DIY BUILD INSTRUCTIONS – PLITKA TRACE (MINIATURE OSCILLOSCOPE)

First off, thank you for your purchase of the PLITKA TRACE DIY Kit. If you are a DIY Synth novice, you have selected a great module to advance your skills. It is not as simple a circuit as the DISPRS or DIÔD OR, but still very doable. If you have built our BTN MASHR, you can build this one. If you are a veteran (or, as we like to say at Tsyklon Labs - "Hero of Synthesizer DIY"), then this kit will be super fun.

First, let's make sure that you have everything on hand before we heat up the iron. The tools you will need are as follows:

- Soldering Iron and Solder
- Wire Cutters
- Wire Strippers
- Needle Nose Pliers
- Knurled Nut Tool (Xicon 382-0006) or Small Pliers for tightening 3.5mm knurled nuts
- 2.5mm Allen Key
- Adjustable Wrench or 5.5mm Nut Driver
- Lead Bending/Forming Tool (I like the Production Devices Model 801)

The following components have been provided in the PLITKA TRACE DIY Kit:

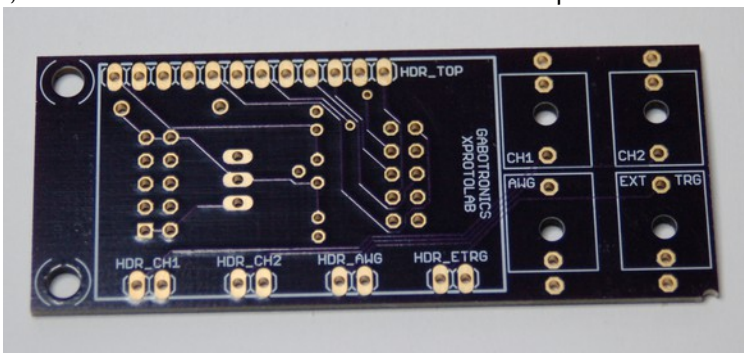
Quantity	Part Description
1	Tsyklon Labs TRACE PCB
1	Tsyklon Labs TRACE Front Panel
2	M3 x 18mm Metric Black-Oxide Screw
2	M3 Locking Nut
2	M3 x 10mm Nylon Spacers
1	Futaba 3 wire servo cable with keyed J connector

Also, you will need the following parts to finish your build:

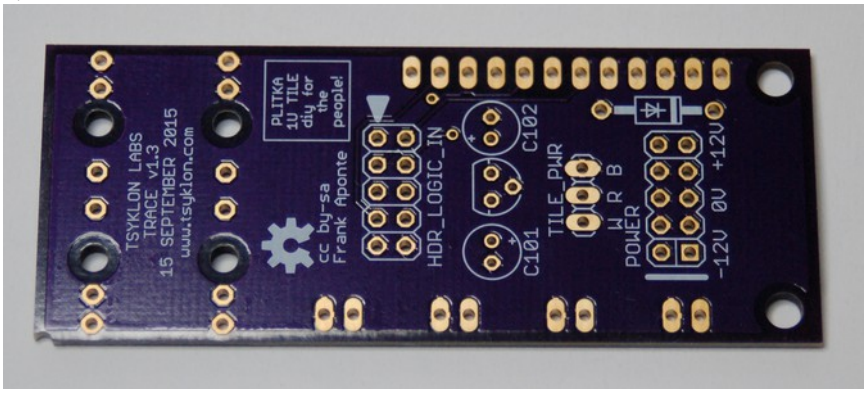
Qty	Part Description	PCB Component ID	Part Number	Vendor
1	0.33uF 50V Electrolytic Capacitor	C101	647-UFG1HR33MDM	Mouser
1	0.15uF 50V Electrolytic Capacitor	C102	647-UKL1HR15KDDANA	Mouser
1	Reverse Power Protection Diode	D101	512-IN4001	Mouser
1	5VDC Regulator, 100mA, TO-92	REG_5V	512-LM78L05ACZ	Mouser
2	10-pin, 2x5, 2.54mm Pitch Pin Hdr	POWER, HDR_LOGIC_IN	571-5-146256-5	Mouser
1	Mini Oscilloscope	Xprotolab	Xprotolab	Gabotronics.com
4	3.5mm Jacks	CH1, CH2, EXT_TRG, AWG	3.5mm Inline Jacks	Erthenvar
4	3.5mm Nuts	CH1, CH2, EXT_TRG, AWG	3.5mm Knurled Nuts	Erthenvar

Now that we have that out of the way, let us start the module build!

1) Take a look at the PCB and Front Panel. This is the top/front side of each:



2) And the reverse/back side of the PCB:

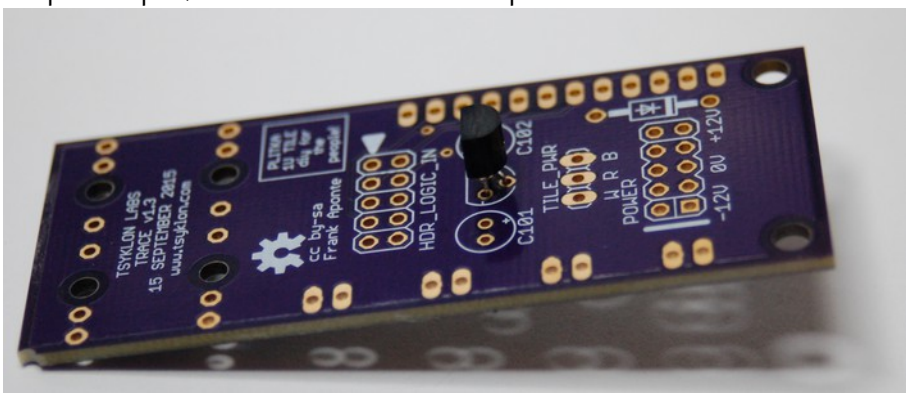


3) Start by painting the front of the Front Panel (if you want to). Smearing in some acrylic paint with a stiff brush works well. LEAVE the protective tape on so that there will be less clean up later. If you haven't done this before, please watch this video (65 seconds well invested). Better information in the video than I can convey here with words:

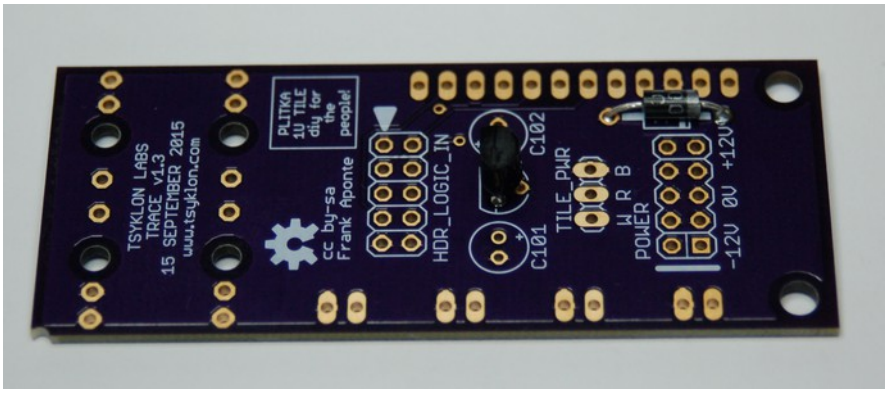
https://vimeo.com/54711135

4) Once you have painted the panel, and the paint has dried, peel off the protective tape (again, good example in the video). Your panel should look something like this. You may need to use a little bit of isopropyl alcohol and a piece of paper towel to clean up the side edges of the panel.

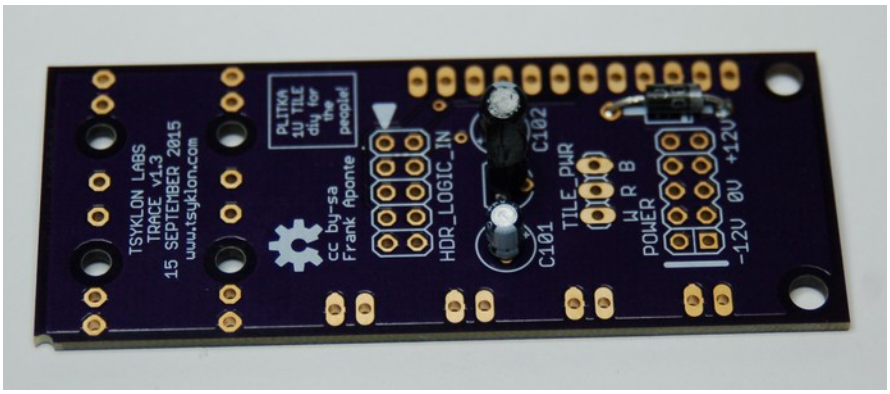
5) Start stuffing the PCB with the 5VDC Voltage Regulator IC. It looks like a small transistor with three legs. Insert it through the Back side of the PCB keeping the flat part of the IC lined up with the flat part of the PCB silkscreen as shown below. When soldering, get enough heat on the pin you are soldering to make a good solder joint without overdoing the heat to the component. It is a good idea to give the IC a few minutes to cool down between pins. Another option is to combine this step with the next few steps – this will let you solder one pin on the IC, then solder one pin on each of the diode and capacitors, then solder another IC pin, then the rest of the other component's pins, then come back for the last IC pin.



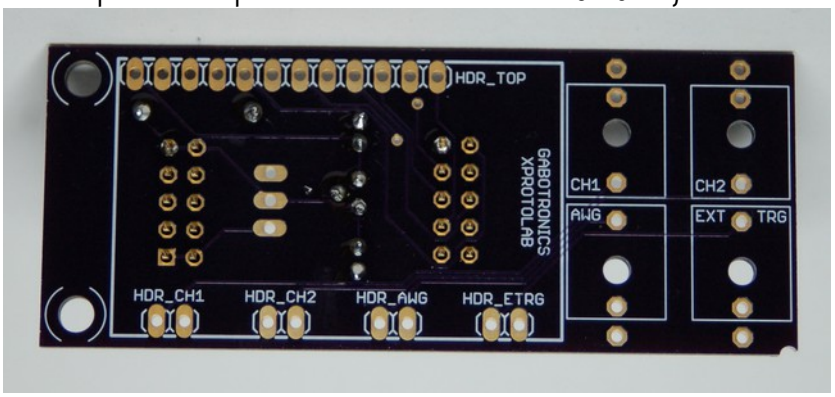
6) Next, install the reverse voltage protection Diode D101. Be sure to line up the silver stripe on the diode's Cathode with the silver stripe on the PCB silkscreen.



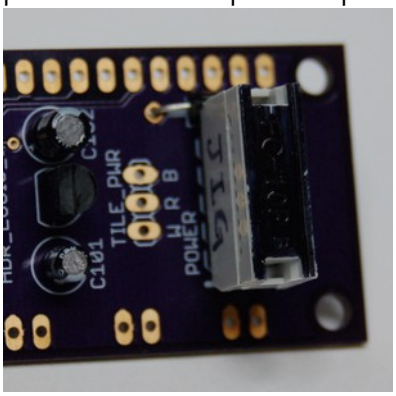
7) Install capacitors C101 and C102 into the PCB and solder. This style of capacitor, an Aluminum Electrolytic Capacitor, IS a polarized device - which means that its installation orientation DOES matter. Be sure to install the negative pin opposite the + marking on the PCB silkscreen.

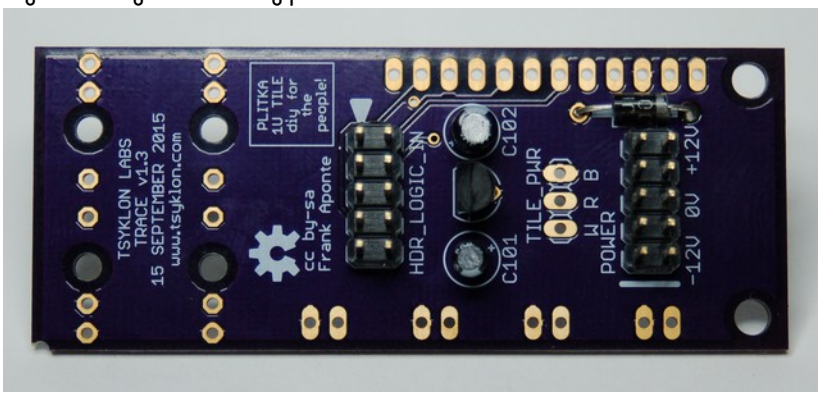


8) Once all of the power supply components have been installed, the next step is to install out power and expansion connections. Start by inserting each of the 2x5 pin headers into the back side of the PCB and soldering one pin (on the front side of the PCB). Once tacked in, flip the PCB over to make sure that the pin header is flush against the back of the PCB. If not, heat up the pin that you have soldered and work the pin header in place so that it is flush with the PCB. Once you have this set, you are ready to solder the rest of the pins.

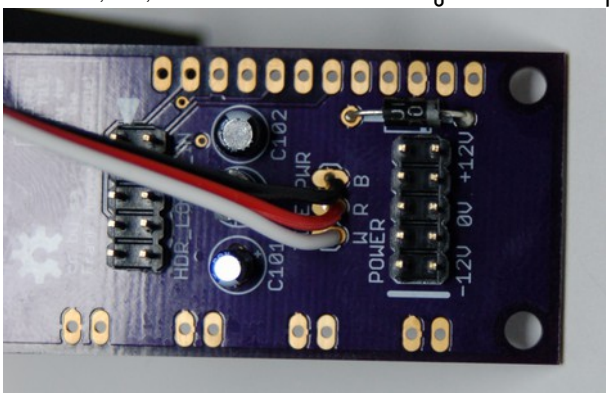


9) Solder the rest of the pins on both 2x5 pin headers. Some headers require more than a little heat to make the solder flow. This heat can soften the plastic that holds the header pins together and aligned. For this reason, I like to take a 2x5 ribbon cable connector and place it on the header pins to keep them aligned during the soldering process.





10) If you are using the PulpLogic style power cable, then strip 1/4" (6mm) of the insulation off each of the three wires (peeling the three wires apart about half an inch from the end makes the wires easier to strip, too). Insert the wires into the 3 pads labeled TILE_PWR. First, the White wire (-12VDC) goes into the bottom pad labelled "W". Next, the Red wire (+12VDC) goes into the middle pad marked "R". Lastly, the Black wire (0VDC) goes into the top pad labelled "B". I like to use a small piece of tape to holder the Futaba cable in place while I solder it. I find it easier to insert all three wires into the PCB, then solder them in. Be sure to inspect the you don't have any whiskers from the black, red, and white wires are shorting from their own pad to the one next to it.

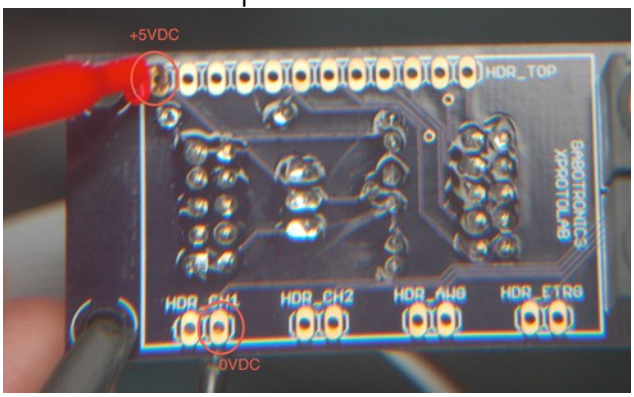


The fully assembled modules from Tsyklon Labs have both power connectors installed, but this is DIY, so install what you need/want.

We are getting close to the end, but the next few steps are important, so maybe this is a good time to take a break for a few minutes – We will see you on the next page!

I1) At this point, it is important to check that the power supply circuit is working as designed so that you do not damage the Xprotolab module. Mount the PCB into your helping hands, vice, or something non-conductive that will hold the PCB in place for test, while powered up. Next connect the PCB to a Eurorack Power supply if you have one near your workbench. If you only have a bench-top power supply available and set it to +12VDC. This module makes its own 5VDC (as we will soon test) and it doesn't use -12VDC, so a single channel bench-top power supply set to +12VDC will suffice.

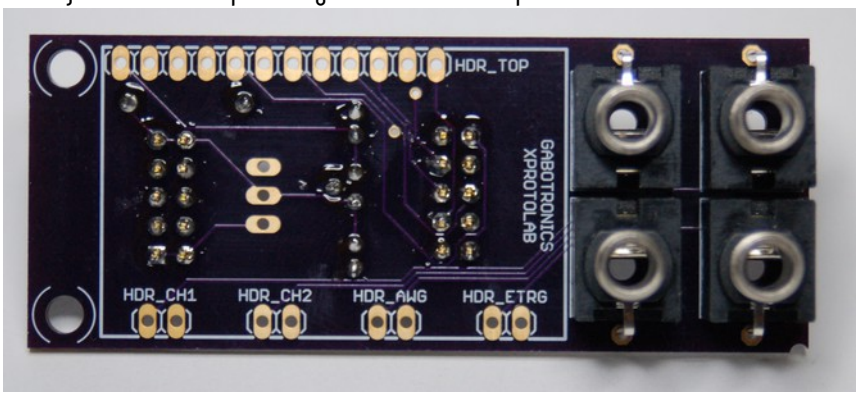
I2) Once your TRACE PCB is set up and powered, turn on your voltmeter and set it to VDC. Connect the Red and Black leads to the terminals shown in the picture below.



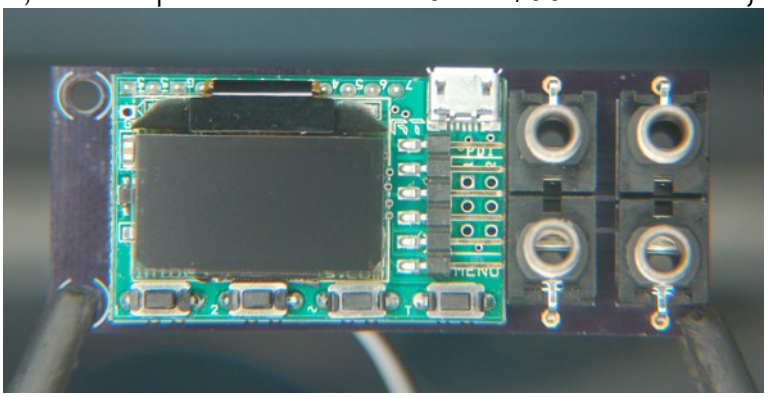
Then, check your voltmeter reading. You should read somewhere close to 5VDC. As shown in the picture below, 4.98VDC is close enough for rocket science, and synthie stuff.

If your on-board power supply rings true, you are ready to proceed. If not, double check your solder joints, and check your work for shorts or open connections.

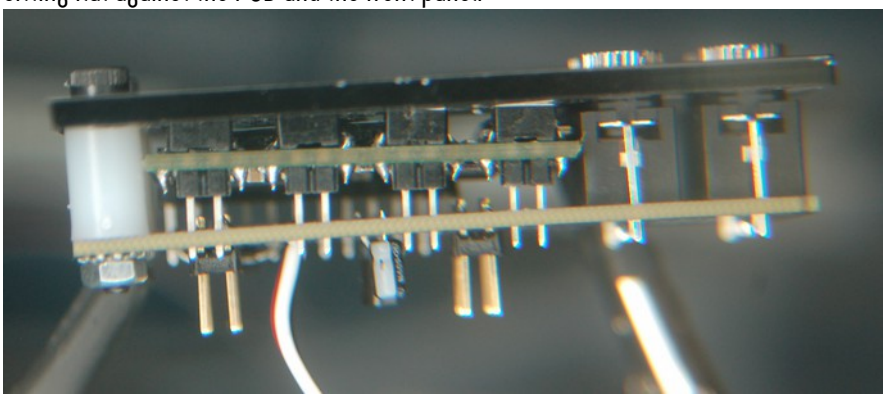
Lucky Step 13) Once you have completed the Power Supply test, disconnect the TRACE PCB from your power supply and install the four 3.5mm I/O Jacks – DO NOT solder the jacks at this time. Note, the ground pin for the jacks is the one outside of the molded plastic part of the jack. This is the pin that goes towards the top and bottom of the PCB.

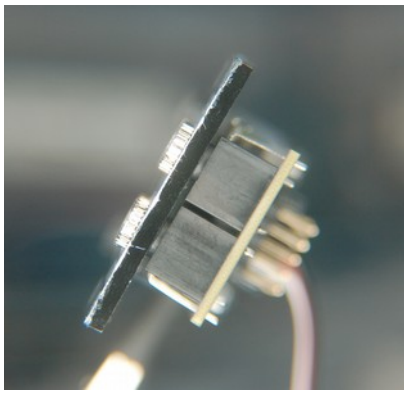


14) Insert the Xprotolab module into the PCB. The I/O Jacks should be to your right with the Xprotolab buttons to the bottom.

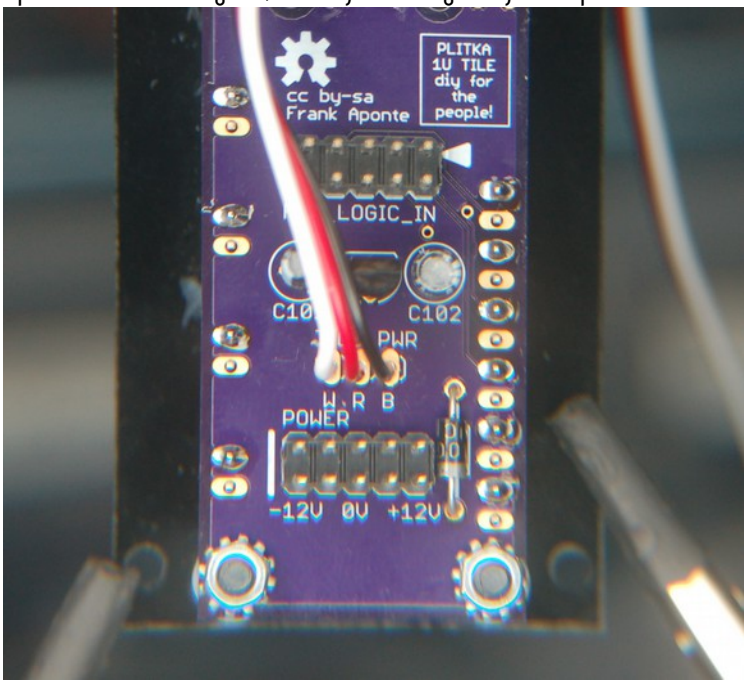


15) Great, so all of the inside parts of the TRACE module are inside. The next step is to mount the front panel and then install the jack nuts. Once you have front panel held in place with the jack nuts, insert one of the screws through front panel, through the spacer, then through the PCB. Thread the locknut onto the portion of the screw sticking through the PCB. Repeat for the other screw. Tighten the nuts until they are snug - no need to go crazy tight on them. If you are using pliers instead of a Knurled Nut Tool, be careful not to scratch the front panel. Don't worry about alignment of the Xprotolab module yet, we will work on that next. Also, be sure that the I/O Jacks are sitting flat against the PCB and the front panel.

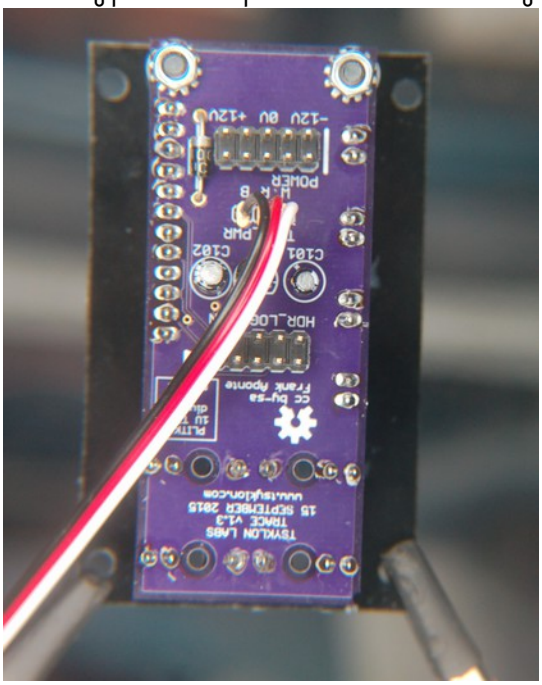




I6) The first step to soldering the rest of the TRACE module is to start with the Xprotolab module. With everything assembled, you can wiggle the Xprotolab module into place. Press the Xprotolab module against the back of the front panel until the the buttons are flush with the front of the front panel and the USB jack on the Xprotolab is flush against the back of the front panel. Once you have the Xprotolab module aligned, start by soldering every other pin on both sets of headers.



I7) Let the Xprotolab module cool off by soldering the pins for the I/O Jacks. Once you have finished the I/O Jacks, return to solder the remaining pins on the Xprotolab module. Do not forget to clean up the flux - if that is what you are into.

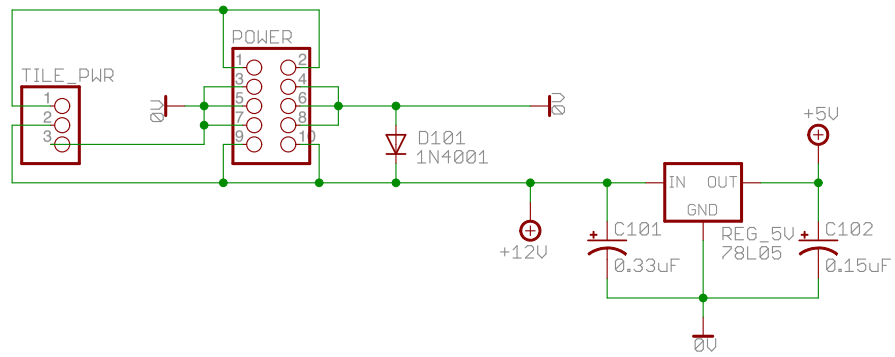


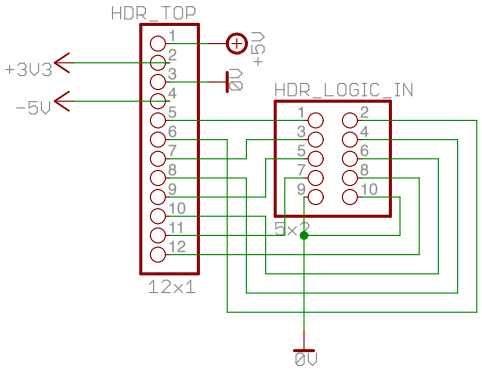
18) Now that everything has been soldered, finish checking that the lock nuts and jack nuts are snug. Once you have confirmed that, power up the TRACE module and we will complete our final test. Start by patching a cable between the AWG output and the CHI input. You should see a waveform appear on the top trace. Next move the patch cable from CHI to CH2 and you should see a waveform appear on the bottom trace. You may need to use buttons K2 and K3 to zoom in on the time axis so that you can see the waveforms clearly.

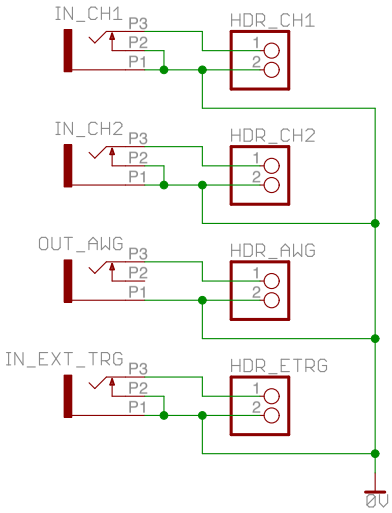
19) Don't forget to download the manual for the Xprotolab oscilloscope module from Gabotronics website:

http://www.gabotronics.com/download/xscopes/xscopes-manual.pdf

20) That is it! Job well done, Udarnik! Enjoy the fruit of your labors - get patching!







TSYKLON LABS

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