

Adding fresh and wastewater heating tank heating to a 2019 Nucamp T@B 400 boondock lite. – Authored by Tundra57.

Thanks to:

Tabaz from the Nucamp Tab Website for the ideas. I followed his modification before I performed mine.

Object:

To add freshwater and black/grey tank heating using the Alde heating system. Also adding additional insulation to the underneath. This is to allow camping with full water use in freezing temperatures, extending the use of the camper into the winter season. This modification will not protect the camper when stored or any other time when the Alde system is not running. Winterization will still be required when the camper is not in use.

Getting started:

The modification can be performed with usual garage/home use tools, however to make things easier, I did purchase some special tools from an Auto parts store (Advance Auto in my case) namely:

- A set of pipe clamps to close off the Alde rubber hoses to reduce coolant loss before cutting the pipe.
- A set of spring hose clamp pliers (for this a pair of long nose vice grips can be used at a pinch <ha ha>, but the hose clamp pliers work in a much more confined space and are less likely to let the hose clip ping off down the driveway never to be found again, yes this did happen before I got the pliers.).
- The hole saw used to cut through the floor was purchased from Home Depot.
- I also purchased the tools to crimp PAX pipe as this is used in the camper for the freshwater drain connections. You could use rubber pipe and screw hose clamps instead.
- To remove the cover over the Alde coolant reservoir next to the left-hand side window, you will need a ratchet type screwdriver for the square drive screws. For the ones adjacent to the window frame you have only ¼" clearance for the screwdriver so I purchased a very low profile ratchet type like a small socket ratchet.

I added an extra 12-volt electrical panel with fuses to control the cold water drain valve which replaced the one mounted by the wheel, to house a temperature display and some aux switches for later modifications and heating pads.

Heating Parts required:

- One inch and half inch-thick solid insulation in sheets four by eight-foot sheets.
- Alde hose (around sixteen feet)
- Alde ball valves (two) and straight hose adapters for these.
- 90 degree bends with spring clips.
- Plastic connectors for the bends.
- 90 degree bend with an air bleed extension.
- Hose mounting clips to secure hose to the floor (1" hoop type clamps for copper pipe).
- 2 gallons of Alde fluid.
- 1 Meter long Alde radiator.
- Funnel with long pipe to refill Alde coolant reservoir.

Other parts:

- Wire, crimp terminals.
- Sheet aluminum for the additional control panel.
- Temperature display (two input).
- Fuse box.
- Switch panel.
- Motorized normally closed 12v dc ball valve (DO NOT USE A DIAPHRAM TYPE VALVE).
- A couple of 12v LEDS to indicate the motorized drain valve position.
- Distribution blocks.
- PVC tube for the floor Alde hose feed through.
- PAX water pipe and crimp fittings with some straight and 90-degree bends to fit the ball valve.
- Marine grade sealant/adhesive.
- Small piece of 1/8" Lucite.

The Job:

Firstly, I had to decide where the two diverter valves would be fitted inside the trailer and where the Alde hose pass throughs would be, this would dictate where I cut into the Alde hose system. I had to be able to access the valves to adjust the flow. Also where the additional control panel would be fitted.

I chose to mount them behind the lower panel under the three-way fridge (in some models that is under the wardrobe). This panel could be easily removed for access and to make the cutout and fit the control panel and wiring. I have already fitted the input ac power monitor here from a previous project. I do intend to make this panel hinged but ran out of time for this first go around.

The four slots in the sides of the under frame were covered with Lucite sheet and glued into place with the marine adhesive, held in place with duct tape until set. I had to slot the two panels of Lucite that fitted behind the wheels to allow the brake wiring to pass through.

The bottom flexible cover was released by undoing all the screws and removing the long aluminum strips, kept for later re-fitting. I ended up lying on this cover, as it was secured at the front, so it just hung down and laid on the floor. I put a sheet over it for more comfort.

Next to decide where the radiator would be and the Alde hose run. In my case there is a large empty area between the fresh water and grey water tanks - plenty of room to mount the radiator crossways. I elected to run the Alde hose around the tanks so that the outside edges of the tanks would be heated by the heat loss from the hose itself. One edge of the grey tank did not have room for the hose, so it is not heated on that edge. The Alde hoses come down through the feed throughs behind the fresh water tank. The hoses then are extended - one goes towards the front down the left side through the cross member with a loop around the floor under the very front section under the AC unit, then turns and follows the cross member back to the left, across and enters the radiator on the left side. The exits the radiator on the right side then turns toward the rear of the trailer and then turns left across the back of the fresh water tank then turns back toward the return pipe.

I used the one-inch insulation board vertically around all the inside edges behind the trailer frame and cut flat sheets to sit inside the frame to act as another floor. Hopefully to significantly reduce the heat loss.

While the bottom was off, I ran out wires for later use, two pairs for waste gate valve heaters and one pair for a fan to draw heat into an enclosure around the gate valve area.

Illustrations:

The Alde hose feed throughs:

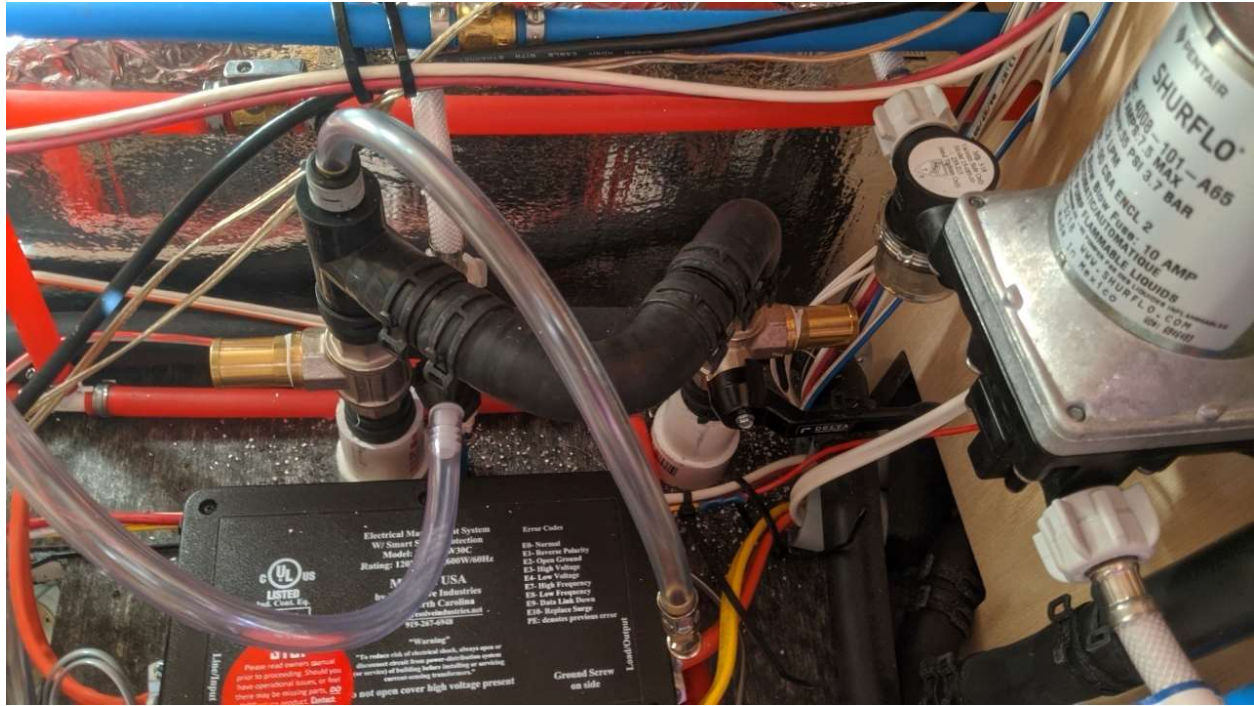
Made from pipe and a coupler cut in half and glued together



Drill the holes with a hole saw:



The ball valves fitted in position:
You can also see the new air bleed with extension tube.



The new pipes drop down through the floor behind the freshwater tank adjacent to the fresh water pump intake:



The Marine Sealant Adhesive I used:

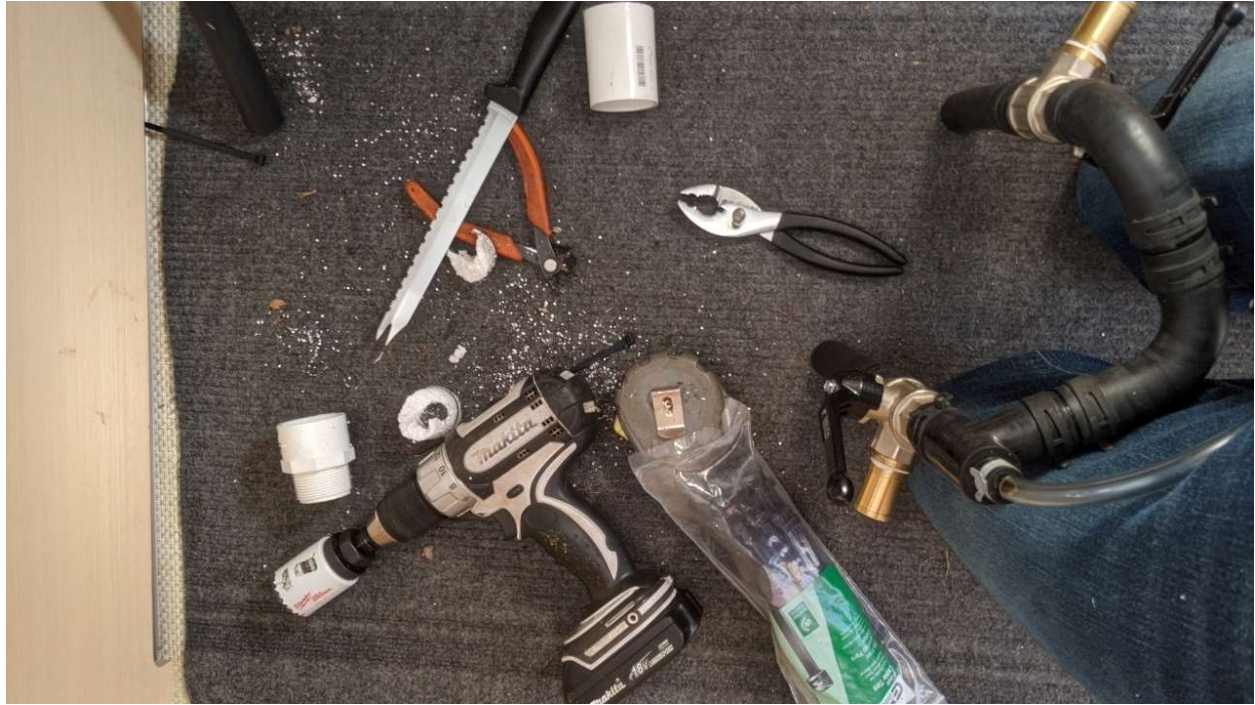


The floor construction:



The tools:

Hole saw, pliers knife to cut insulation board and the assembled valve set with bypass pipe fitted



Hose clip pliers and locking hose clamps.



Lucite Frame hole cover:



Slotted for the brake wires: (the red wire cover is for the reversing lamp wiring I added).



Remove the cover and let it drop:



Area between the tanks where the radiator will reside:



Alde radiator Fitted:

I used self-tapping screws and marine adhesive.



Goes around front open area and back across cross member. Here you can see the insulation around the edge:



This is the insulation I used, in both 1" and 1/2":



Hose clips: Don't bend the hose so much it collapses. For a sharp bend use a 90 degree rubber angle connector.

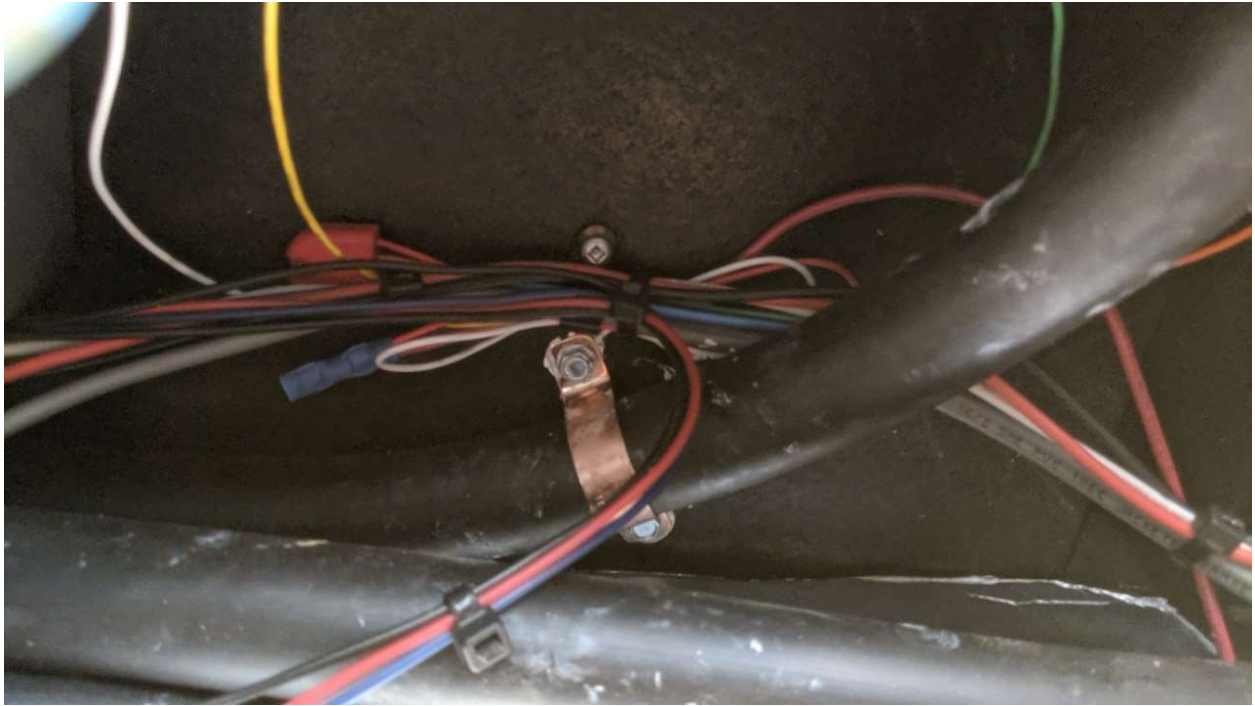


First bottom cover at the front:



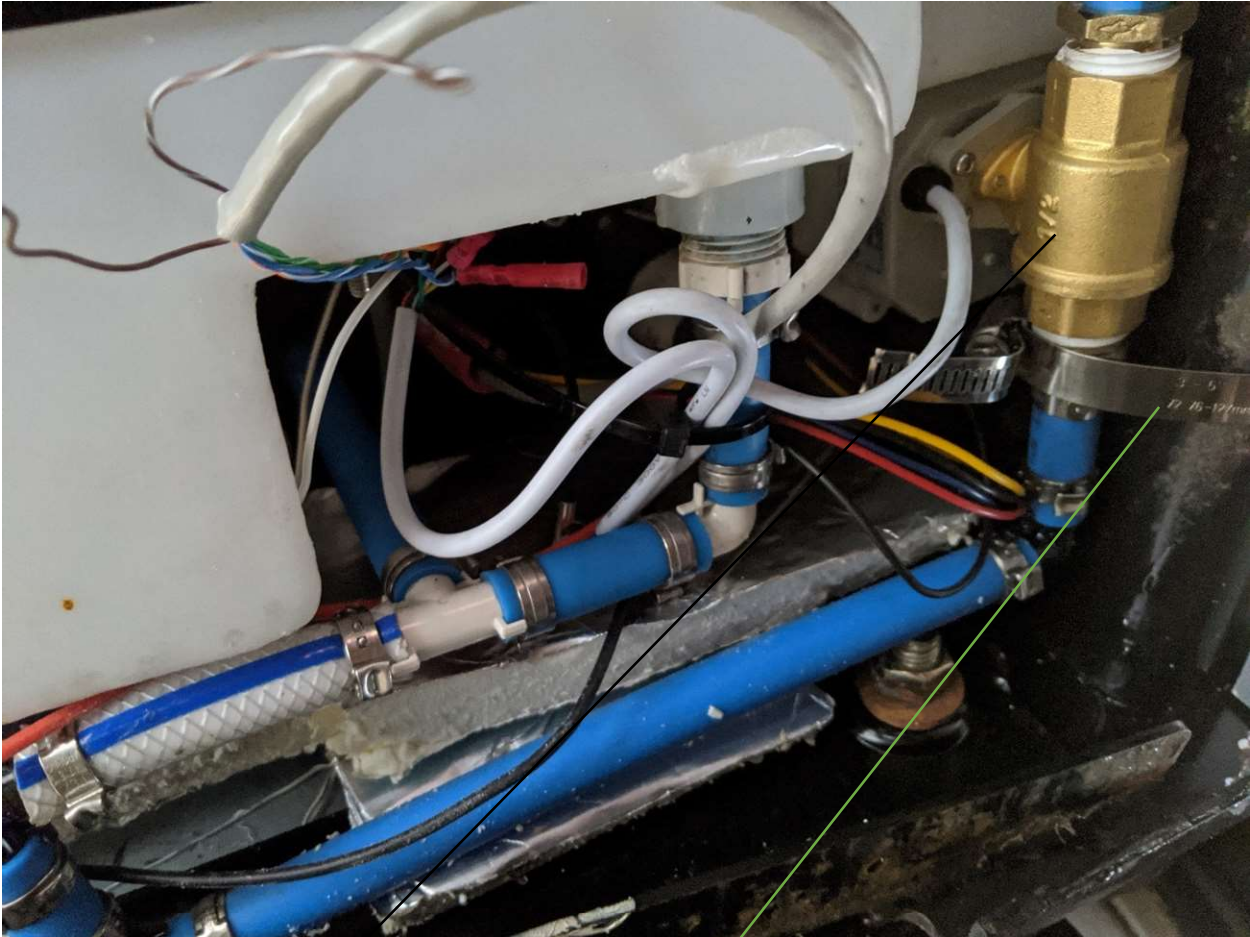
Some pictures of the pipe runs:







The motorized freshwater dump valve:



Valve

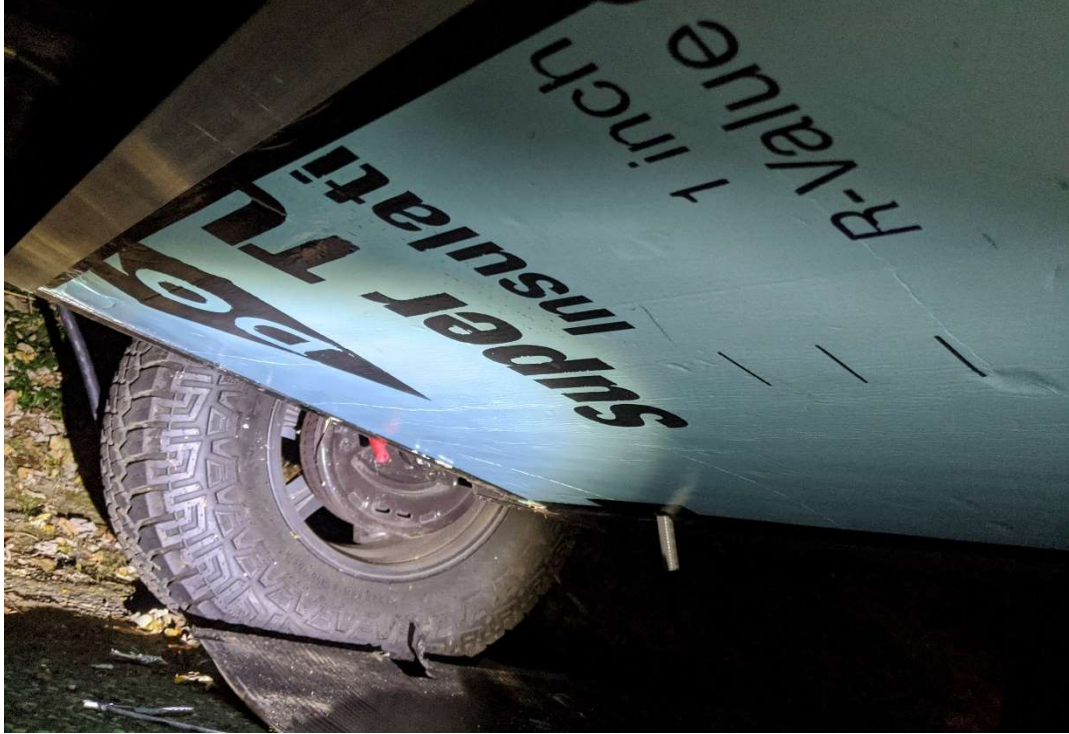
Hose clip secures to axle.

Next section covered and the joint taped with Duct tape:



Last section covered. Had to add an extra support at the back made of 1" aluminum angle two pieces back to back one for each piece as they join below the cross member. Screws drilled and tapped into cross member.

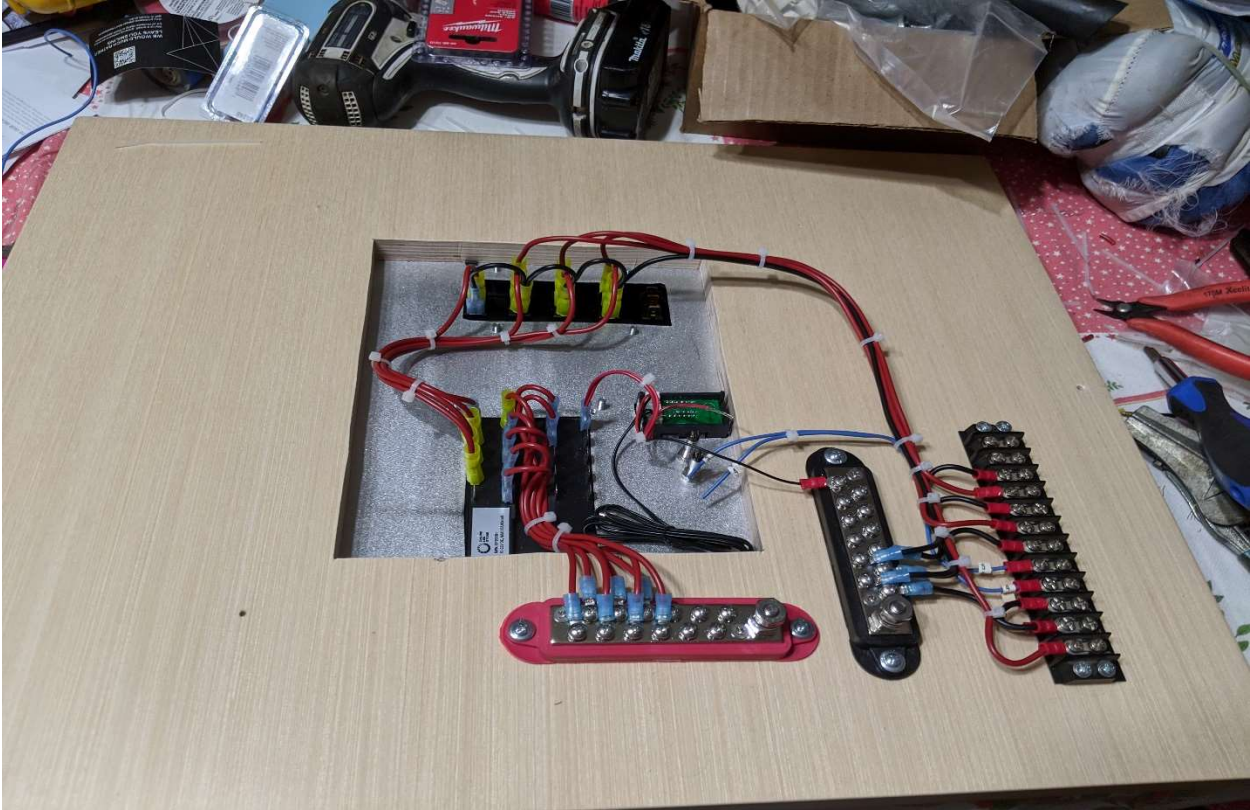
Notice new fresh water tank drain pipe – I reused the old rubber pipe as an outlet.



Had to fit two pieces of 1" angle iron back to back behind axle slid into frame side rails to support the back two cover pieces where they join.



The new control panel.

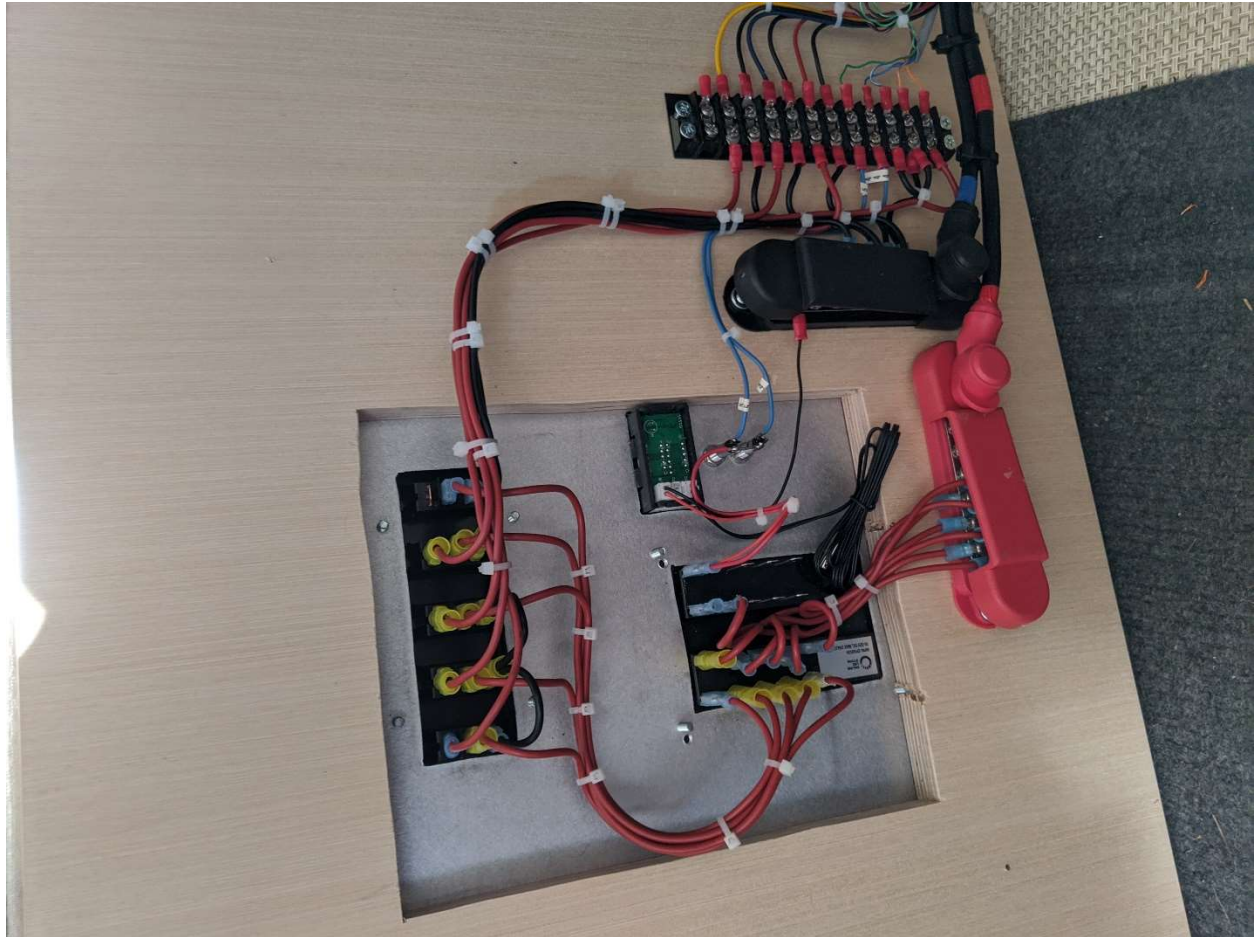


Drilled another hole for a piece of 1/2" PEX to run the wires through from underneath;



Pex Pipe

Ran wires from underneath to terminal blocks and heavy wires (#6) straight from battery junction box under bed.



Used a 50Amp resettable overload, the same type as the overload provided by Nucamp next to the battery cutoff switch, to protect the new panel. Got it from Auto parts store.



The new panel has switches for heaters if I need them and a switch to operate the freshwater drain ball valve. A two-input temp meter, reads in degrees C. The two lamps underneath are top one red for fresh water drain open and bottom green for fresh water drain closed.



New fuse box with blown
fuse LED's

Running the new setup:

After the original Alde hose was cut and re-routed through the new valve set, the Alde reservoir was filled up. The new bleed valve was opened and put in a bucket. The reservoir was filled until fluid came out of bleed valve. The trailer is pointing down driveway so bleed pipe is highest point. Alde was fired up. Pump speed increased to 3. Ran heating and opened new bleed valve at intervals, when fluid came out with no bubbles valve was closed. Keep reservoir full. Process repeated until pipes underneath started to heat up. Checked for leaks (done before bottom was put on of course!!).

Ran for an hour with diverter valves both set halfway then bled again a few times. Used a bit over one gallon of fluid.

Left overnight, bled again and added fluid. Have since had to top up reservoir twice.

Tested on 28F day with temp set to 68F inside and diverter valves both set at half with pump set back to 2. Inside temp stayed at 68. Temp behind panel (top of cold water tank) stayed 70F. Temp underneath at side of freshwater tank where pump outlet is, stayed around 55 degrees F.

I then put the bottom panels on as shown above and the original black cover sheet screwed back on with the aluminum strips

Drove for 5 hours at 28F to 30 F with internal temp set to 65F. Temp behind panel 68F. Temp underneath lowest 47.3F

So it seems like it will work fine. Obviously in the middle where the radiator is, will be much hotter. Have not tried closing the diverter valves a little to reduce the amount of flow in the basement. Obviously the more flow underneath, the more the Alde fluid will get cooled which might lead to reduced heating inside the trailer. This will be experimental trial and error during the winter.

Final work:

- Behind the frame area underneath the bed, I will put a couple of layers of insulation slotted into aluminum angle bolted the floor underneath for extra protection from wind blowing under the trailer.
- Box in the dump outlet completely with a lift-up cover for access. Tried to buy a suitable box without success. Will almost certainly have to make one from checker plate and aluminum angle.
- Route warm air from the underneath heated section through into the dump outlet cover box with a small 12v computer fan. There is a frame rail cover I made (see above photos) so it will be easy to cut this for the fan inlet and outlet. If I make the dump outlet cover box long enough to cover the plate (30" long) it will be easy. The wires are already run out for this. This should get rid of the need to use the wires I ran out for gate valve heaters – then I can use one set for another temperature probe.
- Fit another temperature meter to monitor the temp in the dump outlet cover box and the far side of the grey tank.
- Fit a battery monitor meter to show actual battery voltage.
- Hinge the new panel for easier access to the diverter valves.