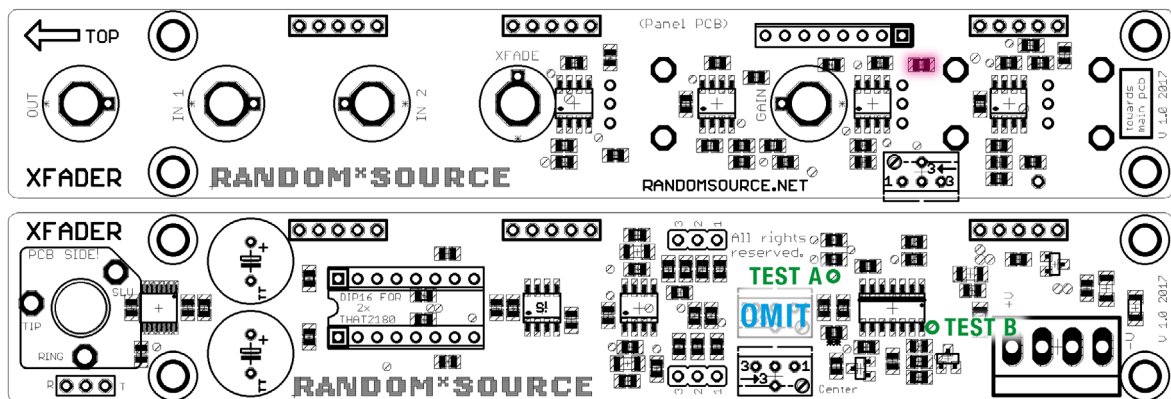


R*S XFader v1.0

The Random*Source Equal Power XFader is a voltage controlled crossfader / VCA based on high-end THAT2180 blackmer VCAs, designed to emulate the behavior of Serge VCAs. Unique features:

1. **Adjustable VCA character („Serge-emulation“)** - using trimmers on the panel pcb, you can set the VCA behavior (i.e. the treatment of gain CV) from purely exponential to „Serge-esque“ - compressing the peaks and providing more „body“ - or even more linear.
2. **Optional balanced output, 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...). The output is not available on the front panel, but can be wired for instance to an XLR jack in the boat.
3. **Burr-Brown op-amps in the audio path.**
4. **Great distortion and soundshaping capabilities - try CV at audio rates and play with Gain.**

The XFader is an improved version of comprises 2 pcbs, a main pcb and a panel pcb, both have all required SMT parts already reflow soldered in. To build the board, **install only the through-hole parts listed in the BOM** 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.

Please Note

- Like the original Serge XFader, the module has been designed to allow for **massive Gain / Over-drive**. Actually, the headroom is even bigger, allowing an output signal of about -12V to +12V (24Vpp)(!) - this might mean that **you may have to adjust input levels of modules and gear you send the output to** (e.g. ADC converters) have to be adjusted / attenuated.

Bill of Materials (Equal Power XFader)

Variable Resistors

1	50k	CENTER TRIMMER
-	1k	RANGE TRIMMER
1	10k	CHARACTER on COMPONENT PCB (sets VCA response between)

Precision Trimmer

*** DO NOT INSTALL ***

Trimpot - **side adjust recommended**, single-turn should do (Vishay T73XW or T73XF, Bourns 3362M, S or Z), if you prefer multi: Bourns 3296X-1-103LF or 3296Z-1-103LF should work

Capacitors

2	47uF BP	
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Bi-Polar (also called Non-Polar),
Nichicon Audio-Grade
Mouser: 647-UES1E470MPM

ICs

3	THAT2180	2 on the main pcb (use THAT2180B or THAT2180A) 1 on the panel pcb (THAT2180C is sufficient)
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A = best, \$\$\$

B = better, \$\$

C = standard, \$

Misc

2	SIL header 3pol	JUMPER
1	MTA-156	PWR
3	SIL header 5pol	X1, X2, X3
1 +1	DIP-16 sockets	Precision (shallow) sockets recommended - use half a socket on the panel pcb - bend the THAT2180 carefully to fit in between the 2 pcbs
1	Phone or XLR jack	- optional / off-panel -
3	Banana Jacks	(bipolar) for AUDIO inputs / outputs - black
2	Banana Jacks	(unipolar) for PAN / GAIN CV inputs - white
3	Potentionmeter 100K	linear (B100K)

Jumper for equal power db
attenuation
MTA-156 power connector
5-pin connectors linking main
pcb to panel pcb
for THAT2180

optional for balanced out
wire by hand

Emerson-Johnson

Mouser: 530-108-0903-1 (black)

Emerson-Johnson

Mouser: 530-108-0901-1 (white)

530-108-0910-1 (blue)

Alpha 9mm vertical pcb mount
available from Thonk, Tayda

General Build Recommendations

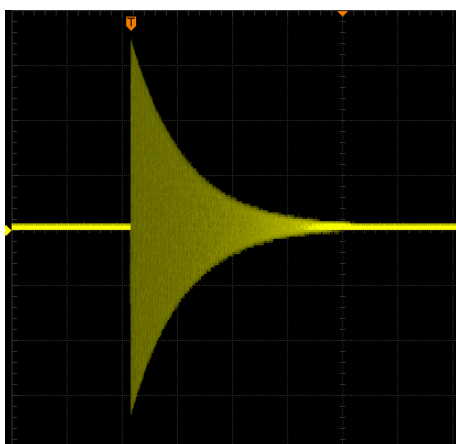
- Use DIP16 sockets can be used for the THAT2180 ICs - precision ones (milled) recommended.
- There is one THAT2180 on the panel pcb / between the pcbs. If you don't use a socket, the space should not be a problem (however, replacing/desoldering that IC could be, if you ever need to). Best way seems to be to use one side of a dual (DIP) precision socket (simply cut in half) - check the height of the socket first, you'll have to bend the THAT2180 to fit in between the pcbs.
- 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) is marked on the pcb - on the main pcb upwards, towards the electrolytic caps, on the panel pcb downwards. Inserting them the wrong way will kill the chips.**

Options / Modifications

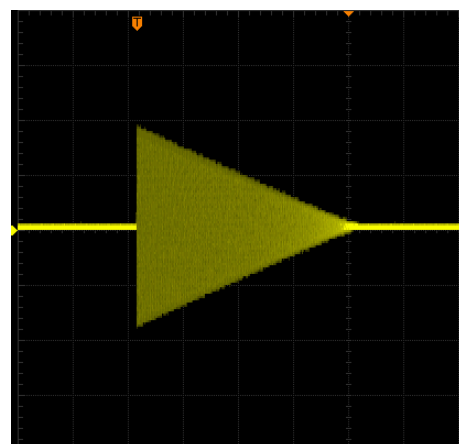
- **Recommended:** Taper for the VC Gain potentiometer. The VC Gain input has a (linear if you use a B-type pot) attenuator. If you set the character to expo / „Sergeseque“ (rather than linear) this means that the knob will be quite sensitive at the end while not much seems to be happening before 80%. **If you use a B100K pot, add a 47k resistor** (0805 works nicely) between the center leg and the one left of it (when looking at the pot upright with the legs towards you) - that's the leg close to the mode trimmer if the pot is mounted on the pcb. (Do not go below 47k).
- You can lower the 10k resistor show in pink the pic above to 4k7 to make the end position of the VCA trimmer on the panel pcb (even) more exponential.

Setup / Calibration

Gain-CV (Serge VCA emulation): The **VCA trimmer on the panel pcb** allows you to blend between a “Serge-Mode” (CW) which is fairly, but not fully exponential and quite musical: peaks which could lead to clipping are slightly reduced and the general loudness is increased) and linear behavior (CCW). The Serge Mode is close to the way acoustic instruments work and is part of the magic of the Serge VCAs. Set according to taste.



„Serge-esque“ (not exponential!)



Linear VCA response

Center Attenuation (optional)

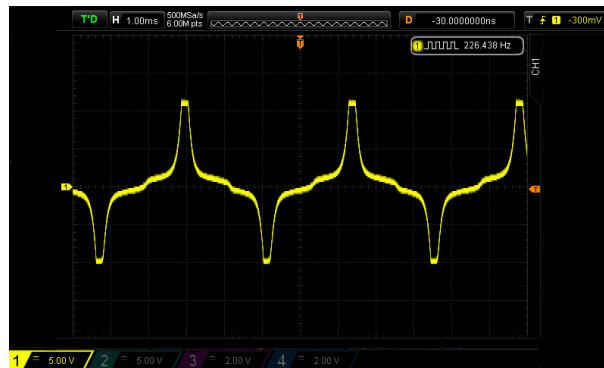
The **jumpers** determine how much the combined volume is attenuated when the XFADE is in center position: Connect Pin 1 and 2 for -6dB equal power attenuation or Pin 2 and 3 for -4.5 db attenuation. **Leave the jumpers open for no attenuation at all (default setting).**

Equal Power XFading

The XFader circuitry is designed for exact reference voltages and is therefore quite sensitive to deviations. 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 NTO / PCO, however, does only go up about +4V and is therefore not suited. You should see the triangle at TEST POINT A (as indicated in the picture above).

Using the the FXADE pot **all the way to the Left (CCW)**. Feed a fairly slow (a few Hertz) triangular wave / LFO that goes from 0V to +5V into the XFADE CV input. Use a scope to look at the TEST POINT B indicated in the picture above (pin 14 of U1). Use T1 ("CENTER) to get a symmetrical wave:



Power consumption: appr. 90mA at +12V / 90mA @ -12V

(Last Change: 22. February 2017, 11:01 PM)