

modDemix

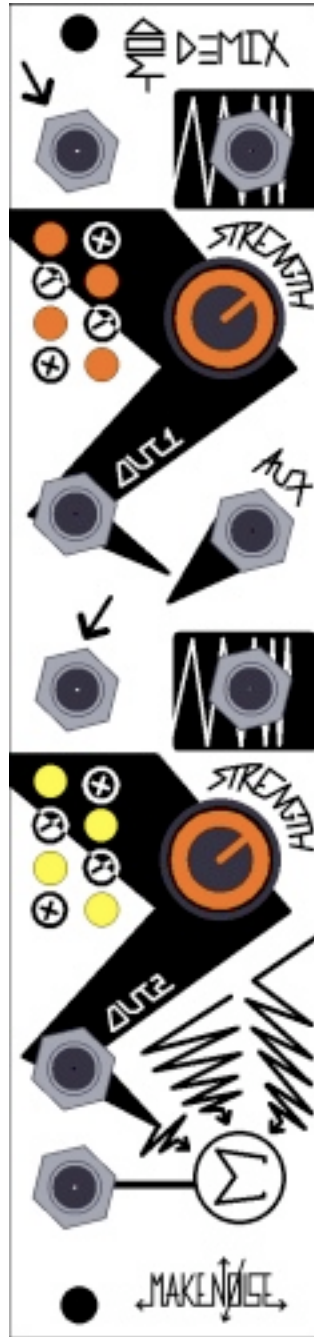
Signal 1 IN: signal to be processed.

Signal 1 OUT

Signal 2 IN: signal to be processed.
Normalled to Signal 1 OUT.

Signal 2 OUT

SUM OUT: mix of Signal 1 OUT, Signal 2 OUT & AUX. IN



Carrier/ CV 1 IN:
determines amplitude
& phase of Signal 1 IN.
*Normalled to Carrier/
CV 2.*

Carrier/ CV 1 Strength:
attenuator for Carrier/
CV IN.

AUXiliary Input to
Summing stage: chain
multiple units for
larger mixes

Carrier/ CV 2 IN:
determines amplitude
& phase of Signal 2 IN.
*Normalled to Signal 2
IN.*

Carrier/ CV 2 Strength:
attenuator for Carrier/
CV IN.

*All I/O Direct
Coupled for use with
audio or control
signals, range is
10Vpp, +/-5V*

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. Go to 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.

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 its 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 be 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 normalised 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.

Limited WARRANTY:

Make Noise warrants this product to be free of defects in materials or construction for a period of two Years 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 or apparatus caused through operation of this product.

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