

To make a Peltier-based saline chiller:

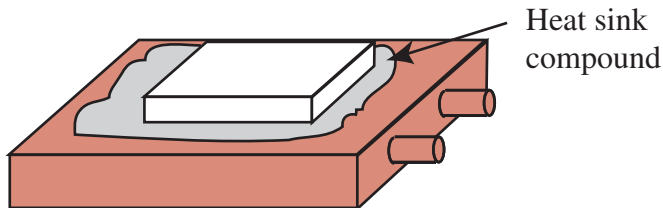
*Note: The ceramic Peltier is fragile, especially at the edges.*

Hot side:

Sand the copper plate very clean, smooth and shiny. You need good surface contact with the ceramic Peltier unit.

Apply a thin coat of heat sink compound, using a clean razor blade to make a very thin, clean layer. Heat sink should be smooth, not grainy.

Gently place ceramic Peltier on the heat sink compound coated copper plate. Squish it around a little as you press down gently (don't break the ceramic). This will squeeze out extra heat sink compound so your Peltier has good contact with the copper plate.

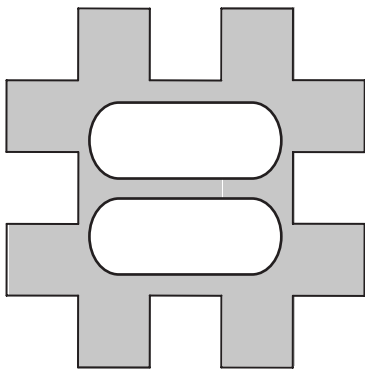


Cold side:

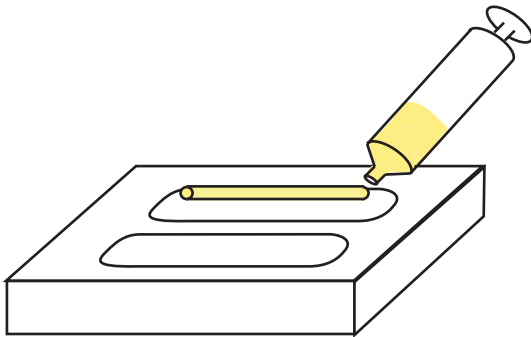
Clean the plastic top. This is where the saline will make contact, so you want it clean, but don't use soap.

Cut a square of parafilm of the same dimensions as the plastic Peltier holder.

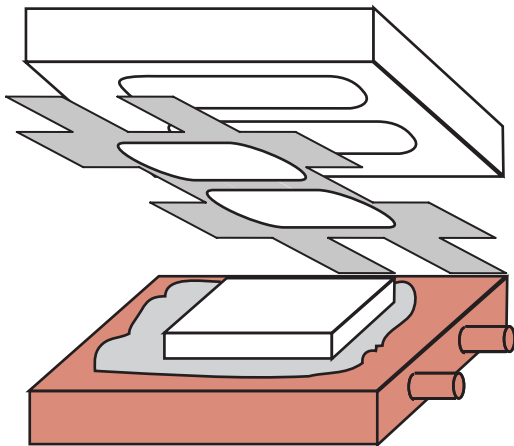
Now cut out parts so that when you screw the top on, the screws won't screw through the parafilm (this gunks up the screw threads). I put the parafilm sheet wax side down, on top of the plastic plate and with a pencil, rub on the paper side of the parafilm, near the screw holes, to highlight where the screw holes are (like a charcoal rubbing). Now you can cut squares for each screw hole. Even better (optional) is if you also rub with the pencil to outline where the saline wells are. You can carefully cut those sections out so you have direct contact between your saline and your peltier. Your sheet should look something like this:



Line the “wells” in the plastic top with Vaseline. This is to prevent the saline from leaking out the sides of the wells. You can spread on the Vaseline with a spatula, or even better, put some Vaseline (not with mineral oil) in a 5cc syringe and extrude it along the sides of the wells. When you’re done, the Vaseline should be uniform and be slightly higher than the sides of the wells:



Sandwich assembly:



*If you did not cut the well-holes out of the parafilm, follow this paragraph:* Apply a small amount of heat sink compound to the ceramic Peltier unit (as you did to the copper plate), using a clean razor blade to make a very thin, clean layer. Lay the parafilm, wax side down, on the heat sink compound. Orient the parafilm so that the sections removed for the screw holes will line up with the screw holes. Using a wooden stirrer stick, gently roll the parafilm as if you’re rolling out dough. This is to gently press the parafilm into the heat sink, for best contact.

*If you did cut the well-holes out of the parafilm, follow this paragraph:* Lay the parafilm, wax side down, on the ceramic Peltier unit. Orient the parafilm so that the sections removed for the screw holes will line up with the screw holes, and the well holes line up as well.

Line the plastic top, Vaseline side down, above the Peltier unit and lower the top onto the unit. Do not press hard.

Slide the screws into their slots (don't tighten yet).

Gently tighten the screws in an alternating fashion: Partially screw in the first screw, just until the screw head is pressing on the plastic. Choose the screw directly opposite and partially tighten it the same way. Continue to do this for all screws, alternating between screws on opposite sides of the Peltier. Using the same alternating pattern, gently tighten the screws. This alternating pattern ensures even compression. The final tightening should be only finger-tight, using the tips of your fingers. If you screw too tight, you risk breaking the Peltier!

You should be able to see the Vaseline wells through the top. Verify that there are no gaps in the Vaseline wells. If there are, the Peltier will probably leak.

Anne-Elise Tobin

Lamont Tang

Adam Taylor

*March 9, 2007*