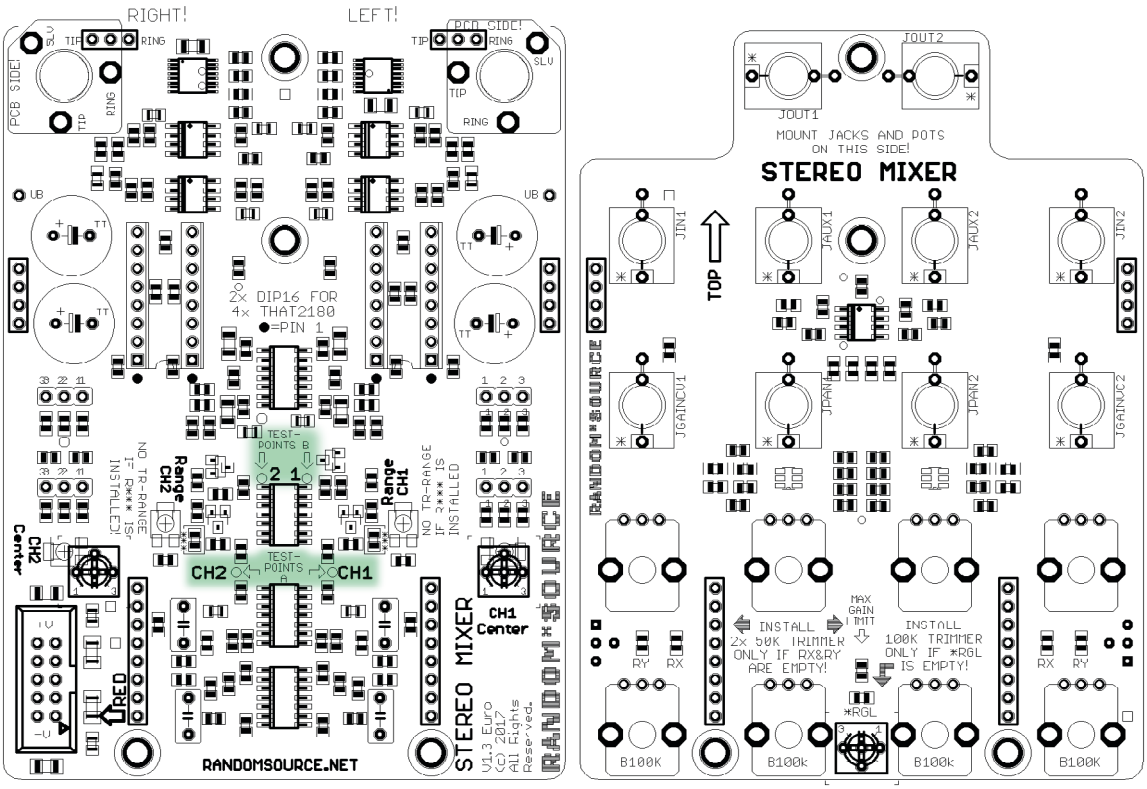
R*S Stereo Mixer for Eurorack

The Random*Source Equal Power Stereo-Mixer is a voltage controlled stereo mixer / panner / VCA based on 4 high-end THAT2180 blackmer VCAs, designed to emulate the unique behavior of Serge VCAs.

- *Special audiophile edition that uses 4 NJR Muses chips and lots of **Burr-Brown op-amps** for superior audio performance.*
- ***Improved Serge VCA emulation for „Serge-esque“ sound - compressing the peaks and providing more „body“.***
- *Balanced Outputs, using „a new generation of monolithic audio differential line drivers offering improved performance over conventional crosscoupled designs“ for low noise and distortion. These outputs can be connected to balanced or unbalanced equipment (amplifiers, A/D converters...)*
- *Great distortion and soundshaping capabilities - try CV at audio rates and play with Gain.*

The Stereo Mixer comprises 2 pcbs, a main pcb and a component pcb:



Please read the build instructions below before commencing the build. The module is designed to be used with a +12V / -12V power supply. Any values given here assume such a supply.

Bill of Materials (Equal Power Stereo-Mixer Euro 1.3)

Capacitors

4	470n	C1, C2, C9, C10	Film (optional - see below)
4	47uF BP		Bi-Polar, Nichicon Audio-Grade Mouser: 647-UES1E470MPM

ICs

4	THAT2180B	IC7, IC8, IC9, IC10	Alt: version A (better, more $$$) or C

Misc

4	SIL header 3pol	JP1, JP2, JP3, JP4	Jumper for equal power db attenuation (optional)
1	Euro Power header		MTA-100 power connector, Reichelt: WSL 10G
2	SIL header 8-pol	X1, X2, X3, X4	pin connectors, linking main pcb to component pcb
2	SIL header 4-pol		
2	DIP-16 sockets		for 4x THAT2180
4	Spacer (12mm)	(12mm fits the height of the Phone Jacks better than the usual 10mm spacers)	Reichelt: DI 12MM

2	Phone Jacks (Balanced Outs)	J1, J11	Switchcraft N112BPCX 1/4" jack socket (6.35mm) Mouser: 502-N112BPCX
10	Thonkiconn Jacks		3.5mm Jack Sockets (PJ301M-12) from Thonk
6	Potentionmeter 50K	PAN: must be 50K linear (B50K)	Alpha 9mm vertical pcb mount available from Thonk, Tayda
2	Potentionmeter 100K	GAIN: must be 100K linear (B100K)	Alpha 9mm vertical pcb mount available from Thonk, Tayda

General Build Recommendations

- *DIP16 sockets can be used for the 4 THAT2180 ICs - precision ones (milled) recommended.*
- *No trimmers have to be installed!*
- *Make sure you pay attention to the direction of the THAT2180 chips - pin 1 (indicated by a notch on top of the IC) should point down to the power connector. Inserting them the wrong way will kill the chips.*
- *If you solder the TS jacks into the main pcb until everything else is done and the module is calibrated and tested, you cannot simply remove the main pcb any more - you have to unscrew the jacks from the front panel and remove them along with the main pcb.*

Options

Lowpass filtering of CV: C1 and C2 can be used to form a low pass filter for the Pan CV, C9 and C10 work similarly for the Gain CV. This leads to higher frequency CV being rounded / flatted, avoiding plops caused by abrupt voltage changes. However, this also disables certain (ab)uses of those inputs and makes trimming a bit more difficult.

Pan CV: 9.1k for R9 and 470n for C1 lead to a filter frequency of appr. 37Hz and restrict CV control over panning to fairly slow changes.

For Gain CV, however, you may want to be more generous - 10n for C9/C10 corresponds to a filter frequency of 7.2kHz. **If in doubt, leave those caps out altogether and see if you miss them**.

Setup / Calibration

Center Attenuation:

The **jumpers** determine how much the combined volume is attenuated when the panner is in center position: **JP1** and **JP3** for Channel 1 (left and right) and **JP2** and **JP4** fot Channel 2 (left and right). Connect Pin 1 and 2 for -6dB equal power attenuation or Pin 2 and 3 for -4.5 db attenuation. **Leave the jumpers open for no attenuation at all (Recommended Setting)**.

Equal Power Panning:
The panning circuitry is quite sensitive to voltage levels. You may want to check that your power supply is actually calibrated to +/-12.0V before you start.

You also need a scope and a (symmetrical) triangular control voltage (LFO) going from 0V to (exactly) 5V. It's a good idea to check the actual voltage - a (properly calibrated) Serge Dual Slope Generator works fine, the triangle output of a Serge PCO, however, does only go up about +4V and is therefore not suited.

Channel 1 and channel 2 have to be trimmed separately:

Using the pan pot, turn channel 1 (**left** side of the front panel) all the way to the **L**eft (CCW).

Feed a fairly slow (a few Hertz) triangular wave / LFO that goes from 0V to +5V into the CV panner on the left (make sure the attenuator is fully open!). Slow is important if you use a capacitor as C1 as R7 and C1 form a low pass filter so that CV at higher frequencies gets rounded down/flattened out. Use a scope to look at the TEST POINTs for that side (CH1 - marked in the picture above). TESTPOINT A should show the incoming triangle wave.

Use T1 ("CENTER) to get a symmetrical wave at TESTPOINT B:

For channel 2, turn the Pan pot all the way to the **R**ight (CW). Pin 1 of IC1 should be at (exactly) 5V when no CV is sent into the PAN CV input. If the voltage is above 5V, you'll not be able to get perfect symmetry in the next

step, so you may have to check your supply voltage (if you haven't already done so) or turn the Pan pot back until you reach 5V.

Feed the same fairly slow triangular wave / LFO going from 0V to +5V into the VC PAN input for that channel and use the scope at TESTPOINT A to make sure you see the triangle wave coming in and TESTPOINT B to trim the signal accordingly as before (using T2).

(Last Change: 9. November 2017, 12:55 PM)