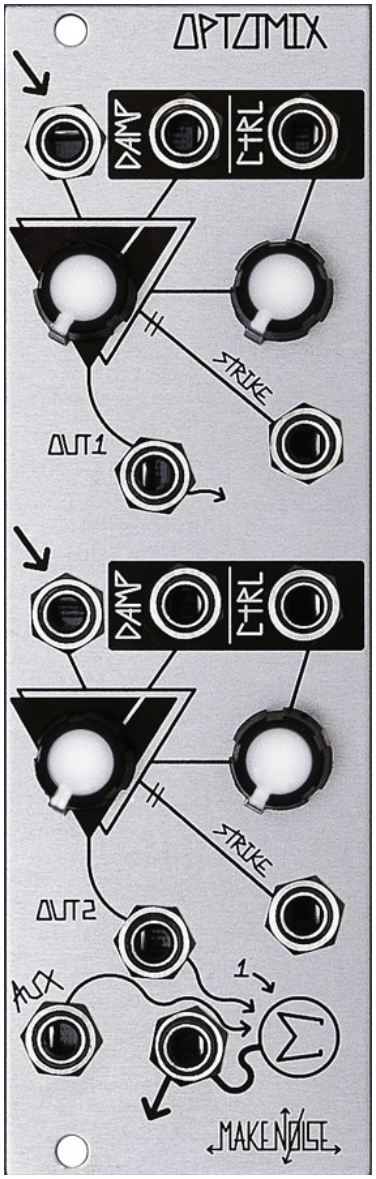
OPTOMIX



MAKENOISE

v2.4

Optomix

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Limited WARRANTY:

Make Noise warrants this product to be free of defects in materials or construction for a period of one year from the date of purchase (proof of purchase/invoice required).
Malfunction resulting from wrong power supply voltages, backwards or reversed eurorack bus board cable connection, abuse of the product or any other causes determined by Make Noise to be the fault of the user are not covered by this warranty, and normal service rates will apply.

During the warranty period, any defective products will be repaired or replaced, at the option of Make Noise, on a return-to-Make Noise basis with the customer paying the transit cost to Make Noise. Please contact technical@makenoisemusic.com for Return To Manufacturer Authorization.

Make Noise implies and accepts no responsibility for harm to person or apparatus caused through operation of this product.

Please contact technical@makenoisemusic.com with any questions, needs & comments, otherwise...
go MAKE NOISE!

http://www.makenoisemusic.com

THANK YOU QMMG.

About This Manual:
Written by Tony Rolando
Edited by Walker Farrell
Illustrated by W.Lee Coleman

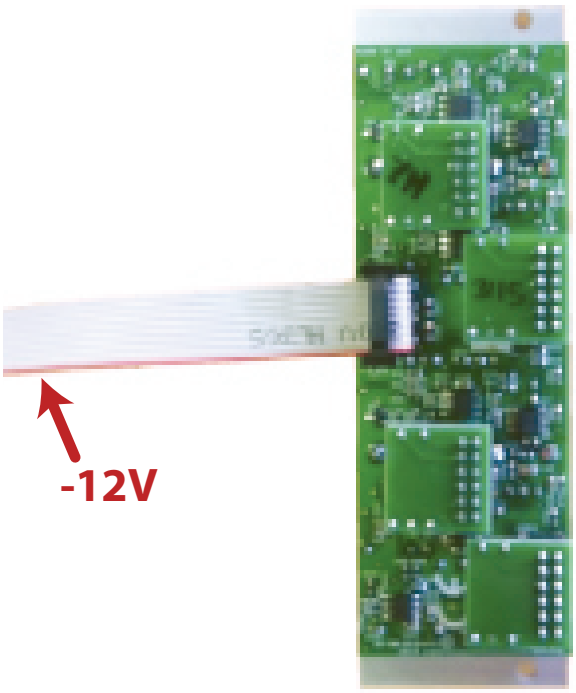
Electrocution hazard!

Always turn the Eurorack case off and unplug the power cord before plugging or un-plugging any Eurorack bus board connection cable cable.
Do not touch any electrical terminals when attaching any Eurorack bus board cable.

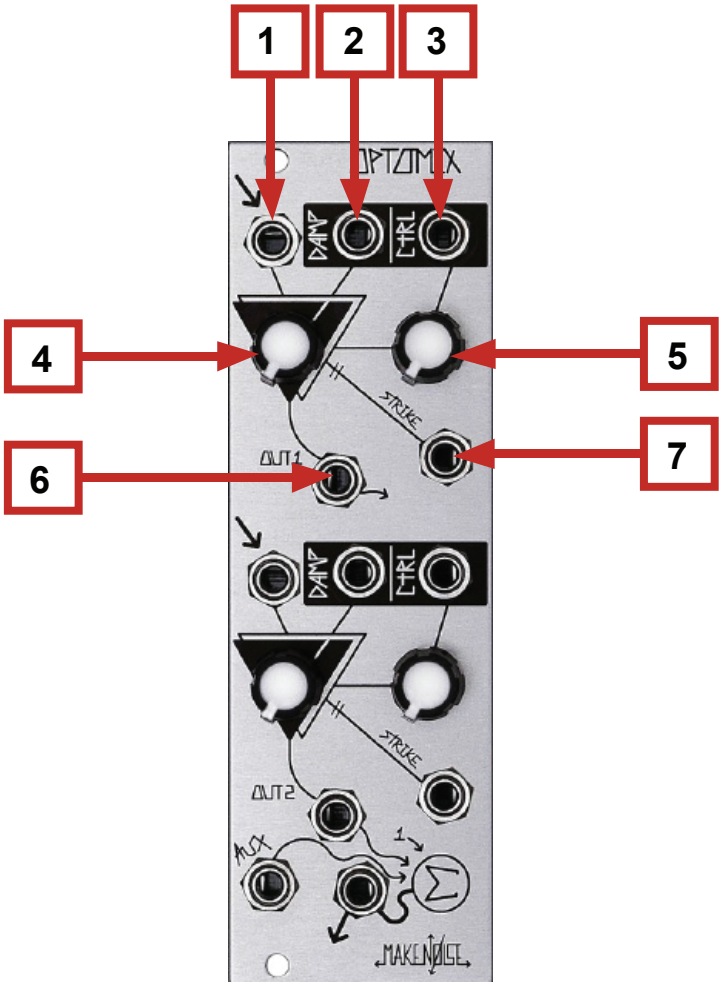
The Make Noise Optomix is an electronic music module requiring 25mA of +12VDC and 25 mA of -12VDC regulated voltages and a properly formatted distribution receptacle to operate. It must be properly installed into a Eurorack format modular synthesizer system case.

Go to http://www.makenoisemusic.com/systems.shtml for examples of Eurorack Systems and Cases.

To install, find 8HP in your Eurorack synthesizer case, confirm proper installation of included eurorack bus board connector cable on backside of module (see picture below), plug the bus board connector cable into the Eurorack style bus board, minding the polarity so that the RED stripe on the cable is oriented to the NEGATIVE 12 Volt line on both the module and the bus board. On the Make Noise 6U or 3U Busboard, the negative 12 Volt line is indicated by the white stripe.



Please refer to your case manufacturers' specifications for location of the negative supply.



Panel Controls

1. **CHannel 1 Signal INput:** Direct-coupled signal input capable of accepting audio or control signals. Range of up to 10Vpp.

2. **CHannel 1 DAMP CV INput:** CV input for the CHannel's DAMPing parameter, now capable of accepting audio or control signals. Normalized to +8V so that with nothing patched, the CHannel 1 DAMP Combo Pot operates as a manual control for the parameter. Range 0V-8V.

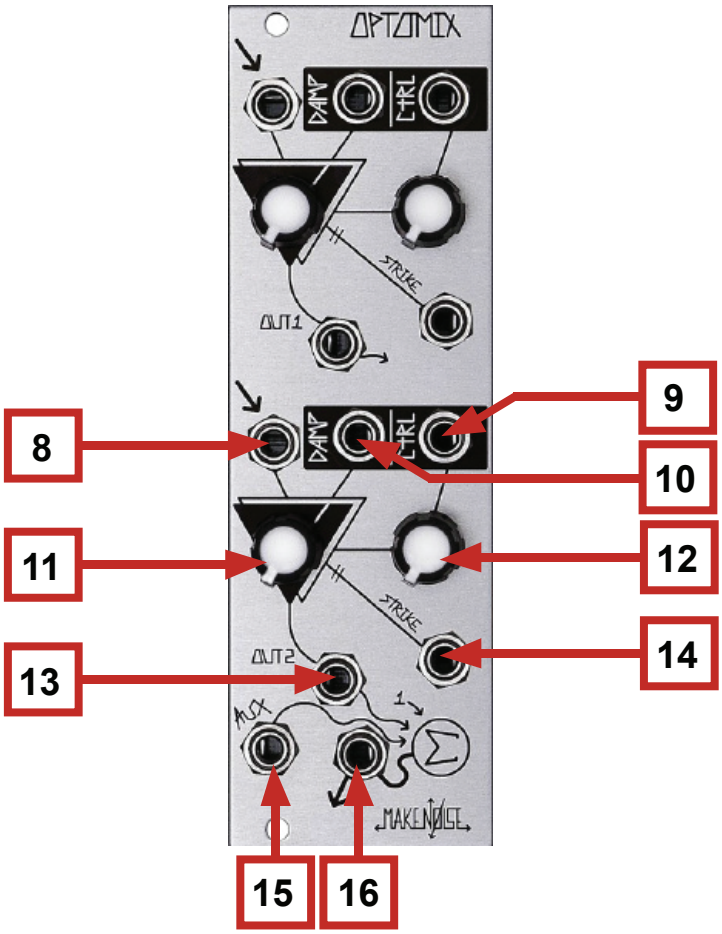
3. **CHannel 1 CONTROL INput:** Direct coupled, highly-sensitive CV input for the CHannel's vactrol VCA. Normalized to +8V so that with nothing patched, the CHannel 1 CONTROL Combo Pot operates as a level control for the Offset. Range 0V-8V.

4. **CHannel 1 DAMP Combo Pot:** Unipolar attenuator for DAMP CV INput. With nothing patched to the DAMP CV INput, operates as a manual control for the DAMP parameter.

5. **CHannel 1 Combo Pot:** Unipolar attenuator for CONTROL Signal INput. With nothing patched to the CHannel 1 Control Signal INput, operates as a level control for the Offset .

6. **CHannel 1 Signal OUT:** Output of the signal applied to the CHannel 2 input, as processed by the LPG. 10Vpp (depending upon settings and source material).

7. **CHannel 1 STRIKE INput:** Gate INput for striking or plucking the vactrol. Expects 8V Gate.



Panel Controls (cont'd)

8. **CHannel 2 Signal INput:** Direct-coupled signal input capable of accepting audio or control signals. Range of up to 10Vpp.

9. **CHannel 2 Control Signal INput:** Direct-coupled, highly-sensitive CV input for CHannel 2's vactrol VCA. Normalized to +8V so that with nothing patched, the CHannel 2 Combo pot operates as a manual control for the Offset. Range 0V-8V.

10. **CHannel 2 DAMP CV INput:** INput for CHannel 2's DAMP parameter, now capable of receiving audio or control signals. Normalized to +8V so that with nothing patched, the CHannel 2 DAMP Combo Pot operates as a manual control for the parameter. Range 0V-8V.

11. **CHAnnel 2 DAMP Combo Pot:** Unipolar attenuator for CHannel 2 DAMP CV INput. With nothing patched to the CHannel 2 DAMP CV INput, operates as a manual control for the parameter.

12. **CHannel 2 CONTROL Combo Pot:** Unipolar attenuator for CHannel 2 CONTROL Signal INput. With nothing patched to the CHannel 2 Control Signal INput, operates as a manual level control for the Offset.

13. **CHannel 2 Signal OUTput:** Direct-coupled OUTput of the Signal applied to the CHannel 2 INput, as processed by the LPG. 10Vpp (depending upon gate settings and source material).

14. **CHannel 2 STRIKE INput:** Gate INput for striking or plucking the CHannel 2 CONTROL vactrol. Expects 8V Gate.

15. **AUXiliary INput:** Direct-coupled signal input to the SUM circuit, allowing for the chaining of multiple Optomix and modDemix units to create larger mixes. Capable of accepting audio or control signals up to 10Vpp.

16. **SUM OUT:** The SUM or mix of all signals processed by the OPTOMIX is output at this jack. 10Vpp (depending upon settings and source material).

OPTOMIX is a two-channel **Low Pass Gate** that utilizes 4 vactrols in order to provide simultaneousvoltage-control over the Amplitude and Frequency content of a signal. It is in essence, a VCF-A (Voltage**OPTOMIXSUM**ming stage, complete with an **AUX**iliary INput allowing for the chaining of multiple units to create larger mixes (this also works well in combination with the modDemix).

The new **OPTOMIX** has the same sound and original feature set, save for one Normalization: CHannel 1 Signal OUTput is no longer Normalled to the CHannel 2 Signal INput. What we have added is the ability to allow **OPTOMIX** to be used as an Audio Compressor or CV Processor/Generator.

The **DAMP** parameter, unique to **OPTOMIX**, allows the artist to ProGraM the way the **Low Pass Gate**responds to a decaying control transient, such as an Envelope signal generated by MATHS or a Gateapplied to a CHannel's **STRIKE** INput (see below). **DAMP** is continuously-variable, allowing anything from a long, slow, ringing to a short, fast, and muted response.

The **STRIKE** INput allows the artist to use a typical 8V Gate signal to trigger the **LPG** (Low Pass Gate) circuit by "plucking" or "striking" the vactrol, thus allowing it to impart its magically-slow response time to the Amplitude of the signal being processed (this concept is also featured on the Make Noise DPO, MMG, LxD, and RxMx). Combined with the **DAMP** parameter, **STRIKE** allows for the programming of percussive sounds(i.e. sharp Attack with Voltage-Controlled Decay) without the need for a Voltage-Controlled Envelope Generator.

As a **VCA**, **OPTOMIX** has a moderate Attack response and slow Decay response, meaning that it turns onsound that is dynamically processed. Folks have often described the sound as "ringing," and while the circuit is not technically ringing, that does describe many of the sounds possible when using a **LPG** such as the **OPTOMIX** in order to process complex signals generated through FM or Ring Modulation.

As a **VCF**, it is a mild, non-resonant **Low Pass** circuit acting to gently reveal (or hide) the sharper edges of asimultaneous loss in high frequency content that is similar to the natural loss of energy in idio and membranophonic instruments.

PERSPECTIVE

OPTOMIX, being a vactrol-based circuit, will never have the speed or tight tolerances found in many other**VCA** and **VCF** circuits. I would recommend that musicians desiring closely matched gain across multiplechannels of **VCA**s look elsewhere! If you seek to ProGraM extremely short sounds, clicks, pops and ticks, **OPTOMIX** is not the best choice. What **OPTOMIX**smooth, natural sounding circuit.

It's a VCA, It's a VCF...

The **Low Pass Gate** operates simultaneously in the Amplitude and Frequency domains. As a **CONTROL** Signal becomes more positive, the Amplitude of the processed signal increases with the lower frequencies being more quickly amplified than the higher frequencies. As a **CONTROL** Signal become less positive, the Amplitude decreases with the higher frequencies being attenuated much sooner than the lower frequencies. The net effect is that fast, transient Amplitude Modulation of a signal's lower frequencies are more pronounced, lurking in the spectrum, while higher frequencies are eagerly diminished. Manual manipulation of the Panel Controls does not display this phenomenon well. A fast, short Envelope of around +8V, when patched to a **CONTROL** INput, provide a beautiful example of **OPTOMIX**'s ability to produce acoustic-like Attack & Decay transients. The processed signal appears to ring-- not unlike a struck drum, piano string, or xylophone bar.

The **DAMP CV** may lessen this ringing, not unlike applying your hand to the head of a drum while striking it, or muting a guitar string with your palm while plucking it. Increasing the **DAMP** parameter could be likened to applying greater pressure, or further muting, until finally, there is almost no ringing at all. In the past, it has been common practice to patch the output of a **Low Pass Gate** to a **VCA** in order to control the RINGING effect, while reducing or even eliminating the signal-bleed often associated with vactrol-based **Low Pass Gates**. The **OPTOMIX**'s **DAMP** circuit allows for this control without the use of an additional **VCA**. In order to control the ringing effect of a CHannel, adjust the associated CHannel's **DAMP Combo Pot**, or apply a **CONTROL** signal to its **DAMP** INput and adjust the **DAMP Combo Pot** for Attenuation. In order to reduce the signal bleed (when the Gate is closed), add a touch of **DAMP**ing.

CV Processing and Envelope Generation:

A Normalization of a positive Offset has been added to each CHannel's Signal INputs, which allows for level-shifting of CV, Envelope Generation, and even subtle, non-symmetrical clipping of signals.

To use the new **OPTOMIX** for Envelope Generation, patch a Gate Signal to a CHannel's **STRIKE IN**put and patch the associated CHannel OUTput to a modulation input of your choosing (e.g. the CV INput of a VCA). That's it. In a pinch, **OPTOMIX** may be used to generate an Offset, attenuate a Signal, and SUM a Signal with an Offset. This sort of Voltage MATH is what makes modular synthesis so much fun! Just be sure to set **OPTOMIX**'s unused CHannel's **CONTROL Combo Pot** Full CCW in order to avoid any unwanted Offsets. An **OPTOMIX** CHannel may also be used as a simple Slew Limiter, with "FALL" time set by the assocated CHannel's **DAMP** (**Note:** "RISE" time would be short and unable to be modified).

Sidechain Compression

A revised version of the **DAMP** circuit allows for Audio-rate signals to be used as Control Voltages. As a result, modulating a CHannel's **DAMP** parameter relative to its **CONTROL** parameter now causes **Gain Reduction**, with the Compression Ratio set by its **CONTROL** parameter. For the best results, the **CONTROL Combo Pot** should be set to around 50%.

Tips and Tricks:

The **DAMP CV** INput may act as an ACCENT parameter when utilizing the **OPTOMIX** in a sequencing patch. For example, patch your non-ACCENTed Envelope signal to a CHannel's **CONTROL** INput with the associated **CONTROL Combo Pot** set to about 70% for attenuation. Then apply an ACCENT GATE/signal to the **STRIKE** INput. Steps where the ACCENT Gate **STRIKE**s/is "high" will be LOUDER.

Now, let's add some **DAMP**ing to the above patch on the ACCENTed Steps by MULTing that same **ACCENT** Gate to the **DAMP CV** IN and setting the associated **DAMP Combo Pot** to taste (set to at least 20%). Next, set up a **Dynamic FM** patch using **OPTOMIX** to control the **DPO**'s **FM INDEX**. Rather than applying an Envelope to the **CONTROL** input, just patch a Gate to the **STRIKE IN**put and set the **DAMP Combo Pot** to taste. This is great for bursts of modulation and works with any mod source (e.g. LFO, Ran-dom, Noise, etc.) In order to emulate a palm-mute, apply your Gate signal to both a **STRIKE IN**put on the **OPTOMIX** and **MATHS** CHannel 1/4's **TRIGGER** INput. Set **MATHS** RISE Panel Control to have a long RISE time (i.e. at least 60%) with a short FALL time (less than 50%). Finally, patch the associated **MATHS** CHannel's Unity OUTput to the **OPTOMIX's DAMP CV IN**put with the associated **DAMP Combo Pot** set to at least 65%.

Side-Chain:

Patch an Audio-rate signal to a CHannel's **SIGNAL IN**put. The **DAMP IN**put acts as the *Side Chain Input* with the associated **DAMP COMBO Pot** setting the *Threshold*. The **CONTROL Combo Pot** determines the *Ratio*, with the best settings typically falling somewhere between 40% and 60%. The resulting sound is soft and squishy-- especially useful for creating ducking effects.

For instance, try using **OPTOMIX** CHannel 1 in order to generate a Kick Drum sound, patching the CHannel 1 **OUT**put to the CHannel 2 **DAMP** INput. Now, patch a drone to the CHannel 2 **Signal Input** and monitor the **SUM OUT**put. Finally, adjust the CHannel 2 **DAMP** and **CONTROL Combo Pots** to taste.

The New Bongo:
Set up a VCO for Two-Operator FM by applying a SINE wave to its Linear FM input and patching the resulting waveform to **OPTOMIX**'s CHannel 1 **Signal IN**put. Patch **PRESSURE POINTS Common Gate OUT**put to the **OPTOMIX**'s CHannel1 **STRIKE IN**put and **PRESSURE POINTS CHannel 3 GATE OUTput** to the **OPTOMIX**'s CHannel 1 **DAMP IN**put. Strike the "Bongo" by **<TAPPING> PP Touchplate 4** and "dampen" the bongo during or after striking it by **<TAPPING> PP Touchplate 3**. Use the **DAMP Combo Pot** to set the amount of DAMPening.

FM Pings:
Patch an FM source such as an audio-rate SINE wave to **OPTOMIX** CHannel1 **Signal IN**put. Patch the **CHannel1 OUT**put to the **Linear FM IN**put on **STO** or another VCO of your choice. Adjust **OPTOMIX CONTROL Combo Pot** full CCW (0%). Patch a Trigger or Gate source to **OPTOMIX** CHannel1 **STRIKE IN**put to "ping" the destination VCO with a short burst of FM. Adjust the **DAMP Combo Pot** to taste.