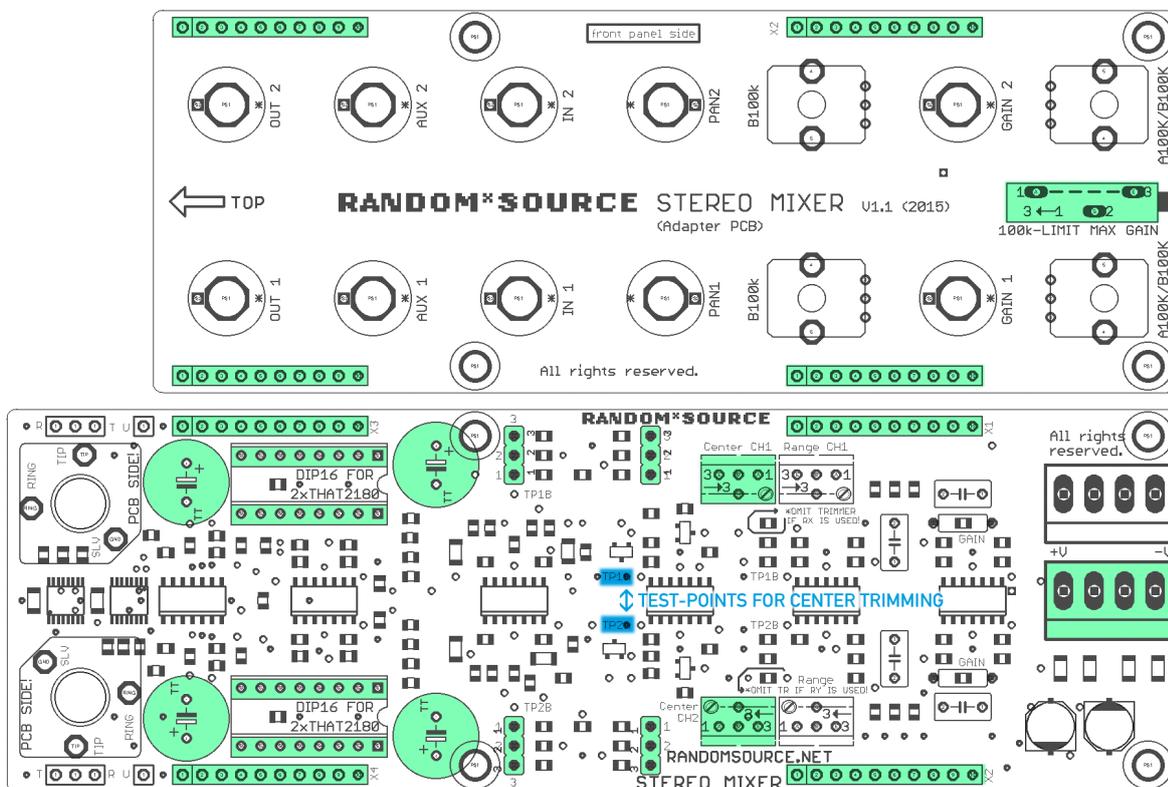


R*S Stereo Mixer 1.1

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 1.1 (main pcb now in SMT) a number of additions and improvements:

1. 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...)
2. Burr-Brown quad op-amps in the audio path.
3. Optimized value set.
4. All 4 large bi-polar audio-capacitors are now on the main pcb.
5. DIP16 sockets can be used for the 4 THAT2180 ICs.
6. Only 2 trimmers (+1 on the component pcb) required for calibration (do not install the other ones!). Test-points added for easier calibration.

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 1.1)

Variable Resistors

- 2 50k T1, T2
- 5k T3, T4
- 1 100k TC on **COMPONENT PCB**
(sets maximum gain for both channels)

Precision Trimmer
*** DO NOT INSTALL ***
 3/4 " Rectangular / Multiturn
 Trimpot e.g. Bourns 3006 series
 Mouser: 652-3006P-1-104-LF

Capacitors

- 4 470n C1, C2, C9, C10
- 4 47uF BP

Film (optional - see below)
 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
- 1 MTA-156 PWR2
- 1 MTA-156 PWR1
- 4 SIL header 10pol X1, X2, X3, X4
- 2 DIP-16 sockets
- 2 Phone Jacks J1, J11
- 6 Banana Jacks (bipolar) for AUDIO inputs / outputs
- 4 Banana Jacks (unipolar) for PAN / GAIN CV inputs
- 4 Potentionmeter PAN: linear (B100K)
100K GAIN: linear (B100K)

Jumper for equal power db
 attenuation
 (optional)
 MTA-156 power connector
 10-pin connector, links main pcb
 to component pcb
 for THAT2180
 Switchcraft N112PCX
 1/4" jack socket (6.35mm)
 Mouser: 502-N112PCX
 Emerson-Johnson
 Mouser: 530-108-0903-1 (black)
 Emerson-Johnson
 Mouser: 530-108-0910-1 (blue)
 Alpha 9mm vertical pcb mount
 available from Thonk, Tayda

General Build Recommendations

Do not solder the TS jacks into the main pcb until everything else is done and the module is calibrated and tested - once the TS jacks are soldered in the main pcb you cannot simply remove them any more - you have to unscrew the jacks from the front panel and remove them along with the main pcb.

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.

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

Gain potentiometer range: Trimpots **T1 on the component board** sets the (upper) limit of the gain pots. As any control voltage sent to the Gain inputs is added, this can be used to set unity gain / avoid distortion or set the level of desired overdrive. Both channels are trimmed simultaneously.

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.

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 **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. 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 POINT indicated in the picture above (pin 14 of IC3). Use T1 ("CENTER") to get a symmetrical wave:



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

Trimpot **T1 on the component board** sets the maximum gain (overdrive) of the gain pots. As any control voltage sent to the Gain inputs is added, this can be used to set unity gain / avoid distortion.

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