VAN USER GUIDE

Welcome to the Outside Van Family!

If you need assistance from us — anything from upgrading and modifying your van, repair or questions you have about your van — please reach out to Shaun Fleener at 971-274-9275.

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OUTSIDE VAN®

POWER SYSTEM

Your van may differ slightly from the descriptions below. These are the most commonly used items and the core of what is here will apply for general knowledge of your van.

The power system of a van is different than that of a home in a few ways. The supply of power is limited and components are not always on . This means you must manage and monitor your resources for best use and to prevent damage to the van components. this guide goes over the components associated with the power system identifying them, their power source, maintenance and trouble shooting.

Useful terminology

Voltage Your van delivers power in two voltage types**.**

12V power This is supplied from the batteries.

110v power This requires shore power to be connected to the van or for the inverter to be on to create 110v. the following components use 110v; three prong 110v and GFI outlets, Microwave, and induction cook tops in the vans require 110v.

State of charge SOC. This is a gauge to your battery levels 0-100% similar to what you may be used to on a cell phone. However we recommend as a best practice to become familiar with the voltage of the batteries in their different states to fully and accurately understand what is happening with the batteries.

Amperage aH. Amperage is how much power is being delivered or how much power is being used. We measure this in amps per hour or aH. Our systems can range anywhere from 200ah – 900ah of power in most cases. Having your interior lights on may use 1-2ah meaning you could have them on for many days. While an air conditioner may use 60-100ah where you can use it for a few hours at a time before running out of power.

At Rest; this is if your batteries are not getting a charge from the alternator, shore power or solar. Or no significant draw being used, 10AH or less. At rest is useful for knowing the health and state of charge of your batteries.

Charging when a battery is charging from a source i.e. shore power, alternator or solar the voltage will rise higher than the at rest numbers. These charging voltages are critical for the health of the battery and the charging process.

Under load As a battery is being used by a component we call that under load. When a battery has a significant load you may notice that the voltage begins to drop.

Power box

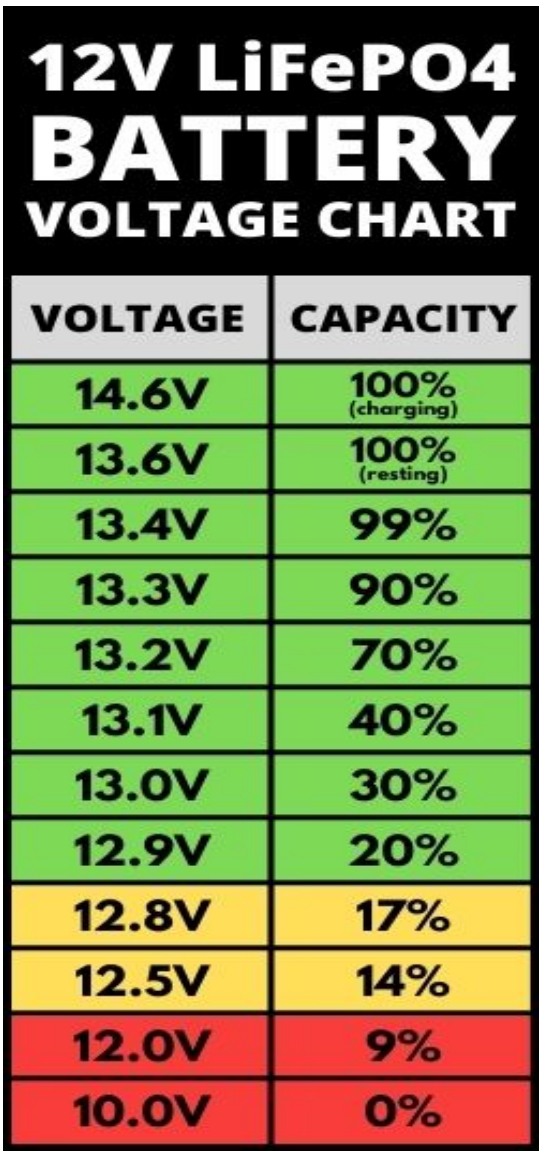
This box houses the power system used to run the components in the van. It contains the batteries, inverter, and inverter temp sensor. Depending on the year or configuration of your build you may also see fuses and an alternator regulator or other custom components.

BATTERIES

There are two battery types that we have used AGM and Lithium. We have been using lithium batteries exclusively since about 2022. To understand your vans power system it is important to know which style of battery that you have.

Lithium batteries:

Voltage and state of charge guide at REST.



Lithium batteries do not accept a charge or are slow to charge at cold temperatures. when temps are below 40 degrees and lower they will charge very slow or not take a charge. We set the inverter to cut power at 12.1 v going below this voltage starts to cause more than desired damage to the batteries. as a guideline Lithium batteries like to rest at a 30-80% state of charge for the longest life. this is not entirely practical to implement during usage never the less that is what lithium prefers. In order for the SOC to read properly the batteries must be charged to 14.2v periodically. this happens at the last stage of charging from the 98-100% capacity. During use it may be that full voltage isn't reached, which is ok just know that the state of charge may be inaccurate until such time that the batteries reach 14.2v under a charge once more. It is best to understand your batteries by observing the voltage more than SOC. 12.1 v at rest is considered dead for battery safety. 13.5-13.7v when resting and not under charge is considered full. When the battery is charging the voltage may go as high as 14.5V temporarily.

Lithionics batteries: mid 2022 – current

Location: Power box

Built in battery power switch. Blue is on, no illumination is off. Refer to the Lithionics owners manual for more specific details.

Power switch

AH 320Ah each battery

These have a few built in features that aren't on any of the other batteries we have used. 1. They have a built in on / off switch (round button lit up with a blue halo when on) 2. They have an internal heating element to assist with charging at temperatures at or below 40 degrees Fahrenheit. They have a blue tooth interface and they have a brand specific display (see controller displays below for more details on this). These batteries have safety shut off protection built in. We set them to shut off at 10% SOC state of charge and they will also shut off at 12v. Once they are turned back on from hitting the safety they will not shut off again until they have been charged above this level. It is important to charge them back up after this to prevent damage and extend battery life.

Relion: 2018 – 2022

Location: Power box

Ah 100 – 300 AH each

We used these batteries selectively from 2018-2022. Some Relion systems have a separate Relion display. We recommend using the magnum controller display for battery status for accuracy over the Relion display.

AGM batteries: 2010-2020

Voltage and state of charge guide at REST.

Voltage	State of Charge
12.60+	100%
12.50	90%
12.42	80%
12.32	70%
12.20	60%
12.06	50%
11.90	40%
11.75	30%
11.58	20%
11.31	10%
10.50	0%

10.5 volts is technically half of the batteries capacity and considered empty. While there is more power available it is unusable power as the volts are so low that components will not function and can cause damage to the batteries when dropping below 10.7V. the voltage drop is the disadvantage of AGM batteries as only half of their listed capacity is useable. Meaning an AGM battery with 210AH has 105 AH of usable power.

12.6-12.8 volts is considered full

Group 31 AGM 2010-2016
Ah 100- 125ah each
Location: underneath the van
Direct Replacements; any group 31 AGM battery

Northstar AGM 480 2016-2020
Location; power box. In Some cases underneath the van.
AH 210-217 AH each

Direct Replacements: Odyssey ODS-AGM480FT

Northstar NSB210FT BLUE +

Battery DISPLAY(S) and CONTROLLER

These display(s) show the status of your batteries. SOC “state of charge,” current flow of power + or –

Lithionics: If you have lithionics batteries this is your main source for information on your batteries. You can observe the SOC, current draw or charge, time remaining based on current use and more. Refer to the owners manual for more details.

Magnum controller.

This interface displays and controls the inverter charging functions and the power on off for the inverter.

If you have Lithionics batteries your main usage for this is to turn your inverter on and off. For other battery systems relion or AGM this is your display for the batteries. Most of what you will want to see is under the Meters button, under DC. We preprogram all the proper settings based on your power system. At times it may be necessary to examine the settings specific to your van. Note these settings Do Not get erased upon a power failure. The Magnum energy manual has full details for the controller and the inverter.

Air Conditioner

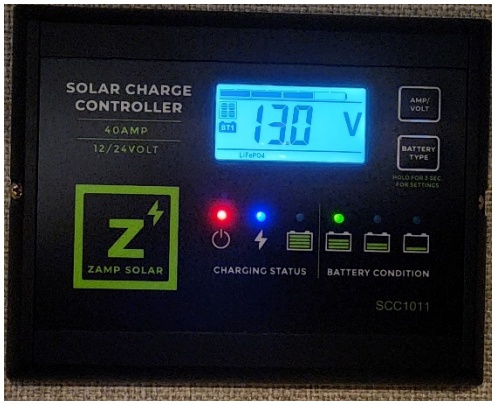
Power type 12v

Fuse type: breaker style. Fuse Location power box, or under the passenger or drivers seat base.

Maintenance

it is best to run the AC once a month for about 15 minutes to keep the seals good and refrigerant from leaking.

Solar Controller



Power type 12V

Fuse type: blade. location upper cabinet, drivers or passengers seat base side fuse blocks, #2 fuse location is underneath the solar panel on the roof.

This controls the power delivery to charge the batteries from the solar panels. Typical charge levels vary depending on how much sun is available to reach the solar panels. This will be anywhere from 0 amps per hour at night or as high as 5 amps per hour during peak hours based on a 100W solar panel. You may get as high of a daily average of 2.8 amps per hour depending on conditions. A 100w solar panel is not enough to keep your van fully charged by itself in the best of conditions during normal use. monitor your batteries through the magnum or lithionics displays for more details on your batteries.

Solar Panels

These are located on top of the van. Cleaning these periodically helps their function.

Auxillary solar port:

Location: Passengers or drivers seat base

If you buy a portable solar panel and use the auxiliary port (if available) it is usually located on the passenger seat base. The auxillary solar panel you purchase will require a separate or built in solar controller in order to provide a charge to the battery.

Shore Power

This is how you charge your house batteries, the van build batteries, from an electrical outlet. The connection point is located under the hood. If you connect the van to the power source, i.e. outlet to the home, garage, campsite or other source the half moon on the shore power connection will light up blue. This is how you know the van is plugged in properly and ready to receive power. NOTE shore power does not charge the van start battery. Shore power is recommended to be set at 15amps which is set via the magnum inverter. If this gets changed higher, i.e. 30amps, it can cause the breaker to trip inside your house and inside the van if the socket can not handle the load. Most homes are 15 amps. If you are having issues with blowing your home or van breaker, try throttling down further to 10AH.

Shore power plug in. located under the hood on the drivers side firewall.

Shore power cord 30Amp

We provide this cord it is used to connect the van and charging source, i.e. home, garage, or campsite.

The 220v shore power cord adapter for use in 120v standard outlets.

Shore power inverter Breaker

This is located behind the control panel and operates like a traditional home breaker which will trip if there is a power draw or surge that is too great or a surge came from the delivering power source. *Note: This breaker box only affects Shore power functions.*

If you are not receiving a charge through shore power or multiple components and outlets are not working this breaker needs to be cycled.

Inverter

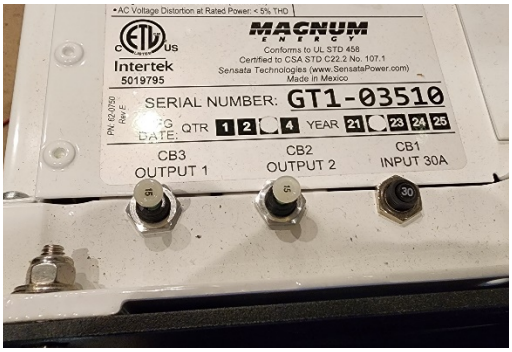
Location: Power Box

Breaker location: Behind the control center on the breaker box.

We use a Magnum energy inverter. This is what operates the outlets, microwave, and induction cook top, when you are NOT plugged into shore power. When you are not plugged into shore power it is required to turn the inverter on to use these components. This converts DC, direct current, from your battery 12v to AC, Alternating current, for the 120v electrical. The inverter also controls the charging of the house batteries from Shore power. From time to time the inverter needs reset. Refer to the Magnum owners manual for more detailed instructions on trouble shooting and resets.

Outlet breaker reset 120 v and shore power

If you have a 120 outlet not working or shore power charging issue one of these breakers may need reset by pressing down on the button.



Soft reset button

If you are having an issue charging, inverting the inverter may need to be reset. Consult the magnum owners manual for more detailed troubleshooting and procedures.

Induction cook top

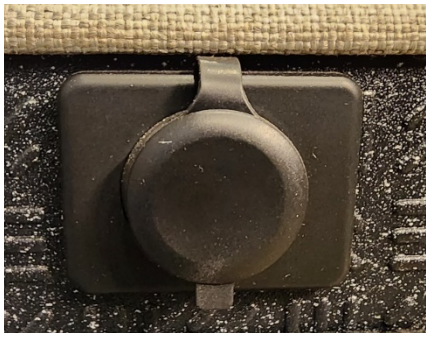
Power type: 110 Inverter / shore power

This requires shore power or the inverter to be on when using the cook top. This unit is plugged into a 110 outlet typically behind the Galley. The cook top requires ferrous metal pans to operate. aluminum or ceramic base pans will not work. Check the pan manufacturer for compatibility for induction tops.

USB / USBC outlets

Power type: 12v

These work off of the house batteries and can be plugged into for use at any time. These outlets are always on unless your batteries are depleted or shut down.



110v / GFCI outlets

Power type: 110v inverter / shore power

Breaker: Inverter and breaker panel behind control center.

The 110v and GFCI outlets operate similar to a home except that they require the inverter to be **on** or plugged into **shore power**. if the outlet has an LED indicator the easiest way to check if it is on is if you see a green indicator light. If the light is orange the GFCI has been tripped and needs reset on the plug itself. do this by pressing the reset button on the plug. If one plug is tripped the entire string of plugs will not work.

Ceiling Vent Fan(s)

Power type; 12V

Fuse: blade style Fuse location: upper cabinet fuse blocK

Battery Parallel switch.

Location: Driver's seat base

2017 - present

This switch is used in recovering dead house batteries or jump staring the van chassis battery.

This switch is designed to be used, for a brief period, to tie together the two battery systems of the van allowing the alternator and or shore power to recognize the house batteries in order to charge them due to low battery voltage.

This can also be used to Jump start the van battery in an emergency. 2020 and up builds

Located on the top edge on the front of the driver's seat base is this momentary switch. refer to the battery recovery document for more details on usage.

Air compressor

Compressor Location: under the hood

Fuse type: high amp breaker style;

Fuse Location; passenger seat base or power box

Power Switch location: 2020 and older passenger on drivers seat base. 2021 and newer passenger seat base or B piller

Outlet Location: air outlets slider door entry, under the hood, rear of the power or water box, drivers seat base, and wheel wells. To use the air compressor on vans built approximately 2020 and older it requires the van to be in the on position or running. The toggle switch turns the compressor on .

Alternator regulator (secondary alternator only)

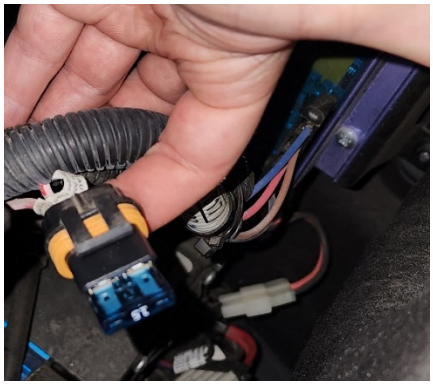
These regulate the power coming from the secondary alternator. We have used two types in our builds your van will only have one of the two.

Balmar regulator: 2015 – 2022

Location: engine bay on the passenger side.

Fuse: type; blade. location; inline

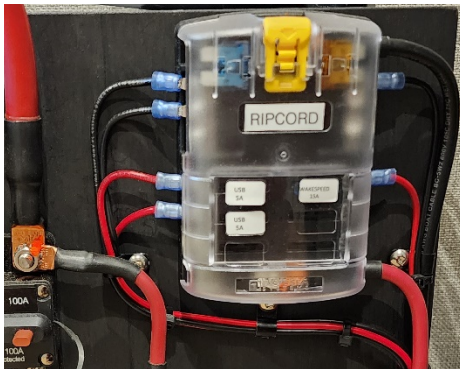
In line fuse



Wakespeed regulator: 2021 – current

Location: Power box.

Fuse type: blade fuse. Location power box; on a fuse block



The orange light shows the function of the wakespeed. If the orange light is not on while the engine is running it is likely there is a blown fuse or the regulator is not functioning.

Battery Shut off switch

Mid 2023 – current and select older builds.

Location: Power box.

This switch is used for emergencies, maintenance, or storage. This switch disconnects the house batteries from the entire system. On is functioning as normal Off disconnects the batteries from the system.

If you plan to store the van without plugging it in this switch is turned off to prevent the depletion of the batteries.

OUTSIDE VAN

WATER SYSTEM

Identification, usage, storage, and maintenance.

The water system of a van is different than that of a house in a few ways. The supply of water and power is limited, components are not always on and the water is susceptible to freezing at cold temperatures. This means you must manage and monitor your resources for best use and to prevent damage to the van components. This guide goes over the components associated with the water system identifying them, their power source, maintenance and trouble shooting.

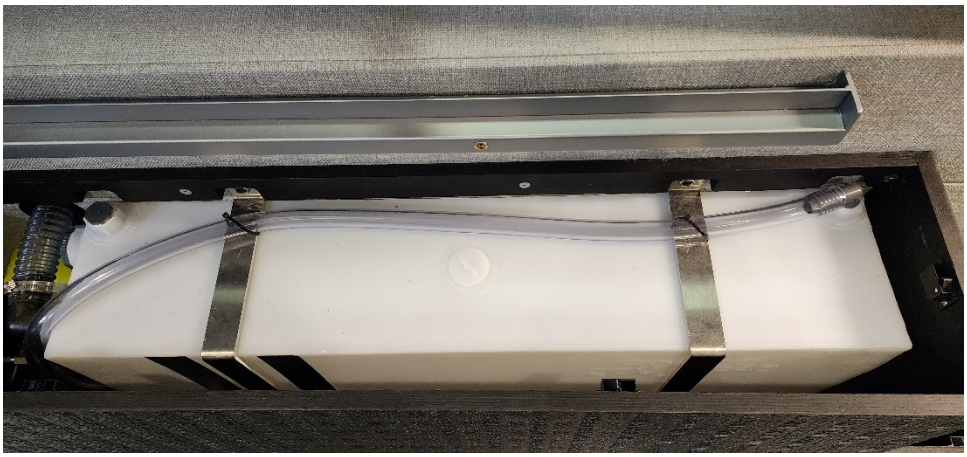
Water box

This is the heart of your water system housing the majority of the components relating to the function of your vans water system. Typical components in the box are, water tank, water inlet tube, water pump, water pump particulate filter, floe system or blowout valve, rear shower outlet, hot water mixer valve, hydronic reservoir, and heat exchanger.

Water tank

Location: Water box

This holds your water. There is a water inlet line, a vent line, and a drain line connected to the tank.



Water tank Drain.

Behind the access door of the water box or by removing the water box top you will see a valve to open or close the drain for the tank. The tank drain tube can be identified as a red colored pex pipe that goes through the van floor; you will see some silicone where the pipe meets the floor this drain pipe also has a valve to open or close the flow of water for draining purposes. This drain is used to drain the water from the water tank for winterization or sanitation.

Water Valves

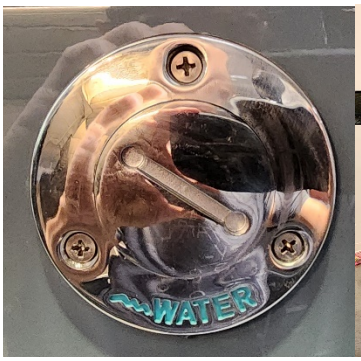
Turn the valve parallel to the water line for open or perpendicular for closed. When the valve is open If there is water in the tank it will begin to drain on the ground.

open

closed

Water fill

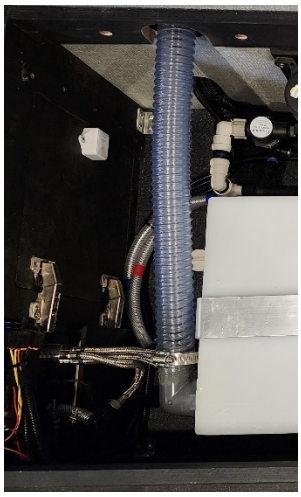
Location: Most common drivers side of the van same side as the water box.



Custom made
OSV Key for water fill

Use the house made outside van or the two prong key to remove the fill cap. When threading the cap back on do not over tighten as this damages the o-ring and over time the cap will leak requiring a replacement o ring. Once the cap stops under light pressure about an eighth of a turn or less past that is sufficient.

Water inlet line



This is the line in which the water travels through to fill the water tank.

Water fill nozzle

This connects to a garden hose to help the process of filling the van with water. We now provide a fill nozzle 2021 and up: that can regulate the flow of water; if the flow is too high or fast water will spill back out. Regulate the flow with the black valve to prevent this.

Tank system monitor

I-series

power type 12V

location; upper cabinet or water box.

fuse type: blade, location upper cabinet

This monitors the level of your fresh water tank and grey water tank, if you have one. You must turn on the gauge to see and cycle through the display showing your tank levels. There is an audible alarm for the water and grey tank. We recommend leaving that on in the beginning and only turning off if you do not wish to be notified of low or full levels via an alarm.

Grey water tank

Location: underneath the van passenger or drivers side.

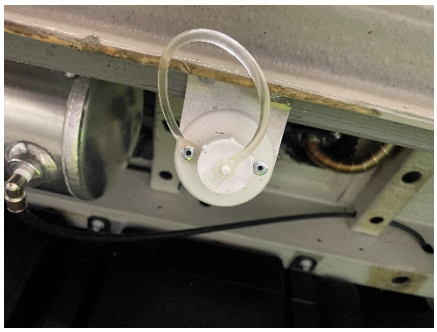
If you have this option. This holds the waste water from your shower and sink. Some campgrounds or state, i.e. California require one for water use. It has a blade valve to release the water from the tank and large screw cap. Remove the cap first then open the blade valve to drain the tank. You will drain this when full or when you want to winterize the van.

1. Open the cap by turning counter clockwise

2. open the blade valve to drain by pulling the handle to the left.

Sink and shower drain.

Location; under the van directly below the sink.



If you do not have a grey water tank there is a cap underneath the van to allow water to drain onto the ground when using the sink or indoor shower. You will know if this is not open as the sink will fill with water. Open this when you want to use the sink or indoor shower

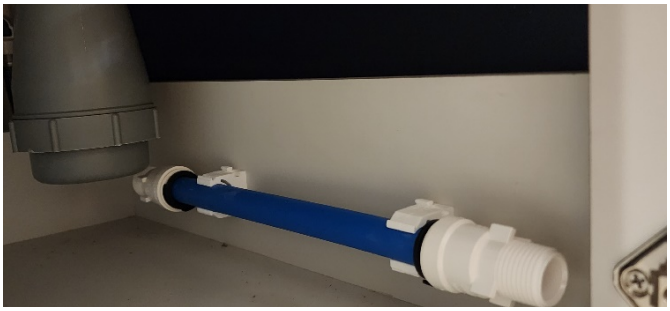
Carbon filter

Location: galley under the sink.

This inline carbon filter we install to filter the water for some contaminants and taste. It needs replacement periodically. Once per year is a good habit. The filter also needs to be removed when winterizing or sanitizing the water system. There is a straight pipe clipped under the sink cabinet that you replace the filter with when winterizing. *see the winterization section for more info on this.* ***Flow Pur FP10GKT***

Straight pipe

This is used if you do not want to use the carbon water filter or during winterization. you put this pipe in place of the carbon filter.



Water Pump and switches

power type: 12V

Location: water box

Switch location; upper cabinet, shower, water box next to the rear shower.

Fuse type: Blade. Location; most common, Upper cabinet fuse block

Water pump on off switch

To use your shower or sink you must turn on your water pump to create water pressure. Turn the toggle switch to the on position most of the time you will hear the pump turn on if it is building pressure. Keep the pump on while you are using the various faucets. It is important to turn this off after you are done using the faucets. Each switch location must be off for the pump to be turned off. Usually there are two (depending on your build) one on the overhead cabinet and one by the shower outlet.

Shower outlet

Plug the shower end into the outlet you should hear a click when it is fully engaged. Flip the level all the way for constant on or leave it for a press to use function.

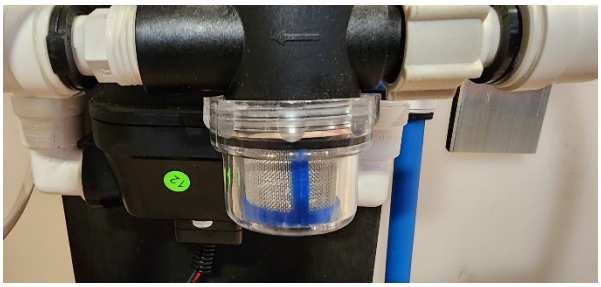
Shower hose

Over time this may dry out and no longer snap in as usual. A small amount of plumbers silicone lube can be used around the ring and it should snap in as before.

Particle filter

Location; water box

This is a stainless screen that filters larger particles before going through your water pump and into the fresh water lines. It protects the pump and filters larger particles. This needs to be cleaned out from time to time and during the winterization process it needs be unscrewed to get the water out of it to prevent freezing. *see the winterization document for more info on this. Model: 51S01 50 mesh*



Air blowout (about 2021 and older 2023 - present.

Location; Water box

There is a Schrader valve (i.e. bicycle or car tire valve) with a regulator behind it. This is used to blow out the lines on your water system during a cleaning or winterization. If you have a Floe system you likely do not have this (see below for Floe.)Simply connect an airline from the air compressor to the Schrader valve and blow out your system. Follow the detailed instructions on the winterization document on when and how to do this. *note do not blow out your system unless you have removed the charcoal filter and replaced it with the straight tube.*

Floe (about 2021 -2023)

Location; water box

Fuse type; Blade fuse. Location: upper cabinet fuse block

This is used on the last step of winterizing your van or clearing out the system of water. refer to the winterization instructions for full use information. It has a black rocker switch for on and off. the blue valve is to open up the air line when clearing out the water from your water system for cleaning or winterization of your water system.

HEATING SYSTEM

When using the furnace(S) for heat or hot water it is important to note that these systems use the van diesel fuel to make heat. The heaters will not function if the van is at or less than 1/4 tank of fuel If the van is not parked on level ground it may require more than 1/3 of a tank to operate as the angle of the van will change the orientation of the fuel inside the tank where the heaters pull the fuel from.

The most common issue with the heaters not working is that the fuel level has gotten too low. Being below 1/4 tank or parked on an incline and the fuel line picks up an air bubble. we will go over the troubleshooting of the heaters below for those issues.

Another common issue that a heater isn't firing is because of low voltage. If the batteries are drawn down too far; either at or below 11.0 volts the heater may not fire until the batteries are charged above this voltage. We mainly see this occur on vans with AGM batteries as AGM voltage drops much lower upon discharging.

We have used a few different types of heating systems.

All in one units

These make both the hot water and cabin heat

Maintenance: At the end of each trip

Fuel: diesel

Fuse type: blade x 2 ; Dual top x 3 blade fuses.

Location: Passenger seat base or drivers seat base.

All in one air heater and water heater controllers

Rixen all in one 2019- present

Webasto Dual top
Analog controller 2015 -2019

Webasto Dual top
Digital control panel
2015 -2019

Air Heater controller (s)

Heater

Fuel: diesel

Power: 12v

Fuse type: blade x 2

Location: Passenger seat base or drivers seat base.

Maintenance: At the end of each trip.

Webasto Air top heater controller

When <u>on</u> the control LED's will light up red temporarily until the display goes to sleep. The three wavy arrows indicate the heater is on. set the temperature with the rotating dial on the outer edge of the controller. *Consult the webasto owners manual for more detailed useage.*

Some versions of the controller have blue tooth and smart temp capability These have a blue tooth symbol on the lower button and say smart temp.

Eberspacher / Rixen Air heater controller

The owners manual(s) for your specific heaters is located in the passenger door in the owners manual folder. these will have specific instructions for your model.

Hot water heater

power type: 12v

Shore power (for electric heat mode only, requires the breaker to be turned on.)

Fuel: diesel

Fuse type: blade x 2 sometimes 3 (all in one only)

Location: Passenger seat base or drivers seat base.

Hot water can be made via the furnace (diesel fuel) or shore power. We recommend hot water be made by the furnace it heats up faster and gets hotter.

turning on the furnace: depending on your build there may be a toggle switch, a button, or a dial. It takes a few minutes for the water to get hot from the furnace. The water can be extremely hot when the mixer at the faucet is set to full hot. As with all the systems we recommend turning the hot water off when not in use.

Hot water breaker switch; *for hot water made via shore power only*

Location: behind the control panel.

We recommend hot water be made by the furnace it heats up faster and gets hotter. Thus leaving the breaker off unless you specifically want to make hot water from shore power. the breaker is located behind the control panel on the upper cabinet. Hot water made via shore power is colder and takes longer to heat up; It also runs the risk of the heater being left on accidently through shore power during storage and can cause issues if constantly left on.

Shore power breaker box.

Heated floor temperature controller. *Only vans with a heated floor system*

Hydronic fluid tank (2019 and newer)

Maintenance: 1-2 times per year

This is the holding tank for the hydronic fluid (car antifreeze or coolant) the fluid runs through a heat exchanger to heat your hot water, radiant heat floor, and or cabin heat . The heater radiator fluid reservoir “large stainless steel rectangle” with a radiator cap on top” requires periodic level checks and will consume and evaporate a small amount of fluid. “DO NOT check when hot.” This is all dependent on frequency of usage. We recommend starting with checking it two times per year and assess the frequency that you need. Keeping the level above 1/2 full and no more than just below the neck. The fluid used is green premixed 50/50 radiator fluid found at any automotive shop and many grocery stores. Either use premixed; or if you mix your own with concentrate make sure to use distilled water only or it will reduce the life of your heating system by leaving mineral deposits from impure water.

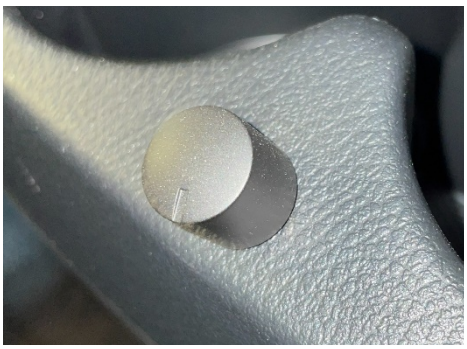
STEREO

Identification and Usage,

Depending on the stereo option you selected there are a few different capabilities.

This guide is dedicated to 2019 – current builds with the factory infotainment system.

- If you have this option the stereo will only operate if the van ignition is turned on or running the same as a traditional car stereo. We identify this system the Good System



Subwoofer controller.

There is a black adjustment knob for the subwoofer bass level only. turning it counter clockwise for less clockwise for more.

If you have the next level of stereo you have a bluetooth capable interface via a hard wired remote control to the amplifier. With this option music can be listened to via a bluetooth audio source most commonly your phone when the van dash stereo is off. This remote control is on the better and best systems.

Amplifier Remote control

has three options available depending on your build Red, Blue, Green. The modes change the audio sound profiles and designation.

Remote operation

- **FADE** - Rotating the larger bottom circle adjusts the fade of the speakers front to back.
- **BASS** - the top smaller circle is the bass adjustment for the subwoofer.
- **SOURCE** - Pressing the top button changes the audio source from blue (Bluetooth source), red (Factory stereo), and green (tv option only).

Pairing to remote.

Blue is for a Bluetooth audio source only and when you are in the center of the van. This mode is intended to be used when your van ignition is off, for audio sources while camping or parked.

MBTRX is the name of this blue tooth control that you will pair with.

Pressing the top button changes the source to blue.

Amplifier switch

Blue tooth mode also requires the amp to be turned when used separate from the van ignition via the on off switch located on the dash. This switch by passes the ignition of the van and turns on the Amplifier to then be used in the blue or green modes (tv only). This switch should be off when driving.

red is for when you are driving and sitting up in the cab and using the factory stereo head unit only.

Pressing the top button changes the source to red.

Green is if you have a TV and will provide a tuning centered around the TV.

Trouble shooting.

If the audio in the front or rear is not sounding full the fade knob is usually too far in one direction or the other. Turn the fade knob to the center and adjust from there to your preference.

If you are not hearing your audio typically you are on the wrong source. Red is for driving, blue is for a blue tooth source, green is for TV

OUTSIDE VAN

INTERIOR

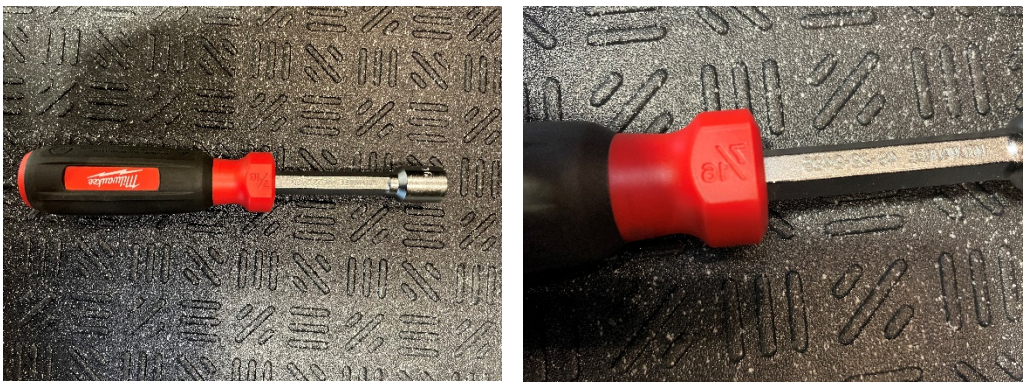
Sun shades, window shades, and vent covers:

Using the sun shades during storage can be very important. Particularly if you live in a hot area. Direct sunlight in high temperatures can cause the laminate to shrink on the cabinets. This can cause delamination issues.

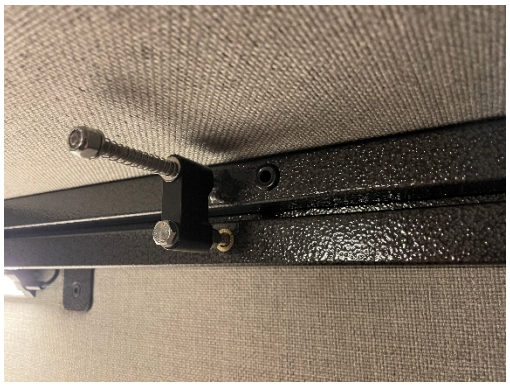
Bed Panels

The bed panels are secured with a two bolt locking mechanism. It requires a 7/16” inch tool to tighten or loosen them for removal or installation. We now provide this nut driver with your van. You can use other tools to perform this procedure as well. Follow the steps below for removal, reverse the steps for installation. The bed panels can be stacked on top of one another or removed entirely. Caution: When traveling lock the bed panels; with the bed panels stacked make sure to strap them down before travel. If the panels are not secure On a collision or impact the panels could come dislodged causing damage or injury.

Nut driver for bed latch 7/16



Step by step bed panel locking mechanism.



1. Locked position with at least three threads engaged or three full turns.

2. Loosen the nut with the 7/16 nut driver until all the threads are out of the socket.

3. pull the bolt out of the socket

4. rotate the bed latch and insert it into the hole on the bed panel.

5. fully Unlocked position. The bed panel is ready to be stacked or removed. *Note: there are two latches per bed panel. One on each side of the van.*

Drawer face

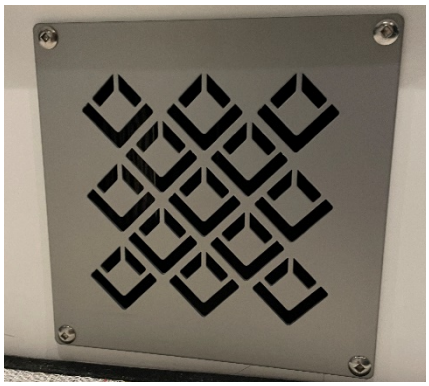
A properly latched drawer face will be flush with the cabinet. If it is not latching properly it is likely an issue with the drawer bumpers.

Drawer face bumpers

Over time these bumpers can wear out or fall off. The drawer may have a hard time latching if they are missing or worn. We recommend inspecting them annually or more as needed depending on use.

They can be purchased at hardware stores such as home depot or online.

Interior vents.



These vents serve multiple functions depending on the location. It is important not to block them to prevent damage to the components in the van.

1. On the lower rear doors they allow for air movement for easier door usage when opening and closing the rear doors.

2. On the water box or cabinetry involving the heater. Recirculating Cabin air inlets for the van build heater system. Blocking these can cause lighter items such as plastic bags or paper in the galley drawers to be sucked into the heater fan causing malfunctions or damage.

3. On the front and sides of the galley for the cooling of the fridge.

4. Exhaust cooling vent on the power box for the magnum inverter.

OUTSIDE VAN

FUSES AND BREAKERS

Fuses protect your components from power surges. If a component isn't working it is most likely because the component needs reset or you have a blown or bad fuse.

Trouble shooting.

- A single component isn't working. i.e. solar controller, water pump, water system monitor, heater, hot water heater, air compressor, fans.
- To fix this the component usually needs one of the following; a reset or replacing the fuse.

Resetting a component:

- pull out the fuse wait 15 seconds and reinsert.
- Cycling the breaker; Flip the breaker switch off wait 15 seconds, then flip the breaker back on.

Replacing a fuse

- Swapping the fuse or replacing a bad fuse.
- A fuse can be blown or burnt which will be visible or sometimes a fuse is bad with no visible signs and needs replaced with a new one.

Multiple components not working

The typical location for most fuses are inside the overhead cabinet next to the control center or behind the removable plastic side panels of the drivers or passenger seat. Larger high amp fuses are under the seats or in the power box. *See below for more specifics on locations and images.*

Fuse Types

Blade fuse.

This automotive style is the most common fuse for your vans components. These can be sourced easily at automotive stores. We recommend having an assortment on hand of 5A, 10A, 15A and 20A fuses as spares for your travels. The most common being the 10A and 15A. These are generally in fuse blocks in locations listed below or in line with the specific component.

Locations. Drivers and passenger seat bases, power box, upper cabinet, or in line trailing from a component.

Blown fuse: the center wire will be burnt or broken. This severs the connection and will cause the component not to work.

High Amp breaker

These are high amp fuses that are typically used for air conditioner, SPOD, audio amplifier, and air compressors.

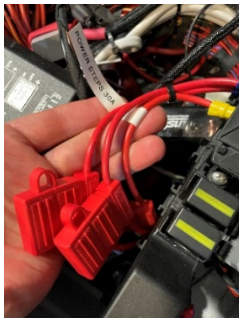
Location by frequency; Power box, inside the passenger seat base, inside the driver seat base.

closed and operating

open or popped.

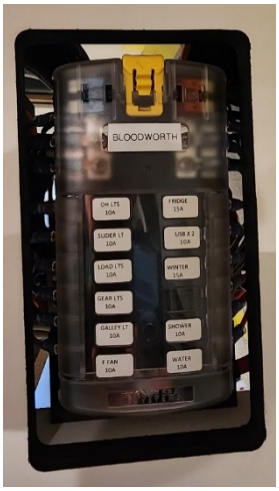
Inline fuse

Locations under passenger or drivers seat base.



Fuse Block

Houses blade fuses



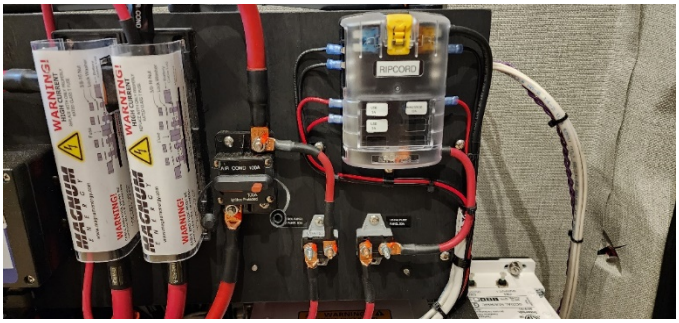
Location by frequency

1. Upper cabinet next to the controls

2.Passenger seat base

Passenger seat base

Fuse block 2018 and older vans or vans that have been upfitted with new components after your original build.

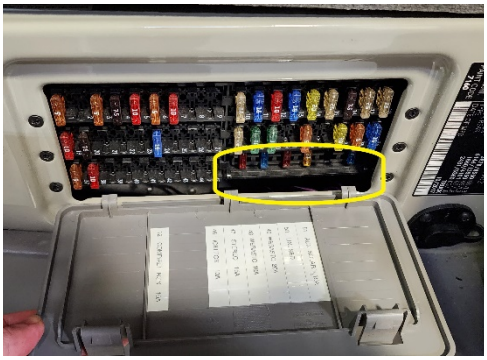


3. **Power box fuse block** location. Power box

Factory fuse panel

Drivers seat base panel fuse block

This is the location for the factory Mercedes fuses. On 2018 and prior vans We use the lower right corner for OSV fuses. 2019 and new this area is typically not used.



2018 and older, drivers side

2019 –current. passenger side.

The breaker panel - for shore power

Location: behind the control center

This is for shore power functions only. When the van is plugged in to a power source via the shore power connection. To access the breaker lift open the cabinet face by gripping the heater controller and pulling outward.

Breaker panel

This houses the breakers for the

inverter
fridge
hot water (electric mode)

The breaker switches have an on and off position. If any of the breakers are off the component will not work. Cycling the switch from **on** to **off** waiting 10 seconds then back to **on** can alleviate some power issues.

OUTSIDE VAN®

USAGE

Usage and best practices:

During the use of your van one thing to keep in mind is that the vans resources are finite as compared to a house. Thus a different mindset is required when using components that require power, fuel, or water.

Power system – usage

This is a guide to the power system usage identifying the different types of power sources and components specific to that power source.

The vans usually can go 2-4 days without needing a charge on a normal use outing, operating various functions such as AC, induction cook top, microwave, fans, heater, outlets, lights ect.

1. When you use a component turn it OFF when finished.
2. *When you leave the van check to make sure everything is off. Unless you specifically know and understand the power consumption of a component you want to leave on and the relative capacity of your batteries or fuel level.*

   Turning components off saves power / fuel and reduces the possibility of issues.

Components and power types.

Components in the van can require different methods of power and or fuel to operate. It is important to familiarize yourself with what type of power or fuel each component uses. This is a quick reference list. Full details on each component, power type usage and maintenance are in the power system section.

Inverter; shore power. Components needing 110v. requiring the inverter to be on or to be plugged into shore power.

House batteries 12v: the house batteries are always on unless the house batteries have been turned off, disconnected, or are discharged.

Ignition switch on: Van ignition in the on position either turning the key or pressing the ignition button.

Fuel: The van shares a fuel tank with the any air heater or water heater furnaces installed on the van. The vans heaters use a separate pick up tube that uses the factory or aftermarket fuel tank.

Van start battery 12v: We isolate the van build from the Mercedes chassis. The van start battery is only used for factory Mercedes equipment except for the optional power amp steps. This is done so the amp steps will always be able to retract when driving upon a house battery failure.

Ignition switch on components:

Mercedes components, i.e factory stereo, Dash factory usb and auxilary power outlets. Van build components: roof rack forward Light bar, basic stereo with subwoofer only control, Air compressor pre 2021.

Inverter or shore power components:

Microwave, induction top, 110 outlets, water heater "*electric heat option only"*

House batteries 12v components: (always on) USB outlets, Interior Lights, Vent fans, Air conditioner, water pump, weboost,

Fuel: Air heater, water heater or all in one units. These use the vans fuel to create heat via a furnace. Keep your fuel level above 1/4 to avoid issues when using the furnace(s)

Inverter components.

The induction top, microwave, and 110 outlets

These use an enormous amount of power 100 amps or more per hour at a time. The vans builds average 200-600 total amp hours of available capacity. meaning you may only have a few hours of use on each before you are out of power. These larger components require the inverter to be turned on when not plugged in. be sure to turn the inverter off when not in use.

Large 12v components

The air conditioner, and air compressor

These use an enormous amount of power 100 amps or more per hour at a time. The van builds average 200-600 total amp hours of available capacity. meaning you may only have a few hours of use on each before you are out of power and need a recharge.

Smaller 12v components

Van build lights internal and external, usb-C outlets, water pump, heater, water heater furnace. Bluetooth controller stereo amplifier, weboost antennae.

These do not use a large amount of power, however it all adds up over time especially the hours you are asleep or not in the van. Notice when you turn on your cabin lights the change in draw or by just switching the inverter on.

The water pump specifically is important to turn off not only for power saving but in the case something goes wrong. if the water tank gets low and there is no more water supply the pump will keep running. If you leave the pump on and this happens you may be out on a hike or where ever the pump will run the whole time and the batteries drain to nothing. In freezing scenarios or if a pipe fails and your pump is on, all the available water will be pushed out of the break point in the pipe and into the van.

Fluids and fuel.

Diesel fuel.

- Mercedes recommends B5 or less on most vans, *refer to the sticker behind the fuel door*. "B" meaning bio fuel. 5 is the percent. B5 would be a 5% blend of diesel and bio fuel. It is best not to top off the fuel tank when filling , when the fuel pump turns off you are done filling.

- The heater, water heater, or combo units use the vans own diesel fuel tank to supply fuel. These units require the van fuel level to be above 1/4 full to operate. Below 1/4 level or if the van is on a steep incline with a lower fuel level can cause an air bubble to develop in the heater fuel delivery line. It is recommended not to use the heater(s) at ¼ or less fuel level. Doing so will most likely cause ignition issues with the heaters requiring multiple starts or a heater reset.

- In very cold weather 15 degrees and lower; it is sometimes necessary to put an additive in the fuel to prevent what is called gelling of the fuel. If the fuel is gelling you will experience poor running, hard starts or heater systems failing to fire or shut off. Standard diesel fuel will thicken or gel at very cold temps. Some fuel stations have it premixed particularly in colder climate areas. If not the additive needs to be added manually and can be found at gas stations and other stores.

- The van's diesel fuel operates your heating components, I.e water heater, cabin air heater, or all in one units. The fuel pickup inside the tank for those components is set to operate at 1/4 tank or more assuming the van is on level ground. This is to prevent you from being stranded due to the heater running the van out of fuel. This means if you have 1/4 tank or less of fuel your

heater(s) will not work. If you are on unlevel ground your heater(s) may not operate depending on your fuel level and the angle of the incline.

DEF “Diesel exhaust fluid”

The fill container is under the hood with a bright blue cap labeled DEF. This is sold at every diesel gas station, auto parts stores and all in one grocery stores this is part of the emissions process of your diesel van. It is important to not let this level get too low there is a gauge on your dash indicating the level. We recommend not going below 1/4 as the DEF can then crystalize in the tank causing your vehicle to go into limp mode. After refilling the def it will slowly un crystalize in most cases. You may need to pull the battery cable or quick disconnection point on the start battery to reset the code and get out of limp mode.

Water System

As a best practice the water in your tank is good for.

2 weeks for potable water

1 month for non potable water.

If left in longer than 1 month it is best to sanitize your system before your next use. See the maintenance section on how to sanitize the system.

Cold Weather usage

- In freezing temperatures we recommend winterizing and removing the water from the van. *See the maintenance section for instructions on how to winterize the van.* Unless you are an advanced user and or understand that your vans water system can freeze if proper precautions aren’t taken. Even with proper precautions the system can still freeze. *See the advanced use section if you wish to use the water system in cold weather.*

- **Diesel Fuel** – Getting fuel from a source that already has cold weather additive or buying the additive to have on hand. Your heaters may not want to run properly without it as described above in the fuel section.

Hot weather

Shades

Window shades and “ optional “ Sun shades

Using the shades during storage can be very important particularly if you live in a hot area. Direct sunlight in high temperatures can cause the laminate to shrink on the

cabinets. This can cause delamination issues which would not be covered under the vans warranty.

Cooling

Power conservation cooling strategy

Using the vent fan(s) or AC in opposite directions can cool the van with minimal power. if you have two vent fans run one as exhaust and one as an inlet. This can also be done with the AC using the fan function only if your van has only one vent.

Heating system

Hot water and hot air.

When using the furnace(S) for heat or hot water it is important to note that these systems use the van diesel fuel to burn and make heat. The heaters will not function if the van is at or less than 1/4 tank of fuel If the van is not parked on level ground it may require more than 1/3 of a tank to operate as the angle of the van will change the orientation of the fuel inside the tank where the heaters pull the fuel from. Trying to operate the heaters with a low fuel level can cause air bubbles in the heater fuel line requiring heater reset procedures to clear the air from the lines.

Water fill hose.

it is a good practice to have a dedicated water fill hose for the van. Drying this out in between use will prevent mold and bacteria from accumulating inside.

Vents inlet and exhaust

We commonly see travel bags and equipment blocking vents. When loading the van keep the vents free from obstructions. usually located on the power and water boxes. don't block them. The heater pulls air from them and the power system cools through them. Doing so can cause damage to your systems.

Ventilation, moisture, and heat - usage

Moisture

Our lungs breath out a lot of moisture, it is important to ventilate your van during use. Not doing so builds up condensation on the interior and van sheet metal particularly in cold weather. One particular spot is the overhead passenger area near the front window. Water will accumulate there and will drip down by the visors and appear that

the van is leaking when it is not. When the weather is cold the vent(s) can be cracked open allowing moisture to escape with the heater on.

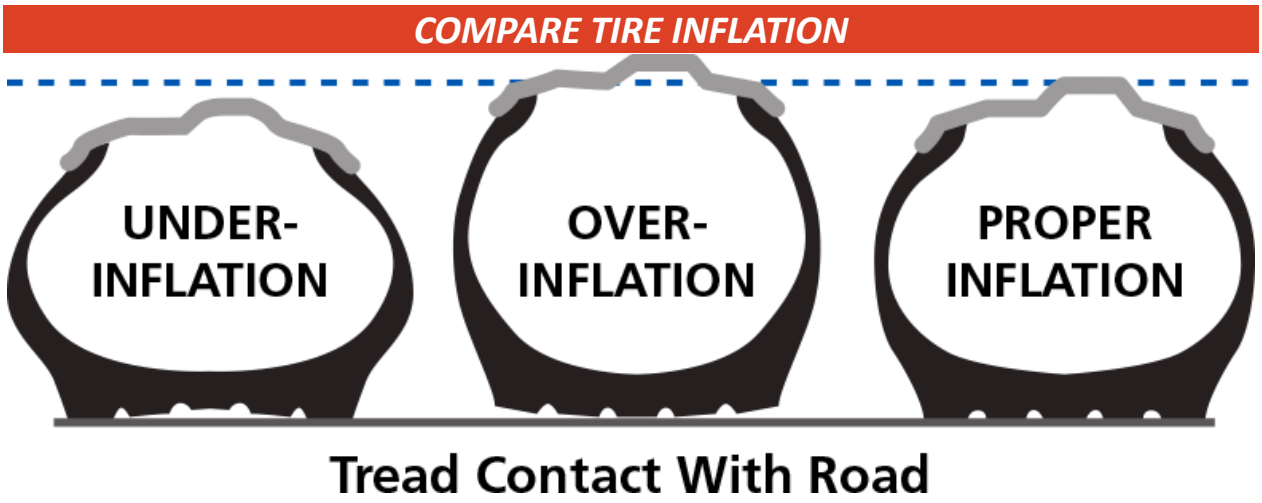
In areas with frequent humidity and rain keeping a dehumidifier or passive air dryer in the van can help prevent mildew and moisture damage and or smells from building up during storage.

TIRE INFLATION BASICS

SO WHAT EXACTLY DOES PSI STAND FOR?

Want to prolong the life of your tires, the comfort of your ride and the safety of your truck? It's not complicated. Start by checking your tire pressure every month when your tires are cold, before driving. Here are a few tips to help you get your PSI (which stands for pounds per square inch, by the way) just right.

Our general recommendation for Pressures are 75lbs in the rear tires and 55lbs in the front tires



THE EFFECTS OF UNDER-INFLATION

Under-inflation increases sidewall flexing, which then generates way too much heat. Too much heat leads to tire deterioration. And tire deterioration leads to bumps, bruises, cuts and tire failure.

THE EFFECTS OF OVER-INFLATION Over-inflation makes the tire very susceptible to damage, along with rapid tread wear.

Advanced use.

Adventure off grid long extended usage.

If you are continually adding water to your system once per week or so while boon docking it is not necessary to drain the tank of water. Use best judgement on this. a tablespoon of bleach or a specific enzyme could be added once a month to keep the system clean while in use.

Water conservation. Water is the most limited resource in the van even more than power by far.

Using paper plates and bowls save on water and work well for starting camp fires.

Wash everything in the same water. if using a pot to cook. When finished put your utensils and cups and a few drops of soap with a little water in the same pot and wash.

The heater draws a bit of power the fan and the glow plug specifically.

Leave the heater off when you are asleep to conserve power. *only For above freezing temps*

Advanced cold weather use

There is no guarantee that your vans water system will not freeze in cold weather. However if certain precautions are taken many users enjoy using the vans water system in cold weather.

The heaters are very efficient and use about 1 gallon a day if they run 24 hours a day on high. Setting the temperature will be relative to the outside temperature. As the heater is very efficient setting a higher temperature such as 60 degrees will lower the risk of freezing.

Covering the rear door vents located on the lower frame area surrounding rear door near the floor will prevent cold air from entering the vents. These vents are designed to allow for free movement of the rear doors caused by a suction effect when opening them.

If you have more than one vent on the water box. Covering the front vent and leaving the rear vent (closest to the back doors) open will create an effect where more of the recirculating air from the heater will enter through the back of the water box and keep the water system warmer from the directed passing air.

OUTSIDE VAN®

STORAGE

In the storage section we will talk about how to store the van in different scenarios short and long term.

Short term 1-3 weeks

Water system.

As a general rule the water in your tank is safe for drinking for two weeks, and one month for non consumption use. this is based on using unfiltered city water and garden hoses.

Power system

Your batteries will drain even if everything is turned off. A van can usually be unplugged if everything is turned off inside for a period of about two weeks without needing charged. We recommend leaving the van plugged in 24/7 when not in use for short term storage, or If you have a shutoff switch switching off the batteries and removing the fuse for the solar panel.

Refrigerator

If you want to keep things in your fridge it is best to leave your van plugged into shore power. If you do not have shore power the fridge uses 40-50 Ah a day if it is set for normal use. Depending on your system the van can go 3-10 days with the fridge on without shore power.

Ventilation, moisture and heat - storage

Heat

In hot seasons leaving the vents open can dramatically reduce the interior temperature of the van protecting components and the laminate.

Shades

Window shades and “ optional “ Sun shades “ optional “ Vent covers

Using the shades during storage can be very important particularly if you live in a hot area. Direct sunlight in high temperatures can cause the laminate to shrink on the cabinets. This can cause delamination issues which would not be covered under the

vans warranty. If you do not have sun shades or vent covers these are a worthwhile investment to protect your van and enhance the life of the components.

Moisture

In areas with frequent humidity and rain keeping a passive dehumidifier or air dryer in the van can help prevent mildew and moisture damage and or smells from building up during storage. In high humidity areas the moisture in the air will condense on the windows and some interior spaces such as the headliner area.

Long term storage 1-4 months

Water system

Perform a winterization of the water system. Drain the water from the tank, run all the water out of both the hot and cold lines using the water pump. Blow out the lines with an air pressure regulated compressor or floe system.

empty the grey tank

Batteries:

House batteries “ van build batteries”

There are two strategies to storing the van batteries.

We recommend leaving the van plugged in 24/7 when not in use or disconnecting the batteries. Not doing so will cause damage to the batteries either lower their lifespan or ruining them completely.

1. **Plugged in.**

   Plug the van into shore power. This also requires checking on the van every few weeks to make sure the charging system and batteries are functional. It is possible that a breaker in your home or in the van can be tripped during storage causing your van not to be charging which then results in battery damage.

Pro: easy to do. Doesn’t require turning off the batteries. Allows for use of the refrigerator while parked.

Con: requires checking on the van batteries. Reduces the life of the batteries on lithium.

2. **Disconnecting or shutting off the batteries.**

You can disconnect the batteries at the battery terminal or the battery disconnect switch if available; if you have Lithionics the batteries these can be turned off.

It is best to turn off everything you can in the system before disconnecting or shutting off the batteries.

If your battery system does not have a disconnect switch you can disconnect the first terminal negative cable to the batteries on AGM (2008 – 2021) and Relion (2020- mid 2021) batteries. The first terminal battery is the one that receives power from the alternator and inverter. *You will know if you have done this right as all lights, components and displays in the van build will go out.*

If you have a Lithionics lithium battery (2020 – current) you can simply turn them off via the power button on each battery. Mid 2023 – current turn off the red battery disconnect switch before turning off the batteries.

Lithium batteries like to be around 70% capacity for long term storage for best longevity. For optimum battery life draw the batteries down to 70% before storage. This takes the internal load off the battery. The easiest way is via the AC or induction top.

lithium batteries lose about 2% per month during storage when powered off.

AGM batteries lose about 5-10% per month when fully disconnected.

If the house batteries are fully charged “AGM” 70% “Lithium” and disconnected or turned off the house batteries can sit for about 1 year without needing a charge.

Solar If you have solar panels and you shut down your system with the van outdoors the solar panels will supply power to the system and your components will try to turn on. it is best to pull the fuse to the solar panel when disconnecting the batteries.

Note that when you disconnect the batteries via the terminals or power switch, or shut them off. They will not charge again until they have been reconnected or turned back on.

Chassis battery “ van start battery “

This is the battery that starts the van provided by Mercedes.

Note this battery will not charge up via shore power. Because of this during storage you must connected a separate trickle charger to the battery terminals located under the hood. or disconnect it via the quick disconnected located inside the van in the compartment next to the gas pedal.

If disconnected via the quick disconnect this battery can go up to 3-4 months before needing a charge.

Refrigerator

If you want to keep things in your fridge it is best to leave your van plugged into shore power. If you are powering down the van it is recommended to clean the fridge out and let it air out for several days to eliminate any moisture. Closing a fridge without drying it out will lock in moisture and cause the fridge to mold. The fridge needs to be completely dry on the inside before closing the door.

Ventilation, moisture and heat

Heat

In hot seasons leaving the vents open can dramatically reduce the interior temperature of the van protecting components and the laminate.

Moisture

In areas with frequent humidity and rain keeping a dehumidifier or air dryer in the van can help prevent mildew and moisture damage and or smells from building up during storage. Another option is to run the heater for a few hours to dry out the van before storing it.

OUTSIDE VAN®

MAINTENANCE

A guide and schedule to maintaining your van

The maintenance guide centers mostly around the custom build of your van and some common scenarios related to the Mercedes chassis. In this guide we provide common maintenance frequencies and explanations of the maintenance process.

Maintenance:

The components below may or may not apply to your van it is specific to the equipment that you have on your van. Below are the items requiring periodic maintenance.

Cabinets

Drawer face bumpers

Over time these bumpers can wear out or fall off. The drawer may have a hard time latching if they are missing or worn. We recommend inspecting them annually or more as needed depending on use.

The can be purchased at hardware stores such as home depot or online.

Tires

Rotating the tires frequently every 5k miles will extend the life of your tires significantly. Many vans use a multi terrain tire these tires can wear more quickly and especially if they are not rotated properly. We frequently see front tires wearing out quickly due to infrequent rotations and low tire pressure.

Tire pressure. Improper tire pressure will also wear the tires more quickly. Too much pressure will show wear in the center of the tire. Too little pressure will show wear on the edges.

Wheels

Lug nut Torque specs are as follows.

Aluminum Wheels 133 Ft lbs

Stock steel rims are 177 Ft lbs

Hydronic heating system.

Frequency: 1-2 times per year

Standard Premixed 50/50 green antifreeze.

The heater reservoir “large stainless steel rectangle with a radiator cap on top” requires periodic level checks and will consume and evaporate a small amount of fluid. This is all dependent on frequency of usage. We recommend starting with checking it two times per year and asses the frequency that you need.

Air Conditioner

Frequency: every 1-2 months

It is good practice to run this once a month or every couple of months for about 15 minutes to get the refrigerant circulating which also lubricates the seals. This helps to prevent frequent services on the AC.

Heater / water heater

Furnace: Frequency; at the end of each trip

Run the heater and or hot water heater on high for 30 minutes before storage at the end of the season to clean out the burner plate. Your heater depending on the model may even show that a maintenance run is required. This cycle cleans the burner plates of the furnace.

Fans: Frequency; 1-2 years depending on use.

Clean the inlet fans on the heater. Not doing so can create fault codes, noise or fan failure.

Roof

Frequency: once per year

Any place on the roof there is sealant, vents, AC, or holes should be inspected each year. light cracking is ok but deeper cracks need a new layer of sealant. hard brittle sealant must be completely removed first, then re sealed. Sealant maintenance varies widely depending on your usage and storage. High heat, direct sun, and organic matter is the main factor for seal deterioration. Cleaning your roof with soap and water regularly and storing out of the sun will prolong the life of the seals.

Shower hose connection

Frequency: once every few years or as needed

The plastic connecter and o ring can become difficult to engage. Using a multi purpose or plumbers silicone lube on the plastic male tip around the o ring area of the shower hose will fix this issue.

Slider Windows

Interior window Troughs

Frequency: 1-2 times per year or as needed

The interior trough of the windows can become dirty and or moldy as water and dirt can collect. These can be cleaned with a rag and or a small brush using a water and dish soap mixture.

Exterior Window drains

Frequency: inspect once a year or as needed

The drains can become clogged with debris like Pine needles or moss. Using a vacuum on each hole while the other holes are plugged or taped helps remove the debris from the drains.

Awning

Frequency / once per year or more if in dusty environments.

Lubricate with silicone or dry spray lube and clean the body mount awning brackets to ensure proper operation and prevent the lock in clips from breaking.

WATER SYSTEM

Replace in line charcoal filter

Frequency: once per year or as needed. More frequent replacement may be needed if your water system was not sanitized properly.

Water pump pre filter screen

This screen can get debris in it. Typically when you winterize this would be a good time to clean out the screen if it has debris in it.

Faucet Aerator screen

Just like your home the screen on the end of your sink faucet can be come clogged usually with calcium. This screen need to be cleaned periodically. Particularly This issue may show up during winterizing your van as when water dries it leaves behind minerals which will collect at the screen when air is blown through.

Winterize or remove the water from the water system

As a best practice the water in your tank is good for.

- 2 weeks for potable water
- 1 month for non potable water.

If left in longer than 1 month it is best to sanitize your system before your next use.

Sanitizing The water system
Frequency: once per year or as needed.

Under proper use Sanitize your water system once per year

Sanitizing procedure.

- 1 cup of bleach per 25 gallons.
- Put in the straight pipe under the sink like you are winterizing.
- add 1/2 cup bleach to the water tank, fill the tank 1/2 full
- add another 1/2 bleach and fill the tank full.
- Run each faucet 30 seconds.
- Let the system sit for a 24 hours with bleach water in it.
- Run each faucet again for 30 seconds or more to flush it out.
- Drain your tank
- Fill the tank with fresh water again.
- Run your faucets again 30 seconds to 1 minute to flush out the remaining bleach water.
- Follow the steps in the winterization process with air to remove the remaining water from the lines.

It is best to store the water system dry so it is ready for use on your next trip.

WINTERIZATION

Winterizing or removing the water from the van

It is important to remove the water from your van for sanitation or to prevent freezing.

There are two general strategies in winterizing your van.

Air or RV non toxic Antifreeze

This is where you choose what method would work best for you. Below are the pros and cons of each method followed by instructions for each.

Air method

Pros: does not require any additional products

Cons: can be more challenging to know if all of the water is out of the system

Antifreeze method

pros: easier to know you have winterized properly. If you see antifreeze coming out of the faucets you know the line has antifreeze in it and is safe from freezing.

Cons: requires purchasing RV non toxic antifreeze. Can temporarily leave a slight taste. Requires removing the antifreeze before your next use.

The equipment in your van will vary from others. Read each step carefully as the steps will indicate and specify based on your equipment. If your van does not have the equipment specified in a step simply move on to the next step.

1. **Drain the water tank**
   a. Park the van on level ground if possible. *Tip; a great way to do this is to open the valve and go for a drive particularly on your return home after a trip.*
   b. Identify the tank drain valve. It is located next to the water tank typically a red pipe and is the only water pipe that goes through the floor of the van. Turn the valve parallel to the drain pipe. If you did it right water will begin to come out on the ground. This will take 15- 20 minutes to drain.
   c. *(Quarter 3 - 2023 and newer builds only)* If you <u>have</u> Low point drains open both the hot and cold drains. Open all the faucets in the warm position to help the lines drain.
   d. The water level must be below the water pickup line a small amount of water left in the tank is ok 1/8th inch. Proceeding with the winterization before this event occurs will cause difficulties or an improper winterization which can lead to the system freezing. Tip drain your tank on the last leg of your trip while driving.
   e. *(Quarter 3 - 2023 and newer builds only)* Close the low point drains
   f. Close the water tank drain valve.

2. **Remove the bulk of water**.
   a. Open the sink drain underneath the van;
   b. *Grey tank equipped vans only*; remove the cap and open the blade valve to drain the water out.
   c. Macerator equipped vans only; turn that on in order to push any water from the shower to the grey tank. *Macerators are rare in our builds and are typically only used in place of having two separate grey tanks when a shower is on the opposite side of the sink. i.e. drivers side and passenger side.*
   d. Close all faucets if open.
   e. Turn on the water pump

f. Open the faucet you wish to remove water from using the warm position “halfway between hot and cold”. Keep it open until no more water comes out of the line. Then close the faucet. The reason for the warm position is so the water clears from both the hot and cold lines. Open and close the Faucet pausing 5 or so seconds in between allowing the pump to build and release pressure in the lines.
g. For the shower outlet(s) hook up the shower connection, make sure the shower head is lower than the connection point. This is essentially a repeat of step f. open the shower mixer in the warm position, fully open or press down the shower handle until most of the water is out. Then close the faucet. Open and close the Faucet pausing 5 or so seconds in between allowing the pump to build and release pressure in the lines.
h. After all water outlets are clear from the bulk of water. Turn the water pump off.

3. Remove the charcoal water filter

a. Locate the charcoal water filter under the sink, note the direction of the arrow.
b. Place some towels down in the galley to catch the water from the filter removal process.
c. There is one plastic fitting and one metal fitting connecting the filter. Start with the plastic fitting first as it will make it easier to then take of the metal one later. it can usually be done by hand if not use a large pair of channel lock pliers and a towel as a buffer to prevent marring the fitting to get the fitting started. Loosen and disconnect the fitting.
d. Use a crescent wrench on the metal fitting and loosen the nut.
e. Remove the filter. We like to put the filter in the sink or clean bucket temporarily. As it will continue to drain water.
f. Take the straight pipe that is fastened to the interior cabinet replacing the filter with the straight pipe. Essentially a reverse process that was just done with the charcoal filter. Start the connection with the metal fitting then the plastic. Once the straight pipe is in and tight you are ready for the next step.

Air method via Floe

If you choose to use RV antifreeze move to step 6.

4. **Floe system**, (for systems with Floe only 2022 – 2023 builds only)
If you do not have a floe system move to step 5.

a. If you have not done so close all faucets.
b. You may want to place some towels around the sink as water will splash.
c. Locate the floe compressor box it is a square box chartreuse in color mounted near the water tank.
d. Open the blue valve connected to the floe box turn it parallel to the black air line.
e. Press the rocker switch on top of the floe to turn it on. The floe may take a short moment to start making pressure or may not turn on at this point, you will hear a loud mechanical noise when it is pumping. If the floe turns on wait for the lines to pressurize until the pump turns off.
f. Open the faucet in the warm position you wish to remove water from. Keep the faucet open for no more than 30 seconds at a time. Water or a mist will

begin to come out. it may take several seconds of being open to observe this. Close the faucet. *Note running the floe for longer than 45 seconds at a time can burn the electric motor out. Running means that the actual pump is running which makes a distinct sound.*

g. Repeat the open and closing process of the faucet allowing the system to build pressure while closed then opening the faucet no more than 30 seconds at a time to release the pressure. Do this as many times as it takes until a mist or no water comes out, it may take several iterations of this process to get all of the water out.
h. Repeat this again on each water outlet in the van until all the water is out. Noting on shower outlets to keep the shower connection below the outlet fitting.
i. Turn the floe pump off.
j. Close the blue valve next to the floe.
k. Skip to step 7.

Air method via compressor

If you choose to use RV antifreeze move to step 6.

5. **Compressed air** (for systems with air inlets only 2022 and older builds 2023-current)

a. You may want to place some towels around the sink as water will splash.
b. Use an air compressor line fitted with a Shrader valve connection. (same as a bicycle tube or car)
c. Set the pressure on the air compressor to no more than 35 psi. note *if your van has a built in regulator this will regulate the pressure automatically. If this step of regulating the psi is not observed properly damage to your vans water system can occur if you have a dual top all in one unit.*
d. Locate the Shrader valve connection point on the water system this is located in the water box or sometimes on the outside of the water box by the shower connection. Remove the cap on the Schrader valve. *Note This looks like a bicycle or car tire valve*.
e. Open the faucet you wish to remove water from first, the order doesn't matter, in the warm position.
f. Use the compressor connection and release air into the system via the Schrader valve connection point. *This is the same process as filling a bicycle tire or a car tire.* Keep it open until no more water comes out. It may take several seconds of compressed air to observe this. Release the compressor fitting after the water has been removed.
g. Close the compressor fitting.
h. Close the faucet.
i. Repeat the process allowing the system to build pressure then opening to release the pressure as many times as it takes until a mist or no water comes out it may take several seconds of being open to observe this.
j. Repeat this again on each water outlet in the van. Noting on the shower outlets to keep the shower connection below the outlet fitting.
k. Skip to step 7.

6. **Antifreeze method**
    a. Pour 1-2 gallons of RV non toxic antifreeze into the water tank.
    b. Turn on the water pump
    c. Run each faucet one at a time on the van in the warm setting until the Anti freeze comes out of the faucet. Close each faucet before moving to the next.
    d. This ensures antifreeze is in all of your water lines.
    e. Move to step 8.

7. **Water pump Particle filter**. “ located in the water box”
    a. Locate the water pump particle filter clear housing. It is located just prior to the water pump in the box containing all your plumbing. There is typically an access door on the side of the box, if not remove the lid on top of the box to access the water box. This holds a small amount of water and must be removed.
    b. Unscrew the clear housing and pour out the water.
    c. We recommend leaving the cap off for the winter.

8. **Disconnect your shower line**(s)
    a. Disconnected the shower line, open the valve and hold the shower faucet end up high and let any remaining water come out of the line.
    b. Roll it up and store with the faucet open (note it may continue to drip some water from the end)

9. **This finishes the water system winterization process**.

OUTSIDE VAN®

TROUBLE SHOOTING

Quick trouble shooting guide

Most issues that come up revolve around A blown fuse / breaker , dead or low battery voltage, improper storage, cold temperatures freezing the water systems, infrequent use, or Low fuel and fluid levels.

In this guide we will go over issues caused by Low battery voltage, low fuel level, blown fuses, tripped breakers and resetting components. This part of the guide assumes you have read and studied the other component sections.

Power and Electrical systems

A single component isn't working. *i.e. Lights, solar controller, water pump, water system monitor, heater, hot water heater, air compressor, fans.*

The fuse or breaker for that component has been popped or needs to be pulled out and reinserted. The typical location for most fuses are inside the overhead cabinet next to the control center or behind the removable plastic side panels of the drivers or passenger seat. Larger high amp fuses are under the seats or in the power box. *See the dedicated Fuse's section for more details.*

Multiple components aren't working.

Common causes

A. The battery voltage is low; 11 volts or less typically.
   The battery system voltage is low and does not have enough voltage to run the components. Recharge the system via the alternator by taking a drive or under shore power (plugging the van in.) We typically see this issue more with AGM batteries than with lithium as the voltage drop on AGM is much more steep than with Lithium.

B. 110 components microwave, induction top and outlets; The inverter or inverter outlet breaker needs to be reset.
   Press the inverter breaker(s) located on the inverter inside the power box
C. The inverter breaker has tripped and needs flipped up and down. (Shore power only)
   Lift up the control panel and Cycle the breakers on the breaker box

An outlet or multiple outlets not working.

D. The GFI has popped on the outlet itself and needs reset. Press the reset button on the outlet. If any GFI plug has popped it can prevent the other outlets from working as well.

Overhead lights flickering or off.

Typically this happens when dimming the lights to the lowest setting. This happens because the dimmer reduces voltage to dim the lights. At the lowest setting the voltage can become too low for the lights to function properly. To fix this simply brighten the lights with the dimmer function of the switch.

Engine codes and limp mode

If your van produces an engine code or goes into Limp mode " where the van has significantly reduced speed" it is typically best to see a Mercedes dealer or mechanic after this happens. In an emergency to get the van going a reset can be performed. In two ways. After three starts the engine code will clear in most cases if the problem has been solved or is intermittent. In more severe cases the van start battery cable can be disconnected via the quick disconnect located in the compartment near the gas pedal on the center console to reset the codes. Refer to the Mercedes owners manual for more details on this.

Heating System

Heater is shutting off prematurely or not making heat.

A. Low fuel level.

When using the furnace(S) for heat or hot water it is important to note that these systems use the van diesel fuel to burn and make heat. This requires the van to be at 1/4 full or more of fuel to operate. If the van is not parked on level ground it may require more than 1/3 of a tank to operate as the angle of the van will change the orientation of the fuel inside the tank.

The most common issue with the heaters not working is that the fuel level has gotten too low from being below 1/4 tank or parked on an incline and the fuel line picks up an air bubble.

solution

This will require you to fill up the diesel tank on the van. It will also likely require the heater to be purged of air. The heater may need to be started and restarted several times to purge the air bubble. *See the heater reset portion for more details.*

B. Low voltage

Another common issue that a heater isn't firing is because of low voltage. If the batteries are drawn down too far; either at or below 11.0 volts the heater may not fire until the batteries are charged above this voltage. We mainly see this occur on vans with AGM batteries as AGM voltage drops much lower upon discharging.

Heater:

If the heater is not working check the fuel levels

1. If the fuel level in the van was too low when the unit was started an air bubble entered the line.
2. The unit needs reset. If there is an air bubble this may take 5- 6 resets.
3. Cold weather creates gelling in the fuel and requires anti gelling agent.
4. The controller has failed.
5. The fuel pump is having an issue priming the line. Try tapping the fuel pump to remove the vapor lock. This occurs typically when the system has not been used in a long time or an air bubble has formed from low fuel levels.
6. The fuel pump power has become disconnected.
7. The fuel pump has failed
8. A fuel line has become disconnected or damaged.
9. The internal controller / receiver has failed on the furnace.
10. The furnace has failed.

AIR AND WATER HEATER TROUBLE SHOOTING

Heater not firing and or getting error code lights

The most common reason the heater fails to fire is because the van is low on fuel at or below 1/4 tank, parked at an incline displacing the fuel below the pickup tube set at 1/4 or if the van has been sitting and un used for a long period of time.

1st Check the fuel level of the van. If it is anywhere near 1/4 of a tank you need to add fuel. The heating systems don't work below 1/4 of a tank. if the van is not on level ground it may require a much higher level 1/4 a tank.

2nd Cycle the heater (this means turning on the heater until success or failure) let the heater complete the cycle which can take up to 5 minutes per cycle. It may take 5-6 cycle attempts to fire up and make heat depending on the issue.

If the same code comes up several times during the process of cycling or staring the heater you may see a new code appear this causes a Heater lock out. If the lockout happens while doing the cycles or the heater fails to make heat after cycling follow the procedure below to reset the heater. The heater will not fire no mater what if it is in lockout and must be reset. Locate the fuses for the heater 2-3 total depending on the heater one 10A (red) and two 15A

(blue). The fuse panels and fuses are typically located at the passenger seat base (2019 – current) or sometimes driver seat base (2018 and prior) depending on your build. See below.

2018 and older vans heater fuse location. Drivers seat base

2019 and newer heater fuse location. Passenger seat base.

Follow these directions specifically the order of the fuse removal and reinstallation will determine a proper reset.

1. Turn the heater to the on position
   There are up to three fuses and will be labeled Webasto or rixen.
2. Remove the small amp10A fuse (sometimes 5A) ; (heater control panel fuse)
3. Remove the larger amp two 15A - 20A fuse(s) (heater power fuse)

4. Turn the heater or furnace control off if you have a manual dial or toggle switch. (digital control panels will automatically turn off)
5. Check for blown fuses.

The fuses must be out at least 10 seconds for all power to subside from the system for a proper reset to occur

6. Replace the two 15A fuses (either order)
7. Replace the 10A fuse

Restart heater

If the reset did not work start again at 1. Then replace the fuses with brand new fuses.

CHARGING ISSUES and BATTERY RECOVERY PROCESS

If you are having charging issues with the alternator, shore power or your batteries have depleted this is the process for correcting charging issues and or charging the batteries back up properly.

The most common reasons your batteries will not charge are listed below in order of frequency.

a. **The batteries have depleted and the voltage is too low for the system to recognize them i.e. from the alternator or shore power controller. This would be letting the SOC of the batteries get below 12 v for lithium 10.7 v for AGM.**
b. **If you have a Lithionics lithium battery system they have engaged into safety shut off mode (this occurs at 10% state of charge. (roughly January of 2022 and newer builds only)**
c. **The delivering outlet (i.e. garage, home, or campsite) that the shore power extension cord has been plugged into has been tripped or is faulty.**
d. **Ambient temperature is near or under 40 degrees Fahrenheit (for lithium batteries, for safety and longevity lithium batteries do not charge well below 40 degrees not at all at 32 or lower. Lithionics batteries have a built in heating system.**
e. **The inverter breaker inside the van has been tripped or needs to by cycled.**
f. **The inverter itself has tripped and needs reset.**
g. **An inline fuse to the battery has been tripped.**
h. **There is a broken component; bad battery, alternator, regulator, inverter controller, inverter, or temperature sensor.**

Items A-G can be fixed on the road side or at home with the guide below. Going through this guide will likely solve your issues. After trying all the steps in this guide thoroughly and you are still unable to get your batteries to charge give us a call, or schedule an appointment with OSV or a local shop of your choice for repair.

Scenario The van is not receiving a charge or your batteries have been depleted and the state of charge (SOC) is low. Your van may charge up like normal via the alternator or shore power or it may require a recovery process. We will cover these scenarios here and common issues for the causes.

This guide is assuming you are familiar with your vans component locations and displays if you are not then it is advised to read through the power system documents first.

In most cases to charge the batteries back up the van needs to be started so we will begin here for purposes of good practice.

FOLLOW the steps 1-4 below. read carefully as you may need to jump around in the steps which are labeled by number and letter depending on the circumstance you are facing.

1. **Start the van**. *(if your van does not start because of a dead start battery then we need to begin with this. The start battery needs to be charged via an auxiliary charger or jumped before we can proceed in many cases. If this is not possible at the moment*

and you need to get the house batteries charged you can try charging the house batteries via shore power just know this may not work either. Note: Shore power will not charge the van start battery. If you have no way to start the van and shore power is not working the next option would be an Auxillary charger connected directly to the batteries. This type of charger must be compatible with your type of battery either AGM or lithium.

1A. Observe the Magnum controller under Meter button then DC or on the Lithionics display usually located on the front of the overhead cabinet. If you are getting a positive charge it usually reads around 80-150 ah continue to step 2**. Charging.** if you are not getting a charge go to step **1B.**

1B.

- "Lithionics batteries only" if you are NOT getting a charge move to step **3. Lithionics power switch**.
- If you do NOT have Lithionics batteries move to step **4. Battery Parallel switch.**
- **If you do not have a Battery Parallel switch you need to charge the house batteries with an external compatible battery charger until the voltage is 11V for AGM or 12.2 v for lithium batteries. once minimum voltage has been achieved remove the charger and return to step 1. *note: if the external charger you are using is not rated for lithium the charger can cause damage to your batteries if left on too long past 13v.***

If you are still not getting a charge from the alternator go to step **1C.**

1C. check The alternator regulator. (secondary alternator equipped vans only)

- Wakespeed. (2021 and newer) *Located in the power box*. The light will be lit up orange if functioning. If not check the high amp breaker fuse under the passenger seat and blade fuse in the power block near the regulator.
- Balmar. (2021 and older) will display voltage if functioning. If there is no display check the inline fuse located near the regulator.

Once charging continue to step **2.**

2. Charging the house batteries.

2A. Now you can charge the van via normal driving. This can take upwards of 3 - 6 hours to fully charge depending on your system and conditions. *If this is not desired and or shore power is available continue to step **B2.*** Monitor the batteries during this time as depleting them low can cause failure and problems charging such as excess heat or expansion. Continue to drive until your SOC is at least 70% for AGM 30% for lithium batteries.

2B. "if shore power is available and working, if not skip to 2E " While the van is running plug into shore power (you typically see the amp hours go up even higher than previously observed.) continue to **2C**. If shore power is not charging go to step **2D**.

2C. shut the van off. You should see a positive charge only lower usually around 15-30 ah after shutting off the van. If you have a positive charge continue to step **2E.** if no charge is showing go to step **2D.**

2D. If you are not getting a charge via shore power it is likely one or more of the following *Refer to the magnum settings document, power system doc or magnum energy manual on how to do this in more detail or possible issues.*

- Check to see if there is a blue moon lit up on the shore power connection point under the hood. if not the plug from the charge source has been tripped. Check the breaker inside your garage, house, or campsite.
- The inverter breaker located behind the control panel in the van needs cycled. Flip the breaker for shore power to on and or cycle it once.
- Check the magnum controller shore power setting make sure it is set to 15A or less. Having it higher i.e 20- 30ah can trip the charge source if it cannot handle the load.
- The magnum inverter needs reset. Press down the reset buttons on the inverter. The magnum owners manual will have more detail if needed.
- Start the van allow a minute to run then return to step 2B or skip shore power charging for now and go to step 2E.

2E. monitor your batteries; It can take a day to charge fully depleted batteries via shore power or several hours driving. It is best to observe the van during this time as the batteries may have been damaged and can swell or fail during the charge process. If the batteries do not hold a charge or more issues arise contact OSV and we can further help.

3. Lithionics power switch. *If you do not have Lithionics batteries skip to step **4.***
Lithionics batteries will go into a safety mode and shut off when they get to 10% SOC. You need to turn them back on to receive a charge. Once the batteries have been turned on the safety threshold will be disengaged until such time that the batteries are charged above the current safety setting which is typically set at 10%.

3A. Remove the cover or lid to the power box typically at the rear of the van.

3B. Turn on the batteries by Pressing the circular button on each battery you should see a blue halo ring light up after pressing each button, 1 button per battery.

- At this point the battery safety has been disengaged it is important to charge the batteries above 20% or more as the batteries will continue to deplete. If you are still have charging issues after completely going through this guide; steps 1-4 it is best to switch the batteries back off by pressing the button (the blue halo will disappear hold for 3 seconds)

3C. Check to see if you are getting a positive charge on the Lithionics display.

- If you are getting a positive charge go back to step **2. Charging**
- If the Temperature is near 40 degrees Fahrenheit or below the batteries either will not charge or will be slow to charge until they get up to temperature. The batteries have a built in heating element this may take some time to heat

depending the temperature. As the batteries heat up a charge should start to display. To speed this up close the doors and turn on the house heater, rotate the vent toward the batteries and turn on the factory Mercedes passenger heater. Continue to step **2. Charging**

- If you are still NOT getting a charge continue to step **4. Battery Parallel Switch**.

4. Battery Parallel switch. (dead battery recovery switch *)*

*Note if you do not have a battery recovery switch (2018 and older vans) an external charger will be needed, step **1B** has instructions.*

4A. With the van motor running, locate the momentary switch (typically Located on the front edge on the front of the driver's seat base). Press and hold the momentary switch for about 10 seconds, do not exceed 20 seconds.

4B. Check the magnum controller display or Lithionics display for a positive charge, this may take 30 seconds or more to observe.

- If you are getting a charge go back to step **2. Charging**.
- If you are still not getting a charge try step **4A** again.
- Return to step **2. Charging**.

Altitude Bed

If the bed is not going down. It may be a stuck limiting tab. There is a limiting tab, " a thin metal tab" on the rear track on the drivers side located about 12 inches from the floor. This tab can sometimes get stuck and needs to be depressed. If this tab is out it can prevent the bed from going down. Pressing this tab will likely allow the bed to go down while on the road.