

My Solar Powered RV Swamp Cooler

If you've ever tested the wind by holding a wet finger in the air, you've used evaporative cooling. The same principle cools you off after a swim, and it also powers one of the oldest and simplest forms of air conditioning. They're known in the U.S. as swamp coolers. Swamp coolers are cheap, efficient and good for the environment.

After installing solar panels on my travel trailer and testing its performance, I saw the rooftop air conditioner was going to be "The straw that broke the camel's back." Its energy use was too great to consider using while out dry camping. On my first trip to the woods, kind of a test trip, I camped for five days without a generator. I used the refrigerator, under counter coffee maker, 700 watt microwave, TV and several lights at night. I didn't make an effort to conserve energy. I wanted this outing to be a true test of the solar setup. In fact, I left the TV on most of the time, even while out for a hike.

When I returned home after five days my batteries were fully charged at 3:30 in the afternoon. My solar setup consists of three solar panels: two 160 watt panels and one 100 watt panel. The inverter used is a Xantrex PROWatt 2000 Inverter. The batteries used for the system are four Interstate 185 amp hour sealed deep cycle batteries.

The only thing missing in my solar setup was something to keep the temperature cool inside the RV.

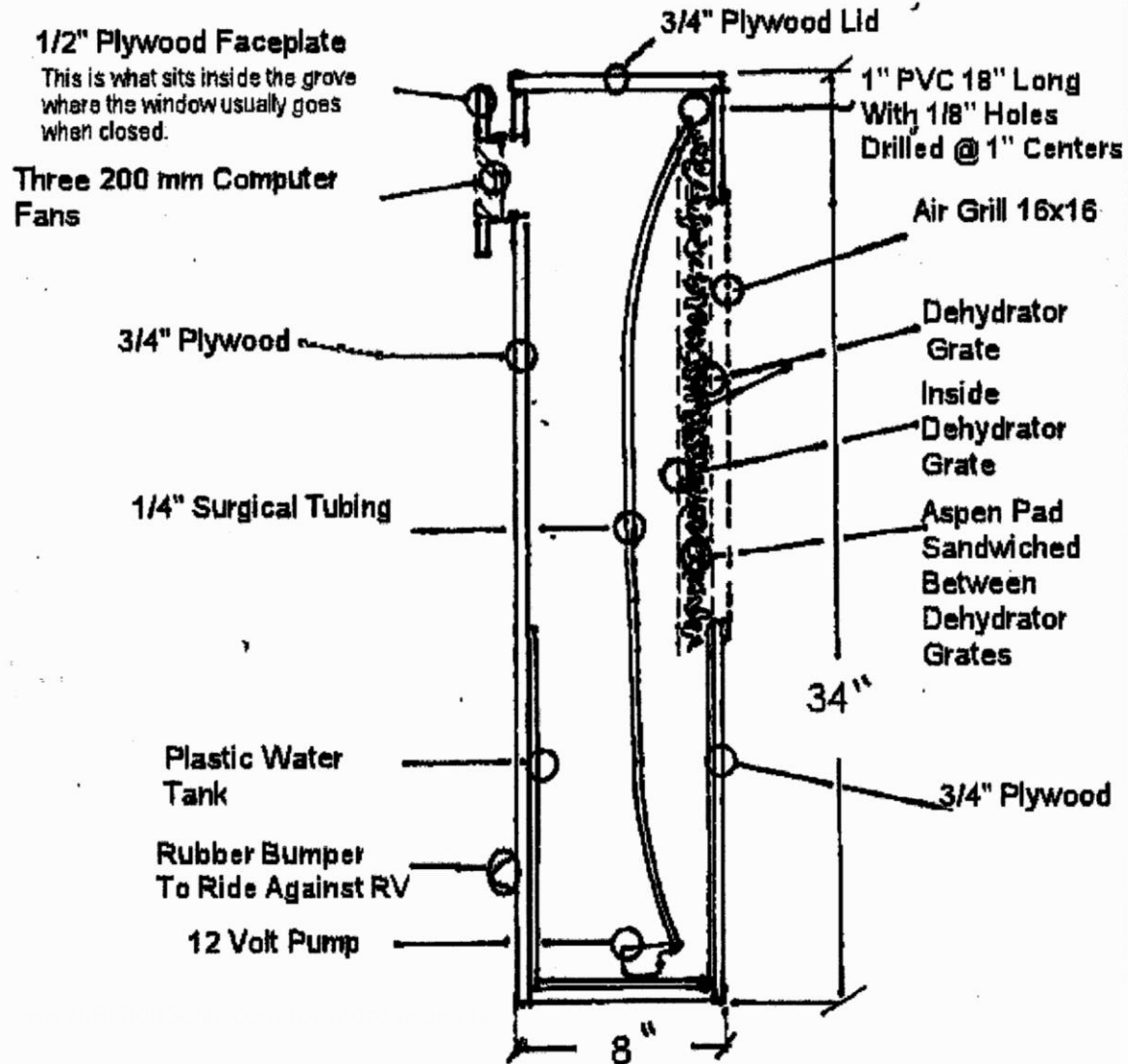
I went online to search for a plan to construct a cooler of any type, but I was unable to find anything acceptable. The only choice I had was to build something myself. I will try my best to explain in an understandable fashion what I did to solve the problem.

The picture below shows the water tank that was used for the swamp cooler. It is a five gallon water storage can used for camping in dry camps without nearby access to a hose bib. I cut the top off the can to create a tank.



After cutting the can top off, I measured the can then built the box $\frac{1}{4}$ " larger than the outside width dimension of the water can.

RV Swamp Cooler Cross Section



The next picture is the cooler in position on the side of the RV. It isn't finished in the picture, Parkland Plastics wall panel covering the plywood plywood exterior still needs to be applied.

The grill is nothing more than a 16"x16" cold air return grill purchased from Home Depot for \$13.25



The top of the water can is at the same height as the bottom of the grill. The cooling pad is aspen pad which is commonly used in swamp coolers. I ordered a roll online and cut a piece large enough to cover the opening at the air intake.

The next pictures are of the water pump used and the fans used to pull air through the aspen pad. Three fans were used to insure enough air would be pulled to be effective.



Docooler Ultra-quiet Mini DC12V Micro Brushless Water Oil Pump Submersible 240L/H 5W Lift 3M
From Amazon \$7.54 delivered. The pump works great.

The next picture showing the installation of the surgical tubing waterline attachment and the attachment of the aspen pad. The nipple the hose attaches to is a standard air hose connection screwed in to the PVC distribution pipe, the aspen pad is held in place by two grills, the aspen pad sandwiched between them.





Cooler Master SickleFlow 120 - Sleeve Bearing 120mm Blue LED Silent Fan for Computer Cases. Amazon \$7.99 each.

The pump sits in the bottom of the water tank. I attached a piece of $\frac{1}{4}$ " surgical rubber tubing for the water line. The other end it attached to an 18" long piece of 1" PVC with caps on both ends. A series of $\frac{1}{8}$ " holes 1" apart were drilled in the PVC to allow the water to saturate the pad evenly.

I had a small piece of $\frac{1}{8}$ " lexan on hand that I used for the faceplate to mount the fans. A $4 \frac{1}{4}$ " hole saw cut the lexan without any trouble. The next picture shows the output temperature after running for one hour. The temperature inside of the RV was brought down to a comfortable 72 degrees from 83 degrees in that same hour. Most of the time the output temperature runs around 67 degrees. I believe the difference has to do with the humidity outside. Swamp coolers work better in dry climates (I learned that on Youtube). After I was convinced 67 degrees was as low as it was going to get, I moved the thermometer directly in front of the fan, when I saw the 63 degrees on the thermometer thirty minutes later, I ran to get the camera. That is the lowest temperature I have

seen the cooler put out. I wish that was the norm. Wouldn't that be great while camping on a hot summer day?



The faceplate was traced from the inside to fit in the slot the window uses to seal. The cooler is hung in the window opening using the slot at the bottom of the window frame.



Anderson style plugs are attached to the RV frame and wires run to the battery on the front near the propane tanks. The Anderson plugs are located under the RV below the cooler.

The inside of the cooler was lined with Mylar and all seams taped with aluminum duct tape. The entire system uses less than 3 amps at 12 volts. The fans are only .35 amps and are very quiet.

I built this with leftover $\frac{3}{4}$ " plywood scraps plus I had silicone caulk leftover from other projects. The only items I needed to purchase were the fans, pump, plastic wall panel, air grill and aspen pad. Total cost for these items was roughly \$84.00. I will be building one for my son's RV very soon. The changes being made will be: $\frac{3}{8}$ " plywood covered with white plastic panel and interior switches to turn the unit on and off.

The next two pictures show the finished Swamp Cooler. The two black knobs on the top of the cooler hold the top down tight to create a seal, thus forcing the air to pass through the wet aspen pad.



I tried to use a synthetic evaporative pad, it didn't hold water well and was soon replaced with aspen pad. Aspen pad was not available locally so back to Amazon, my go-to place for hard to find items.



I hope I was able to make this clear enough to understand the construction of this swamp cooler. The cooler is working better than I had expected. We definitely will be using the cooler this summer in the woods of North Idaho.

If you require additional information please feel free to contact me at tom at lasheronline dot com

Tom

June 30, 2014