

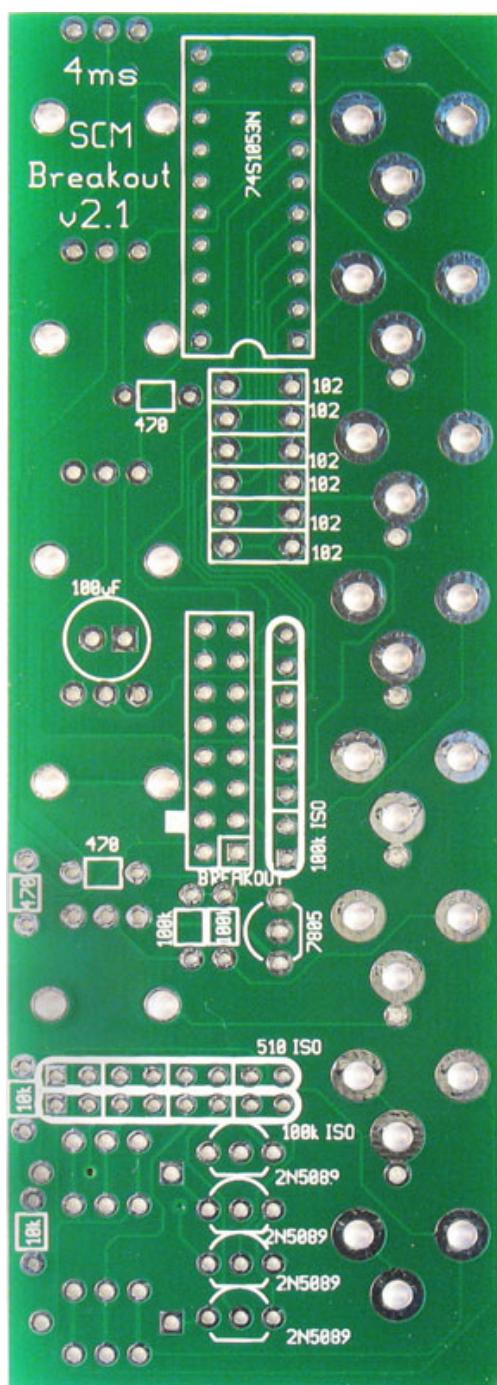
4ms SCM Breakout

Kit Builder's Guide for PCB v2.1

4mspedals.com

Shuffling Clock Multiplier Breakout

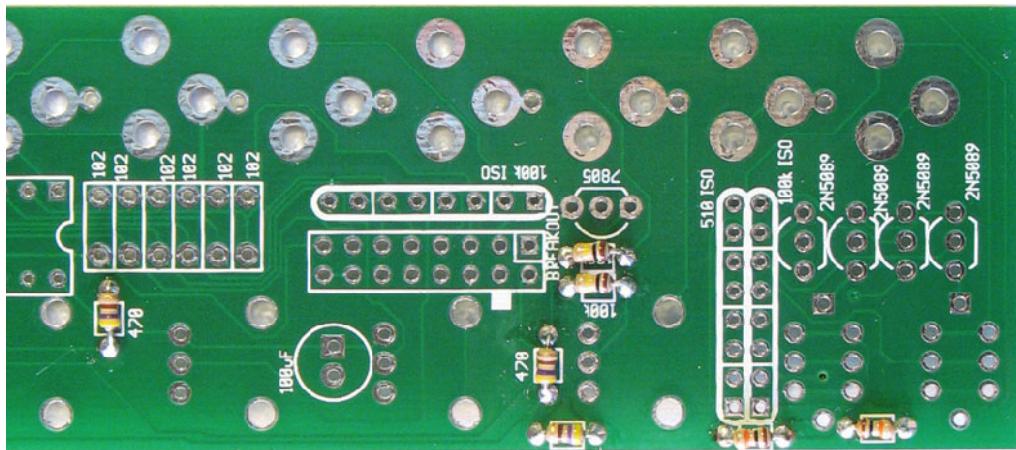
This guide is for building a Shuffling Clock Multiplier Breakout module (SCMBO) version 2.1 from the 4ms kit. The SCMBO requires an SCM to operate, as it connects directly to the SCM board to add features to the SCM. For more information, you can download the SCMBO manual here: <http://4mspedals.com/scm.php>



Step 1: Resistors

Insert and solder the 7 resistors. They are bi-directional which means they can go in either way. After soldering, snip off the leads using flush-cutters.

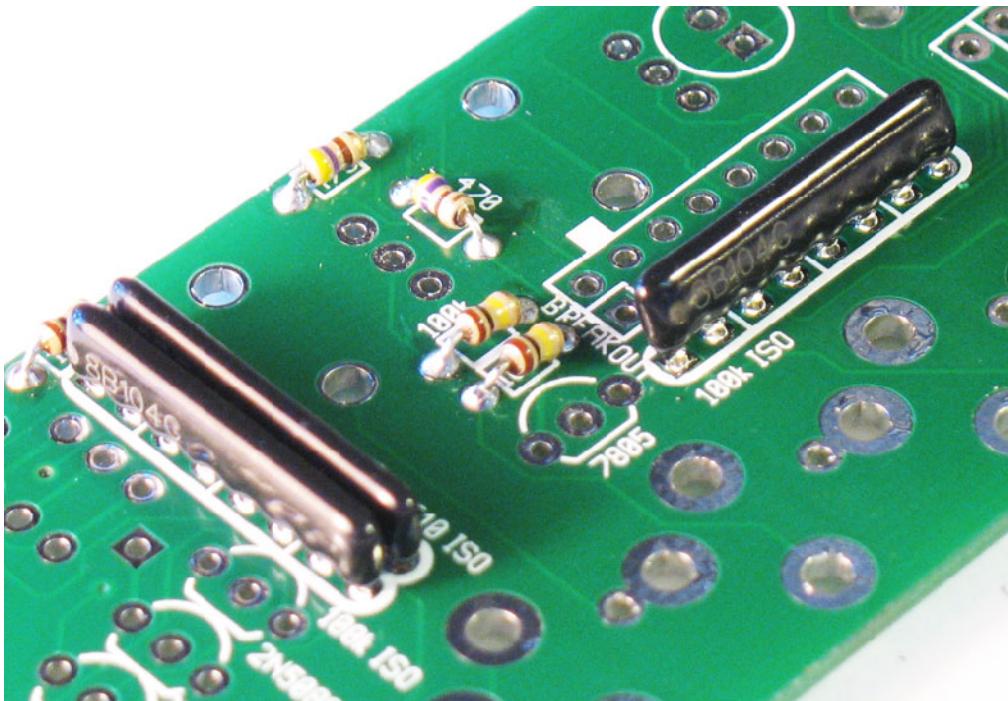
- 470 ohm resistors x 3 (Yellow Purple Brown Gold)
- 100k ohm resistors x 2 (Brown Black Yellow Gold)
- 10k resistor x 2 (Brown Black Orange Gold)



Step 2: Resistor Arrays

Insert and solder the 3 resistor arrays. The arrays are all isolated, which means they are bi-directional and can be inserted either way.

- 100k isolated array, 8-pins x 2 (labeled 8B104G)
- 510 isolated array, 8-pins x 1 (labeled 8B511G, or yellow and labeled 8X-2-511LF)

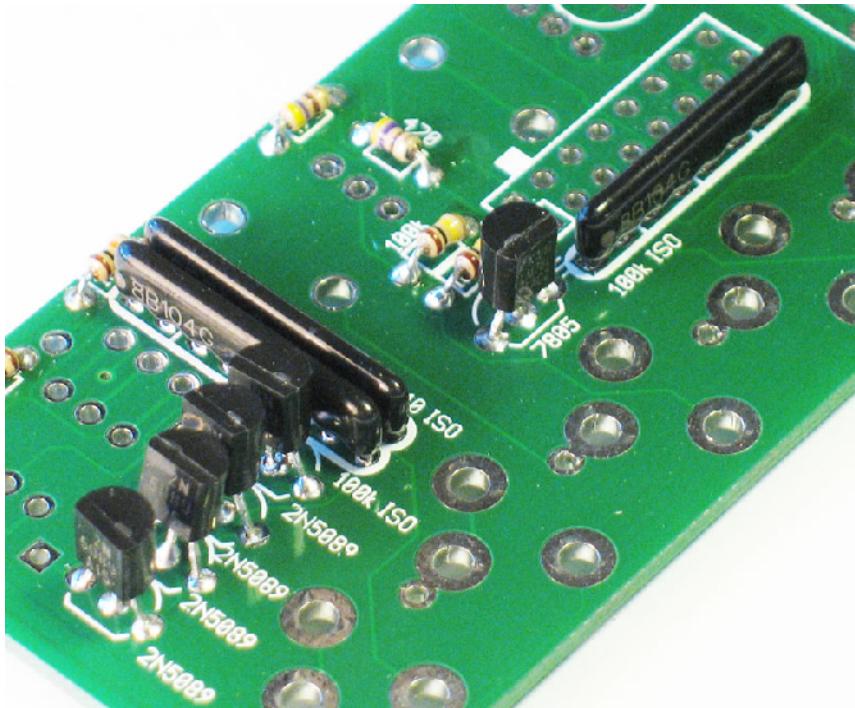


Step 3: Transistors and 7805

Insert the four 2N5089 transistors. They are orientated so that the curved and flat faces match the curved and straight lines on the PCB (the flat sides face the bottom of the PCB).

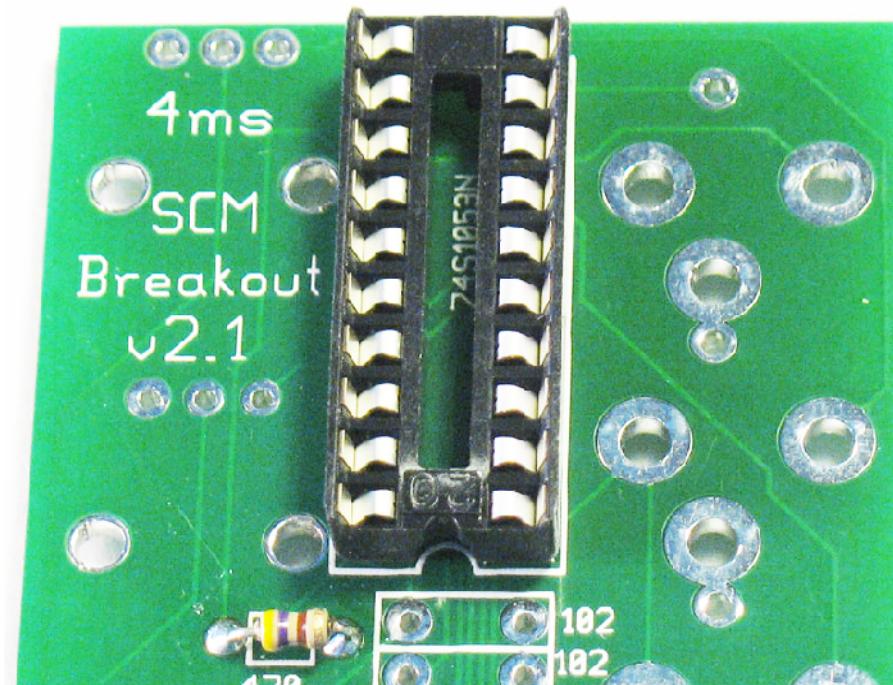
Similarly, insert and solder the 7805 voltage regulator.

- 2N5089 x 4
- 7805 x 1 (*labeled LM78L05*)



Step 4: IC socket

Insert and solder the IC socket (20-pin DIP). Make sure the notch in the socket faces the bottom of the board (lines up with notch drawn on the PCB).



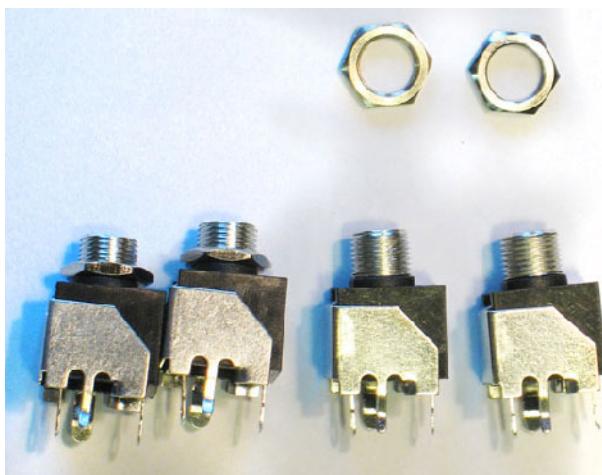
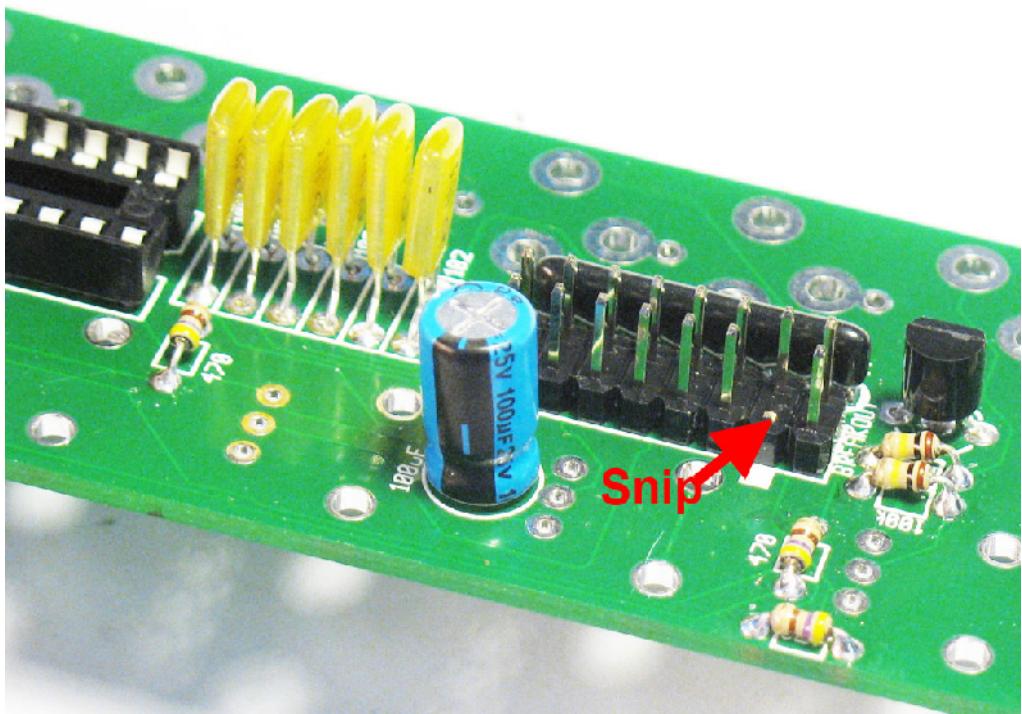
Step 5: Capacitors and header pin

Insert and solder the 6 yellow 1000pF caps and the 100uF cap. **The longer lead of the 100uF cap is the positive and it must go in the square hole:** the shorter lead is the negative side and is marked by a broad stripe on the side of the body of the cap (it goes in the round hole). In case you can't tell, the round hole is closer to the edge of the board than the square hole.

Be careful: it could damage your module if you put the 100uF in backwards!!

Snip the excess leads. Insert and solder the 16-pin header. Snip one of the pins off the header, as shown in photo (the pin to snip is marked with a white square on the PCB)

- 1000pF x 6 (labeled .001, also known as "102")
- 100uF x 1 (may be blue with a black stripe, or may be dark blue/black with a grayish stripe)
- 16-pin male header (snip one pin)



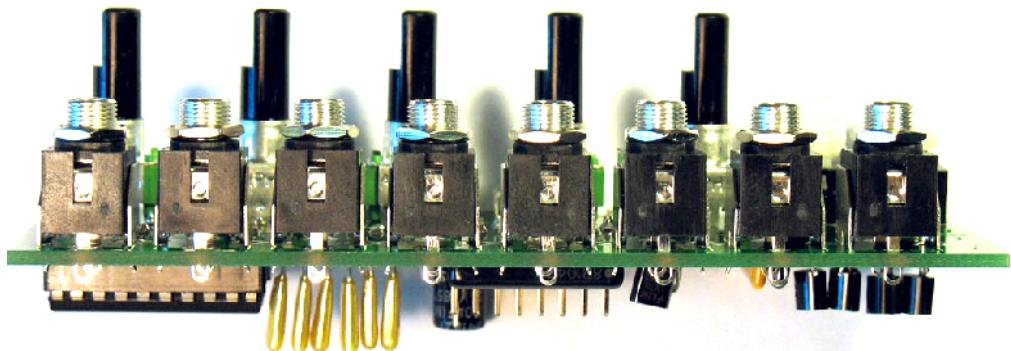
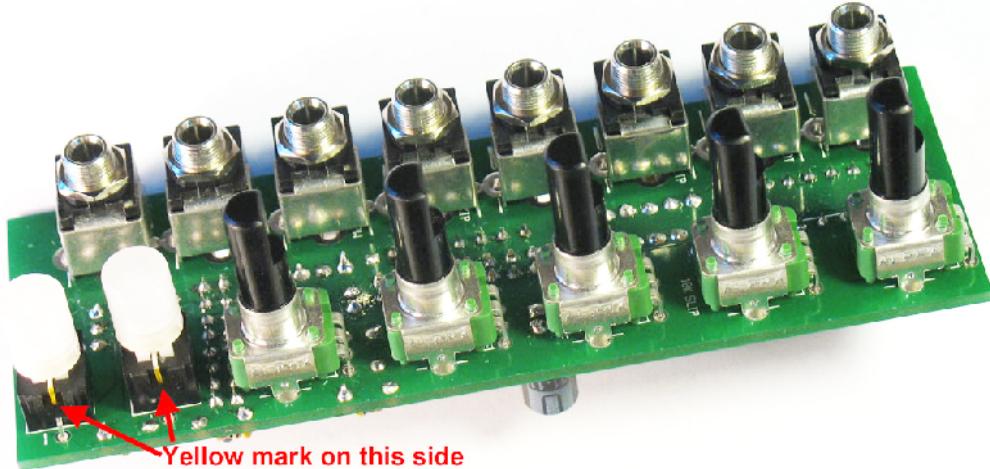
Step 6: Nuts on jacks

Install a hex nut on each jack. Finger-tighten the nut all the way down. These nuts will be under the panel, and in a later step we will put a second nut over the panel.

Step 7: Mount jacks, pots, and buttons

Insert the 5 pots, 8 jacks, and 2 LED buttons. **DO NOT SOLDER YET!!**

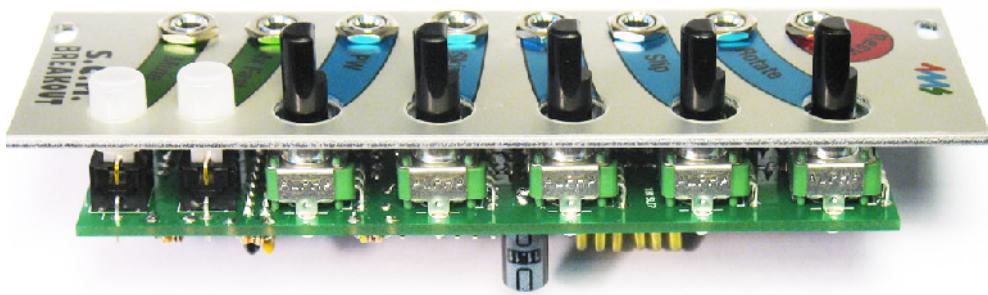
The pots and jacks will only fit in one way, so snap them down firmly. The LED buttons must be inserted with the yellow mark towards the edge of the board (see photo)



Double-check that all the pots, jacks, and LED buttons are square and flush to the PCB. The LED buttons especially will tend to fall out, so keep an eye on them.

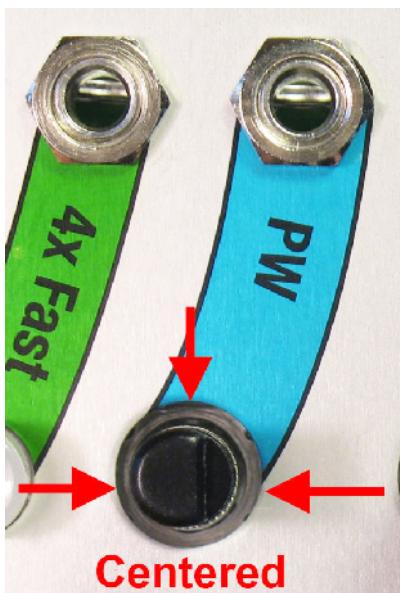
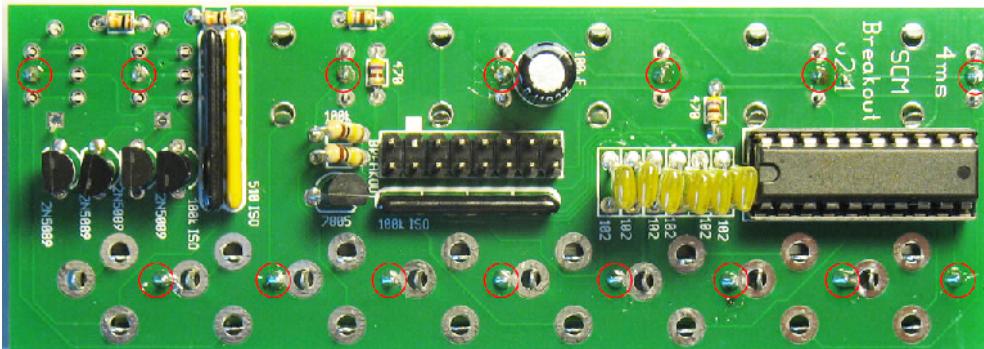
Step 8: Panel

Lower the panel over the pot shafts, then the LED button heads, and finally onto the jack noses. Holding it in place with one hand, put a nut on a couple of the jacks and finger-tighten. Now install the rest of the nuts and tighten down fully using a socket or wrench (careful not to scratch the panel!)



Step 9: Tack solder

Check to make sure everything is straight and level, and then flip the unit over and tack-solder one pin of each pot/jack/button (see circled pins in the photo).



Step 10: Center the pots, and check the buttons

Flip it over so the panel is up, and gently center each pot shaft within the hole in the panel. They should stay in place where you set them.

While you're at it, check that the LED buttons are flush to the PCB. If one is sticking up, or if the button head rubs when you push it, heat up the one solder pad you did while pressing firmly down on the button head.

Step 11: Final solder

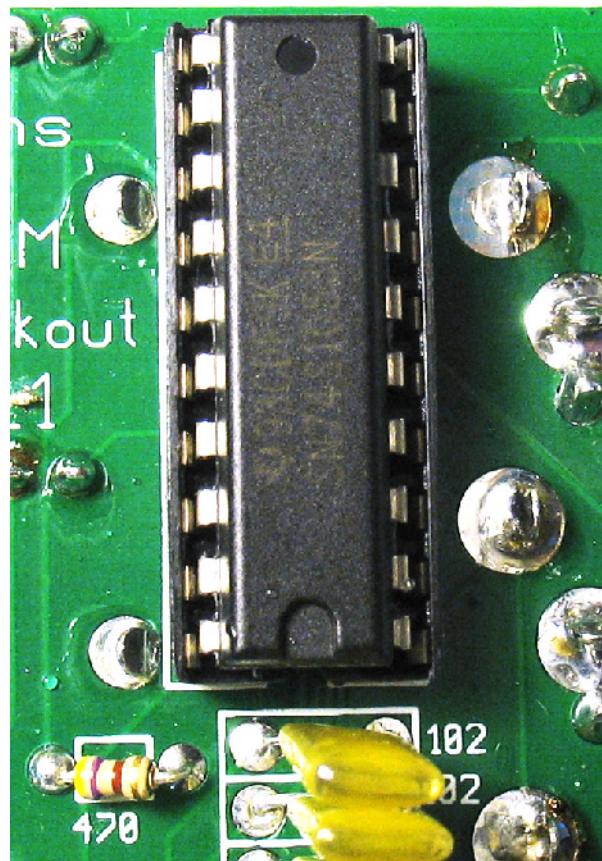
When you're satisfied all 15 of the controls are centered and flush to the board, solder the remaining pads on each.

Note the ground pads on the jacks are very close to their neighbor's ground pads. This is intentional, and the pads should be soldered together



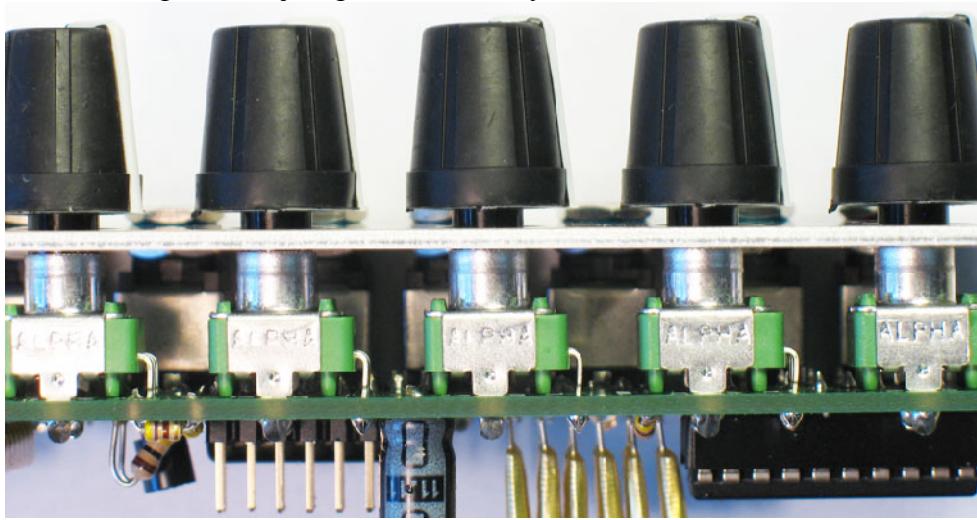
Step 12: Insert chip

Insert the 74S1053 chip into the 20-pin socket. You may want to bend the pins inward slightly so that it fits easily into the socket. **Make sure the notch is pointed downward, matching the socket and the silk-screen on the PCB.**



Step 13: Knobs

Install the 5 knobs on the pots. They are to be pressed firmly straight down (not at an angle, or you could damage the pot shaft). Each one will stop before it touches the panel, so just push all the way down.



Step 14: Done!

Remove the 6 jumpers from your SCM and connect to the breakout with the ribbon cable. Test all the features, using the SCMBO manual as a guide (<http://4mspedals.com/scm.php>)

