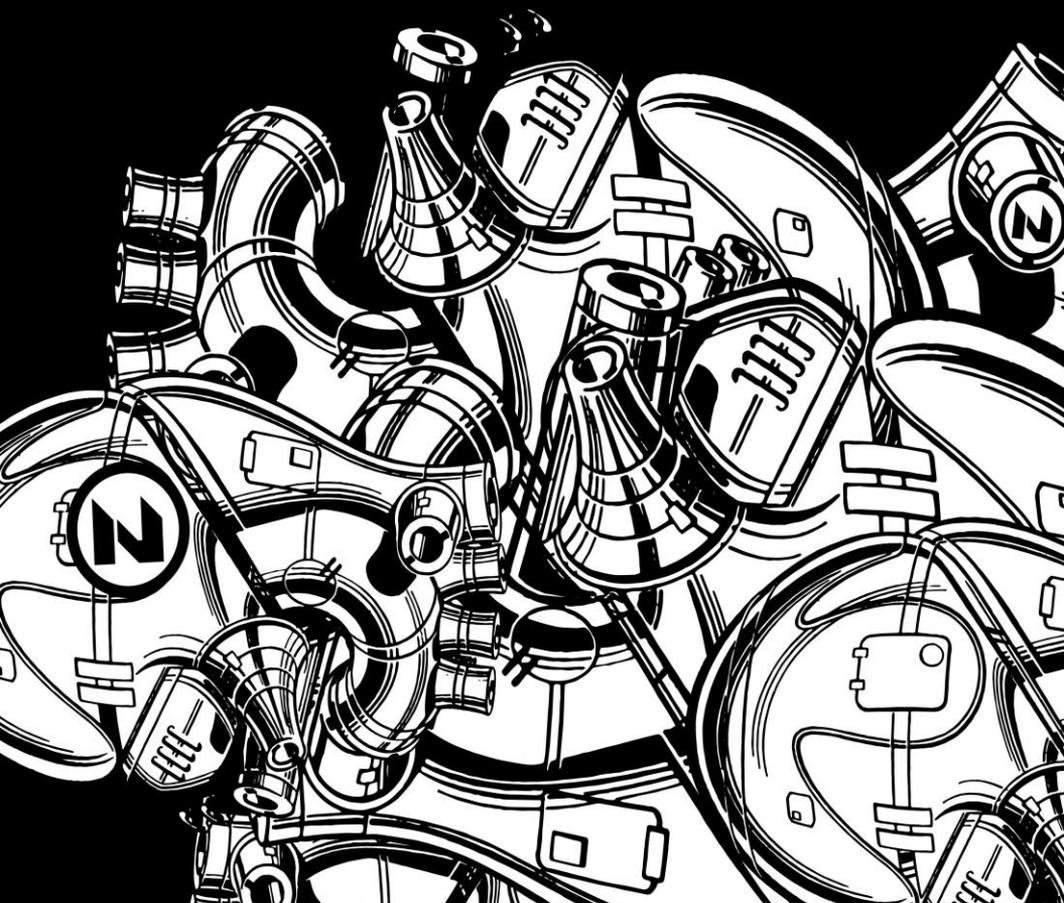


# ORGONE ACCUMULATOR



# USER GUIDE

## Neutron-sound Orgone Accumulator

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# Overview

- The Orgone Accumulator is a digital phase accumulator oscillator module capable of creating a wide range of timbres.
- The basic function is to dynamically scan between 3 selectable waveforms..
- You can select one of are 8 "effects" programs, most of which have bipolar variation.
- Each wave position can have the effect enabled or not, and the effect will also be mixed accordingly.
- There is a global modulator which has index and frequency control
- The Orgone Accumulator has built in non-volatile memory to retain the settings on power down
- The main output is 16 bits playing at a sample rate of 50khz with interpolation, and a 4 pole output filter at 19khz. There is a 1 bit pulse sub oscillator with variable pulse width.
- The **POSITION**, **EFFECT**, **INDEX** and mod **FREQUENCY** controls have bipolar invertable attenuators ("attenuverters")

*The orgone accumulator circuit is designed by Jim Matheson of Neutron sound*

*Control and panel layout and Art: Jim Matheson.*

*Programming: Jim Matheson.*

*Cover Art: Kris Northern.*

# Quick start

The Orgone accumulator module can seem daunting because it has so many Controls, but it is not hard to learn, you should soon get it.

- Connect the main out to a filter or VCA with an envelope control voltage, (or whatever you would normally connect an oscillator).
- Connect a 1V/octave source such as a sequencer or keyboard to the V/OCT input.
- Connect a gate or trigger source such as a sequencer or keyboard
- Set the **EFFECT** control to near the middle position
- Disable the 3 effect enable buttons. (button in the up position)
- Disable Pulsar(LOCK), FM, and X )
- Turn the **INDEX** and **POSITION** controls fully counter clockwise.
- Turn the **A** wave selector somewhere that is not fully clockwise.

Now you can play notes and listen to the waves on position **A** by turning the **A** wave control.

Turn the **POSITION** control and you will see the position indicator LEDs light under the appropriate wave selector, and the wave will gradually change to what is selected there. Try changing those as well and hear how the sound changes.

Try enabling the effect under one of the **A**, **B** or **C** positions.  
Adjust the effect value while you scan to and from that position.

Try turning up the **INDEX** control and adjusting the **FREQUENCY** control, try it with FM turned on and off, pulsar (LOCK) turned on and off. And how **X** effects the top **C** scan position.

Try switching effects. Just press the effect select button, the led will flash indicating the current effect. You can change to a different one by pressing the button for it (see the effects page for details)

# Potentiometers

**1:** The **TUNE** control has a range of 3 octaves in semitone steps. **FINE** tune has 4 semitones. Continuously variable.

**2 A,B,C wave:** main wave selectors: select the waveform played in each of the 3 positions. Some of the waves are different in normal, FM, and pulsar modes. The selectors have stepped or smooth transition depending on the active effect.

**3: POSITION:** this controls a 3 way mixing scanner that fades between the 3 wave positions. The position is indicated by the LEDs below the main wave selectors.

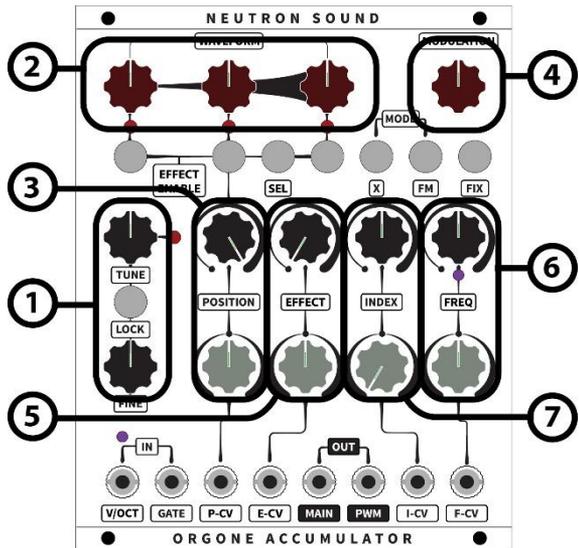
**4: MODULATION** wave selector. This determines the shape of the wave that is used with the modulation modifier. Some are different depending on mode (context aware)

**5: EFFECT:** a bipolar control for the current effect. Variations for positive and negative values (on 2014 panels this is called **detune**)

**6: mod FREQUENCY:** controls the frequency of the modulator, or in pulsar mode, the rate of the pulsed wave.

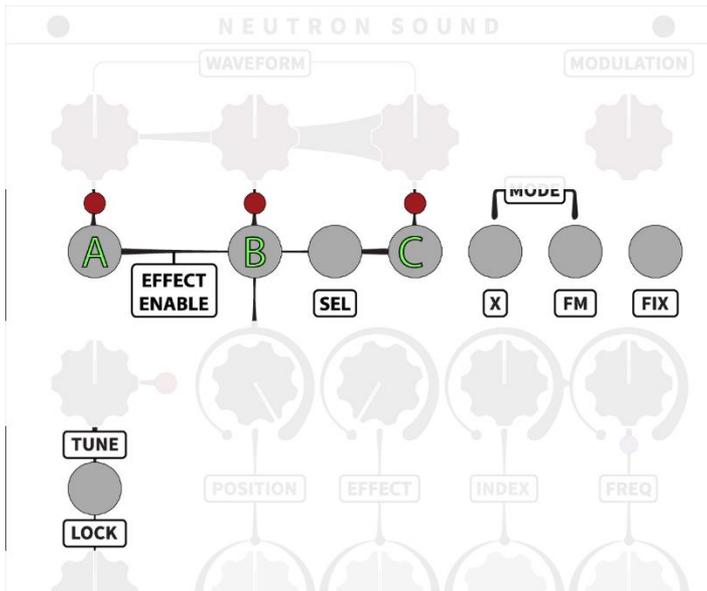
**7: INDEX:** this controls the amount of modulation in normal and FM modes, and the width of the grain envelope in pulsar mode.

**POSITION, EFFECT, INDEX** and Mod **FREQUENCY** have convenient attenuverters\* to control CV modulation.



\*a modular synth community made up word for "invertable attenuator"

# Buttons



**A,B,C:** position effect enable. Turns on the effect for position a,b and c

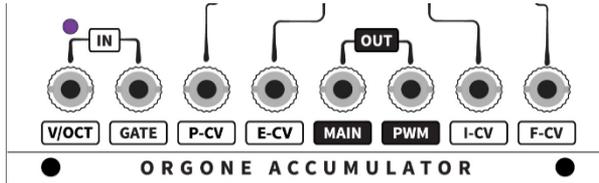
**Tune lock** turn pulsar mode on. The tune lock original function may be restored by editing the config tab before uploading the firmware

**SEL:** effect select cycles through the 8 effects. The LEDs will light up in a binary pattern to indicate the effect. Number. The effect is remembered when the power is turned off.

**X:** modifies the behavior of the **C** position. It uses the wave selected for the **B** position but the pitch is raised or lowered. This allows a subtle bend on a note attack to crazy effects.

**FM:** turns on FM mode. The modulation frequency is quantized while **FIX** is not enabled, with **FIX** enabled the mod frequency has a wider range and it can work as a LFO.

**FIX:** disables the Modulator tracking the v/oct input and tune controls. In FM mode the quantization of the FM frequency is disabled, and the frequency can be turned quite low for LFO effects.



## INPUT and OUTPUT JACKS

**1V/OCT:** controls the frequency of the oscillator with a standard 1 volt per octave. There is just over 4 octaves in range.

**RESET:** trigger or gate sets all the oscillators to zero phase, also triggers the drum effect. (trigger level is about 1.6v)

**MAIN:** the main output

**PWM** a rather crude PWM sub oscillator. The pulse width varies from 50% to about 4% with the index control,

**CONTROL CV:** Inputs for the attenuverter controls indicated with the line above each jack..

Note on polarity: *while the inputs are bipolar, apart from the Effect value, the controls work from 0 to a positive number. That means if the control is at zero (fully counter clockwise) a negative CV will not do anything. Turning an attenuverter below 12 o'clock will invert the input control voltage.*

## CV input normals

There is an option for the CV jacks for **EFFECT**, **INDEX**, and **FREQUENCY** to default to the **POSITION CV** input when no jack is connected. This will allow you to use one modulator for all of them, but it can sometimes be difficult to exactly center an attenuverter if you want no modulation at all.

On older boards (green) that is the default behavior, and a trace has to be cut to modify it.

On newer boards (black) there is a jumper near the bottom left of the board. It may be a switch, jumper or just a wire depending on the builder's preference.

# Effects

To find out which effect you are using, press the LOCK and the LEDs will flash to indicate which effect is currently selected. It will stop flashing in a couple of seconds.

To select a new effect, simply press the select button until the correct pattern of LEDs is lit (see graphic below).

*Effects are designated by binary coded LED illumination.*

<p><b>DETUNE</b> ▼ PRIME    EVEN ▲</p> <p>STEPPED</p>   <p>Original orgone 5 oscillator sets detuned</p>	<p><b>TWIN</b> ▼ DOWN    UP ▲</p> <p>SMOOTH</p>   <p>2 pairs with CV phase offset anti cancellation</p>	<p><b>DIST 1</b> ▼ CRUSH    FOLD ▲</p> <p>SMOOTH</p>   <p>Wave folding and bitcrush with crushbit# smoothing</p>	<p><b>DIST 2</b> ▼ HORRIBLE    SELF ▲</p> <p>SMOOTH</p>   <p>Self modulation and XORible wave bent by self or output is XOR with modulator</p>
<p><b>CHORD</b> ▼ MIN    MAJ ▲</p> <p>STEPPED</p>   <p>chords can be changed by effect control or CV</p>	<p><b>SPECTRAL</b> ▼ XMOD    DETUNE ▲</p> <p>STEPPED</p>   <p>Instead of waves, each selection is a different "organ stop" arrangement of harmonics global waveform is mod wave</p>	<p><b>DELAY</b> ▼ NEG FB    POS FB ▲</p> <p>SMOOTH</p>   <p>CONTROLS effect &gt; feedback mod freq &gt; delay time mod wave &gt; mod freq mod waveform is fixed</p>	<p><b>DRUM</b> ▼ PRIME    FIBON ▲</p> <p>STEPPED</p>   <p>Drum model with xmod noise see drum control reassignment below.</p>

*Effect state is saved after 5 seconds, and will be recalled on power-up*

# Drum Voice Effect Control reassignments:

The drum effect voice consists of 2 waves

The first waveform is selected with wave selector **A** and the decay time is controlled with wave selector **B**

The second waveform is selected with wave selector **C** and **MOD** selector controls the decay

The mix between the waves is controlled in the usual way with **POSITION**

**EFFECT** control spreads out the 4 oscillators of wave 2. they are spread by “prime” in the down direction and Fibonacci sequence in the up direction.

**INDEX** controls the amount of cross modulation between the 4 oscillators of wave 2. It is quite chaotic and becomes similar to noise at higher values.

Mod **FREQUENCY** controls how much the envelope modulates pitch of the first wave all the time, and second wave when its effect enable  $\odot$  is switched on.

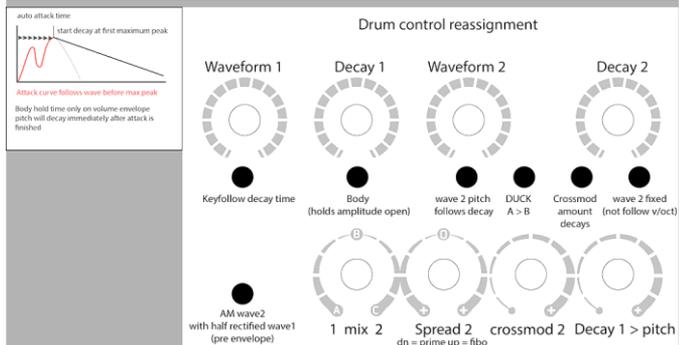
The CV inputs all modify the same controls as usual.

- (A) Enable scales the decay time of wave 1 to pitch
- (B) Enable adds “body” by holding open the volume but not the pitch envelope
- (C) Enable second wave is pitched via the frequency control and envelope 2

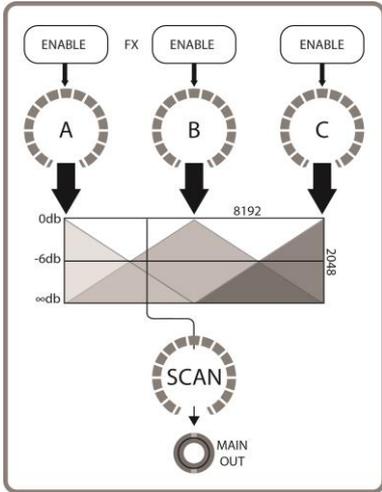
**X** mode button “ducks” wave 2 with wave 1 the level of wave 2 is reduced by the amplitude envelope of wave 1.

**FM** causes the amount of X-mod to be modulated with envelope 2

**FIX** makes wave 2 fixed pitch, though it follows tune controls but not  $\sqrt{\text{octave}}$  input.



## A,B, and C wave mixing and effects



The **A,B** and **C** waves can be individually enabled with the selected effect. Then the **POSITION** mixes between A,B and C.

modulation is calculated before the effect.

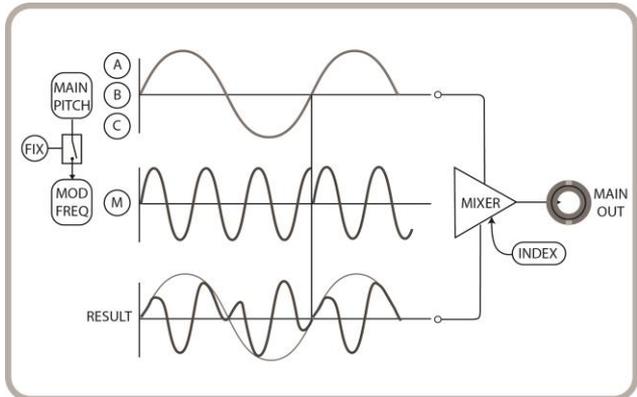
### Normal mode: without the FM or Pulsar (LOCK) active.

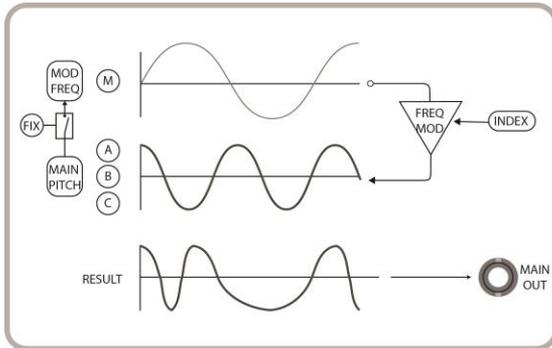
Waves selected and mixed with **A,B,C** and the **POSITION** controls amplitude modulate the **MOD** waveform, which is also synced to the main pitch.

The result is mixed with **A,B,C** with the **INDEX** controls

**Fix** decouples the frequency of the modulator from the main pitch.

## Synthesis modes





wave selectors.

## FM mode. FM active, Pulsar not active.

This is a simple FM mode. Waves selected and mixed with **A,B,C** and the **POSITION** controls are frequency modulated by the **MOD** waveform. The amount of modulation is controlled by the **INDEX** controls.

**Fix** decouples the frequency of the modulator from the main pitch.

With **INDEX** turned down normal and FM are the same, but with different waves in some slots of the **A,B** and **C**

## Pulsar mode active

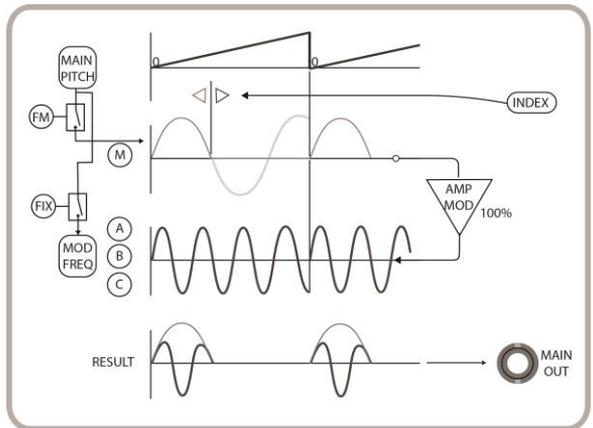
This is based on a form of granular or “pulsar” synthesis. The pitch controls a dummy oscillator which in turn controls a synced pulsar oscillator. The pulsar is an envelope which contains the **A,B,C** waves, which in this case run at the mod frequency.

The **INDEX** controls the duration of the pulsar envelope in relation to the main pitch.

**MOD** wave selector selects the shape of the pulsar envelope. It is derived from existing waveforms half-wave rectified.

**Fix** decouples the frequency of the modulator from the main pitch.

**FM** decouples the pulsar duration from the main pitch.



# Silence?

*Sometimes, silence will fall! It was decided to allow a wider range of sounds with the possibility of silence (and sometimes nasty awful noises) rather than be “safe” and boring. Here are some possible reasons for silence or very quiet operation, and other things you may encounter.*

## 1: the silent wave.

There is a “nothing” wave at the top position on the **A** wave selector. This can be useful for swells and dynamic control without a VCA. However keep in mind it is there. Solution: turn the **A** wave selector or **POSITION** control.

## 2: drum voice effect.

The last effect to (all LEDs ON) is a drum voice. It will not do anything without a trigger or gate on the reset input. Solution: change to a different effect or input a trigger/gate to the reset input.

## 3: thin pulsar envelope.

In pulsar mode, it is possible for the envelope to become so fast that there is nothing to hear. Solution: turn **INDEX** up, turn **FIX** and **FM** on or off, change mod **FREQUENCY**

## 4: low mod pitch in normal mode.

If the mod **FREQUENCY** is all the way down, and **INDEX** is all the way up there can be very low output. Solution: turn up mod **FREQUENCY**, press **FM**.

## 5: Quiet output in detune effect.

Some more complex waves can start to cancel themselves out quite a lot, “it’s not a bug, it’s a feature!” this can be used with the reset input to give you a “pluck” sound with the speed of decay controlled by the amount of **EFFECT** control. Solution: try turning down **INDEX**, or try a different mod waveform. The **X** mode in detune has a waveshaper (soft clipping) which may work for you but it is more distorted.

## 6: Pitch changing

**X** mode is probably on. It is designed to shift the pitch as you scan toward the **C** position. it can be useful for creating sounds with a subtle bend at the start, and also for more outrageous effects. Solution: disable **X** mode or scan the **POSITION** to **A** or **B**

## 7: noise and distortion at high frequencies.

This is not by any stretch of the imagination a “hi-fi” oscillator. It is a large improvement over 8 bit, but is **not** almost perfectly calculated DSP. There can be noise and jitter, it is just the nature of the beast. Solution: have a nice analog oscillator as well!