modDemix

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 manufacture.

Malfunction resulting from wrong power supply voltages, backwards power 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 Make Noise for Return To Manufacturer Authorization.

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

Please contact technical@makenoisemusic.com with any questions, needs & comments, otherwise...

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http://www.makenoisemusic.com

Thanx to Surachai for his help in beta testing, and to the electronic music pioneers who reclaimed radio communications tech for musical purposes.

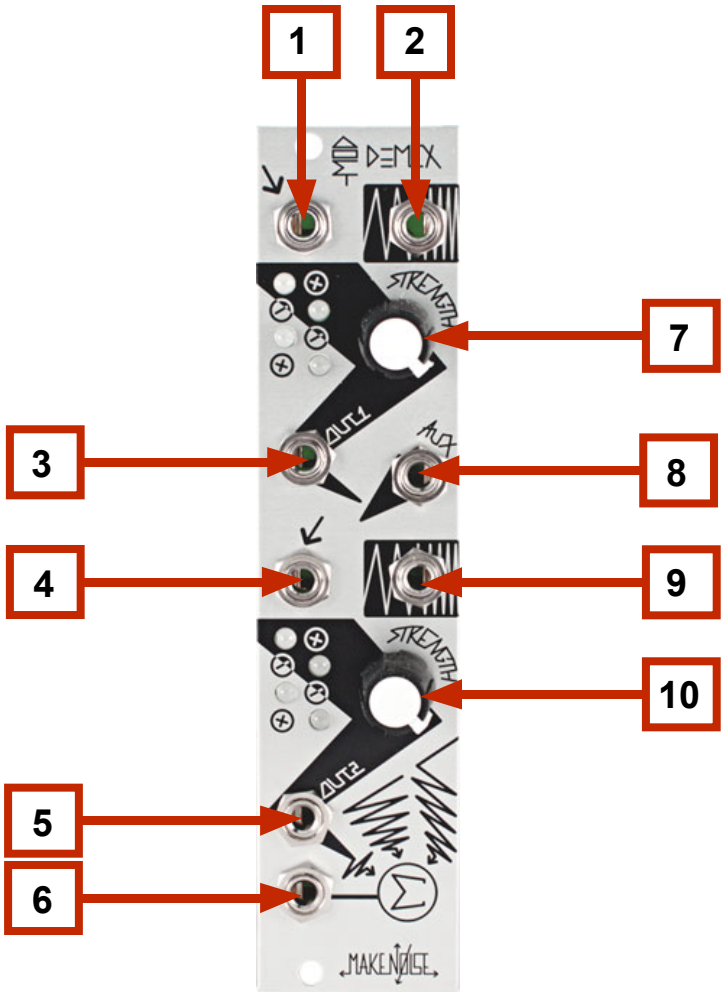
Installation:

The Make Noise modDemix is an analog electronic signal processor requiring 28mA of +/-12V regulated power and properly formatted distribution receptacle to operate. It is designed for use within the euro format modular synthesizer system.

Visit http://www.doepfer.de/a100_man/a100t_e.htm for the details of this format.

To install, find 6HP of space in your euro-rack synthesizer system, plug the 16pin power cable into the euro-rack style power distribution board, minding the polarity so that the RED stripe on the cable is oriented to the NEGATIVE12 volt supply line. This is USUALLY at the bottom.

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



modDemix Panel Controls

1. Signal 1 IN: signal to be processed.
2. Carrier/ CV 1 IN: determines amplitude & phase of Signal 1 IN. Normalled to Carrier/ CV.
3. Signal 1 OUT.
4. Signal 2 IN: signal to be processed. Normalled to Signal 1 OUT.
5. Signal 2 OUT.
6. SUM OUT: mix of Signal 1 OUT, Signal 2 OUT & AUX. IN v
7. Carrier/ CV 1 Strength: attenuator for Carrier/ CV IN.
8. AUXiliary INput to Summing stage: chain multiple units for larger mixes.
9. Carrier/ CV 2 IN: determines amplitude & phase of Signal 2 IN. Normalled to Signal 2 IN.
10. Carrier/ CV 2 Strength: attenuator for Carrier/ CV IN.

Getting to Know modDemix:

Standard AM, Balanced Modulation, Signal Multiplication, Frequency Mixing, Single Sideband, Double Sideband and even XOR (as in Boolean logic) have all been used to implement “Ring Modulators” for musical purposes in the last 50 years. In a way, Ring Modulation has become a catch-all term for music technology that results in a complex, clangorous, modulated sound.

The modDemix consist of 2 identical direct coupled circuits that may be used together or independently to process audio or control signals by means of amplitude modulation and the many derivatives of AM such as double/ single-sideband, voltage controlled amplification/ attenuation, voltage controlled polarization or multiplication and of course, ring modulation. The modDemix is a specialized amplitude modulation circuit that could be thought of as a “Thru-Zero VCA,” meaning that in addition to the AM, when the Carrier signal (called Carrier/ CV) changes phase, the resulting signal’s phase will flip as well. What makes the modDemix unique when compared to other Balanced Modulators, is that because it is Direct Coupled, it will perform wonderfully both as an Audio Rate modulator to implement Ring-Modulation, and as a Control Rate modulator to implement multiplication of control voltages. Additionally, the circuit used within the modDemix will, with ease, turn OFF around zero volts at the Carrier/ CV INput, a characteristic that makes the circuit behave very well as a VCA. Both of the circuits feed a SUMming stage, which thus allows the module to be used as a voltage controlled mixer. An AUXiliary IN allows for the chaining of multiple modDemix units to create larger mixes. An attenuator at the Carrier/ Control INput allows for setting the Strength or level of the incoming signal. When performing ring modulation, adjusting the strength of the Carrier will alter the integrity of the resulting modulated and/ or demodulated signal, thus affecting the timbre as well as the amplitude. When using the modDemix in most other ways, the Strength control will be directly related to the amplitude of the resulting signal.

To better understand the concepts of AM and it’s derivatives, patch a DC offset from CH. 2 of Make Noise MATHS (using associated panel control to set the level) to Signal IN of modDemix. Patch a DC offset from CH. 3 of MATHS to Carrier/ CV IN of the modDemix. Set modDemix Strength to full CW. Take output from Signal OUT on modDemix, patch to an Oscilloscope, DVM for visual feedback, or patch to the 1V/ Octave input on a VCO and listen to the results. Setting a +3V offset at the Signal in, and +5V offset at Carrier/ CV IN would result in a +3V Signal OUT. A +3V Signal IN and a -5V signal OUT would result in a -3V Signal OUT. Please note that because it is designed for musical purposes, the modDemix Carrier/ CV IN is scaled so as to operate with voltages typical of the euro format modular synthesizer, which is why it takes +5V at Carrier to generate the +3V Program Signal at the OUT.

Now replace the DC Offset signal patched to the Signal IN on modDemix, with that of a VCO, preferably a SINE waveform, at audio rate. Leave MATHS CH. 3 patched to Carrier/ CV IN. Patch modDemix Signal OUT to your monitoring system. Adjust MATHS CH. 3 from full CCW to full CW and observe the change in amplitude and phase. Listen for the point at which the sound goes “Thru-Zero.”

Now remove the DC Offset signal patched to the Carrier/ CV IN, and replace with the MATHS SUM OUT. Be sure to set MATHS CH. 2 and 3 to 50% (NULL). Leave the VCO patched to modDemix Signal IN. Initiate the CYCLE behavior on CH. 1 MATHS. Adjust the MATHS CH. 1 attenuvertor to around 3 o’ Clock. Observe standard Amplitude Modulation. Listen for the presence of Sidebands, and “Carrier Feed-Through.” Experiment with the rate of MATHS cycling, and the Strength control.

Using same patch as above, add a negative offset to the Cycling CH. 1 of MATHS, by adjusting CH. 2 panel control to full CCW. Observe Balanced Modulation. Observe the low amount of Carrier Feed-Thorough. Depending upon the Negative Offset added, the Carrier all but vanishes, making the resulting Sidebands more audible. This is the sound most commonly associated with Ring Modulation. Experiment with different amounts of negative offset, which could said to control the Depth of the Ring Modulation. Also experiment with different Carrier Strengths and observe the resulting timbre and amplitude changes.

Return the CH. 2 panel control to 50% (NULL). Set CH. 4 of MATHS for a slow Rise and Fall, and set the corresponding attenuvertor to about 10 o' Clock. Initiate the cycling behavior at CH. 4. Observe voltage control over Ring Modulation Depth. Experiment with combinations of DC Offsets (MATHS CH. 2), triggered or Cycling Offsets (CH. 4 MATHS) added to the Carrier (MATHS CH. 1). Patch a sequencer from Pressure Points to CH. 3 MATHS and add that to the Carrier (as generated by CH. 1 MATHS). Experiment.

Patch Ideas:

VCA
Patch signal to be processed (audio or control) to Signal IN. Patch uni-polar control signal such as Envelope, LFO, Pressure Points CV or gates, to the corresponding Carrier/ CV IN. Take output from Signal OUT. Use Strength to set the level of the resulting signal. If the Carrier/ CV Signal is oscillating at audio rate, you will achieve. Amplitude Modulation. Like Ring-Modulation, AM produces audible sidebands. The main difference is that the Carrier signal is not suppressed, so along with those sidebands, you hear the Carrier. Musically speaking, this sound is quite useful when a complex timbre is desired, but not at the loss of a strong root note.

Balanced Modulation, aka "Ring Modulation," aka Frequency Mixing
Patch audio signal to be processed to Signal IN. This will be the Program. The Carrier signal should be a bi-polar Audio Rate Signal such as a VCO (so it needs to swing from positive to negative). The resulting signal, at Signal OUT, will be the result of the Signal IN having both amplitude and phase directly related to that of the Carrier/ CV IN. To achieve single or double sideband, the balanced modulator is followed by filters tuned so as to eliminate all but one or two sidebands. Obviously, this is not entirely possible within the current synthesizer system, since it requires filters designed exclusively for the job, still many interesting timbres may be heard by using two band pass filters in parallel after the modDemix, for "Stereo-Quasi-Double-Sideband." Modulating the filter cutoff will animate the sidebands.

Control Signal Multiplication or Voltage Controlled Polarization
Same as Balanced Modulator patch, only both the Signal IN and Carrier IN are both Control Signals as opposed to Audio Signals. Use the signal patched to Carrier/ CV IN to multiply the Signal patched to Signal IN. Take output from Signal OUT. Remember the "Thru-Zero VCA" concept when trying to understand how to use this patch.

Voltage Controlled Mixer
Use the VCA patch, apply control signals such as the CV outs from Pressure Points, to the Carrier/ CV Ins of both channels. Take output from SUM out. Create larger mixes by chaining several modDemix together. To do this patch the SUM out from one into the Aux. IN on the next one in the chain, and so on, to create 2, 4, 6, 8 channel mixes.

Mod-Demod
To ease the patching of modDemod effects, Signal 2 IN is normalled to Signal 1 OUT, thus connecting the two circuits in series. Carrier/ CV 1 IN is normalled to Carrier CV 2 IN, so that in patching the desired Carrier Signal to Carrier/ CV 2 IN, the modulation and demodulation processes share a single Carrier Signal. Patch Signal to be processed to Signal 1 IN. Patch Carrier to Carrier/ CV 2 IN. Take output from Signal 2 OUT. The variation from circuit to circuit will introduce demodulation errors that sound as distortions. Using the Strength controls, it is possible to introduce more errors and to greatly reduce the integrity of the resulting signal. A nice variation on this patch uses a pair of independent Carrier VCOs, which are tuned to same frequency, but not synced. Variations in waveshape and Phase inaccuracies between the two VCOs will introduce more demodulation errors and distortions.

Octave UP
To ease the patching of octave UP effects. Carrier/ CV 2 IN is normalled to Signal 2 IN. Patch your signal to be processed to Signal 2 IN. Patch the Signal 2 OUT into Signal 1 IN, take the output from SUM OUT. Use the Strength controls to adjust timbre and blend of octaves.

DPO Supersaw
This patch uses voltage controlled inversion to derive a sawtooth wave from the DPO's Final Output. Mixing it with the VCOA Sawtooth produces a slightly unconventional, but nonetheless classic, supersaw.

Turn off all modulation to Final output parameters and the MOD BUS. Adjust FOLD panel control to ~9:00 so the output is full amplitude but with no folds yet. Adjust ANGLE panel control to 12:00, listening for the fullest sound available. Adjust SHAPE panel control full CW (100%) to "glitched triangle".

DPO Final OUT -> ModDemix Ch1 Input
DPO Square -> ModDemix Ch1 Carrier/Mod Input
ModDemix Ch1 OUTput -> Mixer
DPO Sawtooth -> Mixer

Mix and detune the two sawtooths to taste. The sawtooth derived from the FINAL output will be one octave above its original pitch, and it will also contain a slight "spike" at its peaks and troughs (because of its origins as a "glitched" triangle, as well as varying slightly in amplitude every other period (because of the DC offset in the DPO's square wave). Combined with the unusual sawtooth shape on VCOA, which has a stronger-than-usual fundamental, this patch produces a supersaw with character!

Voltage Controlled Crossfading and Panning with ModDemix and MATHS

Crossfading
Send two signals of your choice to the ModDemix Ch1 and Ch2 INputs. Select a positive-going Control Signal such as a MATHS/Function envelope or a sequence from Rene.

Set up a Voltage Mirror with MATHS
(Apply Control Signal to be mirrored to CH. 2 Signal IN. Set CH. 2 Attenuvertor to Full CCW. With nothing inserted at CH. 3 Signal IN (so as to generate an offset), set CH. 3 Attenuvertor to full CW. Take output from SUM OUT.) Note that if your Control Signal is from Ch1 or 4 of the same MATHS, use the variable (rather than Unity) Output to avoid having the original signal show up in the SUM again.

Using a multiple, patch the original Control Signal to ModDemix Ch1 Carrier/CV IN, and the mirrored version from MATHS SUM to Ch2 Carrier/CV IN. Monitor ModDemix SUM Out. Some adjustment of the MATHS Ch2 and Ch3 panel controls may be necessary to fine-tune the crossfader.

Panning
For panning, patch identically to the crossfading patch, except instead of two signals, mult the same signal to Ch1 and Ch2 on the ModDemix. Instead of monitoring the SUM Output, send the Ch1 and Ch2 outputs to Left and Right inputs on your monitor, or to whatever further signal processing stages you prefer.