# Contents

# Introduction

The motorhome is standard apart from the following.

Soon after we got it, we got it undersealed.

**The Gas Bottles** have been changed to two 13Kg Calor bottles. They are quite a tight fit. The right hand one comes out the easiest and I usually take it out to replace the other one.

I have fitted a connector so that both bottles can be connected at the same time. Basically, one is turned on until it runs out and the gas appliances stop working. Then that bottle is turned off, at the bottle, and the other one turned on. The empty one can now be replaced.

A single gas bottle will last over a year for cooking, and for 4-6 weeks with heavy use of the gas heater in winter.

A flue extension has been added to reduce the incidences of the heater "blowing out" in high winds. Turning the motorhome around can also help.

**The rear suspension springs** have been changed, after one broke. This results in the rear of the van being slightly higher than the front. This has not affected the handling or driving of the vehicle in any way. It greatly improves the situation when parking on an incline, as the motorhome can be oriented to "cancel" the slope.

**Interior Lighting** has been changed extensively. All filament lighting has been replaced with LEDs. There are still fluorescent lights, but these are not needed, and take a lot of energy. We never use them. A LED strip has been added to shine down on the front curtain.

**The power distribution unit and the control panel** have been replaced. See following sections and WEB PAGES.

# The Old Power Distribution Unit (PDU) and Control panel

In 2007 Autosleeper fitted the PWU4M from “Bonus Plug in systems”


I was an electronic engineer and an engineering manager for most of my career and I would never have allowed such an awful design to leave the factory. It looks like it was designed by an ONC student who has just discovered relays. Relays are used extensively in the unit and end up absorbing a large amount of available battery power.

It works in conjunction with the MES control panel, mounted above the door where it is difficult to see or control. This is vastly over complicated and it’s possibly useful features like reporting water and battery levels never worked for me.

When in “normal” operation, i.e. providing the capability to be able to switch on lights and get water from the tap, the PDU takes 0.75 amps.

Now most folk will leave it switched on overnight, so as not to have to stumble in the dark to the badly positioned control panel to put the lights and the water on. Most folk will, in all probability leave it switched on all the time they are in the van, that’s 16AH.

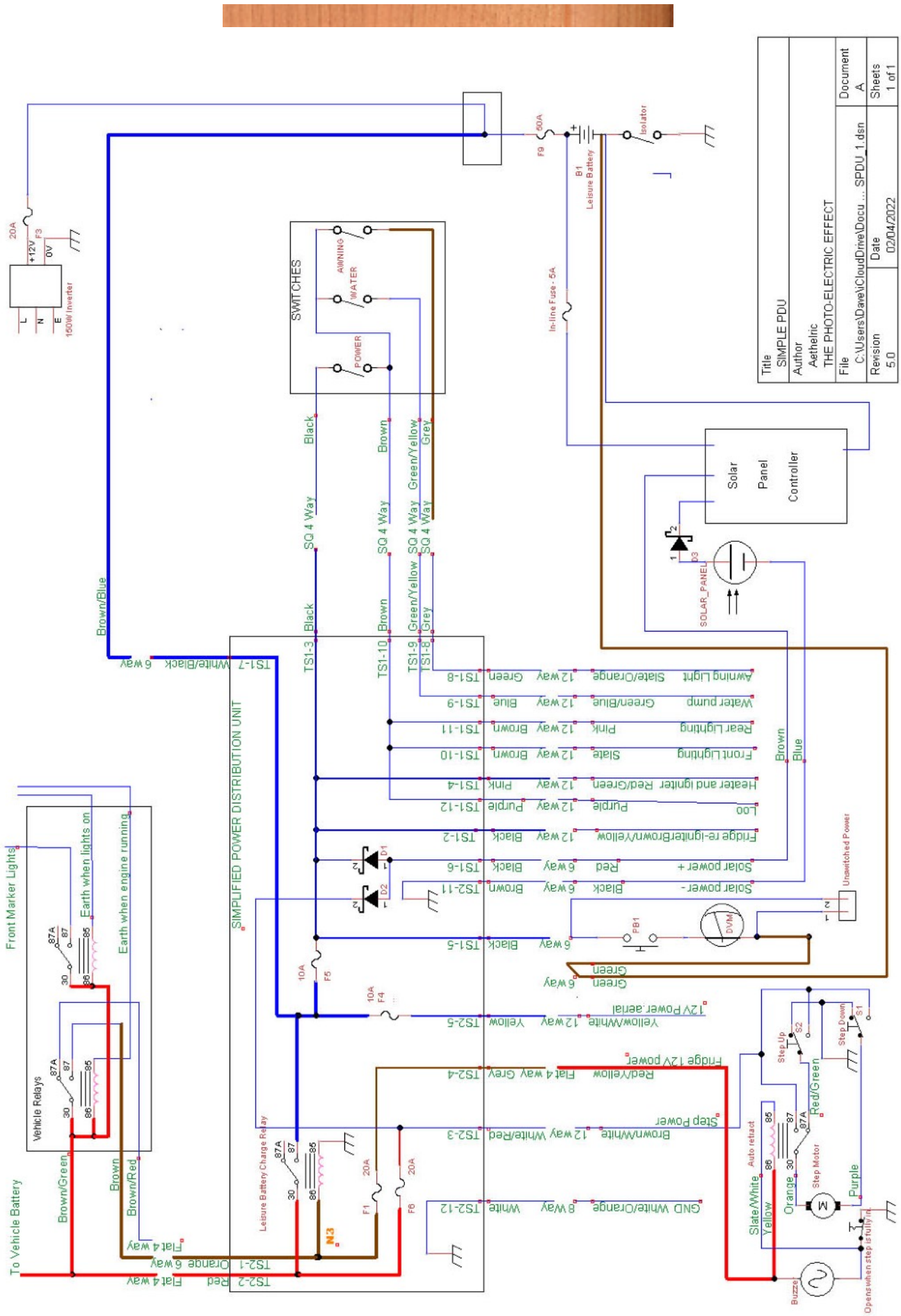
Now this can be reduced but it is a major inconvenience to have to remember to switch off the lighting circuits and the water circuits when not using them. And the penalty for forgetting could be a flat and possibly damaged leisure battery, not to mention the impact on the trip. Only three days would take a 100aH leisure battery to less than 50% charge and that is ***without*** using any power for lights, water, etc.

After a lot of experimentation over a number of years (detailed in WEB PAGES) I finally bit the bullet and fitted my own system which has worked faultlessly for the last seven years.

My system does not use a microprocessor and a series of relays to turn something on, it uses ***a switch!***

# The Control Panel

This is mounted in an an easily accessible place - even from the bed.



**P** is the power switch. Switching this off, switches off everything, apart from the 12V supply over the fridge which is used for charging phones etc overnight, or any time.

**W** is the water switch.

You switch it on. The pump runs for a second or two to pressurize the system then it stops. Turn on a tap, the water flows under pressure, the pressure is released so the pump starts again. If you have the tap switched half on, then the pump keeps stopping and starting.

BUT Sometimes, the feed line from the fresh water tank to the pump will not have water in it. In normal operation his could be caused by a small leak in a joint or the pump letting air in and thus letting the water drain back to the tank. Or maybe the vibration and the water sloshing about when travelling on a "low" tank may let air into the feed pipe. It *always* happens, of course, when the tank is empty. The pump cannot build up pressure by pumping air – it has to have a liquid. So the pump just keeps on running. If there is sufficient water in the tank then operating the tap for a sew second will allow the air out. If not then the pump will run continually until you switch it off with the **W**ater switch.

**A** is the awning light switch.

We usually get into bed with the spotlights and the light over the cooker switched on. Before we go to sleep we switch off the spots, then finally switch off the **P**ower. If we need to get up during the night, then switching the **P**ower back on will turn on the light over the cooker which is sufficient to see what we are doing without flooding the cab with light.

# The new Simplified Power Distribution unit (SPDU)

The SPDU sits where the old one did and uses all the same connectors. The old one could be re-installed, but I can't imagine why.

It has a fuse box on top.

## The Fuses

1. **25A Fridge/Auto- step retract**
   This protects for the fridge when the ignition is switched on, and also powers the step when it retracts as the engine starts.

2. **10A Boost Charger input**
   This is not used. It was a for a charger to boost the current from the solar panel but was deemed not necessary and something to go wrong.

3. **15A Alternator charging input**
   This is the supply from the Vehicle alternator to the leisure battery to charge it up when travelling.

4. **10A 12V Power/aerial**
   **This is**

5. **10A Lights, water, Loo, unswitched power**
   This fuse protects everything controlled by the control panel plus there battery voltmeter, the fridge re-igniter, and the heater fan.

6. **20A Step**
   This protects the step when it is operated when the engine is not running. The step is always powered by the vehicle battery, not the leisure battery.

# Detailed Description

## The schematic

The diagram details the SPDU, its internal connections, and how it interface to the motorhome circuitry. As can be seen, it is mostly wires.

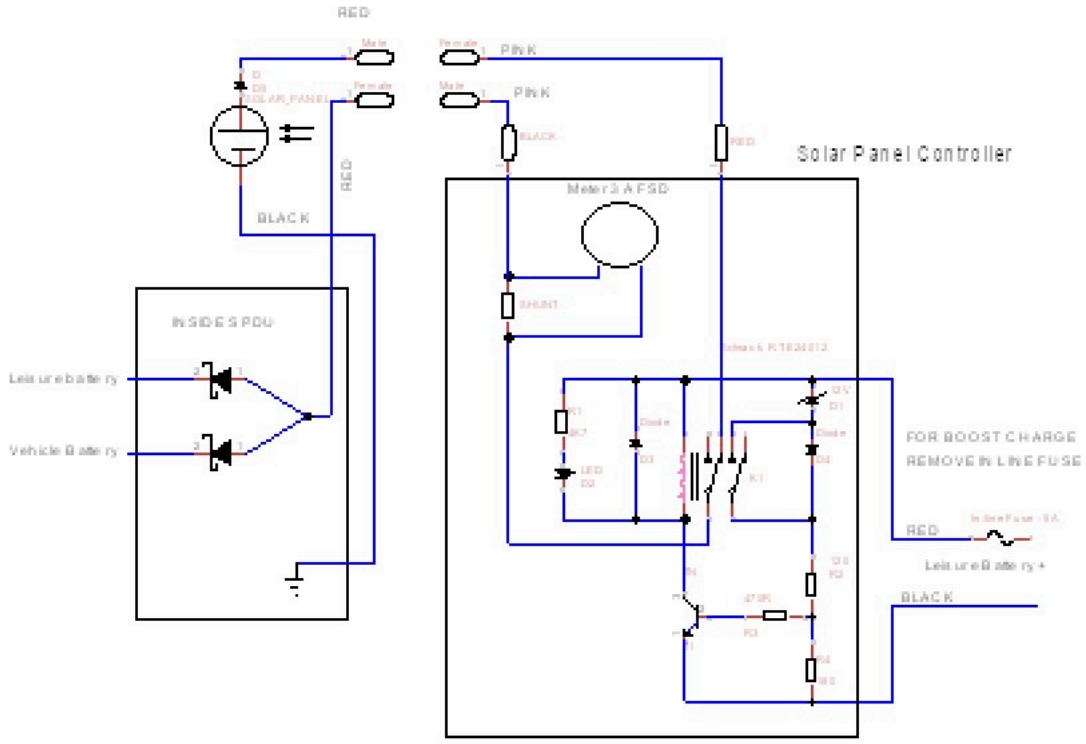
TS1 and TS2 refer to terminal strips inside the box

For example, the Awning light comes in through a Slate/Orange connector into the motorhomes original 12 way connector. It Feeds through the connector to a Green wire which connects up to TS1-8 inside the SPDU. The other side of TS1-8 is connected via a Grey wire which goes through a square 4 way connector to the awning light switch in the control unit.
When the power switch is “on” awning switch will get 12V power via a black wire which feeds through the 4 way connector to TS1-3, where it picks up the power through F5

## The solar panel.

The panel gives out around 1.7A in bright sunlight. This is fed through the charge controller to two Schottky diodes. The diodes are rated at 40V and 30A. The diodes have only a 0.3V forward voltage, so at 1.7A dissipation is only 0.5W.

One diode feeds current to the leisure battery and the other to the vehicle battery. The bulk of the current will always go to the battery with the lowest voltage.




## The solar panel controller

The sun shines and the battery voltage rises to 13.8V, then the relay operates which switches the solar panel OUT.
The battery voltage will fall, very slowly, due to the current taken by the relay.
The voltage gradually drops to around 13.1V and the relay drops out (minimising drain on the

battery) and the solar panel switches IN. The load on the battery at this point is around 5mA down through the Zener diode.The LED is simply to tell if it is working or not.
The voltage will always fall to 13.1 (or below at night time) as the o/c voltage of a flooded lead acid battery is around 12.7V.
When the panel switches in again, the leisure battery voltage can only rise as fast as the vehicle battery. So the lowest voltage battery will charge first then they will charge together until the voltage reaches 13.8V. This is where we came in.
During the winter, there is little charge from the solar panel, but by simply removing the fuse, the controller is disabled, and all of the current from the solar panel will feed into the batteries utilising those days when we do get a bit of sunlight. The voltage now may get above 13.8V.

## Solar Power

This deserves a special mention.

Solar panels are supply a ***current*** proportional to the sunlight falling on it. The voltage depends on the load, but there is a maximum voltage. For most motorhome panels it is 20V.

The original solar panel fitted was a 10W device which means in bright sunlight it can produce 10 Watts at 20 Volts. Watts/Volts = Amps so that is 0.5 Amps. It is still be 0.5 Amps if the voltage is limited to a normal 12V battery voltage.

Now a device called a Buck/Boost converter and take the 20V and 0.5A and convert that to 14V 0.7A (still 20 Watts). I was originally going to fit one inside the SPDU, but when I bought about the increase in complexity and the inevitable decrease in reliability I decided against it. Instead I simply fitted a bigger solar panel which is a 40W device is I can get 2 Amps in bright sunlight.

In practice, it is less as the panel is mounted horizontally under the skylight. I have seen 1.7Amps from it.

There is not much data on 40W panels, but a google search shows that a 100W panel van gives around 300-500 Wh per day in summer.

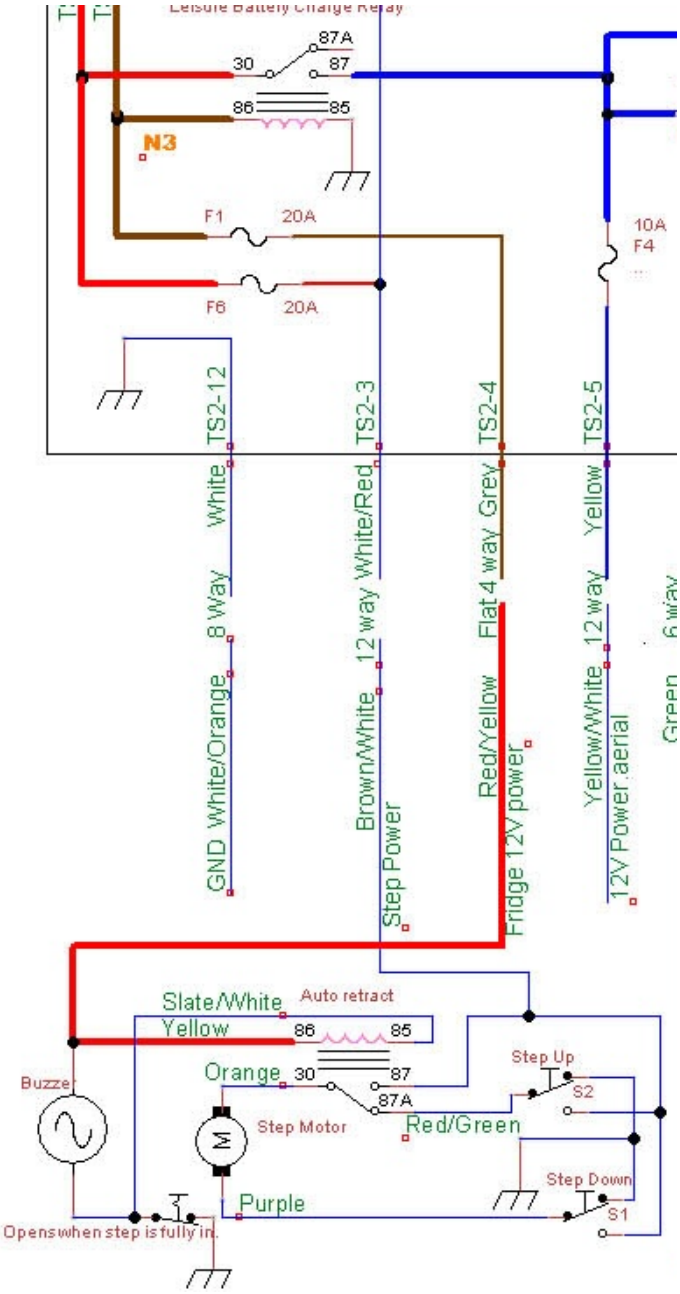
My 40W panel is maxing out at around 1.7A or around 20W at 13V so it should give around 7Ah per day. If we are not living in the van and using some of this power up, the batteries will get overcharged. So a charge controller is a necessity.

In the winter is power typically around 10% of that in the summer, so the output is down to 0.7Ah per day. The main drain is the remote locking circuitry and radio memory which together take around 50mA continuously, or 1.2Ah per day.

Now the battery is 100Ah and losing 0.5Ah per day. It could lose 15Ah or 15% of its capacity over December and January when the van is left unattended. But in February, solar power doubles so the battery now gets 1.4Ah per day so it will gradually charge.

In practice it would probably be a good idea to disconnect the battery over January and December - or at least run the engine for a little while - maybe while winterising the van for freezing temperatures.

# Omni Step operation




**Operation via the switch**

Power for the step comes from the vehicle battery via 20A fuse F6.

The stepper switch can send current through the motor in either direction, but always through the auto retract relay.

When operating, the motor will run until it stalls. The current at this point is quite high so the button should not be kept pushed after the step has operated.

**Auto retract**

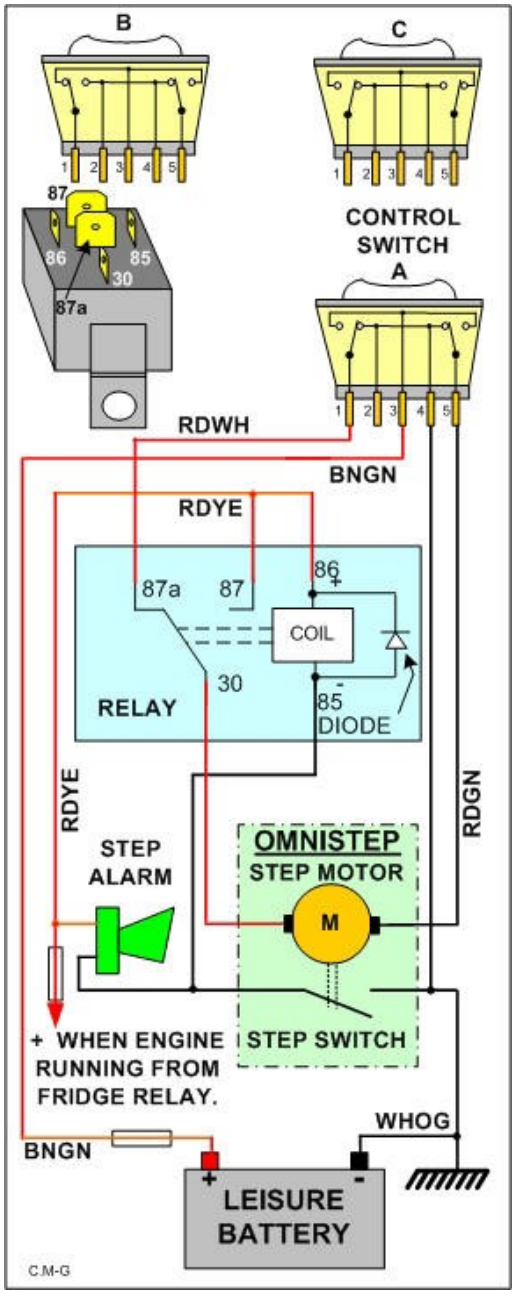
When the engine starts, the vehicle relays apply power to the auto retract relay via 20A fuse F1 (and also to the buzzer and the fridge).

The auto retract relay's other end is connected to 0V via the "Fully in" switch.

This time the motor can only pull the step up. It raises the step until the fully in switch disconnects the auto retract relay, and the buzzer..

# Appendix

## The Omnistep (from an on line article)




The control switch is a DOUBLE CHANGE OVER SWITCH. (Not a double pole change over as this is subtly different) This switch contains two change over switches, one switch changes over when the rocker is operated in one direction and the other switch changes over when the rocker is operated in the other direction. So it carries out a few more functions than just a simple ON/OFF switch.

The Omnistep has a permanent magnet motor. This means that if you reverse the polarity the motor will run in the opposite direction. The switch is designed to do this. The motor rotates in one direction to extend and the other direction to retract.

Nominally 5 amps is the expected working current for the motor. If however you keep your finger on the switch after the step has fully extended or retracted then the motor will stall. Under this condition the current will increase to a significantly higher figure. Sometimes referred to as the "blocking current".

The Omnistep has two electrical components, the motor which moves the step and a switch that is OPEN only when the step is fully retracted. At all other times the switch will be closed.

Firstly the system is designed to retract the step and sound the alarm should you start your engine with the step extended.

Under this condition the control switch is as shown in switch picture A. Battery negative is connected to terminal 4 of the switch and comes back out of the switch at terminal 5. It is connected to the right hand end of the motor with a RDGN wire.

When the engine is running the FRIDGE relay is energised from the vehicle alternator D+ terminal. The fridge relay applies 12 volts to both the fridge and also the step relay terminal 86 (coil+) and one side of the alarm.

If the step is extended then the step switch will be closed. This will provide a negative supply to the alarm causing it to sound, and also the other end of the relay coil (85) causing it to energise.. Now that the relay is energised the fridge supply which is also connected to the relay terminal 87 is routed by the closed contacts to relay terminal 30 and provides a positive supply to the Omnistep motor. The motor will rotate causing the step to retract. When fully retracted the step switch will open, the relay will release, the alarm will go silent.

With the engine turned OFF the rocker switch can be depressed causing the step to extend.

Under this condition the control switch is as shown in switch picture C. Battery negative is connected to terminal 4 of the switch and comes back out of the switch at terminal 1. It is connected to the relay terminal 87a (normally closed contact) and comes out of the relay at terminal 30. From here it is routed to the left hand end of the motor.

A positive supply from the leisure battery enters the switch at terminal 3 via a BNGN wire. This positive supply leaves the switch at terminal 5 which is routed via a RDGN wire to the right hand end of the motor causing the step to extend. When the step has extended you must leave go of the switch or the current will increase to 14 amps!

With the engine turned OFF the rocker switch can be depressed causing the step to retract.

Under this condition the control switch is as shown in switch picture B. Battery negative is connected to terminal 4 of the switch and comes back out of the switch at terminal 5. It is routed to the right hand end of the motor.

A positive supply from the leisure battery enters the switch at terminal 3 via a BNGN wire. This positive supply leaves the switch at terminal 1. It is connected to the relay terminal 87a (normally closed contact) and comes out of the relay at terminal 30. From here it is routed to the left hand end of the motor causing the step to retract. When the step has retracted you must leave go of the switch or the current will increase to about 14 amps!

# WEB PAGES

## Web pages about our van HK07 HZV

This is a copy of web pages that I put on-line as I was working on our Motorhome, which we usually call “The Van”

The webpages were evolving and some of the later pages, while not actually contradicting the earlier ones, may take a different view.

I really hope that this may be of some use to any subsequent owners of the van.

## Contents

# Introduction

We bought our motorhome in 2013. It is a 2007 Autosleeper Nuevo.

We knew little about motorhomes although I had had two Mazda Bongos before. A really nice one, written off by a guy jumping the lights, and a pretty awful one which was all I could afford after the derisory payment from the insurance company. I traded it in against the Nuevo.

There are only three of us, and one is a dog. The motorhome, hereafter referred to as "the van", will theoretically sleep 4 humans. The extra two would really have to be children to fit into the Luton area above the cab and not mind sleeping together. We find that area invaluable for stowing our instruments (Guitars mandolins, banjos, ukuleles and others) and folding chairs and all sorts of light weight bulky stuff.

Although six years old the van had only 10,500 miles on the clock when we got it, this is not unusual for motorhomes. They tend to be based on commercial vehicles which are designed for much higher mileages.

A few weeks after we got the Van we got it under sealed. This was 9 years ago (at the time of writing) and I had forgotten about it until the mechanic at our garage remarked that our van was the best condition, and the highest mileage of all the motorhomes he services. As I remember the cost was around £900, but well spent I think.

After six years we had added about 80,000 miles to the clock and spent hundreds of nights in the van, from the depths of winter to the elevated temperature of recent summers. Activity was curtailed over the Covid years.

We almost never use campsites, we stay in remote locations, lay-bys, public car parks (when allowed), pub car parks and sometimes in residential roads.

When we got the van we were delighted with it (we still are BTW) but found that the weak point was the habitation electrics. Now I am a retired electronic engineer so I saw this as a challenge, so much of the content here is about modifications to the electrical system in the van.

But some of the content is simply sharing the way we manage our particular way of van life. Much of this information was written a few years ago, and some has been updated of late.

I am a member of quite a few online motorhome forums, (but I do not post much). It seems that many motorhomes cannot conceive of operating without at least 2 110 AH leisure batteries and a roof full of solar panels and a 2Kw inverter. I guess this is to power the satellite TV, microwave oven, hair dryer, electric kettles and toaster.

We prefer the simple, though comfortable, life. We don't tend to watch TV in the van (although we can watch it on a laptop if we have a wi-fi connection or a fast 4G connection.

We are not full time motorhome dwellers. The most we have spent continually in the van is about eight weeks - non of it on a campsite or with a hook up.

The van is not pristine. The roof gets cleaned every two years or so and it's a hard job. The outside is not too clean, and shows quite a few scrapes from walls and hedges. But it gets regularly serviced by a wonderful local garage.

We love it.

# Part 1 - Power Use Management -

*This article was first published on 16/12/2013. It was the beginning of a series of articles about my experiences with the electrical system and the leisure battery in our Motorhome.*

The Nuevo comes as original with a 70AH battery and is obviously designed to be operated on regular electrical hookups with a day, or maybe two days wild camping. But that's not what we do. We seldom use campsites and we can spend days or weeks without a mains connection.
This is an account of how we have found ways to manage it.

For much of the investigation was a digital multimeter on the 10A setting inserted in the negative battery lead. This however is not a good way to measure the charging current.

Basically we needed to balance the charge going into the battery with the charge coming out. Taking a measurement using the inline meter indicated that the charging current when the engine is only 4 amps! But the insertion of the meter drastically affects the charging current. According to the meter itself, the lead-to lead resistance is 0.25 ohms. At 4A that means I am losing 1V across the meter. A difference in charging voltage of 1V drastically affects the charging current.
There is a 50A fuse in series with the battery. According to the fuse specifications the resistance of the fuse is 0.0011ohms. I used the battery for a few hours to discharge it a little, then started the engine and measured the voltage across the fuse. I measured 18mV, so charging current is around 16A.

I decided on a target to aim for of 8AH or less drawn from the battery in a normal day. Note that this is irrespective of the size of the leisure battery.

## Steady drain

0.12 amps is continually drawn from the battery to power the control panel. 0.08 amps is added by the fridge re-igniter. This may not seem much but it's on 24 hr and adds up to 4 .8 AH per day.

The battery is probably specified at 50% discharge which is 35AH. Leave the van for 7 days and I am running the battery past its specified operating range. Now when I leave the van for a few days I usually turn the fridge off. But the drain due to the panel, and any chargers which are still connected is still an issue over a few days, and a disaster over a few weeks.
The modern solution to leaving the van for days or weeks seems to be an £X00 solar panel installation. I decided on the old cheap solution of a £6 battery isolator switch. Fitted in a few minutes.

## Lighting

I replaced the 10W halogen spots with 1.6W LED spots, and the double tube 8W fluorescents with led strips taking 4.8W per fitment.
The spots are about the same brightness as the halogens, but the LEDS are much brighter than the tubes.

In the dark days of autumn and winter we find that we have a couple of spots on for around 6 hours supplemented by the overheads for about an hour That's about 2AH.

## Ancillaries

The water pump, and the loo pump take around 2 amps but as they only run for maybe 2 minutes a day the consumption is negligible. The same goes for the fridge light and the loo lights (converted to LEDs taking 0.2 amps each)
The heater fan is more problematic. It takes about 1 amp, so we only use it for 10 mins at a time to heat up the shower room.

## Technology

My old Nokia phone has a 800mAH battery. That translates to about 0.4AH from the 12V supply. But it only loses about 30% a day so that's 0.12AH
I have a Nexus 7 with a 16Wh battery. That will take about 1.5AH from the 12V to charge it up. It loses about 50% a day so that 0.75AH.
My partners iPhone is about 5Wh. it loses about 50% over a day so thats 2.5Wh or 0.2AH

BUT
The laptop has a 5.2AH battery and it will take about 5.2AH from the 12V to recharge it. This is a lot.
But the laptop car charger is a powerful beast and recharges the lap top at about 1% per minute. So we connect it to the vehicle cigar lighter socket and it keeps charged with no drain on the leisure battery. So we can watch TV or a recorded program for a few hours at night with no drain on the leisure battery.

The iPad has a 42WH battery – thats 3.5AH from the 12V. The charger is not as fast as the PC charger and it charges at about 20% per hour. But it seldom drops below 70% charge so once again it seldom if ever "sees" the leisure battery.

We also have a mifi unit running continuously I don't know how much power it takes as it seems to take it in very infrequent short bursts – but I don't think it's much.

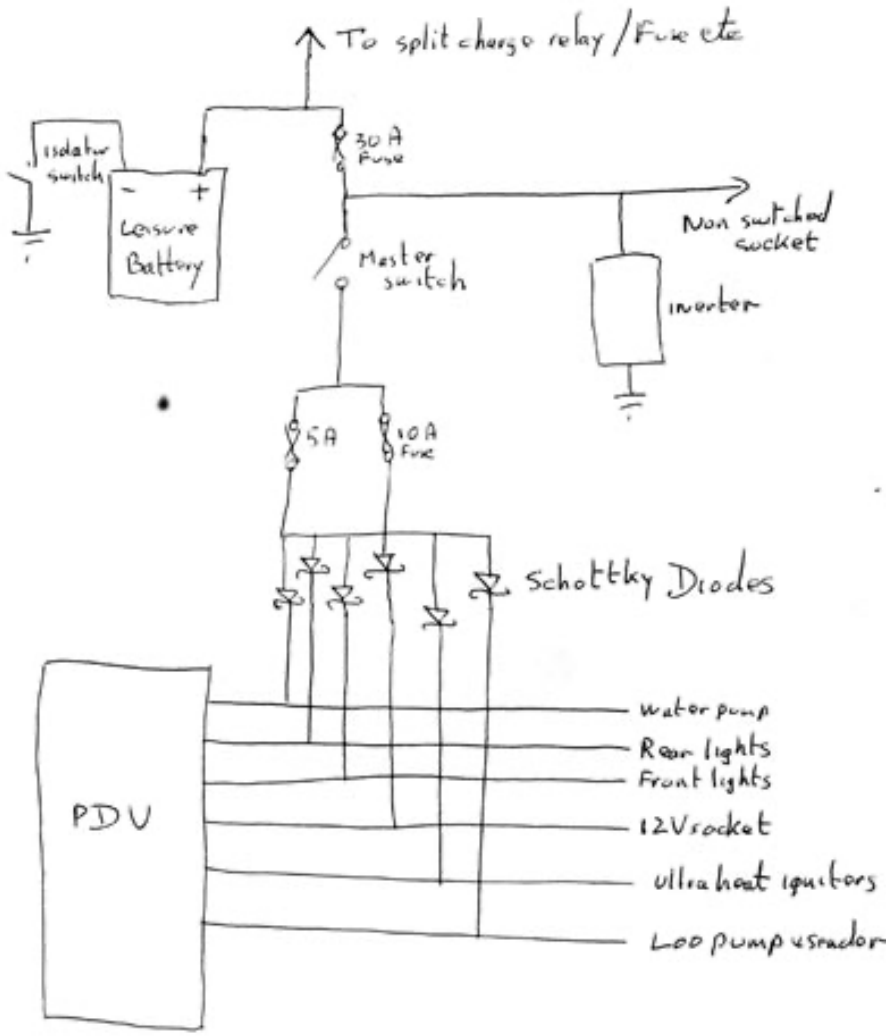
## PDU


When in "normal" operation, i.e. providing the capability to be able to switch on lights and get water from the tap, the PDU takes 0.75 amps.
Now most folk will leave it switched on overnight, so as not to have to stumble in the dark to the badly positioned control panel to put the lights and the water on. Most folk will, in all probability leave it switched on all the time they are in the van. Let's say a conservative 16 hours a day – that's 12AH.
Now this can be reduced but it is a major inconvenience to have to remember to switch off the lighting circuits and the water circuits when not using them. And the penalty for forgetting could be a flat and possibly damaged leisure battery, not to mention the impact on the trip.

Now the PDU has some handy functions. It can measure the inside and outside temperature, the vehicle and habitation battery voltage and give an indication of the fresh water tank level and an

alarm about the waste water level. So I did not want to ditch it. (I later found out that all of these measurements either did not work or were highly inaccurate)

**Solution:-** I installed a self designed and built PDU bypass circuit.




This “master switch” enables the lights to be operated, the water to be run, the loo to flush, the heaters to start, the heater fan to run, the gas cooker to light, and the 12V power to be available when the PDU is “off”. Spin offs are that we can operate the lights when travelling, (very unusual but its handy occasionally) and we can leave some minimal lighting switched on at night and switch off at the master switch, which is just beside the bed. So if we need to get up, one switch will provide power to a habitation area light, the loo light, the water and the loo pump.

## So how am I doing?

When we are touring in the van, PDU and igniters take 3.8AH per day. The lights etc take 2AH and the phones etc take 1AH so we are looking at around 7AH per day. .
Or 49AH per week. If I use the isolator when the van is parked for a half day it will be less. I need to drive for around 3 hours a week to keep that charge or maybe 90 miles. If I don't manage it I need a hookup or a top up, but probably only once a fortnight or more. I think that in practice I won't need a hook up at all.

As standard the Nuevo would need a hook up every second or third day.
It's working fine so far. It's December so the lighting and the heater fan are at around the maximum usage. When we go on a long trip, the battery will in all probability not run down, and it will almost certainly get topped up on the longer trip back. Then I operate the isolator switch and it will be still charged when we set off on the next adventure.

Total expenditure has been under £50.

## Addendums

### Solar Panels

A number of people have asked me why I did not want to go the solar panel route. Here are the main reasons (not in any particular order):-

- Expense
- Complication (charge control circuit and wiring it in)
- Installation (holes in roof)
- Reliability issues (more to go wrong)
- Maintenance (cleaning of the bird poop and other muck)
- Efficiency – I use the van all year round – Not a lot of sun in winter and none under an inch or more of snow or even a few leaves)
- Weight – most folk seem to have a huge battery bank as well as the solar panels. I guess this is to cover the periods when the sun don't shine
- Elegance!! I'm an engineer – throwing technology at what should be a simple problem just goes against the grain.

### General Usage

A few have also suggested that I am "roughing it" in some way. I use the lights, heating, and watch TV (on a laptop) the same as anyone else. My use of the van when wild camping is the same as anyone else's.

### Heating

A few features of the van help with this. It's fairly small, well insulated, with blinds on all windows and, importantly, the skylights, so it is easily heated. The gas heater (a Trumatic) does not need battery power to make the van cosy. It doesn't even need the 12V to start – it has its own battery. The fridge is gas and we cook with gas.

We have a 6Kg and a 13Kg gas bottle. The 6Kg lasted us two weeks in late November and early December. I would expect a month of the 13Kg one in winter – not bad for £26.

## The Battery

I don't know the history of the battery. It was in the van when I bought it. I inadvertently discharged it once to 7.4V which was what prompted this project.
It is rated at 70AH.
Now a split charge relay will generally only charge a leisure battery up to about 85%. So it's 60AH really.
A leisure battery can be discharged to 20%, but it will last far longer if it doesn't fall below 50%.so there is only 25-45AH to spare. With my normal usage I could "park up" for 3-6 days if the battery was in tip top condition (maybe it ain't!). I will probably replace it with a bigger one in the spring when I start attending festivals.
However since the mods we have lived in the van continually for 9 days (so far and with usual incidental short trips) and the battery voltage seems fine.

If the battery should get low, I did some rough measurements to show that it costs about 70p per hour to run the engine on tick over. I haven't had to resort to this though since I installed the PDU bypass system. I get about 18A from the alternator so around 45 mins running will give me three days supply.

## Conclusions

If you always use EHU then this article is probably not a lot of use to you – although you may find the battery isolator switch very handy.
If you have a large motorhome with multiple rooms that need blown air for heating, this article will be of limited use.
If you have a small motorhome, and indulge in off site camping then some of the ideas here may be relevant to you.

Whatever – have fun.

## The alternative approach 3/10/2022

*This is from a post in the wild camping website.*

*I thought I would update the performance of my new Roamer 460ah lithium battery. We have been out in the van since 20th August, returning home on the 22nd September, and we have used the electric kettle about 6 times per day, electric toaster most days, air frier every day, microwave every day, Lorraine has used her 2600 Watt hair drier every other day plus a halogen hob ring quite a few times as well as charging phones, laptops and my drone batteries every day, we have had electric hook up a couple of times, but I have never had to switch the on board charger on, also we have travelled for about 15 hours in total, and I do have 525W solar panels, so with all that the battery has had thrown at it the unit has never dropped below 80% and the smart BMS has now began to condition the cells and the unit is sitting at 495ah when 100% full. I am over the moon with the battery, it was not cheap but I would never go back to lead acid again.*

Each to his own.

# Part 2 - The Leisure Battery

*This article was first published on 14/1/2014. The second in a series of articles about my experiences with the electrical system and the leisure battery in my Motorhome.*

———————-

I'm updating this as I dig out more data. To tell the truth I'm getting a bit fed up with the lack of data sheets and the standard of the data sheets that the manufacturers put out. My theory is the rise in the popularity of solar panels means that users can actually make do with any old battery and the suppliers will sell "any old battery" as a leisure battery at inflated prices.

In part one I explained how when we are engaged in general touring we do not need to use Electrical Hook Ups (EHUs) to keep our 70AH leisure battery charged up with no reduction in out normal power usage.

However this is not the only way the motorhome will be used. Sometimes we go to folk festivals. Now if the festival is only a weekend, or three days, then it is not a problem – as calculated we use about 7AH per day. We are unlikely to need to charge phones, tablets and laptops over the weekend so the battery should manage the 21AH quite happily (provided it's in good condition).

BUT some festivals are longer – a week or even a fortnight. How are we gonna manage?

## Data collecting again

The PDU and the fridge igniter between them are taking 0.2A (this in itself is strange as I measured 0.17A last time). This is a fixed drain on the battery. If I switch the fridge off completely it drops to 0.12A which indicates that the fridge igniter and the LED take 0.08A and the PDU, which I can't turn off takes, 0.12A.
Over a week this is a severe drain – it is 13AH for the fridge igniter and 20AH for the PDU.

Now festivals tend to be in summer, so I would not envisage turning the lights on till about 8pm. We enjoy ourselves at these events and will be out at least 5 nights. We go to bed around 1am, so lights are on maybe 5 hours per night for two nights and 1 hour for five nights. That's 15 hours. But we may be sat outside with the awning light on for a couple of nights. So here is the calculation on the rough estimate.

| | No | Current | Hrs | Days | AH |
|---|---|---|---|---|---|
| Roof Lights | 2 | 0.4 | 2 | 2 | 3.2 |
| | 2 | 0.4 | 1 | 5 | 4 |
| Spots | 2 | 0.14 | 5 | 2 | 2.8 |
| | 2 | 0.14 | 1 | 5 | 1.4 |
| Awning | 1 | .4 | 4 | 2 | 3.2 |
| Total | | | | | 14.6 |

As I said before we enjoy ourselves at these events and are not likely to sit around playing on tablets or PCs or watching TV, BUT they will be used modestly. Assuming they are fully charged when we set out, most will just need a single charge (probably in the form of a few top ups). Here is the calculation.

| | Charges Per Week | AH |
|---|---|---|
| Nexus 7 | 1 | 1.5 |
| iPad | 1 | 3.6 |
| Nokia 6300 | 1 | 0.4 |
| iPhone | 1 | 0.6 |
| PC | 2 | 8 |
| Total | | 14.1 |

- Fridge Igniter 13AH
- Control Panel 20AH
- Lights 15AH
- Technology 14AH
- TOTAL 62AH

The 70AH battery ain't gonna make it.
If I use the BANNER calculation I need 62AH x 1.7(safety margin) or a 105AH Battery
BUT, that Control Panel is really taking the biggest single share and I don't need it. I'll add a switch to switch it off when I'm not using it (I can't use the isolator as it will also switch off the fridge re-igniter) and I reduce the power used to 42AH.A 70AH .battery could do it


But I'm not sure of the history of my battery – I let it drop to 7.4V once, only for a few hours, but it may still be degraded. And, realistically there is not enough safety margin there to stop me worrying.

It says POWER MAX but it is not listed on the Power Max website. It came with the van and is quite widely available in the UK, The batteries on the Powermax website do not have labels like this and the suppliers do not provide a data sheet. Is it really a PowerMax battery?

Basically, it's working fine for the modest uses I'm putting it to, but the discussion about choice of battery below explains why I don't trust it.

I have ascertained that, if I have a good battery, I still don't need solar panels even if I am parked up for a week.

## Sanity Check

Going for a week or more on a single battery and no solar panels seems to be against most of the advice in forums and magazines. And these are written by experienced motorhome owners. Why the discrepancy?

**Higher usage?**

Some (most even?) of these folk will have bigger vans than we have with multiple rooms and thus more lighting and heating. Most will not have switched to LED lighting. Many using inverters, (which are not very efficient) to power TVs, PVRs, and even hair driers and microwaves. Some have heating systems that depend on an electric fan. Some spend all night in the van watching TV. Some have offspring who use the computer all day long.

My van lifestyle uses much less electric power than that. I have only one room (plus a loo and shower). I only use LED lighting. I rarely use the inverter, and have no real interest in watching TV when we are away, other than the odd news program.

**Leisure Battery Issues**

It is not uncommon for motorhome users to fit two 110AH batteries and a roof-full of solar panels and be happy that they can manage a week end away in summer. Their batteries may be heavily sulphated and only providing only a fraction of their original capacity but the owners never know and it doesn't really matter to them.

The batteries may not even be "proper" leisure batteries. A test by the caravan club showed that only 2 out of 9 batteries tested were actually leisure batteries and the remainder were starter batteries with leisure battery labels.

It is so easy in a modern motorhome to completely flatten a battery and thus drastically reduce its performance. Continuous drain can be as high as an amp and this will flatten a battery in a few days.

Solar panels are of little help in the winter. There is not much sun but lots of dead leaves, and possibly snow to reduce or even stop the solar panels output.

In fact a van left for a few weeks in late autumn or early spring may have its batteries virtually flattened every night and charged up partially the next day. Start the van and the battery will quickly charge up fully and all looks OK.

The severely weakened batteries will soldier on and still provide enough power in the summer to last overnight until the solar panels start generating power, so the user will be unaware his batteries are severely degraded. They are still good enough for his needs

My battery will get well used but not stressed. I'll stand by my calculations.

## Choosing a leisure battery

**Rating**

Batteries have different capacities at different drain currents. They are usually rated at a 5Hr, 10 hr, 20hr and 100hr. In my case average current drawn is about 2A with just the lights – It is much higher if I was charging everything at once, but why would I? The PC will take about 5A, but only for 90 minutes or so. The rest of the electronics will take under 2A total. With a 110AH battery the 20hr rating is 5.5A. the 100hr rating is 1.1A. I'll be closer to the 100hr rating but I'll use the 20hr rate to give me a safety margin.

The leisure battery market is a minefield. A recent Caravan club investigation showed that many (probably the vast majority of) batteries sold as leisure batteries are in fact starter batteries. There is a difference. A leisure battery will not happily provide the huge surge of current that the started need particularly when it is cold. A starter battery will not be happy discharging below around 70% and will begin to irreversibly degrade if it does. Think about it – it starts the car with a huge current – maybe 800+ Amps for around 5 seconds. That's about 1AH, from, maybe, an 100AH battery. Then the alternator pumps power back into the battery at around 20 amps or more. It charged up again in a minute or so. Leave your side lights on for a day and you will take around 24W or 2 Amps over say 10 hours – that's 20AH. You have only discharged the battery to 75% so it should be fine, but it's still only rated at around 40 cycles or thereabouts so don't make a habit of it.

The leisure battery does not need to supply huge surges in current, But it does need to supply current over a long time. A 100AH leisure battery should be able to supply around 50AH before a charge, and do it 400+ times.

My van is quite heavily used. We have spent over half our time in it in the last 5 months.But the battery now (since doing the mods listed in part 1) has an easy time. Its average discharge before recharge is only around 10%, but that could be 100+ times a year. In addition it will get around 20% discharge a dozen or so times and 40% maybe three times a year. Now I want my battery to last at least five years. So thats 500 cycles by 10%, 60 cycles at 20% and 15 cycles at 40%. A starter battery might manage that, any real leisure battery should laugh it off, and a good one may last twice as long.

What I would really like are data sheets (I am an engineer – I trust data sheets, not salesmen) but a fairly long search on the web has thrown up very little in the form of hard data. The Caravan club test showed that Varta, and Banner batteries were real leisure batteries. Exide also may be OK but the CC could not fine a battery to test. I have also found that Bosch make batteries with defined cycle count and DOD (Depth of Discharge) values. Also Trojans batteries are all real deep cycle, as thats all they make.

**Varta**

AGM – The LAD115 looks like the best. it's rated to 800 cycles at 50% DOD but it's £230. How long would it take me to ramp up 800 cycles? My battery is only going to get discharged by 50% a few times a year!

Flooded – The LDF90 is rated at "up to twice the cyclic stability of conventional flooded batteries" - up to 200 cycles @ 50% DOD its £80. I hate the phrase "up to". Does this mean it may only be 100, or 50, but it definitely won't be more than 200. It's a weasel expression and does not inspire confidence. It's a Dual purpose battery – I don't think they make any real leisure batteries now other than the expensive AGM ones

The 813010 looks like a real leisure battery but it's not on Varta's own site – probably old stock.

**Banner**

The 120AH Energy Bull 959 01 looks good but I can't find any specifications about number of cycles (except 3x a starter battery but they don't say what a starter battery is!) The Varta spec would imply 100 cycles, but it's a different supplier). It would cost around £142 from the web inc delivery. Banner do have a really good reputation though

**Bosch**

The Bosch L4 018 (110AH) and L4 020 (125AH) look good "Exceptionally high cycle stability – 300 to 400 charge and

The 018 is £106 with free delivery

I can't find a supplier for the 020

Many suppliers advertise the Bosch 679 (strangely they all seem to use a photo of the L4 018!) but its not on the Bosch website and there are no data sheets – so what is it? It's a slightly different size to the L4. Is it a rebadged starter battery?

I suspect that Bosch (owned by Johnsons who also own Varta) are selling the rights to use the names to other manufacturers. So are suppliers selling Bosch Batteries or just Bosch Labels?

**Trojan**

These batteries look like the real deal but they are expensive. The27TMX (105AH and about £130) and the27TMH (115H at £158) both look good

**Exide**

ER 550 looks OK but their data sheet is silly. It implies 250 cycles at 50% reducing at lower discharge rates. Do I want to get a battery from a company who prints this rubbish.

## Conclusion

**Varta** seem to be all expensive AGM batteries now – and they have dodgy specs

**Bosch** seem to be getting their batteries elsewhere.

**Exide** have silly specs

**Banner and Trojan** both still seem to be making flooded deep cycle batteries.
It comes down to the Banner 120AH Energy Bull 959 01 the 105AH Trojan 27MTX or the 115AH Trojan 27MTH
Any of the batteries should last well if cycled down by only 50% but could do the occasional 80%.

A week at a festival should be no problem with any of these batteries and they could probably to a fortnight at a pinch. If I really get pushed (I doubt I ever would) then half an hour with the engine running will put about an extra 3 days of power back into it. That should cost me about 35p, and if I pick my time right it should not upset the neighbours too much.

I didn't want the battery delivered, I wanted to pick it up. Web suppliers of Trojan batteries ignored my emails, and local suppliers wanted £190 for the 27MTX.


SO I bought the Banner 120AH Energy Bull 95901 from APD in Cirencester for £110.46. A good price in my opinion and extremely fast service – they didn't have it in but it arrived next day. It's fitted now – no issues. There is not a vent hose – I need to get that sorted and also arrange something to keep it secure in the battery box.

I also need to change the electrics a bit more

# Part 3 - More power technicalities

*This article was first published on 11/02/2014. It was the third of a series of articles about my experiences with the electrical system and the leisure battery in my Motorhome.*

*This is hopefully the final part of the saga. ( Update - it wasn't)*

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I now have the Banner battery installed and I hope to keep it for a long time. In Part 1 I described how I have added some electrics to bypass the power distribution unit thus saving lots of wasted power. In Part 2 I described what I had to do to be able to last a week on the battery and without an EHU.

Following a few trials, I have had to make a couple of small modifications to the bypass circuit described in part 1

## The Water Pump

The original PDU system works as follows – you switch the system on – the water switch is off by default – so you switch it on. The pump runs for a second or two to pressurize the system then it switches off. Turn on a tap, the water flow under pressure, the pressure is released so the pump starts again. If you have the tap switched half on, then the pump keeps stopping and starting. BUT here is the issue:-

Sometimes, the feed line from the fresh water tank to the pump will not have water in it. In normal operation his could be caused by a small leak in a joint or the pump letting air in and thus letting the water drain back to the tank. Or maybe the vibration and the water sloshing about when travelling on a "low" tank may let air into the feed pipe. It *always* happens, of course, when the tank is empty. The pump cannot build up pressure by pumping air – it has to have a liquid.

My original system did not have a switch for the water so with an empty tank, or with air in the pump, it would run continuously when the power was on. So I have added a switch in the water pump circuit.

## The awning light

There is no separate awning light switch in the van as standard. It can only be switched on by the controller unit. As described in Part 1, the controller unit is inefficient. I would need a minimum of three relays taking 0.14A each in order to switch on the awning light which is a 15W bulb. Thats 1.67 Amps. Now I envisage sitting under the awning with friends for an estimated 8 hours a week – thats a whopping 13.6AH from the battery.

So after finding the relay that switches on the awning light, (not as easy as it sounds – the circuit diagram is wrong at this point and there is an extra relay fitted externally to the PDU) I added another wire, a Schottky diode and a switch. This eliminated the need for the three relays. I then replaced the bulb in the awning light with 12 leds on led strip. Now I did not get this right first time.

For some reason the wires feeding the awning light were *black for positive and red for negative!!* Beats me.

I had originally intended to put double the number of leds, but with only the 12 it looks brighter than the original bulb.

When I switch on the awning light it's much brighter than the original and the current is only 0.2A. So my eight hours under the awning will now only consume 1.6AH instead of 13.6.


**Control Switches.**
P=Power
W=Water
A=Awning

I mentioned in Part 2 that I would probably put a switch in the control unit to switch it off when not needed. I have done that, (it's the switch on the right) and it works. Now when I leave the van with the my power switch off and the fridge on gas, weekly drain on the battery is only around 13AH, due to the fridge re-igniter, as opposed to 33AH with the control unit on.

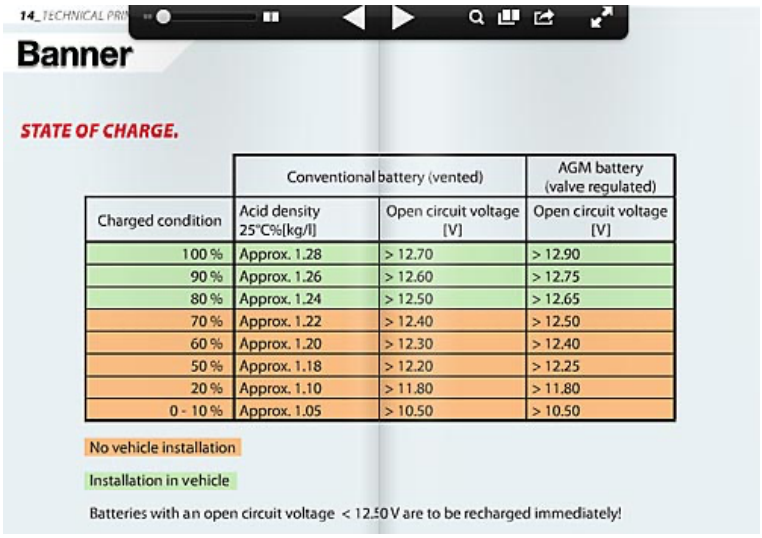
*Figure 1: The standard control panel above the door*

## An extra roof light

The van is generally very bright inside with the lights on, but the cab area is unlit. There is the usual cab light in the middle but, annoyingly, this switches off after the ignition has been off for a few minutes. So finding stuff in the front glove compartments or the many cubby holes involved a torch! Primitive. So I have added some extra LEDs in the front area. I simply connected them in parallel with the front driver side spotlight so they switch on with this spot. Current is 0.3A. It looks really nice when on too, illuminating the curtain in the front.

## Finally

Using the figures in Part 2 I should be taking about 40AH (I originally estimated 42AH but the awning light takes less than originally estimated) from the battery in a 7 day period. It's a 120AH battery. It will self discharge around 10% per month or 2.5% per week or 3AH. After a week I will have taken around 43AH or 35% from the battery. Even a fortnight would be just over 70%. That should be fine for me. I can't imagine going for more than a week without moving on. The alternator should charge up the battery completely again in around 3 hours driving.


Banner

STATE OF CHARGE.

| | Conventional battery (vented) | | AGM battery (valve regulated) |
|---|---|---|---|
| Charged condition | Acid density 25°C%[kg/l] | Open circuit voltage [V] | Open circuit voltage [V] |
| 100 % | Approx. 1.28 | > 12.70 | > 12.90 |
| 90 % | Approx. 1.26 | > 12.60 | > 12.75 |
| 80 % | Approx. 1.24 | > 12.50 | > 12.65 |
| 70 % | Approx. 1.22 | > 12.40 | > 12.50 |
| 60 % | Approx. 1.20 | > 12.30 | > 12.40 |
| 50 % | Approx. 1.18 | > 12.20 | > 12.25 |
| 20 % | Approx. 1.10 | > 11.80 | > 11.80 |
| 0 - 10 % | Approx. 1.05 | > 10.50 | > 10.50 |

No vehicle installation

Installation in vehicle

Batteries with an open circuit voltage < 12.50 V are to be recharged immediately!

But, to avoid mishaps I have just ordered a 2 wire 4 digit digital voltmeter which I will install, connected through a push button switch to keep an eye on it. Everything gets switched off at night (apart from the fridge reignited) so in the morning the battery will have stood with minimal load (80mA) for around 8 hours so this table from Banner should give a reasonable idea of the state of the battery.

The effect of all of the modifications listed above has been to drastically reduce the standing current taken from the battery both when parked “in the street” and “on site”. I initially fitted an isolator switch which I don’t really need now, although it is handy for measuring the current taken by lights etc. I simply put an ammeter across the isolator then open it.

If I am parked “in the street” with the fridge switched off then the standing current is about 10mA. With the fridge on “battery” (it works off the vehicle battery and only with the engine running) it takes 20mA. As standard the current drain is around 120mA. So that has reduced consumption from 20AH per week to about 3.5AH per week (I usually have the fridge on gas)

If I am parked “on site” and not in the van then, due to the fridge re-igniter being switched on current drain is about 90mA. It was 200mA so consumption is reduced from 33AH per week to 15AH per week.

I’m quite happy with the mods. In reality I never have to have an EHU whether I am away any length of time.

# Part 4 - Murphy's Law

*This article was published on 8/4/2014. The fourth in a series of articles about my experiences with the electrical system and the leisure battery in my Motorhome.*

*The saga continues*

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SO after all of the calculations and planning, there we were ready to set off for our first festival at Moffat.

We had been happy with our new battery but while I was arranging the van I noticed liquid in the battery box. Yep, it was battery acid. So I removed the battery and used kitchen roll to soak up over half a pint of acid. Fortunately the battery box is water proof. One cell in the battery was only about 1/3 full. I decided against using it.

But we had a festival to go to! The old 70Ah battery was 550 miles away. But I had bought a tiny Alphaline 44AH battery for my old caravan two years ago. When I laid up the caravan I brought the battery into the house, connected it to a 12V power supply (probably originally off an external disc drive) via a digital timer that switched it on for 1 hour each night. How would a two year old unattended 44Ah battery cope?

It was all we had. I installed it and set off on the Thursday afternoon. We parked in a space in the main street and used the battery as usual, although we did tend not to leave lights on unnecessarily . Not dark you understand, but just taking a little care.

I used the switch I had installed to switch off the control unit so that when we retired, current drain was limited to the fridge re-igniter only.

I had foolishly left my tablet (Nexus 7) switched on with the sat nav running, so we arrived with a flat tablet battery. I put it on charge from the habitation battery and left it till it got to about 50%

On Friday morning the voltage was 12.66V. More than I had expected. We continued, keeping an eye on the power and on Saturday morning the voltage was 12.57V, on Sunday 12.48V.

It was a great festival and we decided to stay on Sunday night. On Monday morning I measured 12.38V. I reckon that’s about 65% charged. So we used around 15Ah over Thursday night, Friday, Saturday and Sunday. We had the heater on most of the time we were in the van,

The engine was not started at all during the time and the battery had no charging from Thursday afternoon until we set off home on Monday, but the little 44Ah battery kept us going.

I’ve contacted the company that I got the Banner Battery from and I expect it to be replaced. It's 120Ah and a true deep cycle battery so I can expect 84Ah from it if pushed (as long as it doesn’t leak that is). I don’t think a week or two at a festival will be much of a problem.

Following is the estimate of the power we used.

| | No | Current | Hrs | Days | AH |
|---|---|---|---|---|---|
| Roof lights | 2 | 0.4 | 0.5 | 4 | 1.6 |
| Spots | 2 | 0.14 | 4 | 4 | 4.48 |
| Fridge | 2 | 0.08 | 24 | 4 | 7.68 |
| Nexus 7 | | | | | 0.75 |
| Total | | | | | 14.512 |

I must admit I was pleased (OK, amazed) to see how close the power calculations tied in with the actual experience.

The trip home on Monday was about 90 minutes. I checked the battery on Tuesday morning – 12,9V – so it got fully charged on the way home.

So, what have we learned?

1. The power saving techniques work – there is no way that the tiny battery would have lasted us all of the weekend with the PDU system and the control panel

2. Using a simple digital mains timer and a 12V charger (not a battery charger) will keep a battery in good condition unattended.


3. We used about 15AH over 4 days taking care. With the proper 120AH battery we will have over 80AH to spare – we COULD manage three weeks without a EHU or a charge. But we'd rather not take so much care, act normally, and two weeks are fine.

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# Part 5 - Four years on

*This article was originally published on 7/3/2018. The fifth in a series of articles about my experiences with the electrical system and the leisure battery in my Motorhome.*

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It's around four years since I wrote the last article on the electrics. The mods have worked very well, we have used the van two or three times a month without any problems. But the Banner Leisure battery was starting to struggle. Sometimes we would see the lights flicker as the water pump or the loo flush motor was running. The lights have built in regulators and will dim if the voltage falls below around 12V.

I decided to estimate the capacity of the battery. I charged it up using a CTEK charger on the reconditioning mode.

Then I connected a 55W bulb across it for 4Hrs. So I took 4 x 55/12 AH or 18AH from the battery. I then left it overnight and measured the open circuit voltage next day. It was 12.3V which indicates about 50% charge.

So the 110AH battery was down to around 36AH.
Now I must admit I was a bit surprised and a bit disappointed. The 110AH Banner battery had never had more than about 20-25AH from it so discharge would been closer to its 75% than 50% of its original rating. But it had been used for four years, so has seen quite a number of shallow cycles.


Out of interest I did the same with the original 70AH battery mentioned in Part 1 and the 44AH one mentioned in Part 4.
The 70AH one measured about 40AH but the 44AH also measured about 40AH! Interesting - more later.


A rethink of the charging arrangement was called for.

The CTEK battery charger has a well developed charging cycle. The first phase is a constant current charge at 5A to push the voltage up to 14.4V. This is called in Battery terms, the "BULK CHARGE PHASE" Then it sits at 14.4V as the current gradually reduces. This is the ABSORPTION PHASE. Now this is not some magic in the charger - if you try to put 14.4V across a battery that is not fully charged the initial current will mainly be limited by the resistance of the connectors and cables. Then it gradually reduces until it is taking quite a low current.
In the Van, the alternator takes care of this stage.

Then the CTEK increases the voltage to 15.8V to "normalise" the cells. I.E make sure they are all fully charged and one cell is not stopping the others getting fully charged. In my charging system I "could" do this with a boost converter boosting the alternator voltage. Not sure I want to take it to 15.8 V as it will happen every time I do a long run. Maybe 15V may be OK.

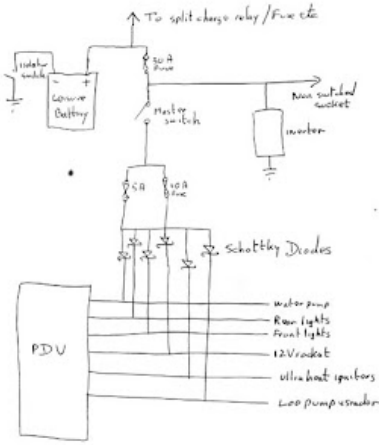
The it puts the battery on a float voltage of 13.6V where it takes very little current. The only way I can do that is with a solar panel  The current required is so small that a small solar panel could manage even if it were very cloudy. I would need to ensure that when left for days or week , the battery was not discharging overnight. I.E. NO steady drains. But when on site, the fridge re-igniter rears its head.

On site, the biggest daily drain is, believe it or not, the fridge re-igniter which takes only 80mA! But it's on 24 hrs so it's almost 2AH per day. The LED lights by comparison are around 1.5AH per day.

I am currently using a 44AH battery and under average use I will use about 4AH per day - lest say 10% of available capacity.
There is a very fast charger built into the van, it is the combination of the engine and alternator. But I really have no idea how long it will take to charge a 90% charged battery back up to 100%. Neither can I find any authoritative posts on the web. It's another data gathering exercise.

But first it was time to carry out a long (four year) overdue job of tidying up the electrics.

# Part 6 - Making a professional job




I had established that the original system using relays to switch everything was inefficient and my original lashed up modification drastically reduced the load on the battery.

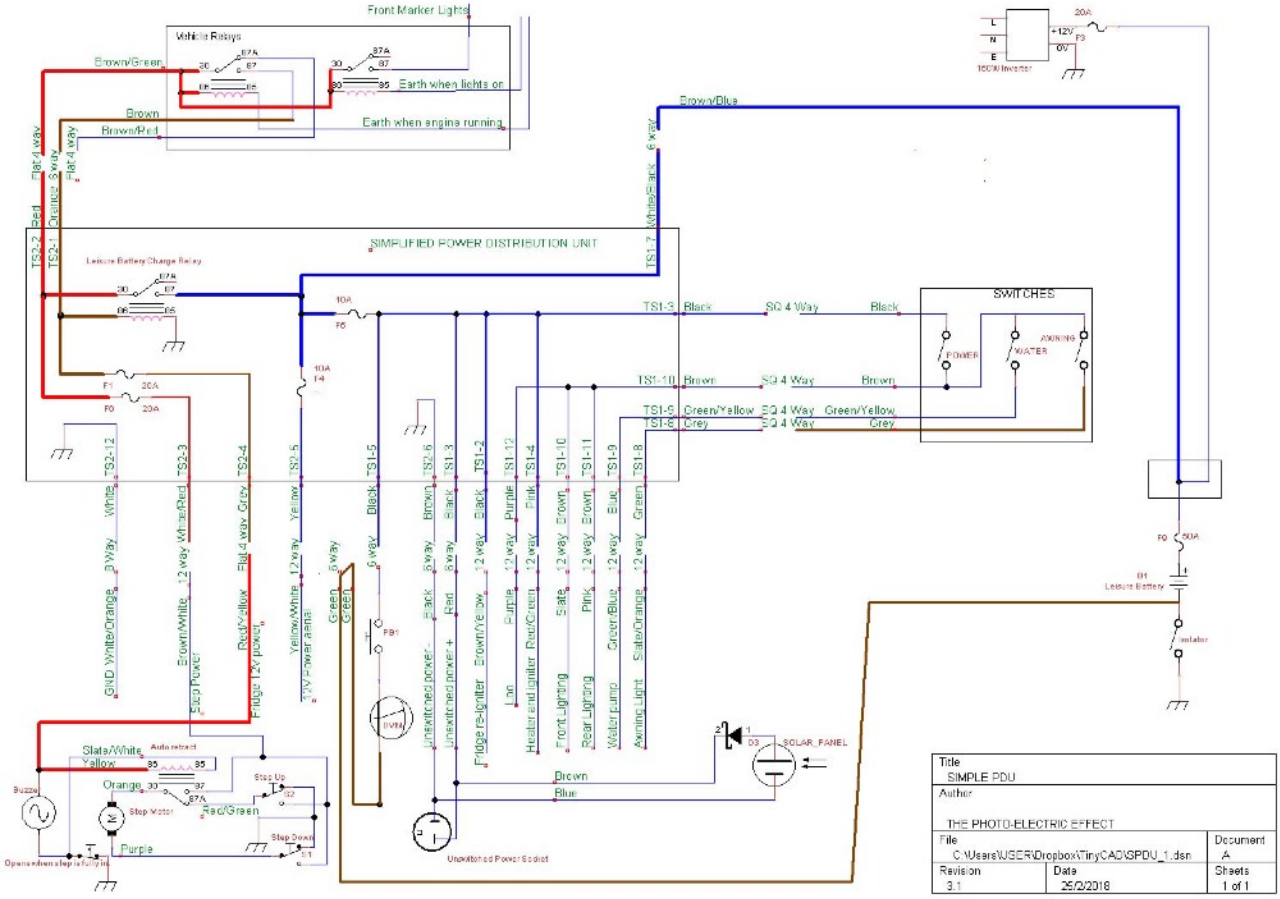
The mod was implemented using terminal strip fixed to the struts under the seat (where the leisure battery and PDU are located) and Scotchlok connectors to tap into the wiring. The Schottky diodes were mounted on the terminal strip.

The mod worked very well with no problems for four years but the wiring was not a pretty sight. So a replacement PDU (Power Distribution Unit) was needed.

I needed to be able to unplug the existing PDU and plug in my replacement so the first challenge was to source connectors that would mate with the van wiring. A web search (looking for matching pictures) established that they were BCA harness connectors and were available on line from caravan accessory shop uk. Then it was a matter of using the schematic in the handbook and a meter to find the connectors I needed.

As I have mentioned, the original system is horrendously complicated. The control panel is microprocessor controlled and gives an indication of fresh water level (very unreliable) waste water level (never worked for me at all) blown fuses (may have worked - I never blew any) as well as battery condition (useless). This means there are lots of wires in the harness that I simply don't need.

## The New System




*Simplified PDU schematic*

*The SPDU in situ*


The Old and New PDU

I modified the leisure battery charging circuit so that the alternator will take the leisure battery to 14.4V (as it did before). I also fitted a solar panel! (after all my talk). It's only 10W and it's fitted inside the skylight. Now it gives out 10W at 18V so that's around a half amp.The way that solar

panels work means that, unless I use a boost converter, I get about a half amp at any voltage (bright sun overhead of course)

SO here is the charging cycle:-

**Start the engine** - battery begins charging from the alternator at about 10A.

As the voltage rises to 14.4V the alternators current reduces. It's possible to get a reasonable idea of the state of the battery from the charging voltage. Basically there is a finite resistance between the alternator output and the leisure battery. So as the leisure battery voltage approaches 14.4 volts it shows that the battery is taking less current and it is becoming charged.

**Then we stop.** If we are not on site (and therefore the fridge reigniter is not taking current) AND the battery is almost fully charged from the alternator, the solar panel will eventually take the battery up to a re-conditioning voltage. The solar panel can only supply about a half amp max when the sun is shining so this will only happen occasionally - which is good.
This can only happen because after my mods to the system, there is NO drain on the leisure battery.

**If we are on site** we start using power. We should uses about 4AH per night

**Then we switch off the power** and go to sleep. The sun rises long before we do and the solar panel starts to supplement the battery. It's a bit weather dependent. On a bright summer day it may manage to put back in maybe half of what has come out the night before. But mostly it will be compensating for the fridge re-igniter On an overcast winters day it won't do much.

But this works fine for our life style. In winter we don't stay in one place for long and the alternator will do most of the work. In the summer we do hang around places, so there is not so much alternator charging and we don't use much electric so the wee solar panel should keep the discharge level very low. We should only be using a total of around 2Ah per day or about 5% of the battery capacity.

## The leisure battery

This is an experiment - I've tried a brand new highly esteemed 110AH battery from Banner. Now I'm running with a five year old 44AH starter battery from Alphaline!

# Part 8 - A new Leisure Battery

*From Part 6*

*This is an experiment - I've tried a brand new highly esteemed 110AH battery from Banner. Now I'm running with a five year old 44AH starter battery from Alphaline!*
*We shall see what we shall see.*

Well we saw! The wee 44AH battery may have been OK, but it was a worry. Due to unforeseen circumstances we had to take a two week trip. This was mostly parked up with no hookup and not a lot of engine running time to keep the battery topped up.
Now, the battery never failed, and it never even gave the impression that it was about to. But we had to stay in the vehicle most of the time, and had to keep charging a laptop, a tablet and two phones. The fridge was on all of the time and there would have been very little from the solar panel

We have never been particularly careful when using power, but because we were aware of the limitations of the battery we found ourselves switching off lights at every opportunity.


So we gave in and bought another leisure battery. This time it was a Varta LFD90 from Battery Megastore.

We were actually living in the van at the time and had little time to research batteries but I found:-
www.aandncaravanservices.co.uk/battery-technology.php
which did sway me.

We got around four years from the previous Banner battery which works out at about £30 per year.  That is not bad really for the amount of work it has to do.

An occasional motorhome user using hookups or with a roof full of solar panels may not have noticed it was down to 25% of its original capacity (*although he may struggle if he were where I am as I write this - in a municipal car park and the roof covered in snow)*

We find we are using the lights after around 4pm and almost continuous until around midnight (with a 1-2 hour break for a meal) so that is about 6.5 hours. We also are charging up two phones, an iPad and a laptop every day. And of course the fridge re-igniter is on.

| | Time | Current | Amp Hrs. |
|---|---|---|---|
| Spots | 2.5 | 0.59 | 1.48 |
| Roof Lights | 4.5 | 0.42 | 1.89 |
| Fridge | 24 | 0.08 | 1.92 |
| Phones | | | 1.2 |
| iPad | | | 1.8 |
| Laptop | | | 3.5 |
| TOTAL | | | 11.79 |

So even with the bigger Varta Battery we'd take 13% of the capacity per day. Four days would be about 50% of the battery's capacity.

But with a bit of forethought we can minimise that. We can't do much about the fridge and lights and we can't do much about the actual usage of the technology.
But we can use the engine and alternator to ease the load. The alternator will charge at about 10Amps in addition to charging up the laptop and phones etc at the same time. So we can recover ALL of the light and fridge load in under 30min with the engine running.

We can also use the time with the engine running to charge up the phones and laptop, at least 50%.

Our little solar panel will contribute a bit - maybe 1-2AH.

That takes the load charge from the battery down to only about 4%. This should be no problem for the battery.

This is an unusual situation for us - but in our little van we are warm and cosy and comfortable despite the outside temperature being below zero.

In the summer, with less time in the vehicle and less time on phones and laptops, and more from the panel we will not need the to use the engine for at least a week.

ROLL ON SUMMER

Addenda
The little Alphaline battery was put into a Vauxhall Agila whose own battery was struggling. The simple battery preservation technique I described in Part 4 saved the price of a new battery.

A few changes to take advantage of the wee solar panel are called for.

# Part 9 - Damned Technology

***UPDATE*** *I managed to flatten my leisure battery!*
*Bummer.*
*I left the van parked up with everything switched off but I forgot to switch off the fridge and it was on battery power.*
*Now the fridge is switched off when the engine is not running BUT I left the fridge door slightly open and the fridge light was on.*

*It's only 2 watts but that corresponds to 4 ampere hours (AH) per day. It was March so the wee solar panel contributed very little. A month results in 112 AH - so flat battery.*

*I should have used the isolator switch. Anyway I charged it up again with the CTEK charger and it's working OK but capacity is almost certainly reduced - but to what?*

*After charging the wee solar panel has kept the voltage of both batteries around 12.8V*

---

Back in 2014 when I first did my calculations I estimated that phones, tablets, and computers would take an average of 14AH a week while we were out and about at festivals and on holidays.

Things have changed in five years. The technology items have got more power hungry and we find that we use the van a lot to visit folk so we spend a lot of time sitting in it. So we use more power demanding technology more often - a classic double whammy.

Here is what he have been doing over the last (incredibly wet) week in the van. (most charged from Buck/Boost converters so capacities normalized to 12V)

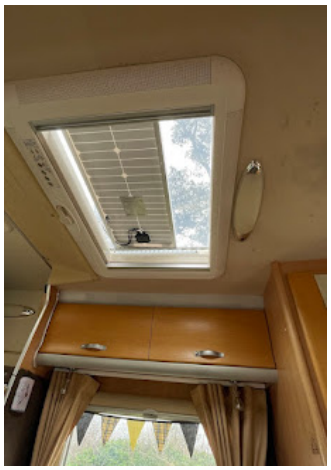
| Device | Battery | % use per Day | AH used per day |
|---|---|---|---|
| Lap top | 4AH | 75% | 3 |
| iPad | 3.6AH | 50% | 1.8 |
| Smart Phone | 1.2H | 100% | 1.2 |
| iPhone | 0.6AH | 15% | 0.09 |
| | | | ======= |
| | | | 6.09 |
| | | | ====== |

That's about 42AH per week!! In 2014 I estimated 14.1AH!!!! Add in the 13AH for the fridge re-igniter and 15AH for the lights and we are using around 72AH per week.

If you compare my various estimates you may see that they vary from page to page. Not a lot. This is simply because as time goes on I can estimate better.

Now this has been an unusual week and the battery has survived because the week has been punctuated with some travelling and a couple of times I ran the engine and the wee solar panel has helped a little.

But more power is needed for this damned technology. I don't need 72AH per week. The leisure battery can still supply a fair amount of power before it reaches 50% charge and the last week's consumption is abnormally high, but a bit of a safety margin would be good.



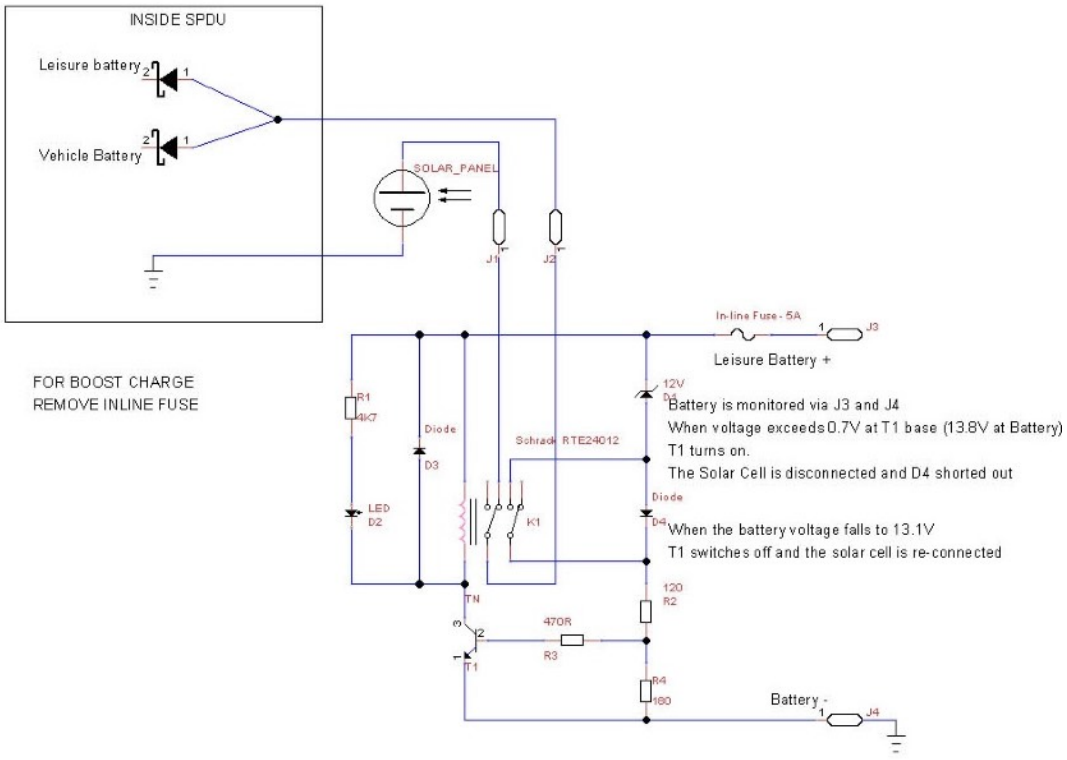
So I replaced the 10W panel with a 40W panel (it still fits inside under the roof window) I can get 4 times what I calculated last time -about 8AH per day, probably 12AH per day in the summer months. That would cover everything we use.

In the winter I will get less from the solar panel, but 45 mins running the engine (stationary or travelling) would compensate for a days usage.

## A non standard approach

The usual method of using a panel is to attach it to the roof then use a charge controller to regulate the charge. Reading on the forums, the biggest hassle seems to be with charge controllers and the fitting of the panels. So I decided to fit a 40W panel INSIDE the van under the roof window and not use a controller.

After a few days of glorious sunshine without a controller , the batteries were up to 15.6V. This is too high, so obviously a controller was needed, so I made one.




Here it is-

The sun shines and the battery voltage rises to 13.8V,  then the relay operates which switches the solar panel OUT.

The battery voltage will fall, very slowly, due to the current taken by the relay.

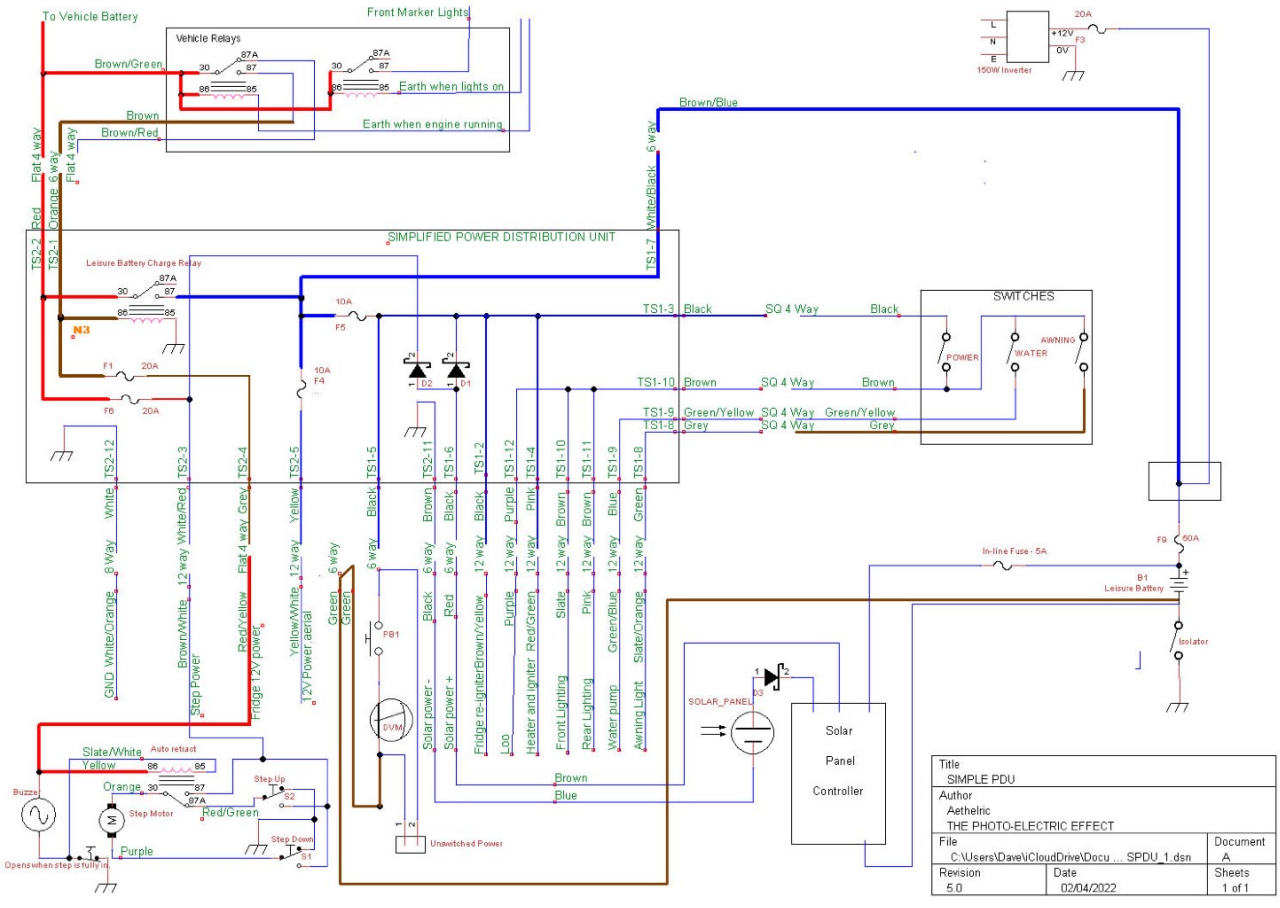
The voltage gradually drops to around 13.1V and the relay drops out (minimising drain on the battery) and the solar panel switches IN.  The load on the battery at this point is around 5mA down through the Zener diode.The LED is simply to tell if it is working or not.

The voltage will always fall to 13.1 (or below at night time) as the o/c voltage of a flooded lead acid battery is around 12.7V.

When the panel switches in again, the leisure battery voltage can only rise as fast as the vehicle battery. So the lowest voltage battery will charge first then they will charge together until the voltage reaches 13.8V.  This is where we came in.

During the winter, there is little charge from the solar panel, but by simply removing the fuse, the controller is disabled, and all of the current from the solar panel will feed into the batteries utilising those days when we do get a bit of sunlight. The voltage now may get above 13.8V

The wiring needed a slight mod to incorporate the controller:-




**Update** - After  a weekend at a folk festival with overcast weather every day, the leisure battery showed around 13.5V every night and around 12.7V every morning. This was charging two phones and iPad, a laptop, operating the lights (including the awning light for around 3 - 4 hours). The job's a good'un

The panel supplies BOTH the leisure battery and the vehicle battery. They are separated by a couple of diodes so they can both be charged by the solar panel but cannot discharge into each other. This means that the lowest voltage is charged first then they charge together until the leisure

battery reaches 14V. So the panel is looking after them both. The added bonus is that the small steady drain to the remote locking mechanism is compensated for.

*I think the Nuevo habitation electrics are now finished.*

We have had it now for 5 years and covered 80,000 miles, spending hundreds of nights in the van. We have used a hook up once the only time we were on a campsite. The rest of the time has been wild camping or a folk festivals with few amenities.

U**pdate.** A few days ago the company I bought the van from phoned to ask if I'd like to trade it in. I considered the offer for a millisecond before saying NO. I have not seen ANY van which is more suited to our lifestyle.

**Update 9/8/2020**

Thanks to Covid 19 the van has not been used since late last year. The solar panel and controller have kept both batteries at 13.2V without attention.

**Update 13/04/2022**

We only had one trip in the van last year, but now we are getting it ready for this year. When I pushed the button to check the battery voltage I blew a fuse! It turns out this is a fault in the digital panel meter. I disconnected it. But thanks to the label on the fuse box telling me the fuse number and the position, it was fixed in couple of minutes.

A new panel meter ordered from eBay and fitted. (The rather nice looking box is actually an old harmonica case.)

I found that the meter reads about 0.2V low at around 13V so ,as shown, the real voltage is 13.3V

The system has performed flawlessly and both batteries are still at around 13.2V. But the leisure battery (Varta LDF90 which has been flattened once - see above) and starter battery (019 Enduroline ) are four years old now. We are heading off for a longish trip soon, so we will see how they are doing.

**Update 31/08/2023**

Just back from Towersey Festival. Four days without the engine running and batteries still around 12.9V first thing in the morning. The solar panel gives about 1.5A when the sun is shining and about 0.5A when the sky is overcast.

But I had managed to flatten the vehicle battery before we set out! The day before the trip we went to the van to load up luggage and we noticed the radio was on. No sound, as it was set to bluetooth but not connected to anything. The engine would not start! But I have jumper cables, and I connected the leisure battery across the vehicle battery and that was enough to get her going. I let the engine run for 45 minutes or so as we packed the van. The next day and every time since the engine has started without difficulty.

But I did notice last winter that it was labouring. The battery was fitted in February 2018 so it's five years old now. Time for a replacement soon. I'll probably go for the same one I use as a leisure battery - a Yuasa L36-EFB from Tayna.

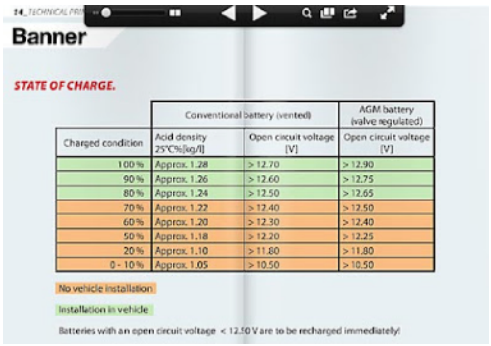
# Part 10 - One more battery for the road

The Varta was 4 years old. I had got the feeling it was a bit down on capacity, but it's a bit immaterial. I managed to flatten it by leaving it for a few weeks with a light switched on. I must have inadvertently left it on when we unpacked the van from a previous trip. Unfortunately the weather has not been good, and the solar panel with a few hours daylight per day could not compensate for the light on 24 hours per day.

I charged up from my wonderful little Ctec battery charger. It's only 5A and so it took quite a while. But it charged up fully. Then we headed off for a 3-4 week tour up North. The battery was good enough for a couple of overnight stays, but the o/c voltage could only reach about 12.3V and the solar panel could only pull it up to 12.5 (as opposed to the usual 13.2V. We really need to be able to last a week or more.


It looks like technology has moved on and the LDF90 is no longer made. www.aandncaravanservices.co.uk recommended an Exide ES900, but it looks like a Yuasa L36-EFB (enhanced flooded Battery) is even better.

But sod's law raised its ugly head. When I drove the van back from the storage place, the brakes did not feel right. So we took it to our local garage. Fishers garage were amazing. Despite being really busy, they replaced my front brake discs in the morning and the rear ones after their normal closing time. They also temporarily sorted the handbrake next morning and we set off in the afternoon. I cannot recommend them highly enough. We entrust our car and the Nuevo to their care.


Banner

STATE OF CHARGE.

| Charged condition | Conventional battery (vented) | | AGM battery (valve regulated) |
|---|---|---|---|
| | Acid density 25°C/%[kg/l] | Open circuit voltage [V] | Open circuit voltage [V] |
| 100 % | Approx. 1.28 | > 12.70 | > 12.90 |
| 90 % | Approx. 1.26 | > 12.60 | > 12.75 |
| 80 % | Approx. 1.24 | > 12.50 | > 12.65 |
| 70 % | Approx. 1.22 | > 12.40 | > 12.50 |
| 60 % | Approx. 1.20 | > 12.30 | > 12.40 |
| 50 % | Approx. 1.18 | > 12.20 | > 12.25 |
| 20 % | Approx. 1.10 | > 11.80 | > 11.80 |
| 0 - 10 % | Approx. 1.05 | > 10.50 | > 10.50 |

No vehicle installation

Installation in vehicle

Batteries with an open circuit voltage < 12.50 V are to be recharged immediately!

As we travelled, the battery charged up from the engine, but next morning it was down to 12.3V, or 60% charged. With some more driving around it got up to 12.8V (fully charged), but next morning it was 12.1V, or 40% charged.

Yep, it was knackered. So we ordered a 100Ah Yuasa L36-EFB from Tayna, who in their usual style had it delivered to a relative in Lancashire next day. Yuasa are selling this battery for £320, Tayna are selling it for £115.
It is now fitted.

It has been in two days, and the voltage is now showing 13.2V, which means that our short drive today (20 mins tops), and the 40W solar panel have, between them, topped it up from it's work last night powering the lights and charging 3 phones, laptop, and iPad. It's only 4:30pm. the sun is still shining and the solar panel controller has disconnected the panel to prevent over charging.

I think, but for my own carelessness, I could have got quite a bit longer out of the Varta. Hopefully I will get longer from the Yuasa.

# Part 11 - Finally battery charging

When I replaced the PDU with my version I did not bother with a battery charger. As we never had a hook up, there was no point But last week we spent a few days on a campsite - **with a hook up**!!! Maybe we are getting old.

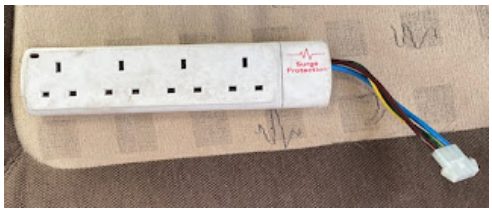
We didn't really need it, but I reckoned on a campsite nowadays you have to pay for a hook up whether you use it or not, and so it's best to use the site's electricity rather than my gas for heating. We also found out, after nine years ownership, that the hook up also heats the water. This is good but there does not seem to be any control of the water temperature and its gets very hot.

The little solar panel kept the battery charged, but I thought it would be good to be able to charge the battery conveniently from the mains. We can charge it now, but it involves a cable running across the floor from a mains socket over the fridge on the left to the battery compartment on the right.

The old (horrible) PDU had a built in charger which gave 18A! Why? That is a continuous 200W. which averages at 5KWh per day. That is more than our house!


*Mains connector in the old PDU*

But I pirated the mains connector from the old PDU and attached it to a 4 way mains socket.

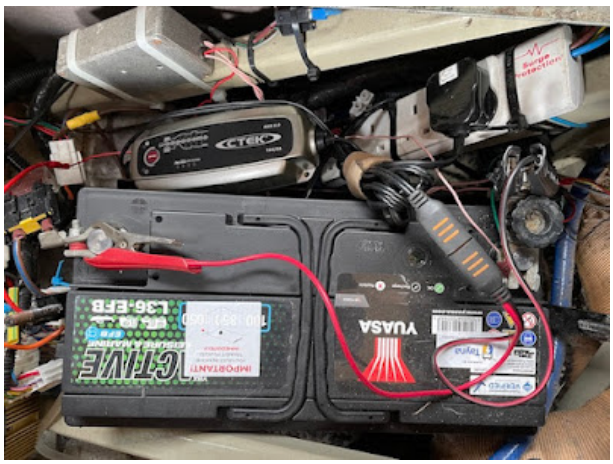


*Old PDU connector fitted to mains extension*

Then I plugged the old PDU connector into the Van Harness giving me 240V available right beside the battery.


Then, on site, all I need to do is simply plug in my Ctek charger. and connect it across the battery.

It is capable of providing 5A or 120AH per day. My **weekly** usage is only around 72AH.




*The battery charger just goes in here when it's needed. It is also used for car and motor cycle batteries.*

So, now if we go on site and get a hookup we can leave the lights on all day (not sure why) and stay nice and warm and have hot water without it costing us anymore than the site fee. In reality it would be useful if we stayed on a site for a week without driving in winter. We haven't done that yet - in nine years.

In the last nine years we have never needed to charge the battery. The alternator and the small solar panel has taken care of it. But we have only ever used a hook up twice, and that was this year (2022).

I guess if we are on a site and a hook up is included in the site fee we may as well use it, and save the gas. When bought in 13Kg canisters, the KWh works out the same as domestic electricity. On cool days I guess we would use an average of 1Kw while we are up and about or 16KWh per day. That would cost around £5 in gas so this is an indication of how much extra we should pay for a hook up (if we have a choice).

# Water

Our van's water tank holds 70** litres. There is also a separate "cistern" tank for the loo. Some folk don't like drinking water from the tank so they carry bottled water with them. We carry a few bottles of tap water in the fridge for use in an emergency (like an empty tank!) or when we want a really cold drink. We are happy to drink the water from the van tank. It is British mains water which is considered safe to drink after sitting in underground pipes for weeks on end, so a few days in the tank should not be a problem.

Anyway we have never had any adverse effects. We add a capful of Milton fluid to the loo cistern and two capfuls of Tesco biological washing liquid to the loo tank. Much cheaper and in my opinion more effective than proprietary concoctions. We drain the complete system if the van will be spending any length of time at sub zero temperatures. We fill the van at home using a normal hosepipe before we set off. We carry some equipment to make it easier to keep it topped up when we away.

We have a long hose for when we can get close to a tap or standpipe. We also carry a collapsible 8 litre watering can, and a short hose so we can fill it from almost any tap (e.g. in public loos) and an extension to make it easy to pour the water into the van.

If we can park over a drain we empty the "grey water" (mainly dishwater and washing water). If we have no drain we see no problem with emptying it on grass or soil. We only empty the loo down a proper toilet, either at home or public loo.

## Update One lives and learns.

We bought six 5 litre bottles of still water for around £2 each from Tesco. We didn't really want the water - it was the bottles. We now head off with a "spare" 30 litres of water stored under a seat. This is enough for around a week. If we are away longer, filling up now means either the hose, (which we can hardly ever find a tap to connect in the UK) or filling up the bottles and emptying them into the tank.  The only extra was a flexible funnel to fit the fresh water inlet.

**70 litres according to the handbook - 50 litres measured!Under normal usage we seem to use an average of 10-12 litres per day so we can just stretch to a week with the extra 30 litres in the bottles.

# Gas

We use the gas for heating,  the fridge,  and water heating (for showers). We have two Calor gas bottles. Only one came with the van, a 6kg one. We found that we could just fit 13kg bottles into the van so we bought one. For some silly reason Calor will not allow you to swap a 6kg bottle for a 13kg one so we have two different sizes. I have been told that recycling centres are good places to pick up empty bottles but I haven't tried yet.

The bigger the bottle the more economic the refills are. A full 6kg bottle (with an empty return) costs around £27; a 13kg one is only £5 dearer and it's over twice amount of gas.

***Update 2023.  Those were the days. A 13Kg bottle is around £60 now***

The prices vary widely from supplier to supplier and Calor themselves are amongst the dearest. Find a cheap supplier and stick with them.

I fitted a splitter with a dial - which is a "must have" piece of kit if you have two bottles. You turn on only one bottle at a time and when it runs out (as signalled by the fridge led flashing and/or the heater clicking as the re-igniters try in vane to light the flame with no gas, and the cooker stops working) you turn off that bottle and turn on the other one. It takes seconds, and is far faster than unscrewing and rescrewing connectors. One of those head torches helps no end if switching a bottle at night.

A spin off is that you connect the bottle when you buy it. I have had to return a couple of bottles because of damaged threads that would not connect to the pipes. Imagine discovering that when you are parked up at sub zero temperatures.

While on the topic of low temperatures - we would only ever use propane gas. Butane loses pressure at low temperatures - no problem if you only use the van in summer, but we don't.

Not much else to say really. We don't stint on using the gas in the van, but energy costs are far, far lower than living at home.

That said, in the recent very cold spell, (outside temperatures down to -5C at night and 0C max through the day) when the van was occupied day and night we managed to get through a 13kg canister in five days.

But we were warm.

## 1.Refillable Bottles

We have been considering a switch to refillable bottles.  This was really prompted by the collapse in Calor's delivery service in the recent cold snap and bad weather.

OK, they could not get their vans through and this caused a backlog but they took ages to clear the backlog.  When we asked dealers when they would get supplies they just shrugged their shoulders and said "Your guess is as good as mine mate".  This shows really bad service.

Now we were not  drastically affected.  We had to run without a full spare for a little while but it could have been worse.  We are unlikely to be spending weeks on end in very low temperatures again. (This was a one off).

Folk say you need this sort of equipment for European touring as Calor bottles are impossible to get. I guess it depends on the length of the trip. I would think a month to six weeks would be our maximum and it would probably be in the warm weather when not much gas would be used for heating. Our 6kg and 13kg could handle it but I'd worry about setting out with a full 6kg and a near empty 13kg.

SO options are to switch to a Gas It type of system or switch to two 13kg Calor cylinders. Even buying a from Calor this method would be drastically cheaper in the short run. The LPG approach may save in the long run, but it's a very long run.

Anyone know of a 13kg red Calor bottle going cheap in Cornwall??

***Update:-*** *I bought two Calor 15Kg blue butane gas canisters from Gumtree for £11. These were exchanged for two red propane 13Kg cylinders. I then sold the 6Kg cylinder half full for £12. So we now have three 13Kg red cylinders. We can set off for short trips with one full cylinder and one somewhere between full and empty. For longer trips we could set off with two full cylinders. On non-winter trips they should last a couple of months.*
*Two and a half years after fitting the splitter the dial gauge is stuck. Oh well, it's not crucial.*

How to estimate how full a gas bottle is.
The bottles come fitted with an aluminium collar which has the empty weight in lb stamped on it. On one of my bottles it said 30.08. (I don't know if that means 30.08lb or 30lb 8oz bit its not critical)
That converts to 13.6Kg. The bottle weighed 22.3Kg (on a digital luggage scale so it had
22.3 - 13.6 = 8.7 Kg of gas in it.
A full bottle would have 13Kg so the bottle was 8.7/13 full or 67%.

**Update 16/12/2022**
We are heading out in the Van to visit relations so I thought I'd do a calculation on the cost of Calor.

In line with all the other sources of energy, the cost of Calor gas has rocketed. It is now £52.50 for a 13Kg refill. This time last year it was £39.50. and in 2018 it was £34.50. A simple calculation shows that 13Kg of propane will provide 180KWh.

The heater can provide 3KW of heat, but we have never had to keep it full on. On the coldest days, we have it set at number 7 (max is 10) I guess we use about 2KW. When we were parked up in the cold at 0C through the day and -5C at night we had the heating on all day and at a reduced setting at night. 2Kw for 16 hours and 500W for 8 hours would empty a canister in 5 days. That's what we found. So that is around £10.50 per day. Actually similar to the house in cold weather. But the price of Calor in 13Kg bottles is almost 3 times the price of home gas. (It's around the same prices as home electricity. The price in 47Kg bottle is only slightly dearer than home gas)

On less extreme days, then the cost will be much less. A chilly day - not freezing, is probably around 30p per hour for heating (based on 1Kw).

Campsites who charge £5 for a EHU in the summer are rip off merchants.

I am so glad we have a three way fridge. Many modern vans are fitted with compressor fridges and these will take around 35AH per day. A 100AH leisure battery will be almost flat after two days without a charge (and a big charge from the engine or an EHU. Calculations show that a 13Kg propane cylinder would keep the fridge running for a year or over.

# Heating

## Windscreen Covers

We don't have a windscreen cover, and so we must lose quite a bit of heat through the windscreen and door windows. We considered buying some covers, but:-

- they seem to cost around £100+
- I would guess at the most they would reduce heating costs by 10-25%. It would take quite a few cold trips to recover the cost
- Sod's Law clearly states that it will always be raining, or snowing, or blowing a gale when they are being fitted.
- Sod's lay also states they will always be soaking wet when removed.
- In our van, they would be difficult to store when not in use. We could stuff them in the outside locker but we'd forget them and they would go mouldy.
- The curtains that go across the cab in front of the seats seem to do a reasonable job of separating the cold windows at the front from the rest of the cab. They do an excellent job for privacy, and they look nice and can be opened quickly to let the sunshine in. It is surprising how warm the van gets simply due to the greenhouse effect, even in winter.

So we decided against it.

## In General

I think we have been very lucky with our heating. We have a Truma Ultraheat which can work of gas or mains electric. We use it on electric on those rare occasions when we are on a site, but is usually running from gas.

There is a fan fitted to duct air into the cab or into the loo/shower but we find the convected air which comes out of the front of the heater without assistance is easily sufficient to heat the van, although in colder weather the fan helps to mitigate the layering effect. We mainly use the ducted air to warm up the air in the shower - it only takes around 5 minutes.

The heater warms up the van completely independently of the battery in a few minutes. It is even fitted with its own alkaline battery for the igniter.
The fan is rated at 0.7A (or 8-9 watts). Our average electric use is 10AH/day, so running the fan for 4 hours would increase this to 12.5AH. So we could go for around 4 days without an electrical charge or running the engine and still keep the battery above 50% charge level.

In the winter we always pull the blinds over the three skylights at night, just to help the insulation. The van windows have blinds and curtains, but there is only a curtain between the living and driving areas. It's a thick curtain though and we have not had a problem. We did consider an outside windscreen cover but the thought of getting out of a nice warm dry van to put on, or take off and stow a wet screen (and where??) in a storm doesn't bare thinking about.

The only problem we get is with high winds. Gusts above around 40-50mph will cause the heater flame to blow out. Not a big deal if it is occasional, as it re-ignites automatically, but if it is a pain if it is continuous. We have fitted a flue extension which helps a lot, and it blows out much less if we have the offside of the van facing the wind. But if it is really windy and we need the heater, the only alternatives are to either use the cooker for heat or run the engine, or move to a less exposed position.

Using the cooker is usually said to be a bad idea, but personally, I can't see why putting a pan on the burner, or a pie in the oven will make it safer!! We have a smoke alarm and a CO alarm fitted BTW.

While travelling we switch all of the gas appliances off (for safety of course) The standard engine heater will heat the van even on the coldest day but it takes quite a long time to get up to temperature. After all it is designed to only heat the front seats. The Truma heats up the van in a few minutes.

Some vans are fitted with diesel heaters which seems a good idea as they are about half the price per KWh compared to Calor in 13Kg bottles. But they need electricity continuously. I believe it's around 1.5A. and there is a surge in current as they start up. I prefer the Truma.

# BLOG POSTS

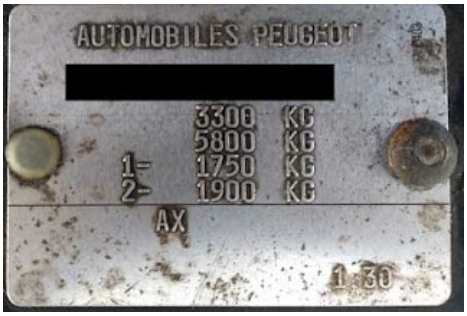
The previous section were informational pages from my website. What follows are blog posts to do with the Nuevo.

## Contents

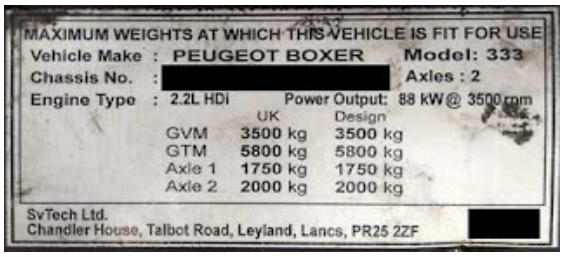
Sunday, 6 December 2020

## Fitting a Scooter Rack

We have a scooter. It's a Suzuki Address 110 and weighs 100Kg so should be OK for fitting on a rack on the van. But first some calculations are needed to ensure the van is operated safely.




The original Peugeot plate shows a GVM of 3300kg. This seemed at odds with some other specs I had read so I queried it with Autosleeper. Apparently it should have had a small mod before delivery which up-rates the GVM. I contacted Autosleeper in 2014 and they carried out the modification and fitted a new plate.




The new chassis plate shows that the rear Axle can take up to 2000kg, and the front Axle up to 1750kg, but the combined weight can only be 3500kg or less.

| | |
|---|---|
| Mass in Running Order | 2780 |
| Mass of the User Payload | 520 |
| Conventional Load @ 75kg per person) | 75 |
| Designated Passenger Seats (plus driver) | 1 |
| Essential Habitation Equipment | 145 |
| Personal Effects (standard figure) | 76 |
| Remainder for Personal Effects / Options / Accessories | 224 |
| Optional Roof Rack + Ladder | 10 |
| Optional Omni Vent | 2 |
| Optional Corner Steadies | 15 |

The handbook indicates that Mass in Running order is 2780kg. Subtract that from the 3300kg maximum weight and we get the 520kg. BUT the upgrade boosts this to 720kg Hoo bloody ray!!!

The handbook also suggests that after taking typical figures for equipment and personal effects, the typical weight left over is 224kg. Now I usually travel with my wife and dog which will add around 75kg. That leaves 149kg. Now the scooter and the rack together weigh 130kg so there would appear to be only 19kg to spare IF I had not had the modification. But now I have 219 kg to spare!

What I need to do is to load up the van as it would be for travelling and get it onto a weigh-bridge. If the total weight is more than 3370kg I will need to think about how to get the weight down before fitting a scooter rack, but I don't think it will be close to that.

I'm heading North for Christmas so the plan is to get the van loaded as much as possible. get it weighed, then weigh any extra bits going in and out.

After that I can work out the effect of the scooter on each axle.

| Axle Weights | |
|---|---|
| Front, in Running Order | 1308 |
| Rear, in Running Order | 1472 |
| MTPLM Front | 1750 |
| MTPLM Rear | 1900 |

The handbook also shows the weight on each axle in "Running Order". This totals the 2780 or the "Mass in running order" shown above. The modification to the suspension has increased the MTPLM Rear to 2000kg.

But this also tells me the distribution of the weight. As the scooter will be behind the back axle it will actually reduce the weight on the front axle and increase the weight on the back axle by

more than the weight of the scooter and the rack. The distance from the back axle to the back bumper is 1.7m. The overhang of a Watling carrier is 450cm, but I estimate the centre of gravity (COG)to be around 300cm behind the bumper. So COG of the scooter and rack is 2m behind the axle.
The distance between axles is 3m and the weight of the scooter plus rack is 130kg. So the uplift on the front axle is 2/3 x 130 kg or 86kg and the downward force on the back axle is 217kg.

Now, if I were to load up to the original handbook limits I'd only be adding 130kg which is less than the extra 200kg allowed.
The original spec allowed 520kg as max user payload. If we used up to this figure, and it was distributed evenly it would be 260kg per axle. i.e. 1568kg on the front and 1732kg rear. The scooter would change this to 1481kg front and 1949kg rear. This gives us margins of 269kg front and 51kg rear and 70kg GVM.
Now we are unlikely to use up to the 520kg anyway, (the weigh-bridge will reveal all) so there seems to be no obstacles to getting the rack fitted.
It would seem prudent to stow any heavy items (such as extra water, and the passenger!) as far forward as possible.

**So I went to a public weigh-bridge - Kernow grain services**
They measured the weight of the van with me my wife and the dog in it, and not a lot else as 3380kg. According to the manual the Mass in Running Order (MRO) is 2780kg. That includes the essential habitation equipment and the driver. Other bits and pieces, (including the wife) may total around 100kg so that would be around 3000kg.

**The weigh-bridge disagreed by 500kg!**

The rear axle weight was measured as 1860kg. The manual says 1472. Add around 50kg for bits and pieces and that would be 1520 - so disagreement is 338kg.

They did not measure the front - but derived that from total - rear to give 1520kg or a disagreement of 162kg

I find it difficult to believe that the van is half a tonne heavier than the book weight - that is five motor scooters! Three and a half on the back and one and a half on the front. Maybe a previous owner has used it for smuggling and the chassis is filled with gold bars! Or more probably the weigh-bridge needs calibrating. The general opinion on the Autosleeper Owners forum is that the manual is pretty correct.

I think I'll go with the manual figures.

**NOW the calculation**

Wheelbase is 3 meters
Overhang is about 2 meters
So any weight on the end of the overhang will result in - 2/3 of the weight on the front axle. So if scooter + rack = 130Kg then uplift on the front is 87Kg.
The weight on the back wheels will go up by the weight of the rack and scooter plus this 87Kg. or 217Kg.

But we need to know what the weight was on the axles without the scooter or rack. The handbook gives us 1308 front and 1472 in running order - which is without any payload. If we add the max original payload of 520Kg and distribute that between the two axles it gives 1568 front plus 1732 rear.

If we now add in the effect of the scooter and rack we get 1483 front and 1945 rear. The rear is 97% of maximum allowed! That is a little close for me. .

Dammit - I think I've just calculated myself out of the idea.

BUT there IS a solution. The Easy Lifter Hydra Trail has its own wheels on casters and is rigidly fixed to the tow-bar. OK, I don't have a tow-bar so that is an additional cost over the £1600 for the "trailer". But it would fit on any vehicle with a tow-bar. So that will cost me over £2000 including the tow-bar. But I guess it's an investment.

Downside is the increased length of the van, and the resultant difficulty in parking. In particular the inability to put the overhang over the grass verge of a car park so we can squeeze into a car space. Also, even without the trailer being attached the ground clearance at the overhang is drastically reduced.

A two seater e-bike would also be an option. These are around 30Kg and so could be carried on the bike rack. But they currently retail at around £2500 which I think is too dear. My scooter was only £2300.

Realistically, if we had the scooter with us we would still be reluctant to leave the dog alone in the van for more than an hour or so.

Oh well.

Thursday, 24 December 2020

## The Frozen North and technology

So we drove from Wadebridge in Cornwall to Ribchester in Lancashire yesterday. This was a journey covering about 360 miles, and a temperature drop of around twelve degrees. We had a little light rain, but most of the journey was in torrential rain. However taking it easy at 60mph max and stopping for an hour every two hours made it quite easy.

Today's technology is amazing.
I have a fairly cheap phone - a Moto G5. Before the journey I used the packing list stored on the phone to check off all items for packing.

On the journey I used it to navigate using Google Maps, and also listen to the radio via the GPS signal which is far more reliable than either DAB or FM or any other signals. We listen via the vans sound system by coupling via Bluetooth. Also we could listen to radio Cornwall anywhere we like. Indeed I have listened to Radio Cornwall while driving over a mountain range in the Andes in Peru. We also listened to a selection of DJ Linda's music from her iPhone via Bluetooth.

On the stops on the way and after arrival I used the hotspot on the phone to connect my old Lenovo Thinkpad to the internet to catch up on what a dog's breakfast Boris is making of the Covid situation (744 deaths today and still rising), and Brexit (about to sell the fisherman short after pretending he was never going to do it all along). I also read my emails.

When we arrived I used it as a torch to read the instructions on the parking meter.

Then this morning I Skyped for an hour and a half with my son in Australia.

All of this on a phone that cost me around £150. (Although my phone and wifi bills for the lifetime of the phone will completely swamp this amount). We take this all for granted. If I could go back in time and try to tell my Dad about this he would not have believed me. This has all came about in the last thirty years or so. I wonder what the next thirty has in store.

Saturday, 26 December 2020

## Home again after Christmas

It was a short trip. Drive up on 23rd, drive back on Christmas day.

We were worried about Meg travelling but, once again, she amazed us. She had been drooling on short trips over less than a nile, so a round trip of 720 miles was a bit worrying. But after a little nursing from Linda, she then found here own space in a little area behind the passenger seat - and she slept. As the trip progressed she moved out and finally was happy to sleep in her bed, on the floor, or on a sofa. No drooling, and full of beans when we stopped. She is an amazing dog.

Once in Ribchester we paid no attention to social distancing within the family but avoided other people like the plague (rather apt?). We had filled up in Cornwall (tier 1) at a card only pump, before we left. We can do the 360 miles on 3/4 of a tank so we had to fill up again in Lancashire (Tier 3), in order to get home again but this involved going into the garage to pay. Mask was worn, hands were washed and cards disinfected.

We let the family know we had arrived and, lo and behold, beer was delivered by Linda's grandson. Then we all sat in the van eating pizza and drinking coffee, beer and some weird Aloe vera drink.

It was cold on the first night. Outside temperature below zero and there was ice on the puddles in the morning. We were a bit cold in bed because we were too lazy to get up and sort out the extra bed coverings.

On Christmas Eve morning we skyped with my son who lives in Melbourne, but was spending time with his in-laws (wonderful folk) in Batemans Bay NSW. We compared the difference of how Australia has dealt with Covid and the UK shambles.

We spend a great Christmas Eve with the Linda's daughter and the grand kids. And our dog Meg met Rhona for the first time. Meg is a 5 month old Border Collie, Rhona is a three year old Spaniel and quite assertive. Although Meg never backed down, a hierarchy was established with Rhona higher up than Meg. Then they got on well and played and ran about together on a walk, so that at the end of the day they were both knackered. The next time they meet, Meg will be fully grown so it will be interesting to see if the relationship changes.

We put extra covers on the bed at night and left the heater on low, so we were nice and warm that night.

On Christmas day morning we went to the house to open Christmas presents and we stayed till around 12:30 then we headed back to the van, got it ready and set off on the 360 miles back home. An easy drive. The roads were very quiet, and there was no rain. We stopped twice on the way for an hour each time making coffee and having snacks in the van each time. On the first stop we talked with my daughter in Scotland by phone. We wanted to visit but Scotland is in lockdown and the boarder is closed.

The journey took 8.5 hours including stops.

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Thursday, 1 July 2021

## Where to put a Motorhome

The UK in general and England in particular seem to have a problem with motorhomes. The general feeling is that we should all be on campsites.

A typical campsite for a motorhome and two adults is around £30 a night in England. We do not need a hookup, or water, or showers, or a loo if we are only staying for a day or two. So we would be paying £30 a night just to park. We often park in pub car parks. It is usually free, but we still at least end £30 on food and drink.

In towns and cities, where we may spend more, many car parks have a height restriction so we can't get in! Neither could a range rover type of vehicle with a roof box. Why? What is the point.

But it gets worse. To avoid congestion in my street I kept my motor home in a nearby car park. It's not a huge vehicle and fits into a car parking space. I had a season ticket (£270 per year) and have parked there for three years. But Cornwall council has decided that motorhomes are not allowed to be in the car park between the hours of 11pm and 8am. There is already a rule against sleeping overnight in a vehicle so why this ban? A residents permit would be easy to arrange but that is beyond what the council are prepared to do. So I have to park in the road and the council loses £270 a year from me.

Travelling in Europe by motorhome is a revelation. There are thousands of "Aires" stops for motorhomes for free or a minimal charge. Motorhome sales have rocketed in the UK recently. Lots of people are going to be really annoyed.

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Friday, 27 May 2022

## A good time to buy a motorhome?

We have had our van for nine years now and it has been wonderful. We have not used it a lot since the start of the pandemic, but we are out and about in it as I write this. We are seeing hundreds of motorhomes on the road. Many more than we used to see.

We hardly ever stay on campsites, but this trip we got caught short for water, so we tried to book on a Caravan and Motorhome Certified Location. It was not easy - most were booked up - sometimes for weeks. We finally got on one with no loos and minimal services (we did not need the hook up) for £20 per night. All we wanted was to fill up with water. The site owner wanted payment in cash, and I'm pretty sure the club, and the taxman will know nothing about it.

We were talking to a lady in a pub who was travelling in her motorhome. She had been to Scotland, and said it was overrun with motorhomes.

I think many of these motorhomes were bought when travelling abroad was impossible or difficult due to Covid. Many will have become very disillusioned with motorhome life due to the difficulty in finding a place to park up and the congestion on the roads, mainly caused by increased traffic due to the huge increase in "staycations". Also, international travel has opened up again. As a result many of their motorhomes will be up for sale at the end of the summer season this year. A surge in supply will cause a dip in prices, so the end of this year would be a good time to buy.

HOWEVER, don't expect the travelling situation to get any better soon. Many people will jump on these bargains and fill up the campsites and the roads again. And, incredibly, many places are becoming more motorhome-hostile. I am not now allowed to park my own motorhome overnight in the Cornwall council car park where I have parked for five years. Another car park in Lancashire where we have parked for a few days overnight for eleven years has suddenly decided that overnight camping is not allowed. My (perhaps cynical) guess is that the councillors have connections to camp sites and want to maximise their profits - despite the fact they are fully booked. Many in-town car parks have height barriers.

The travelling folk do not help either. It is their chosen way of life and I believe they should be allowed to continue in it, but some compromise in their strict hygiene rules, like not using in-caravan toilets would be a reasonable compromise. A caravan parked by some woods and the users disappearing into the trees for a pee is not a problem, but a dozen or more caravans taking over an in-town site and leaving the surrounding bushes stinking of urine, and worse, results in bans for overnight stays or height barriers for everyone.

Ultimately the market will help as more motorhome sites open up to make some money from the situation. But that takes time due to planning regulations, and the final consequence will be even more congestion.

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Sunday, 29 May 2022

# Camping Clubs

We have been camping in our motorhome for a few years. We have hardly ever stayed on sites, but the huge increase in motorhome numbers, and the animosity of the locals caused by inconsiderate owners is driving us to look at staying on recognized sites.

There are two big clubs we could have joined. Here is my attempt to check them out..

## The Camping and Caravanning club

Trust Pilot review *Not very good. 70% of 134 reviews rate it BAD.*

Prices - hard to tell. It's £42 for one but probably only a few pounds more for two. I am not giving out my address telephone number and email just to find out the price,

## The Caravan and Motorhome club

Trust Pilot Review *Not bad. 80% of 4178 review rate it GREAT or EXCELLENT.*

**Prices** £54 per year for two people

SO it looks like the Caravan and Motorhome club is a no brainer. We joined on August 11th 2020

First problems was that the documentation could not be downloaded so we had to wait until August 18 before we had the documentation. We did try to book on a few certificated locations but there is no on-line booking system for them so we had to phone. Non answered straight away. Those that returned calls were all booked up, mostly for weeks or months ahead.

I guess we were wildly optimistic thinking we could book a site for the weekend on the Wednesday and Thursday of the same week in the peak of the Tourist season. Staying on sites definitely takes away the spontaneity we have when wild camping.

We finally did get on our first CL in May 2022. We were completely out of water, so we fell back on a CL. Most were booked up but we found a one in North Lancashire. The Handbook said prices from £13 which I thought was expensive given they had no toilets or showers. We were charged £20! All we used was the water and waste disposal. We did not use a hook up. We effectively paid £20 for 50 litres of water.

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Thursday, 22 December 2022

# Backup heaters and a dodgy fridge

We were 100 miles into an 800 mile 4 day round trip, and we pulled into a service station. It was very cold so I went to turn on the Truma heater.
It wasn't having it.

There was no spark for the ignition. I tried changing the battery in the igniter, but to no avail. So we faced several nights in the van at temperatures below zero without a heater.

Oh the joys of motor homing.

But we have two other back up heaters in the van.

1. **The engine.** We found that leaving the engine running and switching on the heater fan helps, but the coolant temperature, and thus the heater effectiveness drops when idling for a while.It's considerably better than nothing, but noisy, inefficient and expensive.

2. **The cooker.** We have a cooker with three gas hobs, a grill, an oven and an electric ring.We used the rings to heat the van. We found that alternating between one and two rings kept the van nice and warm. Although there was a very strong layering effect.

We would quite happily leave the Truma running on a low setting all night, but we were not happy to do that with the gas rings. So we just made sure we used the seat covers over the duvet at night and we stayed warm.

It's a handy thing to know. The Truma is a wonderful piece of kit, but it struggles in windy conditions. The direction of the wind makes a huge difference so we sometimes turn it around. But if it's very windy, it just blows out continually. But the cooker will be fine under those conditions.

The problem was the igniter. I opened it up (I'm an engineer, it's what I do) but the inside is encapsulated. I ordered a new one on line. It cost me £95 (bloody scandalous) and it was waiting for me when I got home. It's fitted now and we have a working Truma again. (That will be handy for doing the investigations below)

To add to the fun,

We got a surprise cold snap in the second week of December. This does not usually happen in Cornwall. The loo hatch was frozen and it took me about 45 minutes and four kettles of boiling water to free it. I greased the rubber when I finally got it open. **Hopefully fixed.**

I had not had a chance to winterise the van (i.e empty the water out) so we set off with the pipes frozen. We finally got running water after 4 hours driving at an outside temperature of around 3C. But the tank does not seem to hold much water now. I hope it's not cracked.

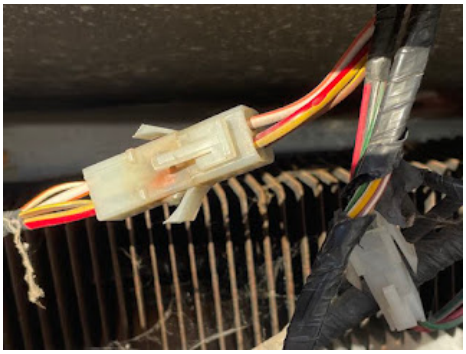
***Investigation 1*** *24/01/2023*

*I poured 25 litres of water into the tank, and none ran out. I think it's not a problem. Maybe we had simply used more than I thought.*

While we were away, the fridge stopped working on battery - it just gave out a buzzing noise, like a relay switching in and out. It worked OK on gas though.

Looking at the circuit diagram, if I have power to F1 then the problem is either in the fridge, the wiring inside the SPDU, or the wiring from the SPDU to the fridge. But the van is parked 8 miles away on a farm so it will have to wait.

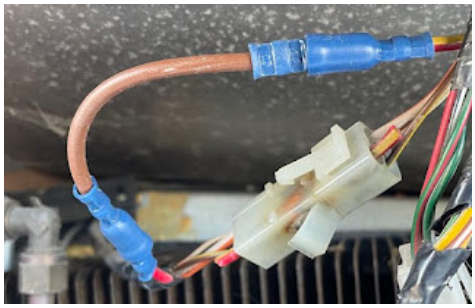
***Investigation 2*** *24/01/2023*



*Here's the problem.*

*This connector takes the 12V to the fridge and it has overheated and burned out. There is no connection between the yellow/red wires on each side of the connector.*

*The connector is at the back of the fridge and accessed quite easily from the outside of the van via the top vent.*



*The heat had also melted the plastic which had fused making it impossible to open the connector. What is really need is another connector, but I decided to use a jumper across the connector. The fridge is specified as 120W at 12V - so 10Amps. But when the engine is running so the voltage will be 14.4V. so closer to 12A. The line is protected with a 20A fuse in the SPDU. I decided to use blue bullet crimps which are rated at 17A. I'll replace the entire connector when, and if, I ever have to take the fridge out.*

And on the way home the fan in the van heater stopped working on anything but high (and very noisy) speed. It was the connector to the little resistor block. I wiggled it a bit and it worked, off and on, then settled down working after a while.

***Investigation 3*** *22/01/2023*

*I disconnected the plug and found that the side of the socket on the cable could be removed allowing me to get to the connectors with a pair of needle pliers. Squeezed 'em up a bit and job done.*

It also seemed to struggle to start on the cold mornings. The starter battery is now around five years old and when the van is stored only has our 40W solar cell to keep it charged.
Many years ago I had a Lada. The instruction manual recommended switching the lights on for 10-15 minutes before trying to start the engine. This was to warm the battery slightly. Crazy, I thought. But all of the lights would have been around 120W and that would only take 2.5AH from a 90AH (Guess - it was quite big) battery. Maybe I'll try that and see if it will last another year.

Hmm, does the solar panel keep it charged?? The meter only measures the leisure battery which has zero drain other than self discharge. The vehicle battery voltage could be lower if the solar panel was not compensating for the remote locking.
Maybe change the push button on the meter to SPDT switch to look at either battery? Even connect both batteries together via a resistor so that they can share a small load.

**Investigation 4** 22/1/2023

I measured the batteries after three weeks standing. The starter battery was 13.03V and the leisure battery 13.1V. Both were fully charged off the solar panel. The started battery was fitted in February 2018 so it is five years old. Maybe a bit old for really cold days. I'll change it next Autumn ready for the winter. BUT I will measure its capacity and it may be my next leisure battery. Although it'd cranking capability may be down its storage capacity may be good enough.

I also measured the current from the solar panel. At around 3:30pm the sun was too low to shine directly on the solar panel. All the panel could see was clear blue sky. The output was 52mA. This is not a lot, but the leisure circuit has NO drain, and the vehicle drain is around 50mA. So when the sun was reaching the panel, around noon, it would have been supplying more. Anyway the panel is keeping both batteries charged but starting is still a bit laboured.

So our normally super-reliable van was being a little temperamental this time.

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Thursday, 31 August 2023

# A TV for the Van

We don't have a TV in the Van, and we don't miss it. When we are away we tend to be out and about or, if we are in for a while, we read quite a lot. But it would be nice to occasionally watch something.

I have recently bought another tablet, a Samsung Tab A 10.5. I bought from Amazon as "renewed" for £145. It looks brand new to me. My other tablet, a Samsung Galaxy Note 10.1, is still working very well but many newer apps won't work on the older operating system.

So I looked at the possibility of downloading programs or films from our streaming services (BBC iPlayer, Netflix, and Amazon Prime) to look at in the Van.

Firstly a needed to see how much memory I'd need.

iPlayer

As a guide, file sizes are:

**High Quality (encoded at 1500kbps):**

- 30-minute programme: 315MB
- 60-minute programme: 630MB

**Standard Quality (encoded at 800kbps):**

- 30-minute programme: 160MB
- 60-minute programme: 320MB

From BBC player info

iPlayer does not allow storage on SD card. (Why??) The internal storage currently has around 10GB spare.

## Netflix

| | |
|---|---|
| Watching Netflix | 1GB per hour (standard definition)<br>3GB per hour (HD) |

According to ASDA

Netflix **does** allow storage on SD card. The current 32GB card has around 22GB to spare but the tablet can take up to a 400Gb card.

## Prime Video

Under Download Options, choose among four different files sizes:

- **Best**: 1 hour of video uses approximately 0.46 GB of data and storage.
- **Better**: 1 hour of video uses approximately 0.33 GB of data and storage.
- **Good**: 1 hour of video uses approximately 0.27 GB of data and storage.
- **Data Saver**: 1 hour of video uses approximately 0.14 GB of data and storage.

From lifewire

Prime **does** allow storage on SD card.

So if we assume 1Gb per hour worst case, I can store around 10hrs from iPlayer and currently 22 hours on the SD card. This could be upped to 400hrs with a 400Gb card which costs around £20.

But we are very unlikely to use 22 hours of video so I'll stick with the 32Gb SD card for now. Some downloads have time limits, so we can't really save for posterity. BUT there is one way **we can!**

We have an oldish Humax PVR. The "oldish" is important because on more modern versions recordings are encrypted and can only be played back on the machine they were recorded on. On ours they can be downloaded via USB. I can download live TV to a computer then save to the SD card.

## Screen Size

The screen measures 22.5cm by 14cm - pretty small. But we watch it when it is on a lap and it is only around 45cm from our eyes. That is the same as a 55" TV 2.3 meters away which, coincidentally, is the recommended viewing distance.

The audio is fine at that distance, but we can also use Bluetooth to send it to the van radio and out through the speakers at the front and back.

We have used it a few times, and it works well.

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Tuesday, 1 October 2024

# Wipers and batteries

## Windscreen wipers

These are driving me around the twist. Sometimes when we are driving they won't switch on immediately. I can be driving with very limited visibility for two or three minutes and then they start.

When I put the van in storage I spent an hour or so checking fuses, connections etc, but I could not make them start. I assumed it was the wiper motor, which is a pig to get out. So I decided to leave it to the garage when he does the MOT. So I went to get the Van this morning:-

- The windscreen wipers started immediately - not sure if this is good news or not as the garage may not be able to find the fault. Intermittent faults are the worst.
- The washers did not work - I tracked it to a defective washer motor/pump.
- The engine would not start - this is bad news.

## Starting

During the winter of 2022 I thought the van was struggling a bit to start. I was not sure it was going to be reliable over the next winter, so in November I fitted a new starter battery. I decided upon a Yuasa L36-EFB which is recommended for use as both a leisure battery and a starter battery.

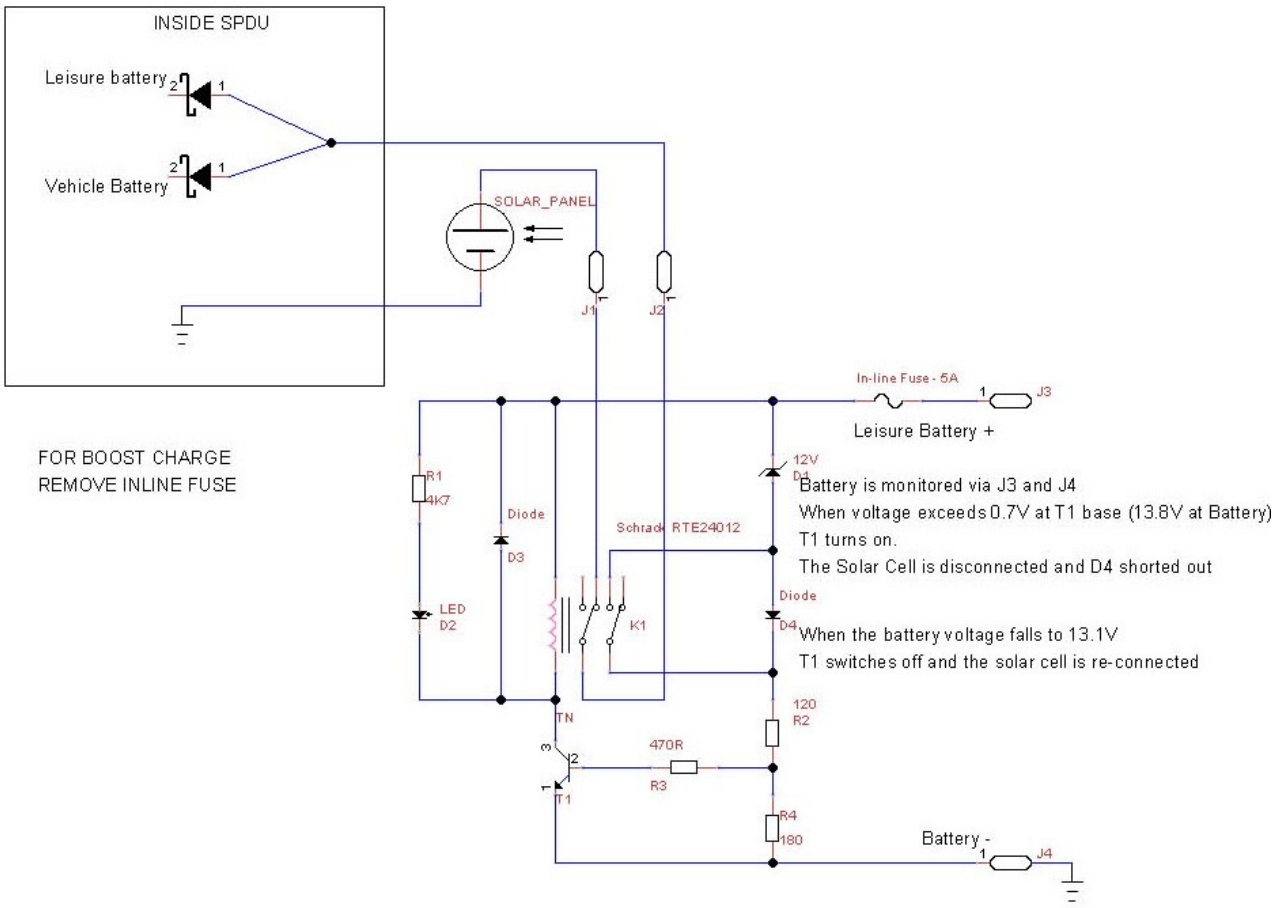
But when I went to pick up the van today it would not start. It seemed to turn OK but it would not fire. After trying quite a few times, I decided to try a jump start from the leisure battery (also a Yuasa L36-EFB). It's a bitt fiddly, I had to get access to both batteries then use my heavy duty jumper cables. It started immediately.

So, what am I doing wrong?

- Have I bought the wrong starter battery?
- The van has been left unattended for three months, and I have been relying on the the solar panel to keep the batteries charged, (this technique has worked for years) and the voltage was 12.9V this morning before I started. The solar panel controller allows the voltage to rise to 13.8V before it switches out. then it come in again when the battery drops to 13.1. During the winter I usually disconnect the controller so the battery voltage can get higher during the events when the sun is shining brightly. Maybe I should have disconnected the controller earlier.

The Van is in for its MOT just now. When I get it back I will store it with the controller switched off but be prepared to jump start it again. If I have to do that, then it will be a new starter battery and I will have a spare leisure battery. If so I will use the simple timed charger technique to keep it in good nick till I need it.

I will also tweak my controller so it cuts off at 14.4V instead of 13.8. In normal operation this is what the car alternator does. It will not be constant, only when the sun shines. In the winter, with the fuse disconnected the battery will get a conditioning charge every time the sun is bright enough




Changing R2 from 120R to 270R should take the drop out voltage to 14.4 Volts and the pick up voltage to 13.7V.

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Friday, 22 November 2024

# Am I a dinosaur?

Reading motorhome forums, it seems that everyone is changing to Lithium leisure batteries. AND they have installed a roof full of solar panels a few years ago. 20A or more chargers seem to be an absolute necessity.

We are still operating with a flooded lead acid battery, but we have fitted a small 40W solar panel under the skylight. We connect up our 5A battery charger if we think we may be having a hook up.

Lithium batteries come with a long guarantee, typically 10 years so they must last much longer than a standard lead acid battery. I find that lead acids last 3-4 years before their capacity drops to lower than our requirements, although they would probably last a further 2-3 years if we used EHU on a regular basis. So I am shelling out around £100 every 3-4 years. A lithium battery would cost me around £5-600 maybe every 10 - 12 years, although no one has had one for that length of time yet.

Lithium batteries have a much higher capacity than lead acids. A Lithium battery typically is 2-300 Ah and can be discharged by 85%. Lead acids are around 100Ah and should not be discharged more than 50%. We use around 7Ah per day but the 40W solar panel provides 50-100% of that. We don't need more capacity, or more solar power.

Our 5Ah battery charger would easily top up the battery overnight even if we had run it down to 50% somehow.

Problems with newer "more advanced" vans seem to arise from:-

- the dissimilar batteries used for the vehicle battery and the leisure battery and the ensuing charging problems. This is usually addressed by fitting a step up dc-dc converter at around £150
- the complex power management systems used
- the complex solar power controllers used
- the power taken from the battery to run the gas heating
- the power taken from the battery to run the fridge
- the reliance on inverters to run mains powered items.

Our van is spared the issues of heating and the fridge by Autosleeper’s choice of items. I see no reason to change them.

The original power management system is another matter. It was horrible. False modesty aside, my simple system is much better, and I suspect better than the commercial offerings.

Our little solar panel charges the similar (currently identical) vehicle and leisure battery with no controller at all in the winter, and a very basic controller in the summer. We don't tend to use mains powered items. Our phones, tablets and computer use 12v usb car adaptors.

As an engineer I find the discussions quite interesting and educational. But I am not tempted to change.

So maybe I am a dinosaur, but a happy one.