The Good, Bad & Ugly VW T6 Campervan Manual

INTRODUCTION

This Manual is in Two Parts:

1) **Use of camper equipment and safety**

2) **Maintenance and repair of camper systems**

NS – means near-side of van (Passengers side) OS – means off-side of van (Drivers side)

Design Aims

This camper project had these design aims:

- Driveability and efficiency
- Safety & reliability
- Ease of use and convenience
- Ease of maintenance & repair
- Attractive and tasteful interior

These criteria are also ranked in the above order. This means that safety and maintenance overrides the final attractiveness.

In extensively researching this project, this is the opposite of most camper vans that are offered for sale by professional builders.

This manual explains the use and maintenance and in doing so provides an insight into the design issues of standard equipment that all VW camper vans use.

Be aware that all of these VW campers are not the same as a motorhome. The pop top is effectively a tent unit and as such it cannot be insulated from the cold. With the top down the headroom is severely limited. The design of this project takes these basic limitations into account and attempts to fulfil the potential of the VW Camper as a different sort of vehicle to a motorhome.

(Note – This manual has been written to help the new owner and not as a sales manual. The lack of detail in other manuals means that the new owner has one of the very few VW campervans that can be easily maintained.)

General Description

VW T6 Transporter Highline model, 150 PS, Five Seats, Six Gears (Manual), Tailgate, AirCon, Cruise, Electric Windows, Bluetooth, Touch Display, Parking Sensors and Display, Electrical Door Mirrors, Colour Detailed Bumpers & Doors Mirrors, Euro 6 Start Stop in Starlight Blue Metallic, 8,500 miles. One owner, (before the conversion).

Registered 31 May 2018
Warranty until 31 May 2021

Conversion includes; Skyline pop top, 4 beds, three windows, fully insulated & sound deadened, Altro insulated floor, leisure battery with top end B to B charging system, 240V hook up, full adult top bed, sliding bed/seat, quiet fridge, hob with gas and water supply, gas vent, water vent, swivel front dual passenger seat, centre sliding table & table storage, Full Evo Design furniture based on the best finish (HPL), 4 additional LED lighting systems. Designed in complementary blue furniture, silver carpet, cloud blue flooring. This gives a light, sophisticated yet practical interior.

Selection of Equipment & Base Van

The equipment was selected after (intensive) research. There are many options available for some items, and just a few sensible options for others. In each case, the criteria was for selection of the best unit for safety, design, compatibility and finally looks.

The reason there are 'only' two side windows is that for functionality, this was deemed the best option. If windows at the rear are fitted, one is completely blanked anyway and there is a significant reduction in the insulation and sound deadening properties., especially if the camper is used in colder weather when with the Pop Top down.

This selection was irrespective of price as the time and effort required to do the conversion was considered too high to compromise on this selection. During research it became clear that many converters use inferior equipment, especially on the electrical parts. The detailed equipment is as follows:

- Evo motion design furniture in lovely blue denim finish (HPL) with top quality fittings, drawers, cupboards and sliding Tambour door
- Skyline pop top roof with lift up Bifold full adult twin bed, high quality material, zip windows with two vents
- Sliding 112cm Rib Altair bed system (this is a clear market leader used by all top converters)
- The Rib bed moves 220mm giving more room in the seating position. During travelling the bed can be forwards or backwards giving more options for storage
- Kiravans double front seat swivel (the best)
- Silver Vitrifrigo Fridge C51i…..the most efficient and quietest fridge with small freezer compartment, left opening for easy access
- Dometic 9722 combination sink and twin gas hob with electric water pump and tap switch
- Top quality insulated 15mm marine ply floor covered by Altro cloud blue top quality vinyl flooring
- 12V LED lighting with 95AH Leisure battery
- Sterling B to B for start/stop/regeneration charging system
- 240V electronically controlled charging system (30 amp)
- Full main control panel with both Leisure battery indicator + Vehicle battery indicator, switches for all equipment, 12V outlets and USB's
- 240 volt electric hook-up with twin interior sockets with USB's and 20m cable

- Overbed locker with twin dimming LED bed lights
- Overhob shelf with twin dimming LED lights, warm and daylight functions
- Internal thermometers (digital), plus clock function (Van voltage display)
- Hafele LED top bed light with two USB outlets
- 12V outlet & USB socket in rear of van for external awning use or internal use
- Black out curtains to all windows
- Opening side window above hob area
- Campingaz Gas bottle (Euro) 907 with vent through floor (Removable for use with an optional external BBQ)
- Underbed storage cupboards
- Central sliding table and safe storage area
- Waste vent (or additional gas vent)
- Total of 12 x USB points and 3 x 12V sockets, 2 x 240V sockets (not including VW cab sockets)

Driveability

The VW T6 150PS Highline drives superbly. It is (now) very quiet and stable, has great manoeuvrability and can be used as an every day vehicle. It comes with a high-end touch media system that runs from a smartphone or tablet via Bluetooth. This conversion enables short term comfortable staying away, while still having a very nice vehicle to drive in all respects.

Some converters seem to be attempting to create a motorhome environment, which is not the ideal prospect for the VW T6 due to the limitations of space, height, and the 'tent' effect of the pop top. If you are considering long-term staying away, then the research suggests that the better option would be either a full motorhome, a caravan or a larger full height Van conversion such as the Mercedes Sprinter.

Additional Equipment that may be considered:

There are a number of items that the owner may require. These have not been fitted as they depend on the expected use of the vehicle.

- Removable chemical toilet
- Bike rack
- Side or rear canopy / awning (The large awning systems are not aerodynamic and it is possible either to fit a simple small rail above NS door, or just use some simple clips to attach a light awning (with poles).
- TV, Radio, Music systems – there are numerous ways to add such items. Depending on your use systems could be 12V or 240V or a mixture. The Van has Bluetooth connectivity and this could also be used in conjunction.

Key to the selection of this vehicle:

- Air-conditioning
- Cruise control
- 150PS power – especially with the additional weight of furniture, bed and equipment and this is the most efficient and quiet engine for motorway use.
- Tailgate – imperative for a camper – as a rain shelter
- Good engine sound proofing (later T6 improvement)
- Efficiency (start-stop, regeneration, fuel consumption), Euro 6 Bluetech efficiency and

green credentials.

- Bluetooth smart phone connection (for music and media)
- Rear parking sensors and display
- Electrically adjustable mirrors
- Low mileage providing longevity and almost new use
- Short wheelbase for manoeuvrability and easy parking

Most converters seem to find vans that are not ideal (eg no tailgate, lower power etc) as they are attempting to maximise their margins. This vehicle was expensive, but, due to the cost and time spent on the conversion being very high, it was considered poor value to compromise on the quality of the base van.

This van was purchased from a large VW main dealer for this project:
This was a leased vehicle originally with low mileage, operated by the dealership.

Original Advert:

Save & compare Print Report ad

Overview

2018 (18 reg)	Panel Van	7,500 miles	2.0L
Manual	Diesel	5 doors	3 seats

RARE TAILGATED HIGHLINE MODEL WITH THE LATEST POWERFUL 150PS EURO 6 ULEZ FRIENDLY ENGINE, CLIMATIC AIR CONDITIONING, ALLOY WHEELS, HEATED WINDSCREEN, CRUISE CONTROL, REAR PARKING SENSORS, ELECTRICALLY HEATED AND ADJUSTABLE DOOR MIRRORS, BODY COLOUR PAINTED BUMPERS AND DOOR MIRROR INSERTS, PLY LINED, FINANCE PACKAGES AVAILABLE, BUY WITH CONFIDENCE FROM THE UK'S LARGEST VW COMMERCIAL DEALER GROUP, WE'RE RIGHT NEXT TO IFIELD TRAIN STATION, NEAR GATWICK AIRPORT, PART EXCHANGE WELCOME. , Blue, BUY WITH CONFIDENCE FROM THE UK'S LARGEST VW COMMERCIAL DEALER GROUP, £18,995 + VAT

Part One – Use of Camper Equipment and Safety Considerations

Safety Considerations:

There are three key areas for safety:

1) 240V supply and systems
2) Gas supply
3) 12V supply and systems

These systems have been kept apart as far as possible and all have been designed for maximum safety. The key safety issues have been addressed within the following detail.

This manual cannot and does not provide complete detail of every safety issue and the user must apply normal commonsense and additional research if you are not trained in the difference between campervan equipment and the use of both 12V and 240V electrical equipment. In a camper, there are fundamental differences to a home environment and more safety awareness is required.

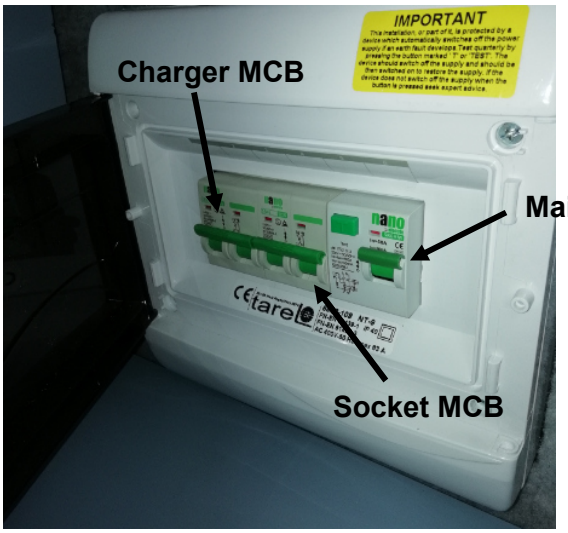
General Operating Instructions & Information

These cover the campervan operations and not the VW Transporter Van – these can be found in the standard VW manual. **Note that the height of the vehicle with the Pop Top fitted is Higher than the original Van and may not fit under standard heights eg car parking limits.**

240V supply

This has a **double pole supply switch** unit that cuts off both live and neutral inputs from the rear OS hook up plug. This supply unit has a built in cut off (RCD) for sensing any earthing within the 240V wires and equipment and two switched and fused circuits (MCB's), one 16 amp for the 240V socket and one 16 amp circuit for the leisure 240V charger which is directly wired to this switched circuit.

All 240V cables run separately to the 12V wires and are protected by cable trunking and earthed to the van body as required by regulations.



Above: shows the 240V switch RCD / MCB unit. The switches are show in the ON positions. There is also a small test push switch that tests the RCD function is working. Note that the cover hinges on the left and it is stiff to open.

240V Hook-Up

Care must be taken when not in the UK as some countries have reversed polarity.

There are connectors that swap the polarity and also test units to make sure that you know what the polarity is on each site.

Use the supplied cable in the UK, it will only fit one way around, and lift the magnetic cover on the rear OS to insert the blue cable socket. Care must be taken to ensure that the amperage from the internal devices does not exceed the supply (from the camping site connection)

The only 240V outlet (double) is below the main switch panel near the hob area. These are standard outlets and incorporate USB charging points.

If the **Left** hand switch on the MAIN 240V RCB unit is on (up) the 240v **charger will automatically charge the leisure battery.**

Gas Supply & Hob

The gas system has been kept very simple. There are only two connections, one at each end of the system. The gas bottle (Campingaz Butane 907) is a standard EU wide configuration. This means gas refills or exchange bottles are available everywhere across Europe. The volume of gas is enough for about 10 days use.

Gas Storage & Safety While Travelling or Sleeping:

The gas bottle is kept near the gas vent and is easily disconnected by unscrewing the top connection for safety. The bottle is held against a padded area with a bungee strap. The easiest way remove the bottle from the pipe and regulator is to remove the gas bottle from the cupboard (remove the bungee strap at the front hook first), and **turn the bottle** to unscrew the regulator. Assembly is the reverse procedure.

When travelling or sleeping the bottle can be disconnected from the regulator for additional safety as detailed above.

This arrangement also has the capability to use the same gas bottle on an external BBQ that has a similar pipe and connector.

Safety Detectors:

As Butane is heavier than air it falls. This potentially can lead to a low down build up of gas that can explode, the vent is there to help prevent any build up if there is a leak. A standard gas monitor can be mounted low down. These are battery operated and easy to fit. (see Appendix)

A carbon monoxide monitor can also be installed higher up to detect if the hob starts malfunctioning. It is advisable to make sure there is adequate ventilation (window, doors) when using the hob burner.

Hob System:

Please refer to the hob instructions in the appendix for hob use (these instructions are poor but the hob use is quite simple and a quick overview follows:

Open the window (and a door ideally) when using the burners to ensure that there is no build up of gases.

- To turn on a burner – hold down & turn the black knob anti-clockwise and at the same

time press down on the ‘ignition button’. This activates the ignition system and the burner lights, hold down the gas knob for several seconds to ensure the safety temperature system is activated.

- To use the water supply, first check the waste is in either the waste container or the waste vent, turn on the Water Pump switch, then simply turn the tap.

Water Supply, Pump and Waste Pipe

There are two water containers. Either use one for water and one for waste, or both for water with the waste, (if allowed), going to the small vent hole that exits via a panel under the van to drain below the van.

The pump is a submersible type and sits in the water container. (Do NOT run the pump unless submerged, so turn off the switch before refilling the water to avoid accidental power on). To remove the water container, lift it out from the cupboard and turn the cap, there is enough ‘slack’ in the electrical wire (12V) to allow the cap to rotate.

The pump switch must be on for pump operation. It then automatically operates when the tap is turned on.

Leisure Battery, 12V Supply and Chargers

There are many 12V cables that run throughout the van. These mainly run within trunking separately from any 240V wires. These wires are relatively safe as all wires are fused at source and before entering trunking. The main power wire is rated at 100 amp and is fused (60 amp) next to the main leisure battery terminal for safety. The leisure battery positive terminal is shielded and the battery is firmly fixed underneath the drivers seat along with the two chargers.

There is a main cut-off switch (see below) rated at 100 amps within the lower part of the sliding door cupboard which is always accessible even when the bed is slid forward. The fuse box is next to the cut-off switch and has red LED’s to show if any of the fuses are blown. There are spare fuses in the same box in unused sections (see maintenance later).

There is a main 100 amp cable that connects the B to B charger to the van battery, this is fused both ends (60 amp, 40 amp). There is also a separate cable that runs from the van battery via the charger to the hob panel voltage meter. This is separately fused at the charger end.

The design of the electrical system provides for access in event of an issue. All electrics are behind removable panels (although to remove the panels the main bed and furniture units need removal first. See Maintenance & Repair Section)

Charging

The charging system for a T6 Transporter is complex due to the stop start and regeneration system. The design ensures the leisure battery can charge properly from both the van engine running and the 240V hook up system.

The engine can be run when stationary to charge the 12V leisure battery (via the B to B charger). The 30 amp charger will automatically charge the 12V system when on 240V hook up (provided the RCD/MCB switch is on, Charger MCB switch is to the left hand switch)

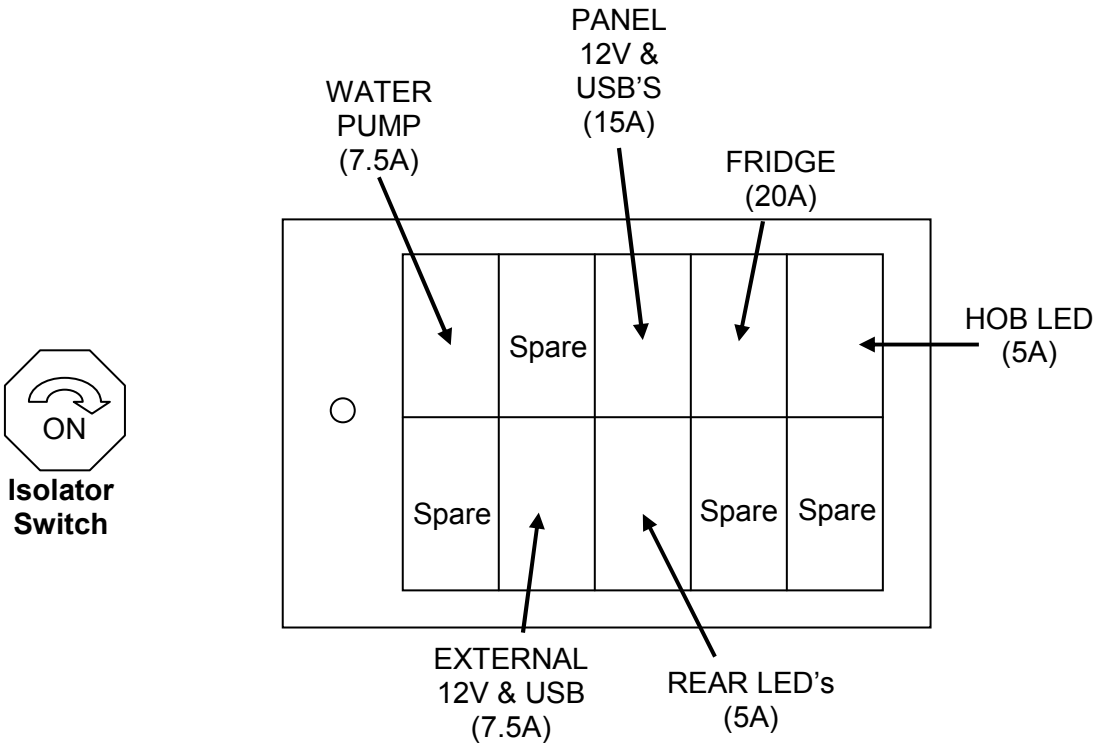
Turning On / Off and Using the 12V Leisure Electrics

Reach into the bottom section of the sliding door, almost directly in front will be the main isolator – use your right arm to turn the switch clockwise to turn on, the light system will bleep when this occurs.

Isolator switch and fuses, the isolator turns Clockwise to turn On (off position shown)

12V Fuse Box & Isolator Switch

The cover prises off, most fuses supply the Panel & Panel switches, the Hob LED & Rear LED 's fuse goes directly to the LED switches (ie they are not switched via the Control Panel switches)



The 12V isolator switch, (**not** 240V), isolates ALL leisure electric equipment including the fridge. This isolator feeds the fuse box only. There are no other 12V feeds from the leisure battery. If you wish to leave the fridge running while driving leave the isolator switch ON and the fridge panel rocker switch on and turn off the other switches and the LED lights.

You do not have to isolate the Leisure battery when the vehicle runs or is driven. The B to B charging system is designed to charge the leisure battery when the vehicle is driven as it protects the leisure battery from the high charging rates from the regenerative system.

Main panel switches and outlets and their use. Note (excepting the top bed Hafele LED) that the LED's are not switched through the panel as they have their own switches:

The left hand voltage display is directly coupled to the Van battery (via a fuse). This will always stay on and gives a constant reminder of the Van battery state of charge for starting. If there is a need to turn off this display or work on this unit, remove the (easily accessible) single fuse (5Amp) under the drivers seat above the 240V charger connected to the Purple wire with yellow ends. (see pic):

12V Outlets & USB's Main Panel

These are fused at 15A total load. Care with USB charging must be taken as the voltage output of USB's may not always match your equipment.

'External' 12V Outlet & USB's (near sliding door)

This may be used for low amperage equipment (fuse 7A) and lighting and is ideally place for an awning supply. Remove any equipment before changing the seat into the bed position, the equipment can then be replaced if required. (Below, shown with covers open):

Van Battery (Replaced June 2020)

It is important to note that the van battery never charges fully due to the allowance for the braking regeneration system. This means that the van battery is liable to go flat quicker than a vehicle without this new technology. There is a voltage display for the van battery on the top left of the control panel near the hob unit. If this voltage drops below about 11.6V the van is unlikely to start. The battery type is an EFB (enhanced flooded battery) start/stop battery and must be replaced with similar.

The electrics are not designed to use the leisure battery as a jump start the battery for the van.

The van has a new battery (June 2020). If there is a need to charge the van battery, note that you MUST NOT connect the external charger DIRECTLY to the NEGATIVE terminal of the battery as it has a monitor that the van electronics uses to detect the van battery charge. Use an earth point such as a chassis bolt.

(It should be possible to add a separate external low amperage charger (3 amp to 5 amp trickle charger) via the FRONT cigar socket to charge the van battery. This could be connected to the main 240V socket near the hob unit. This has not been tested.).

Skyline Roof & Top Bed

Most important – NEVER close the roof with he doors closed – this will damage the roof system and material as the significant volume of air cannot escape.
Make sure the Hafele LED light is flat BEFORE lowering the Pop Top

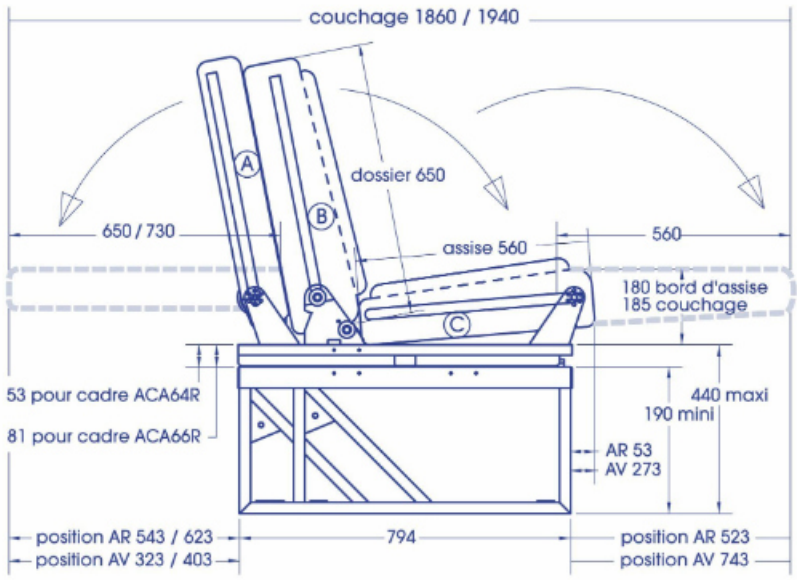
Skyline provide no instructions for operation! These are the best way found to operate the roof and associated bed unit:

- Release the straps almost to the end of their travel before elevating the roof, (if your are short, you will not be able to reach the straps to release then after elevating (and you will be like the Grand old Duke of York)
- I find that using your head to push up initially works, after 20 cm it moves up on its own.
- After the roof has been fully elevated, to elevate the roof bed, push up on the large section of the top near to the hinge for the second section , this again elevates itself after an initial push.
- To pull the top bed down, pull at the same points both sides as above, watch that you don't get caught between the sides as it come down quite heavily
- The bed must be down before the roff can be lowered

- To pull the roof down, there are two handles that can be used, if you are short, it is difficult to reach these.
- The Skyline roof has ventilation windows at the side and one light only at the front using zips.
- To get up into the top bed, either take a course in acrobatics or move the double front swivel seat around and heave yourself up. If you have kids just watch them work it out for themselves.
- Pulling the bed and the pop top down is the reverse procedure, **(open a door first**) – but 100 times more difficult. If you are light, you may hang around for ages attempting to pull the bed and the roof down, don't be discouraged, just think about all the calories you can safely add in a good cause.
- When travelling, role up the front end of the material as best you can, and pull the straps tight – so that when you push up upon the roof you cannot move it – or you may take off on the motorway!
- Push the straps up out of the way and tuck them into the space with the canvas – not ideal, Skyline design fault.

Bed, Furniture & Storage

The sliding Rib seats / bed is a very expensive system that has been crash testes and is fitted to the better conversions. The furniture is again an expensive high quality lightweight design with the best quality hard wearing finish (HPL). The design of both are a little compromised, but they work together quite well in the small space afforded to the VW T6.



The bed / seat unit slides to provide more room and access to cupboards. The bed is tight to the furniture to provide room to reach the handles on the NS. See linked video for bed operation:
https://www.youtube.com/watch?v=pmA_wRymdk8

There are four handles, one at front bottom (pulls up) for sliding bed forward backwards, two on right side (NS) for each of the front and rear sections. These are difficult to get to (design failure). There is final one for the middle section (pull up) for moving the back of the seat into the down position. It is easier to view the video on youtube, but to get the bed out, slide forward, drop the front section down, drop the middle section down then the rear.

The furniture is fairly obvious, just be careful of the doors and draws as the fittings and hinges are not designed for hard handling (Evo design fault).

Passenger Double Swivel Seat (Kiravans Swivel)

This turns and moves to face the table area. There is a large storage space under this seat, pull the seat forward at the bottom and it will release and hing upwards. The operation of the swivel system is a bit of a knack.:

- Move the Drivers seat back until it touches the table support
- Open the Passenger door
- Turn the four main bolt units and pull then up and turn each so that they are held in their up position.
- The seat slides forward, back and sideways – initially slide the seat forward and right (towards the drivers side), then turn the seat carefully Anti-Clockwise.
- While doing this continue to slide and move the seat so that it (just) clears the handbrake and the Drivers seat arm.
- Continue turning the dual seat carefully until it passes the passenger pillar.
- The seat can then be locked in place
- If the seat is not locked it can move about, but this may be useful to position nearer the table
- Before turning back, make sure the headrests are in their lowest position or they can foul the centre consol.

There are videos on youtube also showing this process
https://www.youtube.com/watch?v=ZH_iB7T6PIA

Table with Sliding Function & Storage

This is stored behind the drivers seat. To remove, unscrew the black knob and remove the oak block, puts these back for safe keeping while table is in use. The right hand pic shows the awkward position the table leg must be held to allow the table to hook on the rail. (Note: The leg releases from its storage position by pushing out at the hing end before hinging out the leg)

Above Left: Storage area and screw clamp.

Above Right: To lift the table and secure it to the Rail below the hob area is tricky as the table leg requires positioning mid way open to allow the angle for the table lugs to fit over the Rail (design fault).

General Storage areas

There are the obvious cupboards and drawers. There is a large long space below the rear of the furniture accesses via the Tailgate. There is also a large space under the passenger double seat that is accessed by pulling forward the bottom seat cushion and hing upwards.

The Van Jack, wheel brace & security wheel nut remover

These are located under the passenger double seat.

LED Lights & Switches

The lights have been designed for a range of uses:

- Hob working – both day and night time (warm white & daylight)
- Automatic above sliding door light – van operated, replacing the standard light (This has a night function where is can be on via leisure battery, or off completely for no disturbance sleeping)
- Rear above bed lights, warm white dimmable for easy reading and nightime use
- Rear NS coloured mood light, this can be turned off if not required.

Touch Switches - these have multi-function touch design. (see pics) At the top of the switch is the on off touch switch. The 'M' cycles around different functions. The arrows select the brightness. The units remember the last setting and can be set to come on automatically when you turn on the main isolating switch. The above Hob LED's have **both a warm white and a daylight LED strip**, these can be selected using the 'M' or by the colour touch ring (see rear switch pic for operation)

Changes to the Standard VW systems

Also - Please be especially aware of the 'Safe Lock' VW door locking process – this MUST be understood or you may lock yourself or someone one else in the van! See VW manual.

Above Sliding Door Warm White LED:

- The only major change is to the interior automatic lighting. This has been arranged to operate either as a normal 'door open/close' time dependant switching (as VW standard runs from van battery), or in addition to be turned on fully without any timed out function (runs from leisure battery), or turned OFF completely for night time use where there is no door open light for sleepers.
- The switch that operated these functions is on the NS of the rear top storage unit.
    - Top position - van door open close standard
    - Middle position – OFF completely
    - Bottom position – ON fully, not timed running from leisure

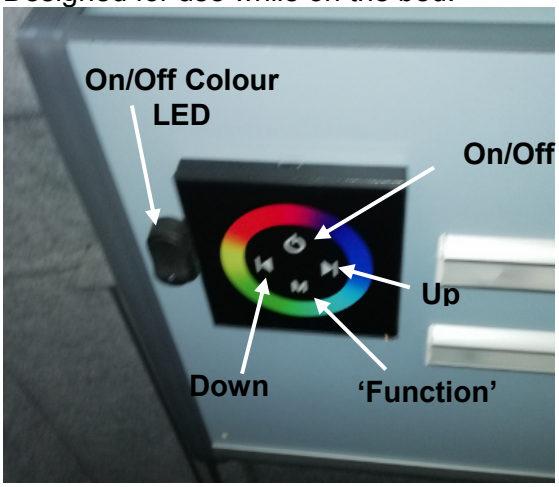
battery

The Rear switches operate 3 different LED's

- Rear Unit Top Unit two LED strips – main touch switch (as above operation)
- Coloured LED strip (rear NS) – turned off or on using the rocker switch next to touch switch – select colour using touch dial
- Warm white LED above sliding door – 3 position switch on the side of the Top Unit
    - Rocker up position – Van timed delay door open/close operation (12V from Van battery)
    - Rocker mid position – OFF completely (for night use)
    - Rocker down position – ON (12V from Leisure battery)

Rear LED switches:

Designed for use while on the bed.



Above sliding door LED switch:

- **Up** (on NS of the top rear above bed cupboard) – Switches on 'Door Open Function, **Middle** – OFF, **Down** – Constant ON (Leisure Battery):

Hafele Top Bed LED with USB's

- Touch centre of light (needs third panel switch to be on), it has two brightness settings, touch again for higher brightness.
- This LED turns off when the panel switch is operated and it will not automatically come on again until LED is touched.
- **Make sure this light is flat BEFORE lowering the Pop Top (Open the door!)**

Part Two – Maintenance & Repair

Most VW campers seem to be built solely for their looks, with the access for maintenance or repair of systems requiring a complete tear-down and re-build of the van. The research showed no consideration to any type of repair and very scant information about how things worked or how to reach them.

For this project, the whole campervan has been designed to be maintained as easily as possible. Due to the lack of space and the way the bed and furniture is required to be fitted, it is not possible to provide simple access to the electrics or other systems without removing some core items.

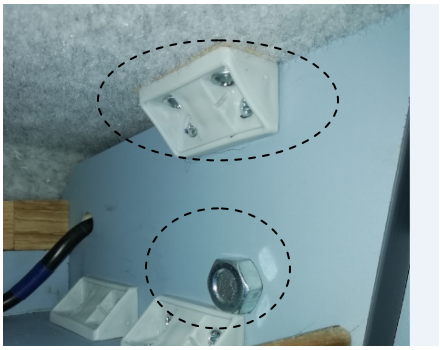
However, the following details how to access the various systems should it be necessary, along with diagrams and details of the systems.

Furniture, Fixings & Panels

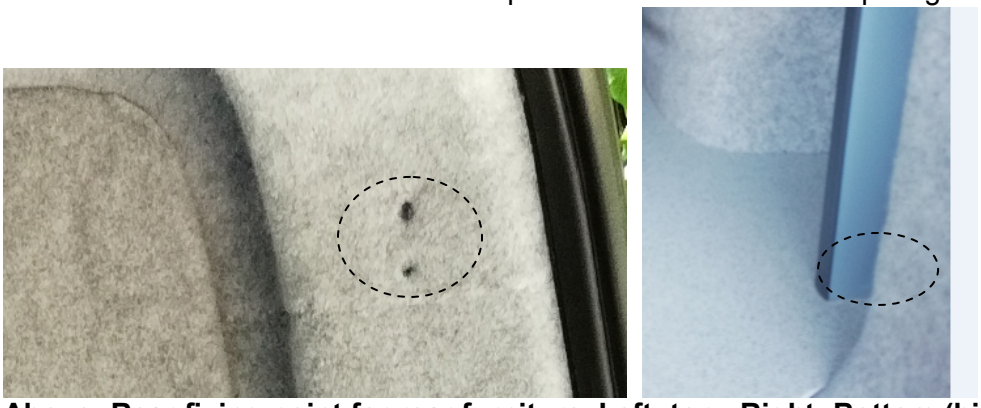
Furniture Fixings

There are seven main **furniture** fixing points:

- Top UNIT with LED above the hob – one fixing at each end screwed into the main roof strengthening strut (see pic below)
- This unit also links to the top of the rear furniture by a bolt at the bottom right of the hob LED unit (see pic below)

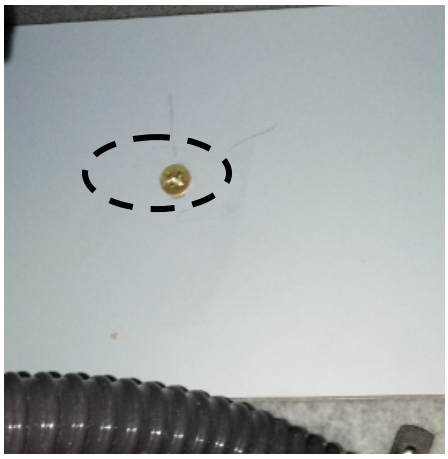


- The rear furniture is also fixed to the rear bulkhead at the top – see pic below, (the holes are market as it is almost impossible to find holes in carpeting otherwise)



Above: Rear fixing point for rear furniture, Left: top, Right: Bottom (hidden), plastic block screws into the ply floor

- The front furniture is fixed to two wooden blocks at the top of the furniture, below the hob area. These blocks are screwed into the main metal van frame behind. The screws into the blocks are accessible from inside the top drawer on the left and inside the cupboard in the middle.



- The front and rear furniture is connected at the front towards the bottom behind the Gas bottle area..
- The Rear above bed Top unit is screwed into the top in two places (left and right top) and is bolted to the rear furniture at the top (see pics below)

Above: Top 'above bed unit' showing bolt to rear furniture & left hand top fixing to the ply above

Bed boards and bed cupboards

This fixing was 'invented' so that the crash tested bed frame did not require drilling – which is normally done – probably weakening the frame. These are easy to remove (cut the ties) and replace with similar. They go through two holes, one in each plastic connector and loop around the frame.

Above: Bed board fixings using ties.

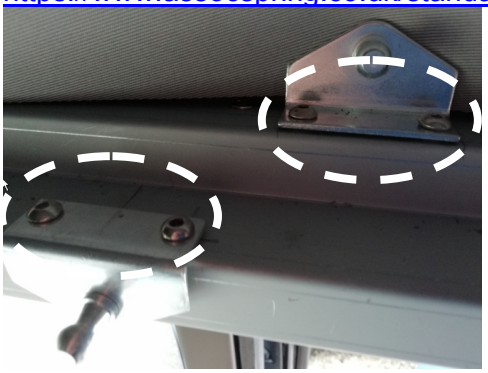
Main Seat / Bed Fixings

The sliding Rib seats / bed is bolted down into a heavy gauge steel strut that fits under the van and provide massive strength for the seats. There are five bolts in total, two through into the strut, three through the floor with large anchor points below. The fixings and holes have been coated with silicon to ensure that the elements do not impair their longevity.

To remove the seats/bed is straightforward but a **heavy** and detailed task. The boards must be removed. All bolts must be removed (17mm), to provide adequate room to manoeuvre the structure out of the back of the vehicle, the seat / bed sections (at least front and back) will require removal first. Note that the space is very tight and the furniture can be damaged by the edges of these units and the seat / bed frame itself

Top Bed Strut Fixings

These have been designed to be maintained and use 'Rivnuts' into the strong Pop Top main strengthening supports. These use standard bolts to hold the supports on to the roof for the struts. The strut ends have clips that prevent them coming off the ends of these supports.
Gas struts are marked as N10PBC0200 :-
https://www.assocspring.co.uk/standard-gas-struts/N10PBC0200



To remove the top bed system, the rearmost hinge screws (lots) must be undone and in the up position the two gas struts should come off after removing the retaining clips. The top struts can then be removed when the bed is lowered into the sleeping position. To remove the two front bed sections requires lifting both together and tilting them down one side (watch the pop top material). To achieve all of this it may be necessary to remove the furniture units or at least the main rear unit.

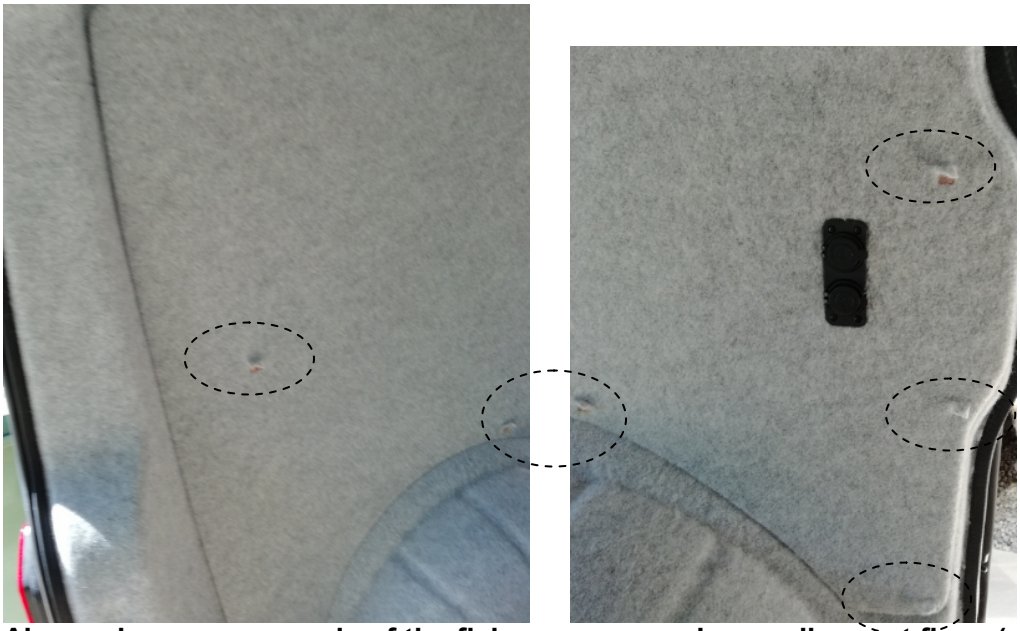
The rearmost bed panel is screwed into Rivnuts from above (under carpet flaps). It will probably not ever be necessary to remove this bed panel.

Removing Side Panels

The panels allow access to Van standard systems (eg door locks) and additional camper equipment wiring & trunking

Note that there are two types of panel used:

- 4mm ply panels (rear NS whole panel, rear top OS, small panel above rear top shelf unit) – FIXED by screws with access point in carpet
- 2mm panels (all the rest – behind front and rear lower furniture panels, fuse box panel, sliding door panel, rear door panel) – FIXED by plastic trim push-in fasteners – these can be carefully prised out using a plastic removal tool. The positions of the clips can be carefully felt by passing a hand over the carpet.



Above shows an example of the fixing screws under small carpet flaps (rear NS large panel). Similarly the OS panel is held in the same way, on the font edge in the middle there is a wooden block to secure the board in the correct position.

ELECTRICS

The Basic Systems & Wiring

(Note, care required – Within the **NS** top roof strengthening strut lies the VW Van wiring front to rear cables. These are not within any trunking and are not well protected against accidental damage (eg by drilling into the metal roof support). This is a design failure (Skyline).

These are grouped together via access points under removable panels:

- Under drivers seat charging systems and leisure battery (remove seat to access)
- Fuse system and cut-off switch (OS mid panel)
- Main electrical switch panel, 240V socket, LED hob light switch (central furniture)
- Rear LED switches on top rear unit
- Hob LED linked to switch on central furniture
- 'External' 12V socket and USB Sockets, NS sliding door (12V socket may be used for low amperage lighting in an awning)
- Top bed light (NS front above passenger seat)
- Water Pump in the water container, linked to tap switch (OS lower furniture)
- Fridge connection (OS front lower furniture)
- Electrical wiring runs, arranged by location and access:-
    - Main charging cable, from Van battery to drivers underseat

(Access- under cab central floor in trunking)

- Van fuse box to drivers underseat (Access- under cab central floor in trunking)

- **Main Cable runs** (12V and 240V in separate trunking):
    - Main leisure battery cable, and van voltage display cable (plus additional unused cables for accessories) from Front drivers underseat leisure battery to rear behind Fuse box OS (12V and 240V) (Access- Front panel behind front furniture section, rear panel behind fuse box panel behind rear furniture and front furniture)

- 240V hook-up and RCD unit OS rear (Access- behind rear lower panel behind rear furniture)
- Fuse box to rear OS and 240V to charger from rear RCD unit (Access- behind rear lower panel behind rear furniture)
- Rear Top LED and switches on the rear top shelf unit (Access- above the rear top shelf unit)
- NS LED's 'External' 12V sockets/usb near sliding door (Access- behind the large NS rear panel)
- Top bed light – this was done by Skyline and there is no direct access after the top of the drivers door, the route is to the top OS above drivers seat, then it is inaccessible to the NS top. (design failure by Skyline)
- Hob light cable from above hob unit through rear top furniture unit

Cable Colours to and from fuse box:

- Large Red – Main Leisure Battery cable
- Purple – Van Battery cable (to voltage display)
- Medium sized Red – Fridge
- Orange – Pump
- Red / Yellow stripes – Top Hafele Bed LED
- Red / Green stripes – Panel USB & 12V outlets
- Grey – Rear LED's power to rear switch
- Red/ Black stripes – 'External' 12V Socket & USB (near slide door)
- Brown – return from panel for supply to 'external' 12V & USB's

Cable Colours Rear LED's:

- Black 4 core (**Grey** used from fuse box as positive 12V to rear switch)
- Second Black 4 core to rear top – spare, unused.
- Large White 3 core (**brown** used as positive 12V) NS run behind panel
- Red, Green, Blue colour coded for colour LED's
- **VW Van** wire for LED switch – Red/Black 12V Van positive 'timed' door open , Brown/Red –ve earth

There is a red wire feed from the van fuse box middle of the cab, low down under the fuse cover; the middle row has a piggy-back fuse connection (5A) that feeds the van "ignition on" to the B to B battery. This feed improves the working of the B to B battery. (see Sterling manual)

Above: shows the front cab under rubber floor wiring routes, alongside the VW standard wiring

Fuse box panel & 240V RCD unit panel positions

This shows the arrangement of the main electric systems behind the furniture on the OS rear of the van, the hanging switch panel screws into the rear furniture. The right pic shows the connection to the hook up point.

Underseat charging systems and leisure battery (under drivers seat)

This is a small space with a several linked systems. They key points are:

- The leisure battery is held by two struts, one at the back (strong oak wood strut, screwed down from the top of the underseat housing), second at the front (plastic covered metal strut which has vertical movement adjustment and bolts through the sides of the underseat housing)
- The positive terminal of the battery is well protected by a thick plastic cover designed to completely cover the terminal connections and protect the battery from accidental discharge.

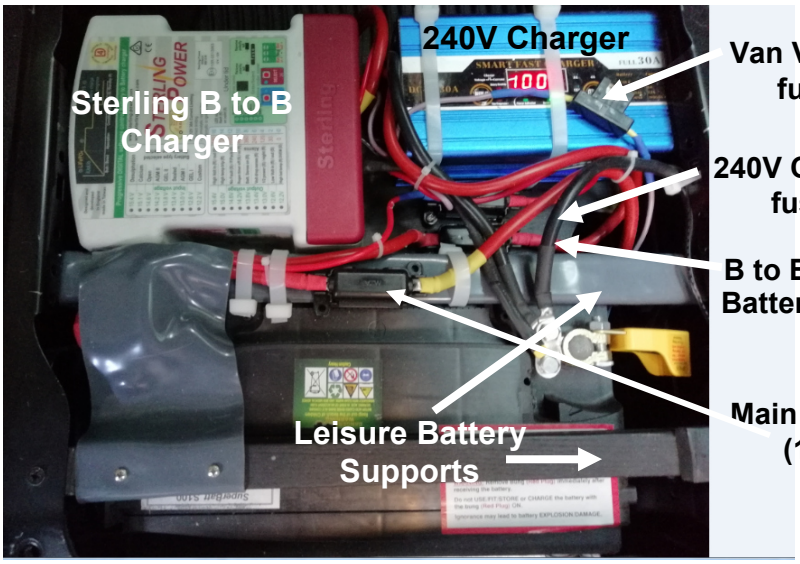
- The main earth point for the Battery Negative is at the OS rear bolt of the seat support unit.
- The chargers reside on a shelf which is bolted to the sides of the underseat housing.
- The wires access from the floor area mid front, and from the trunking at the rear OS of the underseat housing.
- To remove and replace the battery requires removal of the two main struts and may require loosening or removal of the chargers as the battery must move forward to be removed from under the underseat housing.
- The wires connecting to the B to B charger (Sterling unit), are very close together (design failure by Sterling), and this must be accounted for in moving this unit, please make sure that the wire connections cannot short after moving the unit.
- The 240V charger (30 amp max power with fan) is directly wired (no switch or plug at charger end for safety and reliability). If this unit requires replacement or repair, the cables will require re-soldering.
- Each connection is separately fused, care must be taken when removing and replacing fuses to make sure that they are effectively insulated afterwards.

Construction & Disassembly:

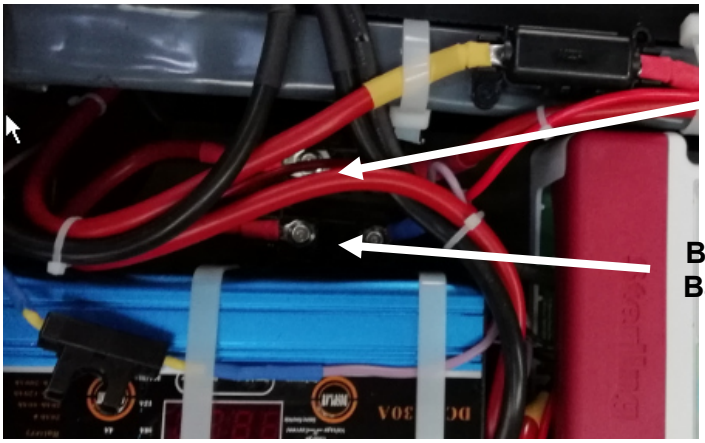
Above: Showing ply shelf for the chargers, this is held by bolts through the side of the seat support. Also the metal support for the battery. Space is very tight and care will be needed to dismantle.

Please refer to the individual manuals for these chargers in appendix. The B to B charger is complex in operation and has been set up to work with a separate ignition on feed (from the Van fuse box under the central front unit).

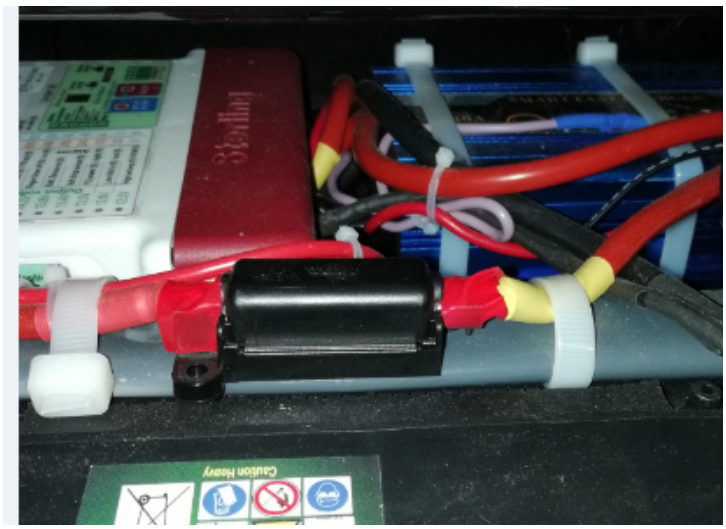
Underseat Drivers Seat Fuses (4)



Above: The Yellow connection on the Negative (earth) is a temperature sensor for the B to B charger



Above: Charger fuses shown without covers on



Above: Main Fuse for the Leisure Battery feed to the Isolator Switch (60A)

Above: Fuse (5A) supplying the voltage display for the Van Battery

Van Battery to (B to B) Charger Fuse

This (50A) fuse is situated on top of the Van battery as close as possible to the Positive terminal for safety.

Cut-Out Isolator Switch and Rear fuse box

- The main 100 amp red cable feeds this fuse box
- All onward connections are fused from this point
- Wires feed both to the rear (bottom fuses) and to the main switch panel (top fuses) see diagram.
- Red LED's light up if a fuse is blown
- Spare fuses can be found in the spare slots (without wires attached), see diagram for correct fuse values
- Negative earth connections are behind the fuse panel and completely isolated from any likely 12V positive short.
- Most negative earth connections are found near to each piece of equipment to lessen any possible voltage drop.
- The van body, chassis and metalwork of the van links the negative earth for both 12V circuits and the earth for the 240V circuit as normal practice and regulations. This does mean that potentially there could be a fault that causes the body metalwork to become 'live' if the external 240V earth supplied by the camping vendor is not properly grounded and there was an internal fault. The only recourse to prevent such occurrence would be to create another ground point eg by fixing a deep ground pin into the external earth and connecting to the chassis.

Main Switch Panel in Hob Area

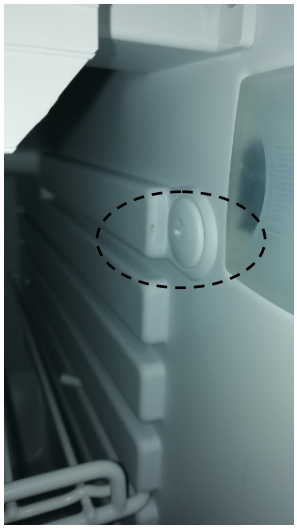
- The main panel switches are rated at 30 amps, more than adequate for all amperage loadings
- To remove the panel to access the wiring and switches, simply unscrew the four retaining self tapping screws and the panel can be manoeuvred through the square hole in the furniture by gently pulling through the black cable trunking. This trunking has slack built into it which resides behind the top rear main panel.
- The electrical joints to the panel are soldered for good long-term connections, while this may seem to complicate any repair, a lifetime of repairing equipment suggests that this is a more reliable solution than connectors that are prone to fail.
- There is a central earth block that terminates behind the fuse box area behind the box panel
- There is a plastic rear cover that is held simply by four self tapping screws, although the access to these is difficult. This may need to be removed to gain access if the trunking will not easily pull through to release the main panel.

Fridge Removal

The fridge is screwed into the SIDES of the furniture (standard fitting, but not a good design, so care needed for removing and re-assemble, the screw lengths are different each side and it is easy to go through the ply by mistake).

- Left screw is in the lower position
- Right screw is in the upper position

Prise off the caps shown below to find the screws hidden inside, well below the surface, which makes them very difficult to get out (if they are not removed, they will scratch the furniture as the fridge is pulled out.)



After removal, the fridge will pull directly out – remove the top drawer to help access. The wires are long enough to get the fridge out. The fridge uses large soldered wires and connections to ensure a small voltage drop as the fridge uses more electricity than anything else.

Earth is located directly behind and above rear of fridge behind panel.

Water Pump

Positive Runs to pump (Orange), the negative (Black) is the switched wire via the tap. Soldered connections are used. Earth is located directly behind and above rear of fridge behind panel

Rear LED switches

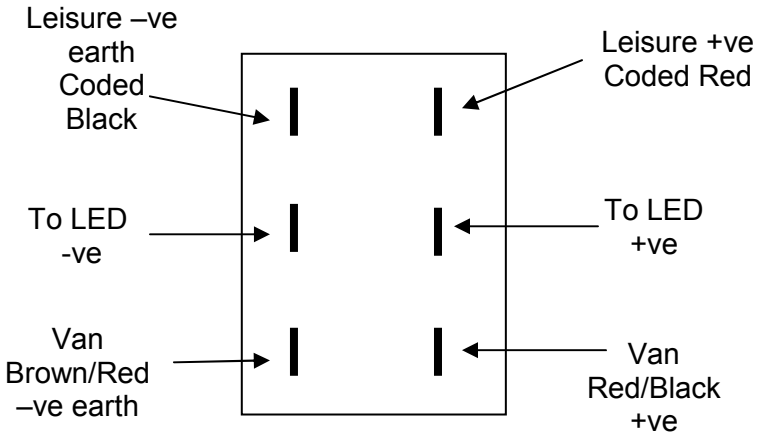
Side switch:

Above: Side door LED double pole switch

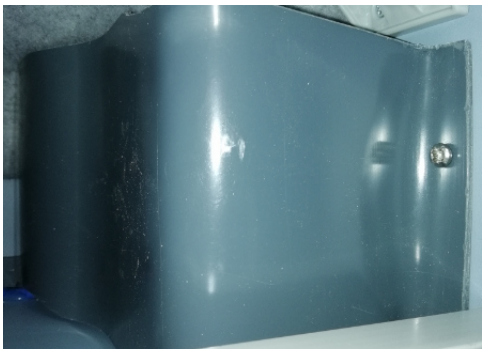
This wiring is complex due to incorporating both the Van feed for the door opening light system and leisure battery fed LED's (see diagram):

(note that the terminals are 'opposite' side to the switch action, this switch has two supplies and allows the above slide door LED to work as a normal door open light from the Van electrics and as a leisure powered LED for additional light, or set as completely off for no disturbance at night time)

If this switch requires work or replacement, the VAN BATTERY must be disconnected (as well as the leisure isolator turned off) or it will be live and could short. The switch is held into the unit by hot melt glue, this is easily removed and can be re-glued.



Above & Below, Viewed from inside rear unit – LED touch 0switch & double pole switch connections



Access is behind the grey plastic cover in the rear top shelf, one screw

Supply Cables run above this unit and drop down, to access the supply wiring requires removal of the rear top unit and the ply cover: Both the 12V positive and negative (earth) run along the top and down the OS pillar. The earth runs to a central earth point behind the fuse box and isolator panel:

Above: Shows the cabling before fitting in the standard VW wiring loom area above the rear door.

'External' connector point (NS mid section near sliding door 12V and USB sockets)

Access by removing the large rear ply panel. There is slack wire to allow easy removal of panel. These units use connectors with a local earth point behind panel. The wire for these units uses a small bore cable within a white outer, the amperage loading should be kept small, fused at 7.5 amps or below.

LED Strip Lights

These contain a single strip of 5050 LED's. Simply put, these LED strips contain single chips called SMD 5050 or 3528 linked in parallel. The colour strip has 3 LED diodes in one housing (sometimes called tri-chips).

In the unlikely event of needing to dismantle the lights, the following explains their construction:

The housing has a long piece of diffuser plastic that covers the light – the ends come off (some are glued), and the covers slide out – note that the furniture unit may have to be removed if there is not room to slide the cover out.

The leads to the LED strips are soldered – they will require sniping (and resoldering or crimping to replace.) The aluminium base is simply screwed into the furniture or metal top (NS), the screws are under the LED strip which is stuck to the base with self adhesive tape.

Top Front Hafele Bed light

Light Unit unscrews by removing magnetic cover in centre of light switch, the wire goes down into the frame below and re-appears above the drivers pillar. This has a local earth point at the top under the standard plastic van trim and the positive is routed down the pillar to meet with the 12V trunking.

240V Double Pole RCD & MCB's

This is the safest possible unit to fit. The double pole means both Live and Neutral are switched in the event of wrong electrics in the supply by the camping field owner this cuts off the power to the neutral.

There is a very short cable that runs from the hook-up to this unit – this is the most dangerous area as it cannot be fused or RCD'd except by the supply owner (which should be ok in the UK but you can never tell what their safety installation standard is).

Obviously, while working on the 240V equipment or cables unplug the supply from the hook-up point.

APPENDIX

*Refer also the attached manufacturers documents

Other equipment information (not fitted currently)

Gas & Carbon Monoxide Detectors

Twin Detectors

Example: CBE Carbon Monoxide and propane / butane gas (aprox £60)
https://www.grasshopperleisure.co.uk/trio-gas-alarm-black-or-ivory-3516-p.asp

Separate Units:

Alternatively, there are cost effective separate units available CBE Carbon Monoxide and a separate gas/butane, And they can be put in he best place, try eBay or Amazon expect to pay less than £20 each.

Awning systems

There are multiple choices here. The reason a particular system has not been fitted is due to the very different choices and functions available. Some campervans have a large unit with a pull out awning. A common example are the Fiamma F45s wind out awning and the Thule awning systems. While this provides a nice solution, there is a massive drawback of significant wind resistance, effecting both fuel economy and wind noise.

There are options of using a smaller rail ('C' profile rail) (Eg Remo Rail system) that attach to the standard VW fixing points for the roof rack. With the pop top some of these fixings are not available towards the rear. However, most C profile rails can be fitted in sections, there are much less expensive options for 'C' profile rails that are arguably more efficient as the sit under the pop top roof thus not affecting the wind resistance of the vehicle..

There is also the possibility of simply using the VW fixing points and the fixing points for the pop top hinges to attach a 'loop' system whereby the awning is linked to a simple hook at several points at roof height. Every system requires some sort of poles, these are built in to the larger system but having a system that is erected using hooks and separate poles will take only a little longer. This creates a cost effective solution without having to install any permanent fixing.

The other main question for selection is do you wish to drive away and leave the awning up. This question dictates the solutions available.

Toilet systems

These are the main units available:

THETFORD PORTA POTTI 335 QUBE

Manual piston pump. 10 litre flush water tank. Fitted with
rotating emptying spout. 10 litre waste holding tank.
Level indicator. Colour: White.
Size: 343 x 338 x 381 mm (W x H x D)
30311
£75

FIAMMA BI-PO

T 30
TA simple, compact, strong and self contained fresh water flush portable toilet. Upper tank capacity: 10 litres. Lower tank capacity: 11 litre. Weight: 4.1 kg.
Colour: White.
Size: 345 x 435 x 300 mm (W x H x D)
30340
£41

DOMETIC 972G

Portable toilet with 360° pressurised flush. 8.7 litre flush water tank. 9.8 litre waste tank. Weight: 5.4 kg.
Colour: White/Grey. Size: 333 x 317 x 387 mm (W x H x D).
30324
£61

Bike Rack systems

These are large cumbersome units and therefore not fitted as this function may not be required. These unit are easy to fit if the functionality is required.

Other Equipment & Accessories

There are many accessories that may be useful depending on the use of the campervan:

- Kettle – needs to be low amperage, there are special campervan kettles available
- Racks and drawer inserts for holding safe cutlery and kitchen items when moving
- External BBQ. Some of these run on butane. The standard butane bottle can easily be removed from the van cupboard and connected to an external BBQ that could then be used under an awning or just out in the open
- External light units for awnings and outside lighting. Most 12V systems can be connected to the 12V socket just inside the sliding door.
- Music, radio, TV systems. This is a huge subject. Care is needed to make sure that the relevant system runs from the right power source and some will be able to connect into the VW media system. (Be very aware that the VW system will drain the Van battery and an eye requires to be kept on the Van battery voltage display on the control panel. It also times-out to save van battery use which can be frustrating).

Electrical System - Background & Research info

The is a lot of conflicting information on the T6 camper wiring system. Having reviewed the available research and looked at the panel systems such as CBE kits, it became evident that there was a better way of creating a stable, high quality system.

Charging Systems & Complexity

One of the main issue is that the Blue motion vehicles (all T6 and some T5) require a B2B charger. ***The kits all seem to cater for a split charge system*** so that you are installing technology you cannot use. Nearly all (all?) the main converters have seemingly ducked this issue and fit 'standard' CBE kit (or worse the poor quality Sargent systems).

This makes the installation significantly over complex, with proprietary electronic components making fault finding difficult or near impossible. The standard panels also have switches that are redundant and the project required different insignia.

Research found that 90% of all campervan failures are due to electrical systems failing. So the design of the electrical systems were key to the whole project.

The design needed to be:

- As simple as possible
- Easily accessible (within the constraints of the cramped VW space)
- Easily repaired
- Easy to operate and understand

The Solution:-

The main control panel was therefore designed from scratch and just requires a few standard 12V switches, display voltmeters, standard 12V sockets and USB ports. There is very little to go wrong with this panel and each component can be easily replaced or isolated if required. All the joints are soldered for longevity - especially as within a moving vehicle the vibrations could cause push-on connectors to work loose. The panel is designed to be easily accessed.

The B2B chargers such a the Schaudt WA 121525 effectively stand alone from the rest of the system. (The Schaudt charger requires an engine run feed which is almost impossible to fit on a Transporter van and this is also too complex for easy maintenance)

The Sterling Pro Ultra Battery to Battery Charger (12v-12v 30a BB1230) was selected as the best unit (with green strip at top as this is latest). It only needs an ignition feed which is available from the central cab fuse box.

In addition there is an electronic smart charger (30 amp) powered from the 240V mains hook-up for the Leisure batteries.

The 240V is designed to stand alone from the 12V system. It is wired within separate conduit and uses a double pole twin 16A consumer unit for maximum protection. The external connection is a Foal magnetic flap installation. The 240V isolator RCD switch and MCB/fuse unit is located just above the external connector and recessed into the panel to provide a neat installation, all 240V wires are hidden and away from harm.

The 12V system runs directly off the leisure battery via a 60 A fuse to an isolator before the main fuse box located behind the main panel area on a removable panel for access to wiring if required. The panel has 4 by 30A rocker switches that are used for:-

- Fridge
- Water pump (tap operated via microswitch)
- Auxiliary panel sockets and voltage display (Leisure battery)
- External 12V socket connection (for awning) & top bed light

The panel has two digital voltage meters, one for each battery, the main battery voltage measurement is taken from a separate wire connected to the B2B battery connections. The main battery is not used for any internal equipment except the standard cabin light and the stereo media player but the voltage meter is useful to keep an eye on the main battery state.

The Panel is located on the right hand vertical panel behind the rear furniture to give access to the wiring. The wires (240V and 12V separately) all come from directly behind this area and are enclosed within removable panels. The isolation switch is found in this area for easy access within the main sliding door cupboard.

The max amperage through switches is well below the 30A rating. There could be an auto isolation for the 12V Leisure system when the vehicle ignition is on, but even if the engine is run, there are no safely or battery issues and it was deemed useful to have the 12V supply operational even when the vehicle is moving especially for the fridge and for other items if required, eg usb charging.

A possible addition would be an alarm at ‘ignition on’ if the 240V hook up is live, providing a

warning for the plugged in hook up lead. The project required to keep 240V away from 12V system and so this was not fitted as this solution needs a 240V relay operated by 12V. (The relay could then activate a 240V buzzer)

LED's

Lighting was a key design issue. Nearly all campers use downlights. These give a local harsh light and even if dimmable do not provide a broad even light for general use. The LED's used are all dimmable long strip lights. These above the Hob are a mixture of white and warm white to give a nice balance (chosen by the touch switches) for the time of day. The above bed LED's are dimmable warm white as they are designed for night time use. There is also a colour LED for additional mood lighting, this can be turned off if not required.

There is a courtesy / door warm white LED above the sliding door. The VW connector is located at the rear top. This is connected via a new double pole switch (DPDT) which has three positions – Middle position - Off (so that at night the time delay can be stopped), ON (UP) for door opening on a timer (BMC). ON Permanently (down) is for a constant light for general lighting within the main seating area and this runs from the Leisure battery to ensure the Van battery is not compromised for starting.

Hob Light is switched from a dimmer and the LED strips include both warm and daylight to give a nice light. (another switch near LED strip could be used to turn off daylight strip but this on testing was deemed unnecessary.

The rear LED strip is above the bed area underside of the Evo Design furniture unit. The switch is on this unit for easy access from the bed. The courtesy light switch is also on this unit on the NS.

There is a Hafele bendy light for the top bed area. This has two brightness levels and USB ports.

The max load on the 12V leisure system is approximately:-

- Fridge 3A
- Water Pump 2A
- LED lights (all) 2 A
- USB Charger ports 4A
- 12V cigar lighter ports 10 A front panel
- 12V external socket for awning lighting 5A

So Total Max about 25 Amps. This is within the 30 amp charger output.

Result:

The final design and use has shown that this research, testing and careful planning was successful at meeting the design concepts. The panel system has been a complete success. This makes the chance of electrical failure very much lower than any other campervan produced by the trade.

In terms of maintenance, the design is partially effective. Due to the space issues within a T6 it is simply impossible to provide very easy access to components such as chargers and wiring. The furniture gets in the way whichever way the design is configured and the bed prevent easy access to the furniture. The main switch panel is very easily accessible – just 4 screws.

Nearly all connections are soldered. This should provide a long-term robust solution and prevent many an issue in future. Most failures are due to loose connections. In the event

of a wiring failure, the bed and furniture removal allows access to the easily removable panels and thus the wiring. This contrasts to most conversions that have no easy access to wiring and require almost a re-build of the whole camper in event of a major failure.

The LED lighting is a complete success. It provides plenty of mostly controllable / dimmable lighting that provides a very broad even light for both daytime and nightime use in all the different areas. The colour LED was perhaps just a bit of fun, but this can be turned off in any case. The solution for the door courtesy light is probably unique and provides a very effective solution.