

Making a Solar Powered Air Heater to reduce heating bills.

(and helping the earth or whatever)

Shopping List:

- 1 2x6x16 board
- 1 2x6x8 board Both helpfully cut into 2x 36" and 2x64" pieces by lowe's
- 1 plywood board 3/8"x4'x8' cut into 36" x 64" shape
- 10 flex aluminum duct
- 2 pieces 30" x 36" again cut to be easier to handle
- 2 1/2"x4'x8' shiny insulation, cut in half to get into the car
- 1 box nails
- 1 can high heat rated black spray paint
- 3 tubes silicon sealer
- 1 12v solar panel (10w, .6 amp, a LOTOS LT10)
- 2 PC fans I already had around
- 1 55yd outdoor duct tape

Total Cost: \$278.62

If I had waited to collect pop cans, it would be been about a third the cost. But the work to make the holes in them might have not been worth it. If you have a couple hundred pop cans though, go for it.

First, build a box using the wood. I had to cut a tiny piece off one end of my boards, oddly enough the "spare" board I thought I wouldn't use fit perfectly, because I forgot to take into account the thickness of the top and bottom piece in my measurements. Don't do that! This is the difference between scientists who think everything operates in a vacuum and has no friction or thickness or anything and engineering, where you have to worry about that stuff. I kid, I kid the scientists so much! So I now have a spare 64" board left over. Hole cut in the top and bottom big enough for my fans to fit into.



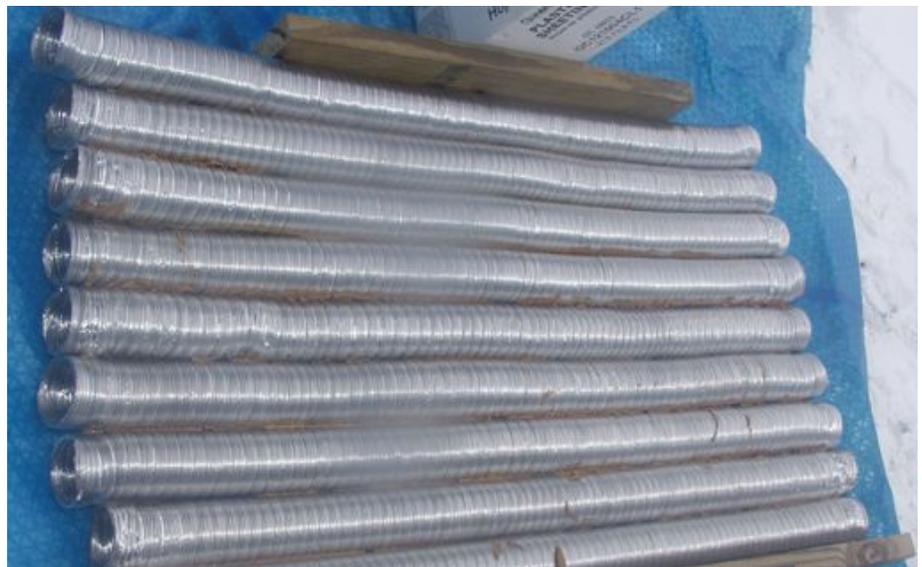
Next, lay insulation into place. This stuff cuts much easier.



Seal it up so it's nice and straight, and will hopefully stay in there when you stand it up.



While that cures, you can get your pipe ready. I was going to make a whole baffle solution to channel air out of extra insulation, but the stuff is just too darn brittle. Or maybe it's just me. Some use wood, which looks nicer, but I'm not sure it's really thermally necessary, and I don't have the tools for it, so I decided to just glue them together with the sealer.



Then while you wait for that to harden up, you can (optionally) paint the box. Maybe not optionally, it is going to be outside, after all.



Now, the hard drive bottoms there, yeah, let me explain. I was going to take my whole stack of them and put them in there to help absorb heat. But with my pipes glued together like they are, there's no air gap (or sun gap in this case) to do any extra absorbing. But I took the trouble to take them apart so I thought maybe they might help retain the heat a little better right by the intake and exit. So I stuck them there and nailed the piece of wood to keep them from just sliding down. So don't worry about that.

With the sealer sort of cured, I painted the pipes.



I put more black on them after this, too. Black is good in this case.

I tied them together with the rope there to help keep them together and hopefully to aid in carrying them. Didn't work out so well. To carry them I slid two boards underneath and carried the boards, and they came along for the ride. They even stayed mostly together!

I dropped them into the box!

Here it is tilted up. One snag I ran into was that, without the baffles there was nothing to hold the tubes in place! Crap! So I drilled a hole right by each pipe and put a nail down through, then sealed the nail on each side to keep it there. Should work, it's only going to be moved twice a year. I put some wood and more sealer on that bottom one that escaped to hold it in place while it sticks together.

I admit, it isn't the belle of the ball, but if it blows hot air, I don't have to look at it so who cares.

By now I was down to about a half of a tube on my second tube of sealant and everything looks good and cured in there so it's time for the glass. I put sealer on the wood and dropped the glass down onto it, making sure it fit tightly together.



.... is what I thought I would be doing. Then I realized there may be a situation, down the road, where I want to open it up. Having it sealed down like that would make it much more difficult. So I looked into aluminum tape, which would have cost a fortune. So I got regular outdoor duct tape, and slapped that on. I did seal the top one and the bottom one, mainly to hold them in extra tight and support the middle ones. And here it is, finished.



Interesting, the glass and tape seem to have de-uglified it somewhat. If that's a word? My glass did turn out to be somewhat shorter than I thought, I must have not had it on properly or looked at it closely enough when I put it on as the test before. I'll have to pay more attention to that next time. So the very bottom has a very tiny gap just filled in with the tape. So that's it. Next stop, electronics.



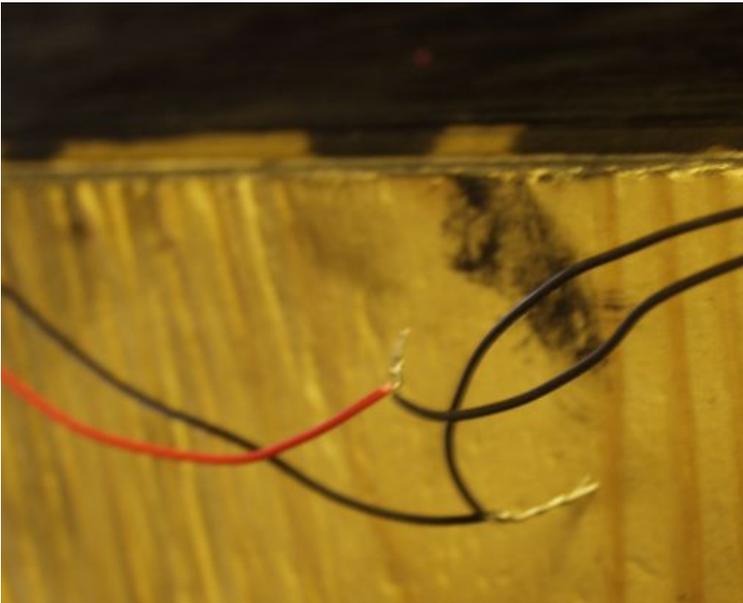
So I had two huge fans I wanted to use that really move air (and they have blue LEDs which I know totally helps) and as you know I left a space for one at the top and the bottom. So after checking the direction of airflow I pushed the first fan in the hole. Astonishingly, it was a perfect fit. I actually measured something right.



I have secured it with tape. Then I did the bottom one.



That done, I looked around for some wire to run the power to the lower fan. I thought I would need to strip down some Ethernet cable for the wire inside but no, I found a spool of wire! So I wired the fans together, black and black, red and red, so they will both be powered by the solar panel. I plan to have that in the middle, resting on top, so the wires meet up there. I taped the wires up the side nice and snug.



Don't freak out, the wire is black, that's why the black goes into the red here. I was very careful about it, I don't want to blow the fans out, I want to blow hot air out.

I plan to expose the solar panel to light very slowly and make sure the fans aren't burning out when it hits full sunlight. That would be bad too. But one small 12v panel,

driving two fans, and one of them five feet away? Shouldn't be a problem. *crosses fingers*

Now, I have a large fan but only a 3" diameter hole for the air to go through. What do to... I know, improvise!



I took some of the leftover insulation and built a box out of it. I cut a slope so it's more a pyramid shape then a box so the other end just fit the hose. Then I sealed it and threw some tape on it for good measure. You can see the inside



the hose is stuck a bit in there so hopefully the air will blow right through.

To hook it up to the panel, I just used the last of my sealer and more tape. Be careful to keep the hose from putting too much weight on the "adapter" as it's heavy, insulation wrecks easily, and it could easily tear off too.

Once it's out there I plan to wrap some insulation around the pipe to minimize heat loss on the journey through. I'll

probably throw a plastic garbage bag around it to keep it dry.

Now we hook up the panel.



I tied the red and black wires in to their respective wires from the fans and soldered them together. More tape covered them.

You can see the extra piece of board in this picture, I decided to mount the solar panel by nailing a thin board to the back, then screwing the solar panel into that. As you'll see below.

I tested the panel with a spare fan I had of the same size, it didn't spin until it was pretty sunny out, which was a concern.



With this done the solar engine was complete. I taped the wires to the box and dragged it outside on a very cold day, but the sun was mostly out. And... it worked! The fans spun and after a while hot air came out. I registered at least 100° coming out of the hole, but I was hoping for a bit more air volume. I'm surprised because those fans really blew air before, maybe they're not spinning fast enough? I don't know. Still, it's nice to see it in action, and it's very quiet, so noise coming into the house shouldn't be a problem. One thing I did notice, when it went into the shade, the top fan kept spinning while the bottom one did not. I suppose because it's farther away, the power only

went to the closer one. (though the LEDs lit up on the bottom one) That's good! Then at least I can still pull some heat out of it. The glass stayed cool so no heat loss there, and the outside pipe got just a little warm, so I'll wrap that in insulation once it's in place. It was about 40° outside, so after two hours a 60° rise in temperature is pretty good.

So here it is, the completed panel! Oh, I taped over the crack in the glass where the panes joined together, just to keep water from getting in there.

You can see in the picture the reflection in the glass the tree that's there. In fact there are two huge trees in the back yard. Normally I love them. How their shadows are going to effect things I'm not sure. There's only a ~2 hour gap where there's no shadow from the trees at all, which is when I did the test, so that 60° rise may be best case. Of course, this



heats just as well in the spring and the fall when temperatures are just "cool" at 50-60° and the heat is off, so doubling the temp would make the room the air comes into more cozy. Time will tell. That white stuff on the ground is snow, so it's still pretty cold, but the true test will be next year, Dec-Jan. Here's a shot from the other side.



See? Trees. Hummmmm....

Now we just have to get the heat into the house!

The plan there is to remove the window you see in the picture in the upper right corner, cut it (or replace the glass with some shorter glass) and pipe it in that way.

Which ultimately, didn't work. The glass was extra thick and couldn't be removed from the frame easily, so another solution had to be found. We took the fan out from above the stove and shoved it in there.



I then filled the gap with the pink insulation you see, and cut a piece of the shiny stuff to fit over it.



Here it is on the outside, sticking through the hole. Don't know if I'll just cover it or try to move it during "summer" those three weeks of "hot" weather we get.

Here it is, all strapped down and in position. The temperature in the breezeway was 40 degrees, and at 11:00 (about the most sun it will get during the day) the air coming out of the pipe was just a little higher then 80. Not bad, not bad.



I'll get a shorter rod to keep it from sliding down, and hopefully the rope will keep it from blowing anywhere. We don't have strong winds around here too much, but we do get them.



The last thing (finally) was just to wrap the pipe up.

So, any final thoughts? Just a few.

Use thinner wood for the box, it got too heavy, and the insulation will do a better job keeping the heat in then the wood will. Trade the short pieces of glass for longer pieces of plastic. Figure out a better way to keep the pipes up, but without a drill press, I'm not sure how I would make the pieces most people seem to that hold things together.

Also, one note related to the pipe, you need a way to cap it off or close it when it's dark. Even without the fans spinning, cold air comes through it into the house. I didn't think it would, but a gentle breeze must be enough to push some through. Right now I have a piece of aluminum foil and a rubber band, not an idea solution, but it works.

That's really about it. Now to enjoy the free hot air that comes out of it!

Good luck with your own, hope my mistakes help you!