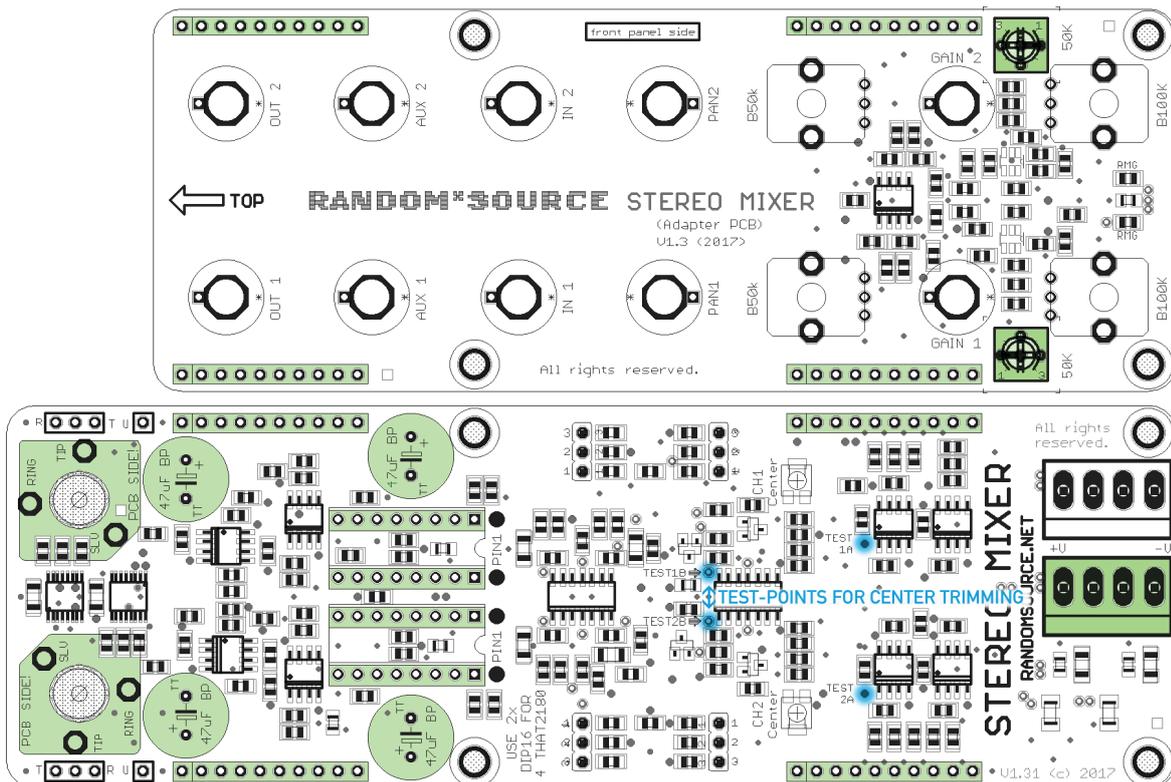


R*S Stereo Mixer v1.3

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 behavior of Serge VCAs. Version 1.3 offers a number of unique features:

1. **Audiophile NJR Muses op-amps and maximum separation in the audio path.**
2. **Serge VCA emulation - using trimmers on the panel pcb, you can set the VCA behavior (i.e. the treatment of gain CV) to purely exponential (like on previous versions of the Stereo Mixer) or „Serge-esque“ - compressing the peaks and providing more „body“ - or anything in between(!).**
3. **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...)**
4. **Burr-Brown op-amps in the CV path.**
5. **Great distortion and soundshaping capabilities - try CV at audio rates and play with Gain. Or use one waveform of an oscillator such as the Serge NTO as input on each side and another (third) waveform for panning control.**

The Stereo Mixer is an improved version of comprises 2 pcbs, a main pcb and a component pcb - To build the board, **only install the through-hole parts shown green here** and omit / ignore any others:



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 1.31)

Variable Resistors

- 2 50k TR-VCA1, TR-VCA2 on **COMPONENT PCB** (sets the VC-GAIN behavior for each side) *** recommended to set these prior to mounting the module *** Single-turn trimpots - **side adjust recommended,** (Vishay T73XW or T73XF, Bourns 3362M, S or Z) should fit.

Capacitors

- 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 MTA-156 PWR2 MTA-156 power connector
- 1 MTA-156 PWR1 10-pin connector, links main pcb to component pcb for THAT2180
- 4 SIL header 10pol X1, X2, X3, X4 Switchcraft N112BPCX 1/4" jack socket (6.35mm) Mouser: 502-N112BPCX Emerson-Johnson Mouser: 530-108-0903-1 (black)
- 2 DIP-16 sockets
- 2 Phone Jacks J1, J11 Emerson-Johnson Mouser: 530-108-0910-1 (blue)
- 6 Banana Jacks (bipolar) for AUDIO inputs / outputs Alpha 9mm vertical pcb mount available from Thonk, Tayda
- 4 Banana Jacks (unipolar) for PAN / GAIN CV inputs Alpha 9mm vertical pcb mount available from Thonk, Tayda
- 2 Potentionmeter 50K PAN: linear (B50K) *updated
- 2 Potentionmeter 100K GAIN: linear (B100K)

General Build Recommendations

- DIP16 sockets can be used for the 4 THAT2180 ICs - precision ones (milled) recommended.
- Use upright / side-adjust trimmers on the panel pcb if possible - that saves you from having to remove the main pcb to adjust the trimmers.
- **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.

Setup / Calibration

Gain-CV (Serge VCA emulation): The 2 VCA trimmers on the panel pcb allow you to blend between pure exponential behavior and a special “Serge-Mode” which is less exponential in a musical way: peaks which could lead to clipping are slightly reduced and the general loudness is increased. This is closer to the way acoustic instruments work and is part of the magic of the Serge VCAs. Recommended to go 100% Serge (usually CW but depending on the trimmer used).

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** for 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 (=default 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) 5.0V. 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 Left (CCW)**. (Pin 14 of IC1 - channel 1 corresponds to the **right(!)** side of the main pcb when looking at the component side - should be at 0V when no CV is sent into the PAN CV input).

Feed a fairly slow (a few Hertz) triangular wave / LFO that goes from 0V to +5V into the CV panner on the left.

TEST POINT A should show the incoming triangle wave. (Do not proceed until it does.)

Use a scope to look at the TEST POINT B indicated in the picture above (pin 14 of IC3). Use SMT-Trimmer 1 ("CENTER") to get a symmetrical wave:



For channel 2, **turn the Pan pot all the way to the Right (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.

Check that TEST POINT A shows the incoming triangle wave.

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 TEST POINT B (pin 1 of IC3) to trim the signal accordingly as before (using SMT-trimmer T2).

(Last Change: 28. December 2017, 9:14 PM)

