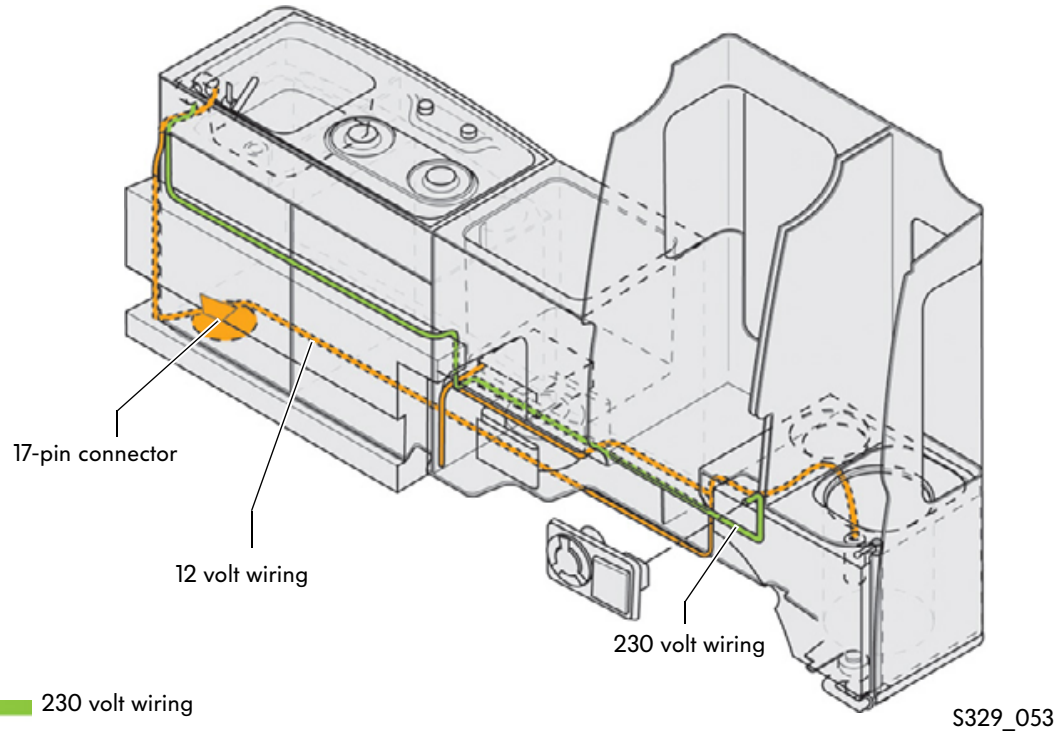
California 2004 electrical system

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.



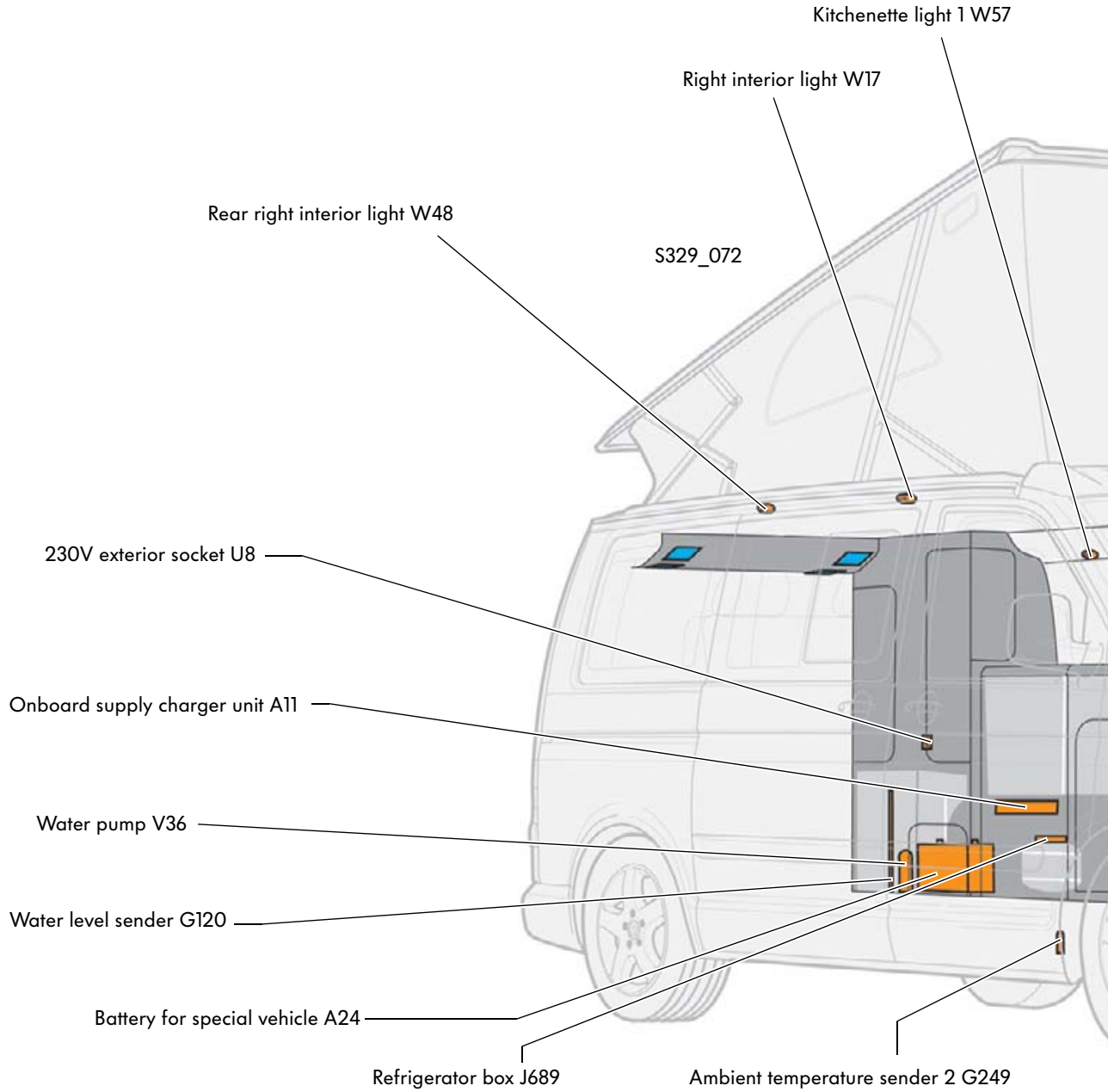
When repair work is carried out, the 230V voltage supply should never be connected at the exterior socket.

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

Electrical system

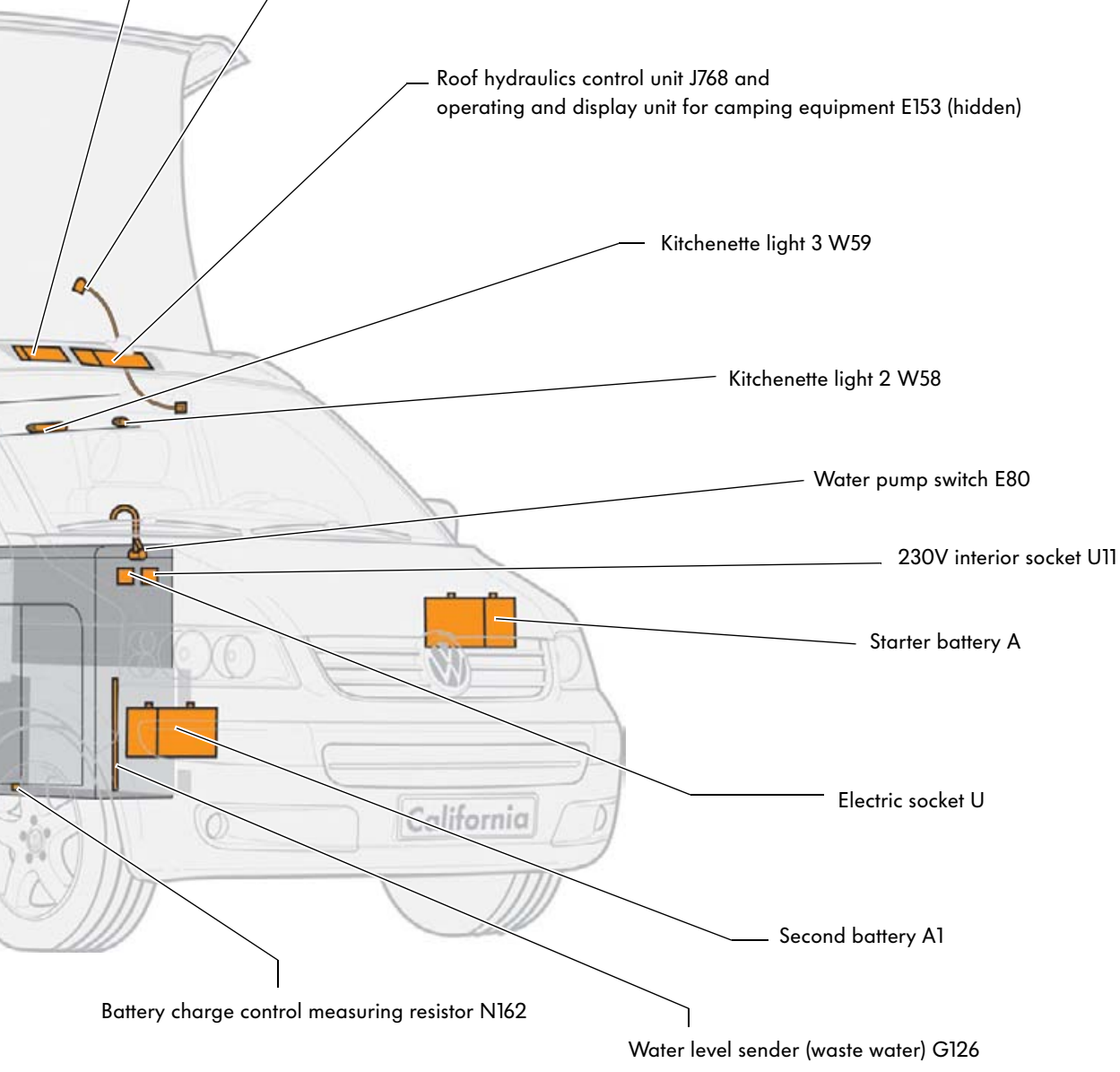
California 12-Volt onboard supply

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

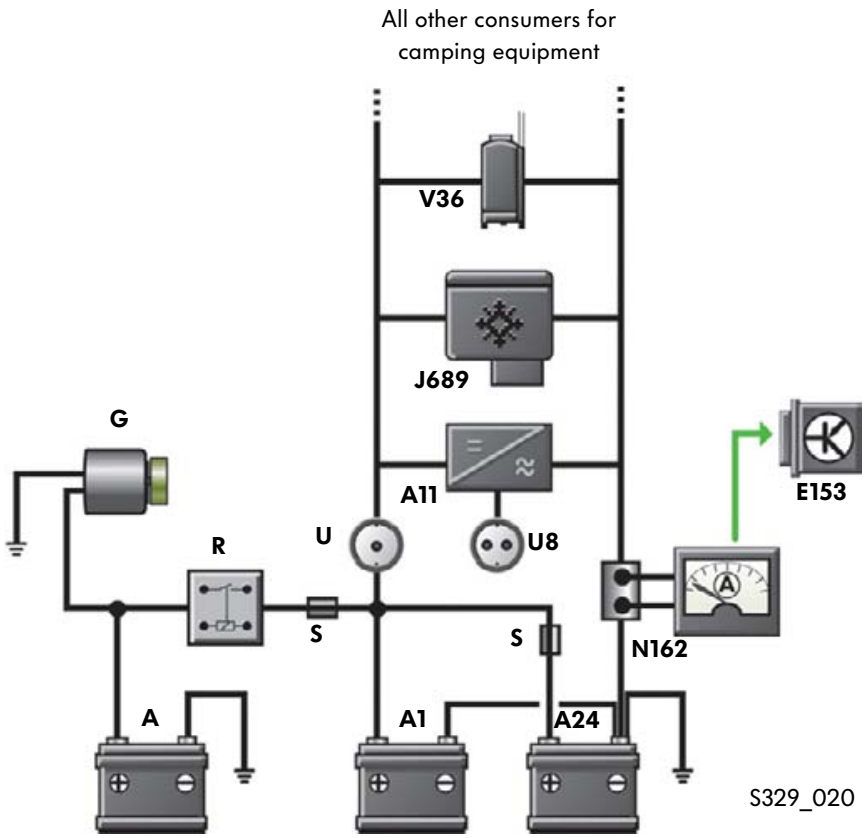
Battery concept

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.



S329_020

A	Starter battery
A1	Second battery (standard equipment, mounted under the front passenger's seat)
A11	Onboard supply charger unit
A24	Battery for special vehicle (when equipped with auxiliary heating or optional; located behind the fresh water tank from the luggage compartment)
E153	Operating and display unit for camping equipment
G	Alternator
J689	Refrigerator box
N162	Battery charge control measuring resistor Charge control (located under the refrigerator box)
R	Isolation relay
S	Fuse
U	Electric socket (12 Volt)
U8	230V exterior socket
V36	Water pump

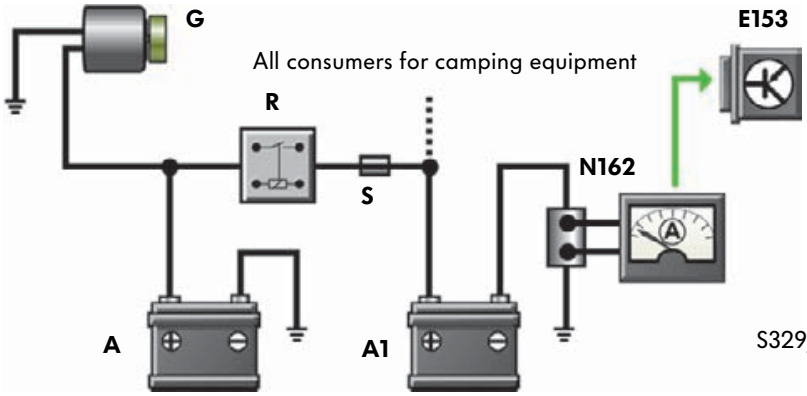
When work is carried out on the onboard supply, the earth cables on the second battery and the special vehicle battery should always be disconnected. Only then should you disconnect the plus leads. Otherwise short-circuits could be caused.

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.

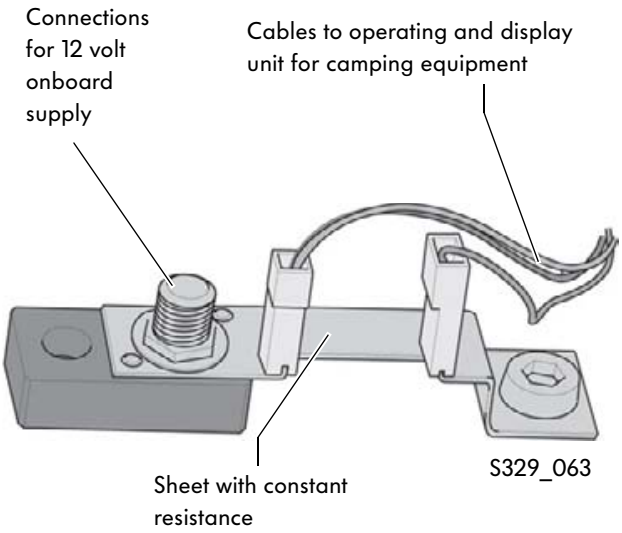


S329_049

A	Starter battery
A1	Second battery (standard equipment, mounted under the front passenger seat)
E153	Operating and display unit for camping equipment
G	Alternator
N162	Battery charge control measuring resistor (near the second battery under the the front passenger's seat)
R	Isolation relay
S	Fuse

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 determined 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

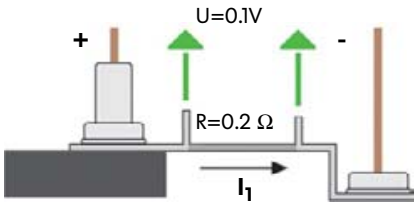
The battery charge control measuring resistor N126 measures the current using a constant resistor on which the voltage drop can be recorded.
The measuring resistor has a piece of sheet metal with a constant resistance via which the current is conducted.
The voltage is measured at two pins. If the current 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”

$$R = \frac{U}{I} \qquad U = R^* I \qquad I = \frac{U}{R}$$

U = Voltage
R = Resistance
I = Current (in this case: the current actually flowing)

Case 1:



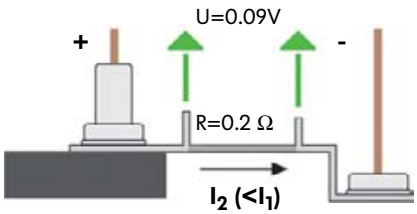
Calculation of I:

$$I_1 = \frac{0.1V}{0.2\ \Omega}$$

$I_1 = 0.5$ A

S329_094

Case 2 (change to voltage):



Calculation of I:

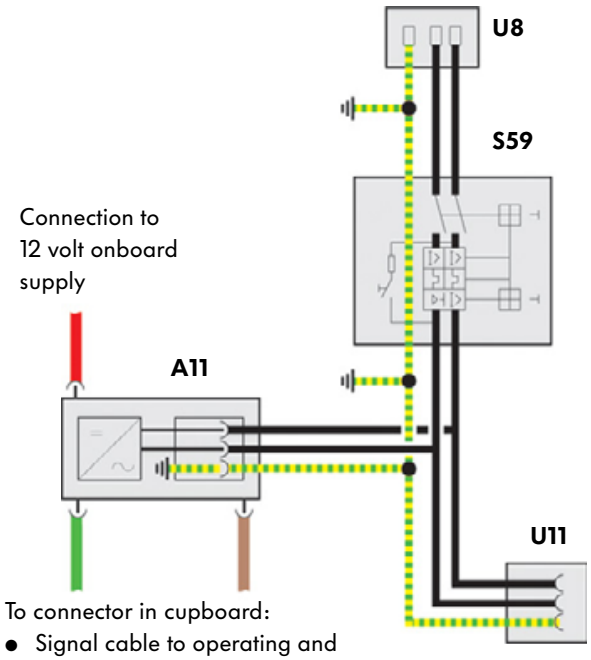
$$I_2 = \frac{0.09V}{0.2\ \Omega}$$

$I_2 = 0.45$ A

S329_094

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.



S329_018

To connector in cupboard:

- Signal cable to operating and display unit for camping equipment E153
- Earth connection

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

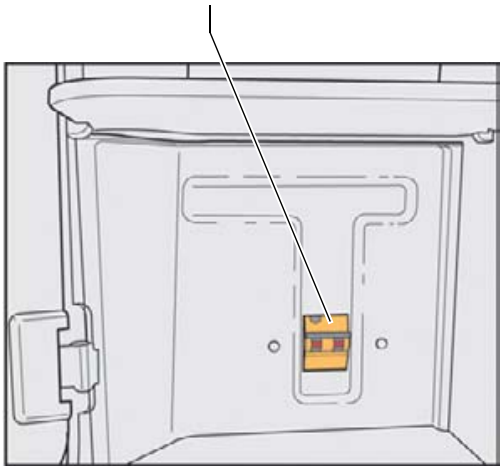
The automatic personal protection circuit-breaker has a switch that has to be pressed approx. once per quarter to check it is working properly.

- 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.

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

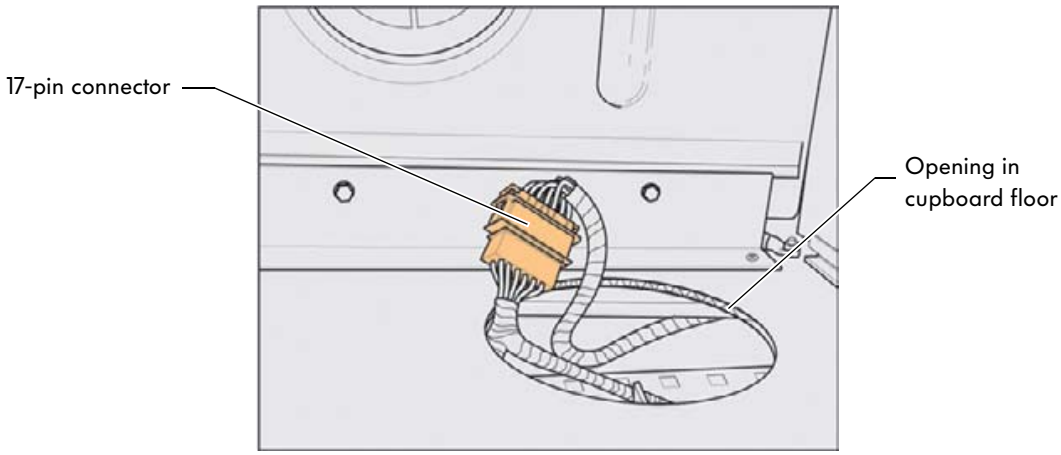


S329_093

Connectors for the 12-volt onboard supply

Cupboard connector

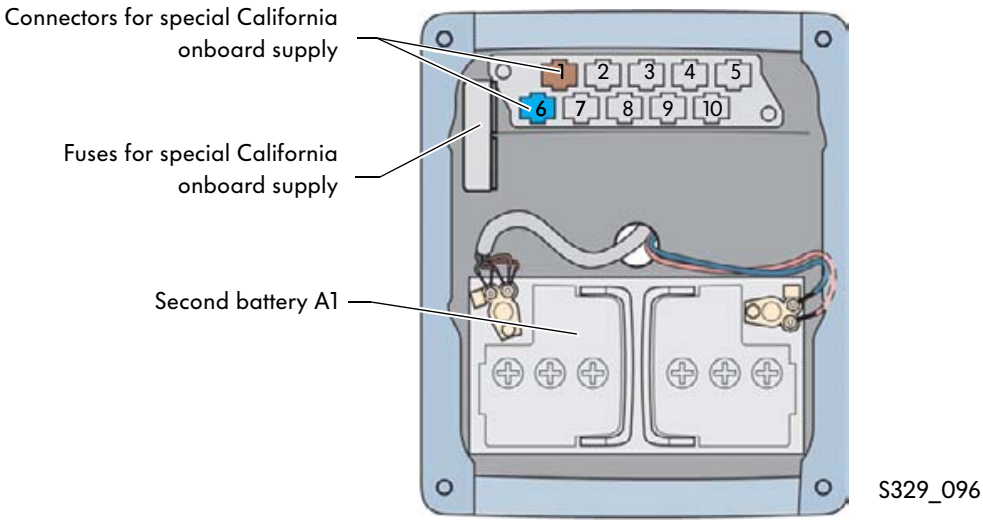
To isolate the 12V wiring inside the cupboard, for example, when you remove the cupboard, there is a central connector in the cupboard under the sink unit. When this is disconnected, the electrical 12V cables in the cupboard are completely isolated from the rest of the 12V onboard supply. The earth connection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



S329_136

Connectors under driver's seat

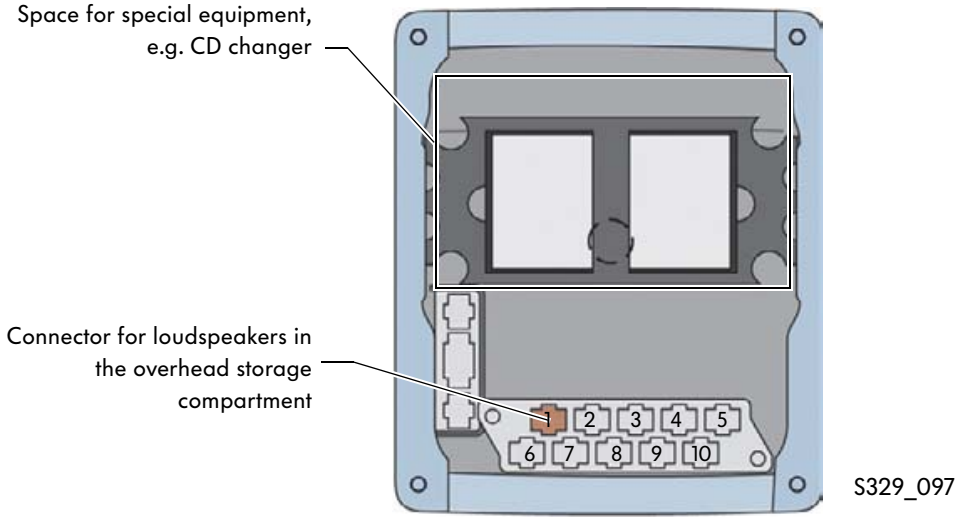
In the seat box under the driver's seat, there is a connector for the special California onboard supply wiring. The second battery A1 is also in the seat box.



S329_096

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.

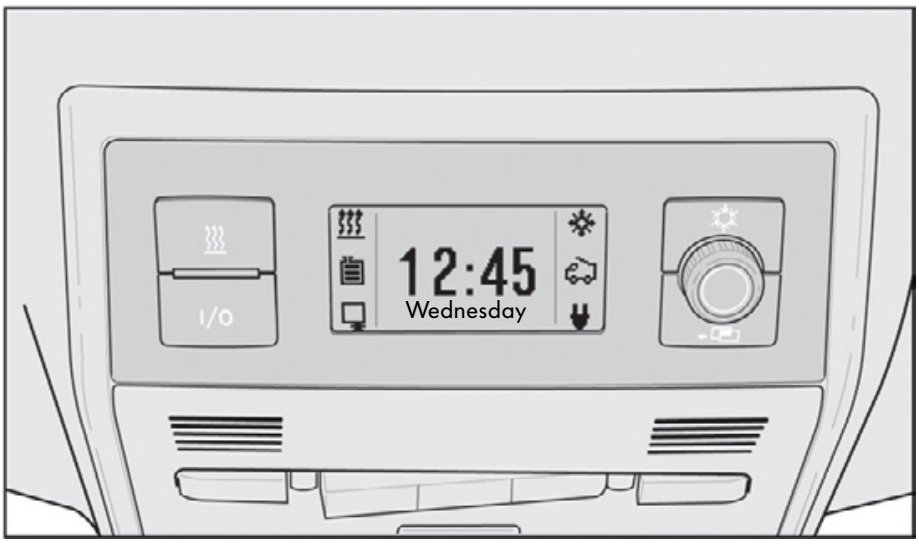


S329_097

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:

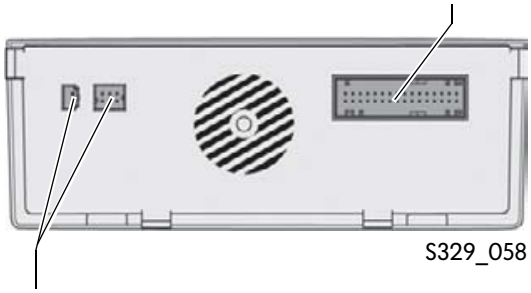
- the pop-up roof electrohydraulics
- the refrigerator box
- the auxiliary heating
- the status of the batteries
- the level of the fresh water and waste water tanks
- the ambient temperature



S329_026

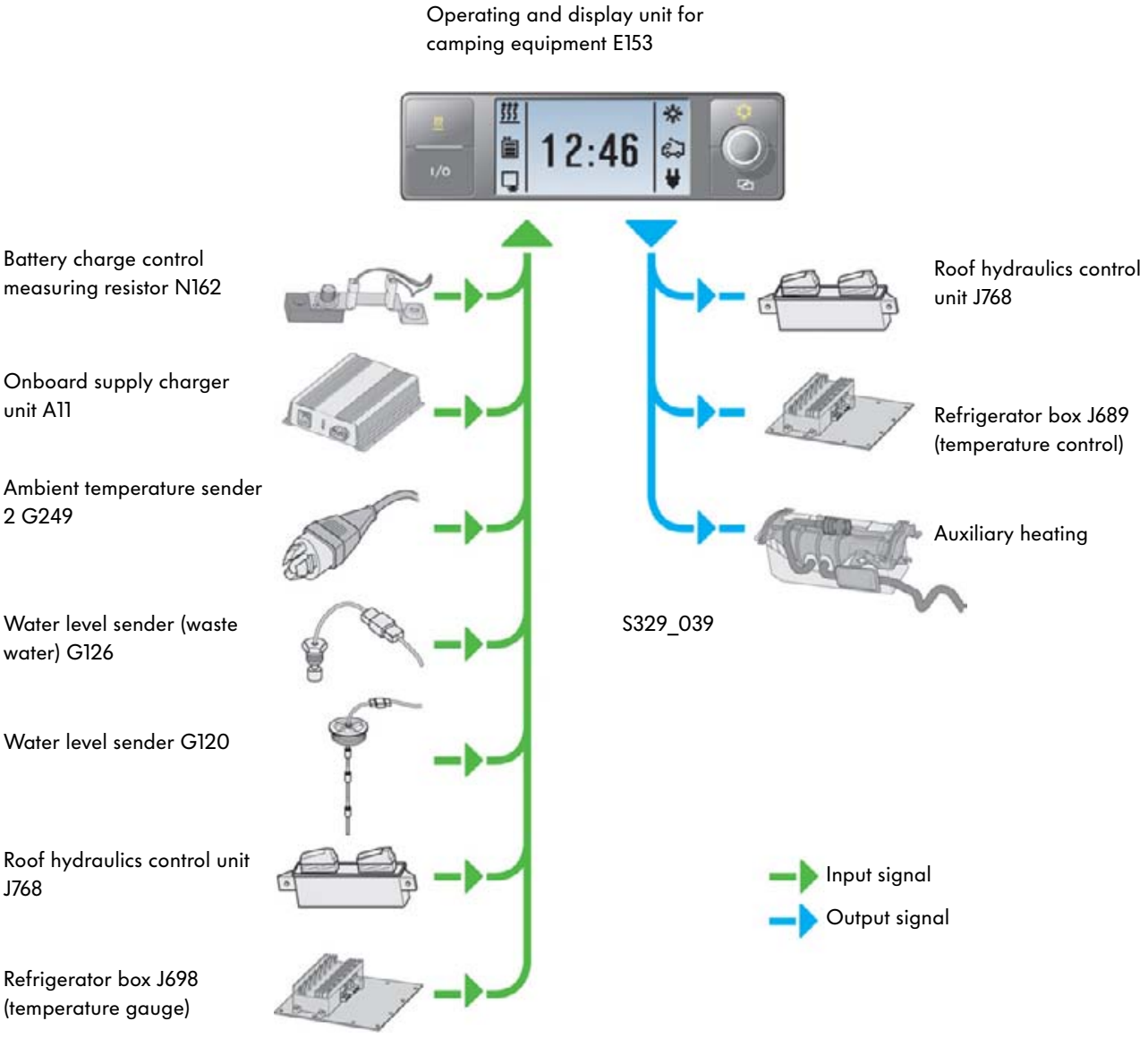
The following connections are located on the back of the operating and display unit for camping equipment:

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



S329_058

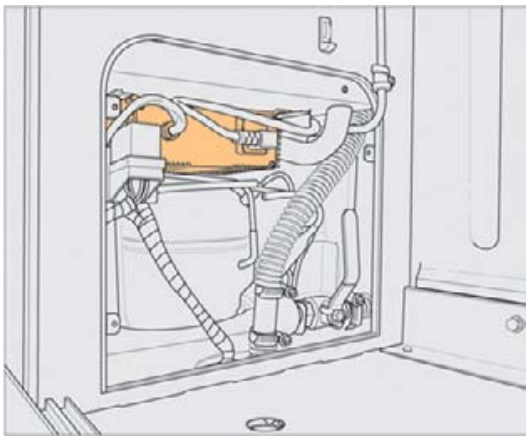
System overview



S329_039

Onboard supply charger unit A11

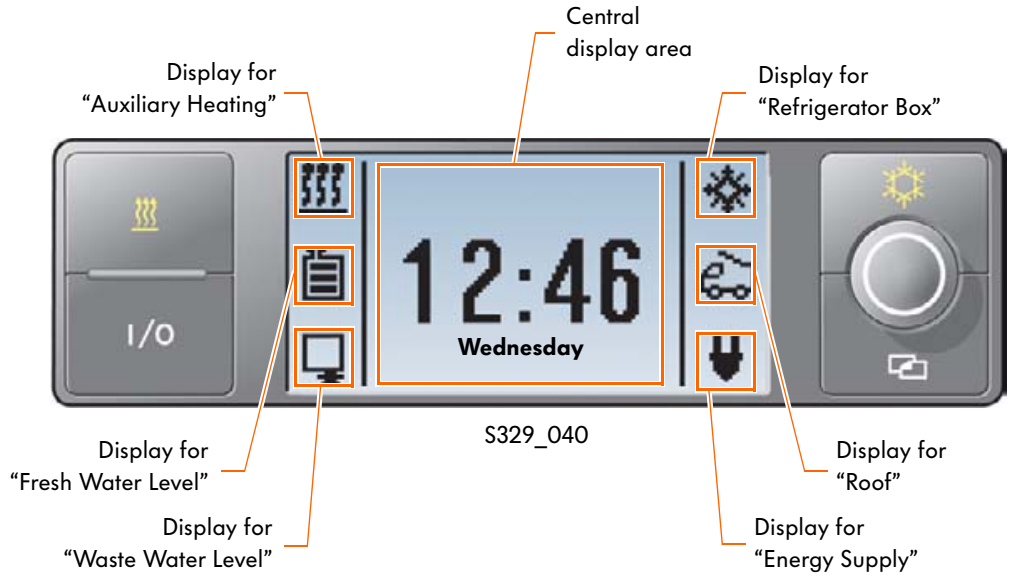
The onboard supply charger unit A11 is located between the refrigerator box and its compressor. It can be accessed by removing a cover in the cupboard under the gas stove. When the onboard supply unit is connected, the onboard supply charger unit ensures that the second battery A1 and the battery for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



S329_138

Electrical system

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



Controls

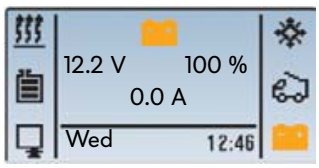
Button	Function
 S329_043	This button switches the display of the operating and display unit for camping equipment on and off. It also switches off all special California consumers (refrigerator box and auxiliary heating).
 S329_047	This rotary press knob is used to select menu options by turning it 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
 S329_123	**Auxiliary heating:** 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.
 S329_124	**Fresh water tank:** 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.
 S329_125	**Waster water tank:** This icon indicates whether the waste water tank is full or empty. If the waste water sender is faulty, the icon will start flashing.
 S329_126	**Refrigerator box:** This icon appears in the display when the refrigerator box is switched on. If it is faulty, the icon will flash.
 S329_128  S329_127  S329_129	**Electrohydraulic pop-up roof** This icon indicates whether the electrohydraulic pop-up roof is closed,... ...in an intermediate state ...or is open. If there is a fault, the icon will flash.

Electrical system

Display functions

Icon	Function
 S329_131	**Battery:** 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	**Mains plug:** In the “Energy Supply” section, this icon indicates that the mains plug is connected to the vehicle.
 S329_133	**Ambient temperature:** This icon indicates that the ambient temperature is being displayed.
 S329_134	**Alarm clock:** This icon appears in the central display area when the time is displayed and an alarm time has been set.

Display illumination

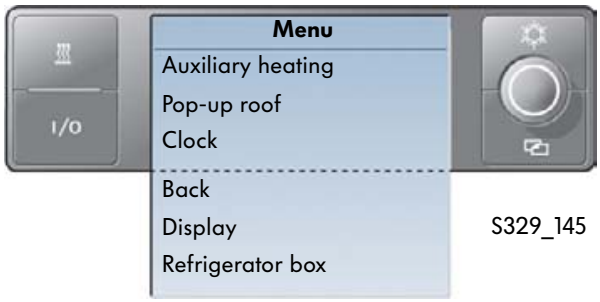
If a button is not pressed, the display illumination switches off after a brief period and can be switched on again by pressing a button once.

S329_152

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.

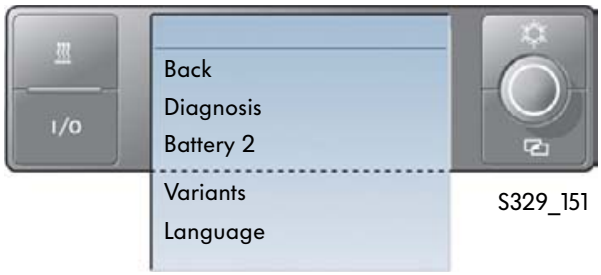


S329_145

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:

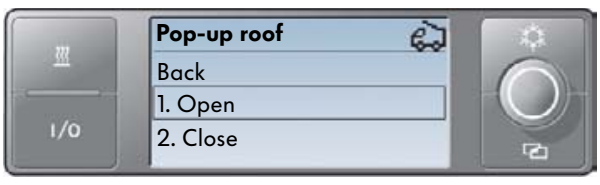
- Back
- Diagnosis
- Battery 2
- Variants (basic settings for temperature and clock display)
- Language



S329_151

Submenus

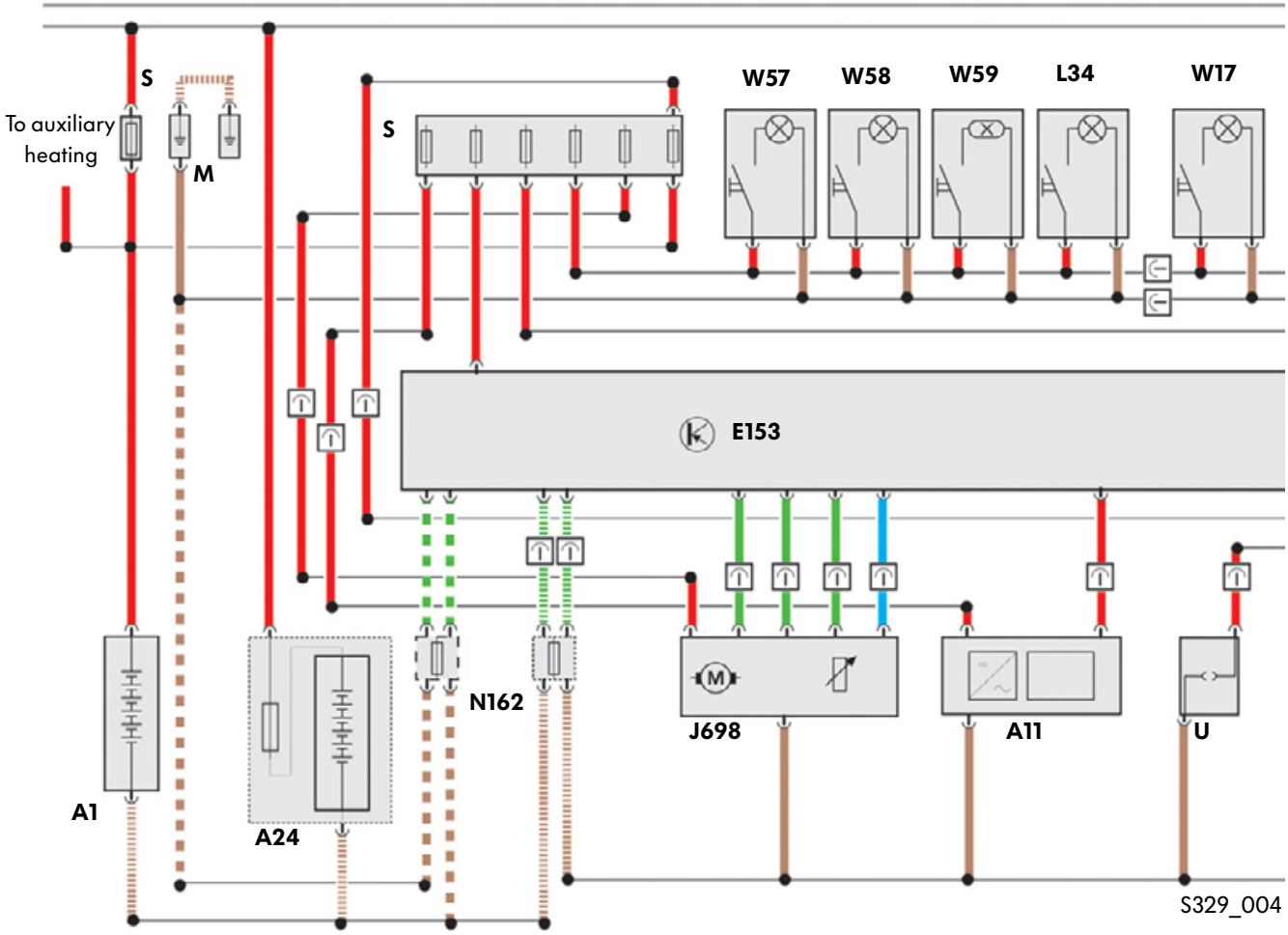
The submenus can be called up with the rotary press knob. The example adjacent shows the “Pop-up Roof” menu.



S329_057

Electrical system

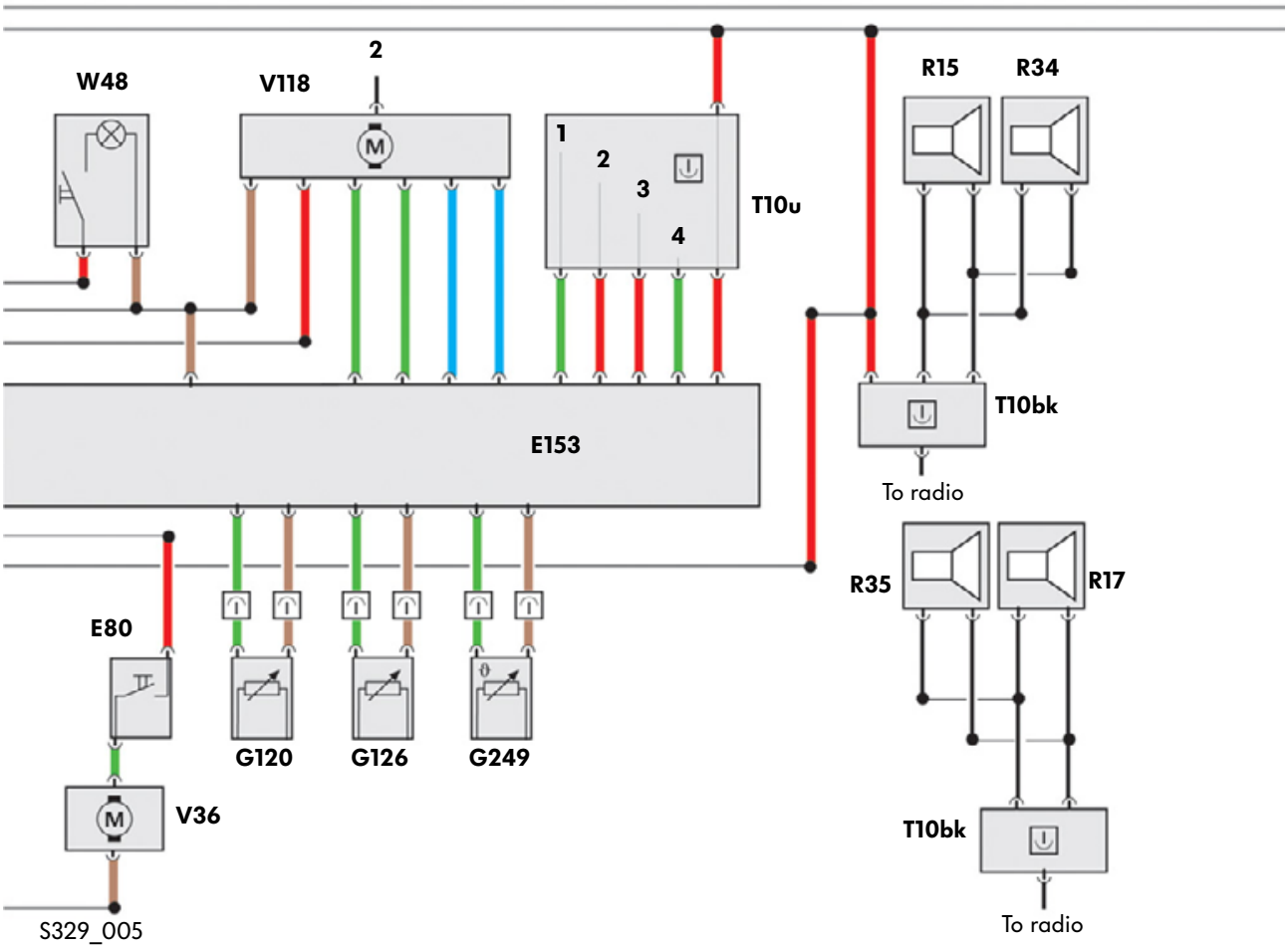
Functional diagram



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

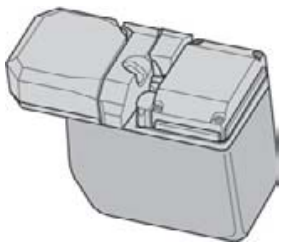
The are three possibilities for auxiliary heating in the California.

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.

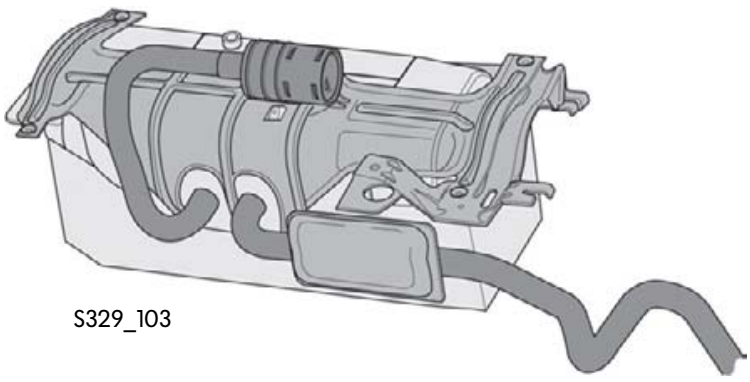
3. Installing fuel-operated auxiliary air heating is another option for air conditioning. This function can be operated from the operating and display unit for camping equipment. The running time is not limited.

Preheater or auxiliary coolant heating



S329_102

Auxiliary heating

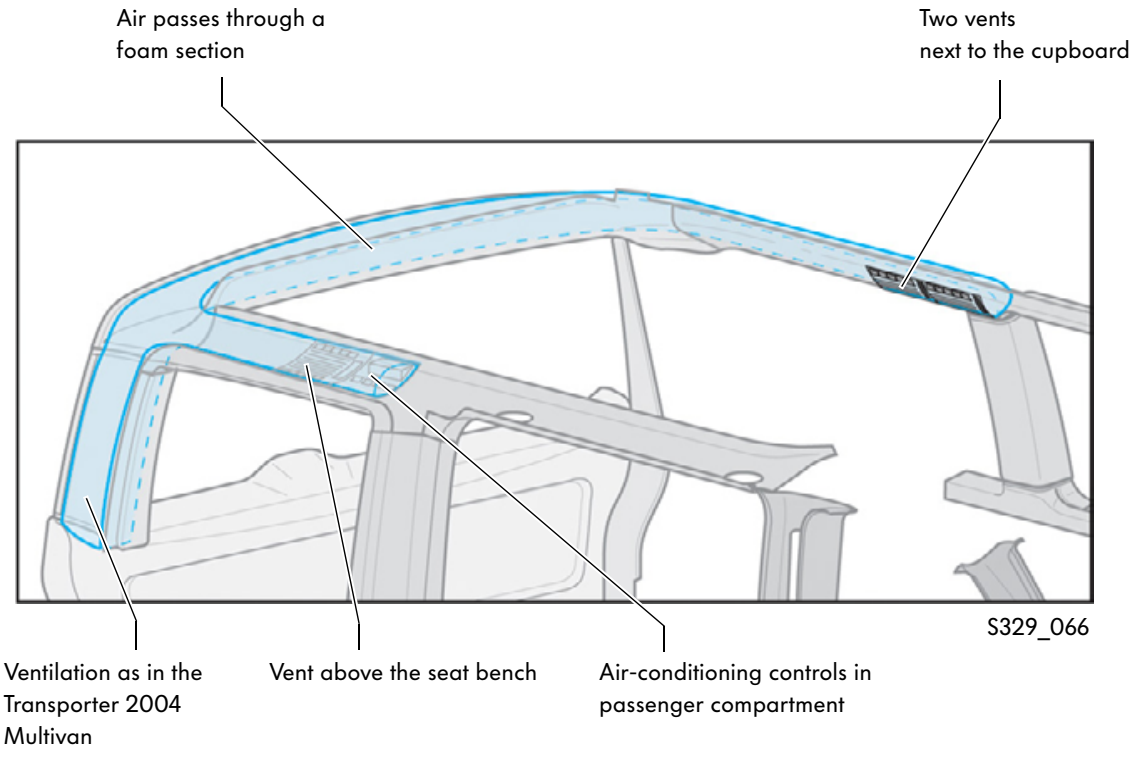


S329_103

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.



329

CALIFORNIA

000.2811.45.20 Technical status 05/2004