

B W A V E R



BASTL INSTRUMENTS

WAVER



Introduction

Waver is a fully analog wave-folding mixer and signal disruptor inspired by experimental mixing techniques and mind-melting drones.

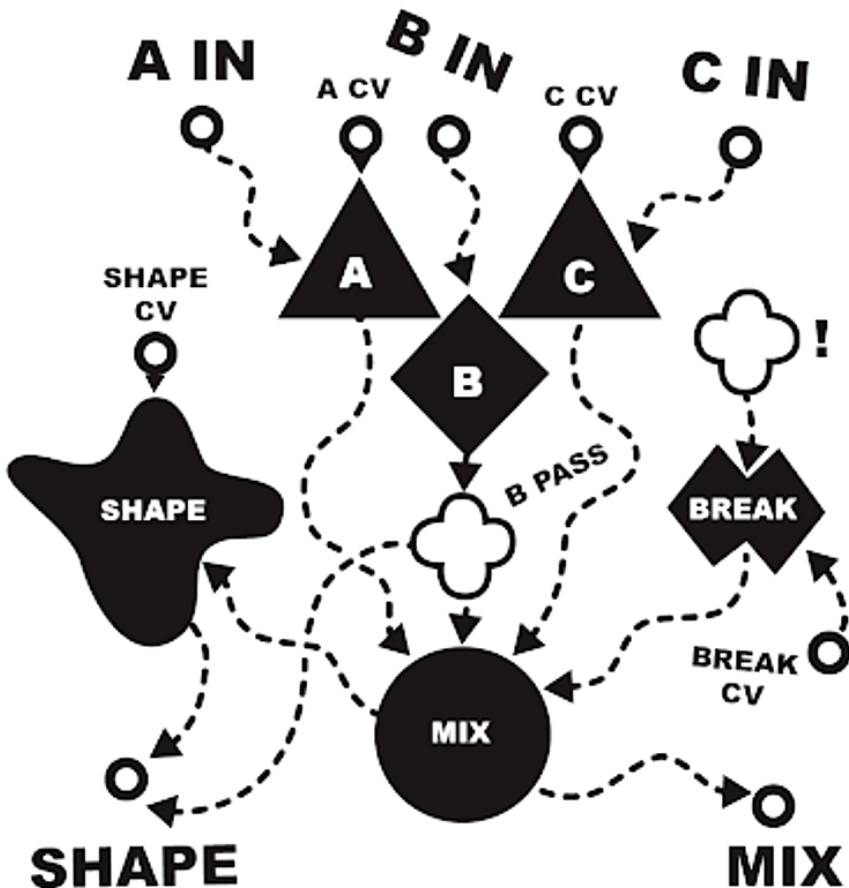
mix-shape-break

Features

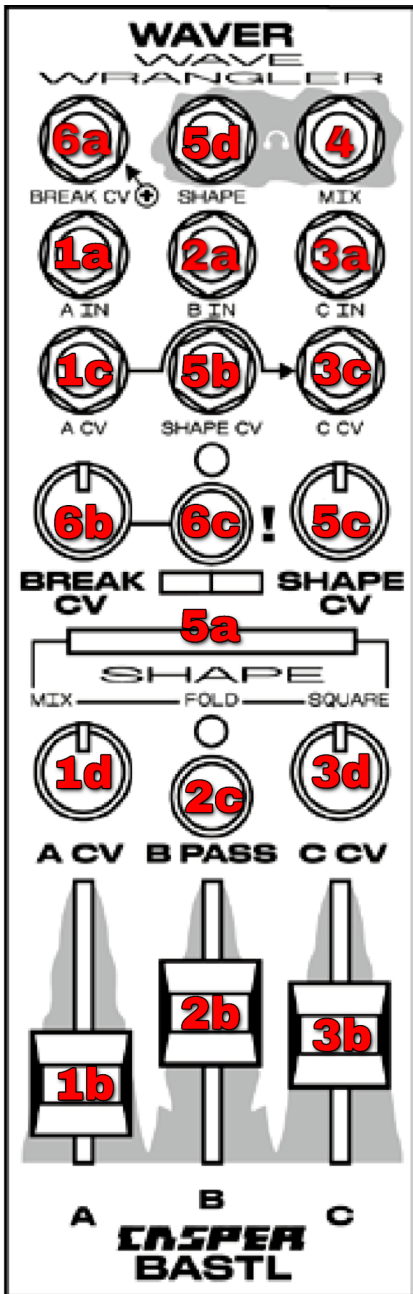
- 3-input mixer
- 2 bipolar VCAs
- wave folder
- square shaper
- pulse width modulator
- signal clipper & feedback
- 2 outputs pre and post shaper

Technical details

- 8 HP
- PTC fuse and diode-protected 10-pin power connector
- 24mm deep
- power consumption +12: < 130mA; -12V: <85 mA



HARDWARE



A IN – *Bipolar VCA*

1a A INPUT JACK

Input to A VCA.

1b A AMPLITUDE FADER

Apply voltage to the A amplitude CV level.

1c A CV INPUT JACK

Add or subtract voltage from the A amplitude CV level.

CV range = +/-5V.

The signal plugged into this jack is normalized to the C CV input jack.

x

1d A CV POT

Attenuate CV from the A CV jack.

NOTE: *Because this is a bi-polar VCA, when the amplitude CV goes negative, the A input signal inverts.*

B IN – *Direct input to mixer with switch to bypass the SHAPE section*

2a B INPUT JACK

Input to mixer.

2b B AMPLITUDE FADER

Manually set the amplitude of the B input signal.

2c B PASS PUSHBUTTON

Press to bypass the shaper.

C IN – Bipolar VCA

3a C INPUT JACK

Input to C VCA.

3b C AMPLITUDE FADER

Apply voltage to the C amplitude CV level.

3c C CV INPUT JACK

Add or subtract voltage from the C amplitude CV level.

CV range = +/-5V.

The A CV input signal is normalized to this jack. Plugging in a cable to C CV will disconnect this normalization.

3d C CV POT

Attenuvert CV from the C CV jack.

NOTE: *Because this is a bi-polar VCA, when the amplitude CV goes negative, the C input signal inverts.*

4 MIX OUTPUT JACK

This jack outputs a mix of inputs A, B, C, and BREAK. This signal can be used as a pre-shaper mix out, but has also been designed to be used for making feedback loops to any unused input.

SHAPE SECTION

5a SHAPE CROSSFADER

Fade from clean mix to wave-folded mix to folded and squared mix.

5b SHAPE CV INPUT JACK

Apply CV modulation to the SHAPE level.

5c SHAPE CV POT

Attenuate CV from the SHAPE CV jack.

5d SHAPE OUTPUT JACK

Final output signal post-shaper with soft clipping and bass boost.

BREAK CONTROL

6a BREAK CV JACK

Apply CV modulation to the BREAK level.
CV range = +/-5V.

6b BREAK CV POT

Attenuate CV from the BREAK CV jack.

6c ! PUSHBUTTON

Press to activate feedback distortion mode.

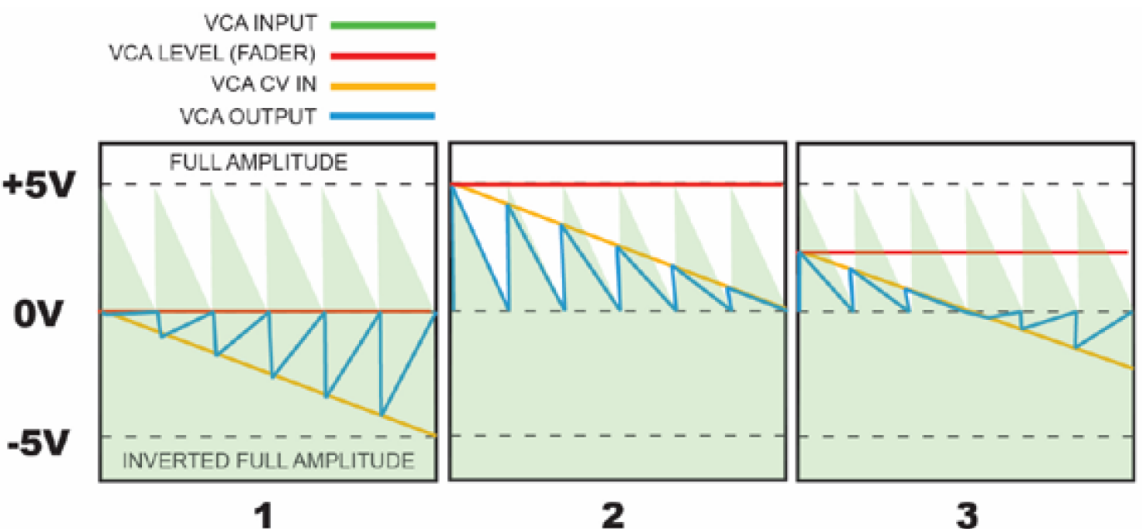
MIX

3-input signal mixer with bi-polar amplitude control and a shaper bypass switch

Waver has 3 main inputs labeled A, B and C, each with its own level fader. Inputs A and C pass through bi-polar VCAs with dedicated CV jacks.

Input B has no CV but has a B PASS switch that allows channel B to be punched in and out of the shaper section.

NOTE: *Bi-polar VCAs invert the incoming signal when negative voltages are applied to the CV inputs. This is also known as a thru-zero VCA or signal multiplier. Notice how the VCA LEVEL fader can be used to offset the CV level in the images below. Take note of image 3, where the output goes silent as the CV crosses zero.*



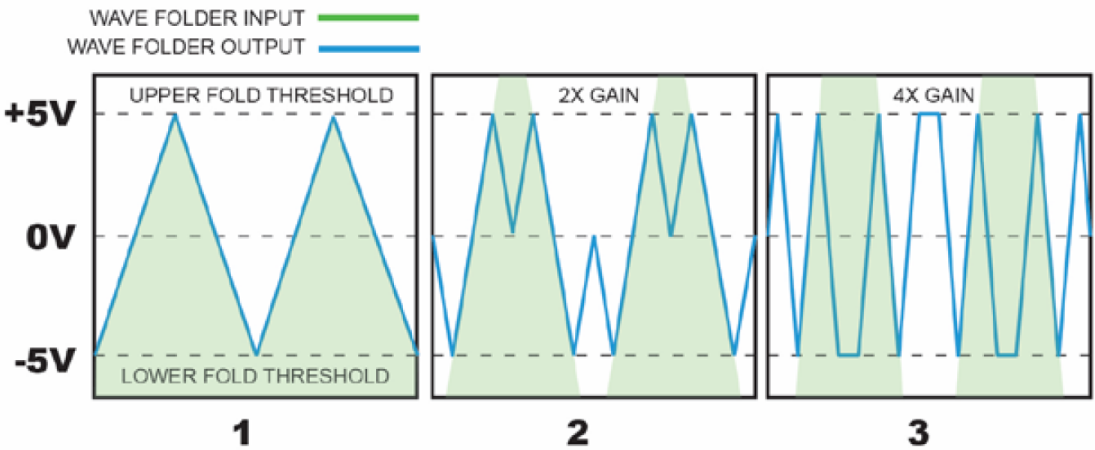
SHAPE

Voltage-controlled waveshaper

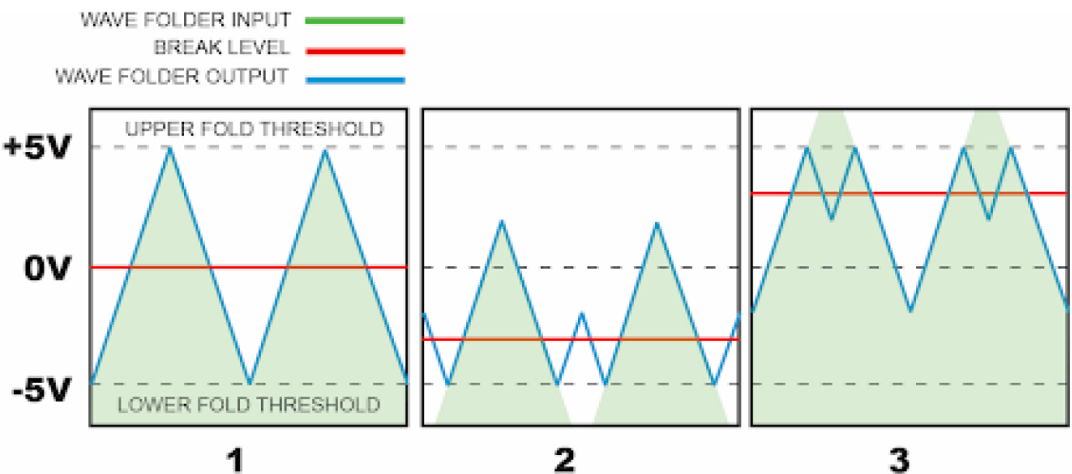
Add harmonic complexity to your mix with wave folding and squaring

WAVE FOLDER

A, B, C, and BREAK are mixed and then passed on to the SHAPE section where the mixed signal passes through a wavefolder. This function increases harmonic complexity by folding a waveform when it exceeds a given threshold. This introduces high harmonic content and frequency multiplying effects. The diagram below shows how increasing the amplitude of the incoming multiplies the signal frequency.

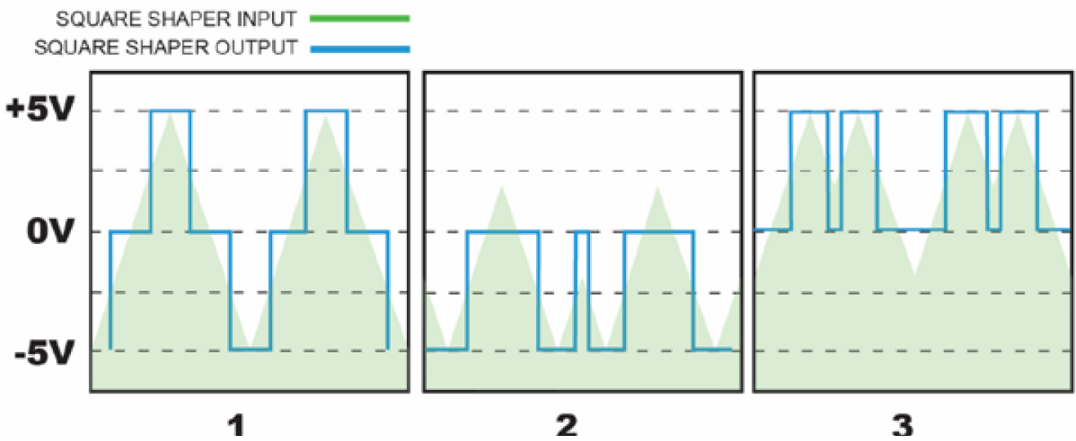


Wave folding can also be achieved by offsetting the waveform with the Break level. This is similar to the effect above but with a more subtle sonic effect. The drawing below shows the wave being offset up and down in turn, causing the top and bottom peaks of the wave to fold.



SQUARE SHAPER

The output of the wave folder is routed to a square shaper stage that converts the waveform into a 3-step square wave. This gives the sound a harder and harsher sound, but it can also be used as a flexible pulse width modulator when processing simple waveforms.



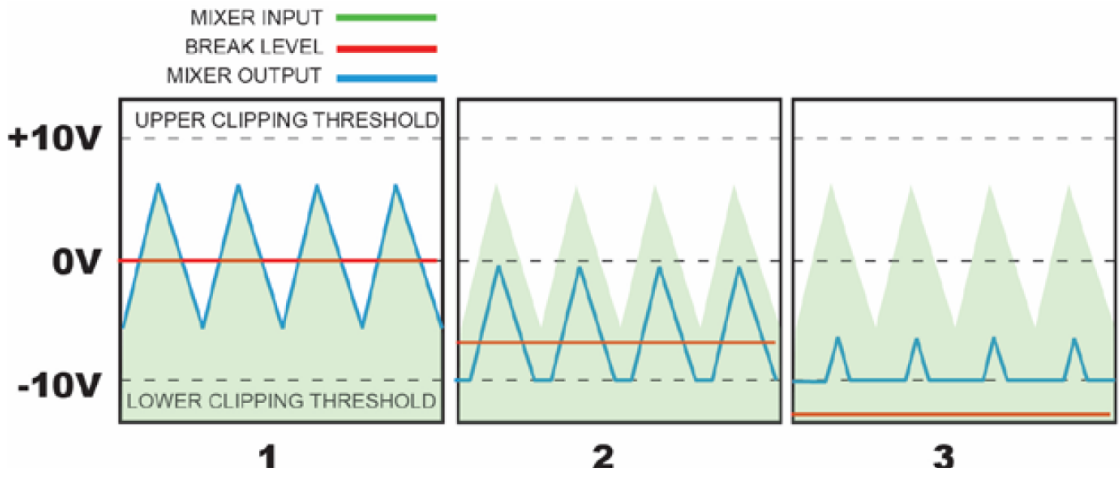
BREAK

Signal disruption

Break has two modes, clipping and feedback, which will disrupt your signal in different ways. Feedback mode is activated by pressing the button marked “!”.

Clipping mode applies a DC offset to the mix pre-shaper. This can be used to offset the audio signal into a clipping region where it becomes sonically thinner and quieter (see image below). You can think of this sort of like an inverse VCA where applying voltage decreases the density and volume of the sound.

Feedback creates similar sound-dissolving effects as well as distortion and input-synced suboctave oscillation. In this mode, the square output of the shaper is looped back to the input of the mix via the Break CV knob. External CVs can be used to modulate the amount of feedback.

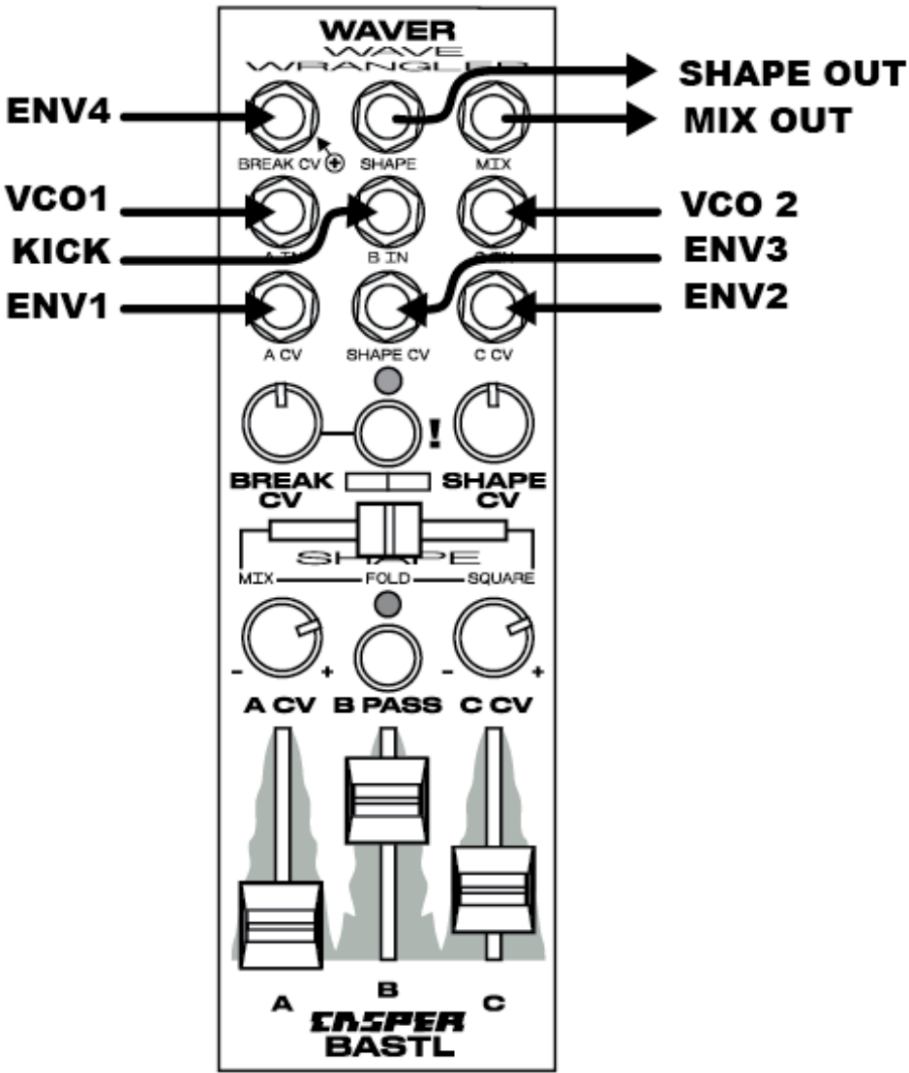


This image shows the input signal being negatively offset by adjusting the BREAK level in offset mode. This effect can range from subtle to extreme depending on the amplitude of the incoming signal and the amount of offset applied.

QUICK START

How to make pulsing, mind melting drones

- Plug slightly detuned VCOs into A IN and C IN.
- Create a sequence of gates to trigger a kick drum and 4 envelopes.
- Plug the kick drum into B IN and press the B PASS button.
- Plug rhythmically triggered envelopes into all other inputs.
- Play with all the levels.
- Press B PASS to rout the kick into the shaper section.
- Unplug the envelope from the Break CV input. Adjust the Break CV knob to hear how the drone gets thinner and more distorted.
- Press the “!” button to activate feedback mode. This works best with steady drones, so it may be better if you turn down the modulation on A and C.



mix-shape-break

TIPS AND TRICKS

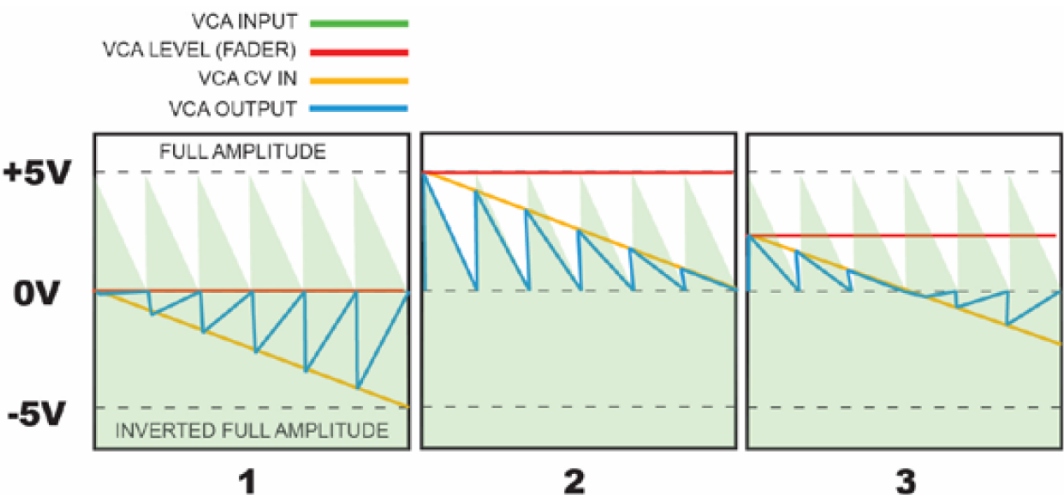
MAKE IT DRONE

- Plug 3 slightly detuned triangle wave oscillators into inputs A, B and C.
- Set the SHAPE fader to FOLD.
- Play with the input levels and detuning of the oscillators to change the character of the drone.
- Plug rhythmically synced LFOs or envelopes into any or all of the CV inputs.

PULSE WIDTH MODULATION

- Set the SHAPE fader fully to SQUARE (to the right)
- Plug a triangle wave into A IN. Play with the A volume fader to change the pulse width.
- Adjust the BREAK CV knob while in offset mode (“!” light is off). This will change the pulse width in a less pronounced way.
- Plug an envelope or LFO into C IN and adjust the C volume fader. The A, B, and C inputs aren’t only for audio; this patch makes it especially obvious why.
- Plug another envelope or LFO into A CV.

VCA CV TRICKS



See the diagram above. Ponder the diagram above... This shows how the fader offset level affects the behavior of the

CV signal. If the offset fader is all the way down, as shown in image 1, then the amplitude will increase (albeit inverted) with a down-sloping envelope. If the fader is UP (image 2), the volume will DEcrease with the same envelope. And if the offset is in the middle, you can get a decrease and then increase with that same envelope. So you can change from a fade-in to a fade-out just by adjusting the fader.

- Plug a VCO into A IN and a positive (uni-polar), repeating envelope into A CV.
- Set the fader all the way down and turn the A CV attenuverter halfway to the left. You will hear the sound fade out with the envelope.
- Raise the fader all the way, and you will hear the sound fade IN with the envelope.
- Set the fader in the middle to hear the interesting effect as the envelope goes above and below zero.

CROSS FADING

The A CV input signal is normalized to the C CV jack. Both of these inputs are attenuverted, so by turning the A CV knob right and the C CV knob left, you will be inversely modulating the amplitude of inputs A and C which will result in cross-fading your inputs.

- Plug two audio signals into A and C. Set A and C faders to the middle position.
- Plug an LFO or envelope into A CV. Adjust the A CV knob to the right of the center. Adjust the C CV knob to the left of the center.
- The LFO can now be used to cross-fade between input A and input C.

mix-shape-break

DUAL MODULATION EXTREME

Apply several levels of modulation to a single input signal. This trick sort of flips the module on its head. You will use A CV as your main audio-in and A IN and C IN as CV inputs. It's confusing, but it works and sounds great.

- Set the SHAPE fader to MIX.
- Plug two different LFOs or envelopes to A IN and C IN.
- Set A and C faders all the way down.
- Plug an audio signal into A CV. This will be normalized to C CV as well.
- Play with the A CV and C CV attenuverters to change the amount of modulation to the audio signal.
- Now adjust the fader levels. This will add the IN signals to the main mix, which will have a strong effect on the signal when it's folded. Try it.

RING MODULATION

Inputs A and C are fed through bi-polar VCAs. This means that if the CV input goes negative, the amplitude of the input signal will increase but will be inverted (as opposed to a standard VCA, which goes silent if the CV drops below zero). This is the function a ring modulation employs to get its signature sound.

- Plug an oscillator or drum voice into input A and set the fader A all the way down.
- Plug a simple waveform, like a sine wave, into A CV and turn the A CV attenuator up.
- You're ring-modulating now, buddy.

TECH NOTE:

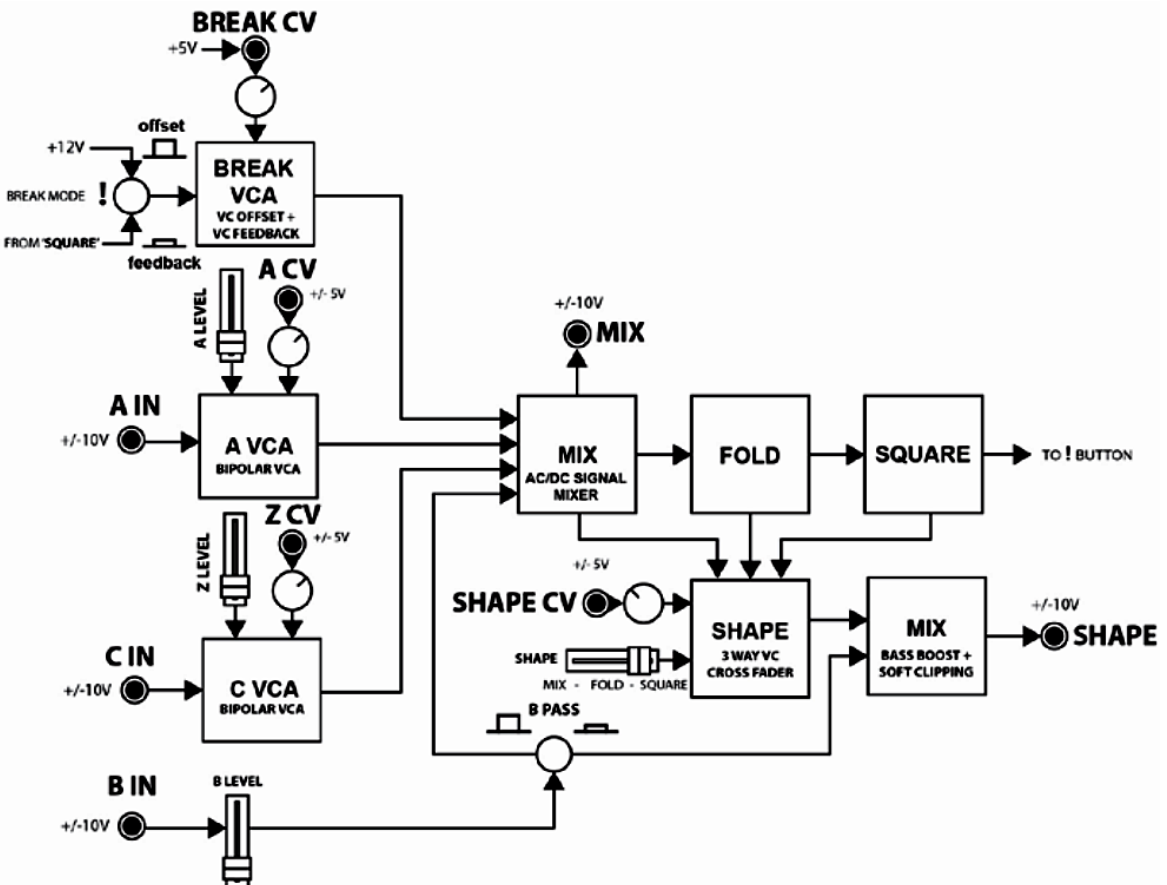
One thing to keep in mind that differentiates the WAVER VCAs from standard ring mods is that the A and C faders are DC offsets for the VCAs. (Most ring mods have volume control for the input but no amplitude CV offset control. We

find our configuration a bit less intuitive but far more flexible and useful.) So even if you feed a negative voltage to the CV jack, the offset level may keep the total voltage from going negative. To achieve negative-voltage modulation, you may need to put the fader all the way down to zero.

STEREO OUTPUT

Under the right conditions the SHAPE and MIX outputs can be used together to create interesting stereo images. The key is to play with the BREAK and SHAPE settings. As these are adjusted, the stereo image will move and transform. Works especially well when audio signals are used and plugged into the BREAK and SHAPE CV jacks.

BLOCK DIAGRAM



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more info

and video tutorials

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