

Making PCBs with Sharpie Markers

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Step 1: Design your circuit you want to create on a paper—a design on paper is easier to modify than a design on copper. Make sure all of the traces are in the right position and that the component pads are also in the correct positions.

Step 2: Locate a piece of copper board big enough for your circuit. It is generally a good idea to find one that will be a little bit too big for your design. That way you can draw your traces off to one side to allow space for the board to fit into the “bubble tray.” Otherwise during the etching process you will need to rotate the board a couple of times to get all of the unwanted copper off. Take a piece of steel wool and buff your board till it is good and shiny.

Step 3: Draw your circuit on the board, be careful to not touch where you have just buffed—the oils from your hands will resist the acid during the etching. Let it dry a minute or so and go back over your traces again. You may repeat this as many times as you would like, generally three times will do.

Step 4: Ask a lab assistant to “cook” your board. If the lab assistant does not know how refer him to *How to cook a board at BYU-I*.



Tips:

1. Whenever possible try to use a Sharpie single-ended, fine-point marker. In my experience these have the best results.
2. Again whenever possible try and get your board cooked within the same day that you drew it on the copper. The longer it sits the drier the ink becomes and the less resistant. If the ink gets too dry it will flake off prematurely in the etching process and your trace will be compromised.
3. Using Sharpies is a great way to introduce PCB prototyping, but there are better ways to make PCBs. With this said your sharpie board may require some trace fixing after the etching process. This can be easily accomplished by using the clipped-off leads of a resistor. Simply solder one end of the lead to where the copper is good and then solder the other end to where the copper is good again—essentially building a bridge over the bad copper trace. Bad traces can be located by setting the DMM to the 200Ω setting and using probes to check from point *A* to point *B*. This will produce a beep if good connectivity from point *A* to point *B* exists.