

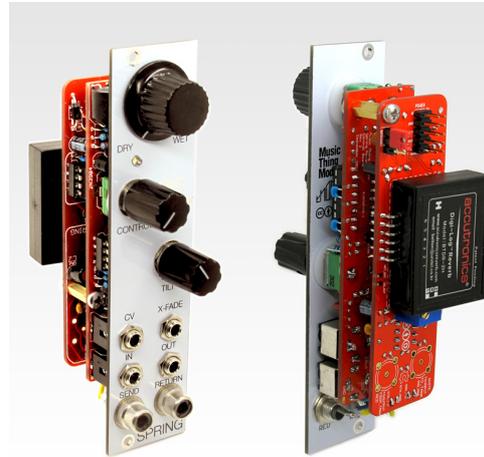


## OVERVIEW

For the most recent version of this document please visit <http://thonk.co.uk/documents/springreverb/>

For all technical support please visit <http://bit.ly/196uq9j> on Muffwiggler.

This document must be read in conjunction with the Music Thing Modular user manual <http://bit.ly/197HL0U>



All Thonk kits are sold under our standard Terms and Conditions - <http://www.thonk.co.uk/faq/>

## DIY INSTRUCTIONS

This document gives detailed instructions that assume you have purchased a complete kit from [www.thonk.co.uk](http://www.thonk.co.uk). It also assumes no previous knowledge of electronics. To learn to solder try [http://youtu.be/l\\_NU2ruzyc4](http://youtu.be/l_NU2ruzyc4) and the [Adafruit guide to excellent soldering](http://bit.ly/1177tF4) – <http://bit.ly/1177tF4>

**Watch and understand that whole YouTube video! If you're not achieving the results shown in the video then you need to buy new tools or seek advice.**

**You will not end up with a working module otherwise.**

## TOOLS REQUIRED

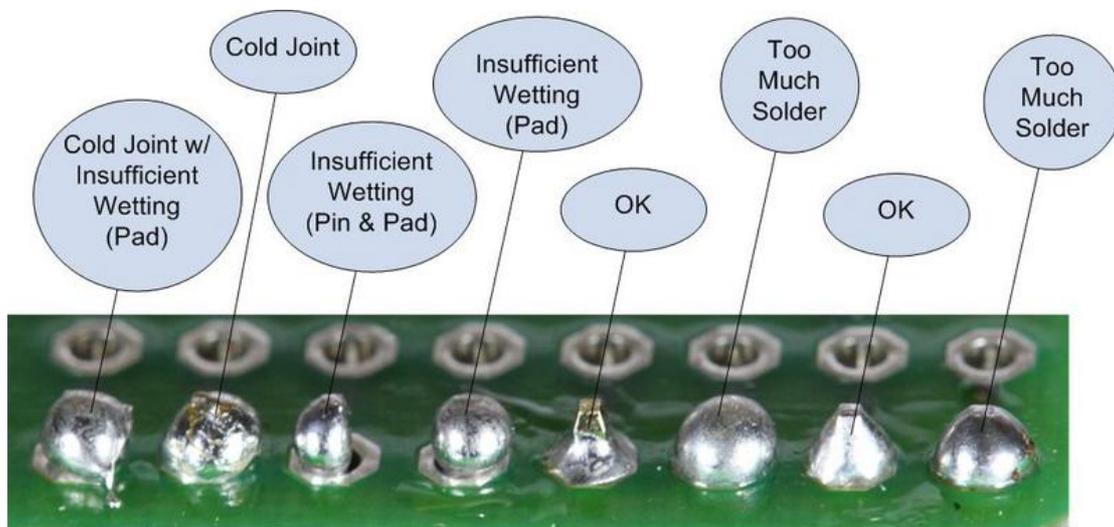
Soldering iron, snipe nose pliers, wire strippers, small flat head screwdriver and diagonal cutters AKA snips AKA side-cutters. A Digital Multimeter is always helpful for checking for bad solder joints and continuity. Thonk sell a range of inexpensive tools here - <http://bit.ly/1jxqF3n>



## SOLDER JOINTS

Your solder joints should look like those shown as 'OK' below, they should have that neat conical shape on **BOTH sides of the PCB**. If they don't look the same on both sides then stop! Work out why from the soldering guides linked and don't continue until you are getting those results.

This isn't just OCD talking, you are very likely to end up with a destroyed, damaged or defective unit if you're not hitting that standard.



This photo is from the **Adafruit guide to excellent soldering** - <http://bit.ly/1jxqF3n> and is reproduced under an Attribution-Sharealike creative commons license - <http://creativecommons.org/licenses/by-sa/3.0/>



## SPRING REVERB BUILD INSTRUCTIONS

1.

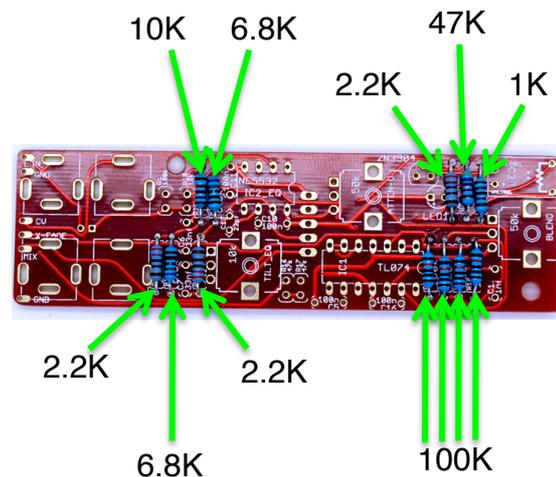
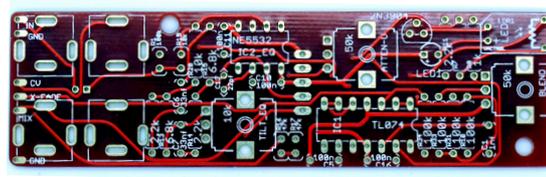
Start by emptying the **Resistors and Capacitors** bag into one bowl or container and the **Main Bag** into another. This makes it much easier to pick parts as you need them and you're less likely to lose anything.

2.

Start with the front PCB as pictured.

The first job is to solder all the resistors that are positioned horizontally. These are:

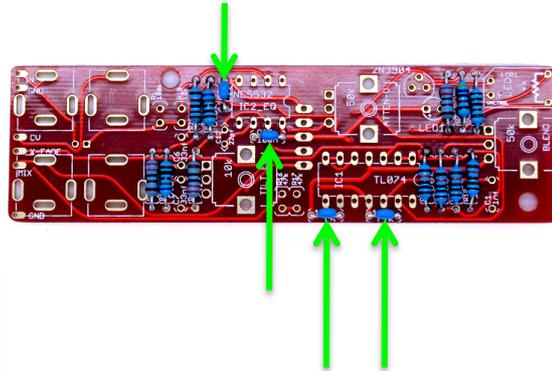
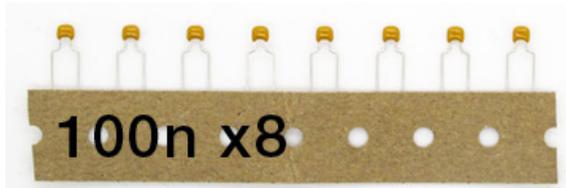
- 1k x1
- 2.2k x3
- 6.8k x2
- 10k x1
- 47K x1 (R7 – value not marked)
- 100k x4





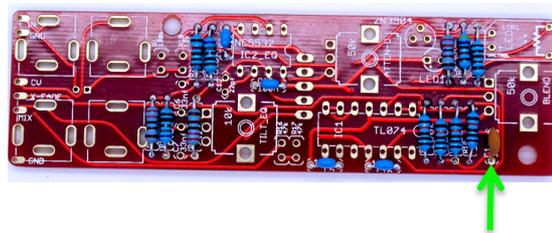
3.

Next solder the four 100n capacitors. They come in a strip of 8 parts and are Dark Yellow in colour rather than blue as shown in the PCB image.



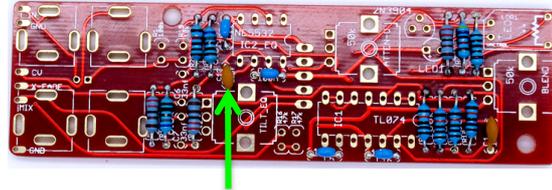
4.

Next solder the single 1nf capacitor in the position shown.



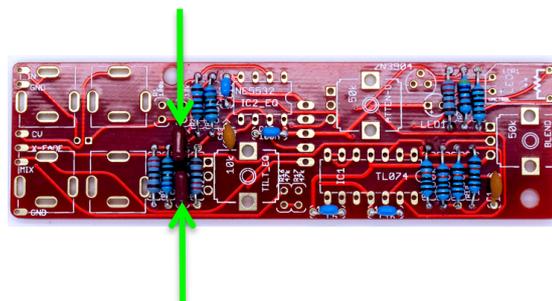
5.

Next solder the single 22pf capacitor in the position shown.



6.

Next solder the two large red 33nf capacitors in the positions shown.



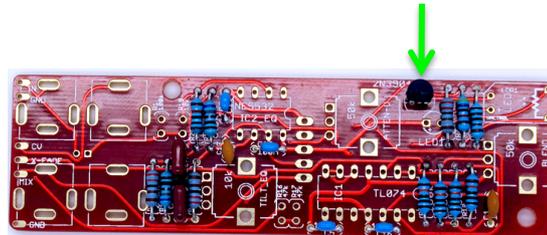
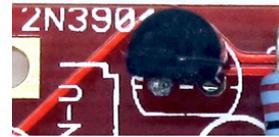


7.

Take the protective pink ESD bag with yellow sticker out of the main bag and find the 2N3904 transistor.

The middle lead needs to be bent slightly towards the semi-circular face of the transistor body, the component should sit in a 'tripod' configuration on the three leads.

**NOTE!** Do not solder the 78L05 voltage regulator into this position! Apart from the text marking it looks identical.



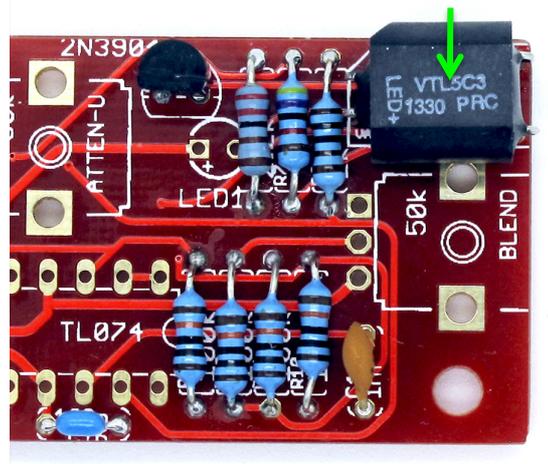
**NOTE!** Do not heat this part excessively or you will damage it, you should be aiming to solder quickly and neatly.

8.

Next take the Vactrol from the Main Bag and solder into place as shown. The orientation of the 4 pins is vital.

The Vactrol should be completely flat to the top surface of the PCB and sit within the boundary of the PCB.

**NOTE!** Do not heat this part excessively or you will damage it, you should be aiming to solder quickly and neatly.



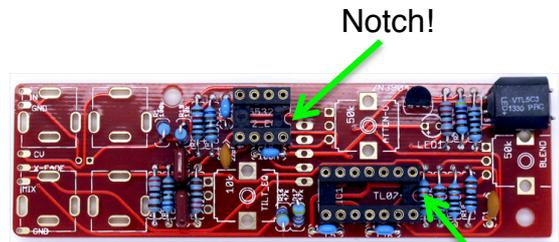
9.

If you use organic solder that can be washed with water then now is the perfect time to do that. Make sure you leave your PCB to dry in a warm place for at least 30 minutes before progressing further.



10.

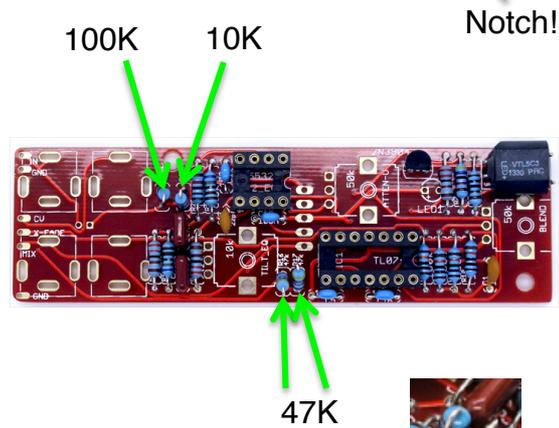
Next you should solder in the 8 pin and 14 pin IC sockets. Make sure these sockets are soldered flush and perpendicular to the PCB surface.



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Then solder the 4 remaining vertically positioned resistors:

- 10K x1
- 47K x2
- 100K x1

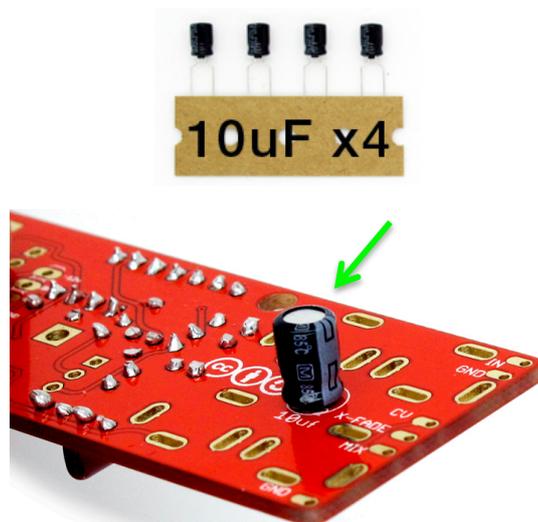


Solder each pair of vertical resistors so they are in a mirrored configuration. This removes the chance of them hitting each other and shorting.

11.

Now flip the board over and solder the one of the four 10uF Electrolytic Capacitors into place.

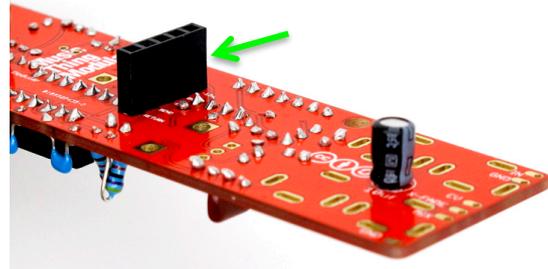
**NOTE!** Orientation is vital on this part. The grey stripe should be positioned as shown and the longer lead of the component should go into the hole marked + on the PCB.





12.

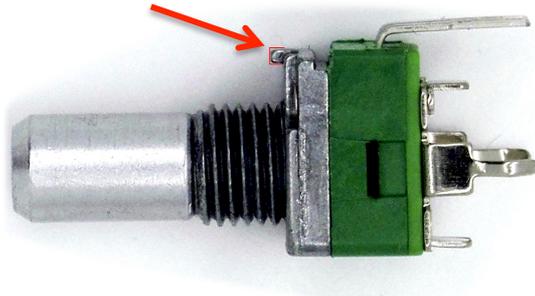
Next solder the 5 pin female socket into position.



13.

Next you need to make a small modification to the 3 pots. You need to snap, cut or file off the small metal tag that protrudes from the top surface of the pot body as indicated.

The easiest way is to snap off with pliers, it comes off very easily. If you cut or file it off be careful not to damage the thread on the shaft.

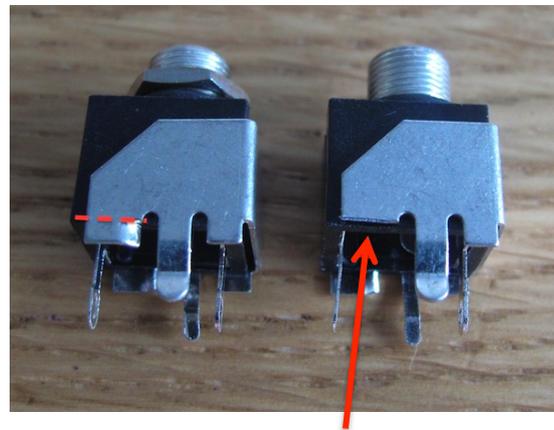


14.

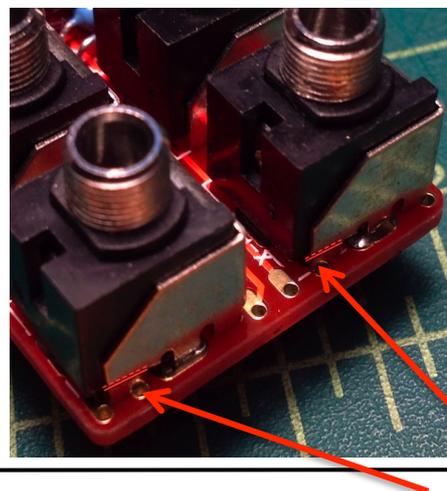
Next you need to make a small modification to two of the four 3.5mm jacks sockets.

You need to cut off a small section on one side of the grounded metal shroud that surrounds the plastic body of the jack. Do not cut off any of the other tabs of metal.

If you don't have anything you can cut these with you can also just bend this small section away from the body of the jack.



**NOTE!** This is done otherwise it is possible (although not 100%) that a short circuit is made with the wiring pads that sit at the very end of the PCB. These wiring pads are not used in this build.



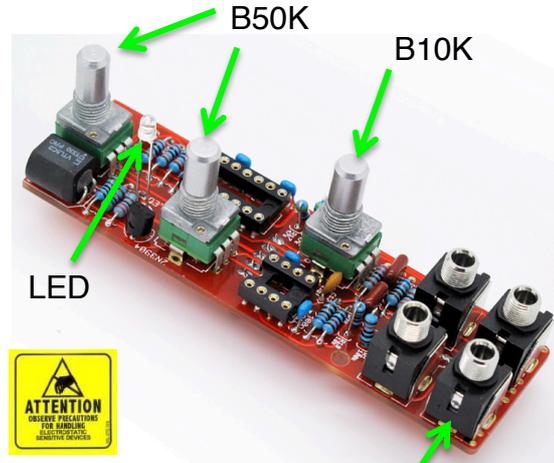


15.

Next position the four jacks and three pots and single LED in place on the board but **DO NOT SOLDER** any of them yet.

The LED is in the pink ESD bag with yellow sticker. It won't actually stand upright from the PCB as shown in the image yet, it'll just drop down.

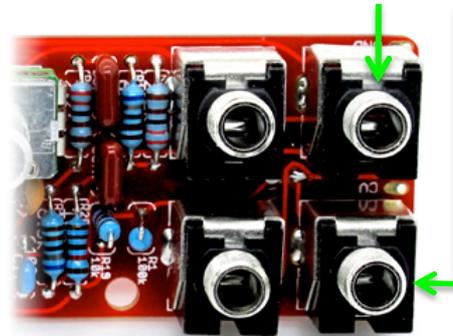
**NOTE!** Ensure the the longer lead on the LED goes into the square hole marked with a +



Ensure black face of the jack faces this way

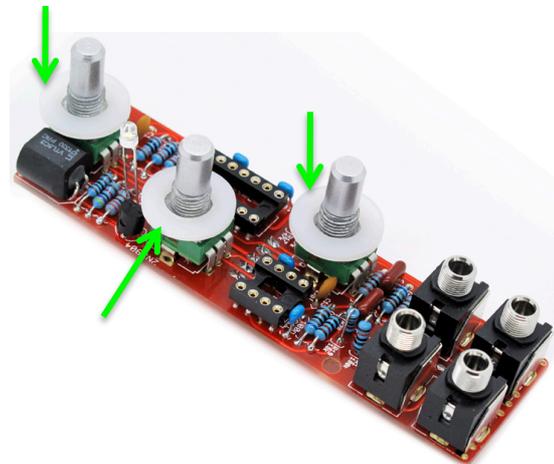
**DO NOT SOLDER YET!**

Modified Jacks  
(step 13)



16.

Put the three plastic washers on the pot shafts.





17.

You didn't solder the pots and jacks yet did you? Good!

Put the faceplate on (White PCB material or Aluminium) and tighten a few nuts on to make sure everything is sitting true and flat.

Now solder the pots and jacks (not the LED yet, and make sure it doesn't fall out in the process). There are 5 solder points per pot and 4 solder points per jack. 31 solder joints in total.

**NOTE! It's easy to accidentally miss a joint at this point, so I advise double checking the 31 joints again after you've finished**



18.

The LED should still be loose. Push it up through the hole in the panel and it should hold in place. Solder it.

Remove the front panel again. Be careful to not bend the LED as it's quite exposed now.





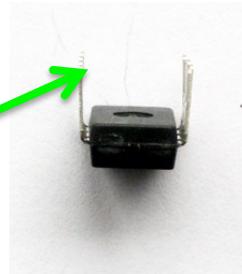
19.

Go back to the ESD bag and take out the **TL074CN** and **NE5532P** IC's.

In order to fit them into the IC sockets you need to bend the pins inward slightly.

Do this with a pair of pliers, or if you're careful you can bend each row manually on the top of table.

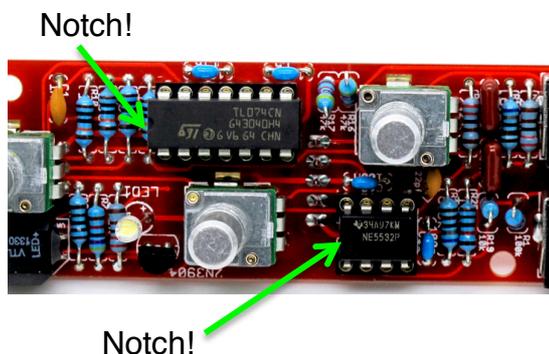
The pins ideally should be perpendicular to the body of the IC.



**NOTE, the below image is ROTATED compared to previous images.**

Fit the IC's in the positions shown.

**NOTE! You will wreck the IC's and possibly other components if you power up with them in backwards.**

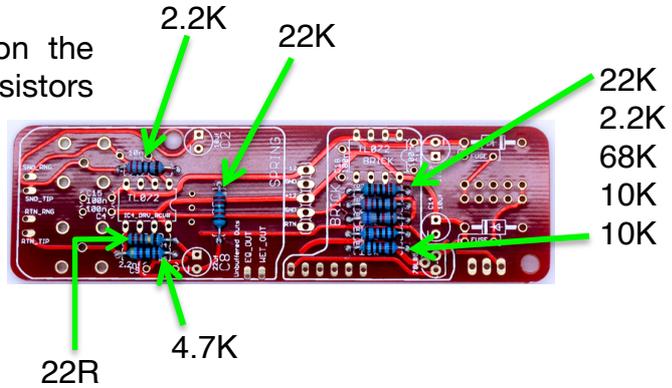


You have finished with this PCB for now, it's time to switch to the other one.



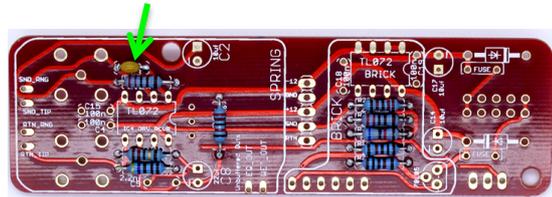
20.

First solder all the resistors on the PCB. There are no vertical resistors on this PCB.



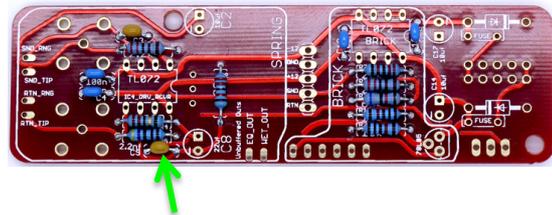
21.

Solder the single 10nF capacitor into place at C3 (in labeled bag.)



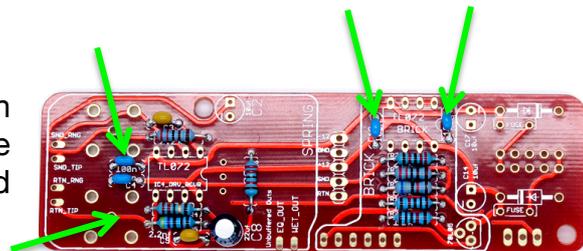
21.

Solder the single 2.2nF capacitor into place at C9 (in labeled bag.)



22.

Solder the remaining four 100nF capacitors (originally on the cardboard strip of eight, you soldered the other four on the other PCB).



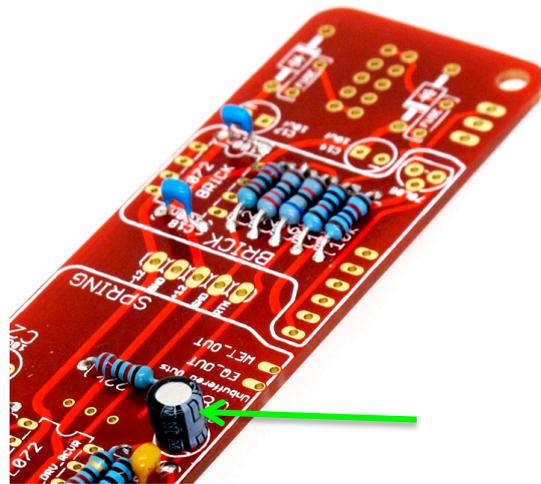
Remember that while they are shown as blue in the image to the right, the ones supplied with the kit are dark yellow.



23.

Now solder the single 22uF Electrolytic capacitor into place at position C8.

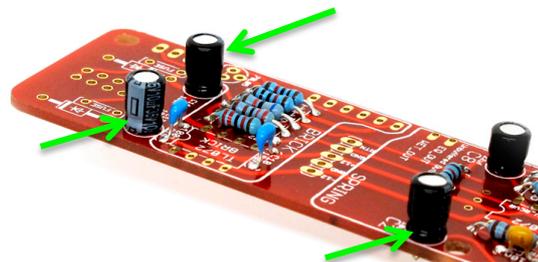
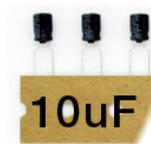
**NOTE!** Orientation is vital on this part. The grey stripe should be positioned as shown and the shorter lead of the component should go into the hole marked '-' on the PCB.



24.

Solder the three remaining 10uF Electrolytic capacitors into place at positions C2, C14 and C17.

**NOTE!** Orientation is vital on this part. The grey stripe should be positioned as shown and the shorter lead of the component should go into the hole marked '-' on the PCB.

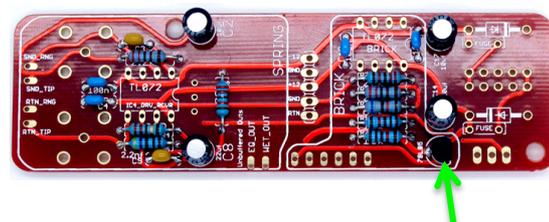
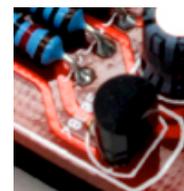


25.

Take the protective pink ESD bag with yellow sticker out of the main bag and find the 78L05 voltage regulator.

The middle lead needs to be bent slightly towards the semi-circular face of the transistor body, the component should sit in a 'tripod' configuration on the three leads.

**NOTE!** Do not solder the 2N3904 voltage regulator into this position! Apart from the text marking it looks identical.



**NOTE!** Do not heat this part excessively or you will damage it, you should be aiming to solder quickly and neatly.

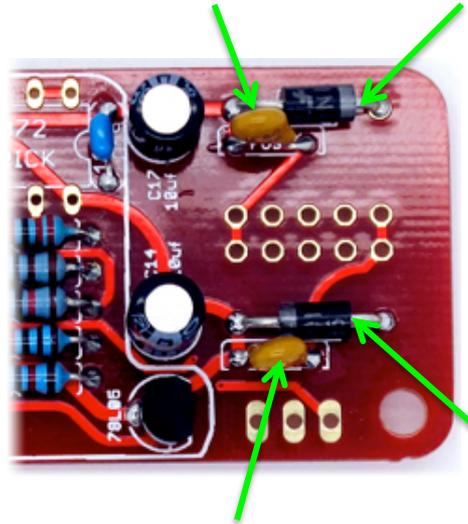


26.

Solder the yellow fuses and the two black diodes into place.



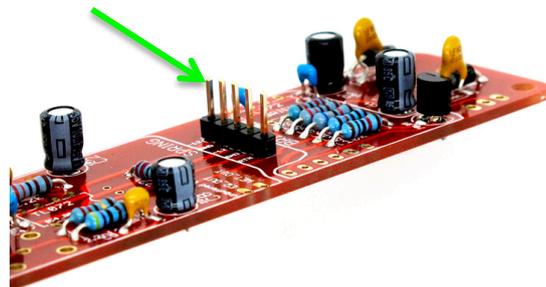
**NOTE!** Take care with the orientation of the silver ends of the diodes which match the thick white stripes on the silkscreen.



**NOTE!** Do not heat the diodes excessively or you will damage them, you should be aiming to solder quickly and neatly.

27.

Next solder the 5 pin header into place.

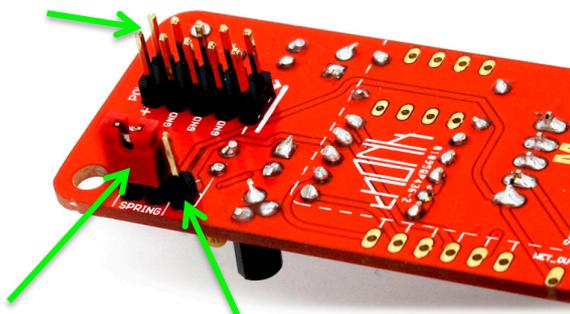


28.

Solder the ten pin power header and three pin reverb selection header into place on the other side of the board.

Do not solder with the shunt in place, place it on the header after the 3 pin header has cooled. (The shunt supplied might be black).

Set the shunt to 'Spring' to use an external spring tank or 'Brick' for the digital brick.



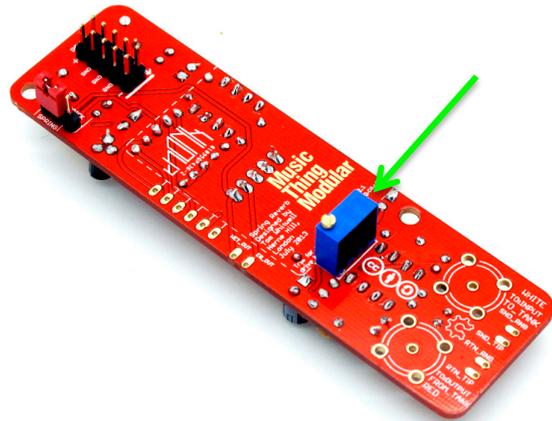


If you use organic solder that can be washed with water then now is a good time to do that. Make sure you leave your PCB to dry in a warm place for at least 30 minutes before progressing further.

**NOTE!** If you wash the board, put the shunt somewhere safely first.

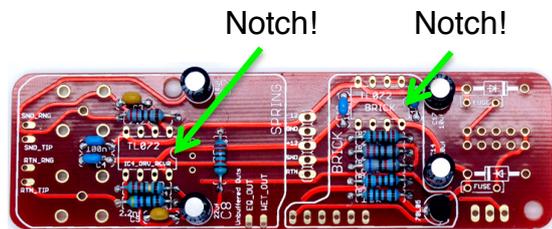
29.

Solder the blue multi-turn trimmer into place as shown.



29 a.

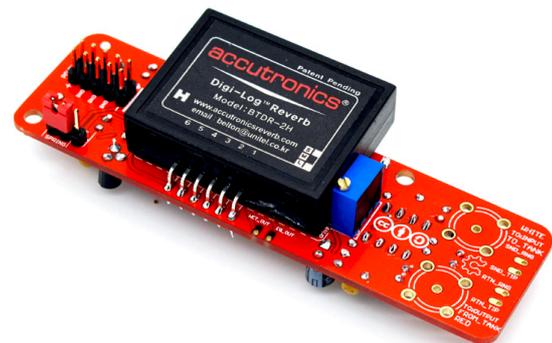
Next you should solder in the two 8 pin IC sockets. Make sure these sockets are soldered flush and perpendicular to the PCB surface.



30.

If you are using an accutronics digital brick (optional) then solder this into place now. The bricks are available in different reverb tail lengths.

If you think you might want to switch these out depending on taste then you might want to use a 6 pin female header (not included) instead of soldering directly to the board.



**NOTE!** Do not heat the brick or rework it excessively or you will damage it, you should be aiming to solder quickly and neatly.



31.

You can skip to step 32 if you have the panel with RCAs on the front.

If you have a kit with rear RCA connectors for the real spring tank then these should be soldered now.

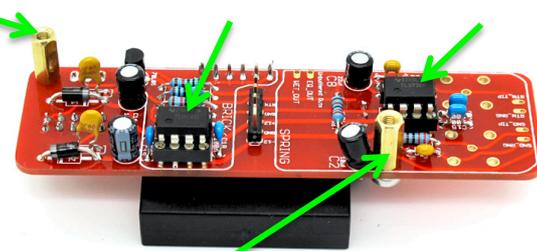


32.

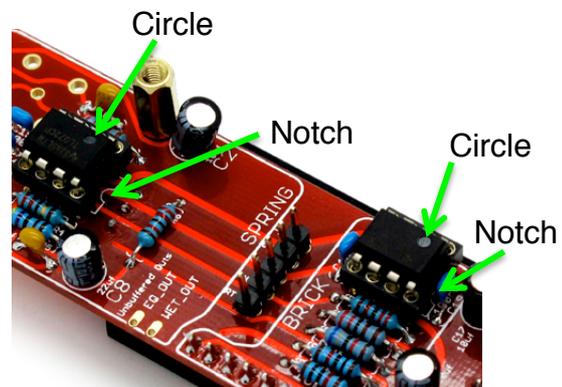
Screw in the two brass hex spacers into place. Make sure you use two of the shorter machine screws, not the two longer screws which are provided to mount the finished module into your case.

Now fit the two remaining TL072 ICs.

Make sure the circle on the top face of the ICs are both at the end with the notch in the IC socket.



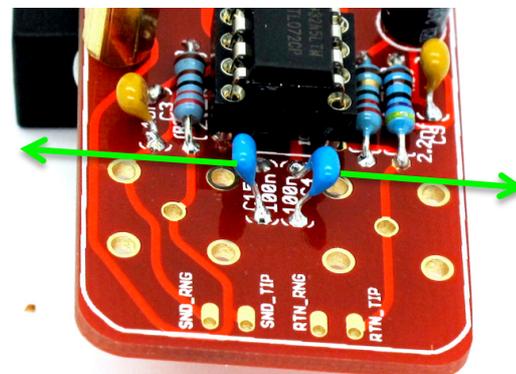
**NOTE!** This spacer may cause the C2 Electro Capacitor to lean over but this shouldn't cause a problem.



33.

Gently splay apart the two 100n capacitors at the end of the PCB as shown. The solitary 10uF capacitor on the other PCB will nestle between them once the two boards are connected together.

**NOTE!** Don't push them so far apart that the leads touch the RCA socket connections.





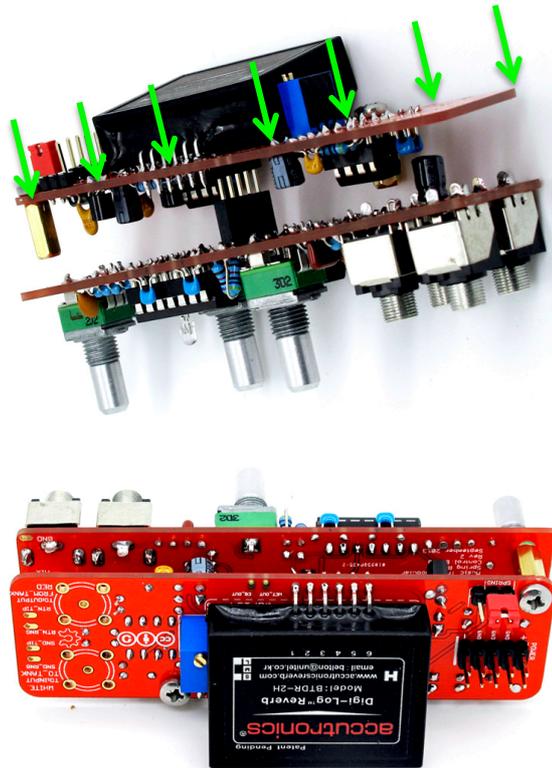
33.

It's time to join the two PCB's together as shown, mating with the male and female 5 pin headers in the centre of each board.

Use the two remaining small machine screws to secure the brass hex spacers.

**NOTE!** Again make sure you don't use the two longer screws for the front panel or it'll be a boring job taking it all apart again later on.

**NOTE!** Remember to take care of the exposed LED, it bends easily.



34.

Put the three plastic washers back on the pots and fully and finally affix the front panel. 3 nuts on the pots and 4 nuts on the 3.5mm jacks sockets.

**NOTE!** Leave the knobs off until the module is fully tested.





35.

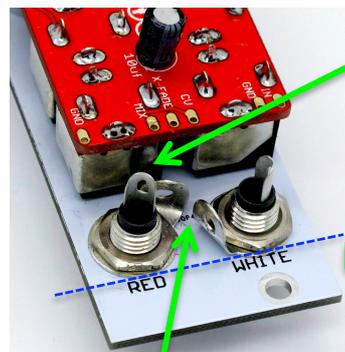
If you have the Front panel with RCA connections you need to follow these steps, otherwise skip to section 37.

If you have the panel with the RCA jacks on the front then fix them now. The washers go on the front and the grounding tags and nuts go on the back.

Bend up the two ground rings so it'll be easier to solder wires to them. It's vital that the nuts are tight and that the ground rings do **NOT** touch.

**NOTE!** If the ground rings touch **then the module will not work.**

Once the nuts are secure and the rings are apart they are unlikely to touch each other again... but you also have to make sure that they don't touch the metal shrouds on the 3.5mm jack sockets, **OR protrude down to a position where they can touch the aluminium rail in your synth case.**



Don't let the grounding ring touch the jack socket body

Leave a gap!

Don't let the grounding ring rotate below this dotted line

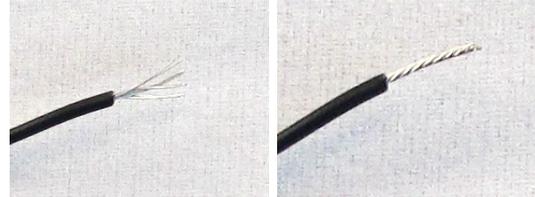
There is significant variation in Eurorack case mounting rails. Take particular care with rails which don't have a lip which stops the front panel moving vertically beyond a certain distance. Even with a lip you may find that one or both nuts on the RCA jacks can make contact with the Aluminium rail. This won't damage the module but it will stop the real spring reverb working. You may want to consider putting thick insulating tape on the inside edge of the case rail to stop this happening. It won't be visible once the module is screwed into place.



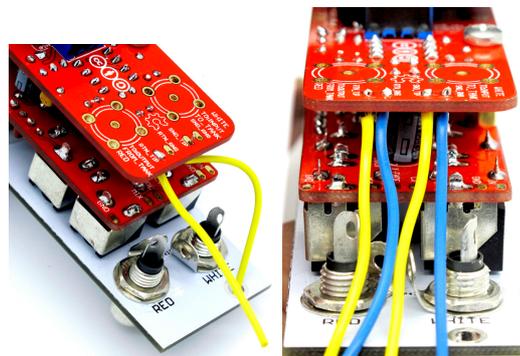
36.

Wire up the RCA jacks as shown.

You need to strip, twist and tin the ends of the wires with a small amount of solder. You need to do this neatly, particularly the end that solders to the PCB, or it won't fit through the holes.



The wires shown in yellow go from **RTN\_TIP** and **SND\_TIP** on the PCB to holes at the tip of the main body of the RCA jacks.



The wires shown in blue go from **RTN\_RNG** and **SND\_RNG** on the PCB to the grounding rings.





37.

The module is now complete. Affix the power cable as shown with the red stripe down.



38.

The trimming and calibration process is detailed in the Music Thing Modular documentation linked below, if you don't follow it you can easily end up with a distorted reverb sound.

It also contains excellent instructions for general use, a guide to selecting spring tanks and ideas for further modifications and expansion.

[http://musicthing.co.uk/modular/wp-content/uploads/2013/10/Spring\\_2\\_1\\_Documentation.pdf](http://musicthing.co.uk/modular/wp-content/uploads/2013/10/Spring_2_1_Documentation.pdf)