Unofficial nüCamp T@B 400 Resource Guide

The book you are about to start leafing through started-out as a set of checklists and a departure trip card that we used on our 10,000-mile cross-country family tour of National Parks. The RV seemed huge and daunting but by the end of the summer, my wife and our daughters were given surprised approval from fellow campers as they backed-up the 21' diesel pickup with a 26' trailer and otherwise performed all the various arrival and departure tasks. At some point it all became second nature; then complacency set in, then we got reminded why we shouldn't be complacent and now we are like most other people who travel in an RV; respectful of the equipment, grateful for the opportunity and in awe of the things we see. When a 2nd camper came along so the extended family could participate together and separately, we needed some way to communicate what we knew and how we wanted the 2nd camper to be used and maintained. It started as a simple 20-page recap which inexorably grew to its present format.

What you are reading is one family's idea of how we want things done along with WHY we made these decisions. We make no pretense of being expert or authoritative. The binder of manuals which came with the trailer are what experts at nüCamp say should be done. This guide is how we interpret what the experts left out. Our interpretation will change as we are exposed to new ideas but until this book is changed, this is how we want it done for our family. We voluntarily posted it to the forum. You are free to download and print this guide for your personal, non-commercial use. Anyone who insists on paying their way can donate to the Susan G Komen foundation annual walk. Otherwise, enjoy and please post your critiques so this can be improved over time.

USE ANYTHING YOU READ HERE AT YOUR OWN RISK !!!!!

Dear Family & Select Friends whom we trust to borrow our trailer,

Exploring with an RV requires a positive attitude and a degree of self-reliance. Service points are far apart, and good mechanics are in high demand. There is a world of difference between knowing how to use something and understanding WHY it's done a certain way. When you need to improvise while on the road, the WHY will become very relevant. If your goal is to go where wildlife outnumbers people, then you need to know how to make your own repairs when possible, improvise when you can't and recognize when to call for help. For those who plan to stay in our driveway or keep to KOA campgrounds, this guide may seem a bit much. For everyone else, it attempts to explain the WHY.

As the title says, this is an unofficial resource guide for use with our nüCamp T@B400 Boondock Lite trailer although much of it applies to the 320 as well as our Airstream. At delivery, we received a binder containing copies of whatever documentation the factory had for the equipment they installed and a generic user's manual. In the RV world, new owners are expected to figure it out themselves by reading everything in the binder, paging through blogs, picking apart books and watching YouTube videos. This leads to widely varying experiences and interesting posts on internet sites. The dealer binder with its many safety warnings is under the dining area seat and you should read it.

In this guide, we've tried to share what we've learned including the best practices of others. Hopefully this will help give you confidence to hook-up the T@B and either head out on adventures of your own, team-up with us in our Airstream or make the rational decision that this is nuts and not for you.

Love Mom & Dad

HOW TO USE THIS RESOURCE GUIDE

We wrote this guide from the premise that you just want to get going and intend to read just enough of HOW & WHY to do that safely. The longer your trip and the more intense the terrain and weather, the more you will need to know the details behind what is going on. Trying to strike a balance between user & mechanic, we broke the guide into three parts:

GREEN	Daily operation and general safety.
YELLOW	Maintenance, Repair & Emergency Situations
RED	Manufacturers Safety Warnings & Instructions

The RED & GREEN pages need to be read and understood before you take the trailer anywhere. You may use the trailer so long as you read these two sections and follow the checklists we've provided.

The YELLOW pages contain detailed Maintenance & Operating details, Schematics and Emergency Procedures along with an educational background to each category. Anyone using the RV for more than a week should read the yellow pages at some point. Anyone using the trailer when temperatures can get below freezing, MUST read the winterizing and tank heater pages.

We've done our best to seek out and incorporate the best practices of others wherever possible. After gleaning ideas from experience on the road, at RV & camping gatherings or trolling RV & Camping forums, we've sorted through it all and stocked the trailer with tools and this guide which hopefully ties it all together.

To minimize confusion, drivers' side and passenger side refers to use on North American roads. The abbreviations **TT** refers to the T@B Travel Trailer and **TV** refers to the Tow Vehicle. A PDF icon implies that clicking there when reading online will take you to a document being described. A MOVIE icon launches a video we thought would help clarify a subject. If you subscribe to the YouTube Channel ***Junior and Little Miss***, all the videos in this guide are under *PLAYLISTS*.

NECESSARY DEFINITIONS

As with any hobby or pursuit, there are words and abbreviations which the people around you, and the sections of this Unofficial Guide, will assume you already know.

- 7-WAY: We need some way to connect the electrical systems of the tow vehicle with those of the trailer allowing the driver to apply trailer brakes and illuminate the marking & signal lights. There is a thick black cable running from behind the propane tub on the front of the trailer, attached along the black rails heading towards the hitch connector and when not in use, dangling from a hanger on the jack hoist. It terminates with a cylindrical plug which mates with a receiver on the rear of the tow vehicle.

- A-Frame: The black rails on the front of the trailer form an "A" starting at the hitch coupler, past the jack and ending at the propane tub.
- Alternating Current or AC: There are two types of electrical current used in the RV. AC, sometimes referred to as Line Voltage, is what you use daily in your home and operates at 120-volts (+/-). Think of your toaster. What we think of as electrical current is better described as electrons moving from one atom to the adjacent atom. In an AC circuit, they first go one-way, reverse course, and then go back again; typically, 60 times (cycles) per second. This is in contract to DC which relentlessly flows in one direction like the rushing water of a whitewater river.
- AGM Battery: In general, you will find some kind of lead acid battery in a typical tow vehicle and most RV's. The type installed in our 2019 nüCamp is an Absorbed Glass Matt battery. We have two 6-VDC batteries wired in series to produce 12-VDC. The ELECTRICAL portion in the GREEN section covers these batteries in detail but for now, just know that we have AGM batteries in as opposed to the typical maintenance free or serviceable flooded cell car battery.
- AMPS or Amperage: Electrical current is better described as electrons moving from one atom to the adjacent atom. The pressure the electrons put on each other as they push along is referred to as Voltage and the sheer number of electrons which are moving, we call Amperage.
- AMP-HOURS: Rated AMPS times HOURS operated. Somewhere on each electrical device you will find a tag stating the number of AMPS it draws. The refrigerator, for example, uses 5.15 AMPS and should you decide to

use the maximum setting during the hottest part of the day requiring it to run 4 hours to reach temperature, you would consume 20.60 Amp-Hours (5.15 x 4) from the battery.

- Battery Disconnect Switch: Round red switch behind the passenger side cargo hatch which cuts power from the battery to the 12-volt side of the vehicle electrical/fuse panel. It doesn't turn off the Solar or Inverter.
- Black Water: Unlike your home where toilet and shower outflow is connected to the same piping and winds-up in the septic tanks or flows to City Sewer, the RV must contain both waste streams onboard. The nüCamp has a different tank for each waste stream and they are differentiated verbally as either being Black or Grey. The Black Tank stores toilet discharge and the Grey tank handles the sinks and drains. The Grey tank is larger than the Black tank for obvious reasons. Logically, there is also a black valve and grey valve used for emptying these tanks independently. This is covered in detail under DUMP STATION in the GREEN SECTION
- Boondocking: Using the NÜCAMP RV without connecting to a power outlet, water hose or sewer in places where immediate public services such as paved roads, stores, home, etc. are beyond reasonable walking or travelling distance. Such as BLM or back country places.
- Brake Controller: The tow vehicle needs some way of applying the trailer brakes in proportion to how hard the tow vehicle brakes are being applied. As the trailer brakes are electric, this is done with a device mounted in the tow vehicle which connects to the trailer brakes through the 7-WAY connector. This is covered in some detail in TIRES & BRAKES & WHEEL HUB in the YELLOW section as well as BRAKE CONTROLLER in the GREEN section
- Breakaway Cable: Should the trailer somehow separate from the tow vehicle the safety chains are designed to cradle the hitch coupling while the breakaway cable activates the trailer brakes. There is a thin cable connected between a removable pin and the TV. Since the cable is shorter than the distance the trailer connector must fall after disconnecting from the hitch ball, the pin gets pulled-out thus closing an electrical circuit activating the brakes. Not perfect but better than nothing. When connecting the trailer, don't forget to attach this cable! **SAFETY NOTE: If the battery in the trailer is dead, or if someone turned the battery disconnect switch to OFF, even if the breakaway cable is pulled, the trailer brakes won't be applied because trailer brakes are electric!!

- Bureau of Land Management or BLM: Federal public land where you can hike or camp without having to ask for permission. Very remote but you can find your version of paradise here at little or no cost!
- Chains or Safety Chains: The trailer "A" frame has a permanently connected pair of chains that must be clipped onto the hitch receiver of the tow vehicle. They are crisscrossed when connected such that the passenger side chain gets connected to the driver's side of the hitch receiver and vice-versa. The chains are designed to catch and cradle the trailer hitch coupler above the ground if the trailer somehow detaches from the tow vehicle while travelling. **SAFETY NOTE: Since its purpose is to hold the trailer hitch coupler above the ground while in motion, the chains can't be too long allowing the trailer to nosedive into the pavement nor too tight preventing the trailer from turning as it follows the tow vehicle. Proper setup requires the chains to be removed from the TT and reattached at the correct length as twisting them to shorten them will weaken the links.
- Check Level: When parking the trailer, you want it to be as level as possible for comfort and efficient operation of the refrigerator. We installed two green bubble levels on the passenger side of the "A" frame indicating front-to-back and side-to-side. This is covered in SETTING-UP in the GREEN section but in general, these levels are a guide as site conditions will rarely allow you to get things perfectly level nor do you need to be. When the air bubble hovers below the "0", you are dead level. Being 1 to 1-1/2 either way is fine.

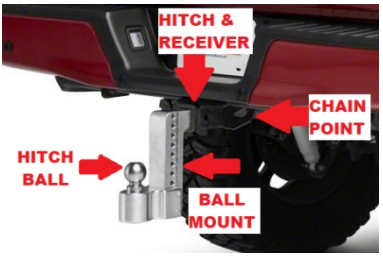
- Chocks (for Wheel or Tires): Bright orange plastic triangles you put in front & behind the tires to keep the trailer from moving when it has been disconnected from the tow vehicle. ** SAFETY NOTE: You set the chocks BEFORE you detach from the tow vehicle or you may well find it starts rolling away from you with disastrous results.
- Direct Current or DC: Type of electricity in your vehicle. What we think of as electrical current is better described as electrons moving from one atom to the adjacent atom and in a DC circuit, they relentlessly flow in one direction like the rushing water of a whitewater river. This is in contrast to AC which goes one way, reverses course, then goes back again typically 60 times (cycles) per second.

- Dry Camping: Using the NÜCAMP RV without connecting to a power outlet, water hose or sewer. Sometimes you may have one of these, but you get the point. Distinct from Boondocking in that you can dry camp in your driveway but boondocking is done where animals outnumber people.
- Dog Bone Adapter: The only electrical connection point to the trailer is through a special twist-lock round 30-amp RV connector. Makes it hard to plug into a random outlet you happen to find outside a building or garage, so a bright soul invented these short electrical connectors to help us. There are a variety of types: some let you plug an extension cord directly into the trailer and others let you plug that extension cord into the wall end of the thick RV electrical cable. When you see it, you'll understand.

- Cold Tire Pressure: This appears on the tire sidewall where it states the Maximum PSI. Most of us understand this to mean at first light when the car hasn't been driven anywhere as driving heats up the tires and the air inside. Engineers would more specifically say that the MAX is the inside tire pressure when the ambient temperature is at the index value of 68-deg F and that this changes by 2% for every 10-degree of temperature change. For the rest of us this means that since the vehicle rests on the tires, and tires are supported by the air inside, when it's hot out the air expands and when its cool, the air contracts. If you drive a perfectly inflated vehicle from Florida at 70-degrees average temperature to Canada with a 45-degree average temperature, the tire will need more air when measured cold the following morning because cooler temperatures are contracting the air volume and the air volume is what keeps the tire inflated. The reverse is true when you go in the opposite direction and you'd need to let some air out when you got to Florida to stay at your MAX rating. This is why you check tire pressure seasonally.
- Dump Station: The grey and black tanks have a limited capacity which you can determine from the Information & Control Center. You first empty the black tank using its dedicated valve, then the grey tank and then flush-out the black tank at the dump station. This is covered in detail in DUMP STATION in the GREEN section.
- Flooded Cell Battery: As discussed above in AGM Battery, this type is either maintenance free or requires the owner to remove the row of caps

on top to check the distilled water solution for PH and water levels. We DON'T have these.

- GEO Method for Holding Tank Cleaning: Over time, debris deposited in the Black & Grey tanks build-up on the sensors installed inside causing the tank monitors to show incorrect readings. The GEO cleaning method is well known in RV circles and uses a combination of water softener, dish soap and ice cubes to clean both the tank and contacts through agitation while driving. The water softener breaks down surface tension allowing the Dawn dish soap to do its job.
- Grey Water: Unlike your home where toilet and shower outflow is connected to the same piping and winds-up in the septic tanks or flows to City Sewer, the RV must contain both waste streams onboard. The nüCamp has a different tank for each waste stream and they are differentiated verbally as either being Black or Grey. The Black Tank stores toilet discharge and the Grey tank handles the sinks and drains. The Grey tank is larger than the Black tank for obvious reasons. Logically, there is also a black valve and grey valve used for emptying these tanks independently. This is covered in detail under DUMP STATION in the GREEN SECTION
- Hitch: There are many components here but in general it refers to the place and method that the trailer connects to the tow vehicle. The hitch with its square tube called a receiver is attached to the frame of the vehicle. There is a place on the hitch for the trailer safety chains to be mounted and this visually appears as a set of circles or ovals on either side of the square receiver. A ball mount is a heavy device which slides into a square metal receiver onto which a hitch ball is firmly connected. A hitch pin securely locks the ball mount to the receiver. The trailer is physically connected to the tow vehicle by mating the hitch coupler on the front of the "A" frame of the trailer to the hitch ball on the tow vehicle, Taken together, we refer to the whole combination of equipment on the back of the tow vehicle as the "hitch" although that isn't entirely



the correct verbiage. The vehicle manufacturer has rated the hitch for a certain weight carrying capability and this is different from the vehicle payload capacity. When considering payload capacity, you need to take hitch weight into account but when considering hitch capacity, you don't need to concern yourself with payload capacity. In circumstances where you want to pull a trailer that is heavier than the hitch capacity (rating), a Weight Distribution hitch can be used which will move some of the weight from the rear of the vehicle to the front axle of the vehicle and to the trailer axles. Our nüCamp DOES NOT use a weight distribution hitch although our Airstream requires one. This is covered in detail in the GREEN section. The words to remember are: hitch (bolted to the vehicle chassis & containing square receiver) hitch ball (chrome), hitch receiver (square metal tube on the back of the tow vehicle), hitch coupler (gadget on the front of the trailer with a latch that locks onto the hitch ball) and ball mount (heavy thing that carries all the weight and slides into the hitch receiver).

- Hitching or Un-Hitching: Process by which the trailer is connected to (or disconnected from) the tow vehicle by mating the hitch coupler on the front of the trailer to the hitch ball on the rear of the tow vehicle while also connecting the two safety chains and a breakaway cable to the tow vehicle hitch. In addition, the 7-WAY connector from the trailer is inserted into the appropriate place on the tow vehicle and whomever made that connection, visually confirms that the trailer signal, marker & brake lights illuminate. **SAFETY NOTE: DO NOT SKIP THIS STEP EVER – EVER. YOU DO NOT WANT TO TRY STOPPING WITHOUT TRAILER BRAKES OR TURNING WITHOUT TRAILER SIGNALLING. This is covered in detail in DEPARTURE & ARRIVAL in the GREEN SECTION.
- Hooked-up: Connected to any combination of: 120-volt AC electrical outlet (shore power), water hose or sewer. Ideally all 3.
- Inverter: When you want to run your 120V-AC toaster in the trailer while Boondocking, there is an inverter you can activate that turns DC current from the battery into AC current. The button and outlet are located at the foot of the bed under the TV.
- Jack Base Plate: The jack on the "A" frame can either have a wheel or a flat base plate on the bottom. The wheel allows for

minor position adjustments while hitching-up but hangs-down during travel. We have both but usually use the plate.

- Jockey Wheel: See Jack Base Plate Above
- Leveling Blocks: It is more comfortable to sleep when the trailer is level front-to-back and side-to-side. The "A" frame jack tilts the trailer so you can get it level front-to-back but sometimes you need to lift it higher than the jack foot will go. Equally, to get the side-to-side level you need to raise one tire to bring it level with the other when on uneven ground. We have chosen the Lynx Levelers as they act like wide flat Legos that interlock.

- Parasitic Drain: All batteries loose charge even sitting unconnected. This drop-in charge occurs because there are some devices that are always on either through poor design or for safety purposes. The Propane (LP) detector is always operating as is the Victron BMV battery monitor and the LED on the TV. So even if you've turned off all the switches, the battery is being discharged, albeit very slowly, all the time. This is fully detailed in BOONDOCKING DECISIONS in the GREEN section.
- Power Converter or Converter: Electrical panel for the 12V-DC & 120V-AC circuits. It also serves as a battery charger & battery maintainer for the two series wired 6V-DC AGM batteries. This takes over two pages to describe in CONVERTER in the YELLOW section. AKA -Electrical/Fuse Panel
- Recreational Vehicle or RV: This can have many meanings as some think of a massive home on wheels and others, like many in the nüCamp family think of a minimalist shelter with just a bed on wheels. Suffice it to say that when we say RV in this guide, we mean the nüCamp and its ilk.
- Rectify: What happens when you convert AC to DC current such as when you plug in the trailer and let the Converter/Charger provide 12-VDC power for the lights. This is in contrast to the Inverter which turns DC current into AC current so you can run your toaster.
- Shore Power: Marine term meaning connected to the AC electrical grid.
- Stabilizers: These are generally misunderstood to be devices that level out the trailer. This is NOT what they are and doing so will damage the stabilizer, the trailer or both. A stabilizer is an arm that extends down from each corner of the trailer to touch the ground and no more. It helps dampen movement when you walk around inside the trailer and no more. See DEPARTURE & ARRIVAL in the GREEN section for more details.

- Tongue: Refers to the place where the trailer coupler attaches to the tow vehicle hitch ball. Once connected, it gets latched into place. **SAFETY NOTE: You must use the latch lock before departing as this helps prevent the trailer hitch connector from disconnecting from the ball during transit.
- Tongue Weight – TRAILER: The weight the trailer exerts onto a scale when the trailer is perfectly level and the scale is placed directly under the hitch coupler where the hitch ball would rest.
- Tongue Weight – TOW VEHICLE: Any weight placed immediately behind the rear axle of the tow vehicle. This includes any cargo in the very back of the tow vehicle plus the weight of any hitch equipment plus the trailer tongue weight. ALL 3 weights.
- Tow Vehicle or TV: the vehicle that pulls a travel trailer
- Travel Trailer or TT: an RV that is pulled behind another (tow) vehicle.
- VOLTS or Voltage: AMPS or Amperage: What think of as electrical current is better described as electrons moving from one atom to the adjacent atom. The pressure the electrons put on each other as they push along is referred to as Voltage and the sheer number of electrons which are moving, we call Amperage.
- WATTS: If voltage is the pressure one electron puts on the other in a wire and amperage is the sheer number of electrons then if you multiply them together you get a measure that electricians call Power and the rest of the speaking world calls WATTS. Ohm's Law even says POWER (watts) = AMPS * VOLTS. This formula is important because sometimes vendors describe their equipment in WATTS and other times in AMPS. If you know one, you can figure out the other. Thus, AMPS = WATTS / VOLTS. The formula would state that as I = P/V where I = AMPS, P = WATTS and V = VOLTS.
- Winterizing: When temperatures fall below 32°F or 0°C, the fluids in the trailer can freeze unless precautions are taken to maintain internal temperatures and protect the holding tanks & piping in the unheated areas below the trailer. You can put a skirt around the trailer and a small 500w heater in this space to keep the tanks and piping warm or you can remove all the fluids from the tanks, piping, faucets & shower heads. A variety of things can be done depending on temperatures where you winterize only the fresh water side, fresh & grey or all three.

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Daily Operations

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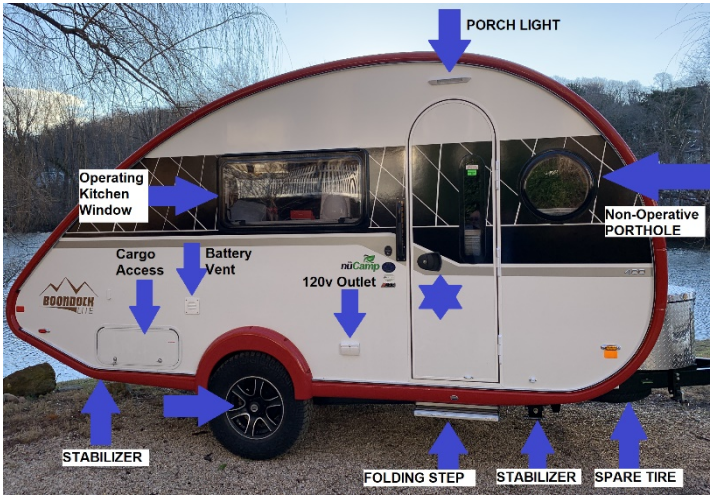
EXTERIOR FAMILIARIZATION



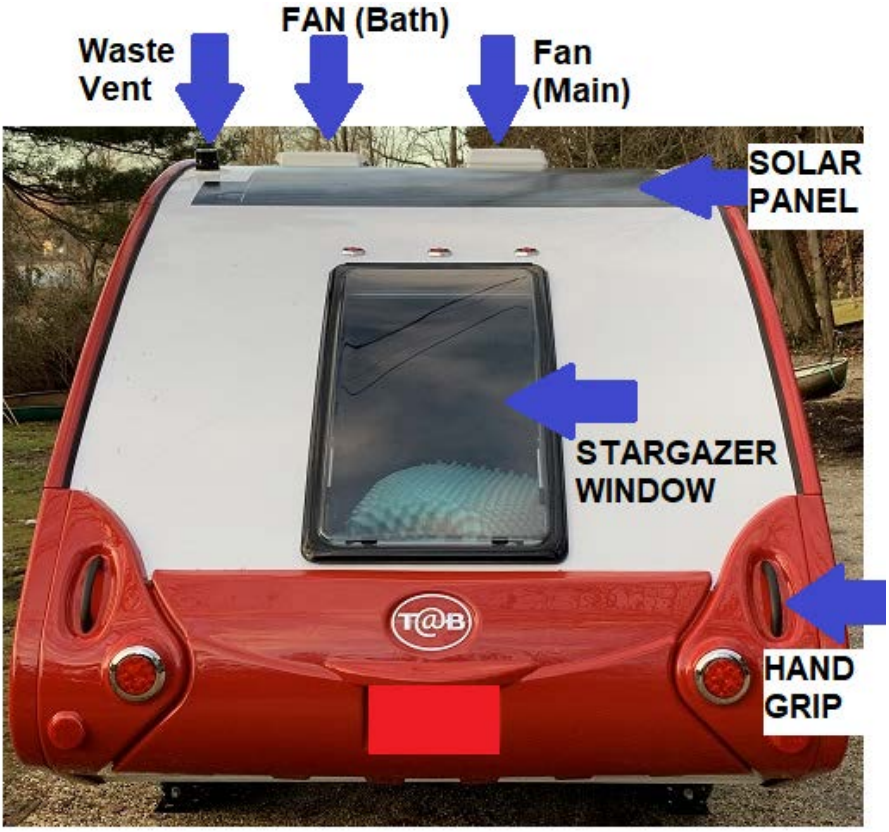
PASSENGER SIDE

nüCamp is an Amish company located in Sugarcreek Ohio building teardrop trailers with quality materials at reasonable prices. Ours is a T@B400 Boondock model which has an axle and tire combination offering high road clearance with off-road tires. The large operating window over the kitchen sink has both a bug screen and blackout shade which provides a significant amount of light for the main area. When the sliding step is extended, an LED gives just enough light below to guide you at night while the porch light over the door is meant to illuminate the area for evening activities. The winch controlling the spare tire mechanism is located on the side just below the aluminum tub housing the propane tanks. There is only one cargo area but it is large enough to store all the equipment and tool bags needed for daily operation. The GFCI outlet is designed to provide ground fault protection should whatever equipment in use while connected to it experience a short between the HOT and ground such as what may happen if doused with water.

The sidewalls are composite panels consisting of a thin fiberglass layer affixed to a sheet of polypropylene Azdel bonded to an aluminum frame. The entire assembly becomes a structural component called Azdel which is free of

formaldehyde, it is fade resistant, sound absorbing, half the weight of a similar wall made of lauan wood and impervious to water penetration greatly reducing the possibility of mold & mildew formation. The porthole window adds little besides boosting the cute factor.

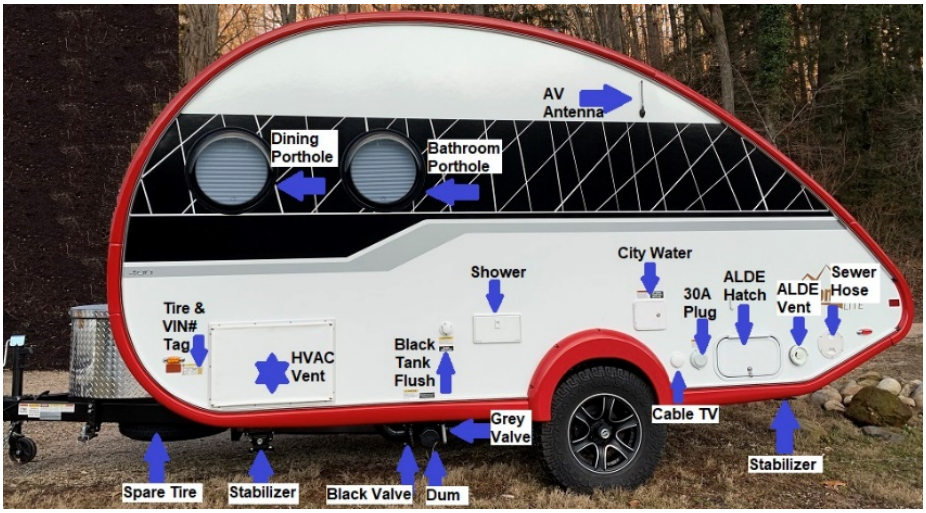
REAR



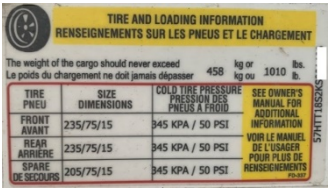
The operating stargazer window is a key feature of the nüCamp trailers as they are right over the bed and offer plenty light. A bug screen and blackout shade provide all the privacy you could ask for even while the window is propped open. Hand grips allow you to slide the trailer manually when the hitch has the pivoting wheel installed instead of the flat skid plate. The 190-watt flexible

plastic solar panel which is rated to produce up to 15-amps per hour (with 10-12 Amp-Hours to be expected), the two ceiling fans and the black tank vent are the remaining items you can see from here.

DRIVERS SIDE



All the utilities are located on the driver's side. There is a fresh water fill port, a connection for city water with a PSI of 50 or less, a 30-amp electrical connection for shore power or generator, blade valves for the grey & black septic holding tanks, the heat exchange vent for the air conditioner, the exhaust port for the ALDE furnace, the radio antenna, two porthole windows, two stabilizing jacks, other side of the spare tire and the access hatch for the winterizing valves. The Vehicle Identification Number (VIN#) can be found on the Tire Inflation tag located to the left of the HVAC vent. In addition to showing the maximum inflation for a cold tire, it also shows how much cargo (1,010 lbs) you can carry. The rest of the weight figures and a second printing of the VIN# are on the silver tag located along the black "A" frame just forward of the tubs and a portion of that tag is shown below.


TIRE AND LOADING INFORMATION
RENSEIGNEMENTS SUR LES PNEUS ET LE CHARGEMENT

The weight of the cargo should never exceed 458 kg or 1010 lbs.
Le poids du chargement ne doit jamais dépasser 458 kg ou 1010 lbs.

TIRE PNEU	SIZE DIMENSIONS	COLD TIRE PRESSURE PRESSION DES PNEUS À FROID	SEE OWNER'S MANUAL FOR ADDITIONAL INFORMATION
FRONT AVANT	235/75/15	345 KPA / 50 PSI	VOIR LE MANUEL DE L'USAGER POUR PLUS DE RENSEIGNEMENTS
REAR ARRIÈRE	235/75/15	345 KPA / 50 PSI	
SPARE DE SECOURS	205/75/15	345 KPA / 50 PSI	

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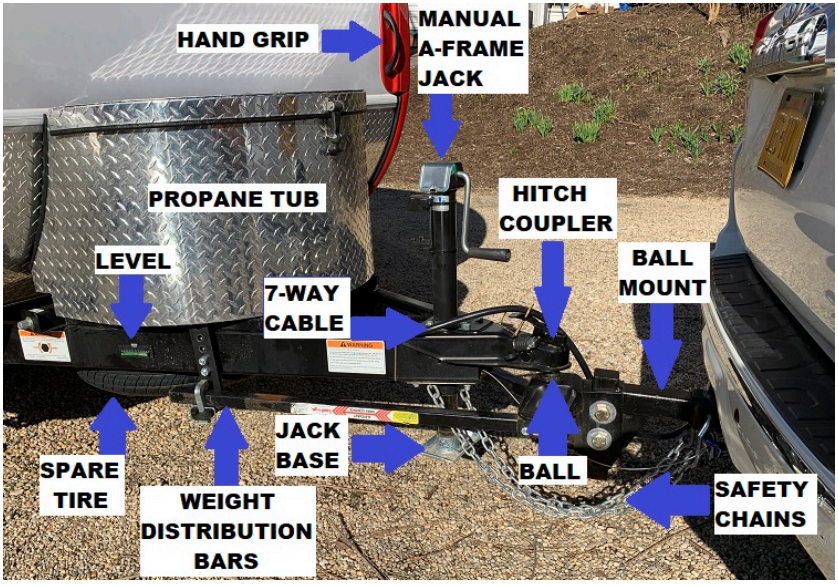
EXTERIOR FAMILIARIZATION

FRONT

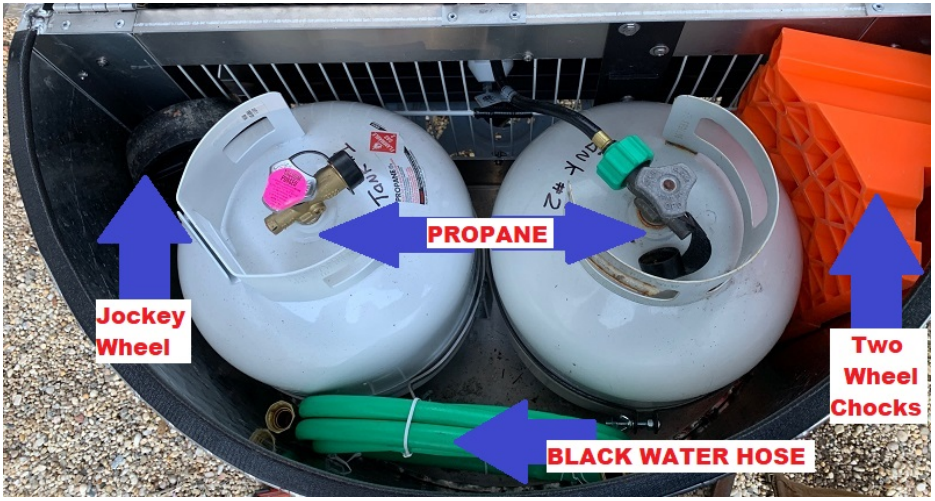
Completing the circle, we come to the front where another large picture window gives visibility when sitting at the dining table. The jack has a jockey wheel on the bottom which helps to adjust the trailer position while hitching-up. A flat jack base plate is stored in the tub should a wheel not be desired at a given boondock location. Also visible are the hitch components which connect the trailer to the tow vehicle. The two chains are safety devices which catch & cradle the "A" frame in case the trailer separates from the hitch during travel. While highly unlikely, should that happen, a thin cable not readily visible in the photo would manually trigger emergency brakes. The two long bars reaching from the tow vehicle hitch and running alongside the A-frame are part of the Equalizer weight distribution & sway control system. Weight distribution refers to using mechanical leverage to transfer some of the weight from the rear of the tow vehicle axle to both the front of the TV and to the trailer axle. This reduces rear end sag caused by the weight of the hitch and the weight of the trailer tongue on the hitch.



EXTERIOR FAMILIARIZATION

STORAGE

Although the trailer as shipped comes with one propane tank, we have installed a second on in the tub to assist with winter boondocking. The tub also holdsthe filthy things you don't want to put anywhere else. Two orange chocks fit perfectly to the right of Tank #2, the black water hose you use to flush the grey tanks at the dump station fits in front of the tanks and the jockey wheel/jack plate fits to the left of Tank #1. A Ziplock bag of latex gloves fits in the cracks that remain for when you operate the dump station and need to keep clean. Finally, a wooden plank rests on top of everything



for those times when you need to park in mud and a flat surface is hard to find otherwise.

The passenger side cargo hatch is lockable, so this is where we put the HITCH, WATER, ELECTRIC, TOOL, RIGGING and TOOL bags along with the torque wrench & lug wrench.

INTERIOR FAMILIARIZATION

INFORMATION & CONTROL CENTER

As you enter the trailer, all the controls are grouped together just inside the front door on the wall to your left. Some of these items came with the trailer, and others (A, E & D) we added after taking delivery.

A **Holding Tank Heating Pads**

B **Cool Cat A/C & Heat Pump**

C **ALDE Heat/Hot Water Control**

D **Propane Tank Monitor**

E **Battery Monitor BMV-712**

F **nüCamp Convenience Center**

HOLDING TANK HEATING PADS (A)

The GREY and FRESH tanks are mounted under the floor in an unheated section of the trailer. To extend the edge of the seasons we can use the T@B trailer, we added 12-volt electric heating pads to the DUMP VALVES plus the GREY and FRESH tanks. Rigid foam and reflective bubble insulation were added to cut down on heat loss although by no means can the underside be considered "insulated." Full details can be found in the schematics section which is at the end of the YELLOW section in this resource guide. This is where electrical, plumbing and other schematics can be found for future reference.

INTERIOR FAMILIARIZATION

The switches are labeled A, B, C and D from left to right although D is not used.

A	VALVES	12-watts	0.3 amps @ 12v-DC
B	GREY	78-watts	5.8 amps @ 12v-DC
C	FRESH	65-watts	4.8 amps @ 12v-DC

When activated, a red indicator light shows they are drawing battery power. While the BOONDOCKING DECISIONS page is the best place to reference when deciding when and how long you can run each of these heaters when drawing from the battery alone, combined they only draw 10-1/2 AMPS @ 12v-DC. This means that while connected to shore power, this translates into just under 1-AMP allowing you to run them without concern. The GREY and FRESH heating pads are thermoregulated meaning that when activated, they will draw power and provide heat when the temperature drops below 45-F and turn off when the temperature reaches 67-F. The VALVE pads will remain on so long as switch A is lit-up.

The BLACK tank is mounted above the floor and is therefore heated so long as the trailer is kept above freezing. This means that you can use the toilet in freezing temperatures so long as you run the VALVE heaters. As they have negligible current draw, there is no reason not to and it will help insure against freezing the dump valves thereby causing an unpleasant problem when they thaw should cracking or damage occur. For this reason, VALVES were wired to switch A.

It is easy to use the trailer and carry water in portable containers but quite annoying to be unable to use the sink or shower. The GREY tank was wired as switch B under the assumption that you would probably be using the waste tanks and managing your water in portable containers. Partially because water freezes well before waste water will and partially to give as much flexibility when running on battery as possible.

The FRESH water tank is wired to switch C and you will probably only use this while connected to shore power for a period of time. If it gets below freezing and you disconnect from shore power, you will need to read the WINTERIZING WHILE ON THE ROAD section before you depart.

INTERIOR FAMILIARIZATION

AIR CONDITIONING & HEAT PUMP THERMOSTAT (B)

The trailer has a Dometic Cool Cat heat pump which ducts AC and Heat throughout the interior. It is only available while hooked-up to either shore power or a generator capable of providing a steady 20-amp current. Between the ALDE hot glycol convectors and the Cool Cat heat pump, you have two ways of staying warm. ALDE while boondocking and when temps fall below 35-degrees and Cool Cat when the temps are above 40-degrees needed for the heat pump to operate efficiently. Before turning it on, please make sure the rectangular canvas storage cover snapped to the front driver's side has been removed.

The cover gets stored under the seat closest to the front door while driving so it doesn't fly off and get lost in transit.

The temperature setting is not a precise measurement, so if after running the AC for a while you are too warm or too cold, raise or lower the thermostat setting by a few degrees. Don't be so focused on a specific number if another gives you the comfort level you want.

Pres the MODE button on the left to cycle through the choices as follows:

- First press wakes it up.
- Pressing 2x shows you the internal temperature.
- Third press shows COOL with a Snowflake for A/C.
- Fourth press shows FURNACE with a Flame which isn't used on this trailer as the ALDE has its own thermostat. (C)
- Fifth press shows Heat Pump with wavy lines

Use the UP and DOWN arrows to change the temperature setting shown on the top of the display. There is no option to program different temperatures based on time & day.

INTERIOR FAMILIARIZATION

ALDE HEAT / HOT WATER CONTROL (C)

A 10-page explanation of the ALDE heating system can be found further back in this section. For now, just know that there is also an ALDE radiant heat system in addition to the heat pump from the Dometic Cool Cat and that the ALDE also provides the hot water. It can be operated from propane using the 12-volt battery or using 120-volt electrical heating elements while plugged into shore power.

PROPANE TANK MONITOR (D)

There are two propane tanks in the aluminum tub on the front of the trailer. A magnet holds a sensor to the bottom of each tank which uses a form of sonar to determine how much LPG remains in the tank and transmits that via Bluetooth to either a smartphone app or this wall mounted device. The top of each tank is marked with a 1 or 2 corresponding to the numbers shown on this device. There is a maximum of 5 LED's although the smartphone app shows this information as a percentage of fill. While this wall mounted sensor is easy to operate, the smartphone app also shows you the status of the remaining battery life in percent, so you can replace it when needed. Search for "MOPEKA TANK CHECK" in the app store to download. The YELLOW section has detailed instructions for synchronizing the sensors to your phone via Bluetooth.

To use the wall mounted monitor:

1) Press the large button for the tank you want to test. Green on the left for Tank #1 and Black on the right for Tank #2.
2) Lights will scroll indicating the unit is synchronizing a reading.
3) A maximum of 5 lights will illuminate after a few seconds showing the tank level before going back to sleep mode.

4) If the lights scroll and never display a level, the sensor and monitor aren't sensing each other. Try again but if it still fails, check the FAQ in the YELLOW section under Propane Tanks.
5) Every 30-minutes, the monitor will synchronize on its own. The red light will flash slowly when the tank falls below 10% fill.

BMV-712 SMART BATTERY MONITOR (E)

Although the trailer comes with a battery condition indicator on the convenience center described in section (F), it is so rudimentary as to be of no practical use. To deal with this, we've installed a battery monitor made by Victron which tracks actual usage over time and therefore has the information to tell you what percent of usable battery energy remains. For reasons which are explained in BATTERIES & SOLAR in the YELLOW section, looking at just a voltage read-out for a moment in time tells you little. For general use, however, know that this replaces the battery indicator light section E of the Convenience Center.

Pressing the **+** and **−** buttons cycles you through battery health information. While many readings will appear, we only explain two of them here for brevity. The YELLOW section explains fully what the device can do along with how to download & use the smartphone app.

State-of-charge

This is the reading you will use 99% of the time. Since a battery at 50% of power is a dead battery and can't be used without damaging it, the State-of-Charge shows how much energy is remaining after considering how long the current loads have been operating, current temperature and so-forth. The reading you see here shows you how much power you have remaining before the battery reaches it's 50% "dead battery" level.

INTERIOR FAMILIARIZATION

Time-to-go

If you want to know how many hours you can run the trailer using exactly the equipment in operation right now, the Time to Go provides that answer. In this example, you have 49.5 hours before recharging or shutting down. From a practical standpoint, you would use this to figure out when to start turning things off, so you didn't get to the point where you ran out.

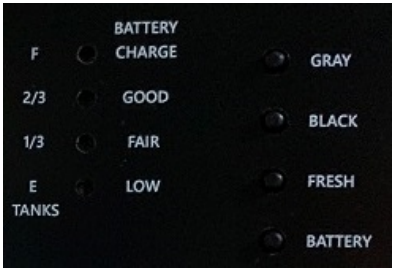
Synchronizing

The monitor needs to be synchronized regularly or the data displayed will be incorrect. Under normal operation, this happens every time the battery is recharged to 100% either by the solar panels, a generator or being connected to the electrical grid. Specifically, the monitor waits until both the voltage exceeds 13.2V AND the (tail-) charge current falls below 4% of total battery capacity (4% of 224 ah during a 3-minute period. If this doesn't happen, or if the monitor gets disconnected from the battery, the readings displayed will be garbage-in, garbage-out.

One indicator that the battery is not synchronized with the monitor is when the Sync and the Battery icons are both blinking.

If you KNOW the battery is at full charge but the State of Charge shows less than 100%, the monitor and battery can be re-synchronized by pressing the + and – simultaneously for 3 seconds until you hear a beep.

KIB ELECTRONICS CONVENIENCE CENTER SWITCHES (F)



The trailer has three holdings tanks: FRESH for clean water, GREY for sink & shower water and BLACK for toilet water. As these tanks each have a finite holding capacity, you need to know when you are getting close to full in the case of GREY/BLACK and close to empty in the case of FRESH. nüCamp selected KIB Electronics to provide the tank monitoring equipment.

INTERIOR FAMILIARIZATION

These indicator lights give a general idea of how full the Fresh, Black or Grey tanks are. For example, pressing the little black button next to GREY causes LED's to appear next to "Empty, 1/3, 2/3 or Full." What you see depends on how the four tank mounted sensors react to a momentary electric current.

EXAMPLE: The grid below shows the maximum tank capacities as follows: 30 gallons of fresh water, a maximum of 12 gallons in the black (toilet) tank and up to 18 gallons in the grey (shower/sink). Any more than this and the tanks will overflow with possible trip-ending results.

Gallons	**Empty**	**1/3**	**2/3**	**Full**
GREY	5 or <	6 to 12	13 to 17	18
BLACK	3 or <	4 to 8	9 to 11	12
FRESH	9 or <	10 to 20	21 to 29	30
Volts	**Charged**	**Good**	**Fair**	**Low**
BATTER	13 to 12.5	12.5 to 11.7	11.7 to 11.2	11.2 to 10

So, what do you do when the display reads 2/3? If it's the BLACK tank, you just stop using it until you can empty the trailer. If it's the GREY tank, you have some options depending on where you are, how long it will be till you can dump the trailer and how empty the black tank is. Read the pages on "Boondocking Decision Making" to see what your options are.

When it comes to the batteries, however, this KIB four-light monitoring system is more dangerous than helpful. Our trailer has a pair of 6-volt Absorbed Glass Matt (AGM) batteries and they can't be allowed to drop below 50% discharge which per the battery vendor is 12.2 volts. Using the grid above, the KIB monitor would illuminate GOOD reading as 12.2 is between 12.5 and 11.7. By the time the monitor displayed FAIR, the battery would be below 11.7 volts and further use will seriously damage them. Just don't use this monitor. A more advanced battery monitor was added and described in (E) immediately prior to this portion.

INTERIOR FAMILIARIZATION: APPLIANCES & FIXTURES

The trailer is small enough that you will discover the nooks and crannies available for storage and come-up with your own ideas for usage. What follows is a brief overview touching on some of the non-obvious things you'd find out eventually or wish someone had told you.

1) Shower
2) Refrigerator
3) Stove
4) Water Pump
5) TV & Stereo
6) Main Fantastic Fan

Shower

While hooked-up to sewer and city water, the Alde hot water system will let you take what a sailor would call a "Hollywood Shower". One as long as you want and as hot as you want it. While dry camping, however, you are limited by the 18 gallons in the Grey tank and the 30 gallons in the fresh water tank. That same sailor takes a "Navy Shower" which translates to a quick 30-second rinse, no water while lathering and a quick 60-second rinse afterward. Done correctly, your shower should use no more than 3-gallons. Keep an eye on the KIB tank monitor so you don't overflow the storage tank. Practice!!

Refrigerator

There are some compromises you need to make when living in an RV and one of those is adjusting your expectations for the refrigerator. The Norcold was designed for mobile & marine use so it switches between shore & battery power depending on what is available. The R134a compressor is extremely efficient and allows both cooling & freezing compartments

- To minimize battery drain, when the inside temperature is between 70-deg and 90-deg, keep the thermostat at the #3 position.
- When making ice or storing frozen foods, use the coldest setting #5

INTERIOR FAMILIARIZATION: APPLIANCES & FIXTURES

Stove

Despite what the knob seems to indicate, there is no electric ignitor and you must light a match. We found the instructions on the glass stove top to be a bit confusing, so this is what we do:

1) Open the ceiling vent or the window behind the stove as burning propane both gives off water vapor and requires oxygen and the RV is small enough that you need all the O2 you can get.
2) Put a lit match against the burner ring so when gas comes out, it lights quickly and there is no time for propane to gather while you struggle to light a match.

3) Push the control knob in & turn left bringing the flame symbol on top.
4) By keeping pressure on the knob, propane will flow at a higher rate making ignition easier. Keep pushing in for 8 seconds after the appearance of flames and then release.
5) Vary the height of the flame by moving the knob between the flame symbol and the OFF position.
6) If you don't get a full circle of flame, then one or more of the jets have been obstructed. As insects like to build nets in BBQ and stove burners, clean the jets prior to use if they are obstructed and don't operate when only part of the circle is operating.
7) To turn the burner off, move the knob to the OFF position.

Water Pump

If you need to use the sinks or shower while dry camping, a 12-VDC pump located in a compartment beneath the closet floor supplies the water pressure. A pressure switch monitors the water lines and when the pressure drops, such as when you turn on a faucet, the switch activates the water pump causing water to leave the 30-gallon fresh

water tank and enter the plumbing system. Use the blue WATER PUMP switch to activate the system.

If there is air in the plumbing lines, or if the water tank is empty, the pump may show its displeasure through banging noises (hydraulic hammer) in the water lines or simply refuse to turn off. You may see reduced water flow or no water at all. If this occurs:

1) Confirm there is water in the freshwater tank.
2) Just like when you try to pour water from the 5-gallon jug, there needs to be another source of incoming air to replace the water that is leaving, or a vacuum will be created. On the 5-gallon jug you open the little knob opposite the water spigot to let in air. On the nüCamp, you open the faucets allowing the pump to displace the air with water. Once the system is fully charged, turning the pump on or off results in a short noise while the system re-pressurizes. Should you switch from City Water to Water Pump, you may run into the water displacement issue and must open faucets. I've found that for a fully discharged plumbing system, I usually must open the hot and cold water for the outdoor shower as well. Wastes some water but gets the system going.

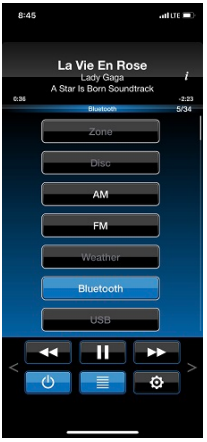
Another source of plumbing noise and reduced water flow would be a clogged water pump debris filter. This is located right next to the water pump. The clear plastic cover unscrews from the housing and the metal filter inside can be cleaned-out of debris. ** When reassembling make sure you include the gasket and that it seats in place completely.

Lastly there is the problem of the water pump running constantly. This situation arises when there is a leak somewhere in the system causing the pump to stay on trying to keep up with a slow leak. Try the simple checks first by looking at the outdoor shower or slowly running sinks. Absent that, water

dripping from the bottom of the trailer is usually a dead give-away. If you fail to find a leak, the problem could be the diaphragm on the pump has given way and you need a replacement. Unlikely but possible. A Shurflo 4008-101-A65 can easily be found on the road.

Jensen TV / RECEIVER / SPEAKERS

The Jensen 12-volt TV is connected to a JWM70A receiver giving you CD, USB, MP3 and Bluetooth inputs. While you can operate everything from the control panel, it's easier to download the smartphone APP and use Bluetooth to control everything. Search for JCONTROL.



Main Fantastic Fan

We upgraded the #1400 that came with the trailer with a #7350 refit kit in order to reduce the electrical draw while boondocking. We went from 3 speeds to 10 while gaining a sensor which shuts the unit down when it rains. The operation moved from switches & knobs on the fan itself to a remote that is mounted above the sink. To conserve battery usage, the remote will enter a "sleep" mode 30-seconds after the last command. By pressing any button, you can "wake" the remote and it will display the last temperature/speed setting.

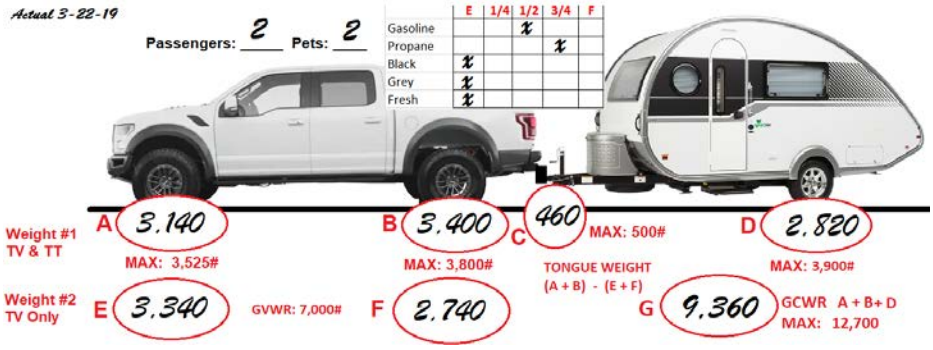
INTERIOR FAMILIARIZATION: APPLIANCES & FIXTURES

ICON	NAME	FUNCTION
	Fan Power ON/OFF	• Press to turn ON the fan (this will start the fan in Auto mode). • Press to turn OFF the fan (this will stop the fan and close the lid).
	Fan Speed	• Press UP to increase the fan speed. • Press DOWN to decrease the fan speed. Pressing either button will change fan mode to Manual. These buttons work in Manual mode only. The fan has 13 speeds. Fan speed is indicated on the remote in % from 10% (low speed) to 100% (high speed). An LED will illuminate next to the % of fan speed. If two LEDs are illuminated, then the speed is halfway between the illuminated %. (for example: Both 85% and 100% LEDs are illuminated; the speed is approximately 93%).
	Thermostat Temp Setting: Fahrenheit/ Celsius	• Press UP to increase the Set Temperature. • Press DOWN to decrease the Set Temperature. Pressing either button will change fan mode to Auto. These buttons work in Auto mode only. The fan has 13 temperature settings; the temperature setting is indicated on the remote in degrees (60 °F–90 °F;15 °C–30 °C). An LED will illuminate next to the degrees setting of the thermostat. If two LEDs are illuminated, the thermostat setting is halfway between the illuminated degrees. For example: If both the 85 °F (29 °C) and 90 °F (32 °C) LEDs are illuminated; the setting is approximately 88 °F (31 °C).
	Vent Lid UP/DOWN	• When the vent lid is closed, press this button once to open the vent lid. • When the vent lid is open, press this button once to close the lid. This will operate independently of the fan ON/OFF switch. Pressing this button will not change the fan mode. (The rain sensor can be turned ON or OFF by pressing the button for three seconds.)
	Air OUT/IN	• In either Manual or Auto mode (when the vent lid is open), press this button once to reverse the fan blade direction. Press it again for the opposite direction. Pressing the button will not change the fan mode.
	Rain Sensor LED	• This LED will illuminate when the rain sensor has been turned OFF. • The rain sensor may be turned ON/OFF by pressing the Rain Sensor UP/ DOWN button for three seconds
	Manual Mode LED	• This LED will illuminate when the controls are in Manual mode. • Press the Speed UP/DOWN to enter Manual mode.
	Auto Mode LED	• This LED will illuminate when the controls are in Auto mode. • Press the Temp UP/DOWN to enter Auto mode

ABOUT TOWING

Most any vehicle with a hitch strong enough not to fall off under the weight of the trailer can get the nüCamp to move forward. The real question is how to properly size the tow vehicle so it stops when it needs to, maintains control during an emergency maneuver, can withstand the buffeting effects of a tandem trailer whizzing by at 80-MPH, can pull uphill at over 45-MPH in the mountains and otherwise not quit when you need it to keep going. All while being small enough to be manageable and fun to drive.

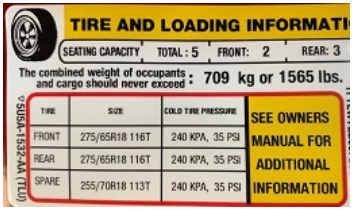
To figure this out, we needed to know the weight of the trailer with all the stuff we planned to take with us, the weight of the truck including people and gear and lastly, the weight of that loaded trailer on the truck hitch. Then, we checked the manufacturer ratings for the trailer and tow vehicle to make sure the real-world weights were lower than the maximum allowable according to nüCamp and Ford. Thousands of words have been posted on hundreds of forums about this mix of actual .vs. rated weights and what it all means. We will try, as tersely as possible, to explain these terms and their implication without causing your eyes to cross.

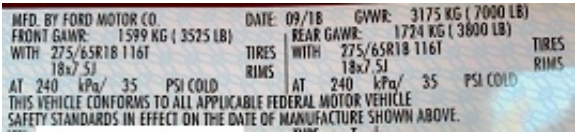


ABOUT TOWING

Superimposed over the first picture on the previous page were some terms you'll need to know in roughly the position on the equipment that they play a role in. The second picture takes those terms, turns them into numbers and draws a conclusion about the choice of equipment with how they were loaded on the day they were weighed. The weights in the circles are actual measurements done on professional CAT scales using the assumptions in the grid between the truck and trailer. On this measurement day, there was ½ tank of gasoline, ¾ tank of propane in the tub, empty holding & fresh water tanks, two people and two pets.

We included the MAXIMUM ratings as well. You can find the manufacturer specifications on the door frame of any vehicle and those stickers look like this:



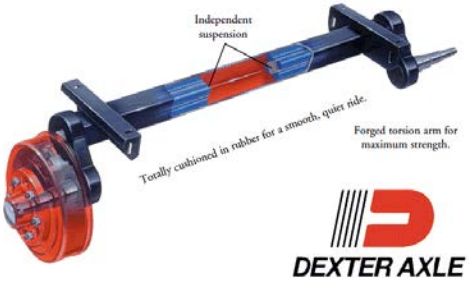


For our F150, you'd read the stickers from left to right as follows: so long as you are using the tires specified at the 35# PSI shown, the truck can carry 1,565 pounds in addition to the weight of a 150-pound driver and a full tank of gas. This figure is known as the Payload Capacity. The white & black sticker tells us that if you weighed the truck with everything including the weight of a trailer on the hitch, it can't be more than 7,000 pounds. This figure is called the Gross Vehicle Weight (GVWR). Since we know that the maximum payload is 1,565 pounds, we can deduce that the truck with fuel and a 150# driver weighs 5,435 pounds. When we weighed just the truck itself, circles E & F show that the front axle weighed 3,340# and the back axle weighed 2,740# and taking those together we know the vehicle weighed 6,080# on the day it went over the scales without anything hooked to the hitch.

The mathematically inclined among us already noticed a discrepancy and might be wondering why Ford rated the vehicle with a GVWR of 7,000# when

the sum of the front and rear axle capability ratings is 7,325#. I don't know and wonder if it's a marketing or an engineering decision or a bit of both.

That brings us to the trailer data plate on the A-Frame which shows an axle rating of 3,900# and a Gross Vehicle Weight Rating of 3,700#. We will stick with the factory guidelines of 3,700# and not ask why. From the image showing weights, the trailer weighed 2,820# (Circle D), which was well within the maximum allowed.



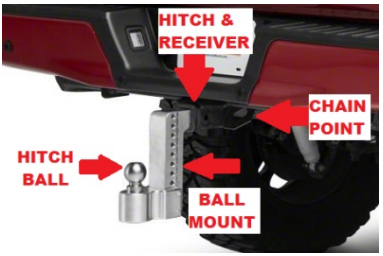
The second weight measurement which impacts the trailer is the tongue weight shown in Circle C. This is the weight that the hitch connector at the very front of the trailer places upon the hitch ball at the very end of the tow vehicle. The vehicle manufacturer places a rating sticker on the hitch and in our case, we are limited to 500# unless we add additional equipment called weight distribution. For the moment, lets accept the fact that the truck can handle 500# on the tongue and when we weighed it, it measured 460#. This tells us that the trailer is within the weight requirements of how much it can weigh both on its own axles and on the rear of the tow vehicle.

Now we need to determine if the tow vehicle itself, including the 460# of tongue weight on its hitch is within the manufacturer maximums ratings. The front axle has a rating of 3,525# and it weighed 3,140# while the rear axle has a rating of 3,800# and it weighed 3,400#. Clearly, the vehicle falls within the ratings for its axles, but does it also fall within the tow capacity rating?

The third rating is how much weight the engine, drivetrain & brakes can safely pull. This is called the Gross Combined Weight Rating (GCWR) and since our F150 can pull 12,700#, the 9,360# (Circle G) of the combined TV & TT falls well within that figure.

ABOUT TOWING

That brings us to the hitch which connects the TV & TT physically and electrically. While the NECESSARY DEFINITIONS section explained these briefly and the HITCHING-UP explained how they go together, here we will talk about them as part of the towing system. In the picture to the right, everything is connected, and the A-Frame is almost perfectly level to the ground.



The hitch with its square tube called a receiver is attached to the frame of the tow vehicle. When the trailer rests on the hitch, it does so by placing it's hitch coupler onto a hitch ball that is mounted on the ball mount. That ball mount slides into the hitch receiver and rigidly supports the full 460# of tongue weight. Taken together, we refer to the whole combination of equipment on the back of the tow vehicle as the "hitch"

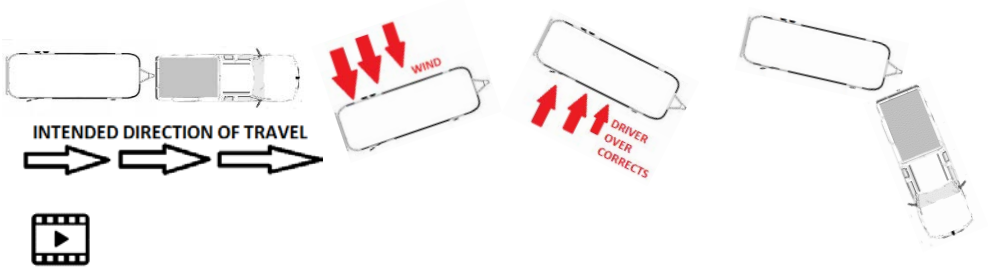
Why is all this important? If enough weight is placed on the rear of the tow vehicle, the front end will rise. This causes the headlights to tilt up just enough to blind oncoming drivers and angle the front wheels just enough to create a "light steering" condition causing you to have less traction and diminished steering control. Each tow vehicle has different sizing and load capabilities and each trailer has different tongue and total weights. If you change either the TT or TV, and you must go back to the drawing board and recalculate the capacities possibly requiring weight distribution & sway control. All this work has been done and it's being explained here so you appreciate what you are seeing and using. The F150 has automatic sway control built-in.

While not needed with our F150, some hitches have an additional set of equipment called Weight Distribution or WD. It is used when the tongue weight is close to, or exceeds, the maximum hitch rating. Using mechanical leverage, it simultaneously shifts some of the Tongue Weight from the rear

axle of the tow vehicle forward onto the front axle of the tow vehicle and rearward onto the trailer axle.

A helpful feature of a WD hitch is that is also assists with trailer sway. Sway Control refers to limiting the tendency of a trailer in motion to sway from side-to-side when hit with crosswinds or when the tongue weight isn't between 10-15% of trailer weight.

An example of trailer sway is shown below. The TT and TV are happily motoring along when something induces the trailer to sway. It could be the wind from a strong storm, a tandem trailer passing by, or an incorrect relationship of tongue weight to trailer weight. Doesn't matter, sway sets-in. The natural tendency is to turn hard the other way which has the effect of swinging the trailer in the opposite direction resulting in the driver overcorrecting again until they lose control and jackknife or otherwise leave the road in an unexpected manner.



ABOUT TOWING

Should you find yourself in this situation where the trailer starts to sway:

1) DO NOT BRAKE !
2) DO NOT STEER !
3) DO NOT TRY TO SPEED-UP ! You can't outrace what you are towing.
4) Instead, manually apply the trailer brakes without locking-up the trailer wheels so the trailer gets pulled backwards while the truck goes forwards something like a rubber band being pulled at both ends. This will cause the trailer to straighten out.

5) When you apply the trailer brakes, take your foot off the gas and gently let the rig slow down until you can regain control and carefully exit the road at a 45-MPH speed so you can figure out what is going on.

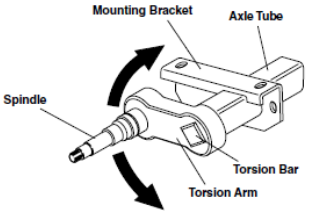
The trailer brake controller is located to the left of the stereo and below a round dial called TRAILER BACKUP. It looks like the image above. You squeeze the two vertical pieces together with your fingers and it has the effect of applying the trailer brakes.

Be careful not to SLAM on the trailer brakes causing them to lock-up. This may create a bouncing situation just at the wrong part of a sway from one side to the other and make things worse. Ease into it so the wheels slow down but are still rolling. Just like you can lose control slamming on the car brakes causing the front end to nosedive and turn unexpectedly, same with this. Easy does it but firmly and with the purpose of creating tension behind the tow vehicle so the trailer slows down.

TIRES & BRAKES & WHEEL HUBS

BACKGROUND

Trailers use special tires (ST) constructed with very stiff sidewalls which allows them to carry heavy loads and resist the natural urge to sway when being pulled behind a tow vehicle. Traction comes second to weight carrying and anti-sway capacity. Light truck tires (LT) or even passenger tires (PAS), give the vehicle traction and their softer sidewall allow for better road control and a softer, read more-comfortable, ride. Our Rainier Apex tires have an aggressive tread making them well suited for travel when the asphalt gives way to less refined roads. They are ST235/75R15 with an M rating. While the M rating implies a speed rating up to 81-mph, factory recommendation, consensus advice and our instructions are to go no faster than 65-mph. Remember, you are pulling your house behind you, "where are you in a hurry to get to?"



Travel trailers generally do not have suspensions such as shock absorbers dampening the ride as nobody travels in them while on the road. The result is that everything gets jostled, pushing cabinet latches and storage cubbies to their limits. A Dexter Torflex® axle was used instead of the leaf-springs you often find in trailers because it insulates the trailer from road vibration, allows each wheel to travel independently and its low profile allows for maximum road clearance. To make this happen, there are 4 large bands made of rubber inside the axle housing which are connected to a torsion arm. As the wheels follow the road, the torsion arm moves causing the rubber cords to provide a rolling/compressive resistance through a process called hysteresis.

One trade-off for using this system over the typical leaf spring setup is that you absolutely CAN NOT jack the trailer from the axle. The housing isn't designed to hold the weight and doing so would damage the torsion system requiring the entire axle to be replaced. If you MUST jack the trailer for service, ONLY do so at the locations shown in the TIRE REPLACEMENT & JACKING.

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TIRES & BRAKES & WHEEL HUBS

The brakes are electric as opposed to the hydraulics you have in your car. This means the brake controller mounted in the tow vehicle sends a variable voltage to a pair of magnets causing them to apply the brake pads against the wheel drums. If you stand next to the trailer while the brakes are applied without the vehicle moving, you can hear the magnets hum.

The wheels consist of 15" aluminum rims mounted with off-road special trailer ST235/75R15 tires. From a safety perspective, there are three safety checks you should be making:

1) A pressure check should be done first thing in the morning while the tires are cold, and the Trip Card updated.
2) A visual check will tell you if there is any sidewall damage, cuts or nails in the tread.
3) A Hub temperature check should made once during the day after several hours of driving.

The wheel hub is what connects the tires to the axle. The bearings allow it all to rotate. An early indicator of serious trouble is when the hub on one side gets significantly hotter to the touch than the other after several hours of use. When this happens, it usually means the bearing is in trouble either from lack of lubrication, the wrong lubrication, a bearing failure or too much weight on the trailer. While you can just test the hub with the back of your hand, we've included an infrared thermometer from Home Depot to remove any guesswork. Simply aim the device at the center of the wheel and press the trigger. It's the part that says T@B shown inside the red circle in the adjacent photo. If the temperature readings between drivers & passengers side differ by more than 30-degrees, then the hub bearing may be in trouble.

BRAKE CONTROLLER

The trailer has its own set of electrically operated brakes and when everything is working properly, can stop itself without needing the braking power of the tow vehicle. In order to make that happen, however, we need some way to communicate the amount of pressure being applied to the brake pedal in real-time to the braking system of the trailer. Fortunately, the electrical systems of the tow vehicle and travel trailer are connected by a thick black cable that originates at the front of the trailer and is connected into a 7-WAY connector on the rear of the tow vehicle. One of the 7 pins carries an electrical signal from a device called a brake controller that is part of the tow vehicle.

When the brake controller senses voltage in the tail light circuit, it applies a voltage to the trailer brakes causing magnets to apply its brake pads against the wheel drums. The amount of voltage sent to the trailer brake assembly through the 7-WAY connection depends upon how quickly an accelerometer in the brake controller determines the tow vehicle is slowing down.

The TV brake system uses a hydraulic reservoir to transmit brake pedal pressure via fluid through stainless-steel hoses to mechanical brakes at each wheel. The harder you press the pedal; the more pressure gets sent to the brakes and the quicker you stop. Since there is no way electronically to sense how much pressure is being applied to the hydraulic brake system when the tow vehicle brakes are being applied, the brake controller must rely on electronics to approximate how hard you are pressing on the brakes. The variable pressure (gentle, firm or hard) on the brake pedal is translated into a strong or weak electrical voltage sent to the trailer brake assembly.

The controller also has a lever that allows you to manually apply the brakes to the trailer. The more you pull the lever, the harder the brakes get applied. This feature is a critical safety tool that allows you to brake the trailer without braking the tow vehicle and is the only way you can straighten out the trailer should it begin to sway. If this is at all unclear, re-read the previous section on ALL ABOUT TOWING.

BRAKE CONTROLLER: F150

The F150 has a built-in brake controller which automatically activates the trailer brakes when you use the truck brakes. The manual brake levers and setting selector is located to the left of the stereo and below a dial called TRAILER BACKUP. Normally, you don't need to concern yourself with it as the setting of **4.5** should be correct for the rig when you received it. Should you have an extra heavy or extra light load, we would have verbally discussed it with you but the details for setting it up are in the Ford owner's manual. Briefly, however, you can change the setting, called GAIN, using the Plus and Minus buttons to the right of the sliding pieces.

There are two situations where you would use the manual brake levers. The first is when testing the trailer brakes to confirm the GAIN setting is correct and the second is during an emergency braking maneuver such as what would happen during a trailer sway event. The manual brake control consists of two vertical pieces where the left one is fixed and the right one slides towards the left. Putting your thumb on the left and pointer finger on the right, you squeeze them to apply the trailer brakes.

To test the gain setting:

1) On a dry level piece of paved road, drive at 20-MPH
2) Take your foot off the gas
3) Apply the trailer brakes manually. Slowly, don't slam on them.
4) You DO want to feel the trailer slow the equipment down
5) You DON'T want to feel or hear the brakes lock-up and skid.
6) Too much GAIN setting and the brakes will lock-up and possibly cause an accident by making you lose control. Too little and you won't have the braking power you need when you need it.
7) If you aren't getting the feel of it, do #1 but on a gravel road. You'll hear and feel things more clearly on gravel. Once you get the feel, then you'll know what to look for when doing the test on asphalt.

EQUIPMENT BAGS CONTENT & EXPLANATION

BACKGROUND There are three events that get performed over and over again: Arrival, Departure & Pre-Departure safety check. The first two involve the placement or servicing of equipment while the latter involves a visual check and updating the daily trip card. While all can easily be managed by one person, chances are that two people will be travelling at some point. While tackling group tasks, some people communicate so well, their interaction appears effortless. For the rest of us, managing a group task can appear chaotic and be described as trying to teach a goat to ice-skate in Summer. Annoying for the goat and generally unproductive.

Each job during Arrival & Departure requires different tools and equipment along with a specific process to follow. Although Mom & I know what needs to be done and work well together, having different tool bags for the various tasks does several things. First, by grabbing one of the color-coded bags, we are communicating what task set we are undertaking. Second, the equipment we need is at hand allowing two people to work together, in the dark. No scrambling around looking for a flashlight or wrench because whatever is needed, is in that bag.

This works for us, might not work for you and all we ask is that the RV be returned with the bags where they belong and with what should be in them. If you are unsure, there is a manila tag with a sticker detailing what should be in each bag. These items listed on the sticker are also explained in the following pages under each bag description. If you lose something, you know exactly what to buy to replace it.

EQUIPMENT BAGS CONTENT & EXPLANATION: HITCHING

RED BAG – HITCHING / STABILIZERS / TIRES

A 12” red bag marked with red electrical tape on the strap handles and containing the following items is stored in the cargo area.

1. 20v Cordless Drill & Multi Screwdriver
2. Light: LED Headlamp
3. Red Reminder Streamers
4. TireTek Flexi-Pro Tire Gauge 0-100 PSI
5. Small Tire Tackle Kit
6. Hitch Ball Grease
7. Hitch Ball Cover
8. 3/8" drive torque wrench / Long thin case in storage area
9. 3/8" drive Deep Impact Socket 3/4" w/Extn for lugnuts
10. Camco RV Leveling Adapter 3/8" drive socket 3/4"
11. Spare hitch pin & clip
12. Infrared Thermometer for Hub test

This bag will be used every single time you hitch and unhitch so it gets stored last and comes-out first. All these tools are used at various points on the Arrival / Departure card. When it is time to raise or lower the stabilizers, you can use the manual crank or instead use the cordless drill as it is much easier on the knees and back. The adapter socket is usually left in the drill as shown in the photo above because other than the rare tasking for drilling, it remains a stabilizer tool. The cordless drill uses a lightweight lithium battery which maintains a charge for a long time, but it also simply stops when the battery gets low instead of giving warning by slowing down. Keep a mental note and charge it weekly.

The torque wrench is too long to fit in the bag, but we describe it here. You will find the wrench in a long narrow black plastic case stored along with this bag. It’s included because each time the trailer leaves home, the lug nuts should be checked to make sure they are still snug at the correct tension.

EQUIPMENT BAGS CONTENT & EXPLANATION: HITCHING

The departure trip card asks for the trailer tire pressure and we've included the TireTek Flexi-Pro which has a large 2" display and holds the reading once you've checked the pressure. Before going to the next tire, press the silver bleed button to release the last reading or it will show that all tires measure the same PSI. We did that once.

Sometimes the valves inside the tire stem become loose and begin to leak air. If you suspect a tire is losing pressure because of the stem and not because of a damaged tire, a simple fix is to check the valves to ensure they are seated correctly. If, however, you have a puncture and need to use the tire plug kit in the ORANGE BAG because the spare is flat or you have two flat tires, learn to use it ahead of time by watching this video.

When we were first learning how to handle the trailer and with 4 people working at the same time, we worried that we'd drive away without taking up all 4 stabilizers or hitch jack, or simply leave the propane tank on. These red lanyards are still used today and get clipped to each of the stabilizers and the hitch jack. It is amazing how easily you get distracted when hitching-up and the driver can walk the rig and quickly see something is wrong because the red lanyards are still there. Looks odd but it works, and we've caught potential problems; usually the jack.

The refrigerator will work best, and you will sleep more soundly, when the trailer is sitting level. There are many ways to accomplish this, but we use the Lynx stacking and interlocking squares to create a platform on one side of the trailer that we drive upon.

Question is, which side of the trailer needs to be raised? Look at the level on the passenger side of the A-Frame. The air bubble wants to rise and will move towards the side that is higher. In this example, the trailer is between 0 and 1 on the right side so you would put one row of Linx Levelers on the left side to bring it even.

EQUIPMENT BAGS CONTENT & EXPLANATION: WATER

BLUE BAG – WATER

A 20" red bag marked with blue electrical tape on the strap handles and containing the following items is stored in the cargo area.

1. Pressure Reducer w/Gauge
2. 90-degree brass elbow
3. Water Filter w/strain relief
4. Collapsible hose 5/8" x 50' by ZeroG
5. Spare hose washers
6. Adjustable Wrench 6"
7. Water Bandit for stripped threads
8. Light: LED Headlamp
9. Teflon plumbing thread tape
10. Clorox wipes

As you can imagine, we have a process for hooking-up the water and it incorporates the best practices of RV'rs with more experience than us.

FIRST: Use the supplied Clorox wipes to clean off the spigot before connecting anything. This is because some people will use the dirty water hose when flushing their black tank before leaving the campsite. These actions mean that the hose which was connected to the spigot marked NON-POTABLE at the last dump station is now connected to the spigot you are expecting to get clean water from. It's simple enough to avoid this by just wiping down the spigot & handle before connecting your clean water hose to it.

SECOND: A sticker next to the City Water inlet side warns that the plumbing system can handle a maximum of 50-PSI. Above this pressure, fittings get stressed and either leak slowly or burst unexpectedly. National parks & commercial campgrounds are notorious for highly fluctuating water pressure levels, so we use a reducer. The ALDE has a pressure relief valve set to dump water under the trailer at pressures above 53 PSI so that may clue you in that you forgot the regulator.

EQUIPMENT BAGS CONTENT & EXPLANATION: WATER

By using the pressure reducer as the first connection to the spigot, we take strain off the hose, water filter and other fittings leading to the trailer and reducing the risk that they might fail due to fluctuating water pressures. Others connect in a different sequence, but if we can protect the downstream equipment and eliminate the need to replace a burst hose at 2AM, there is no reason not to. We've followed the One-is-None, Two-is-One rule here and included a sturdy metal pressure reducer with a gauge along with a simple plastic fitting. Please use the metal reducer but if it gets left behind at the last campsite by accident, the small plastic one is there as a stopgap.

Sometimes the spigot is so close to the ground that there isn't room for the pressure reducer so we've included a 90-degree brass elbow (#2) and a few 6" strain relief adapters so you can improvise. Once attached to the spigot, connect one end of the ZeroG hose to the pressure reducer and the other end to the water filter. The water filter has an arrow molded into the plastic showing you the direction the water should be running through it for proper filtration. To make it easier for the water filter to hang from the trailer and not strain any of the connections, we've put a brass 90-degree elbow on the end that goes to the trailer. This is the end the arrow points to. Attach the other end of the hose to the end of the water filter the arrow is pointing away from.

Both the water filter and the pressure reducer are stored in large Ziplock bags to keep them sanitary when disconnected and capture the water that leaks out during transit. Please do your best to keep these bags clean by storing them in the BLUE BAG.

The Water Bandit (#7) is used when the threads on a campsite spigot are so worn out or damaged that you can't connect a hose. This fits over the stripped threads making a secure seal. While you can't rely on the connection staying put under pressure for any length of time, it does give you some flexibility when all you need is to fill the fresh water tank. Similarly, the Teflon Tape (#9) can be used when the spigot threads are so worn that water drains past the fitting as it tightens up the connection enough to make it secure. You will also use this to replace the elbow and fittings connected to the water filter.

EQUIPMENT BAGS CONTENT & EXPLANATION: ELECTRIC

GREEN BAG – ELECTRIC

A 20" red bag marked with blue electrical tape on the strap handles and containing the following items is stored in the cargo area.

1) 30AMP black shore power cable
2) Dogbone adapters for 15A and 20A to 30A RV blade
3) Dogbone adapter of 50A to 30A
4) Generator Neutral Bond Adapter
5) Plug In Circuit Tester (3-light)
6) Extension Cord 14-guage, 15AMP 50-feet
7) Spare Fuses for the Trailer
8) LED Headlamp
9) Multimeter (Basic)
10) Plug-in Surge Suppressor
11) Surge Suppressor Lock & Cable

Campgrounds are notorious for having bad and sometimes outright dangerous electrical wiring. If there are too many people for the design of the electrical system, you will not receive enough voltage and when it drops too low, it causes irreparable damage to motors such as your refrigerator & air conditioner. Alternatively, you could have 220-volts coming out of an outlet designed for 120-volts causing the reverse but explosive situation. For these and other reasons, we carry a surge suppressor and require that you use it. The process is very simple:

1) Plug the surge suppressor into the shore power outlet
2) Plug the 3-blade end of the shore power cable into the surge suppressor and the round twist-lock into the RV. The connectors can only go one way.
3) Wait 136-seconds as it cycles through its error codes and when you see E0, you are getting power. See the YELLOW section for a detail sheet of the error codes and surge suppressor operation.
4) Lock the expensive device to the shore power pole.

EQUIPMENT BAGS CONTENT & EXPLANATION: ELECTRIC

The rest of the equipment is to provide options should you have anything other than a perfectly situated campsite. The 50 AMP dogbone adapter lets you plug your 30-AMP RV into a 50-AMP outlet that is usually reserved for the very large RV's and motorhomes. Nothing bad will happen if you do this. The reverse, however, isn't true. If you plug your 30-AMP RV into a 15-AMP outlet, you run the risk of drawing too much power and tripping the fuse protecting the 15-AMP outlet. Should you find yourself needing to hook-up to a smaller amperage outlet, use the Victron BMV-712 to monitor your amperage use and stay under 15-AMPS. This means, specifically, you can't run the HVAC.

The 3-prong outlet tester lets you quickly check the campsite power post GFCI outlet to see if it's wired correctly, or at all. It also lets you test the trailer outlets to see if you are getting power when you are trying to figure out why something you have plugged in isn't working. The multimeter is for more advanced debugging and if you don't know how to use it, it's isn't wise to try to explain how in this guide. Just leave it alone.

The neutral bond adapter connects the ground of the vehicle to the neutral bar of the electrical panel. An RV electrical grounding system is very different from a home electrical system and when you try to take a generator designed for home use and use it on a vehicle isolated from the ground by rubber tires, things don't work as expected. This is explained further in GENERATOR USE.

EQUIPMENT BAGS CONTENT & EXPLANATION: GENERATOR

YELLOW BAG – PROPANE GENERATOR

1) Honda EU2000i propane
2) 6-foot propane hose with regulator
3) Quart 5W-30 synthetic oil & funnel
4) Generator Cover

We chose the Honda EU2000's because they are relatively light-weight and for those few times when you must run the air conditioner, two can be connected (shown above) using a companion cable. Moreover, they have something called ECO Throttle which adjusts the engine speed (and noise) according to how much power you are drawing which is different from non-ECO models which run at whatever speed (and noise level) needed to produce the full wattage rating regardless of how much is being used. Lastly, we chose the EU because it produces power as a typical generator and then sends it through a device called an inverter which electrically cleans it up making it safe for electronics such as the ALDE, TV and so forth.

The GenConnex conversion removed the gasoline tank and replaced the carburetor with one that uses propane from the 20# tank carried with the trailer. We felt this was safer than carrying around volatile gasoline and you can run the generator for as long as the propane tank has fuel. Plus, it's easy and very safe to transport the 20# BBQ style propane tanks in summer heat.

The nüCamp has the Standard model and the Airstream has the Companion model. On the standard unit, there are two 20-AMP outlets and one 12-VDC outlet. On the Companion unit, there is one 30-AMP twist lock, one 20-AMP and one 12-VDC. To avoid the possibility of someone trying to use the twist lock, we put the standard unit in the nüCamp.

The 2000-watt unit would produce 16.6 AMPS at 120-VOLTS at full power. Your typical use would be to run one appliance or to charge the batteries for 3-4 hours bringing them to 100% SOC.

You don't need the surge suppressor. Use a dogbone and plug into the standard 30-AMP connector using the regular power cable.

EQUIPMENT BAGS CONTENT & EXPLANATION: SAFETY

ORANGE BAG – Jump / Tow / Flat / Safety

A 12” red bag containing the following items is stored in the TV.

1) 12’ jumper cables 4-guage
2) Tow Strap 2” x 20’ capable of 2800#
3) Nitrile Gloves
4) Tire Plug Kit
5) LED Headlamp
6) Poncho
7) Work Gloves
8) Vest with Reflectors
9) Flares – Pack of 3

Aside from the jumper cables, explaining how to use these items is simply beyond the scope and purpose of this guide. You need to practice before there is a problem and hopefully, we’ve had an opportunity to do that together. If you have an internet connection and a PDF version, the links might be helpful.

Tire Plug Kit Orion Flare Kit Jumper Cables

There are too many warnings and instructions regarding jumping a dead battery to address that here. There would be no reason for you to use jumper cables on your trailer, so this is one reason why the bag is stored in the TV. One commonly asked question is what order to you connect things.

FIRST:	DEAD BATTERY positive terminal
SECOND:	BOOSTER BATTERY positive terminal
THIRD:	BOOSTER BATTERY negative terminal
FOURTH:	METAL BRACKET in engine compartment of dead battery at least 6” from the dead battery but away from moving parts

You make the final connection away from the battery because there may be hydrogen gasses coming from the battery and should a spark jump from the cable to the battery, they could ignite. This raises the question of which way electricity flows: negative to positive or positive to negative.

EQUIPMENT BAGS CONTENT & EXPLANATION: SAFETY

The following items aren't stored in the Safety Bag but go along with their use in spirt and have been included here. Should you find yourself down a forest road and upon the return discover a downed tree or large branch, there are few options besides self-rescue. That self-rescue could take the form of hiking out to the main road and seeking help from qualified road maintenance people or it could involve you using the tools at hand, WITHIN YOUR SKILL LEVEL, to clear the path. You may be in the company of others who know how to use forestry tools but having failed to bring them, are just as trapped as you are. So while these pages aren't the place to learn how to use the equipment, they are being described in the hope that after reading this page you take the time between now and when you need to self-rescue to gain the SKILLS required to do so safely.

There is a Bahco 10-30-23 Bow Saw with both Dry Wood and Green Wood blades and a wedge stored behind the back seats of the pickup.

While a chainsaw would be preferred, we are trying to prepare for the possible while not loading down the truck with a complete shop. Thus, we decided on a saw and a hatchet as these could be equally used to source wood for a fire and doing so would build your forestry skills should you need to deal with something a bit larger at some point.

Finally, there is the question of how to move the fallen tree. Again, this isn't the place to teach technique as the process can lead to serious injury or death, but assuming you are trained in how to deal with this, there is a 20' tow strap rated at 2800# along with a shackle and rigging rope in the bag.

BOONDOCKING DECISIONS

When hooked-up to shore power, city water and septic, there are no constraints on the length of your shower, amount of water used to wash dishes, ALDE heat setting in winter, use of electric tank heaters and so forth. Once you disconnect the umbilical cord and start to dry camp, or possibly even boondock, you must ration your use keeping in mind how long it will be until you can empty the tanks, find fresh water and recharge the batteries through solar or shore power. Actions have consequences and it is especially true in the RV. You have the following available to you:

1. 30 gallons of FRESH WATER
2. 12-gallon BLACK tank
3. 18-gallon GREY tank
4. 112 of usable Amp-Hours in the battery

Get used the idea that you are on a natural resource diet. You have no choice regarding what goes into the BLACK tank, but the GREY usage can be managed. While boondocking, you will generally carry one or more 5-gallon water containers in the TV. To avoid prematurely filling-up the GREY tank, you can place a tub in the kitchen sink and use the faucet for hot and cold water. This lets you wash semi-normally but prevents the water from going down the drain into the GREY tank. As the tub gets filled, you empty it outside in a responsible manner. This lets you limit the GREY TANK to the bathroom sink and showers. To the extent you can use the external shower and refill the fresh tanks from the 5-gallon portable tanks, you can further extend the boondocking time until you need to find a dump station. You will find that 12-gallons of BLACK is plenty while 18-gallons of GREY goes quickly. Assume you will use 1.5 gallons of water for every minute in the shower.

A detailed spreadsheet on the next page provides the amperage used by each electrical device. Multiply AMPS by OPERATING HOURS to get the Amp-Hours that usage will consume. You have a maximum 112 Amp-Hours you can draw out of the battery before you need to add more through solar or shore power. The Boondocking Spreadsheet makes seasonally changing usage assumptions to give an idea of what you might expect.

BOONDOCKING DECISIONS

FUNCTION	Electrical Device	400 AMPS ~	Winter Hrs	Winter AMPS	Spring/Fall Hrs	Spring/Fall AMPS	Summer Hrs	Summer AMPS
Air Conditioning	Cool Cat 441003A701	8.90	Not used for boondock calculations - Information Only					
Always Running	LP / Solar / BVM712	0.35	24.00	8.40	24.00	8.40	24.00	8.40
Compresssor	Viair 450		Not used for boondock calculations - Information Only					
Fan Bathroom	Fan-Tastic 600	3.13	0.25	0.78	0.25	0.78	0.25	0.78
Fan Main - Level 1	Fan-Tastic 1400	1.35	0.00	0.00	6.00	8.10	0.00	0.00
Fan Main - Level 2	Fan-Tastic 1400	2.00	0.00	0.00	0.00	0.00	8.00	16.00
Fan Main - Level 3	Fan-Tastic 1400	2.65	0.00	0.00	0.00	0.00	0.00	0.00
Heat: Alde Panel On	Alde 3020	0.52	Not used for boondock calculations - Information Only					
Heat: Heat Pump	Cool Cat 441003A701		Not used for boondock calculations - Information Only					
Heat: Alde Circulator Only	Alde 3020	1.15	7.00	8.05	2.50	2.88	0.00	0.00
Heat: Alde Circulator & LP	Alde 3020	1.85	1.00	1.85	0.50	0.93	0.00	0.00
Heat Pad: Valves	Therma Heat	1.09	8.00	8.72	3.00	3.27	0.00	0.00
Heat Pad: Grey Tank	Therma Heat	6.00	8.00	48.00	0.00	0.00	0.00	0.00
Heat Pad: Fresh Tank	Therma Heat	3.95	0.00	0.00	3.00	11.85	0.00	0.00
Hot Water Only	Alde 3020	0.00	1.00	0.00	1.00	0.00	1.00	0.00
Inverter	AIMS PWRIX120012S		Not used for boondock calculations - Information Only					
Light: Accent Switch		2.02	3.00	6.06	2.00	4.04	2.00	4.04
Light: Bathroom		1.23	0.25	0.31	0.25	0.31	0.25	0.31
Light: Bed Wall		0.62	0.00	0.00	1.00	0.62	1.00	0.62
Light: Ceiling #1 Blue		0.56	0.00	0.00	0.00	0.00	0.00	0.00
Light: Ceiling #2 White 3-Bars		0.65	0.00	0.00	0.00	0.00	0.00	0.00
Light: Ceiling #3 White 4-Bars		0.72	0.00	0.00	0.00	0.00	0.00	0.00
Light: Ceiling #4 White 5-Bars		0.87	0.00	0.00	0.00	0.00	0.00	0.00
Light: Closet #1 White		0.21	0.25	0.05	0.25	0.05	0.25	0.05
Light: Closet #2 White		0.18	0.00	0.00	0.00	0.00	0.00	0.00
Light: Porch Switch		0.23	0.50	0.12	0.50	0.12	0.50	0.12
Light: Reading Lamp, Table		0.15	0.00	0.00	0.00	0.00	0.00	0.00
Light: Reading Lamp; Bed		0.13	2.00	0.26	1.00	0.13	1.00	0.13
Light: Shower		0.35	0.00	0.00	0.00	0.00	0.00	0.00
Light: Sink Switch		0.33	1.00	0.33	1.00	0.33	1.00	0.33
Light: Steplight		0.01	12.00	0.12	12.00	0.12	12.00	0.12
Radio Receiver	Jensen JWM70A	0.58	0.00	0.00	0.00	0.00	0.00	0.00
Refigerator (2-way)	Norcold NR751BB	5.15	4.00	20.60	4.00	20.60	4.00	20.60
Television	Jensen JTV24DC		0.00	0.00	0.00	0.00	0.00	0.00
Water Pump at 30 psi/1.5 G	ShurFlo 4008-101-A65	5.10	2.00	10.20	2.00	10.20	2.00	10.20
	TOTAL Consumed	AmpHrs	74.25	113.85	64.25	72.72	57.25	61.70
	Estimated Solar Input	WattHrs		600		700		800
	Voltage Denominator	Volts		13.73		13.73		13.73
	Estimated Solar Input	AmpHrs		43.70		50.98		58.27
	NET Battery Draw	AmpHrs		70.15		21.73		3.43
20-hr Discharge Rate @ 50%		AmpHrs	OK	112	OK	112	OK	112
10-hr Discharge Rate @ 50%		AmpHrs	OK	97	OK	97	OK	97
5-hr Discharge Rate @ 50%		AmpHrs	OK	90	OK	90	OK	90

BATTERIES & SOLAR

In passenger side of the under-bed storage compartment, you will find two 6-volt Absorbed Glass Matt (AGM) batteries in a black plastic box. They are wired together and act like one typical 12-volt battery. This dual battery set-up was chosen because 6-volt batteries have thick metal plates designed to release energy continually over time as opposed to 12-volt batteries which have thin plates designed to give large jolts of energy very quickly. The former is great for running relatively low powered electrical devices over a long period of time while the latter is great for running a high-powered device like a starter for a short period of time. You see 6-volt batteries in golf carts and other continual use applications.

BACKGROUND Our batteries are fully charged at 12.65 volts and are fully discharged at 11.8 volts. If allowed to reach full discharge, it reduces the lifespan of the battery substantially each time that happens and one day, they read 0-volts and must be recycled. For this reason, we never go below 50% of charge which is 12.2 volts as replacing them before their 5-year typical lifecycle is both expensive and time consuming.

To get an accurate voltage reading, you must disconnect the trailer from shore power, or you will see a voltage of between 13 and 14 volts which means the battery is being charged. Once removed from charging, the batteries must rest & cool down before attempting to measure voltage. It is like waiting to see how much fluid is in a measuring cup while holding it unsteadily in the air and filling it. Electricity is created through a chemical process within the battery and after "filling" it, it needs time to settle and rebalance itself. That also why you put the glass measuring cup down after filling, so you can see exactly how much liquid you have.

While the high (12.65) and low (11.8) voltage points are fixed, it's overly simplistic to rely on a single voltage measurement to get an accurate picture of how much energy is remaining in the battery especially if you are checking them while appliances are running. The voltage you see while equipment is in

use tells you the strain being put on the batteries at a given moment in time but not how much more energy is remaining before you must start turning off equipment. The 190-watts of solar will further throw off the reading because you may be checking voltage during the few minutes when the sun comes out on a rainy day. Since knowing how much energy you have is crucial to knowing when to turn on the generator or when to turn off certain appliances, we've added a battery health monitor. This device measures battery health by tracking how much power the solar system is generating, the ambient temperature and what equipment has been running and for how long. All of this is considered to give you an idea of how much energy is remaining in the battery.

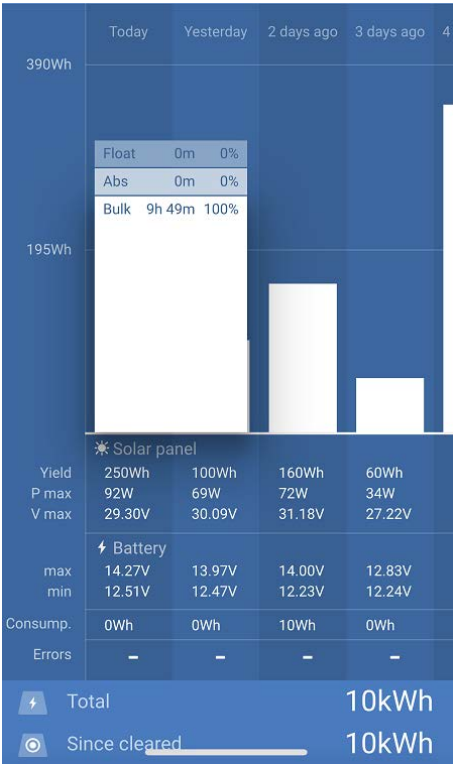
You can either look at the display to get a reading showing what percentage of the battery is remaining or, for those interested in detail, download the Bluetooth smartphone app and view a wide range of information showing State of Charge %, historical usage data and other information that would let you fine-tune your boondocking decisions. Full equipment and troubleshooting details can be found in the YELLOW section.

SOLAR

The amount of electricity the 190-watt flexible solar panel on the roof puts back into the batteries is directly proportional to the amount of uninterrupted sunlight it receives. An engineer reading the spec sheet for our CIGS style flexible panel by Sunflare would tell you that under Standard Test Conditions (STC), the optimal operating current of 6.2 AMPS is reached at 28.2 VOLTS when the suns irradiance reaches 1000 w/wm2 just as the voltaic cells reach 52.1 degrees Celsius and the angle to the sun is 1.5. Since this perfect intersection of temperature, time of day, location and angle to the sun will rarely if ever be achieved, much less sustained for hours on end, our panel will produce some percentage of this optimal rating. In reality, we just don't know how many watts you will get on a given time but you can use the Bluetooth Victron solar controller APP to tell you how much power was generated today.

BATTERIES & SOLAR

The main screen isn't shown here because it shows you what is happening right now which isn't terribly useful as you need to know cumulative data. Looking at the History tab you will see the screen on the right.



Since the panel produces less in mornings & evenings compared to mid-day, and less in winter vs summer, a value called Pmax shows the highest wattage at a moment in time that day. Similarly, Vmax shows the peak voltage while Yield shows total Watt Hours generated. If yield says Kwh instead of Wh, then you are seeing a figure for killowaht hours vs plain watt hours. You can calculate total generated Amperage as Wh/13.72-volts or Kwh x 1000/13.72-volts.

The controller uses 3 different methods to recharge the battery depending on the state the battery is in at a given moment. In BULK mode, as much electricity as possible, in the highest voltage as possible (up to 14.6 VOLTS), it crammed into the lead plates. Once it hits a certain point, it switches to ABSORPTION for the final 10% at a lower voltage and charge rate. Once the battery is fully charged, it receives small amount of current in FLOAT mode to keep it topped off at 13.2 to 13.4 VOLTS.

In the example above, the controller used 100% of its 9-hours and 49-minutes charging time in the BULK mode. This means that the battery was either discharged before the solar panels started receiving sun, that there were electrical demands on the battery during the charge phase or some combination of both.

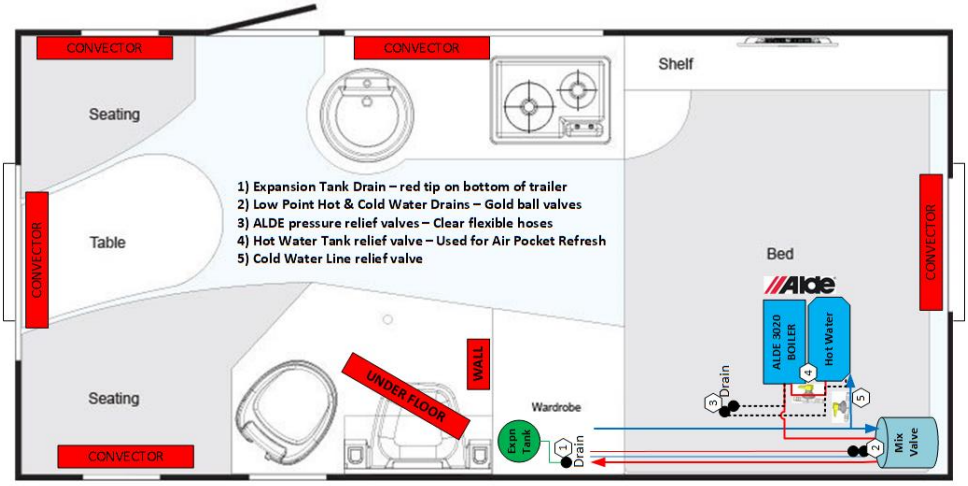
BATTERIES & SOLAR

Reading the data below the bar chart, we know that the panels generated a total of 250-Watt hours (Yield) and the highest wattage our 190-watt rated panels produced today was 92-watts (P max). The final figure shows that this was all done with a maximum voltage of 29.30-volts (V max). Less importantly but still helpful in understanding how it all comes together is that the battery ranged from a low of 12.51 VOLTS to a high of 14.27 VOLTS The YELLOW section gets into the implications of this data.

On the BOONDOCKING DECISION pages you just passed is a spreadsheet giving you the tools to estimate how much power a given component will draw per hour. An estimate for average usage hours for each season is shown along with the total amperage those hours would draw the battery down by. For Example, Winter use has the highest season AmpHrs at 113.85 and the lowest Solar Input at 43.7 leaving a net draw of 70.15 AmpHrs. The battery has 224/2 = 112 AmpHrs before depleting so the trailer can run this estimated load assuming only 600 wats of solar is generated. In summer, it rises to 800 watts and since the heat is off, in an ideal situation, the system would have a net draw of ZERO leaving the battery fully charged at End of Day.

ALDE HEATING SYSTEM & CONTROLS

BACKGROUND The ALDE equipment provides both central heating and hot water. Looking at the image below, you can see that there are 5 convectors around the perimeter of the TT, one under the shower floor and one panel radiator just below the shower controls. Glycol fluid circulates through the piping heating the convectors. The rising heat draws cool air from the vents along the bottom of the trailer cabinetry setting-up a convection current that creates an invisible column of air swirling along the perimeter walls and being drawn back down into the center of the TT where it cools and goes back into the floor vents. Since the convectors are built-into the cabinetry they act partially as a convection radiator and partially as a radiant heat source by heating their enclosures and by convection, causing the entire interior to warm up. The upside is that the heat is very even, but the downside is that the trailer can take a while to come up to temperature.



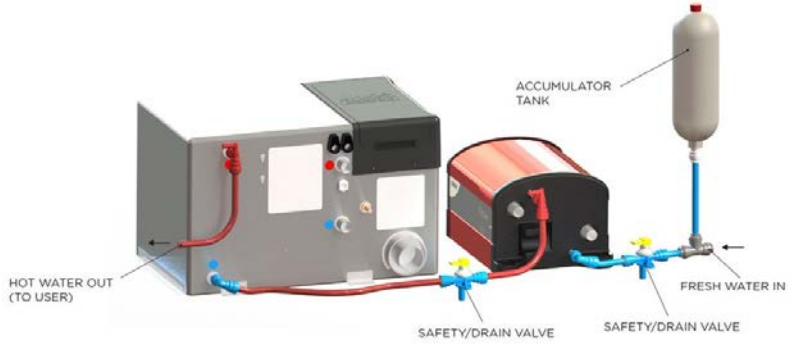
ALDE is only found in the very high-end trailers and even then, only on their high-end models. Our late model Airstream is like most RV's in that it employs a forced air furnace which provides a dry heat and never really warms the interior evenly but creates hot and cold spots depending on how the unit is ducted. The combination of ALDE, the quality of the wood used in the

cabinetry, Azdel construction and the 12-volt appliances are what convinced us to purchase a nüCamp for our small trailer instead of another Airstream.

If nüCamp ever made a large unit, we would be hard pressed not to switch entirely. But we digress.

The system can operate from the LPG tank, from shore power or both at the same time providing a wide range of flexibility. As the Dometic CoolCat heat pump becomes too inefficient to use when the outside temperatures drop below 40-degrees, ALDE picks-up during the cold weather working well even at Zero degrees. Honestly can't tell you why the RV has two heat sources as the ALDE can cover all temperature ranges but it's nice to have redundancy. When connected to shore power, the electrical heating elements can be operated at three power settings giving you flexibility when working on a limited power budget. The lower settings just mean it takes longer for the system to heat-up. Since the system can run on electric and LP at the same time, this turbo boost can be welcome on very cold days. Just like home, however, setting the thermostat higher than you want the eventual room temperature to be for comfort won't get the TT warmer faster, it will just overheat the inside by eventually reaching the higher temperature. Similarly, save the turbo boost capability for when it's really needed as this uses significantly more energy than just operating at normal temps and speeds.

Our TT also has the Alde Flow continuous hot water system. A dedicated circulator inside the 2.2 gallon Alde Flow hot water tank passes hot glycol over



a heat exchanger to rapidly raise the water temperature before it reaches the main hot water heater to bring it the rest of the way to 122°F. This additional "boost" feature is usually turned on to ensure hot showers. After going through a mixing valve, it exits the hot water taps at 100-degrees F.

The mixing valve described above can be found by opening the driver's side compartment, also called the ALDE compartment, and looking on the right-side floor. This mixing valve should already be set properly but in case it has been inadvertently adjusted, it can be used to increase or decrease the water temperature. Turning the knob clockwise INCREASES the temperature and counter-clockwise DECREASES the temperature. A ¼ turn in either direction roughly corresponds to a 44.6-degree F change and you can turn the knob a maximum of ½ turn from the neutral setting. It should go without saying that you can seriously injure yourself or someone else by setting the valve to allow scalding temperatures through the system so unless Mom or Dad tell you specifically that you can do this, leave it alone and deal with cold showers! For the most part, this very long paragraph has been included to provide a better understanding of how the system works than serve as a self-help tool.

Best performance will be obtained by keeping the air intakes clear and providing a way for stale air to exit. Look at the EXTERIOR FAMILIARIZATION page for the driver side image to locate the intake. Under each convector is an air intake of some sort that you'll be able to see at the bottom of the cabinetry. Don't block these areas while the Alde is in operation as cold air is needed for the convection process to take place. Similarly, warm & moist air needs a place to vent out if you are to avoid condensation and stale air syndrome. Just open the main vent one-inch high (1") at first and use your observations to determine if you need to open it wider. Temperature, humidity, cooking, number of people in the TT all contribute to the amount of venting required. At night, additional air venting will be necessary due to the number of hours you will be sleeping and emitting moist CO2 and we've found that opening the kitchen sink window and the kitchen table vents to their smallest openings will do the trick.

ALDE HEATING SYSTEM & CONTROLS

BEFORE USE

If the system hasn't been used in a while and before starting-up for each season, the following checks MUST be performed to avoid damaging the equipment or putting yourself in a dangerous situation.

1) Check the fluid level in the expansion tank located in the rear of the closet next to the bathroom. It looks like the picture shown here and the glycol level should read be about ½" above the minimum indicator when cold. If the tank needs additional fluid, you must use Century Chemical TF-1 as that is what it currently is filled with. Using any other brand requires you to flush the entire system and refill completely with one brand. Mixing them can lead to coagulation.
2) Before using the Hot Water Flow system, flush any standing water from the tank by opening the hot water tap of any faucet and allow at least 3-gallons of water to flow through.
3) Confirm the exhaust port is free of snow & ice as this port contains both the fresh air intake and the carbon monoxide exhaust flue.
4) Make sure the trailer isn't parked next to a physical object which would block the exhaust port. Similarly, make sure the trailer isn't parked inside or is blocked in such a way as exhaust gasses wouldn't be free to dissipate but instead would build-up in an enclosed or trapped area.
5) Perform an air circulation check making sure that all the fresh air intakes below the cabinets are free of obstacles.

ALDE HEATING SYSTEM & CONTROLS

SAFETY WARNINGS

The Alde manual is replete with a variety of warnings and they should be read and understood. From a daily use standpoint, there are a couple that we've reproduced here as a friendly reminder.

1) **Never operate the Alde system ON PROPANE while the TT IS INSIDE A BUILDING**. Electric is OK but turn off the LP flame at the panel. As a byproduct of burning propane (LP), it's exhaust contains dangerous carbon monoxide (CO) that can lead to carbon monoxide poisoning. While the trailer is equipped with a CO & Propane detector, don't risk your life or the lives of others. Symptoms of CO poisoning include headache, dizziness and/or nausea. If you have any of these symptoms, get fresh air at once and seek immediate medical care.
2) **Never block the exhaust port** located on the driver's side towards the rear by parking too close to an object which might block it. This applies equally to using the TT while surrounded by deep snow as there would be no place for the exhaust to go but back inside the TT.
3) When cleaning the TT, never spray water into the exhaust outlet.
4) **Hot water at temperatures above 120-F can cause serious scalding injuries and in extreme cases, even death.** The Alde system can deliver hot water at temperatures above 185-F. There is a mixing valve installed which is designed to bring these temperatures down to safe levels. DON'T MESS WITH IT!

How long can skin be exposed to hot water?

Temperature °F (°C)	Time before skin becomes scalded	
158 (70)	Extreme danger!	< 1 second
151 (66)	Very dangerous!	1 – 5 seconds
140 (60)	Dangerous!	10 seconds
129 (54)	Warning!	30 seconds
126 (52)		2 minutes
120 (49)		5 – 10 minutes
100 (38)	Safe	Safe bathing Temperature

Source: Moritz, A.R. / Herriques, F.C.: Studies of thermal injuries: the relative importance of time and surface temperature in causation of Cutaneous burns A. J. Pathol 1947; 23: 695 - 720.

ALDE HEATING SYSTEM & CONTROLS

5) The Alde 3020 boiler has the following **SAFETY FEATURES** built-in which may cause you to believe the equipment isn't working when in fact, it has been shut down for safety reasons. Be aware of these conditions when debugging a failure to operate problem.
   - Flame monitoring: If the flame goes out, the gas supply is switched off by a flame monitoring device.
   - Low-voltage shutdown: If voltage drops below 10.5 V DC, the gas supply to the burner will be switched off.
   - Monitoring of the combustion blower: A failure of the combustion blower causes the gas supply to the heating system to shut off.
   - Monitoring hot water temperature: A water temperature switch helps avoid excessively high water temperatures above 194 °F
   - Always use caution before exposing the skin to heated water.
6) **The exhaust temperatures** from the boiler can be up to 392-F so keep clear of the exhaust port and piping in the rear of the boiler itself while operating under LP. For this reason, the ALDE compartment is not suitable for storing anything and shouldn't be used in this way.

ALDE HEATING SYSTEM & CONTROLS

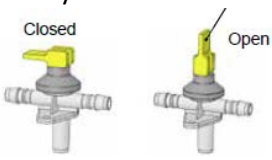
HOT WATER FLOW TANK AIR CUSHION

There is one maintenance task that comes along with the great features of the ALDE and it involves draining and refilling the hot water tank every 10-days. As water is heated, it expands a little, so the Alde Flow hot water tank expects there to be a small air pocket at the top to absorb pressure surges. For reasons I don't understand but which have to do with fluid dynamics, after a series of showers and heat-expansion cycles, the pocket starts to dissipate and must be renewed. Furthermore, the Alde manual says that the air cushion helps protect the heating system against pressure surges from the heat pump.

Some signs that you may need to restore the air cushion before the generic 10-day period are: (1) reduced water temperature and (2) small puddles of water under the Alde compartment on the driver's side as the hot water tank vents from increased pressure.

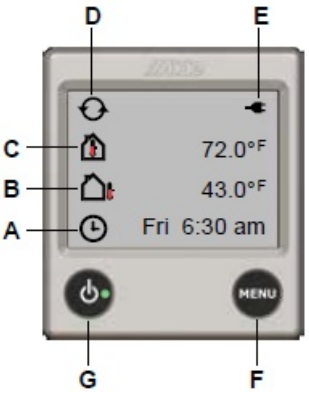
STEPS

1) Turn off the water pump.
2) Turn off the ALDE system.
3) Open the kitchen & bathroom faucet turning the lever to HOT. This provides replacement air as the water exits the closed system.
4) Locate the yellow valve shown in the picture to the right. On the floorplan at the beginning of the ALDE section, it was labeled ④ and is attached to the red PEX hot water line between the 3020 boiler and the Flow tank.



5) Lift it vertically and wait until water stops pouring out of the bottom of the TT.
6) Locate the red automatic check valve on the rear of the 3020 boiler. It is near the top and towards the front of the TT. Check to see that it is open by listening for a hissing sound as air enters while the water drains below.

ALDE HEATING SYSTEM & CONTROLS



STANDBY SCREEN

When the ALDE system is turned-on but in standby mode, you see the screen to your right Since the BACKLIGHTING option can be set to OFF by using the TOOLS menu, your only indication that the system is in standby mode would be a green LED on the power button (G). Press the screen or MENU to light it up should this be the case. The display reads as follows:

(A) **CLOCK** shows time & Day and can be set in the TOOLS menu.
(B) **OUTDOOR TEMPERATURE** is not installed in our T@B400
(C) **INDOOR TEMPERATURE** is always displayed
(D) **CIRCULATOR PUMP** symbol shows when it is running
(E) **PLUG** shows when ALDE is connected to a 120-volt source.
(F) **MENU** button for entering the sub-menus
(G) **ON/OFF** to turn the Alde system on and off.

SETTINGS MENU

TEMPERATURE setting is shown on the 1st row next to the thermometer icon. By using the touch screen to press the -/+ icons, you can raise or lower this setpoint from a low of 41 F to a high of 86 F. If the NIGHT AUTO or DAY AUTO options in the TOOLS menu were selected, then the -/+ will be greyed out. These AUTO settings allow temperature changes by time of day.

The 2nd row with a shower icon indicates the current hot water setting. A 2.2-gallon hot water tank is part of the ALDE system and instead of heating elements inside the tank or using an open

flame under the tank, there are coils filled with heated glycol fluid wrapped around the tank. When hot water is called for, the system sends heated glycol into these coils and indirectly heats the water inside the tank.

There are three temperature settings: OFF, HOT and VERY HOT. In the example shown here, the hot water is set to HOT. The gauge between the icons is partially filled but would be empty if set to OFF and full if set to VERY HOT. If the NIGHT AUTO or DAY AUTO options in the TOOLS menu were selected, then the -/+ will be greyed out. These AUTO settings allow temperature changes by time of day.

While in the VERY HOT mode, the circulator pump which sends glycol through the heat convectors would be turned off thereby permitting the boiler to provide all its heating capability to the hot water tank bringing it up to 149 F and allowing up to 1-gallons per minute to be supplied.

The 3rd row operates the two 950-watt electrical heating elements inside the ALDE. When plugged into shore power, you have the option of using propane or electric, or both as a turbo boost to heat faster.

There are three settings: OFF, 1 kw and 2 kw. In amperage, they equate to OFF, 8-amps (950-watts) and 16-amps (1900-watts) at 120-volts. You must be on shore power to use these settings. When active, the + icon will turn from blue to green as shown in the example above and the power level will be shown. If you have the available amperage and really need lots of hot water quickly, the 2-kw setting will do the trick. If you can wait or have limited electrical reserves available, use the OFF or 1-kw. It's all about giving you the options to use the available electrical connections wisely. Sometimes you may be connected to a 30-amp panel and other times to a 20-amp.

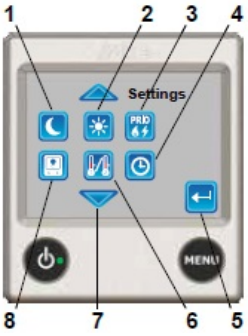
Note: When operating in turbo boost mode, Alde will use both electric and propane to get the inside temperatures up to the set temperatures and then switch to electric for maintaining temperature to conserve propane.

ALDE HEATING SYSTEM & CONTROLS

The 4th row has two functioning icons and one greyed out option that isn't installed on this trailer. Any time you see an icon that is greyed out, it either has been disabled by another menu or isn't installed here.

LPG/Propane icon on the left activates the boiler. The icon will change from Blue to Green when turned on as shown in this image. The icon on the far right brings-up the TOOLS menu shown below.

TOOLS MENU



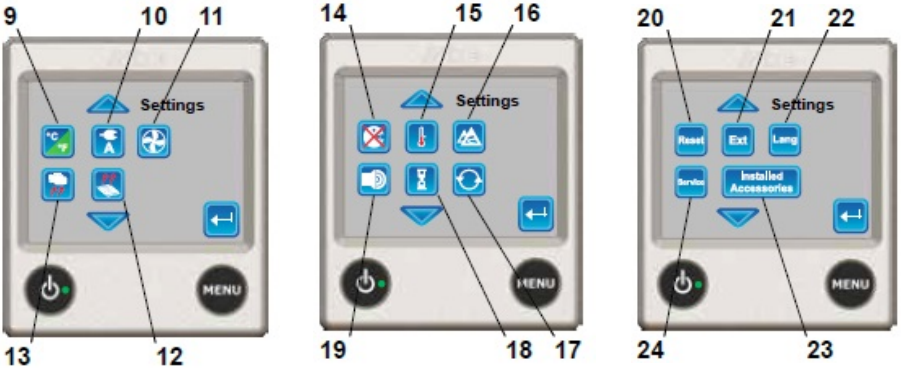
There are four menu pages available and you scroll through them using the up and down arrows. Each icon calls a sub-menu with more features. You can press the round black MENU button marked (F) on the silver plastic faceplate to exit the TOOLS MENU. We will briefly describe the 4 main menu options here but show the detailed sub-menus in the YELLOW section.

ICONS 1,2 & 3: NIGHT AUTO , DAY AUTO and PRIO. The Night & Day sub-menus allow you to set temperature, standby display brightness and hot water options for either one day during the week or for the entire week and differently for night and day.

ICONS: 8, 6 & 4: BACKLIGHTING, ROOM SETTING (greyed out & unavailable) and CLOCK. The Backlighting setting determines the screen brightness level when the ALDE system is in standby mode. The clock must be reset when 12-VDC power is lost and is necessary for the Night & Day settings to function.

The RETURN icon takes you to the prior menu.

ALDE HEATING SYSTEM & CONTROLS



ICON: Celsius/Fahrenheit button toggles C and F and the icon will highlight in green the selected option which in this case is Fahrenheit.

ICONS 10 to 13 are greyed-out and unavailable.

ICONS 14, 15 & 16: AUTOMATIC TEMPERTURE INCREASE, OFFSET, and HIGH-ALTITUDE MODE. As a safety feature to reduce the risk of legionella building-up in the hot water tank, turning this on will activate the boiler at 2 AM and run the Hot Water Boost Mode for 30-minutes. The Temperature Offset allows you to adjust the displayed temperature, so it more closely matches the actual internal temperature. High Altitude is used when operating above 3,000 ft. To use this, first turn off the propane ICON on the panel, select this switch and turn on the propane ICON to activate the LP burner.

ICONS 17, 18 & 19: CIRCULATION PUMP, AUTO START and AUDIBLE ALERTS. You can choose to run the circulation pump in continuous operate or controlled by the thermostat. Normal mode is Therm and you shouldn't

change this. The AUTO START feature turns the heating system on for 24-hours once each week on the day & time set. To activate it, enter day/time and turn the On/Off button to OFF. Sound lets you silence the audible alerts for Hot Water reaching temperature and for Gas Failure.

ICONS 20, 21 & 22: RESET, EXTERNAL START, LANGUAGE If you reset to factory, the panel will revert Boiler OFF, electrical heat in Level 1, LP Gas in ON and indoor temperature set to 72-F while all other functions are OFF. External Start has an OFF and 120V option giving you the ability to have the heating system turn itself on when it senses shore power is hooked-up. You'd have to choose the 120V option and turn the control panel OFF for this feature to activate. Language should be set to English although no matter what you select here, the SERVICE menu below will always be in English.

ICONS: 23 and 24: INSTALLED FUNCTIONS and SERVICE MENU. By selecting Installed Functions, you see the accessories that are activated on ALDE. The Service Menu shows the following screens and are updated every second.

ALDE HEATING SYSTEM & CONTROLS

DEBUGGING NO-HEAT SITUATIONS

The suggestions below are things that you can fairly easily perform while on the road. If these ideas don't solve the no-heat problem, you will need to seek professional attention at a nüCamp dealer or mobile RV repair service.

- **Propane Check:** If you are not getting heat while on propane, confirm that propane is flowing into the trailer. Simple check is to turn on one of the burners on the range. If it lights, you have propane. If it doesn't, either turn the valve on or refill the tank.

- **120-volt Power Check:** If you are getting heat while using  propane but are not able to get the electrical elements to operate when hooked-up to shore power, confirm that shore power is present. The simple test is to look for the plug icon (above) on the ALDE standby screen. If the plug is not present, then you need to figure out if the trailer has 120-volt power connected. First, look at the surge suppressor and see if there are any error codes that would indicate power isn't being supplied to the trailer. The table to debug these codes can be found in the YELLOW section. Second, look at the BMV-712 and check the battery voltage. If it is 13-volts or above, then the converter is receiving 120-volt power and is trying to power the battery. If you believe you are getting 120-volts to the trailer, check the converter panel just below the closet door and reset the ALDE breaker by switching it left and then right again. Lastly, lift the hatch cover shielding the ALDE compartment and make sure the ALDE 3020 boiler is plugged into the electrical outlet on the right side.

- **Air Pocket Obstruction:** It is possible that air pockets have formed in the glycol somewhere along the piping connecting the expansion tank, ALDE equipment and the convectors. The goal is to get those pockets to shift and rise naturally into the glycol expansion tank. Often this problem arises when the ALDE system was left on and has been

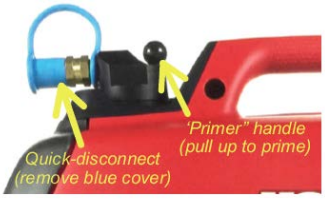
operating while the TT was being towed. To clear an air pocket obstruction,

1) Turn off the ALDE system at the silver control panel.
2) Block the tires front and back.
3) Lift any stabilizers as if you were departing
4) Remove the TT from the TV if connected.
5) Raise the trailer to it's maximum reach on the hitch jack which will cause the rear to drop down and the "A" frame to lift.
6) Do the reverse and lower the trailer by cranking the hitch jack as low as it will go.
7) Return the trailer to level and check to see if this cleared the obstruction by turning the ALDE back on so it calls for heat.

- **12-volt DC Fuse Check**: There are two fuses physically mounted to the ALDE 3020 boiler. One protects the control board and the other protects Alde accessories which may be connected. The one on the control board is the one you are concerned about. These can be found by turning to the FUSES section of this manual and identifying fuse #5 & #6. One or both 3.15-amp fuses may have blown. To check the fuses:
  1) Turn off the ALDE at the control panel
  2) Unplug the ALDE from the outlet
  3) Remove the green cartridge holding Fuse #5 and look at the fuse. You should see an intact wire inside the glass tube. If this wire is not intact, replace it using one of the fuses from the spare fuse kit in the toolbox.
  4) Do the same for Fuse #6
  5) Plug the ALDE back in
  6) Turn the ALDE back on at the control panel
  7) Check for heat.

GENERATOR EQUIPMENT & USE

1) Set the generator on a hard level surface outdoors at least 5' from any opening (window, door vent, etc) although 10 is better. Place tank at least one foot away from generator making sure it is secured from tipping over and close enough for the propane hose with pressure reducing regulator to reach with a slight slack in the hose (not pulling on fittings) A milk crate is ideal. Close the valve on the propane tank then attach the propane hose with pressure reducing regulator onto the tank. Connection should be hand tight.



Propane inlet location. Remove protective cap for access

2) Attach the end of those with the female quick-disconnect onto the generators male quick-disconnect found near the pull starter side of generator. To do this, fully pull back on the safety shroud of the female quick-disconnect to expose the ring of bearings, insert over male on generator, then release the shroud to seal. See "Safety Information" section in the binder of safety manuals.

3) Turn the generator run switch to "ON". This lever does not effect the propane flow but does allow the spark plug to fire when in the ON position. Note: switch in picture is in the "OFF" position.
4) Change fuel orifice if operating above 5,000 feet. Your generator has been pre-configured to run from propane, but you may instead configure it to operate at a high altitude (above 5,000 ft). To do so you will need to change the fuel orifice. See GenConnex Manual for this procedure.
5) Connect the generator using the correct hose. DO NOT connect the generator directly to a propane tank without the proper regulator or to an intermediate 10-15 psi regulator often found on large tanks.

GENERATOR EQUIPMENT & USE

The generator comes pre-set from the factory to run from low pressure at 7-11" w.c. equivalent to approximately 1/2 psi standard household pressure.

The nüCamp requires a pressure regulator and the Airstream has a dedicated low-pressure hose. DON'T CONFUSE THE HOSES.

6) Prime the generator by pulling up on primer ball for 3 seconds (see ball on top of generator at propane inlet), then pull starter cord to start. If generator mis-starts, prime again then pull again to start. Priming for too long will flood engine. If so, wait a minute then try again.

Generator won't start, won't stay running or runs very poorly

1) Make sure the generator's run switch is set to on.
2) Check that quick disconnect from hose to unit is fully seated and locked.
3) Check that propane tank hose connection is fully screwed on and tight.
4) Turn your propane tank off then back on slowly to check/reset tank internal valve.
5) Check that your air cleaner element is not flooded with oil. This can happen if your generator tips over. If it is, squeeze filter between paper towels, then properly dispose of oily paper towels. (oily rags can spontaneously combust in garbage or in pile - hang until dry, then soak with water and detergent before discarding)
6) Check that your tank isn't empty, or near empty.
7) If your propane tank tipped over, the tank valve may freeze up. Return tank to upright position and let it sit for a while without use to let valve thaw and/or drain.
8) Listen for slight "hissing" sound before starting when pulling up on round ball on top of inlet (to let you know fuel is flowing through tank and regulator)
9) Observe lights on front of generator panel to help diagnose problems.

We recommend ECO mode only if your load will not be fluctuating greatly. This prevents a brown-out and possible damage to your equipment as the generator tries to quickly increase RPM's to handle the sudden change

WASTE WATER (DRAIN & FLUSH & TABLETS)

People tend to make a big deal out of the tank emptying process, and it isn't a big deal.

1) Once you've determined that the tanks need to be emptied, it's a matter of driving the TT to the dump station and roughly lining-up the dump valve with the receptacle in the ground.
2) Following the checklist, you first put on disposable gloves that you will find in the propane tub. Go to the rear of the trailer on the driver's side and remove the hose from the storage pipe.

3) The green hose in the front of the trailer marked DIRTY WATER gets hooked to the Non-Potable spigot of the dump station and the BLACK FLUSH inlet on the RV. It is ONLY used at the dump station because it connects to a non-potable spigot that is assumed to be contaminated with sewer stuff.
4) Connect the ends as you see in the picture to the right, so the clear elbow goes into the ground and the other end attaches to the trailer in the picture above where it says dump valve cover. Note: You first must remove the cover by twisting it counter-clockwise in order to attach the pipe.

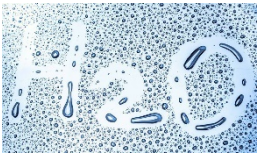
5) You can see that the GREY tank is controlled by the grey handle on the right and the BLACK tank is controlled by the black handle on the left.
6) Open the black tank valve observing the flow in the clear elbow until it slows to a trickle.
7) Open the grey tank valve until it slows.
8) Close the black tank valve and turn-on the Black Tank Flush faucet so you can hear water start to fill the black tank. Until you get a feel for how long to let it fill the tank, have someone inside checking the KIB monitor so it doesn't overflow. At 75% open the black valve keeping the hose running.

WASTE WATER (DRAIN & FLUSH & TABLETS

9) Repeat as many times as it takes until the water running through the clear elbow is clear.
10) Turn off the non-potable water spigot.
11) Watch the elbow until nothing is left to drain out.
12) Close the GREY and BLACK valves.
13) Use the dirty water hose to clean the Rhino sewer pipe.
14) Put everything away.
15) Before leaving the dump station, wash your hands with soap & water.
16) Put a Porta-Pak tablet into the toilet and flush it down with 1-gallon water. Wash an Elemonate tablet in the kitchen sink to deodorize the grey tank.
17) Put a long squirt of Dawn Dishwashing Detergent (Original Blue) into the toilet and fill the toilet partway by holding the lever down gently. The detergent will slosh about cleaning the bowl and when washed into the tank, will clean the tank and the KIB sensors.

#	DUMP HOLDING TANKS
1	PUT ON Disposable LATEX Gloves
2	Connect "DIRTY WATER" hose to **SEWER FLUSH INLET**
3	Connect other end of hose to non-potable water supply
4	Connect SEWER HOSE to dump drain w/clear elbow
5	Ensure hose drains downhill - use supports
6a	Open black valve - observe using clear elbow
6b	When flow stops, close black valve.
6c	Watch black tank levels and turn on water spigot
	!! If you OVERFILL it will erupt through the TOILET !!
6d	Open black valve with water still running
6e	Count to 15 / Shut off Water / Close valve when empty
6f	BRIEFLY turn on dirty water hose for a few gallons
	You added water in 6f to allow sloshing while driving
7	Disconnect Dirty Water hose from AS & set aside
8	Open Grey Tank Valve and let it drain completely
9	Close the Grey Tank Valve
10	Disconnect SEWER HOSE from AS to clean it
11	Use Dirty Water hose to clean SEWER HOSE
	- Helps if you wash with the AS end elevated
12	Rinse outside of HOSE & ELBOW and stow away
13	Disconnect Dirty Water hose from dump water
14	COIL & BAG Dirty Water Hose
15	Remove & Dispose of Nasty Gloves
16	Sanitize Hands - Add chemicals to TOILET

CONDENSATION



Activities such as cooking and breathing put moisture into the air which is difficult for the confined space of an RV to dissipate. Condensation is what happens when water vapor hits a cool surface and changes back to a liquid. If the humidity level is high, the surface doesn't have to be very cool before droplets appear first on the walls and windows. Over time, condensation leads to mold and rot because if you see it on the bathroom wall or kitchen window, it is also on a hidden surface that will be slower to dry and permit mold to form.

An analogy works well here. Think of humidity level as being the wattage of a light bulb in that for the moment, the quantity is fixed. Temperature becomes the dimmer except when you raise the dimmer it gets colder and when you lower it, the humidity drops. The colder the surface, the more the water vapor will condense there and the warmer the surface, the less condensation will occur. Therefore, while opening the windows in winter may seem counter-intuitive, it gives the humidity a way to exit the RV through the normal heat exchange of hot air rising with water vapor out of the interior.

We have found the best way to keep condensation down is to crack the window over the kitchen sink by opening the latches, pushing them past the resting point and then closing the latches letting the window fall back and rest against the window latches. That gives you enough fresh air intake for one person and one pet. For additional people or when it gets below freezing, do the same for another window. At the same time, raise the ceiling fan cover so it has a 2" opening. Over time you will get a feel for how much fan venting and fresh-air you need to counter the amount of condensation generated for a given temperature and quantity of people.

You will be wasting energy as hot air will escape. Through the process of convection, the rising hot air will draw cool air in through the open windows and exchange moisture laden air with cool air. You want enough of this exchange to avoid condensation on the walls and windows of the RV but not so much that you overwork the ALDE heater and waste more energy than necessary.

DEPARTURE CHECK LIST

The checklists which follow have been condensed and are more a reminder to do a set of tasks than a step-by-step instruction set. Printed in color and hanging on the key hooks, they are easy to carry around and not as intimidating as a 3-page version. They do, however, cover most of things that you would regret overlooking later. I can recall the time we arrived at a boondock site with zero fresh water and a full grey tank because we forgot to turn off the water pump and a random cushion tossed by the turbulence struck the kitchen sink faucet handle turning on the water. There is also the rumor that we once drove for a mile without the trailer 7-WAY hooked-up and only noticed because the TV seemed to brake heavily. We neglected to use the checklists on those days.

Complacency is a natural tendency especially when you are in the groove after a week on the road and you "know" what needs to be done. Thing is, you put the coffee down, get sidetracked by a rabbit, get interrupted by a conversation and before you know it, you "forgot" about one thing or another and there you are leaving the water hose connected and about to drive away. So, for our sake, and to avoid a trip ending event, please use the checklists. Unlike airline pilots, these don't cover everything but are more like "To Do" lists nudging you to remember a group of things that need to be done such as the Hitching or Unhitching line items.

The checklists anticipate two travelers allowing each to take a "job" and complete it without interruption. The INTERIOR checklist doesn't interfere with the EXTERIOR and they can be done simultaneously or consecutively. The only task that requires two people is checking the brake lights although the truck has a dashboard option you can view called Trailer Light Check so when solo, that is something you can rely on. Best to check for yourself whenever possible, though as human eyes beat software assumptions every time.

If you have any questions about the various steps or what they refer to, you should find it in the HITCHING portion or the INTERIOR FAMILIARIZATION portions of the GREEN section. Then again, this is a guide and not a manual so ASK if confused.

DEPARTURE HITCHING-UP & SAFETY CHECK

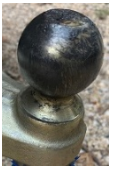
Most of the items on the Exterior Departure checklist is self-explanatory but for safety sake, we will briefly touch on items 9-11 and 18-20. We lack the skill to adequately describe in words how to backup, so the ball is exactly under the trailer hitch connector, so we won't. This will be shown to you and you will practice it before being allowed to solo. There is the YouTube way and there is OUR way.

When Hitching the TT to the TV (#9-11) you are doing the following:

1) Remove the Reese Hitch Lock. This operates by putting a ball into the hitch connector and a U-bolt over the hitch receiver making it impossible for someone to back-up to the trailer with a smaller ball than the 2" one we use and take the trailer away even with the latch locked closed.

2) Using the hitch jack, raise the trailer hitch connector so it is higher than where the hitch ball will be when the truck backs up. Otherwise you will hit the trailer causing damage to the jack, anything surrounding the trailer and even the connector itself. Pay attention!

3) Remove the hitch ball cover and confirm that the hitch ball has an amount of grease on it that could resemble butter thinly spread onto bread. Place the cover in the driver's door.



4) At the front of the trailer A-frame is the hitch coupler. Remove any lock or pin that might still be in place preventing you from lifting the lever in the rear. Pull up on the lever while pulling back on the lever tab and the coupler will slide rearwards

opening the latching mechanism below. The photos below give you an idea of what it looks like open & closed.

5) Once the ball is in place under the connector, lower the trailer onto the ball using the jack and lock the connector latch into place by pushing it forward. You may have difficulty latching it for a couple of reasons: (1) ball not directly under and rearward of the hitch coupling, (2) not aligned left or right or (3) ball doesn't have enough lubrication. For 1 & 2 once the hitch coupling is resting on the ball, you can often push or pull against the A-frame to get it to drop into place. Sometimes it will be necessary to put the vehicle in gear and let it move 1/2" to 1". You will get a feel for this.
6) Once it is latched, continue raising the jack until it goes as high as possible. If using the Jockey Wheel, remove it and place it in the left side of the tub next to the propane tank. If using the Jack Base Plate, it can remain on the jack stand.

7) Locate the thin silver metal emergency brake cable on the passenger side of the A-Frame. It has a carabiner on the end. Slip it into the safety chain loop on the right side of the TV receiver and double back, clipping it onto itself. If for some reason the trailer separates from the hitch ball and the safety chains fail, the cable will remain connected to the tow vehicle as the trailer falls behind and a pin will be pulled from the emergency brake switch causing the trailer brakes to apply.

8) Take the driver side safety chain and twist it 2x in a circle causing it to shorten-up. Latch it into the passenger side receiver safety chain loop. Do the same for the passenger side safety chain but hook it to the driver's side loop.
9) Remove the 7-WAY plug from its storage position and inspect it. Should you see debris or corrosion, look in the YELLOW section under 7-WAY CONNECTOR and follow the instructions there for cleaning the contacts.

10) Insert the 7-WAY plug into the TV making sure that the protrusion on the plug catches the lip on the TV door that folds down. Pull slightly on the plug to make sure it stays in place. A loose connection means one or more pins won't make a reliable connection affecting brakes or lights or both.

DEPARTURE HITCHING-UP & SAFETY CHECK

Performing a light check means you are visually confirming the following:

1) Both tail lights illuminate when the BRAKES are applied.
2) Both the driver's side and the passenger side signal lights illuminate. Don't test one side and assume the other works!
3) We mounted two LED lights under the trailer at a slight angle to the side to provide some backup lighting when entering narrow camping spots at night. Check that these illuminate.

#	DEPARTURE INTERIOR CHECKLIST
1	TV & Stereo: OFF
2	Inverter: OFF
3	Bathroom Sink cleaned & folded UP
4	Bathroom shower FAN vent closed
5	Bathroom door & walls squeegied dry
6	Close & Latch All Windows
7	Main Vent FAN turned OFF & CLOSED
8	KIB Panel: Water Pump OFF!!
9	KIB Panel: Lights OFF
10	Tank Heaters: OFF
11	ALDE PANEL: OFF
12	COOL CAT HEAT PUMP: OFF
	-- Intermission or Split Between Two People
13	Kitchen counter items stowed away
14	Wipe down kitchen counter & sink
15	Kitchen sink empty & clean
16	Dehumidifier unplugged & stowed away
17	Stove cover stowed in down position
18	Trash can under sink emptied
19	Seating & table items stowed away
20	Sweep or Vaccuum entire trailer Fore to Aft
21	Shades Closed
22	Lights off
23	Door locked & deadbolted

#	DEPARTURE EXTERIOR CHECKLIST
1	Shake out exterior rug and stow in TV
2	Disconnect & stow generator(s) in TV
3	Disconnect & stow sewer line
4	Disconnect & stow water line(s)
5	Check ALDE is OFF before removing power!
6	Disconnect & stow electric line / surge supresso
7	Retract stabilizers and clip (4)flags to ring
8	Turn off Propane and clip (1) flag to ring
9	Hitch TT to TV and clip (1) jack flag to ring
10	Inspect 7-way plug for debris
11	Plug in 7-way cable
12	Store ball cover in drivers door
	-- Good time to get someone else to help --
13	Confirm all people are out of trailer
14	Stow Steps - confirm door is locked
15	Walk around rig to confirm it is safe to move
16	Turn on Truck
17	Brake Controller Set to [4.5] and TV recognizes T
18	Turn on headlights & test TT marker lights
19	Test TT brake lights
20	Test TT turn signal lights
21	Move slightly to remove stress on chocks
22	Remove & stow (2) wheel chocks

DEPARTURE TRIP CARD

The departure trip card is part of the trailers log and helps tell the story of where it's been, how it's been used and what problems there might be with the equipment. If you use it, it will also force you to think about when you need to dump or refill water/propane/food next. The driver is responsible to do the tire check and know if the lug nut torque needs to be set and there is a reminder for what the settings should be. You can use the vehicle Tire Pressure Monitoring System (TPMS) to record the TV numbers because you are really looking for irregularities more than an exact figure. Periodically you should check using the manual gauge because you'll have it out anyway for the TT.

One or more people can complete the reverse, but it gives you a place to comment on what you liked and what you'd like to try out next time. Knowing who came is part of the trailer log so unless the name is obvious, the first time that person is coming please use first & last names as seeing BOB doesn't help that much.

We record the TV mileage because it is also a reminder to do certain maintenance operations when you hit major 10,000 milestones and keeps oil change timing at top of mind. If there is a problem with one of the systems, you make a note next to the % sign saying something like, BROKEN – LEAKING – STUCK and so forth. The mileage tells us how long this problem has been going on. By tracking the propane, you can look back and see how long a tank lasted, where you were and what you were doing so you have an idea what to expect next time. It will all make sense once you start using it.

Printed on Avery #5689 card stock, blank ones are stored in the glove box with a binder clip and completed ones are stored in the console between the driver & passenger seats with a rubber band.

Have fun!

DEPARTURE TRIP CARD

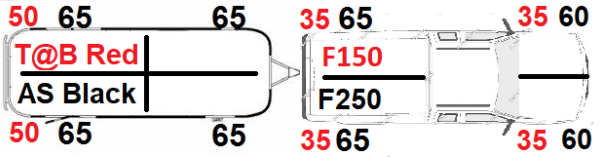
DURING THIS VISIT
Who Came?
What did we do?
Next time we should try?
WALK THE ENTIRE RIG and confirm jacks, stairs, cables hitch lock, tow mirrors & site are all squared away!
AS Height 9' 9" Width 8' 6" / TAG Height 8' 8" Width 7'4"

DATE: _____ By Whom _____

NEXT CITY _____ STATE_____

Staying At:	
HAS: Elect___ Water__ Dump __ Shower__ Lake/Pool___	
DATA TO RECORD BEFORE HEADING OUT	
Battery Voltage %	
Fresh Water %	
Grey Tank %	
Black Tank %	
Propane #1 Tank: 1,2,3,4 or 5 dots	
Propane #2 Tank: 1,2,3,4 or 5 dots	
TV Fuel Guage (Circle Closest)	E 1/4 | 3/4 F
TV Mileage	
TV DEF (Circle Closest)	E 1/4 | 3/4 F
Spare Water 5L Tank (Circle)	EMPTY 1/2 FULL
Spare Fuel 5L Tank (Circle)	EMPTY 1/2 FULL
We Need:	

Show COLD PSI if not +/- 3 lbs of number shown below



Check TORQUE AS 110# / TAG 100 #	YES / NO

ARRIVAL CHECK LIST

Very often we use the TT to stay at a Cabela's, Whole Foods or Cracker Barrel while on the road and don't unhitch because we are in transit between one place and another. In these cases, we don't bother with the whole leveling procedure because it's just a place to sleep. We've found it best to find a place in the parking area where it slopes so the engine is higher than the tailgate as this would make the trailer level. Its considered rude to put down the stabilizers and unhitch for these temporary stops as you run the risk of damaging their asphalt. It's perfectly safe to use the trailer while hooked-up to the TV but you should make sure to apply the parking brake.

If you are just staying overnight, leaving the 7-WAY connector won't create any problems as the TV has protection against the trailer trying to drain the battery. Longer than that, you should unhitch anyway.

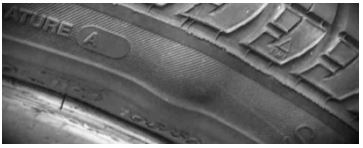
If you have any questions regarding the electric, water or sewer hookups in 6-8, please turn back to the EQUIPMENT BAGS pages where the materials and connection process is covered in detail.

#	ARRIVAL CHECKLIST COMBINED
1	Level Trailer Right to Left using Linx Blocks
2	Chock all 4 Wheels
3	Unhitchr & Level Front to Back using Tongue Jack
4	Cover Hitch Ball / Install 7-way Connector Cover
5	Set stabilizers w/gentle pressure & attach red flag
6	Connect Fresh Water if Available
7	Lock Surge to either Generator or Site Outlet
8	Connect Sewer & Support on Extension Rails
9	Put screen tent / grill / SOLO / chairs on picnic table
10	Unlatch stove vent tabs
11	Turn on Propane
12	Setup ZAMP portable solar panel if appropriate
	---- INSIDE & CAMP Jobs to Be Done ---
13	Unlock AS and reorganize from driving turbulence
14	Turn on Water Pump
15	Turn on Water Heater if arriving in the afternoon
16	Transfer items from the TV ARE fridge to AS fridge
17	CAMP Setup as appropriate:
18	- Erect Screen Tent
19	-Cover picnic table with Tablecloth
20	- Firewood & SOLO stove set up as appropriate
21	-Erect folding camp chairs as appropriate
22	-Configure Grill
23	-MEAL PREP or RELAX

ON THE ROAD SAFETY CHECK

Given that the TV has a 400+ mile range on it's 36-gallon tank while towing the TT and a 530-mile range without, you might be tempted to keep driving until you need fuel. It's a bad idea! Get out of the vehicle every 2-hours and walk around. It will help keep you alert; the dogs will appreciate it and the driver will mentally get a break and hopefully a refresh. As you walk back to the vehicle take a quick eyeball over the items below. Other than the Hub IR check, this is what every driver does before heading out. This is especially important if all you are doing is swapping drivers because the driver is responsible now for the entire rig and there is no way to do that without checking it over. You may think this isn't necessary because you've driven this rig hundreds of times without problem and you can do it in your sleep rain or snow. That is true until someone forgets a step or road vibration or debris changes things.

1) Obvious signs of tire damage from road debris, potholes and so forth. Looking for nails & bulging on the sidewalls. Is one tire looking flat?



2) If you are doing this after mid-day, it's a good time to check the wheel hubs for uneven heating. As explained elsewhere in this guide, take the infrared heat gun and aim the red dot at the center of the wheel where it says T@B. Remember the number and do the same on the other side. They should be within 30-degrees of each other and range between 130 and 175-deg F. If not, check the section on Wheel Hubs.

3) Count the lug nuts. There should be 5
4) Eyeball the hitch confirming the chains are in place and not too loose (dragging close to the ground) nor too tight (preventing turning) and that the brake safety cable is in place.
5) Eyeball the roof for open vents and the TT for open windows.

SPECIAL SITUATIONS: FREEZING WEATHER

There just wasn't enough time to get everything written before the April 1st trip so these pages were intentionally left blank as space-holders to be completed later and inserted into the binder when complete.

SPECIAL SITUATIONS: LIFE SAFETY SYSTEM DATE CHECKS

There just wasn't enough time to get everything written before the April 1st trip so these pages were intentionally left blank as space-holders to be completed later and inserted into the binder when complete.

TIPS for DAILY OPERATIONS

1. **Bathroom Sink:** Due to the compact design of the folding bathroom sink, you may start to think it's clogged but, it drains very slowly. Give it time to drain because if you flip it up before everything has gone down, what remains will drain along the wall making a mess to clean-up later
2. **Many Night Lights:** The numerous electronic devices that make the T@B so convenient to use can also be annoying when trying to sleep. This is a quick guide for dimming them:
   i. The **Jensen radio** can be dimmed, and the display even turned totally dark by pressing the DIM button and using the volume control to raise or lower the intensity of the display. First turn the radio on. Then press and hold the DIM button while turning the volume dial off.
   ii. The **Jensen TV** has a blue light that can't be turned off or dimmed. A piece of black electrical tape from the tool bag will effectively turn this off.
   iii. If you are using **ALDE** for evening heat or to schedule morning hot water, the backlighting can be set either to Light or Dark while the panel is in Standby Mode. Press the MENU button to wake the screen.
      - Press the Tools icon in the lower right corner. 
      - Press the Backlight icon for Settings. You will see a screen titled Backlight. 
      - Use the left and right arrows to cycle between Bright, Inverse and Dark. If you just want to dim the screen, you can choose between 3 brightness settings.
      - Hit MENU to exit.
3. When all the shades are drawn and every other light turned off, the translucent cover of the center fan lets in enough light to either act as a nightlight or be a sleep interrupting annoyance depending on how you like to sleep. When fan operation isn't needed at night, a fabric cover can be placed over the fan using Velcro strips to hold it in place. When not in use, this cover is stored in the closet on the lowest shelf on the left.
4. **Septic Hose Cover Sticking:** The all plastic design of the hatch cover invariably leads to it sticking for any number of reasons. Too tightly closed the last time, dirt on the threads, temperature, slightly off track, and so

on. Lubricating the threads with McLube SailKote Dry Lubricant periodically is good proactive maintenance and will save you a frustrating fight with stuck threads.

5. Use a small bungee to hold the 7-way umbilical cable along the "A" frame to keep it from dragging along the ground & otherwise getting in the way.
6. The tires are rated M for up to 81-mph but factory recommendation, industry norms and plain common sense say to go no faster than 65-mph. Remember, you are pulling your house behind you; what's the hurry?
7. Spare valve stem caps are included in the HITCHING bag in a tire care kit in case you see a tire without a cap. The purpose of the cap is to seal moisture out of the valve. One of the causes of stem failure leading to a slow or even a rapid leak is cracking due to the freeze-thaw cycle of water in the valve.
8. At the beginning of each month during the seasons when the CoolCat heat pump is being used, lift the dinette seat on the driver's side and you will see the AC dust shield. It is a flexible foam filter located in a housing which pulls upwards for removal and cleaning. Use a hose to wash the dirt and junk away, dry thoroughly and reinstall. If the filter is clogged, air won't flow efficiently into the unit causing it to work harder and reducing the amount of cool air you receive. Besides, it is filtering out the dirt and pollens that you would otherwise breath in so cleaning it keeps you healthier to boot.
9. If all you have available is a standard 15-amp outlet, you can still power the lights, refrigerator and top-off the batteries. Problem is that the trailer requires a specialized twist-lock connector meaning you must use the thick cable that would ordinarily be plugged into a 30-amp outlet. Since each amperage has a different type of connector to help prevent accidents, there are converters, called dogbones, in the ELECTRICAL bag that adapt from 15-amp or 20-amp to the 30-amp. Pick the appropriate amperage for the outlet and plug the surge suppressor into the dogbone and connect as usual. If the outlet is too far away from the trailer, use the orange 15-amp extension cord between the dogbone and the wall outlet.

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Equipment & Component Detail

Systems

APPENDIX: Modifications & Plans (Plumbing / Electric)

EQUIPMENT & COMPONENT DETAIL

2019 NuCamp &@B400 - Boondock Lite	
CATEGORY	**SPECIFICATIONS**
Exterior Height for Clearance	8' 6"
Exterior Length End to End	18' 3"
Exterior Width for Clearance	7' 4"
Interior Height	6' 9"
Ground Clearance Lowest Point	11.5"
Top of Ball to Ground at Level	22"
Hitch Ball Size	2"
LPG Tank Fitting	RV Type I Acme
Stabilizer Socket Size	3/4" socket - 6 point
Tank Capacity - Black in GAL	12
Tank Capacity - Grey in GAL	18
Tank Capacity - Propane Tanks	One 20#
Tank Capacity - Water in GAL	30
Battery Configuration	Two 6V AGM 224-AmpHrs
Water Intake - Potable	5/8"
Water Regulator - Potable	None - Use external at 50 psi
Weight - Axles GAWR	3,900
Weight - Curb	2,690
Weight - GVWR	3,700
Weight - Hitch# Tongue Wet	400
Weight - Hitch# Tongue MAX	460
Weight - NCC (Carry Capacity)	1,010
Wheels - Brakes	Electric
Wheels - Axle	Dexter #10F 4K Torflex
Wheels - Lug Nut Torque	100 foot pounds
Wheels - Rim Code/Size	#L55205R / 15" diameter x 6.0" width J collar
Wheels - Tire Pressure COLD	50 psi
Wheels - Tire used for Specs	235/75R15
Wheels - Tires mounted	Rainier Apex ST APC-X ST235/75R15
Wheels - Type	Black Aluminum
Wheels - Spare	Rainier ST 205/75 R15

	2019 T@B400	2018 F150
Tire Pressure Cold	50 psi	35 psi
HEIGHT	8' 6"	6' 4"
WIDTH w/wo mirror	7' 4"	8'-w / 7'- wo
LENGTH	18' 3"	19' 4"
NCC / Payload	1,010	1,565
GVWR - Total	3,700	7,000

Vendor	Product	F	Manual	Model #	Rating
AIMS Power	Pure Sine Wave Inverter DC to AC - 1200/2400 watts	Y	PDF	PWRIX120012S	
Alde	Hot Water Indirect Tank	Y	PDF	Flow	
Alde	Furnace and Hot Water Heater	Y	PDF	30209300	
Ameri-Kart	Grey Holding Tank	Y	None	H-1140 Polyethylene, Wall : .187" Nom	
Ameri-Kart	Fresh Water Tank	Y	None	W-1507 Polyethylene, Wall: .187" Nom	
Atwood	Dual LP Gas & Carbon Monoxide Alarm	Y	Paper	36681	
BAL	Sidewind A-Frame Trailer Tongue Jack 2000#	Y	Paper	29025	
Dexter	Axle	Y	PDF	8136692 #10F 4K Torflex 10" Brakes	4000#
Dometic	Propane Cooktop	Y	Paper	2BR-1066050 RV	
Dometic	Capacitive Touch (CT) Thermostat	Y	Paper	9108853314	
Dometic	Cool Cat RV Under Bench AC & Heat Pump	Y	PDF	441003A701	10,150
Dometic	Fan-Tastic Vent in Main Area 14x14	Y	PDF	1400	
Dometic	Fan-Tastic EZ-Breeze Vent in Bathroom	Y	n/a	600	
Dometic	Sink 16.5" round x 5-1/2" deep	Y	PDF	VA7306AC	
Equalizer	Sway Control Weight Distributing Hitch 600#	NO	PDF	90-00-0600	600#
Ford	Two-Ton Jack Assembly & Handle/Tool Kit	NO	None	#7C3Z-17080-AE & #HC3Z-17005-H	4000#
Harris Battery	Golf Cart Batteries 6v 224 Ah at 20hr / 12.1=50%	Y	PDF	HBDAGMGC6-A	
HepvO	Kitchen Sink Waterless Waste Valve 1-1/4"	Y	PDF	BV1B/UA	
ITC	Latching Exterior Shower	Y	PDF	Fontana 97022-A-5	40 psi

Vendor	Product	F	Manual	Model #	Rating
Jensen	CD/USB/MP3 Bluetooth Receiver	Y	PDF	JWM70A	
Jensen	LED TV 24 volt HDMI/UAB/VGA/	Y	PDF	JTV24DC	
KIB Enterprises	Convenience Center Panel	Y	PDF	M-Series	
LK Armatur	Mixing Valve	Y	n/a	LK-550 AquaMix	
Mopeka Products	Tank Monitor - Propane	NO	PDF	Tank Check Double Monitor	
Norco Industries	Bal RV Type C Stabilizing Jack	Y	n/a		
Norcold	Refigerator: 12v or 120v 2-way / 2.7cu ft	Y	PDF	NR751BB	
Progressive Ind	RV Surge Supressor	NO	PDF	EMS-PT30XRV	
Project 2000	Step	Y	PDF		
Rainier	Tire: Rainier Offroad ST on aluminum wheels	Y	PDF	APC-X ST235/75R15 110/106M	
Rainier	Tire: Spare on steel wheel	Y		ST205/75R15	
ShurFlo	RV Revolution Bypass Pump 3.0 GPM 1/2" NPSM	Y	PDF	4008-101-A65	
Sunflare	Solar Panel	Y	PDF	190 w flexible CIGS	
Therma Heat	Fresh Water Holding Tank Heating Pad	NO	PDF	#210SLT1218RTBX	
Therma Heat	Grey Water Holding Tank Heating Pad	NO	PDF	#210SLT725RTBX	
ViAir	Compressor 100% duty @ 100psi	NO	PDF	450	
Viair	RV Winterization Kit w/Regulator	NO	PDF	90145	n/a
Victron Energy	SmartSolar Charge Controller 15AMP	Y	PDF	MPPT 75-15	
WFCO	Converter (120vAC and 12vDC)	Y	PDF	WF-8955PEC	

BATTERY MONITOR: VICTRON BMV-712

The Victron BMV-712 keeps track of what you use so it can describe the battery health in a way that is useful. The term used is State of Charge (SOC). This is possible because a device called a shunt was wired as last point of the negative circuit before reaching the battery. This configuration allows it to monitor all the current flowing into and out of the battery over time allowing it to calculate how many Amp-Hours were added or removed. A battery is rated by the number of Amps it can deliver over a period of hours which is described as Amp-Hours or Ah.

Since it gets synchronized to set the SOC to 100% every time the battery is fully charged, it tracks Amp-Hours added or removed since the last synchronization and it knows how many Amp-Hours the battery can contain fully charged, by accounting for battery temperature and the rate the Amp-Hours are coming & going, the monitor calculates SOC and all of the other metrics that rely upon it. Experienced readers may point out that an Ah rating can be higher or lower depending upon the speed with which the current is drawn and whether the load is large or small. Trying to run a microwave oven on high would drop the Ah rating while running a low wattage heating pad for 12 hours would raise the Ah rating. All of this is taken into account by the monitor.

Readings can be taken either by pressing the **+** and **−** buttons or with a smartphone app that communicates by Bluetooth. The app is both easier to read and it stores history patterns which the monitor doesn't display. Search the app store using the term VICTRON CONNECT.

(explain how to download the app and show pictures of it's information

(pull 3.3 "How does the BMV work on p12 of manual and put here)

Battery voltage

Shows voltage at this moment. Not extremely useful information by itself as this will change depending on loads connected.

BATTERY MONITOR: VICTRON BMV-712

Current

Shows how many AMPS (current) are flowing into or out of the battery at this moment. Excellent tool when trying to learn how much current a piece of equipment uses when running. Most common use is to turn everything in the trailer off and then operate one appliance, such as the fan, at a time. Record the current draw in AMPS, turn that device off and operate another. For the A/C, watch the meter as the Cool Cat turns on, when it settles-in, when it turns on again, and you will be able to build a table of how this specific unit operates. We've done all that and the information in the BOONDOCKING DECISIONS uses these readings to help you figure out what you can (and can't) run for a given combination of equipment at one time.

Power

If Current refers to AMPS, then Power refers to WATTS. This shows how much is flowing in or out at this moment. As explained in the YELLOW section, WATTS = VOLTS x AMPS. Feel free to measure your loads in Watts or Amps, whichever accomplishes what you need but they are two sides of the same coin.

Consumed Amp-hours

Shows total amps used in the X hours since the last recharge. Please refer to the YELLOW section for an explanation. For now, the number shown can be interpreted to mean that 3 amps were drawn from the battery over a 12-hour period.

State-of-charge

This is the setting you will use 99% of the time. It shows you what % of the battery remains before it reaches 50% of it's power. Since a battery at 50% of power is a dead battery and can't be used without damaging it, the State-of-Charge shows how much energy is remaining after considering how long the current loads have been operating, current temperature and so-forth.

BATTERY MONITOR: VICTRON BMV-712

Time-to-go

If you want to know how many hours you can run the trailer with the current equipment being used as they are right now, the Time-to-Go setting gives you a quick answer. In this example, you have 49.5 hours before recharging or shutting down. From a practical standpoint, you would use this to figure out when to start turning things off so you didn't get to the point where you ran out.

Battery temperature

The battery monitor power cable has a temperature probe where the electrical connection is made. Since the factory essentially built the battery box into the trailer and it can't be removed without significant disassembly of the cargo area, this isn't showing the battery temperature but the temperature of the terminal connector just outside the battery box. Perhaps at some future time this will be changed but for now, it is close but not completely accurate.

ALARMS

We have turned-on the alarms feature which will alert you when voltage and battery life thresholds have been reached. Press any button to silence the alarm.

SYNCRONIZING

The monitor needs to be synchronized regularly or the data displayed will be incorrect. Under normal operation, this happens every time the battery is recharged to 100% either by the solar panels, a generator or being connected to the electrical grid. Specifically, the monitor waits until both the voltage exceeds 13.2V AND the (tail-) charge current falls below 4% of total battery capacity (4% of 224 ah during a 3-minute period). If this doesn't happen, or if the monitor gets disconnected from the battery, the SOC and other readings will be unreliable.

One indicator that the battery is not synchronized with the monitor is when the Sync and the Battery icons are both blinking.

BATTERY MONITOR: VICTRON BMV-712

If you KNOW the battery is at full charge but the State of Charge shows less than 100%, the monitor and battery can be re-synchronized by pressing the + and – simultaneously for 3 seconds while in normal mode until you hear a beep.

HISTORY

You can access the history data by pressing the SELCT button and cycling through the parameters below using the + and – buttons.

Parameter	Description
A dEEPESt d ISCHArGE	The deepest discharge in Ah.
b LASt d ISCHArGE	The largest value recorded for Ah consumed since the last synchronization.
C AUErAGE d ISCHArGE	Average discharge depth
d CYCLES	The number of charge cycles. A charge cycle is counted every time the state-of-charge drops below 65%, then rises above 90%
E d ISCHArGES	The number of full discharges. A full discharge is counted when the state of charge reaches 0%.
F CUMULAt IUE AH	The cumulative number of Amp hours drawn from the battery.
G LO'ESt UOLtAGE	The lowest battery voltage.
H H IGHESt UOLtAGE	The highest battery voltage.
I dAYS S INCE LASt CHArGE	The number of days since the last full charge.
J SYNCHrON IZAt IONS	The number of automatic synchronizations
L LO' UOLtAGE ALArMS	The number of low voltage alarms.
M H IGH UOLtAGE ALArMS	The number of high voltage alarms.
*P LO'ESt AUH UOLtAGE	The lowest auxiliary battery voltage.
*9 H IGHESt AUH UOLtAGE	The highest auxiliary battery voltage.
r d ISCHArGEd ENErGY	The total amount of energy drawn from the battery in (k)Wh
S CHArGEd ENErGY	The total amount of energy absorbed by the batteryin (k)Wh

BATTERY MONITOR: VICTRON BMV-712

Program Setting for BMV-712 Battery Monitor

If the unit needs to be reset or replaced, a few factory defaultsettings need to be adjusted to work with our 224-ah AGM Batteries. This is all done using the Victron Connect smartphone APP which communicates with the monitor via Bluetooth. The pin should be 0000

1. Find the GEAR icon in the top right corner.
2. Choose BATTERY SETTINGS and enter these settings:
   a. Battery Capacity **224**
   b. Charged Voltage **14.1**
   c. Tail Current **2%**
   d. Peukert Exponent **1.12**
   e. Charge Efficiency **97%**
3. Go back to settings and choose MISC
   a. Aux Input **Temperature**
   b. Temperature Unit **Fahrenheit**
4. You are done and can exit the settings section

BREAKAWAY SWITCH

The breakaway switch is mounted on the trailer A-Frame and it consists of a pin that goes into a rectangular black box. That pin is connected by a thin silver cable to the truck receiver. Should the trailer disconnect from the hitch for any reason, the pin would get pulled-out of the breakaway switch and the trailer battery would lock-up the trailer brakes. It is a worst case, RV disaster scenario.

At the beginning of the season, we check the switch to make sure it's doing its job. Since removing it causes the brakes to lock-up, we really don't want to leave them in that state very long. Bad things happen. So be ready to do the test and then put the pin back in.

1) With the TV and TT hooked-up and ready to go, put the TV in park.
2) Pull the pin out of the breakaway switch by tugging on the silver cable with about 35 pounds of force.
3) Have the driver put the TV in gear and let it inch slowly forward without pressing on the gas.
4) The trailer shouldn't move.
5) Apply a little gas and force the trailer to move forward. It should not move easily and don't drag it more than a few feet.
6) Stop the vehicle.
7) Put the pin back in the breakaway switch.
8) If you could hear the brakes hum when you pulled the breakaway switch but in #4 it failed to hold the trailer or in #5 it failed to resist against the pulling forward, then get the brakes checked. The breakaway switch did its job which is why you heard it hum so it must be a problem with the brake system.

CLEANING

In the TV bed is an orange bucket with all the cleaning supplies listed below. We ask that you not improvise but use the specific products we've provided and if you run-out, please purchase replacements on the road. The Dyson V7 vacuum cleaner is in the rear of the closet. NOTE *** Don't use anything with abrasives anywhere on the trailer

EXTERIOR: West Marine Boat Soap is suited to the fiberglass and painted metal roof while being biodegradable, non-toxic and phosphate-free. DO NOT USE any other chemicals like Armor All or tire dressings. Don't need nor want those chemicals!

SIMPLE GREEN ALL PURPOSE CLEANER: This age-old cleaner is non-toxic and biodegradable and contains no abrasives. Follow the instructions on the spray bottle.

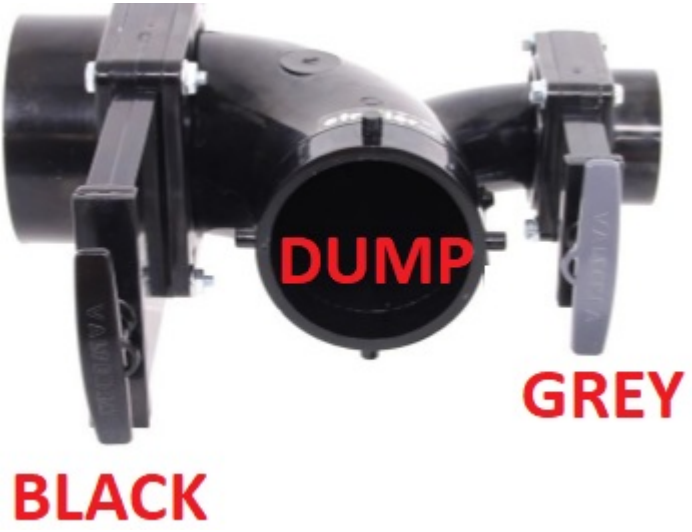
MURPHY OIL SOAP: A gentle biodegradable vegetable oil-based soap which works well for furniture grade wood and cleans vinyl without leaving any residue.

CLOROX WIPES: These are a mixed bag as they are a disinfectant but have some harsh chemicals which I guess is what allow them to kill 99.5% of germs, viruses & bacteria. Read the warning label and use them on the dirty areas of the shower & toilet areas. We like them because they are convenient and bleach free.

SURFACE	DON'T USE	OK TO USE
Laminate Counterto	NO Abrasives or	Simple Green
Laminate Walls	NO Abrasives or	Simple Green
Vinyl Flooring	NO Abrasives or	Simple Green
Wood Cabinetry	NO Ammonia or	Murphy Oil
Plastic Shower/Sink	NO Abrasives or	Clorox
Toilet	NO Abrasives or	Clorox
Trailer Exterior	Soap	West Marine

DUMP VALVE SERVICING

There just wasn't enough time to get everything written before the April 1st trip so these pages were intentionally left blank as space-holders to be completed later and inserted into the binder when complete.



ELECTRICAL: FUSES

BACKGROUND The T@B400 trailer consists of appliances and equipment sourced from third party vendors such as the refrigerator, the radio and so forth. Any RV electrical system is even more complicated than a typical home because it needs to contend with operating on 120-volts AC while plugged into the wall, 12-volts DC while operating from the RV battery and even 120-volts in a special inverter circuit that converts 12-volts DC into 120-volts AC. When plugged into shore power, both 12-volts DC and 120-volts AC are operating at the same time.

AC and DC are different systems and, uniquely in the RV, you sometimes want normal 120-volt devices such as a blender to work even when you are boondocking somewhere on Bureau of Land Management (BLM) land in a remote area of Wyoming. nüCamp had to figure out how to make all these things possible, whenever and wherever you want them to be. Since the appliances were designed to stand alone and are best of breed from various industries, and not knowing how they would eventually be used, their manufacturers built-in safety fuses to protect them from all eventualities. This means that there are thirteen (13) hidden fuses that nüCamp didn't add but the appliance manufacturers did. The following pages show pictures of where to find these hidden fuses should it turn out that some appliance stops working and a check of the main fuse & circuit breaker panel doesn't resolve the problem.

The toolkit checklist includes "SPARE FUSES" with both fuses and a detail listing by type and amperage. In case that kit is missing, the list is included at the end of this section so you can buy while on the road.

** SAFETY NOTE ** Fuses & circuit breakers exist to protect the wires which power an appliance, not to protect the appliance itself. The logic is that a wire of a given size can handle only so much electrical current before the insulation literally burns away and the wire melts. For our purposes here, that breaking point is measured in AMPS. For this reason, if a 7.5-amp fuse blows and you only have a 10-amp one, **DO NOT EVER** go higher than 7.5 amp but you can go lower in a pinch. Make do or do without.

ELECTRICAL: FUSES

If a fuse is replaced and then blows 10-days later, it is likely due to an overloaded circuit. If you replace a fuse and it blows immediately afterwards, stop what you are doing as there is likely a dead short somewhere.

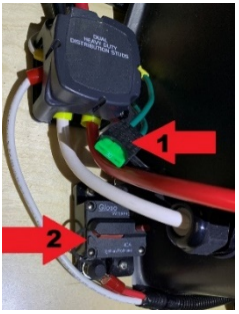
A glass cylinder with chrome caps on each end and a visible wire inside is called a glass fuse. Some devices briefly require a large amount of power when starting-up and then level off to a low current flow. Others have a steady & predicable current draw during all phases of its operation. For this reason, two fuse types apply here: slow blow and fast blow. A slow blow fuse has a thick wire that might resemble a thin metal guitar string and it can tolerate a high current for a short period before melting. A fast blow melts immediately when subjected to a high current. For what should now be obvious reasons, never substitute one fuse type for another.

We grouped the Hidden 13 by where to find them

UNDER THE BED

The bed consists of 3 separate mattresses because there are three compartments accessible by lifting three different hatches. The passenger side contains the battery shutoff switch and all those items accessible to the outside rear passenger storage hatch. Any future reference to the BATTERY compartment means this area. The driver's side compartment contains the ALDE system, the bypass valve and those drain valves accessible by the driver's side storage hatch. Any future references to ALDE compartment mean this area. Access the DC to AC inverter through the center one.

BATTERY COMPARTMENT



Victron Solar Controller

There are two fuses protecting the solar controller which is mounted in the ALDE COMPARTMENT but the fuses are located in the BATTERY & ALDE compartments. *Fuse #1* is a 30-amp ATO protecting the constant power circuit for the controller. See #7 and #8 as well.

ELECTRICAL: FUSES

Battery

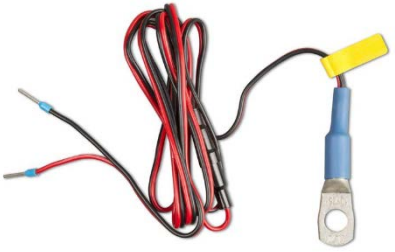
Fuse #2 technically isn't a fuse, but since it qualifies as a "hidden" breaker, it's included here. Instead of a simple inline fuse, this is a waterproof 40-amp marine breaker. One weakness to the design is that being located on the floor of a general storage area, it's possible to accidentally trip the breaker if something presses on the red button.

AIMS Inverter

The inverter is protected by two different fuses. *Fuse #3* is a 150-amp Stinger mounted under a clear rectangular plastic housing attached to the heavy gauge wiring on the forward bulkhead of this compartment Fuse marked #4 is physically part of the inverter and is a 15-amp KLKD under a black twist-off cap.

Victron BMV-712 Battery Monitor

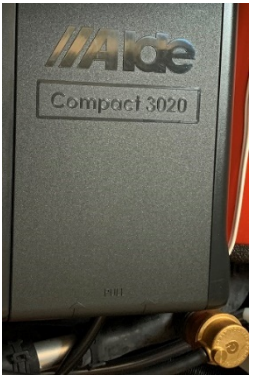
When we added this item after taking delivery, it required a slight re-direction of the negative (white wire) cables and a few other tweaks to the electrical set-up. One of these was to install a combination temperature probe and power cable from the positive terminal block to the battery monitor. There is an in-line fuse holder with *Fuse #12*, a 100ma 250v GDC 20mm glass fuse. The GDC tells you it is a slow-blow.



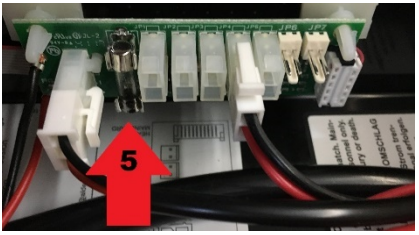
ELECTRICAL: FUSES

ALDE COMPARTMENT

ALDE 3020 COMPACT HEAT & HOT WATER

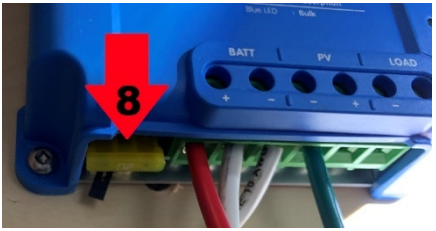


The ALDE system is protected by two glass *Fuses #5 & #6* directly on the unit in addition to the 20-amp circuit breaker on the electric panel. ALDE includes two spare fuses in a plastic bag directly on the unit and while the tool bag spare fuses contains spares, please use the ones on the unit first. The fuse is a 20 mm Slow Blow 3.15-amp glass fuse rated at 250V with a part number of T3.15AL250VP. To access them, you open the black access panel (right) marked PULL to see the following:



Victron Solar Controller

The solar charger is mounted on the rear bulkhead of this compartment and if the bright blue doesn't catch your eye, it also flashes blue periodically. There are three possible circuits marked BATT, PV and LOAD. BATT is protected by Fuse #1. *Fuse #7* is in-line and protects the PV (Photovoltaic) circuit with a 30-amp ATO. *Fuse #8* is hard to see because its physically mounted on the underside of the controller, but it is a 20-amp ATO.



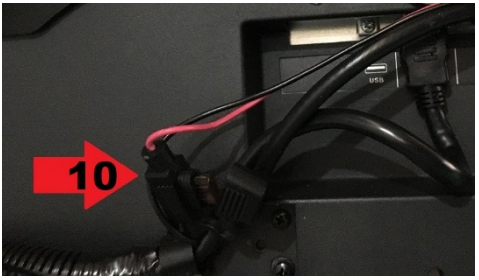
ELECTRICAL: FUSES

WARDROBE CLOSET

On the bottom of the wardrobe closet is an access hatch. Here you can see the rear of the Atwood LP and CO2 detector**.** There is an inline fuse holder containing *Fuse #9* which is a F1AL250VP glass fuse.

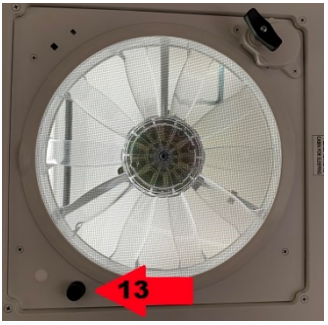
ENTERTAINMENT

The Jensen TV is a 12-volt DC device. *Fuse #10* is an inline Mini-ATC fuse holder with a 7.5-amp fuse.



Fuse #11 protects the 12-volt Jensen radio with 10-amp ATC fuse physically mounted to the rear of the radio. You need to remove the faceplate and remove the screws to take the radio out. No photo appears because frankly it's not worth the effort to take it out just to show what it would look like if you did.

FAN-TASTIC FAN



We upgraded the model #1400 fan with a #7350 that has an MDL 4-amp slow blow 30mm glass fuse under a black fuse holder on the face of the fan. This is in addition to the 7.5-amp ATC fuse in the converter panel.

REFRIGERATOR

According to Norcold Tech Support, the DC line is protected by a 15-amp fuse and the AC line by a 3-amp fuse. Neither can be replaced without taking the unit apart so if the NR751BB fails, it's a factory fix.

ELECTRICAL: FUSE KIT

A set of spare fuses & fuse tester can be found in the main toolbag located in the cargo area under the bed. If it gets lost, the box Mini Skater #MSN6164 clear plastic available on Amazon.

FUSE DIRECTORY			
FUSE #	LOCATION	Amps & Type	PROTECTS
1	Battery Hatch	30-amp ATO	Solar Controller BATT Circuit
2	Battery Hatch	40-amp Breaker	Battery
3	Battery Hatch	150-amp Stinger	Inverter wiriing
4	Battery Hatch	15-amp KLKD	AIMS Inverter
5 & 6	ALDE Hatch	T3.15 A 20 mm glass	Alde 3020 Furnace
7	ALDE Hatch	30-amp ATO	Solar Controller PV Circuit
8	ALDE Hatch	20-amp ATO	Solar Controller Device
9	Hatch in Closet	1-amp F1AL250VP 20mm glass	CO2 & Propane Detector
10	TV Wall Bracket	7.5-amp Mini-ATC	Jensen TV
11	Rear of Radio	10-amp ATC	Jensen Radio
12	Battery Hatch	100ma250v GDC 20mm glass	Victron BMV-712 monitor
13	Face of Main Fan	4-amp slow blow glass	Fan-Tastic #7350 fan

CONVERTER PANEL 12V Side		
CIRCUIT	Amps/Type	PROTECTS
1	7.5 / ATO	NuCamp Monitor
2	7.5 / ATO	Inside lights step light
3	7.5 / ATO	Ceiling Fan
4	7.5 / ATO	Alde / Cool CAT
5	7.5 / ATO	Water Pump / LP Detect
6	15 / ATO	Radio / TV
7	15 / ATO	USB 12v Outlets
8	20 / ATO	Refigerator

While the converter panel is covered more completely under its own topic heading, the fuses on the 12V DC side were duplicated here so all fuse information for the trailer can be found in one place.

You can cut out the graphic and it fits perfectly inside the top cover of the Mini Skater box.

T@B400 2019 - FUSE KIT	
Amps & Type	QTY
100ma GDC 20mm glass	1
1-amp F1AL250VP 20mm glass	2
T3.15 A 20 mm glass	4
4-amp MDL slow blow 30mm	1
7.5-amp Mini-ATC	5
10-amp ATO	1
15-amp KLKD	1
20-amp ATO	2
30-amp ATO	2

ELECTRICAL OVERVIEW

In order to fully appreciate the wealth of information which follows, it would help to understand a little about electrical system terms. Good thing that this is in the YELLOW section, so I don't have to worry about boring you with the details. Feel free to double check what I say below as it will probably challenge some of what you believe to be correct.

BACKGROUND There are two types of electric current in our trailer: Alternating Current (AC) and Direct Current (DC). Virtually all home electronics operate on DC which is generated when you attach a power supply to AC current. Batteries store and deliver energy as DC so in a vehicle or trailer, using DC for as many things as possible keeps things simple and maximizes the efficiency of the battery. The only equipment which can't operate on DC is the air conditioner because the compressor and motor require more energy than can be provided by a battery system like ours. Recognizing that there is a difference between Boondocking & Dry Camping and having to choose one word to describe operating without shore power, we use the word ***Boondocking*** if only to be aspirational. When you are running only on DC from the battery, we use the term Boondocking in this resource guide.

The refrigerator and the ALDE heating system can use either AC or DC. This takes some demand off the battery giving it time to cool-down and recharge while allowing indefinite use of all the heating & cooling systems while AC is available. When you are plugged in to shore-power on AC, you are ***Hooked-Up.***

Sometimes while boondocking you get an overwhelming urge or need to use an AC device. Whether it's a pressure cooker or a blender, the RV inverter can handle it. Located under the TV at the foot of the bed, the inverter outlet can supply 1200-watts of AC without a sweat and even go as high as 2400-watts for a short period. Since the inverter is an inefficient way to convert (or invert) DC into AC and using it will cut into battery life, make sure to read the Boondocking Power Decisions topic.

While we have talked about the types of current (AC/DC), it's helpful to know what is happening inside the wires. The words "electrical current" refers to

electrons moving from one atom to the adjacent atom. It is this process of electrons moving which we think of as electricity. The pressure the electrons put on each other as they push along is referred to as Voltage and the sheer number of electrons which are moving, we call Amperage. As the electrons jump from one atom to the other, they must overcome opposition to this move and we call that Resistance.

As you get more deeply involved in the troubleshooting and maintenance of the RV electrical systems, you will encounter the heretical notion that the electrons responsible for electrical current flow from negative to positive. While this is true from a physics standpoint, it doesn't really matter except when considering the safest way to wire something such as where to put a cutoff switch and why you place the dead battery negative clamp last and remove it first.

CONVERTER/CHARGER

As mentioned above, RV's require a system which can power some equipment at 12v-DC, others at 120v-AC and a few devices which can operate on either. Since AC and DC can't operate over the same wiring, some wires must be duplicated. The panel needs separate breakers & fuses and for these situations, a sensing device that prioritizes AC current when plugged into shore power/generator and DC current when operating off the batteries. Additionally, when AC power is available, the panel needs to act as a battery charger. For all these reasons, the RV electrical panel is referred to as a Converter/Charger because it converts 120v-AC into 12v-DC and charges the batteries when possible. nüCamp has chosen the WF-8955 power center from WFCO to fill this role.

It is also a 3-Stage battery charger which explained below.

ELECTRICAL: CONVERTER / CHARGER

The 8955 has a 30-amp main breaker and 5 branch breakers for 120v-AC current. The 12v-DC side uses Littlefuse Type 257 ATO (Replaced by ATOF Type 287) fuses to protect 11 circuits where 2 can be a maximum of 30-amps and 9 are 20-amp. While we call it a 12-volt system, it is outputting a constant 13.6v-DC. All told, it has a maximum power output of 950-watts at 55-amps.

Like any electronic device, the converter can be damaged by 120-volt power surges and voltage variations. Therefore, we provided a plug-in surge suppressor in the ELECTRICAL BAG and this is explained a few pages later.

NOTE: Should you accidentally connect the POS+ of a battery terminal to the NEG- wire and then connect the POS+ wire to the NEG- battery terminal, you create a situation called reverse polarity. Doing this causes the current to run in reverse which destroys low voltage electronics. Anticipating something like this, many manufacturers install reverse polarity fuses and the Converter has these as well.

The previous image shows an LED inside a white circle. When a fuse blows, or in this case is removed, an indicator light comes-on next to the fuse telling you there is a problem. To show a picture with the LED glowing, we had to remove the fuse but in normal operation, if you see a fuse with a red light like this illuminated, you know the adjacent fuse has blown.

3-STAGE CHARGER

The goal while charging the battery is to get to 100% capacity as quickly as possible without over-stressing the battery. Due to somewhat complicated chemical processes, it needs to be done in stages and with varying voltages. The term absorption rate refers to how much energy can be put into a battery without overheating it.

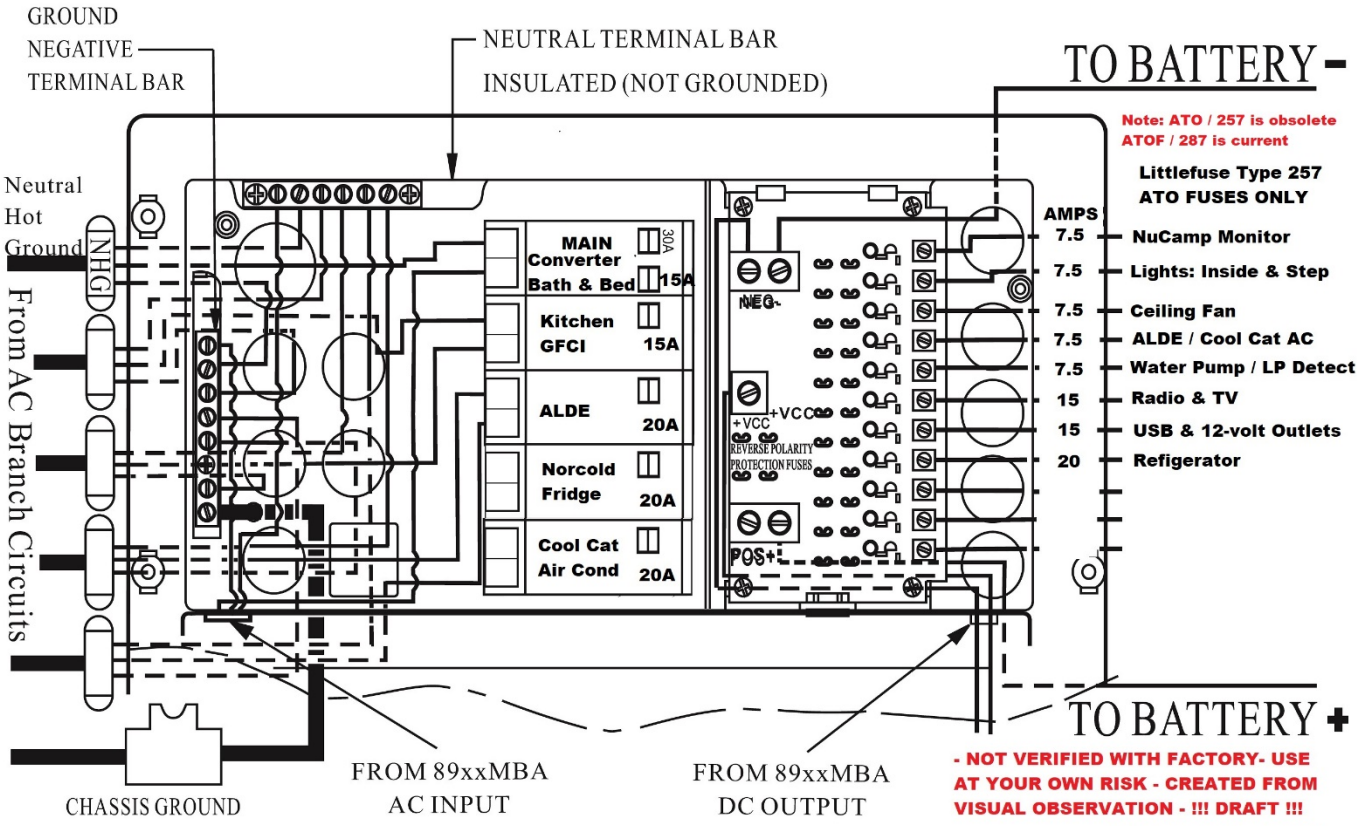
The first stage is called BULK or QUICK CHARGE because a constant 14.4 volts DC is supplied to the battery until a combination of the batteries voltage and resistance indicates an 80% charge level. The charger next shifts into ABSORPTION mode of 14.3 volts DC declining gradually to 13.6 Volts DC until

the battery reaches full charge. This second stage takes a long time because the last 10% is much more difficult to achieve than the first 90%

The third and final stage is the trickle charge or FLOAT mode which provides a steady 13.2 Volts DC to keep the battery at full charge by replacing whatever loses occur while the battery sits. These losses, called parasitic draw, comes

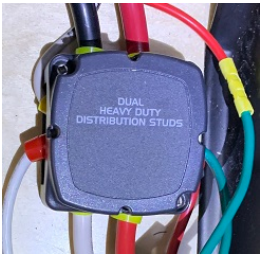
from natural battery chemical reactions and power draw from equipment that is always running such as the LP detector and Jensen radio.

Despite being called a 12-Volt system, a fully charged battery should read 13.2 Volts DC when there is no load. Getting below 12.2 Volts means it's discharged. So why call it a 12-Volt system? Sort of why you call a piece of lumber a 2 x 4 when it only measures 1.5 x 3.5. Who is John Galt?



ELECTRICAL: BATTERY DISCONNECT

A battery disconnect switch can be found on the right side of the cargo area when looking through the passenger side exterior hatch. Its purpose is to disconnect the batteries from the Converter/Charger. The way the RV is wired is that the batteries, solar charger, inverter and converter all connect to a power distribution block. The battery disconnect switch sits between this power distribution block and the converter. This means that when the switch is in the OFF position, the converter is disconnected but the power distribution block is still live allowing the solar panel to continue charging the battery and permitting the inverter to operate. You can see from the small gauge red wires in the photo above that this switch only controls the light duty 12-VDC devices.



** SAFETY NOTE: There is NO WAY to disconnect either the solar panel or the inverter from the battery without removing the fuses which protect these two systems meaning they are always LIVE.

When the battery switch is ON and the trailer is plugged into shore power, the batteries will be charged by the converter and the 12-VDC needs of the RV will be met by the converter.

When the battery switch is ON and the trailer is NOT plugged into shore power, the batteries will be providing the 12-VDC needs of the RV. This is the Dry Camping / Boondocking mode.

ELECTRICAL: SURGE SUPPRESSOR

The surge suppressor manual was so well written it was included here verbatim although we re-wrote the error code descriptions.

1. Plug into AC power.
2. Digital display will read 888 for one second then begin scrolling the voltage, amps, line frequency, and error code(s). In addition, the time delay light will flash in the bottom right corner of the display.
3. The EMS will read L-1, and then give you a 3-digit number which is your line voltage. Next, it will give you an "OA" reading. This is the amp reading; however, it will read zero until the time delay is complete. Then you will notice a number between 0 and 35. That number indicates how many amps the RV is drawing. Next, the display will read L-2 and indicate the voltage and amps for Line 2. Then it will read 60H and this number should remain fairly consistent; however, it may read plus or minus one or two. Lastly, you will notice the E code. E-0 is normal. Only when an E-0 and E-10 is present will the delay light flash and ultimately bring power in to the RV. Refer to your Error Code Chart that is provided or see next page for details.
4. Verify that Error Code E-0 is displayed.
5. Set up is complete.
6. The EMS has a 136-second time delay before you will receive power into your RV

CODE	DESCRIPTION
E-0	Normal Condition
E-1	Reverse Polarity - Hot & Neutral legs are
E-2	Open Ground - There is no ground wire
E-3	Leg #1 Voltage HIGH - above 132 volts
E-4	Leg #1 Voltage LOW - below 104 volts (also
E-5	Leg #2 Voltage HIGH - above 132 volts
E-6	Leg #2 Voltage LOW - below 104 volts (also
E-7	Hertz is above 69 cycles when it should be 60
E-8	Hertz is below 51 cycles when it should be 60
E-10	Replace surge suppressor module

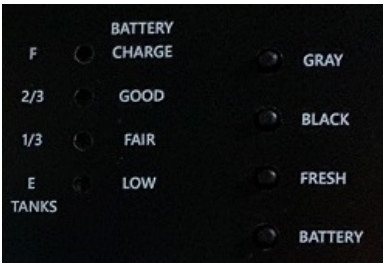
ELECTRICAL: SURGE SUPPRESSOR

IMPORTANT: The display will only read voltages between 78 volts and 255 volts. Note: If the wiring reads anything different than correct, the EMS will not turn on and we recommend moving to a different source of AC power, or you use your generator power. Also, if power is below 104 volts or above 132 volts, the EMS will not turn on, and we recommend using your generator power.

Note: If the EMS cuts the power to the RV, it will show a PE code following the E code. This denotes a previous error or why the EMS shut down. Example: The EMS cuts power for low voltage on Line 1, and then the power is restored. The error code reads E0 but the PE code reads PE4 which tells the user that low voltage was the reason for the EMS previously cutting the power. This PE error code will be deleted when power is disconnected from the EMS.

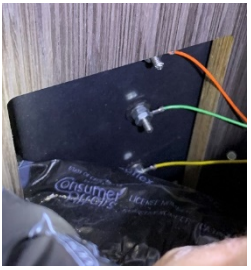
Accidental 240 Volt Protection
Should this condition occur, the display will read 240 volts instead of displaying the voltage and the error code message will read E-3. AC power will shut down instantly. DO NOT UNDER ANY CIRCUMSTANCES BYPASS THE EMS; OTHERWISE, THIS WILL RESULT IN SEVERE DAMAGE TO THE RV.

HOLDING TANK: DETAILS & CLEANING



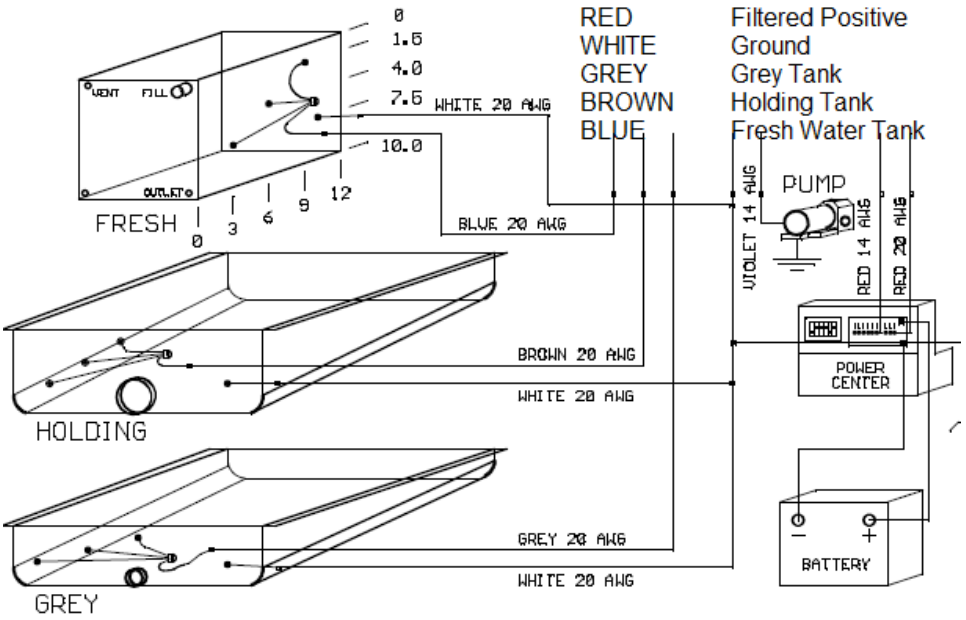
BACKGROUND There are four electrical contacts exposed in the interior of each tank arranged in a precise ladder pattern. By pressing one of the buttons on the KIB Industries panel, a current is sent to the K-101 resistor tester and the difference in voltage across each of the MP5 contacts resulting from the resistance created by having to pass through the liquid & debris, is measured against what was expected for an empty tank. The OHM resistance reading determines which LED indictor will illuminate.

If the GREY or BLACK tank readings aren't showing what you believe they should be, the contacts inside the tank have probably been fouled. This occurs when slime or debris like toilet paper has solidified on the contacts, changing the resistance the sensors can record and confusing the KIB system. Usually, the tanks just need a good cleaning, and this can be done on the road. While there is no simple fix for the FRESH water tank, the cleaning advice below works 90% of the time for the Grey & Black.



The "GEO Method" is well known in RV circles and the idea is to let a combination of water softener & dish soap clean both the tank and contacts through agitation while driving. The water softener breaks down surface tension allowing the Dawn dish soap to do its job.

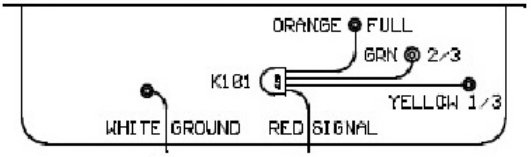
1) Dump the tanks and fill 2/3 with clean water.
2) Pour 1 cup of Dawn Dishwasher Detergent (the blue stuff) and 1 cup of Calgon Water Softener into the grey and black tanks.
3) Empty a bag of ice cubes into the toilet. They act as a scouring pad.
4) Take the RV for a drive of 20-minutes or more.
5) Dump and check the readings. If the KIB shows empty, fill the tank and check the readings. If you get wonky results, repeat the cleaning but this should do the trick.



For more advanced debugging, the M-Series troubleshooting manual is included with the trailer binder. A generic wiring diagram from KIB appears below and the K101 pigtail can be tested against the OHM level table shown below for each colored lead.

K-101 Resistor Sensor & Wiring

ORANGE	= Sensor on FULL level
BROWN	= Sensor on 2/3 level
YELLOW	= Sensor on 1/3 level
RED	= 12v Power
WHITE	= Ground



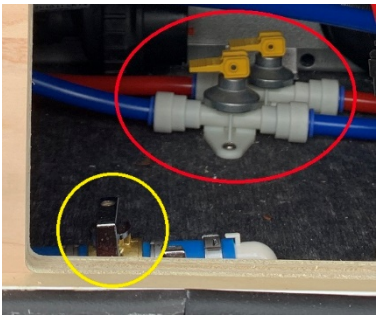
To test the K-101, factory manual shows the following:

- RED to ORANGE at 0 OHMS
- RED to GREEN at 68K OHMS
- RED to YELLOW at 188K Ohms.
- Leave the WHITE alone

HOLDING TANK: DETAILS & CLEANING

We sanitize the freshwater tank at the beginning, middle and end of each season. If it's your turn, this is how we do it.

1) You will be adding water to the grey tank, make sure you have room.
2) Put chocks in front of, and behind, both wheels.
3) Since the fresh water drain valve is in the rear and it mounts to the side and not the bottom of the tank, we want a gravity assist while draining the tank. Use the hitch jack to tilt the trailer up so the green level bubble on the A-frame moves to the right and rests at #3. You did chock the brakes as requested in #2 above, right?
4) Turn off the ALDE hot water system and if it has been running, wait 1-hour for the system to cool down from scalding as it will be drained.
5) If connected to City Water, remove the hose.
6) Turn off the water pump if it is on.
7) Open all (3) faucets and shower both Hot & Cold valves.
8) When operating the drain valves, when they are perpendicular to the pipe they are closed and when parallel they are open.
9) Empty the freshwater tank using drain valve behind the driver's side trailer axle. It is very well marked!
10) We need to empty the ALDE hot water tank. Unlock the ALDE access hatch on the driver's side and locate the two yellow valves. When you lift the yellow tabs 90-degrees so they are vertical, the hot and cold water will drain directly below the valves possibly splashing your feet with hot water. Be alert for scalding water.



11) We need to drain the waterlines as these get sanitized as well. Locate the two hot and cold valve drains shown inside the yellow circle to the right and open the valves. They drain directly below and may splash your feet.
12) Check the KIB panel testing the FRESH LED until it reads empty.
13) Close the drain valves that you opened in #7-9 above, the three faucets and the shower.

HOLDING TANK: DETAILS & CLEANING

14) CLOSE THE BYPASS SWITCH as this will prevent bleach from coming in contact with the ALDE FLOW stainless steel tank. In the picture to the right the valve is OPEN in NORMAL position,
15) Turn it so the red lever handle is vertical. We drain the tank so we know it's washed and drained several times each season, but we don't sanitize it.
16) Using UNSCENTED bleach, pour ½ cup through a funnel into the fresh water tank. It's the one on the left when you open the door. To sanitize, you need ¼ cup per 15-gallons and it's a 30-gallon tank.
17) Fill the Freshwater Holding Tank with 30-gallons of water.
18) Turn on the water pump.
19) Open the hot and cold-water valves of each fixture one at a time until you can smell the bleach flow out. The water will bubble, gurgle, and foam. It will slow, surge, start and stop until the air bubbles go away.
20) Leave the water pump on keeping the system under pressure.
21) Let it sit overnight. If you can't, at least let it sit 3-hours.
22) Repeat steps 6-13 again to drain the system completely.
23) Repeat steps 17-20 to wash out any bleach residue.
24) Repeat steps 6-13 again to wash out any bleach residue.
25) OPEN THE BYPASS SWITCH to allow water to flow back into the ALDE FLOW stainless steel tank.
26) Repeat steps 17-20 to recharge the system.
27) Dump the Grey Tank as needed.

INSPECTION: Pre and Post Storage

There just wasn't enough time to get everything written before the April 1st trip so these pages were intentionally left blank as space-holders to be completed later and inserted into the binder when complete.

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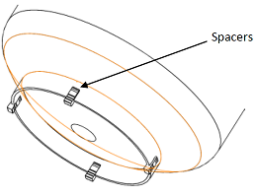
Poop Pyramid

The black tank is designed to always have some water in it. This keeps the solids in a semi-liquid form making it easier for them to exit the tank at the dump station. One mistake RV'rs make is thinking that they can leave the black tank valve open when at a site with full hookups. While this is necessary for the grey tank as it lets you take uninterrupted showers and permits full use of the sinks, it's a bad idea for the black tank. For a day or two, not a problem but not a good idea. For a week or more such as when on vacation at one park or another, it's a bad idea that can lead to the dreaded poop pyramid. Just imagine what can happen when human excrement piles-up directly under the toilet with nowhere to go and no way to break down. It becomes a poop pyramid that is difficult and possibly very expensive to clean and remove.

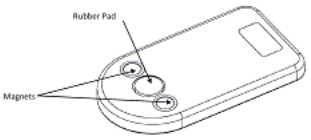
The black tank should be emptied when it is about ¾ full and flushed each time it is emptied. After emptying, it should have about 1 gallon of water flushed down the drain along with a porta-pak holding tank deodorizer. This tablet helps to break down paper & waste while managing odor. We also add about ¼ cup Dawn Dishwashing liquid every other dump. We place a squeeze of the dishwashing detergent in the toilet before travelling for several hours and putting a "normal" amount in the bowl. This washes it nicely and avoids discussion about the nasty work. Plus, the detergent winds-up where it's needed below.

PROPANE TANK MONITOR

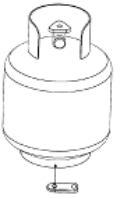
REPLACING SENSOR



1) These monitors read the level of propane in the tank and communicate wirelessly to your Smartphone and the wall mounted monitor.
2) They are mounted on the bottom of the propane tank with a magnet so when you need to refill it, you need to make sure you don't lose either the sensor on the bottom or the metal tabs or feet which raise the propane tank a bit so the sensor can fit underneath.

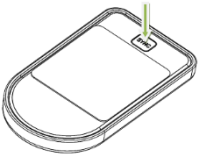


3) Each time you take the monitor off, you need to reinstall it on a clean surface and add some dielectric grease to the rubber pad and magnets. The grease prevents the sensor from sticking to the tank due to the oxidation from dissimilar materials. You will find the grease in the upper zipper compartment of the main tool bag.



4) The sensor mounts to the bottom center of the tank.

To Synchronize to the Smart Phone



1) Go to the APP store and look for MOPEKA TANK CHECK and install it.
2) Remove the sensor from the underside of the tank.
3) Launch the APP and while it is scanning, press the SYNC button on the rear 2X.
4) The sensor will then appear as a new device on the app.
5) See REPLACING SENSOR

SPARE & REPLACEMENT PARTS

It is generally easier to order replacement parts if you can provide the dealer with a part number of some kind. As neither schematics nor a parts detail has been provided by nüCamp, this will be an evolving spreadsheet created as various forum posts & experience turns-up new information.

COMPONENT	ITEM	VENDOR	PART #	WEBSITE
Alde 3020	Glycol Fluid	Century Chemic	TF-1	www.centurychemical.com
Cool Cat AC	Exterior Canvas Cover			
Cool Cat AC	Replacement Filter 8.75" x 19.5"	Dometic	3313107.126	
Exterior Shower	Shower Head	ITC	97022-001	www.itc-us.com
Exterior Shower	Slide Latch	ITC	97020-009	www.itc-us.com
Holding Tanks	Fresh Water (Polyethylene)	Ameri-Kart	W1507	http://www.ameri-kart.com
Holding Tanks	Grey Holding (Polyethylene)	Ameri-Kart	H-1140	http://www.ameri-kart.com
Plumbing	Fresh Water Low Point Valve			
Plumbing	Water Pump 3.0 GPM 55 PSI	Shurflo	4008	
Plumbing	Water Pump Check Valve	Shurflo	94-800-03	www.shurflo.com
Plumbing	Water Pump Strainer 1/2" NPSM	Shurflo	255-313 (15-085-00)	
Septic Hose Holder	Access Hatch Cover 5" ID	Viking Marine	ABS5W	
Wheel Bearings	Bearing: KIT per wheel	Dexter	K71-717-00	www.dexteraxle.com
Wheel Bearings	Bearing: Inner Cone	Dexter	031-033-02 (Timken L68149)	www.dexteraxle.com
Wheel Bearings	Bearing: Outer Cone	Dexter	031-031-02 (Timken L44649)	www.dexteraxle.com
Wheel Bearings	Bearing: Seal	Dexter	010-019-00	www.dexteraxle.com
Window Latch	Plain Black Latch	Plastoform		www.eurotete.com
Window Latch	Locking Latch Red Button	Plastoform		www.eurotete.com

TIRES & BRAKES & WHEEL HUBS

ACTION DISTRESS NOISE TESTS

The 3 most likely causes of distress noises from your running gear while in motion are: bearing failure, magnetic brakes being lightly applied, or debris stuck somewhere in the assembly. This guide can't take the place of a factory repair manual but it can assist in narrowing down problems so they can be better defined and perhaps, even solved on the road. Before doing anything, safely ease the trailer to level area where it can be parked & worked-on without endangering yourself or others. This means pulling off the road into an area that provides physical safety from two and four legged critters and doesn't expose you to being rear-ended or sideswiped. If that isn't possible, call roadside assistance for help.

Use the jack to lift the trailer such that the wheel making distress noises is off the ground. Follow the procedures in the jacking section to include: (1) making sure the RV is attached to the TV, (2) that the TV is turned off, (3) applying the parking brake of the TV, and (4) chocking both sides of the wheels opposite the one you are jacking-up.

TEST ONE – Bearing Check

Hold the tire at 9:00 and 3:00 positions and rock back and forth like a see-saw where the center of the wheel is the pivot point. If there is no movement (play) or movement beyond 1/8", your bearings probably need to be serviced. This is not something you can do on the side of the road. Read the "BEARING SERVICE" section for further information.

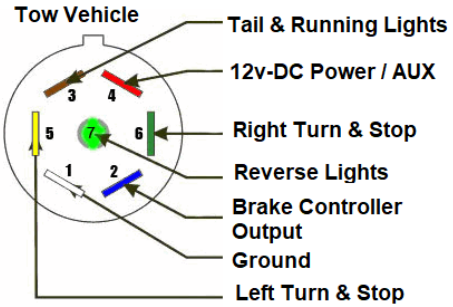
How long has it been since the bearing was serviced? Is this the first time an elevated temperature was recorded (check Trip Sheets) and if not, keep an eye on it. This guide can't tell you what to do but understand that if the bearing fails, the wheel either won't turn or may fall off. If this happens while on the highway, it would be a catastrophic failure causing injury or death to yourself or others.

TEST TWO – Magnetic Brakes Dragging

As more fully described in the "BRAKE CONTROLLER" section, the trailer brakes are activated when the brake controller senses voltage in the tail light circuit and applies a voltage to the trailer brakes causing magnets to apply the brake pads against the wheel drums. The amount of voltage sent to the trailer brake assembly through the 7-WAY coupling depends upon how quickly an accelerometer in the brake controller decides the tow vehicle is slowing down. The TV brake system relies on a hydraulic reservoir sending fluid down stainless-steel hoses to mechanical brakes at each wheel. Your foot pressure on the brake pedal gets applied to the hydraulic fluid and the harder you press the pedal; the more pressure is sent to the brakes and the quicker you stop. Since there is no way electronically to sense how much pressure is being applied to the hydraulic brake system when the tow vehicle brakes are being applied, the brake controller must rely on electronics to approximate how hard you are pressing on the brake pedal. The variable pressure (gentle, firm or hard) on the brake pedal is translated into a strong or weak electrical voltage sent to the trailer brake assembly.

Rotate the wheel two turns and listen either for a humming, a slight squeal or try to feel if the wheel is somehow being held back like it would be if the brakes were applied. If you have parked the truck, shut off the engine and applied the parking brake, then if everything was working correctly, the brake controller wouldn't be sending any voltage to the trailer brakes. If any of these apply, there may be some stray voltage going to the trailer brake assembly.

To debug, first do a test of the brake controller as described in that section. Failing that, you can test the vehicle side of the 7-WAY connector by using a multimeter to see if there is any voltage between the Brake Controller blade (#2 Blue) and Ground (#1 White). This could be caused by a faulty controller or a



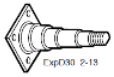
short somewhere. As the 7-WAY assembly has a 12v-DC wire for accessories & charging the RV, it's possible you have a frayed or defective cable assembly allowing a voltage leak. It is also possible there is metal debris in the 7-WAY allowing a connection from the accessory pin to the brake pin. Unlikely but easy to rule-out.

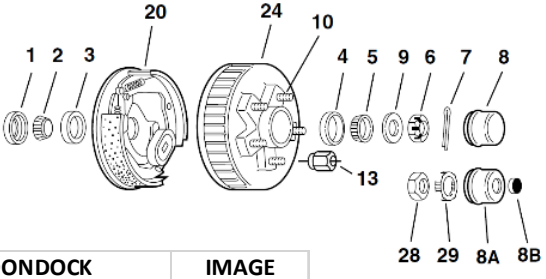
TEST THREE – Debris

The idea here is that there is something stuck inside the wheel hub assembly like a stick, rock or other debris. Aside from observing something obviously out of place, you either need to remove the drum to perform a closer check or look on the backside of the drum while mounted. Since you CAN'T, WON'T and WILL NOT ever go under a vehicle that is jacked but not sitting on jack stands, this option ISN'T open to you. If you feel up to removing the drum, check the "BEARING SERVICE" section for instructions on how to remove the drum and perform a visual inspection. At this point it becomes a judgement call based on your experience, where you are and whether it makes more sense just to call roadside assistance. At least you can tell them what TEST 1 & 2 showed.

TIRES & BRAKES & WHEEL HUBS: AXLE & BEARING SPECIFICATIONS

There is a Dexter Operation Maintenance Service Manual titled "600-8k_complete_service_manual which explains how to perform the various services required in this section.





AXLE	BOONDOCK	IMAGE
Make / Model	Dexter #10F 4K Torflex	
Configuration#	8136692	
Brakes	10" D44 Electric Manual Adjust	
Down Tail	10-degrees	
Hub Diameter (H-D)	5 spokes on 4.5" diameter	
Hub Face (HF)	76	
Hub Group	#10F 545	
Hub Size	10" x 2-1/4"	24
Inner Bracket	59.25	
Mounting Bracket	Norco Tall E-1425	
Rubber Capacity (RC)	3900	
Studs	1/2" - 20	
Bearing Service #84 Spindle		
Bearing: KIT per wheel	K71-717-00	
Inner Bearing/Cone	031-033-02 (Timken L68149	2
Inner Race	Timken L68111	3
Outer Bearing/Cone	031-031-02 (Timken L44649	5
Outer Race	Timken L44610	4
Grease Seal Double Lip	010-019-00	1
Replacement Parts		
Brake Assembly Left	K023-462-00	20
Brake Assembly Right	K023-463-00	20
Shoe & Lining Kit	K71-672-00	
Magnet Kit	K71-125-00	
Washer	005-067-00	9
Wire Clip (Need 2)	027-005-00	
Retractor Spring (Need 2	046-009-00	

TIRES & BRAKES & WHEEL HUBS

BEARINGS Wheel bearings need to be properly maintained and these two videos will help you do that. The Dexter approved greases are listed below and nüCamp uses the Valvoline product. It is important to follow these recommendations because it isn't the grease that provides the lubrication but the oils inside the grease. Grease is just the carrier for the oil. Most bearing failures can be attributed to either too MUCH, too LITTLE or the WRONG type of grease.

** Very Important **

Don't mix greases. If you add additional grease, it must be the same brand otherwise the bearing must be cleaned and then repacked. Contamination resulting from mis-matched greases may cause grease failure.

 Bearing Maintenance Video: https://youtu.be/GnH-h3W9XvI

 Hub Lubrication Video: https://youtu.be/WzW1kK8oWkc

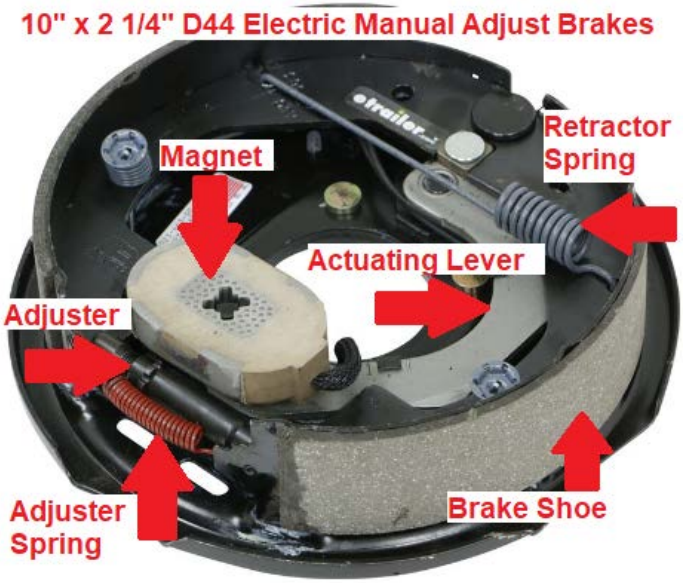
Grease (Per Dexter Specifications)	
Thickener Type	Lithium Complex
Dropping Point	215 deg C (419 deg F) Minimum
Consistency	NLGI No. 2
Additives	EP, Corrosion & Oxidation Inhibitors
Viscosity Index	80 Minimum

Approved Grease Sources	
Chem Arrow	Arrow 2282
Chevron Texaco	Chevron Ulti-Plex Grease EP#2 Texaco Starplex Moly MPGM #2
Citgo	Lithoplex MP#3 and CM#2 Mystik JT-6 Hi-Temp Grease #2
ConnocoPhillips / 76 Lubricants / Kendall	Multiplex RED #2 L427 Super Blu Grease
Dexter Company	Lithoplex Red MP#2
Exxon/Mobil Company	Ronex, MP Mobilith AW2 Mobil | Synthetic Grease
Fuchs	Renolit Uniwrl 2
Great Plains Lubricants	Lithium Complex EP #2
Oil Center Research of Oklahoma	Liquid-O-Ring No, 167L
Pennzoil-Quaker State Company	Synthetic Red Grease
Royal Mfg. Company	Royal 98 Lithium Complex EP #2
Shell	Gadus S3 V220C Gadus S5 V220 Rotella Heavy Duty Lithium Complex #2
Valvoline	Valvoline Multi-Purpose GM Valvoline Durablend

TIRES & BRAKES & WHEEL HUBS

BRAKES

The Dexter maintenance schedule show that the Dexter D44 electric brakes should be checked periodically for current draw:



Brake Pad adjustment is also specified, and this requires placing the trailer on jack stands. Following the procedures in the manual, you would find that the star adjusting wheel is rotated so that the brake shoes are gripping the drum until the wheel is very difficult to turn. Then, the adjuster is reversed until the wheel turns freely with a slight drag between the brake shoe and the drum.

Magnet Amperes Chart		
Brake Size	**Amps/Magnet**	**Magnet Ohms**
10" x 2 1/4"	3	3.2

TIRE CHANGE & JACK PLACEMENT

If possible, nudge the trailer until you can get it on a solid surface and have the trailer as level as possible. Sand or gravel can be unstable causing the jack to give way just enough to cause the trailer to heed the call of gravity. If this happens while your hands are awkwardly changing the tire, it could mean serious injury, damage to the trailer or both. So, if you are on gravel, dig down till you can find a solid base to set the jack. If you are on sand, find a way to move the trailer to where it is solid.

1. Ensure the trailer is hooked-up to the tow vehicle because it will provide a secure fixed point to help prevent movement.
2. Set the parking brake on the tow vehicle.
3. Place two chocks on whichever trailer wheel isn't the one you are replacing. Chocks go in front and behind the tire so there is no possibility of it rolling.

4. Locate this white 2" PVC tube sitting on top of the large grey pipe running along the back wall of the middle compartment under the bed. Inside will be a long chrome ½" breaker bar with a 3/8" adapter. A 3/8" x 6" extension is connected to a ¾" deep socket for the lug nuts and both have red reflective tape in case you drop them. The two black rods hook-into the jack letting you raise the jack from alongside the trailer. We chose these tools because here is very little space between the wheel housing and the lug nuts preventing you from using a traditional lug nut wrench. The jack is also in this compartment.

TIRE CHANGE & JACK PLACEMENT

5. Locate the RED REFLECTIVE sticker just forward of the axle located on an L shaped piece of metal parallel to and alongside the tire being replaced. This is the lowest physical part of the trailer and the most structurally stable for lifting.
6. You will be placing the jack assembly under this point. If you are on anything other than a flat paved surface, use the 8" x 8" metal plate marked "JACK BASE" under this point. Note: nüCamp doesn't provide a jack or lug nut wrench and this came from a Ford F-250. If lost, Part numbers #7C3Z-17080-AE & #HC3Z-17005-H are shown here.

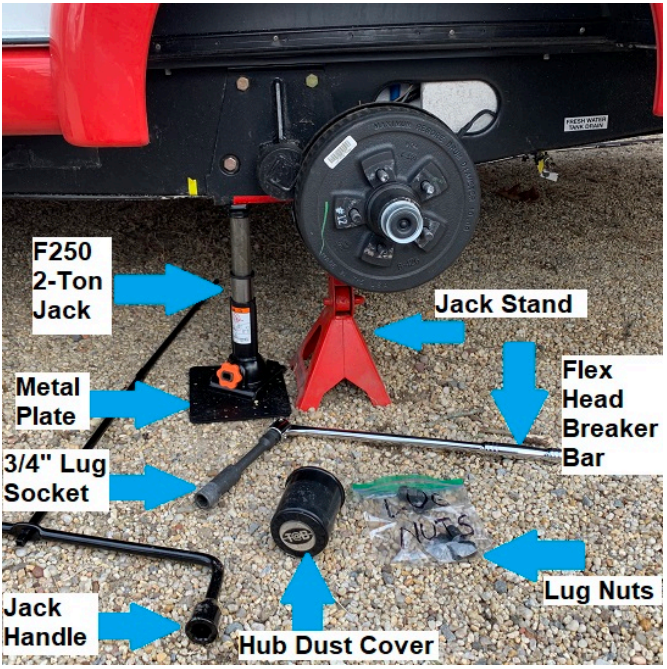
7. Align the jack so the cradle is perpendicular to the tire and the crank handle connection point is angled so the crank handle can turn the big orange knob. Put just enough upward jacking pressure that it is "finger tight" but NOT lifting the trailer. The idea here is to place the jack into place where you know it is stable and can safely lift the trailer but before you drop the spare tire. The red stand just behind the jack isn't something you will have on the road, but these photos were taken outside the garage and one was available.
8. Assemble the rod pieces, angle it into the connection point, slip the end into the center of the lug wrench handle so it forms a T, and you have a jacking handle you can use while safely away from the vehicle.
9. Attach the ¾" deep socket & 3/8" x 6" extension to the breaker bar making a lug nut wrench.
10. The spare tire is tucked into the front of the trailer between the main rails of the "A" frame. A winch crank is located on the passenger side just behind the propane tubs. Take the ¾" wrench stored in the TIRE bag

and crank, the one with the blue plastic along the sides, follow the instructions on the label below the winch nut, and lower the tire. In case the label has been damaged, turn left to LOWER and right to RAISE the tire. The sticker says "DO NOT USE A DRILL!" I got lazy and used the drill attachment we use for the stabilizers and understood why. If you let it down, or up, too fast or with too much force, you'll break the cable leaving you with a loose tire.

11. Follow the wire down from the trailer through the center of the tire and remove the cradle that holds the tire against the frame. Place the tire nearby so it can easily be put into place once the damaged one is removed. You want to minimize the amount of time that the trailer is being supported by the jack. While the trailer is still resting on the tire, loosen the lug nuts applying as much pressure as needed. The lug nuts may be set very tight and need a hard jolt to get them moving. It's much safer to do this while the trailer is on the ground and not in the air on the jack.

12. Use the jack to raise the trailer making sure to keep any body parts away from the trailer frame. Vigilantly watch the jack making sure it stays perpendicular to the ground and doesn't start to lean over. You only need to lift the trailer enough to remove the tire. Once the tire is off the ground, take a moment to slowly turn the wheel for two rotations. If you hear a grinding noise, you may have wheel bearing damage and that would have to get checked & fixed immediately after changing the tire and moving to a safe spot. See the section on BRAKES & AXLES & BEARING

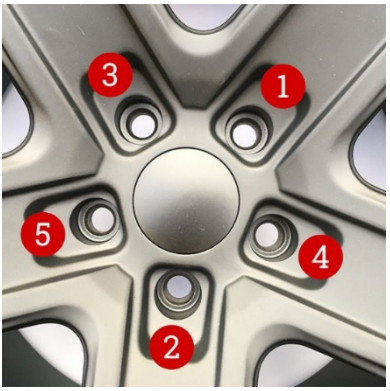
TIRE CHANGE & JACK PLACEMENT



13. Remove the remainder of the lug nuts and remove the tire. Find the ziplock bag labeled LUG NUTS in the HITCH BAG and use it to keep the lug nut from getting lost and/or filled with dirt and grime if left on the ground. Remember that the trailer is 3500# and is resting on a 1" surface connected to a hydraulic ram which itself is resting on a 4" x 3" base; so, don't do anything that would jar the trailer and cause the jack below to slip.
14. The plastic shroud around the wheel well will make it a little tricky to remove the tire. Tilt the bottom toward you as pull the tire off the threaded wheel studs while also pulling the dust cover towards you. That cover slides and most removal/replacement problems occur when the cover gets wedged part way. As soon as the tire is off the wheel studs, let it slide down to the ground while shifting it to the RIGHT and angling it so it will roll out of the wheel well to the LEFT

TIRE CHANGE & JACK PLACEMENT

15. Replace the damaged tire with the spare.
16. Put the lug nuts back into place by hand screwing them loosely as far as they will go. You might need to rock the wheel a bit like a sea saw as you push it back, gently, onto the trailer.
17. Follow the star configuration shown in the chart to the right and tighten the lug nuts until you feel resistance. No hard-jerking motions. Just get the tire tight on the drum.



18. Lower the trailer to the ground
19. A long thin black plastic case containing a Husky 20-100 ft-lb torque wrench is in the cargo area. Pull the collar back and twist the handle until the rim sits on the line between 90 and 100. The wrench uses 3/8" drive sockets and there is a ¾" one in the HITCH bag. With the wrench set to 100 ft-lbs, follow step #14 again making sure to keep tightening until you hear the wrench click which means you've reached the torque setting required.

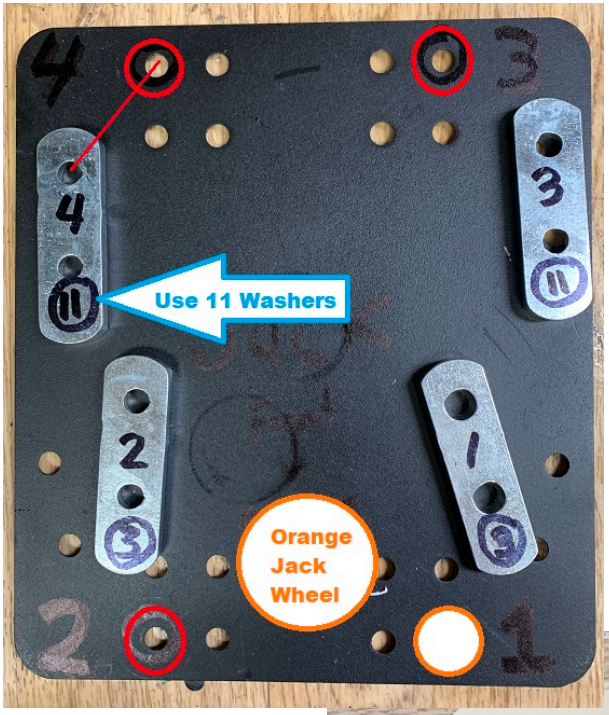
20. Do the opposite of what you did in Step #6 to secure the damaged tire.
21. Return the torque wrench to 0 ft-lbs as this relieves spring tension and helps maintain accuracy of the settings.
22. NOTE: nüCamp factory hasn't provided guidance on the tire changing process nor provided any equipment to do so. My guess is they want to avoid liability for what accidents might come from people misunderstanding their instructions. Either way, you have each gone through this procedure with Dad before heading out so just use street senses. Follow the idea behind these instructions and remember it's

just a piece of equipment. It can be replaced! If in doubt, of your abilities or the situation you find yourself in, call for help.

Anyone not our family… Use any of these recommendations at your own risk!

NOTE: A Vehicle Jack Adapter Plate can be found along with the jack in a black zipper pouch. If you are in a situation where you want to make the base of the jack longer, such as where the surface is uneven or soft, using the jack plate may be the safest route to take. Using the picture below, note that there is a black plate with four silver oval metal tabs. These tabs have been numbered 1, 2, 3, & 4 and a corresponding number is on the plate. The hole to which that number corresponds is circled. On the metal tab is a number inside a circle. That number corresponds to the number of washers you should put under the tab to make it level with the base of the jack. For example: Tab # 1 & 2 each has 3 washers while Tabs #3 & 4 use 11 washers. The photo to the left shows you what it should look like once it's fully assembled.

NOTES: If the jack extension rods get lost or damaged and all you have is the jack, a drill adapter has been included as a backup. Set the drill on its LOWEST setting and it will raise and lower the jack. Only your arm should be under the trailer at that point and use extreme care. Street sense prevails.


4
3
4
11
Use 11 Washers
3
11
2
3
1
9
Orange
Jack
Wheel
2
1

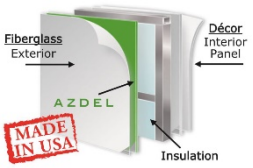

Vehicle
Jack
Drill Adapter

TOOLS & SEALANTS & LUBRICANTS

The TV tool bag was designed with self-rescue in mind as follows:

TOOLBAG	NOTES
Allen Wrench Set: Metric & SAE	
Burnishing Tool 0.25" x 3" - CG-9338	Stored in zipper compartment
Carabiner Locking: Small	Stored in outside pockets
Demolition Tool: Small	
Diagonal Cutting Plier 8"	Single most used & useful tool here
Drill Bit Set: Titanium	
Electricians Tape 3M #88	#88 is expensive but tough & sticks forever
Flashlight: Big Larry Magnetic	Uses 2 ENLOOP rechargable AA
Flashlight: LED Headlamp	Uses 2 ENLOOP rechargable AAA
Funnel for Oil	One-time collapsable for generator service
Fuse tester & spares	Two Fuse Sets: One for RV and one for TV
Generator high altitude Venturi	If using Honda 2000eu above 5000' switch to #60
Gloves: Mechanics	
Gloves: Nitrile	Stored in outside pockets
Gorilla superglue gel	Replace yearly
Hacksaw Blades (2pcs) 10" 18tpi	Just the blades - makeshift a handle when needed
Level: Torpedo	
Lube: Boeshield T-9	See Lubricants & Sealants in YELLOW setion
Lube: WD40	See Lubricants & Sealants in YELLOW setion
Lube: White Lithium Grease	See Lubricants & Sealants in YELLOW setion
Lube: Powdered Graphite	See Lubricants & Sealants in YELLOW setion
Lube: Dielectric Grease - Permatex #81150 .33oz	See Lubricants & Sealants in YELLOW setion
Lube: DeoxIT - #D100L-2C 2ml	See Lubricants & Sealants in YELLOW setion
Paracord 5/32" x 50'	
Pliers: Needle Nose	
Poncho: Cheap Plastic	Stored in outside pocket
Quick Link 1/4" Zinc	Use for rigging
Ratchet Driver Set 1/2"	Use 1/2" for Airstream - 3/8" for nuCAMP
Scissors: HD Sheer Type	
Screwdriver - Multi with Bits in Handle	This is where the square & torx heads are
Screwdriver - Small Jewelers Size	To change batteries on several electronic tools
Screwdriver Set for Drill	Mixed bits and sockets for 3/8 chuck
Screwdriver: Demolition Flat	Use like a chisel or pry bar as needed
Sharpie Marker Fine Point	
Snap Clip: Double Ended	Use for rigging
Snchor Shackle Stainless 3/8"	Use for rigging
Spring Snap Link S.S. 5/16"	Use for rigging
Steel Wool	Burnishing contacts & removing surface oxidation
Swivel Adapter Stainless Steel	Use for rigging
Tie Wrap: 12" Stainless (2-pcs)	Careful using this - has no give at all
Tie Wrap: 14" H.D. (10-pcs)	
Tie Wrap: 24" H.D. (3-pcs)	
Tie Wraps: 14" regular	
Towel - Microfiber	
Utility Knife / Box Cutter	Spare blades are in the handle. Unscrew it.
Vise Grip Pliers - Irvin #10WR	
Wire Cutter/Stripper	
Wrench: Adjustable	
Wrench: Set of Box Style 12pt	Use SAE for Airstream - METRIC for nuCAMP

TOOLS & SEALANTS & LUBRICANTS



Before choosing a sealant or performing a repair to the exterior, you first need to know something about the materials in use. The sidewalls are composite panels consisting of a thin fiberglass layer affixed to a sheet of polypropylene Azdel bonded to an aluminum frame. The entire assembly becomes a structural component called Azdel. When thinking about sealants or repairs on the sidewalls, they must to adhere to fiberglass.

The roof is a single piece of painted aluminum starting in the front just below the propane tanks at the A frame and running over the top to the rear, ending just after the leveling jacks. The remainder of the underbelly is a black plastic corrugated panel called Coroplast. If any of these surfaces get punctured due to road debris, a physical accident of some type or even a branch falling on the roof, a temporary repair can be made with aluminum tape.

Like the word says, sealants are used between the joints and seams of the RV's surfaces to keep water from penetrating. It has to stand-up to vibration from road use and degradation from UV rays. Over time, the sealants WILL fail and that will cause the trailer to leak through a factory penetration like a vent, fan or window opening. Each spring and fall the seams are checked for failure and maintained as necessary. It is possible, however, that a section of sealant will fail while you are on the road and reading this should help you through that eventuality.

The word SEALANT was used instead of CAULKING and that's because when a sealant cures, it remains flexible. This property allows it to remain in place during an expansion/contraction cycle and resist vibration separation. Caulk, on the other hand, becomes rigid making it entirely unsuitable for an RV bouncing along the road.

When you see the phrases "self-leveling" and "non-sag" (beading), pay attention because the products are used in different circumstances. A self-leveling sealant will flow like honey and flatten-out. Using it on horizontal surfaces to seal two seams, a crack and even a flange up to a quarter inch is appropriate. For vertical applications, a non-sag or beading sealant is required because once applied, it holds its shape and doesn't sag. That also means it doesn't flow as well into cracks, but each sealant has its strengths and weakness.

On a horizontal surface when sealing a flange greater than a quarter inch, applying multiple layers of self-leveling products just results in a wide but thin flowing mess with little build-up. For these tasks, you would use a no-sag

sealant to get the height you need and just realize that it doesn't flow into cracks as well.

Aluminum Foil Tape

This is what HVAC technicians use to repair and assemble commercial air conditioning ducting. It consists of a thin film of aluminum over an adhesive and while it might look like duct tape, it is nothing of the sort. When repairing a damaged metal or fiberglass section, it will act as a moisture barrier sealing out water and provide physical protection. The metal foil won't break down under UV rays and the adhesive was designed for thermally changing surfaces. To make it easier to make permanent repairs later, use sparingly.

The preferred tape is approximately 4-mil thick and has at least 12 ft-lbs of pulling resistance. A great choice is Shurtape AF100 and you can find it at any air conditioning supply store or even one of the many Grainger locations nationwide. Home Depot carries a thinner version by Nashua called Waterproofing Repair Tape.

Dicor Lap Sealants (Non-Sag and Self-Leveling)

The most likely cause of an interior leak will be failed sealant around a roof penetration. Given the size of the trailer, finding it shouldn't take that long and the difficult part will be safely reaching the offending area. Assuming you can find a ladder or other means of reaching the source of the leak, you are looking for sealant that is both dirty and easy to peal away from the surface by rubbing your fingers perpendicular to how the bead was laid down. The sealant should be secured firmly, and you are looking for a place where it isn't. The failed area usually becomes apparent once you use a rubber cleaner as this process moves the material around making gaps visible.

Both nüCamp and Airstream recommend the Dicor brand of sealants. A tube is conveniently kept in the main tool bag; but if missing, can also be purchased while travelling at Camping World. Both the Non-Sag (#551LSW) and the self-leveling (#501LSW) come in 10.3oz tubes that fit into a standard caulking gun you can find at any hardware store. The manufacturer notes that the UV stabilized sealant is excellent for adhering to aluminum, mortar, wood, vinyl, galvanized metal, fiberglass and concrete.

TOOLS & SEALANTS & LUBRICANTS

Applying in 50-70-degree temperatures, it will skin over in 5-minutes, become waterproof in 4-hours, cure 80% in 48-hours and cure 100% in 30-days. While the instruction label should clearly describe how to apply and what personal protective equipment (PPE) you should use, expect to purchase a rubber roof cleaner of some type to prepare the area you intend to apply the sealant to and as always, wear protective gloves.

Captain Tolley's Creeping Crack Cure

A mariner named Captain Tolley fought the same battles in the 1980's that we fight today trying to locate and plug hard to find leaks without having to disassemble his boat. Using capillary action, the water based acrylic co-polymer sealant wicks into small cracks of 1-mm or smaller such as those around screws or rivets. While the Captain used them to seal around stressed fittings such as marine portholes and deck fittings, we can use them around vent, window and other penetrations where stress cracks develop and allow water to wick from the outside into the trailer.

During application, the sealant should appear a milky white and appear to get sucked into wherever you think the crack is. If instead it immediately pools outside, it probably means you don't have the right spot. If it just disappears, the crack may be too wide, and you should look on the inside to make sure it isn't just pouring out somewhere. What you expect to see is the sealant being drawn in, backing-up, being drawn in again and then pooling on the outside. Apply sparingly meaning only use enough sealant so you can stop as soon as it starts to pool. As a point of reference, a 1-mm crack would be as wide as three grains of table salt end-to-end, or the gap between the columns of the Lincoln Memorial on the reverse of a US penny or 2/3's of the width of a pinhead.

As it cures it will look like a small puddle of paint would; firming-up from the outside in. After 24-hours it is fully cured forming a clear, flexible and strong bond that can be painted or caulked over.

Manufacturer FAQ says: (1) you can apply around existing sealants, (2) once cured it resists most everyday chemicals, (3) the area exposed to sunlight should be so small not to pose a problem (4) it is water-based and non-toxic, (5) best to apply while the area is dry but if a "small degree" of moisture remains, it will still work.

TOOLS & SEALANTS & LUBRICANTS

White Lithium Grease

Used when the lubricant must stay in place under medium to high pressure applications such as hinges and garage door rails. PRO: Stays in place, doesn't drip and prevents corrosion. CON: Water soluble, stays tacky & retains dirt.

Marine Grease

Applied to trailer wheel bearings, shafts and gears that are constantly exposed and often immersed in water. Designed to prevent rust while preventing moving parts from seizing. PRO: Can handle high torque loads while remaining in place and is the most water resistant of any grease. CON: Petroleum based, stays tacky and holds dirt & dust

Synthetic Grease

Applied to trailer wheel bearings, shafts and gears that are under heavy load, high torque, high sheer stress and high temperatures. PRO: Lowest rolling friction of any grease and remains in place under high temperature. Lasts longer than petroleum-based products. CON: Stays tacky and holds dirt & dust. Most expensive.

Silicone

Used on porous surfaces where things slide against each other such as drawer slides, light duty hinges, weather stripping, etc. PRO: Extremely slippery, non-reactive to most substances and repels water. CON: Extremely slippery and holds dirt & dust. DO NOT use on or near electrical connections. Paint will not stick to anything that was sprayed with silicone. NEVER washes away!

Graphite Powder

This dry lubricant doesn't attract dust or dirt, so it is ideal for locks and tumblers. It can create quite a mess so keep its use limited to small amount in locks.

WD40 Rust Penetrating Oil

This is NOT a lubricant and should be thought of as a cleaner & rust inhibitor first! Unsticks metals that are oxidized together while being a 1-year corrosion inhibitor and a light lubricant. PRO: Rust penetrating solvents get into threads and cracks and breaks down oxidation and rust. It then remains

as a corrosion preventative by displacing water. CON: Doesn't stay slippery very long. Don't use on hinges, locks or bike chains as it will attract dust & dirt.

McLube Sailkote

Another marine sourced product is Team McLube Sailkote which is typically used to make sails & rigging slide more smoothly. As a dry lubricant it dries quickly forming a slick, smooth, hard surface that doesn't attract dirt and won't wipe-off onto other surfaces. Described as a hydrophobic coating, it bonds strongly when applied to a clean surface and the manufacturer bill it as being five times more effective and longer lasting than Teflon or silicone-based products. If this is the product that sailors rely on to make it easier to move heavy sails along their sliding tracks, then it can be relied upon to do the same for similar surfaces in the travel trailer.

Dielectric Grease

A silicone-based grease which lubricates and protects electrical contacts by repelling dirt, salt, oils and moisture. By warding off corrosion, it helps reduce voltage drop. It does not conduct electricity but the grease is designed to flow in such a way that permit the metal contacts to touch each other while sealing the connection from the ambient environment. Perfect for the 7-WAY connector contact points.

Aerospace 303

Aerospace 303 is to plastics & rubber what suntan lotion is to a bather. It has an SPF45 providing UV protection to hard plastics, black trim, clear polycarbonate, vinyl and the rubber gasket liners of our storage compartments. At the beginning and end of each season, we wipe down all the door and window gaskets with 303 keeping them soft and prevent cracking & aging from UV. DO NOT use it on glass, paint or chrome. According to California, it will kill you or make you grow multiple heads so don't use it there.

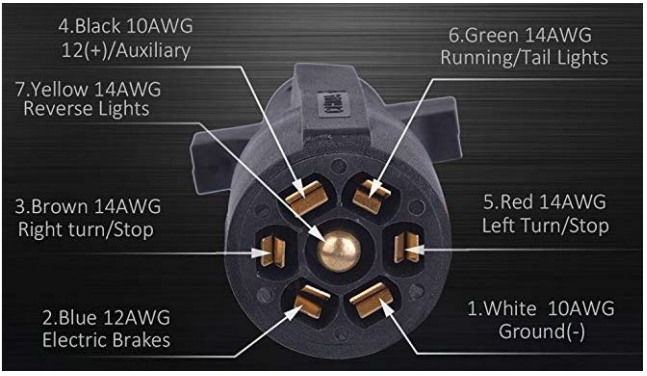
TRAILER 7-WAY CONNECTOR

You are looking at the end of the connector that you plug into the truck when hitching-up. While we provide a storage place on the hitch jack to keep it off the ground and out of the dirt while disconnected, unavoidably this end will at some point get corroded and full of dirt & debris.

While it should be checked each time while hooking-up, maintaining it is often an end or beginning of season task. If you are here because the trailer failed its pre-Departure light check, a cleaning is the first step.

The 7-WAY connects the travel trailer and TV in SEVEN important ways.

CLEANING PROCEDURE



1) Knock the connector against the palm of your hand while aiming the pin towards the ground to remove as much loose material as possible.
2) There should be a Ziplock bag in the top zipper compartment of the big tool kit containing a tube of DeoxIT, a burnishing file and a tube of Dielectric grease. NOTE: If using in the State of California, like everything else, it contains chemicals which are known to cause cancer, birth defects & reproductive harm.
3) DeoxIT Electrical Cleaner is a fast-acting deoxidizing solution that cleans & lubricates metal contacts. We take these 7-WAY connectors for granted but clean contacts mean reliable electrical conductivity which translates into having our travel trailer stop when you press the brake pedal. Think of DeoxIT as soap for electrical connectors.

TRAILER 7-WAY CONNECTOR

4) Clean one contact at a time. You only need ONE DROP per contact. Use the GC9338 burnishing file to gently scrub each contact surface until you can see the copper under whatever layers of dirt or green oxidation may exist. Depending on how bad things had gotten, what once appeared black will now appear light brown / copper colored. On the vehicle side which has the male blades, you need to clean both sides of the blade. The RV side is female so you only need to clean the inside of the tabs.
5) Once everything has been cleaned, apply what Grandma would call a "pinch" or "dab" of dielectric grease onto each contact surface. It protects electrical contacts by repelling dirt, salt, oils and moisture. Immediately insert the plug into the truck to get the grease into the nooks & crannies. Take it out and put it in again a few times. The dielectric grease will protect the contacts by lubricating and warding off corrosion which helps reduce voltage drop
6) NOTE: A clean contact is of special importance for the brake controller since they work by sending variable voltage to the electric brakes. If the brake controller is sending the correct voltage but a lower one is being received due to a bad contact, the driver will think that everything is set correctly when it isn't.

As an aside, the same problem described above for the 7-WAY can afflict the 30-AMP twist-lock power cord connections on the RV. Fortunately, these are larger and easier to clean but the concepts above still apply.

SUPPLIES

At home, we use the large cans of CRC #05113 Dialectric Grease and CRC QD Contact Cleaner sourced at Home Depot. For use on the road, there are small tubes of the following in the zipper pouch of the toolbag.

Product	**Manufacturer**	**Part**
Dialectric Grease 3 oz	Permatex	#22058
DeoxIT Cleaner 2ML	CAIG Labs	D100L-2C
Burnishing Tool 0.25" x 3"	GC Electronics	GC-9338

WINTERIZING

Methods and opinions vary widely on how to winterize a trailer depending on how people have always done things, where they live, prior experience and so forth. What follows is how WE wish the trailer to be winterized so if you are using or storing it at a time when winterization becomes necessary, this is our process.

The tanks will be emptied, the lines blown-out with compressed air and non-toxic, pink MARINE & RV fluid will be pumped through the PEX plumbing, poured down each drain and into the black tank through the toilet. We will NOT be putting the fluid into the fresh water tank because while the material is rated non-toxic, there is sufficient anecdotal evidence that bacteria can thrive in RV antifreeze. Our method limits its use to the volume within the plumbing pipes for the bends and elbows that just can't be protected or flushed of water any other way. The small amount of water left behind after draining the fresh water tank, or which gets deposited by condensation during storage, isn't a danger even if it freezes given the amount of expansion space within the tank. In any event, the entire system is sanitized at the beginning and in the middle of each season.

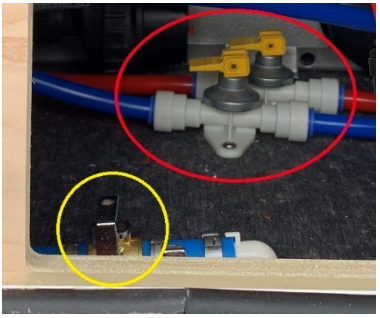
Some prefer to just blow the waterlines dry or just inject RV fluid. We believe in both as experience has proven air doesn't blow out all the water and RV fluid doesn't displace all the water either. Combined, they do the job at the low temperatures we see in the North East while just using compressed air without the RV antifreeze works at borderline temperatures.

We prefer the Seafit RV antifreeze sold at West Marine but a similar propylene glycol antifreeze for potable water systems can be found elsewhere. You are looking for the words "Safe for potable water systems" and propylene glycol. While it is safe to handle, it was named Allergen of the Year for 2018 by the American Contact Dermatitis Society so if this is potentially an issue for you, act accordingly. What you absolutely CAN NOT put into the system is ethylene glycol which is toxic to humans and due to its sweet taste, attractive and deadly to dogs and other animals. So, look for propylene and avoid ethylene. Fortunately, manufacturers dye the propylene products pink to make it easier to identify. (Hint: Go to West Marine)

WINTERIZING

1) Confirm that the city water hose has been disconnected.
2) Since we will be using a compressor on the ground and because propane is heavier than air, out of an abundance of caution, turn off the tank(s).
3) Put chocks in front of, and behind, both wheels.
4) Since the fresh water drain valve is in the rear and it mounts to the side and not the bottom of the tank, we want a gravity assist while draining the tank. Use the hitch jack to tilt the trailer up so the green level bubble on the A-frame moves to the right and rests at #3. You did chock the brakes as requested in #3 above, right?
5) We sanitize the freshwater system at the end of the season. Please stop and perform the HOLDING TANK: DETAILS & CLEANING procedure except stop at step #22. You don't need the 2nd rinse.
6) If you did #5 above correctly, the bypass valve is in the vertical BYPASS position.
7) There is a check-valve in the Shurflo 4008-01-A65 water pump which acts like an anti-siphon valve in that it protects the cleanliness of the water tank by preventing water from flowing backwards through the pump and into the fresh water tank. Like the valves on a modern home which prevent water in a garden hose from being sucked back into the house plumbing when the spigot is turned off causing the valve to appear to leak. This check-valve also works to prevent air from going backwards when the compressor is used to clear the lines so the fresh water tank will only drain by gravity.
8) Set-up your compressor and ensure the outgoing air pressure is no higher than 30 PSI. We do not want to blow-out a crimp fitting on the PEX plumbing lines especially behind a wall somewhere.
9) Connect the threaded end of the silver blow-out-plug to the city water inlet and the quick release end to the compressor hose. Taking care it is **NOT** going to the fresh water tank behind the locked door but to the water inlet. We do **NOT** want to put pressurized air into the fresh water tank.
10) Turn on the compressor and visually check the gauge to ensure it never goes above 30 PSI. If it does, recalibrate per the instructions in WINTERIZING WHILE ON THE ROAD in the following pages.
11) Open all (3) faucets and shower both Hot & Cold valves.
12) When operating the drain valves, when they are perpendicular to the pipe they are closed and when parallel they are open.

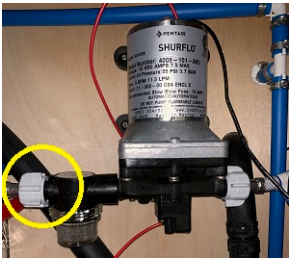
WINTERIZING



13) We need to drain the low point waterline valves. Locate the two hot and cold valve drains shown inside the yellow circle to the right and open the valves. They drain directly below and may splash your feet.
14) Close the drain valves that you opened in 11-13 above, the three faucets and the shower.
15) One valve at a time while the system is under compressed air pressure, operate the outdoor shower moving the lever slowly from hot to cold until no water comes out of the shower head. Do the same for the indoor shower, bathroom sink and kitchen sink.
16) Operate the toilet 4-5 times until no water comes out.
17) Do it again by walking to each point and rotating handles from hot to cold and keep doing it until only air comes out.
18) Disconnect from City Water and connect to Black Tank Flush Valve. Blow out this line for 60-seconds. Use Clorox wipes to clean threads at adapter due to possible black water contamination.

RV ANTIFREEZE

There will be times when you need to winterize while on the road and not need to put RV fluid back into the lines. For this reason, the WINTERIZING instructions were broken into the air compressor part above and now the antifreeze process. We DO put antifreeze into the lines, and we DON'T put antifreeze into the fresh water system. This is accomplished by locating the water pump in the hatch below the closet and detaching the hose coming up from the freshwater tank below. After confirming once again the BYPASS switch is in BYPASS mode so no RV fluid goes into the hot water tank, one end of an adapter is placed where the freshwater hose connected to the water pump and the other end is placed into the bottle of RV fluid. The water pump is turned on which charges the lines. Each faucet and shower are operated manually, hot and cold, until a steady flow of RV fluid comes out with no spurting or foaming. That's it till next season.



WINTERIZING

The description of the ANTIFREEZE PROCESS will be expanded at a later point to include pictures and this page is a placeholder.

DE-WINTERIZING

There just wasn't enough time to get everything written before the April 1st trip so these pages were intentionally left blank as space-holders to be completed later and inserted into the binder when complete.

WINTERIZING WHILE ON THE ROAD

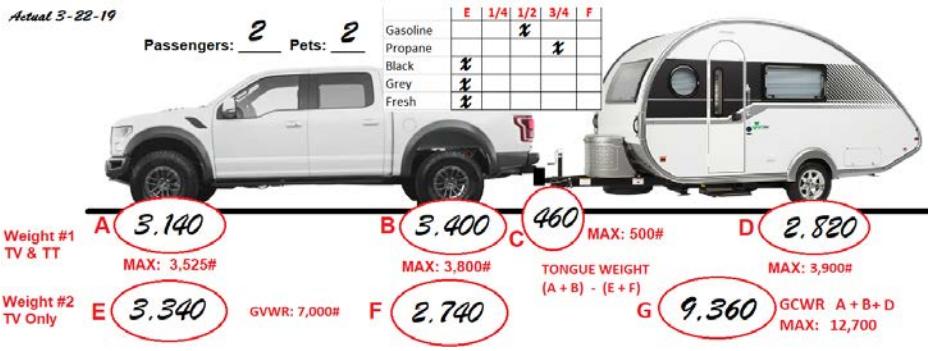
Sometimes your trip will either be long enough or travelling on the cusp of season changes, or both, and you will need to winterize the T@B while on the road. A simple and safe preventative action is to blow-out the water lines. The portable Viair 450P compressor stored under the bed turns on when the holding tank is below 130 PSI and stops when it reaches 155 PSI making it great for truck tires. nüCamp put a sticker by the City Water Inlet advising use of a pressure regulator set no higher than 50 PSI and that rating is the same for water or air pressure. Since the outdoor shower has a factory rating of 40 PSI, we will be using that lower pressure for winterizing and will go no higher than 30 PSI

The Viair Winterizing Kit #90145 comes with a 220 PSI regulator & gauge to which we've attached the ¼" quick connect coupler and stud. As described in the WINTERIZING T&B400 section, the blow out plug gets attached to the city water inlet. It is extremely important that you don't mess with how we've set the adjustment knob on top but if you accidently do, it will have to be reset to 30 PSI.

To reset the adjustment knob, hook-up the equipment as described in the Green section under CHECKING TIRE PRESSIRE except place the regulator as shown in the photo below. What you will be doing is connecting the unit to a vehicle tire and turning on the pump. If the pressure reads anything other than 30, turn the knob in the direction shown on top to either increase (RIGHT) or decrease (LEFT) the pressure. From a practical matter, you will need to adjust the knob and then try to fill the tire again and again raising or lowering it a bit each time till you hit the 40 mark. Once you've got it set at 30, push the knob down and lock it.

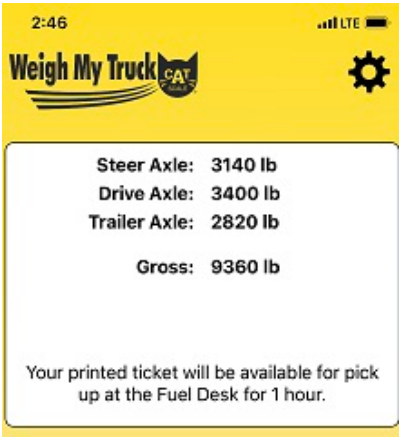
WEIGH THE TRAILER

Before setting out, the trailer and tow vehicle were weighed using the same CAT scales that truckers rely upon to avoid DOT overweight fines. These scales have a 20# standard deviation and suit our purposes well. The example below from an actual weigh shows the F150 and T@B400 max specifications in red with field weights shown inside the red ovals.

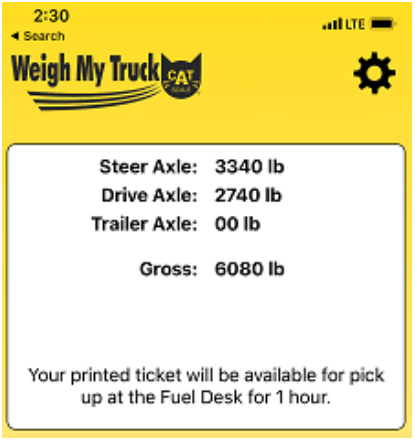


There is an APP called Weigh My Truck offered by CAT allowing you to drive onto the scales and using Bluetooth, weigh & pay. Two passes are required: FIRST is the truck and trailer with one axle on each of the 3 large pads. SECOND is just the truck with one axle on each pad.

Truck & Trailer

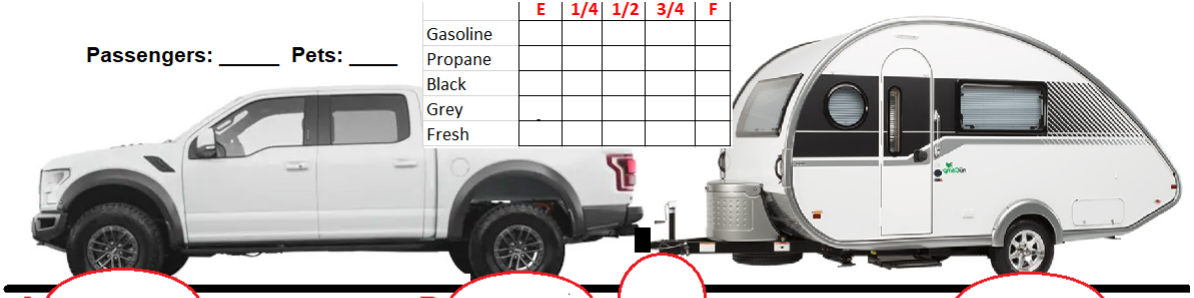


Truck ONLY



Passengers: _____ Pets: ____

	E	1/4	1/2	3/4	F
Gasoline					
Propane					
Black					
Grey					
Fresh					



Weight #1 TV & TT

A MAX: 3,525#

B MAX: 3,800#

C MAX: 500#

TONGUE WEIGHT (A + B) - (E + F)

D MAX: 3,900#

Weight #2 TV Only

E

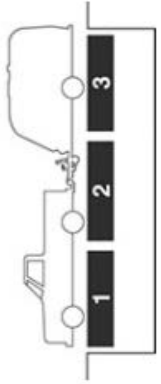
GVWR: 7,000#

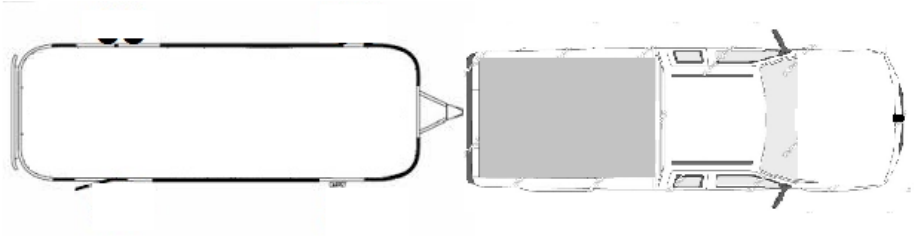
F

G

GCWR A + B + D
MAX: 12,700

WEIGH THE TRAILER





T@B 400 Dealer Prep Revision 10.30.18

TRAILER MODEL, COLORS & VIN: *400 Boondock White / Red*

5 7 H T T 1 8 S 2 K S xxxxxx

Inspect Trailer at Time of Delivery

Hook Up Trailer to Vehicle Date: ***12/13/2018***

a. Inspect coupler and chains.
b. Test operation of running lights

Inspect Interior

a. Inspect door & windows including latches, screws and locks.
b. Remove cushions, inspect floor, walls and ceiling
c. Inspect storage areas and adjust cabinet doors
d. Add packaging tape to round cabinet left door aluminum to prevent marking
e. Test operation of fans, A/C, all lights and outlets.

Test fridge operation on ac and dc for proper cooling

f. Inspect screens, shades, cabinets, etc.
g. Vacuum dust out of crevices, vacuum interior, reinstall cushions.
h. Test power converter operation CHARGING VOLTAGE ***13.4*** Volts
i. Hook up water and bleed air from system. Test Alde operation.
j. Inspect wiring and plumbing, finger tighten hoses near water pump.
Test band clamp connections
k. Install mend plate over closet door latch screws and warning label inside
l. Test entertainment center
m. Install floor protection covering

Inspect Exterior and Underside of Trailer LUG NUT TORQUE ***100*** Ft Lbs

a. Inspect under-body panel for proper fit
b. Inspect paint on frame
c. Test brake circuit resistance and break-away RESISTANCE ***1.7*** ohms
d. Install spare tire

e. Check operation of stabilizer jacks. Lube only if dry. *Visual*

f. Check exterior lights and accessories

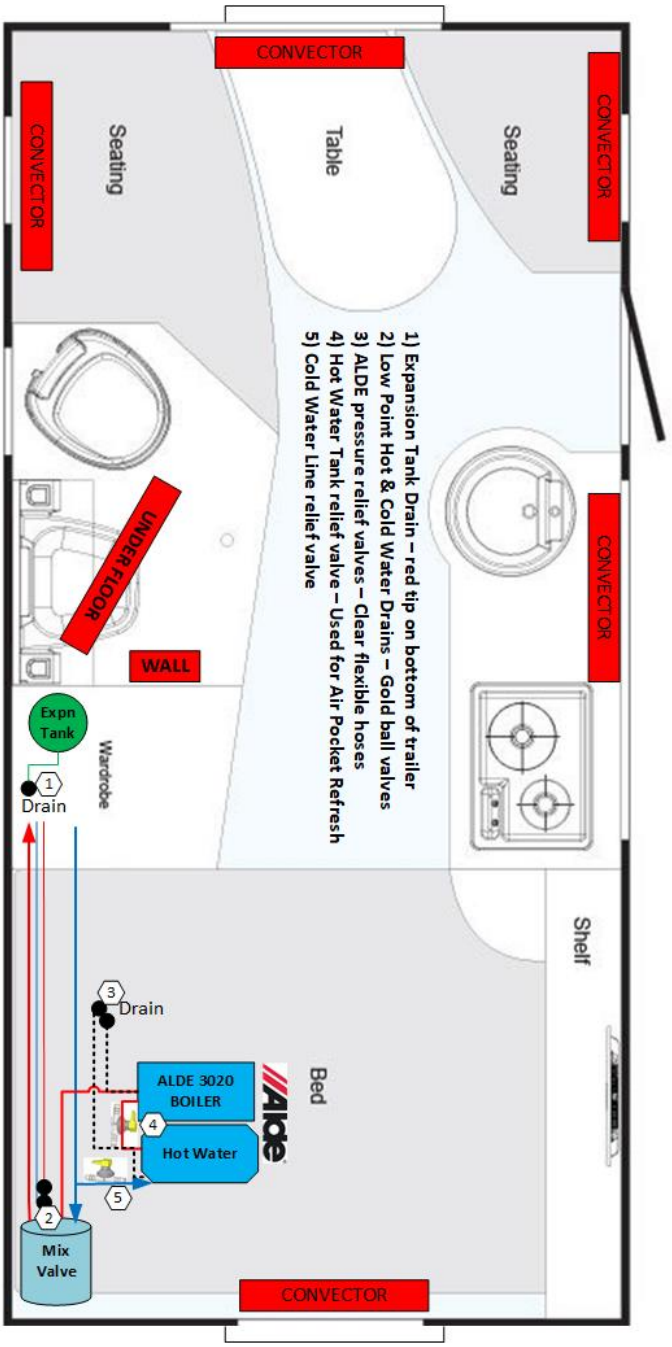
g. Install dust seal on top of baggage doors ~~and seal plywood edge~~

h. Seal solar panel at top edge *N/A*

i. Install front Tub, storage boards and propane tank.

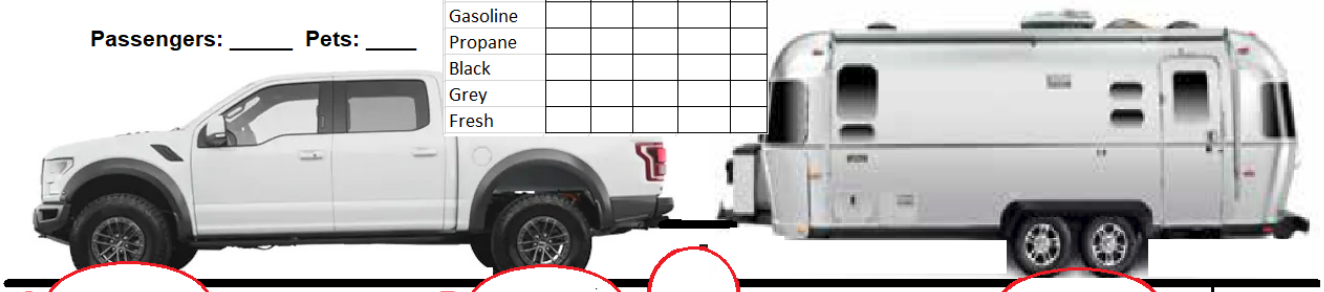
j. Install dealer Trailer Decal

ADD GIFTS: BUBBLE LEVEL and DRILL ADAPTER FOR JACKS


CONVECTOR
CONVECTOR
Seating
Table
Seating
CONVECTOR
CONVECTOR
1) Expansion Tank Drain – red tip on bottom of trailer
2) Low Point Hot & Cold Water Drains – Gold ball valves
3) ALDE pressure relief valves – Clear flexible hoses
4) Hot Water Tank relief valve – Used for Air Pocket Refresh
5) Cold Water Line relief valve
UNDER FLOOR
WALL
Expn Tank
1
Drain
Wardrobe
Shelf
3
Drain
ALDE 3020 BOILER
4
Hot Water
Bed
5
2
Mix Valve
CONVECTOR

Passengers: _____ Pets: ____

	E	1/4	1/2	3/4	F
Gasoline					
Propane					
Black					
Grey					
Fresh					



A

MAX: 5,990#

B

MAX: 6,340#

C

MAX: 1,500#

TONGUE WEIGHT
(A + B) - (E + F)

D

MAX: 7,300#

Weight #1
TV & TT

E

GVWR: 10,000#

F

G

GCWR A + B + D
MAX: 15,000#

Weight #2
TV Only

WEIGH THE TRAILER