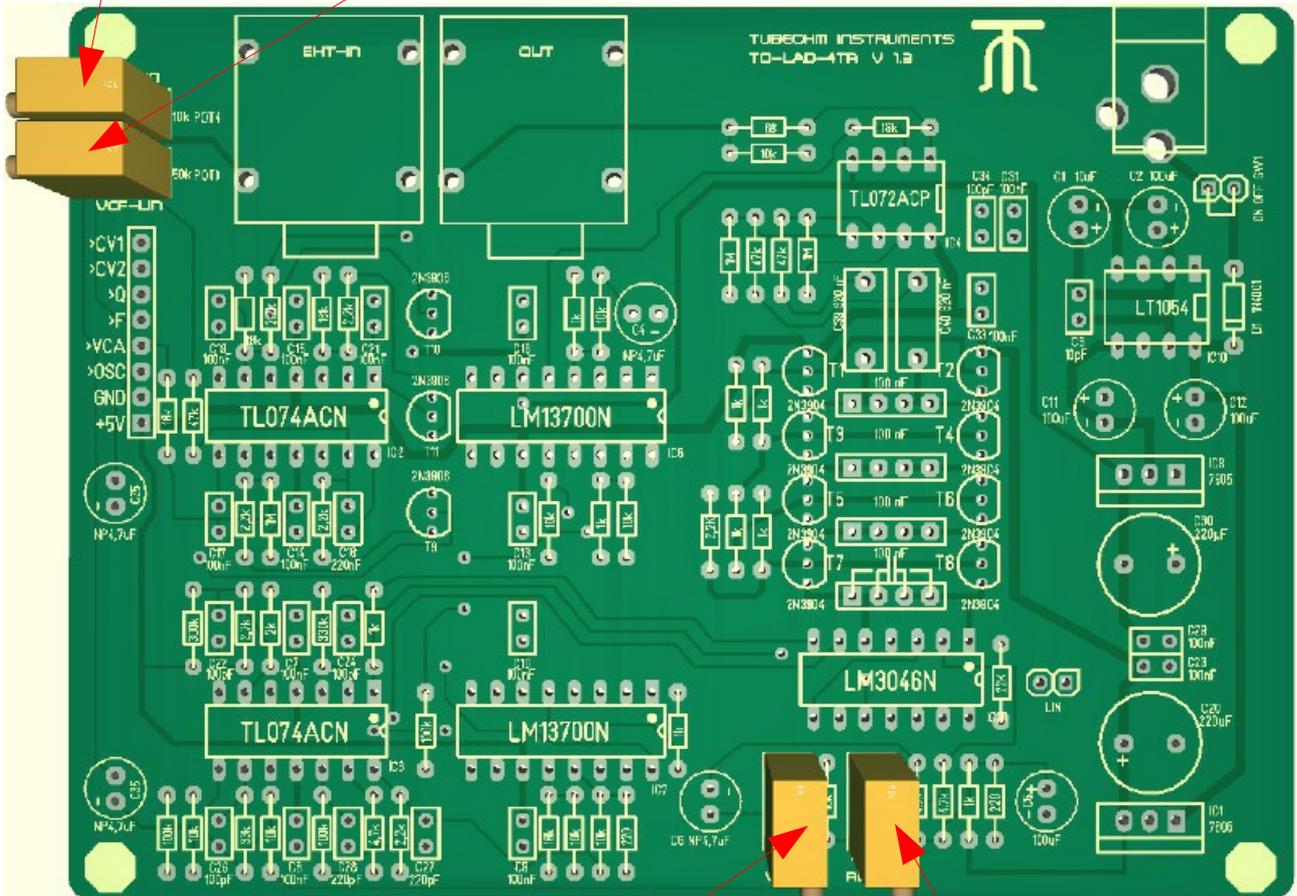


TO-LAD-4tr V 1.3 Filter for Shruthi-1 from Mutable Instruments

Calibration instructions

POT4 EXTERNAL IN

POT1 LINEARITY



POT3 INTERNAL VOLUME

POT2 RESONANCE ADJUST

**What you need:**

- 1:) frequency multimeter or a guitar tuner or the TubeOhm filter-calibrator
- 2:) screw driver

Now we come to the important point, the calibration.

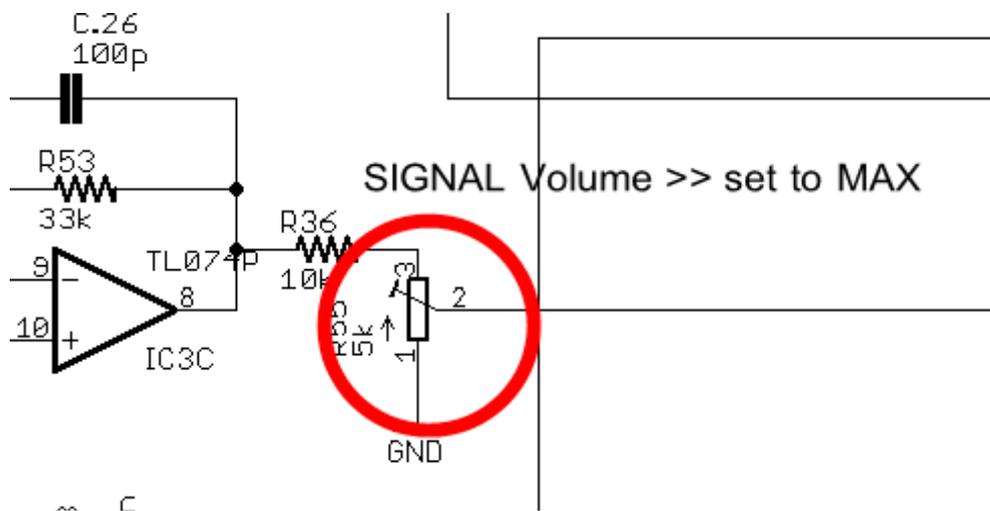
We have on the Ladder Filter four trim-potis for the calibration.

Pot1= linearity

Pot2= resonance adjust ,clockwise more resonancy, anti clockwise less resonancy

Pot3= internal Volume , clockwise less Volume, anti clockwise more volume

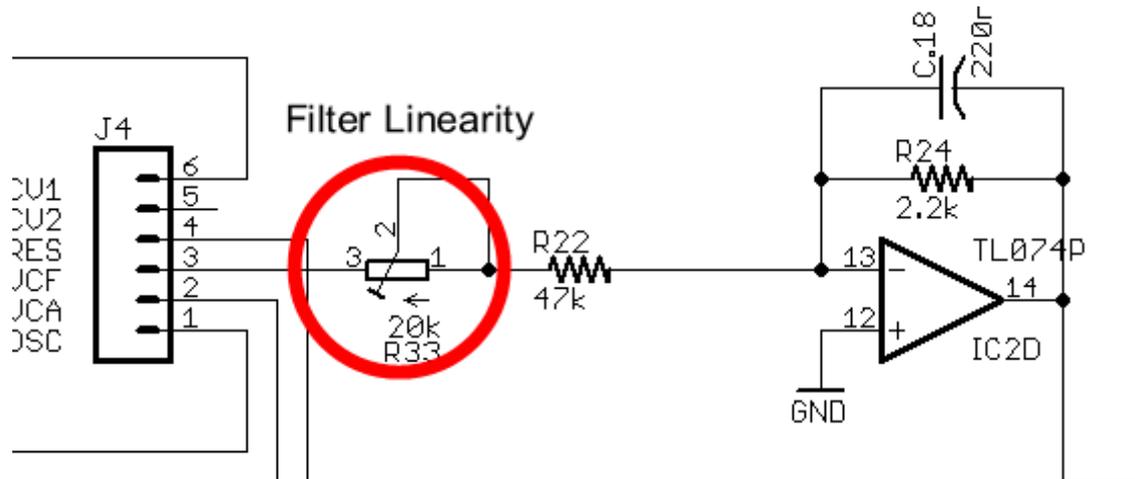
Pot4= external volume

**First step -- adjust the internal volume.**

- 1:) connect the filter board with the Shruthi motherboard and switch it on.
- 2:) screw Pot 3 ANTICLOCKWISE to maximum volume and let it so !!!!!  
you will hear a click if the poti is on maximum.
- 3:) now you should hear sound , if you play with Shruthi !



### Third step – filter linearity:



The Filter becomes from Shruthi a V/OCT voltage. It is very important that the Filter moves its frequency with the note you play.

One oct higher must double the frequency. But attention, the frequency is relative to the cutoff value and not absolute.

Absolute is the difference between C2,C3,C4.....

Example. Cutoff 30, both oscillators and the sub to OFF, Filter LFO and ADSR to off. Resonancy maximum.

If you play now C 3 you have a Q-Frequency 100 HZ, C4 =200 HZ and C5 =400 HZ  
But this depends on the cutoff !!!

Turn the cutoff to 20, you will have maybe on C 3 =75Hz,C4= 150 Hz and C5=300Hz  
This I mean with 'ABSOLUTE differencys'.

The linearity is stable from 50 HZ p to 3000 HZ, over 3000 HZ it can be that the linearity is minus 5..10 %.. That doesn't matter, because only the sounds changes a little.

Important is, that the linearity is in rage from 50 to 3000 HZ.

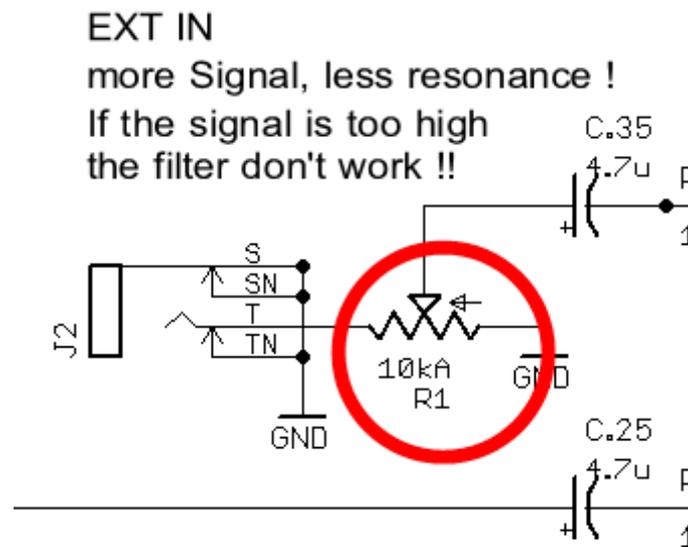
- 1:) take a guitar tuner or a frequency counter or the TubeOhm Filter calibrator.
- 2:) play on the Keynoard C2, C3, C4 and measure the Frequency.
- 3:) from C2 to C3 you should have the double frequency.
- 4:) from C3 to C4 you should have the double frequency.

**Adjust Pot 1 linearity** until in the low and mid range ( 50...3000 Hz) the filter doubles the frequency from one octave to the next.

This is very important for the Filter FM, because FM interact with the resonancy.

Is the resonancy out of tune, it gives more intermodulations and distortions .

#### Stepp 4 EXTERNAL VOLUME:



One behavior of a Ladder filter is, it doesn't work on high Amplitudes.

Another effect is, more input volume, less resonancy volume.

Less input volume, more resonancy volume , but a bad SIGNAL to NOISE ratio !

So you had to adjust the **POT 4 External Input** in this way that the noise is less and Resonancy is not to loud.

\*\*\* Note for the internal Volume Pot3. I have test it with different internal Volumes.

Less internal Volumes gives more resonancy output, but more noise in the signal.

So, please set Pot3 to Maximum. This gives the best results.

TubeOhm

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