WORNG Electronics LRMSMSLR user manual

Thank you for purchasing a WORNG Electronics LRMSMSLR.

The LRMSMSLR brings the power of mid/side processing to the world of Eurorack. Mid/side processing is a powerful tool often utilised in mastering studios; it takes a stereo signal and separates it into the mid and side elements, allowing you to independently process them and then recombine them into a stereo signal.

Used creatively this allows a sound designer to do anything from using two filters with differing responses on a stereo signal without having to perfectly match them for a balanced stereo response, to using a VCA to modulate the stereo width at audio rates to add harmonics to a stereo signal, to techniques which haven't even been invented yet. The outputs are DC coupled so the LRMSMSLR can be used to get a sum and difference from two CV signals to create complex dynamic CV signals from plain old LFOs and envelopes.

LRMSMSLR has two four inputs and four outputs in the following order:

Left & Right signal in (L & R, triangle pointing in)
Mid & Side signal out (M & S, triangle pointing out)
Mid & Side signal in (M & S, triangle pointing in)
Left & Right signal out (L & R, triangle pointing out)

The Mid out is half-normalled (patching to the output doesn’t break the normalling to the input) to the Mid in, as

is the Side out to the Side in, as indicated by the lines connecting the jacks on the front panel. This means Left and Right in and out can be patched in, passing the stereo signal through unaltered to the Left and Right outs until the Mid and Side inputs are patched in. It's a good idea to patch your LRMSMSLR into your stereo signal path like this when you're setting up your stereo patch so you can start manipulating the stereo image without having to repatch, the high quality opamps used in the signal path of the LRMSMSLR won't negatively colour your signal.

Connecting your LRMSMSLR

The LRMSMSLR needs to be installed in a compatible Eurorack case with power supply to function. The power cable is positioned with the red stripe oriented downward on the module and is marked with the word STRIPE. The LRMSMSLR was designed for operation on +-12V and consumes 15mA of current per rail during normal operation. LRMSMSLR is designed to process stereo signals but as it conforms to the Eurorack standard those signals must be supplied on a pair of mono 3.5mm leads, the LRMSMSLR doesn't facilitate use of signals on a single stereo lead.

About Mid-Side Processing

In normal operation the best way to think of the LRMSMSLR is as a module which facilitates a send and return effects loop for mid and side on a stereo signal. Patch your stereo signal to the Left and Right inputs at the top of the module, and take the Left and Right outputs at the bottom to your stereo mixer, audio interface or speakers. If you want to filter only the sides of your signal, for example to mono the bottom end of a track, patch from the Side out to your filter, then from the filter back to the Side input. Due to the half normalling you can check the effect of your processing by unpatching the Side input, this will allow the unprocessed signal through again for you to A/B with your processed signal.

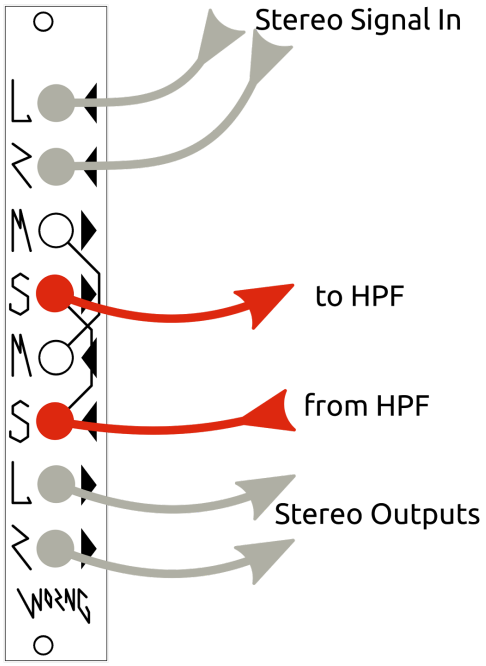
It’s worth noting that the Mid signal is a sum of both the left and right inputs, it only becomes the mid element of the signal once it’s recombined with the Side signal in the MS -> LR section. You may initially be surprised to find that a signal panned hard left or right appears on both the Mid and Side outputs, this is the module functioning as expected.

You will most likely find that for typical stereo signals the level of the signal in the Mid send is higher than the level of the Side send, this is normal as any signal present in both Left and Right inputs will be phase-cancelled in the Side send. This can affect the operation of some processes, for example distortion and compression, so keep it in mind.

One thing to note is that any additional audio introduced on the Side path (such as self-oscillating resonance from a filter etc) will appear in phase in the Left output and out of phase in the Right output. This will only occur in more extreme processing but is something to be aware of. Likewise if you sum your signal to mono (as some people do when checking their mixes) you will find the Side signal disappears, this is to be expected with any Mid-Side processing.

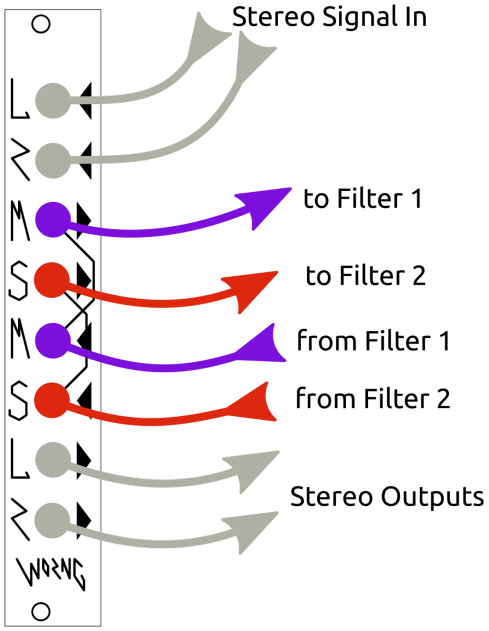
As the Side signal is required to reconstruct the stereo signal at the Left and Right outputs, you may find that extreme processing on the Side signal (for example wet reverb or delay) can render the dry stereo signal summed to mono. This is to be expected, and something you can take advantage of if you know it’s going to happen.

Patch Suggestions



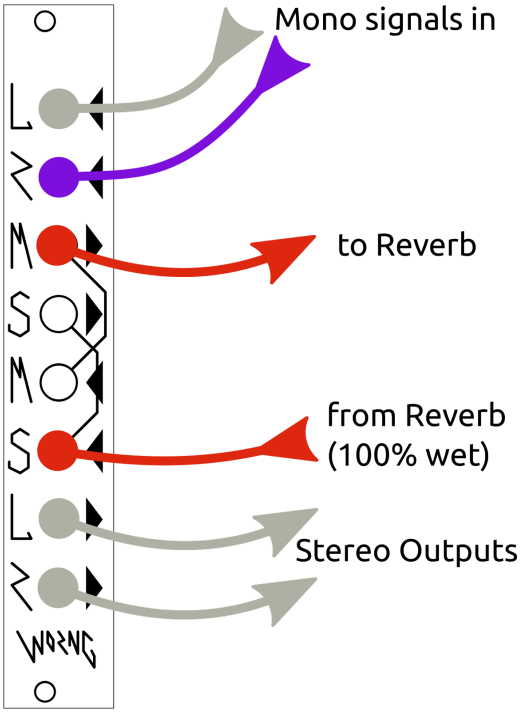
Stereo width enhancement:

Patch a stereo signal to the L and R inputs. Patch a HPF into the Side send and return, high pass to taste. Introducing positive gain will increase the width of the resulting stereo signal. Note that if you use a resonant HPF the added frequencies at the cutoff point will be added into the stereo signal out of phase with one another, so it's better to turn the resonance down.



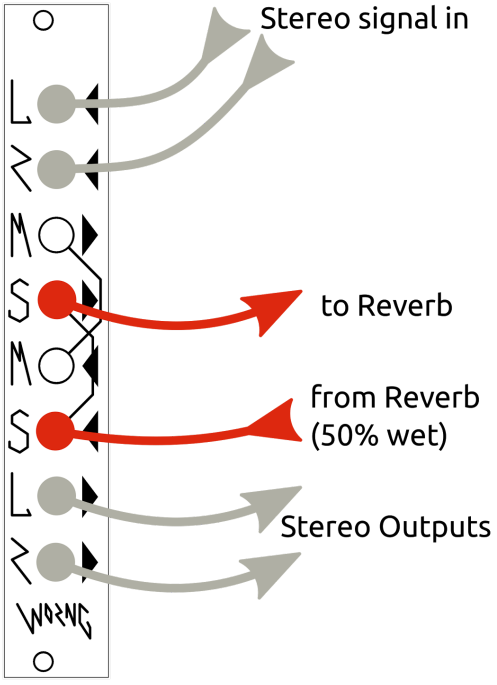
Stereo filtering without identical filters:

Patch your stereo signal to the Left and Right inputs, then patch Mid and Side outputs to the inputs of two filters. Patch the outputs of the filters back to the respective Mid and Side inputs and take the stereo signal from the Left and Right outputs. You can now dynamically modulate the two filters without worrying that your stereo image will be skewed by different filter responses, for example you can use 12 and 24dB/oct filters together, two filters that respond differently to control voltages etc, all the while keeping a symmetrical stereo image. Note that you may need to adjust for different amounts of gain between the two filters.



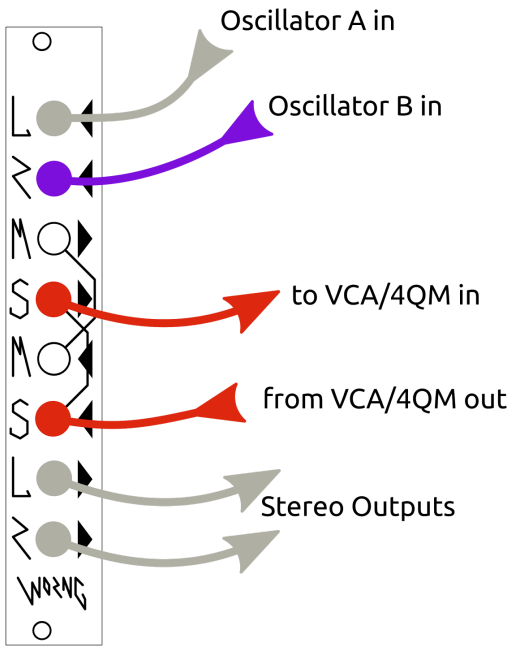
One-spring stereo reverb (mono source):

This patch works with either one or two mono signals. Patch signals to Left and Right inputs, patch Mid output to a spring reverb set 100% wet and then the output of the spring to the Side input. Take the stereo signal from the Left and Right outputs for a super wide stereo reverb, with the source signals in the middle of the soundstage.

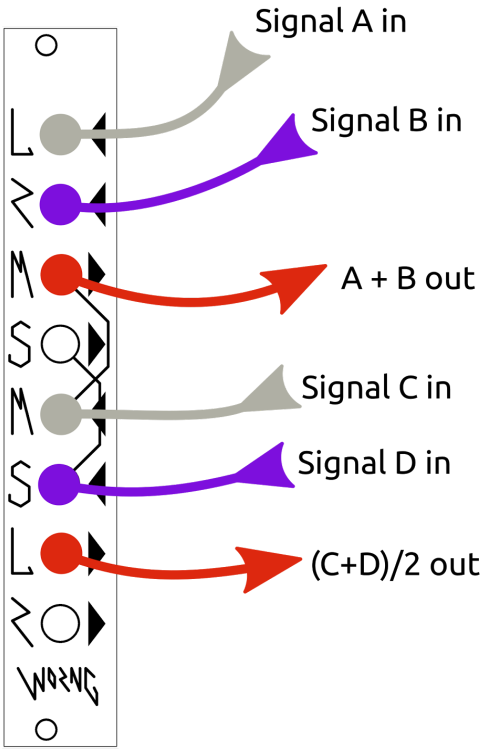


One-spring stereo reverb (stereo source):

Patch your stereo source to the Left and Right inputs, patch Side out to a spring reverb set set 50% wet, then patch the output of the reverb back to the Side input. Take your effected stereo signal from the Left and Right outputs. Note this patch will result in signals panned wider having more reverb on them than signals panned closer to the centre of the stereo image. This can come in handy if you have mono panned elements, for example kick drum, that you don't want to have reverb on.

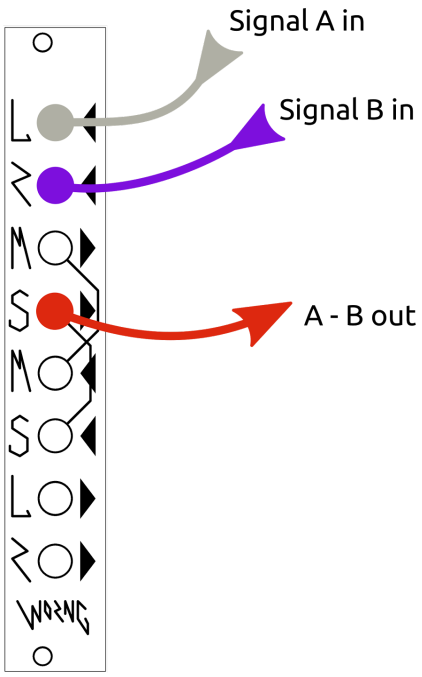


Stereo sideband creation:
Patch two oscillators detuned from one another to Left and Right inputs. Patch the Side output to a four quadrant multiplier (such as a Befaco A*B+C or Mutable Blinds) or VCA and back to the Side input, then modulate the 4QM or VCA with an audio rate signal (a third VCOs triangle or sine wave gets good results, but experiment to see what you like) to create wide and thick stereo sidebands. When the modulation frequency is a factor of the oscillator's frequency interesting harmonics start appearing. The advantage of using a 4QM over a VCA is that negative modulation will result in a reversed stereo image and the modulation will happen 100% of the time, as opposed to just the positive half of the modulation waveform with a VCA.

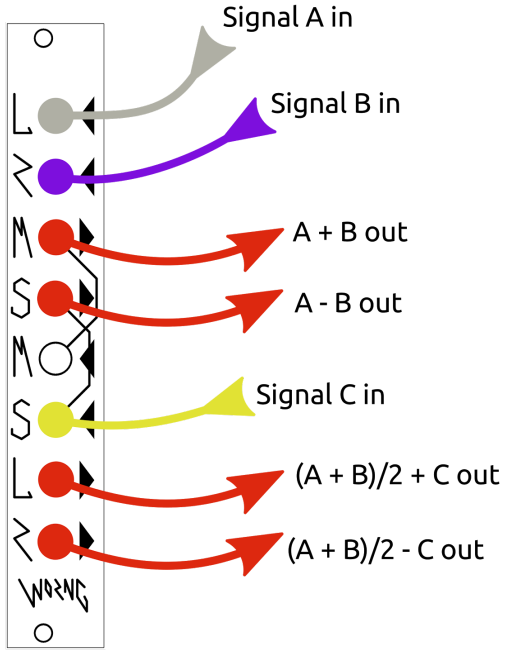


Unity mixer:
Patching two signals (A and B) to Mid and Side inputs will mix them with unity gain (A + B) at the L output.

CV averager:
Patch two CV signals (C and D) to the Left and Right inputs and take output from the Mid output, this will give you the mathematical average of the two input signals ([C + D]/2). This can also be used for a 1:1 mix of two hot audio signals with -6dB gain for extra headroom.



CV difference calculator:
Patch two CV signals (A and B) to the Mid and Side inputs and take output from the Right output. This will give you dynamic mathematical difference between your input signals (A - B).



Complex CV mixing:
Patch three CV sources (envelopes, LFOs, sequencers etc) to the Left, Right and Side inputs, take CV from Mid, Side, Left and Right Outputs which will be complex mixes of the input CVs which you can then use to modulate any other module you wish. If you like the sound of this then check out our Vector Space Module, it takes this idea and greatly expands it to get 17 different combinations out of three CV signals, based on a 3D vector model.

These suggestions should get you started with the LRMSMSLR but keep experimenting to invent new techniques, Mid-Side processing is a fairly new technique in modular synthesis and there are no doubt more

powerful patches waiting to be unlocked. If you come up with a new way of using the LRMSMSLR get in touch with us online and let us know!

Keep patching,

WORNG Electronics.