p><b>Auxiliary heating:</b> This icon appears in the display when the auxiliary heating is switched on. If it is faulty, the icon will flash. Ten temperature levels can be selected for the auxiliary heating.</p>
 <p>S329_124</p>	<p><b>Fresh water tank:</b> This icon indicates the level of the fresh water tank in four steps 3/3 full, 2/3 full, 1/3 full and empty. If the fresh water sender is faulty, the icon will start flashing.</p>
 <p>S329_125</p>	<p><b>Waster water tank:</b> This icon indicates whether the waste water tank is full or empty. If the waste water sender is faulty, the icon will start flashing.</p>
 <p>S329_126</p>	<p><b>Refrigerator box:</b> This icon appears in the display when the refrigerator box is switched on. If it is faulty, the icon will flash.</p>
 <p>S329_128</p>	<p><b>Electrohydraulic pop-up roof</b> This icon indicates whether the electrohydraulic pop-up roof is closed,...</p> <p>...in an intermediate state</p> <p>...or is open.</p> <p>If there is a fault, the icon will flash.</p>
 <p>S329_127</p>	
 <p>S329_129</p>	



# Electrical system

## Display functions

Icon	Function
 S329_131	<b>Battery:</b> In the “Energy Supply” display area, this icon indicates firstly when energy is being supplied by the batteries. In the central display area, it indicates the remaining battery level.
 S329_130	<b>Mains plug:</b> In the “Energy Supply” section, this icon indicates that the mains plug is connected to the vehicle.
 S329_133	<b>Ambient temperature:</b> This icon indicates that the ambient temperature is being displayed.
 S329_134	<b>Alarm clock:</b> This icon appears in the central display area when the time is displayed and an alarm time has been set.

## Display illumination

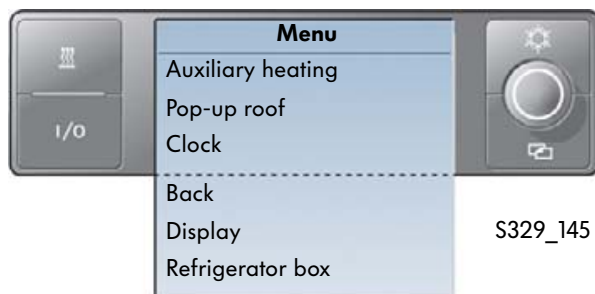
If a button is not pressed, the display illumination switches off after a brief period and can be switched on again by pressing a button once.



## Main menu

The main menu for the operating and display unit for camping equipment has the following items:

- Auxiliary heating: Operation of the auxiliary heating.
- Pop-up roof: Operation of the pop-up roof.
- Clock: Setting the time and alarm.
- Back: Back to the previous menu, in this case to the main screen.
- Display: Selection of which information should appear in the display.
- Refrigerator box: Operation of the refrigerator box.

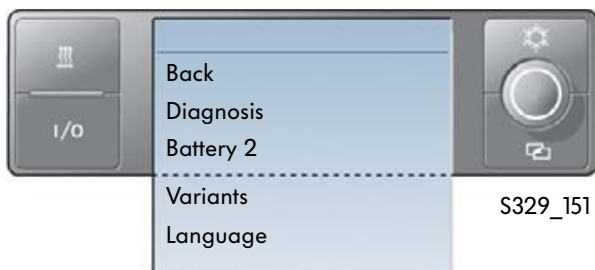


## Non-public menu

The non-public menu contains options for workshops. It is opened by pressing the Escape button (for longer than a second) and pressing the rotary press knob at the same time.

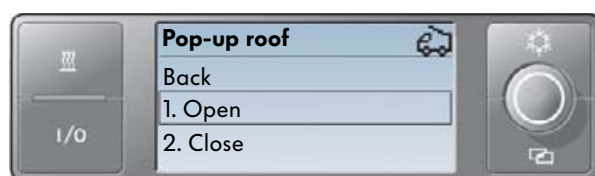
Items in the non-public menu:

- Back
- Diagnosis
- Battery 2
- Variants (basic settings for temperature and clock display)
- Language



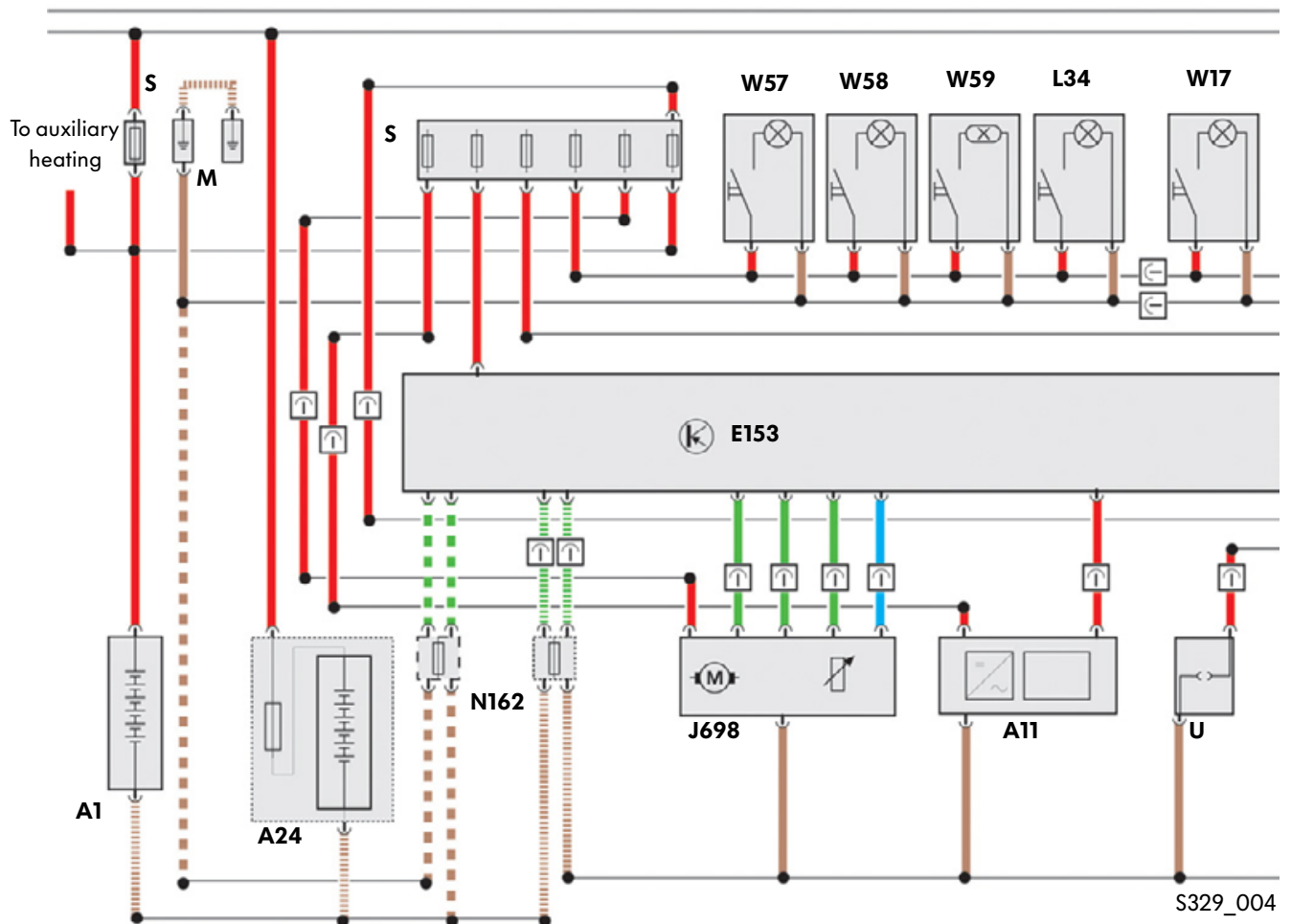
## Submenus

The submenus can be called up with the rotary press knob. The example adjacent shows the “Pop-up Roof” menu.



# Electrical system

## Functional diagram



### Legend:

- 1 VESCM signal
- 2 S contact
- 3 Terminal 58d
- 4 Roadspeed sender signal

- A1 Second battery
- A11 Onboard supply charger unit
- A24 Battery for special vehicle

- E80 Water pump switch
- E153 Operating and display unit for camping equipment

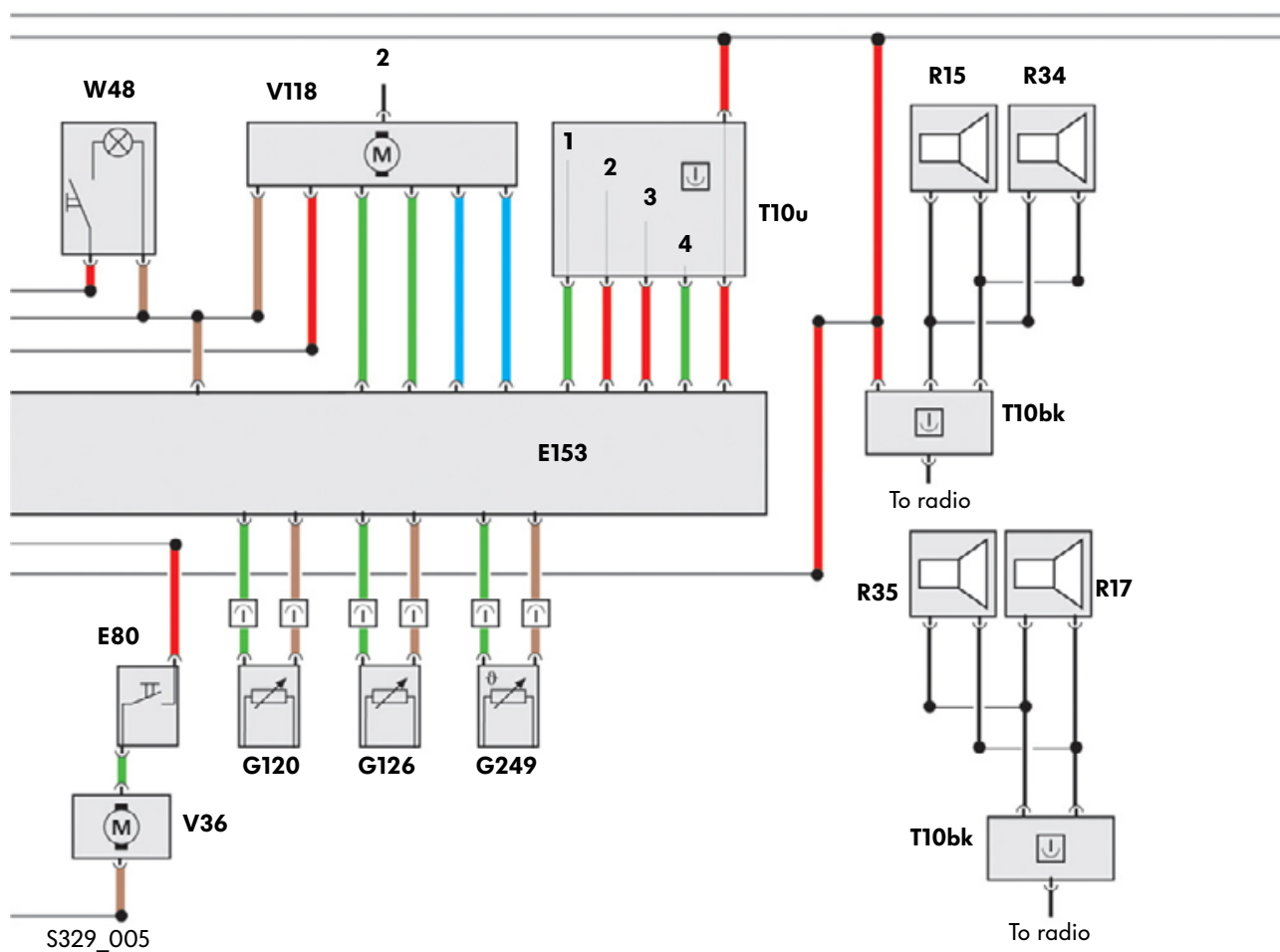
- G120 Water level sender
- G126 Water level sender (waste water)
- G249 Ambient temperature sender 2

- J698 Refrigerator box

- L34 Map reading light bulb
- M Earth points (two)
- N162 Battery charge control measuring resistor
- R15 Rear left bass loudspeaker
- R17 Rear left bass loudspeaker
- R34 Rear left mid-range and treble loudspeaker
- R35 Rear right mid-range and treble loudspeaker

- = input signal
- = output signal
- = positive
- = earth





#### Legend:

S Fuse

T10bk 10-pin connector, brown  
Coupling station under driver's seat

T10u 10-pin connector, blue  
Coupling station under driver's seat

T17b 17-pin connector, black

U Electric socket

V36 Water pump

V118 Roof actuation hydraulic pump

W17 Right interior light

W48 Rear right interior light

W57 Kitchenette light 1

W58 Kitchenette light 2

W59 Kitchenette light 3

..... Only when equipped with A1 and A24

■ ■ ■ ■ Only when not equipped with A24



Connected via a connector (T17b) in the cupboard base under the sink unit. This connector isolates the wiring in the cupboard from the other special California system.



# Heating and air conditioning

## Air conditioning in the California

The California comes with a manual air-conditioning system (Climatic) as standard. 3-zone air conditioning (3C-Climatronic) is available as an option. Except for the vents in the rear, the air conditioning has been taken from the Transporter 2004 Multivan. The vents in the B-pillar that are standard in the Transporter 2004 Multivan, as well as the booster function are not featured in the California due to the different vehicle equipment.

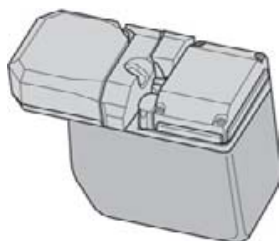
## Auxiliary heating in the California

There are three possibilities for auxiliary heating in the California.

1. A fuel-operated preheater that preheats the coolant without the driver noticing to improve the start phase of diesel engines.
2. Upgrading the preheater to auxiliary coolant heating. This heating system allows presetting and remote control (for heating and ventilation) with a limit of 30 min running time.
3. Installing fuel-operated auxiliary air heating is another option for air conditioning. This function can be operated from the operating and display unit for camping equipment. The running time is not limited.

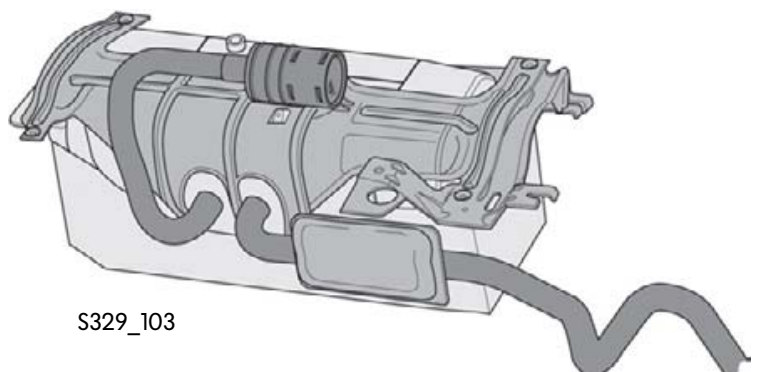


**Preheater or auxiliary coolant heating**



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**Auxiliary heating**

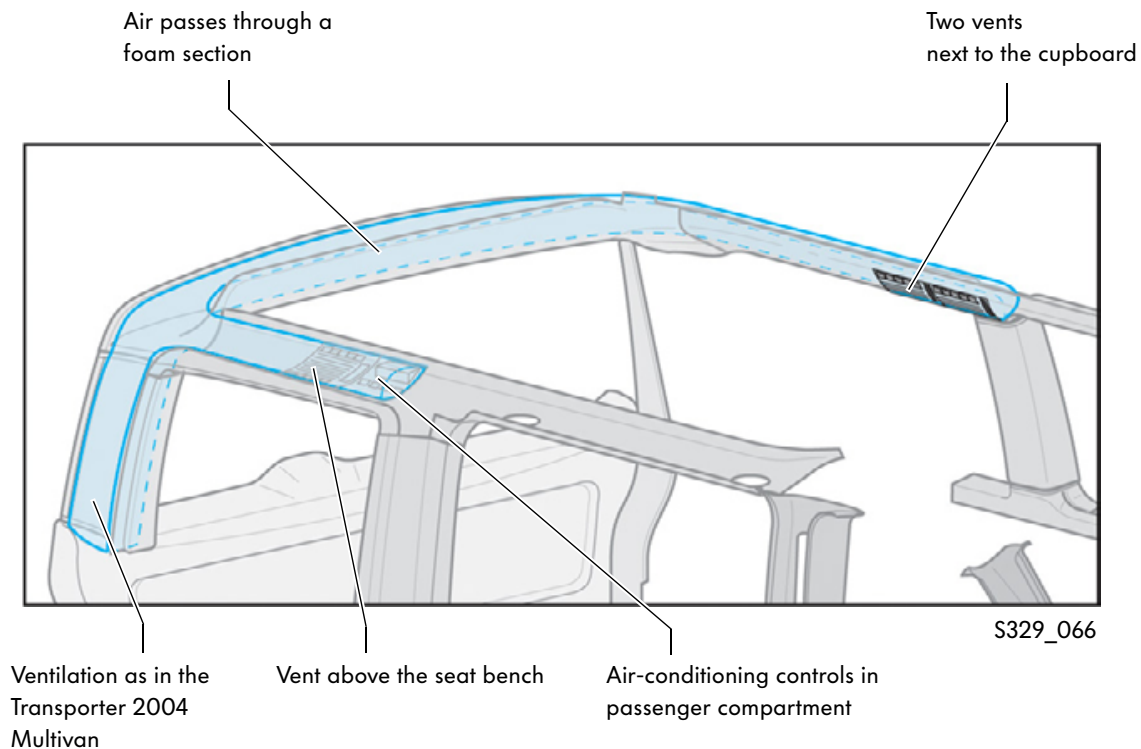


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## Ventilation in the California

The ventilation in the “living area” has been adapted due to the furniture and the roof bed in the California. The panels have been modified so that the air from the basic ventilation in the Transporter 2004 is collected from the right-hand D-pillar and distributed via the roof frame panels.

On the right-hand side, the air reaches the vents on the right-hand side via a connecting section. On the left-hand side, the air is conducted through foam fitted in the rear roof-frame panel.





# CALIFORNIA



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