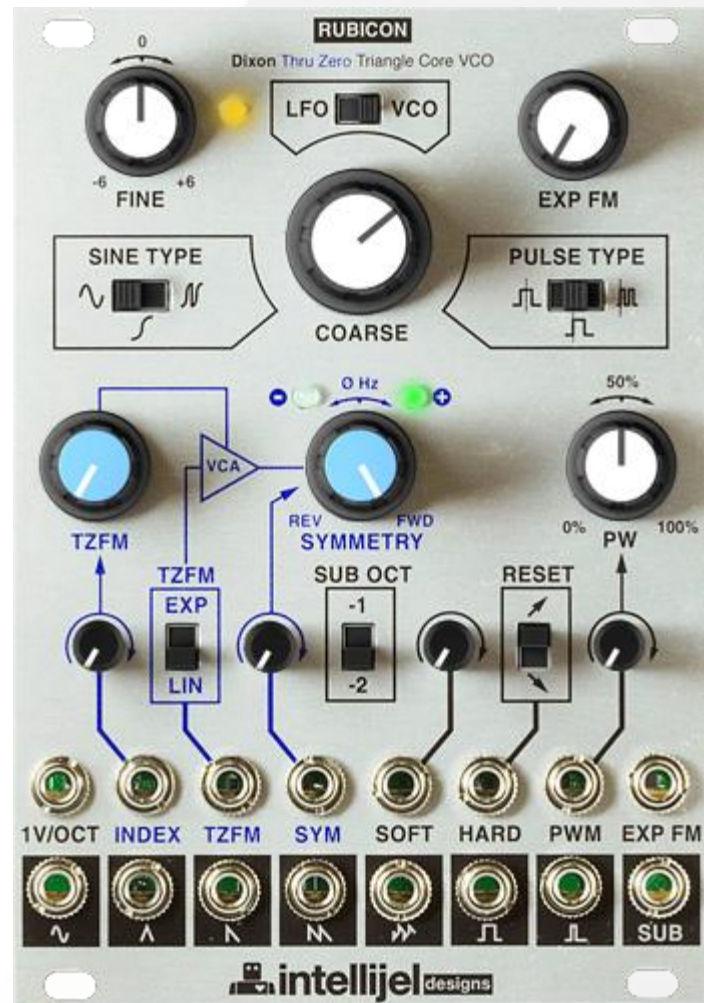


# Intellijel RUBICON

## Illustrated supplement



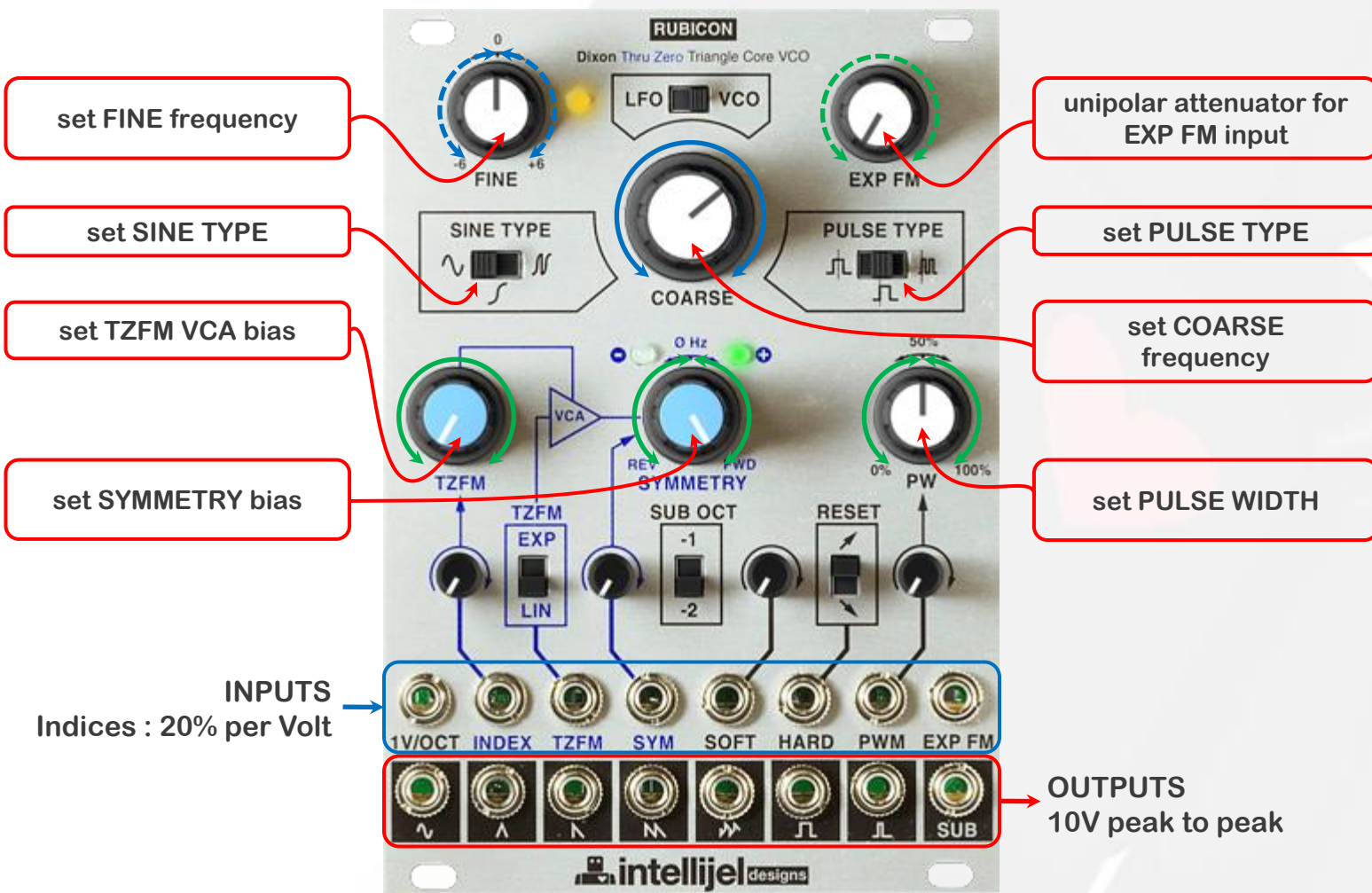
by Demonam

# Index

- 01... Overview
- 02... Waveforms
- 03... SINE TYPE
- 04... PULSE TYPE
- 05... Pulse Width Modulation chart
- 06... SUB OCTave
- 07... SOFT sync
- 08... SOFT sync probability chart
- 09... SOFT sync chart - part 1
- 10... SOFT sync chart - part 2
- 11... SOFT sync chart - part 3
- 12... SOFT sync chart - part 4
- 13... HARD sync
- 14... HARD sync RISE chart - part 1
- 15... HARD sync RISE chart - part 2
- 16... HARD sync RISE chart - part 3
- 17... HARD sync RISE chart - part 4
- 18... HARD sync FALL chart - part 1
- 19... HARD sync FALL chart - part 2
- 20... HARD sync FALL chart - part 3
- 21... HARD sync FALL chart - part 4
- 22... LFO mode
- 23... EXPonential FM
- 24... TZFM - Introduction
- 25... SYMMETRY set
- 26... SYMMETRY modulation
- 27... SYMMETRY modulation chart (SINE out illustration)
- 28... TZFM signal input
- 29... TZFM amplitude modulation with INDEX
- 30... TZFM VCA modulation chart (triangle TZFM input illustration)
- 31... SYMMETRY vs TZFM chart (SINE out illustration)
- 32... TZFM EXP/LIN signal input response

- 33... TZFM EXP/LIN signal input response chart
- 34... Using TZFM - Modulation rate (David G. Dixon)
- 35... Using TZFM - Balanced TZFM (David G. Dixon)
- 36... Using TZFM - Example 1 (David G. Dixon)
- 37... Using TZFM - Example 2 (David G. Dixon)
- 38... Using TZFM - Example 3 (David G. Dixon)
- 39... Basic 2 Operator TZFM - step 1
- 40... Basic 2 Operator TZFM - step 2
- 41... Classic DCO style PWM Saw Strings
- 42... Classic DCO style PWM Saw Strings chart
- 43... TZFM vibrato
- 44... Solar winds
- 45... Massive square
- 46... Tri-octave pad
- 47... Dual saw
- 48... Classic FM sweep
- 49... FM feedback
- 50... TZFM feedback loop
- 51... Space-folding (Danjel Van Tijn)

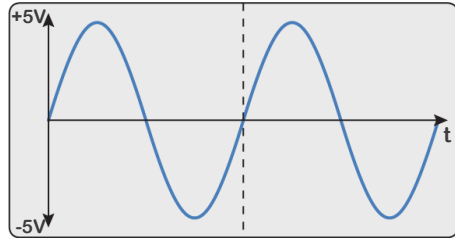
# Overview



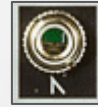
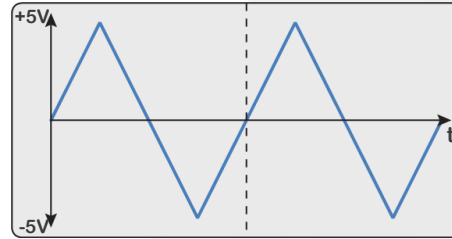
# Waveforms



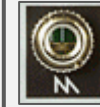
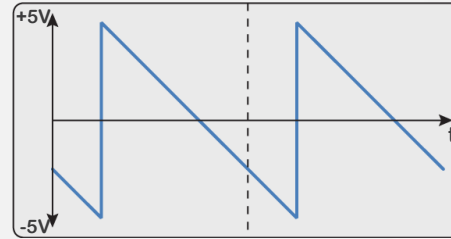
**SINE**



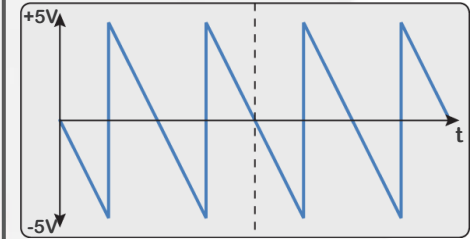
**TRIANGLE**



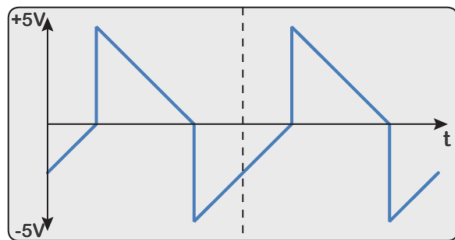
**SAW**



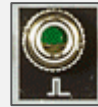
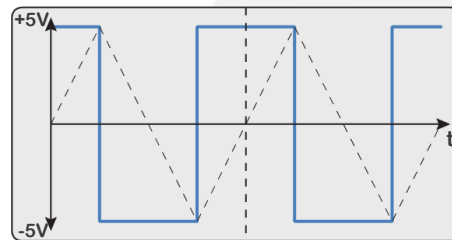
**DOUBLE SAW**



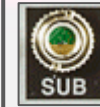
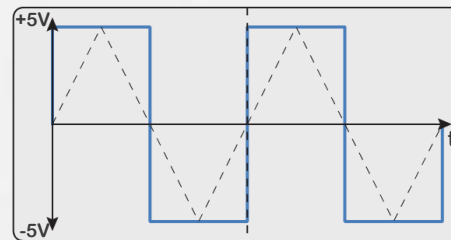
**ZIG-ZAG**



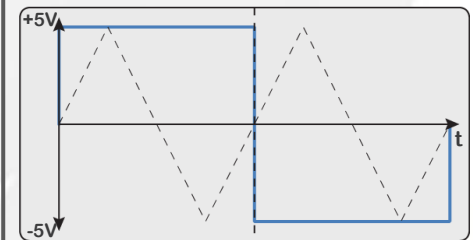
**SQUARE**



**PULSE**



**SUB OCTAVE**



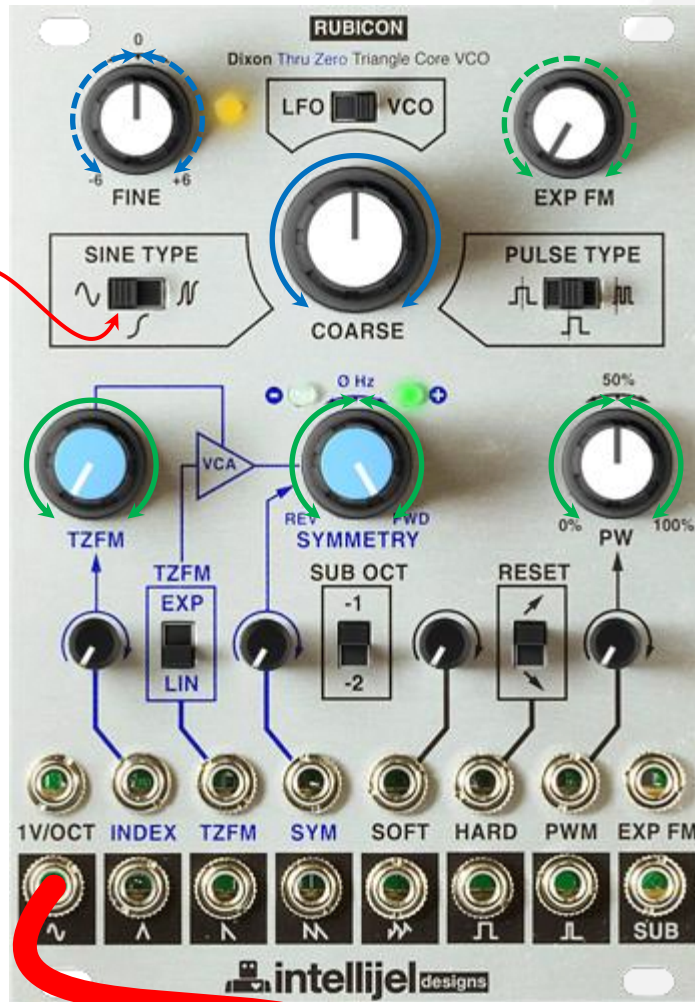


# SINE TYPE

**SINE TYPE switch** : SINE on the left, SIGMOID in the middle, SIGMOID at double the base frequency on the right.

Sine is what you get when you push a triangle wave to a sine shaper, and sigmoid is what you get when you push a sawtooth wave through a sine shaper -- it sounds a lot like a saw, but a bit warmer and can be great for creating metallic sounds.

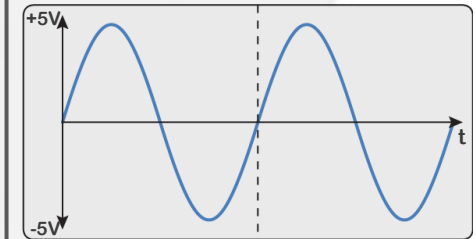
set  
SINE TYPE



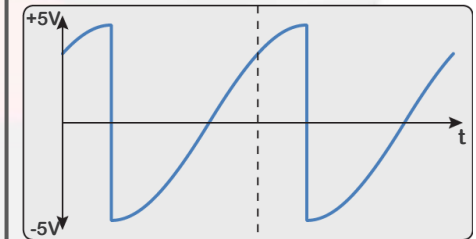
SINE out



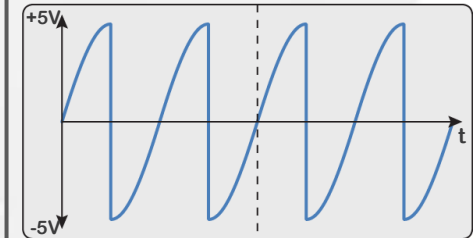
**SINE**



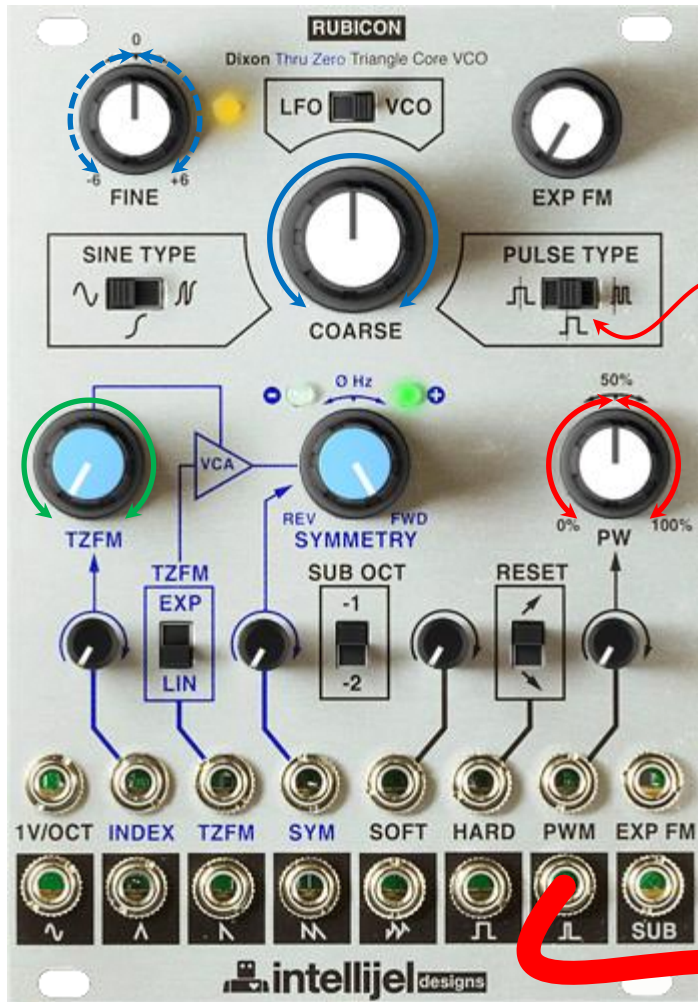
**SIGMOID**



**DOUBLE  
SIGMOID**



# PULSE TYPE



set  
PULSE TYPE

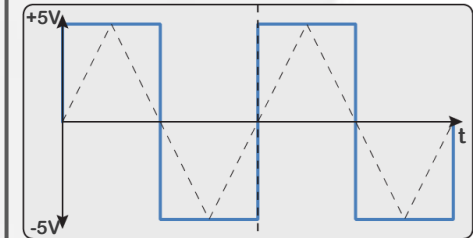
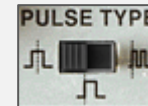
PULSE out

**PULSE TYPE switch** : Centered pulse on the left, edge aligned pulse in the centre, edge aligned pulse at double the base frequency on the right.

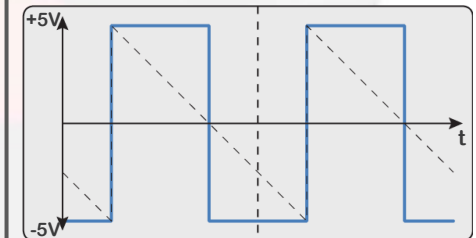
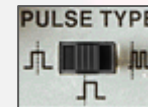
Centre pulse is what you get when you send the triangle wave to the pulse comparator, and edge pulse is what you get when you send the sawtooth wave to the pulse comparator -- they are the same, but they have a different phase relationship to each other, so they do different things when blended with the other waveforms.



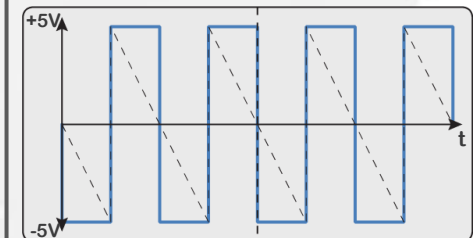
**PULSE**  
centered  
sync





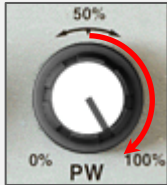
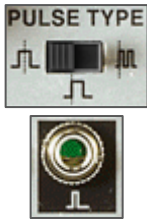
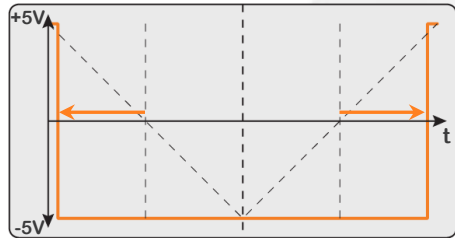
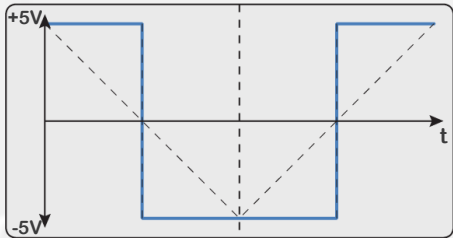
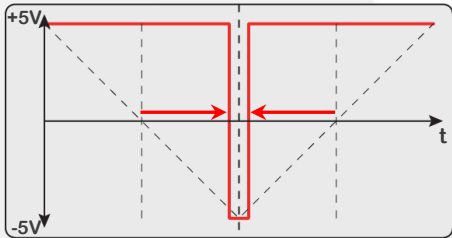
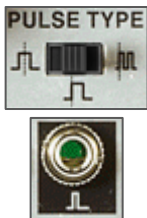
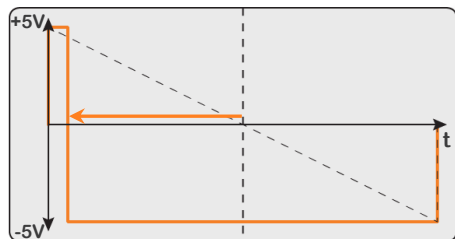
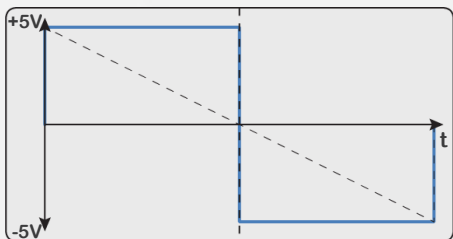
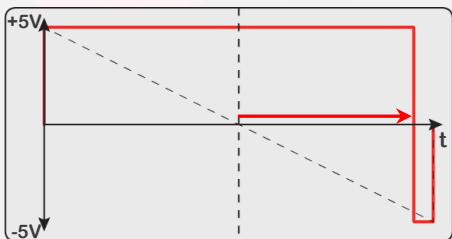
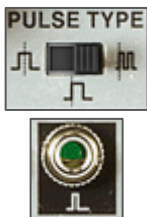
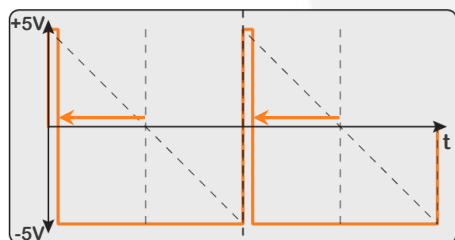
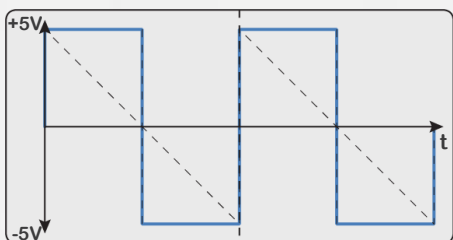
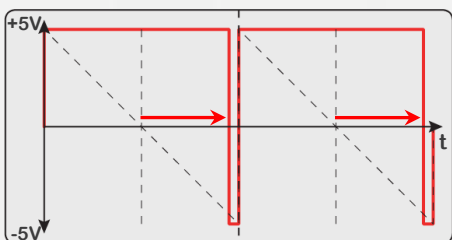
**PULSE**  
edge sync



**DOUBLE**  
PULSE



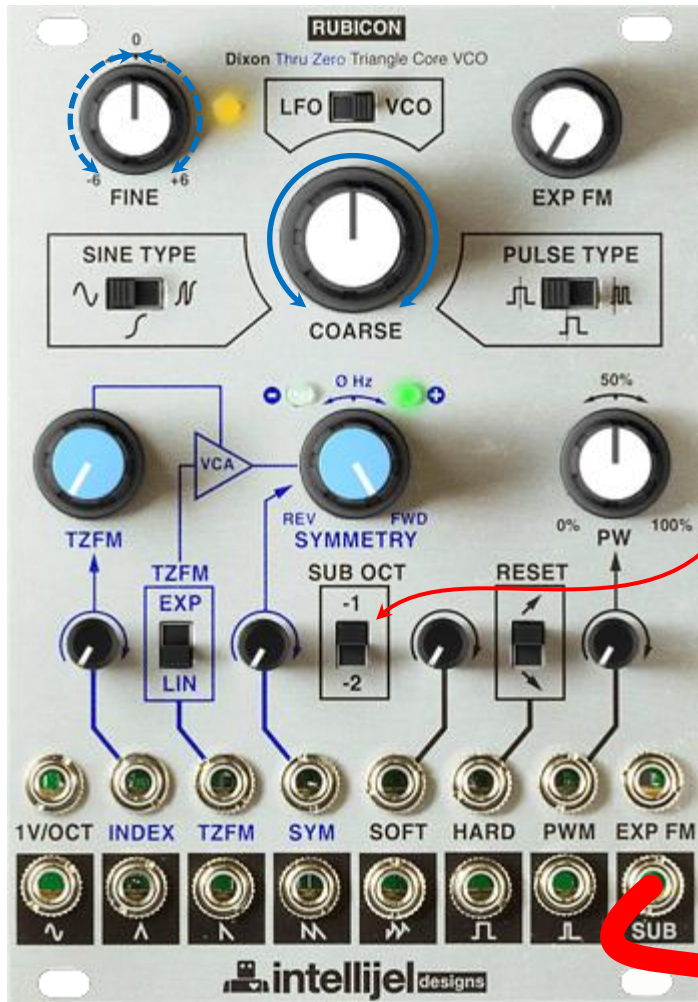
# Pulse Width Modulation chart

	0% PWM	50% PWM	100% PWM
<b>PULSE WIDTH MODULATION</b>			
<b>CENTERED PULSE</b>	<div></div> 		
<b>EDGE PULSE</b>	<div></div> 		
<b>DOUBLE PULSE</b>	<div></div> 		

# SUB OCTave

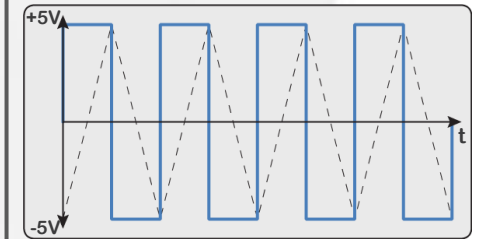
**SUB** : Sends a square wave either one or two octaves below the base frequency to the SUB output. SUB OCT switch selects -1 octave or -2 octave below the VCO frequency.

This circuit is very similar to the SUB control on a classic Roland SH-101 synthesizer.

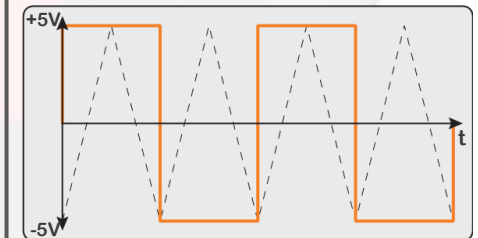


SUB out

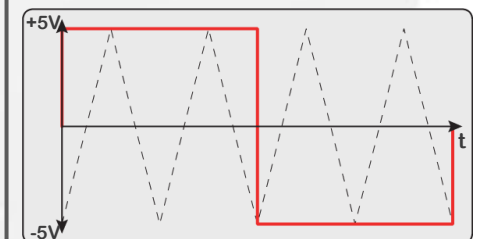
VCO frequency  
reference



-1 OCT  
sub

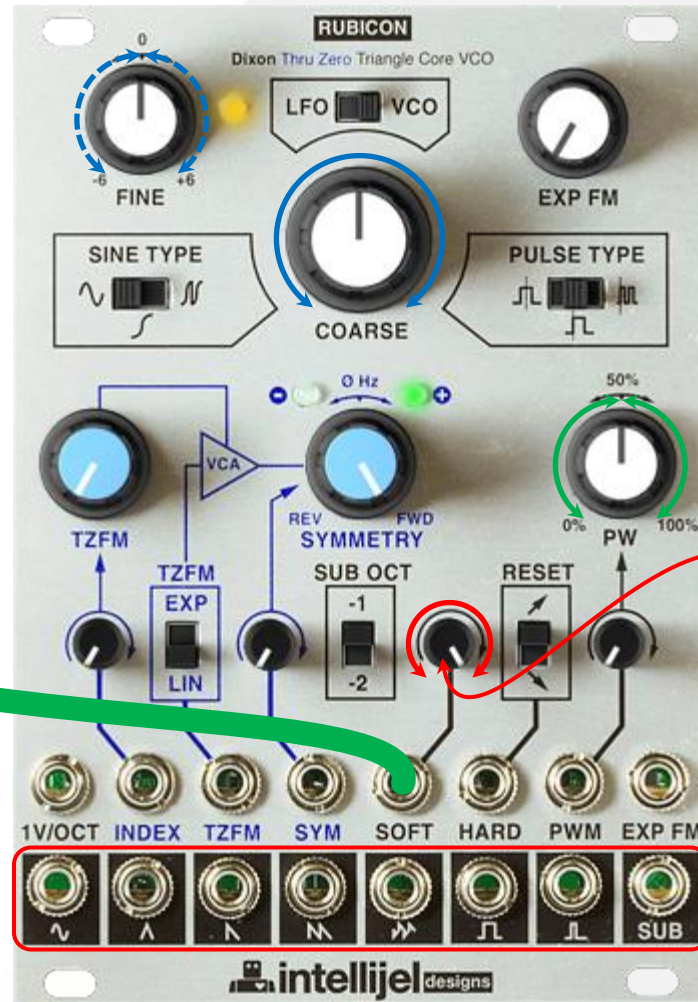
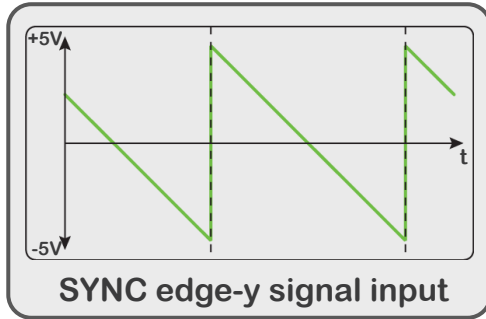


-2 OCT  
sub





# SOFT sync



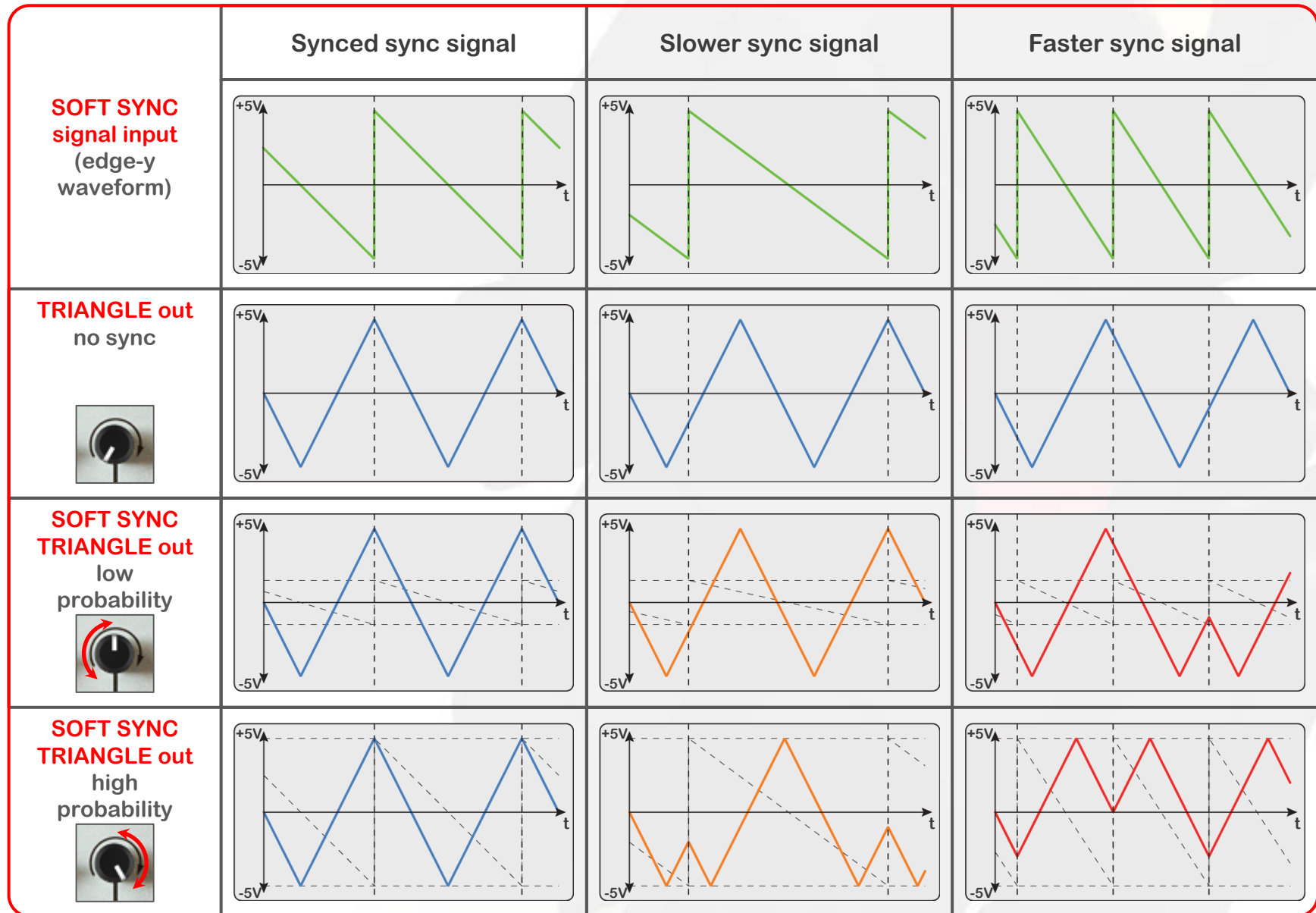
**SOFT sync** : the triangle wave reverses on the incoming sync pulse, and the attenuator sets the probability that a pulse will cause reversing.

Requires edge-y waveforms like square or sawtooth (sawtooth is best). There is a mini attenuator on this input.

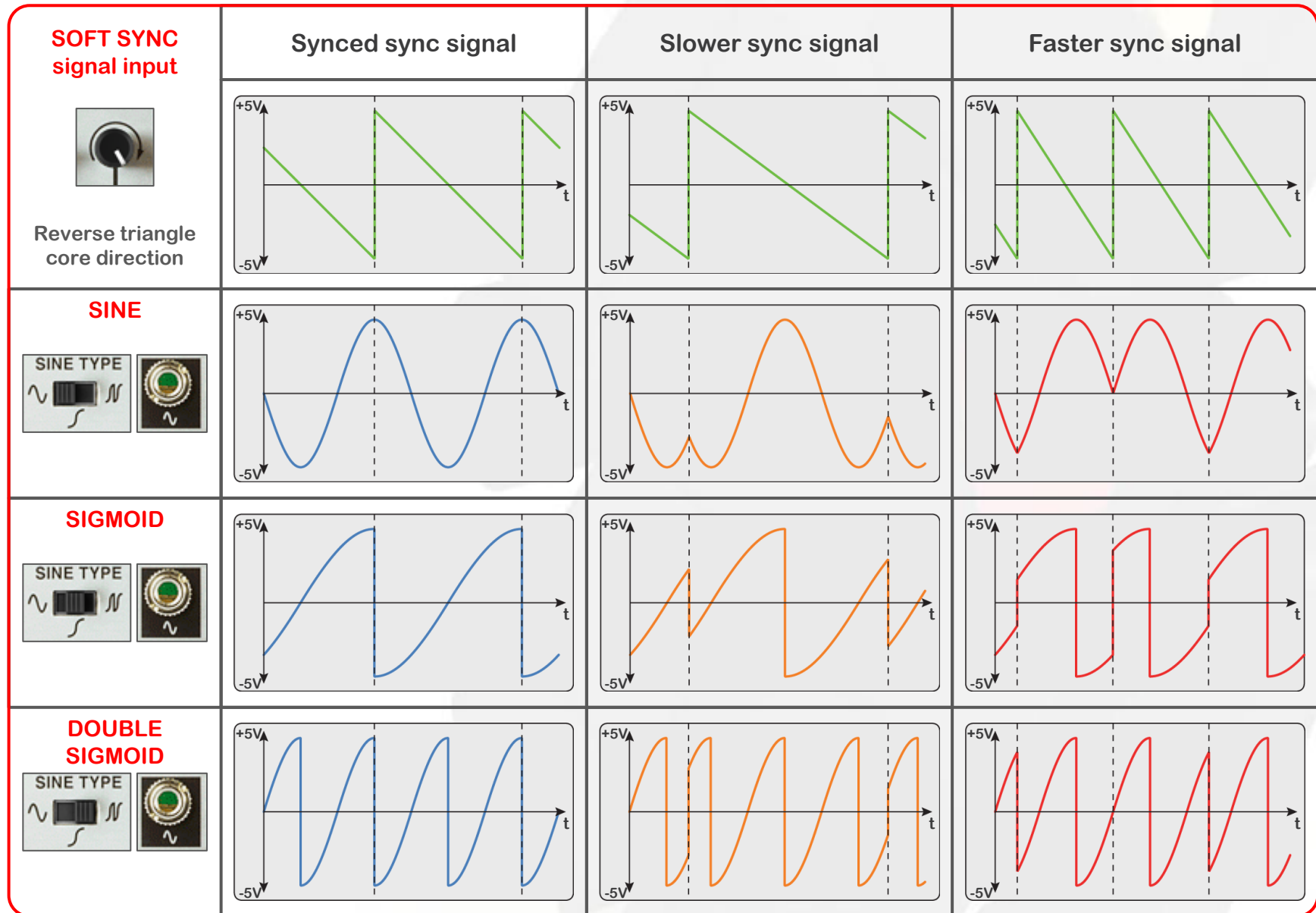
set SOFT SYNC reverse probability

soft-synced OUTPUTS

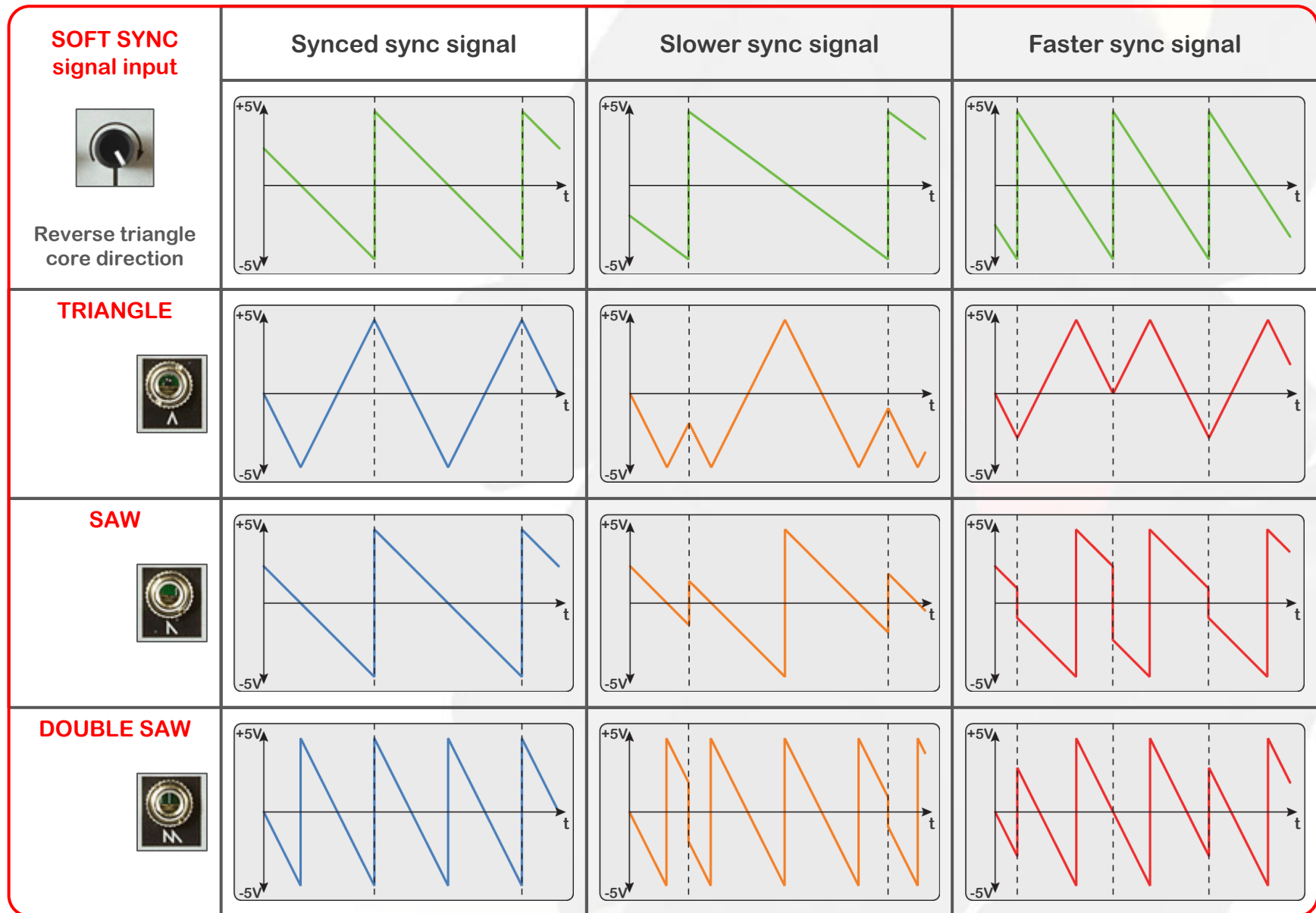
# SOFT sync probability chart



# SOFT sync chart - part 1

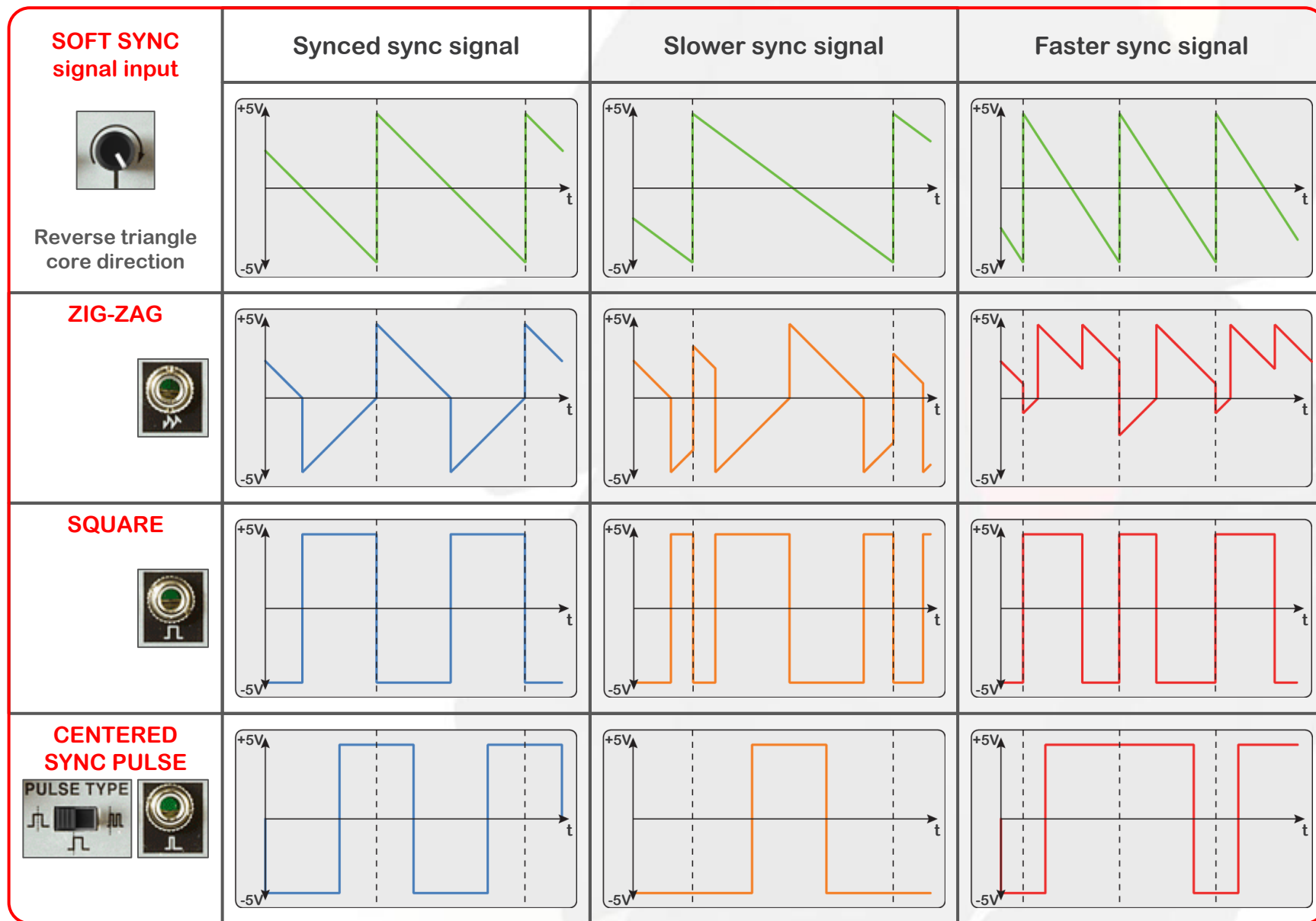


# SOFT sync chart - part 2

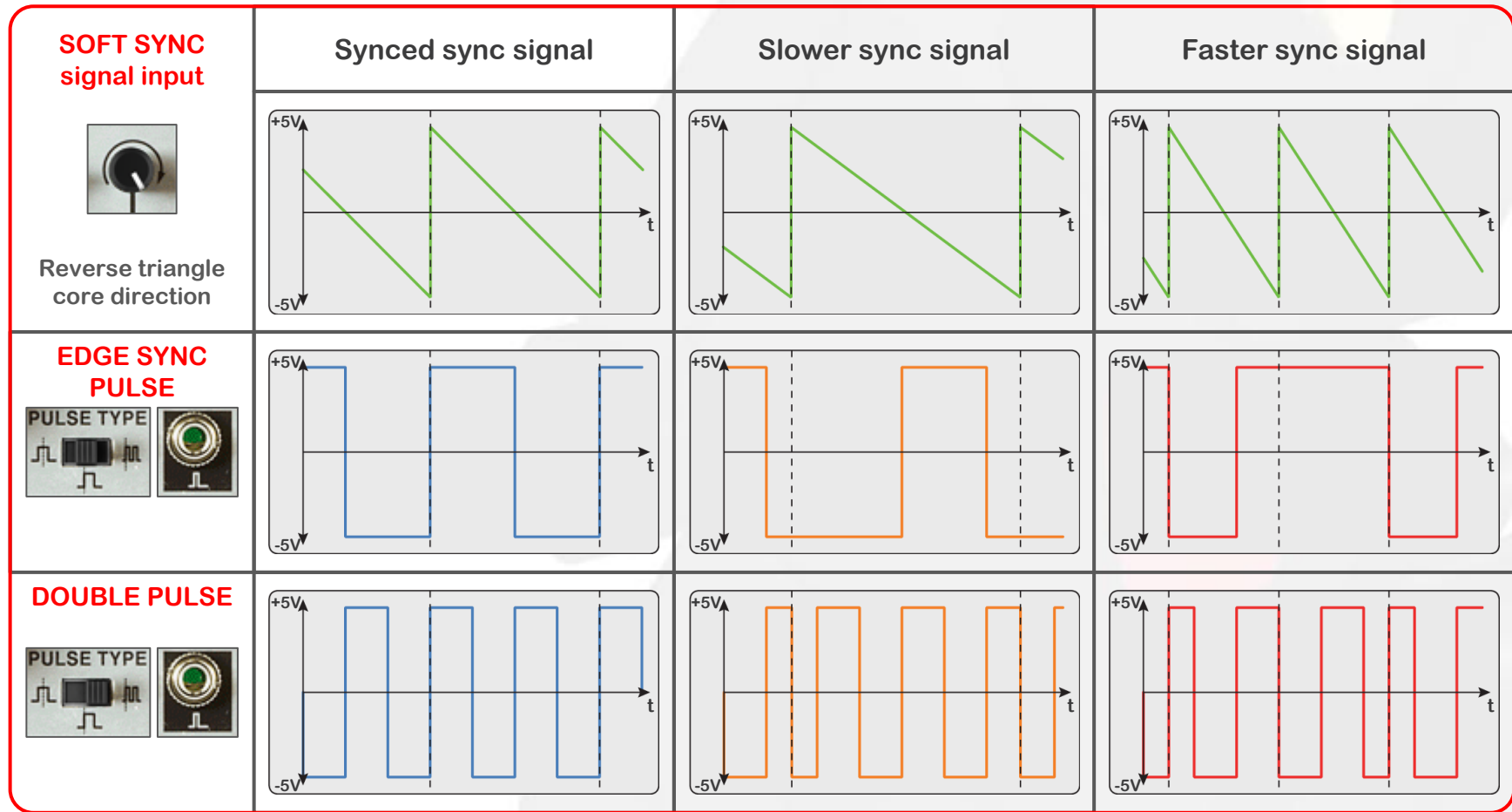




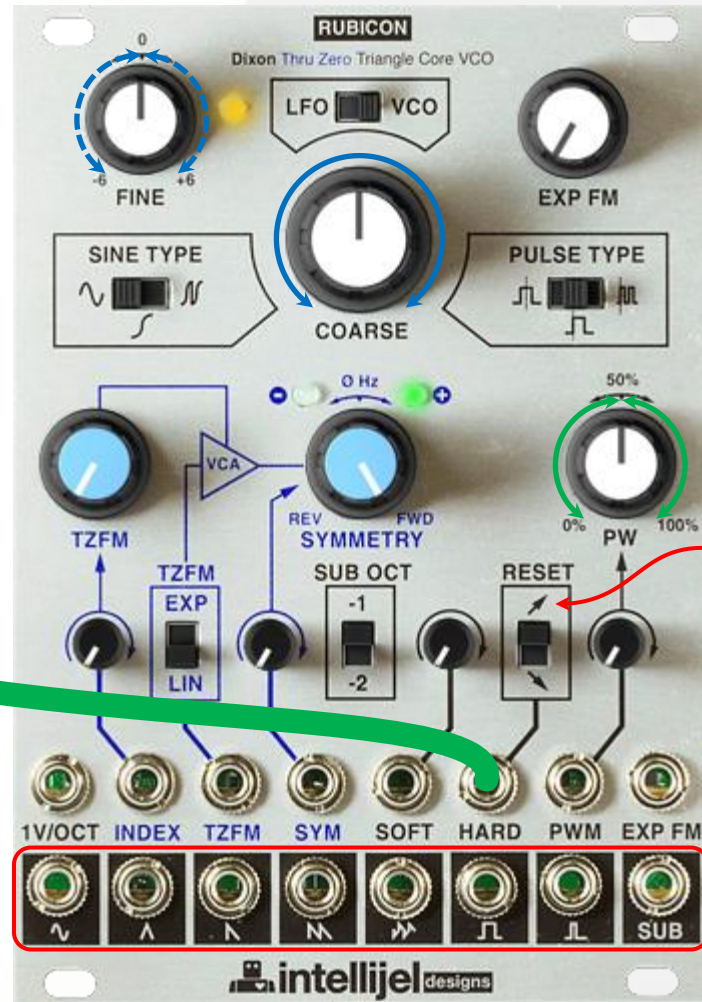
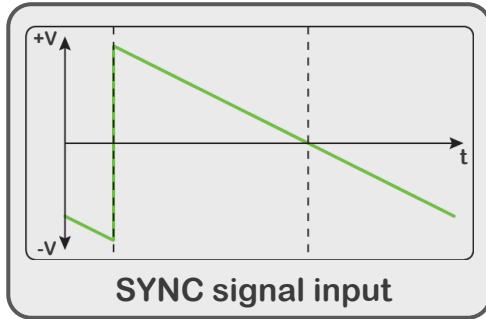
# SOFT sync chart - part 3



# SOFT sync chart - part 4



# HARD sync



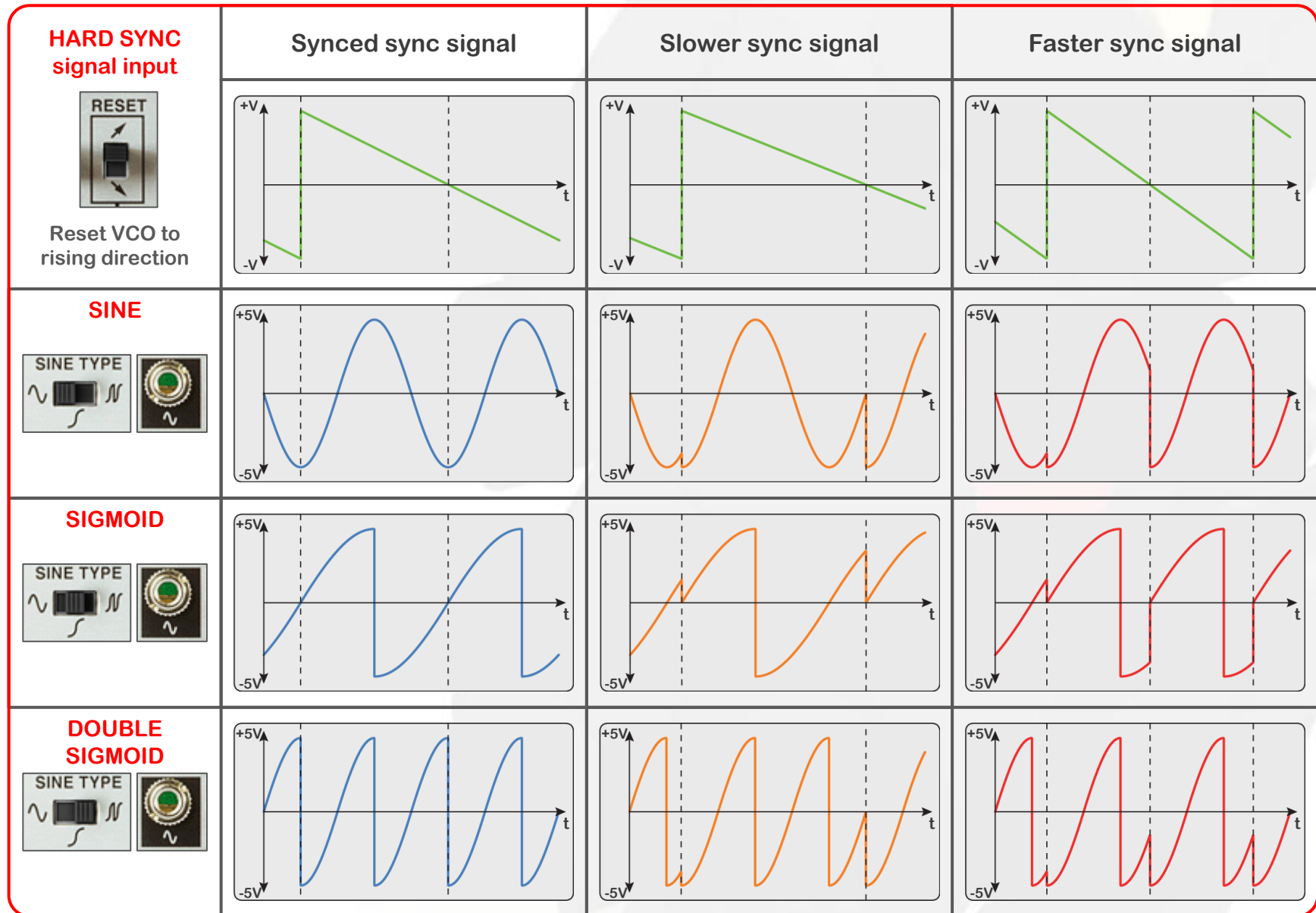
**HARD sync** : Traditional VCO sync that resets the Rubicon when the input VCO or Master crosses zero.

Use the **RESET switch** above it to select if the waves will reset rising or falling.

set HARD sync reset direction

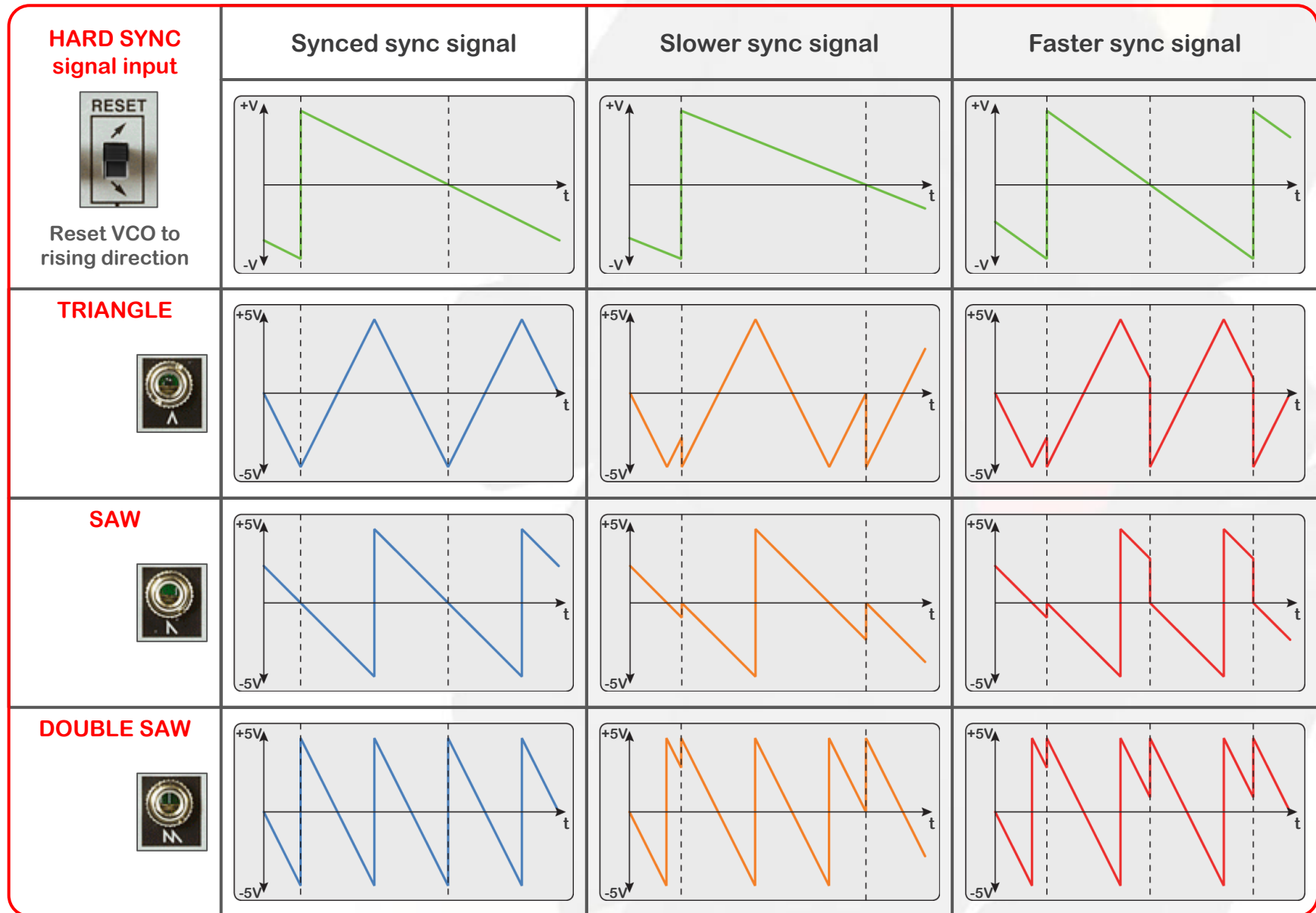
hard-synced OUTPUTS

# HARD sync RISE chart - part 1

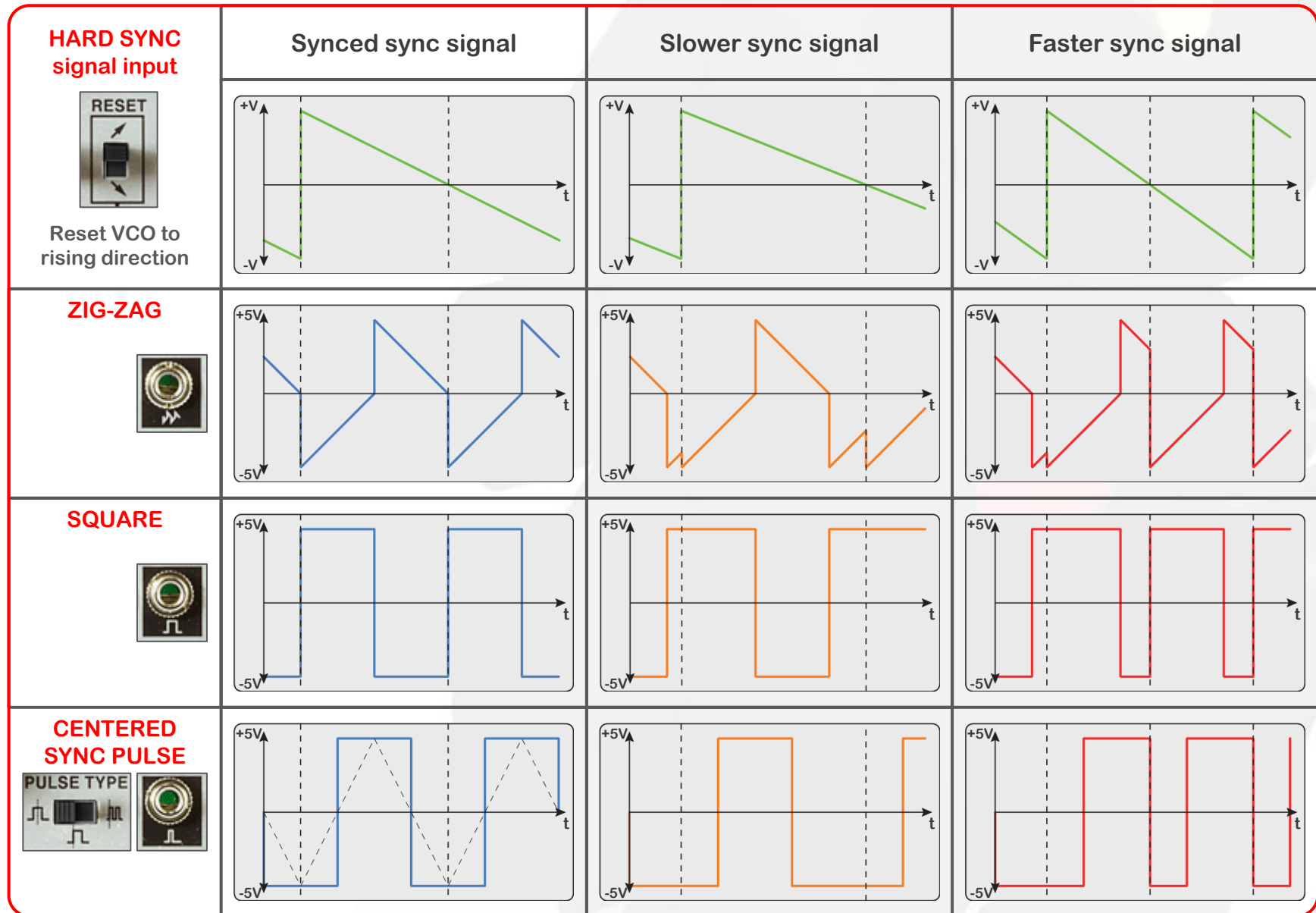




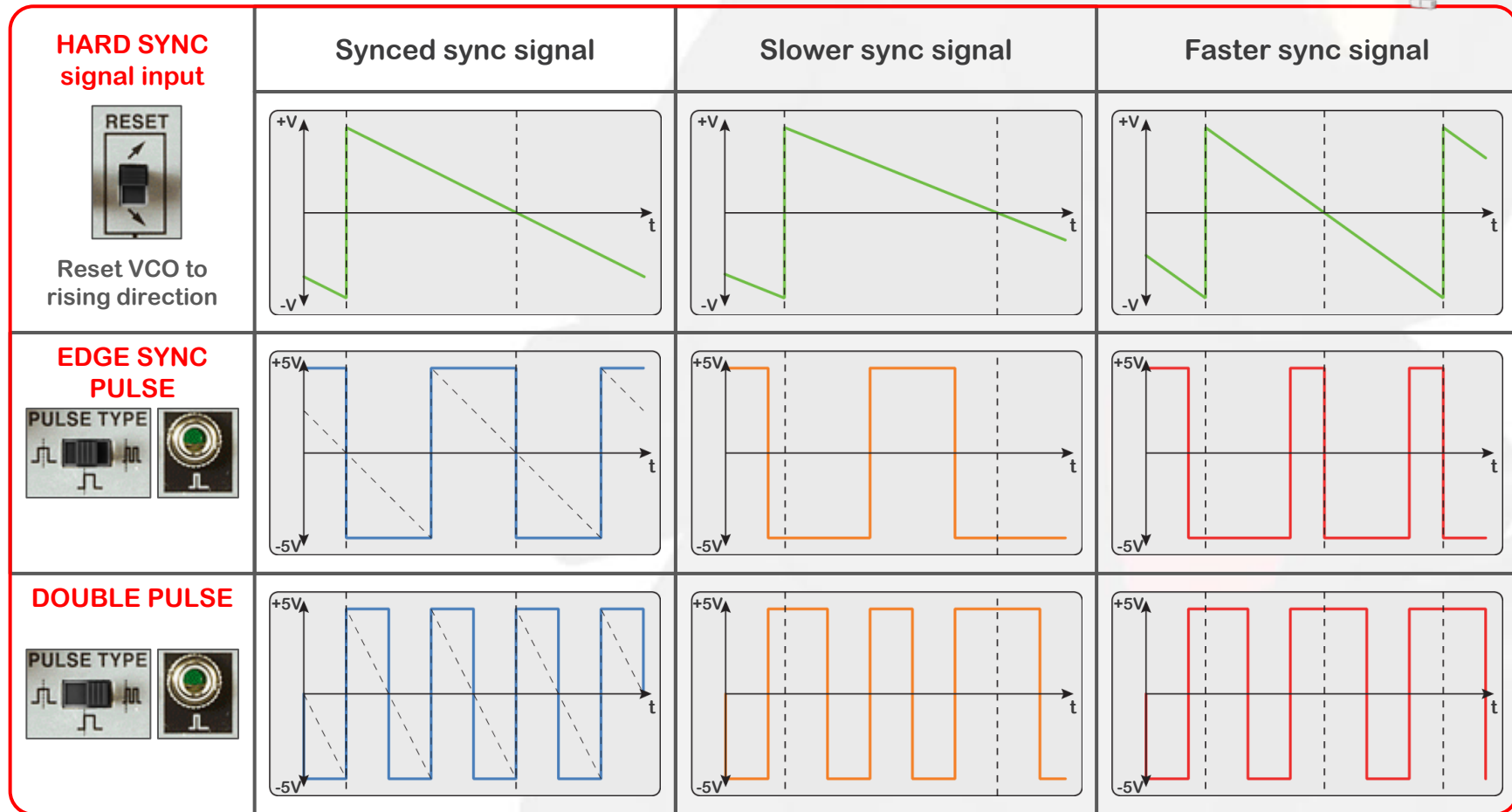
# HARD sync RISE chart - part 2



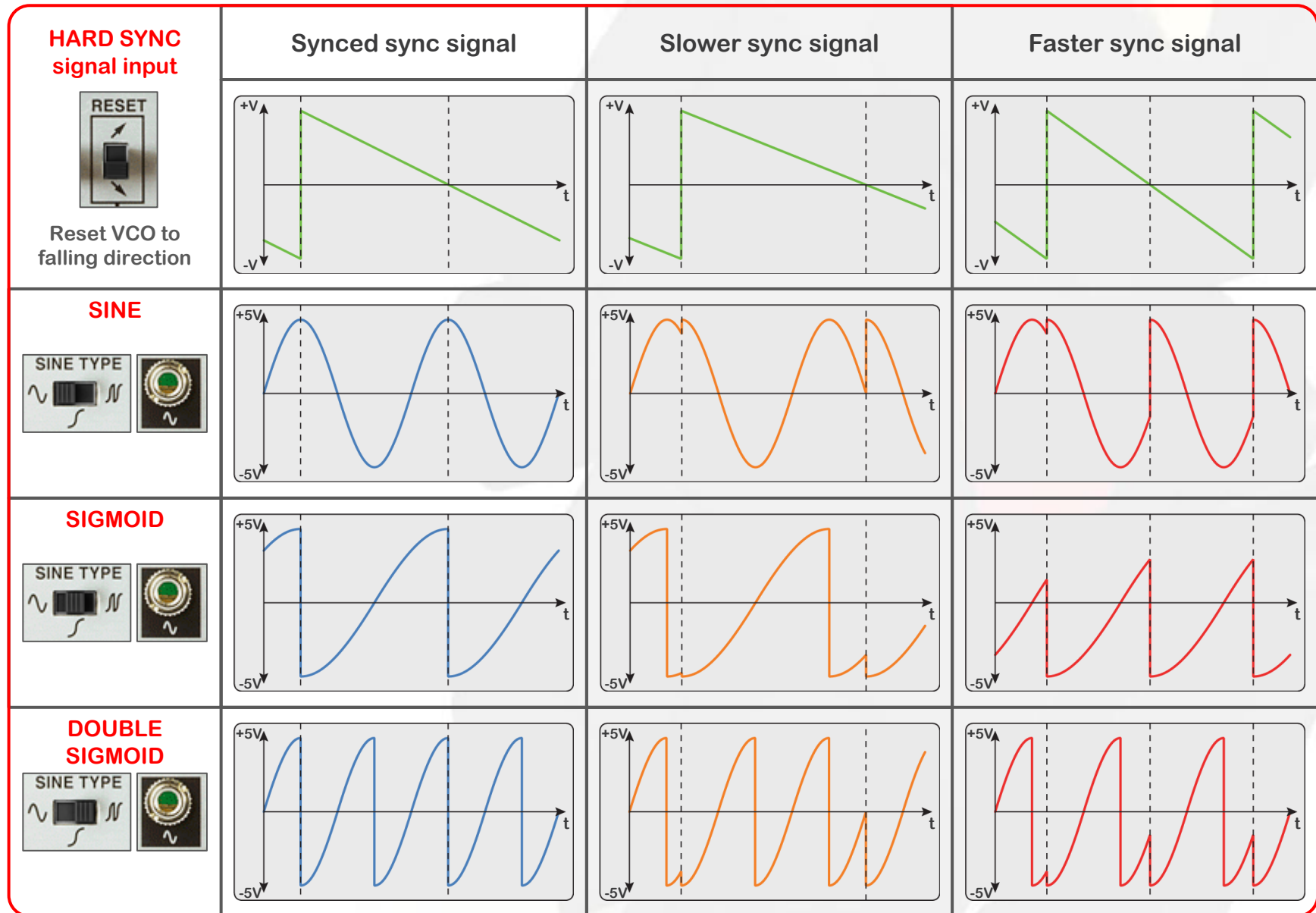
# HARD sync RISE chart - part 3



# HARD sync RISE chart - part 4

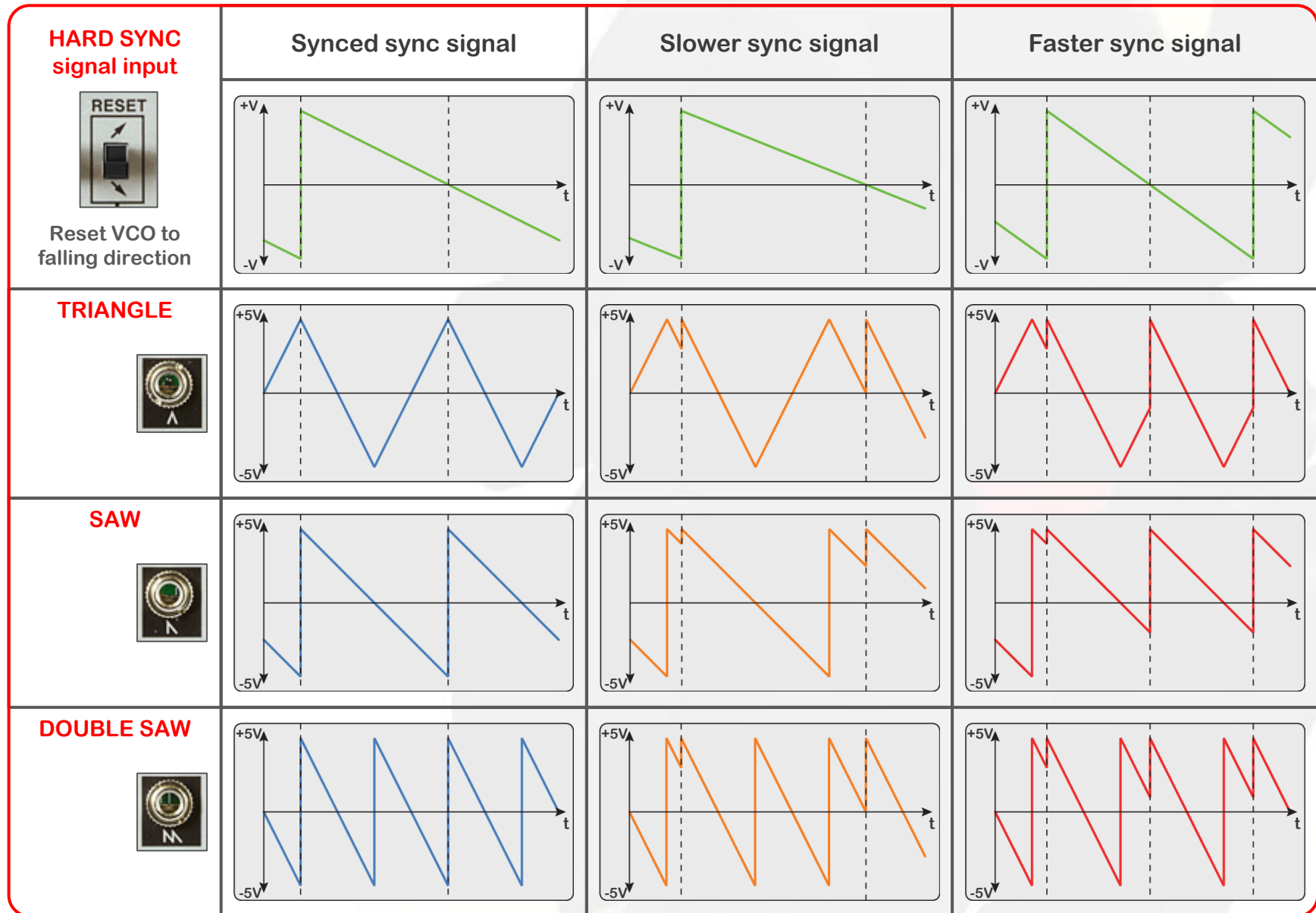


# HARD sync FALL chart - part 1

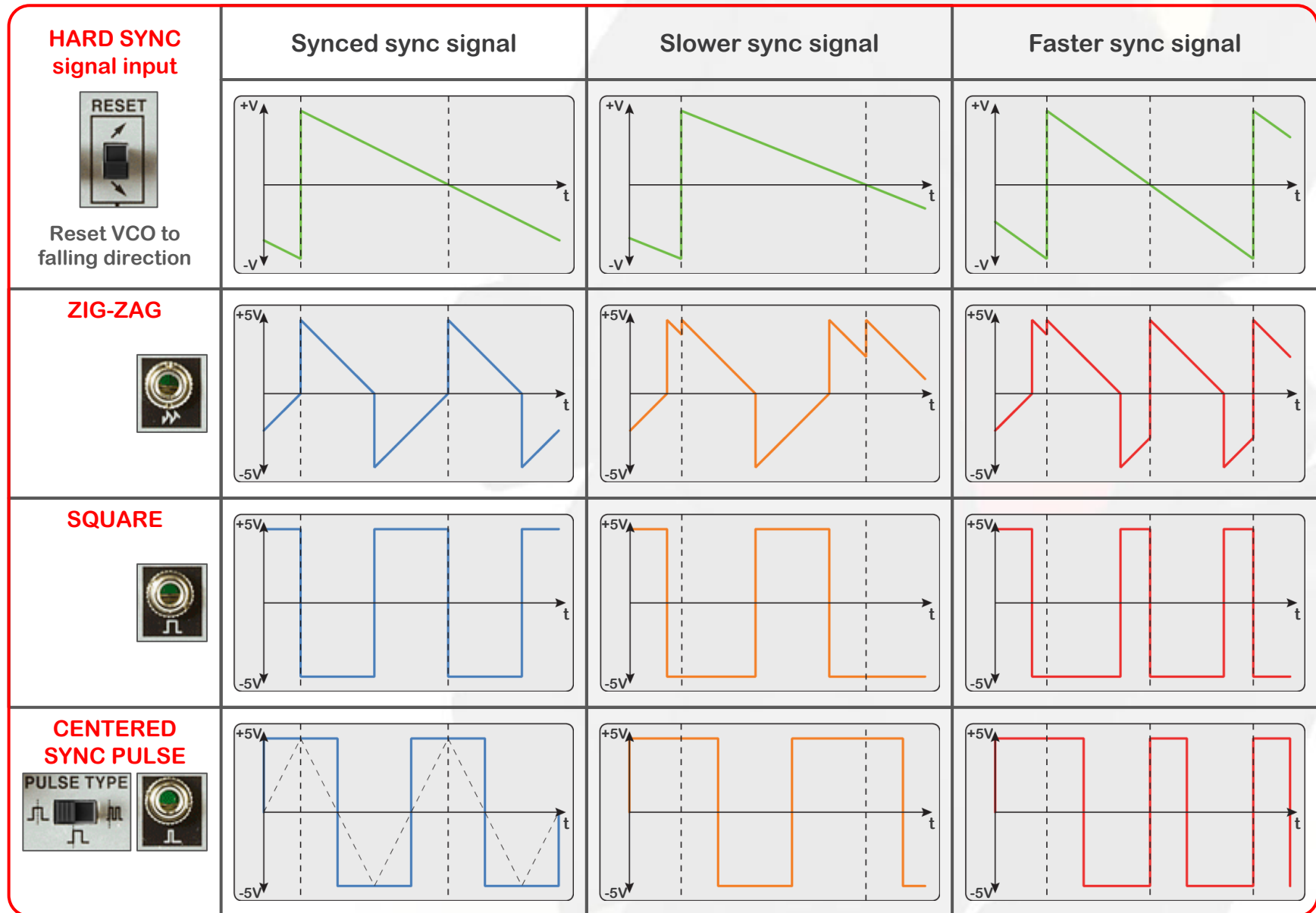




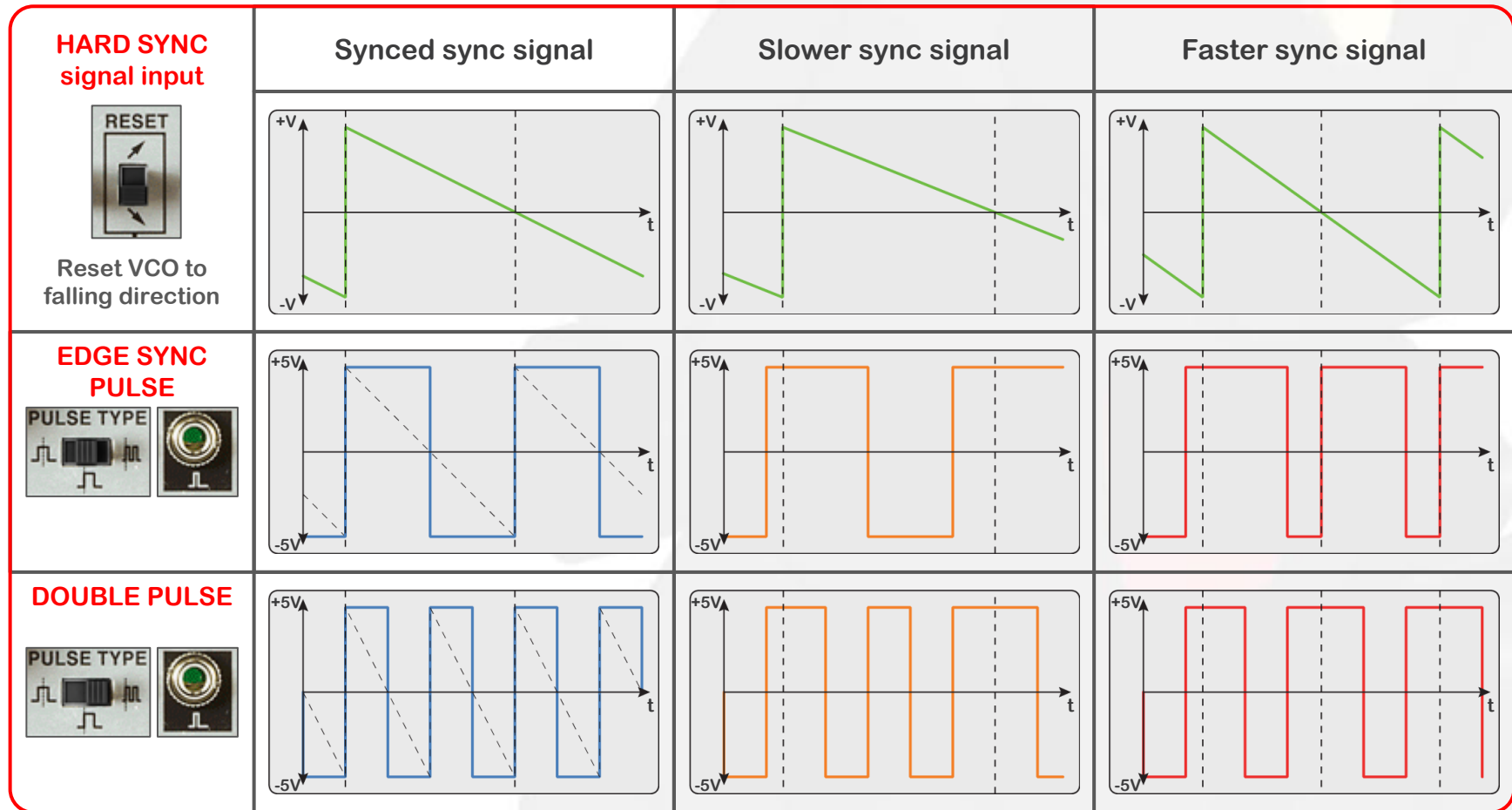
# HARD sync FALL chart - part 2



# HARD sync FALL chart - part 3

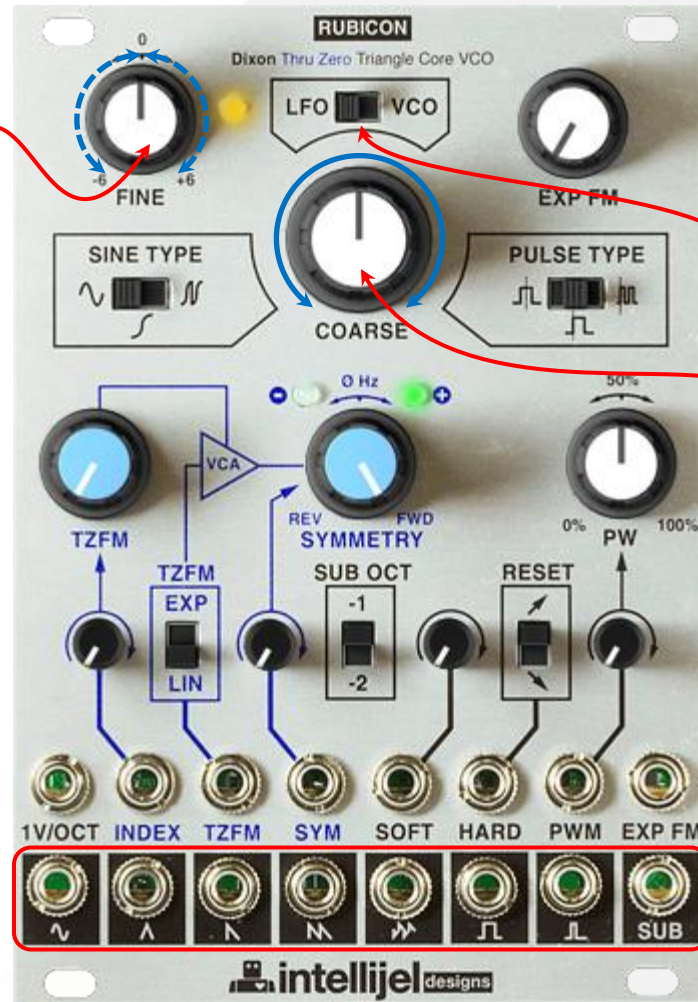


# HARD sync FALL chart - part 4



# LFO mode

set FINE LFO frequency



**LFO mode** : Changes the base frequency range from audio (VCO) to very slow (LFO).

LFO range : 0.01 Hz (100s) to 240 Hz  
VCO range : 1 Hz to 24 kHz

set **LFO mode**

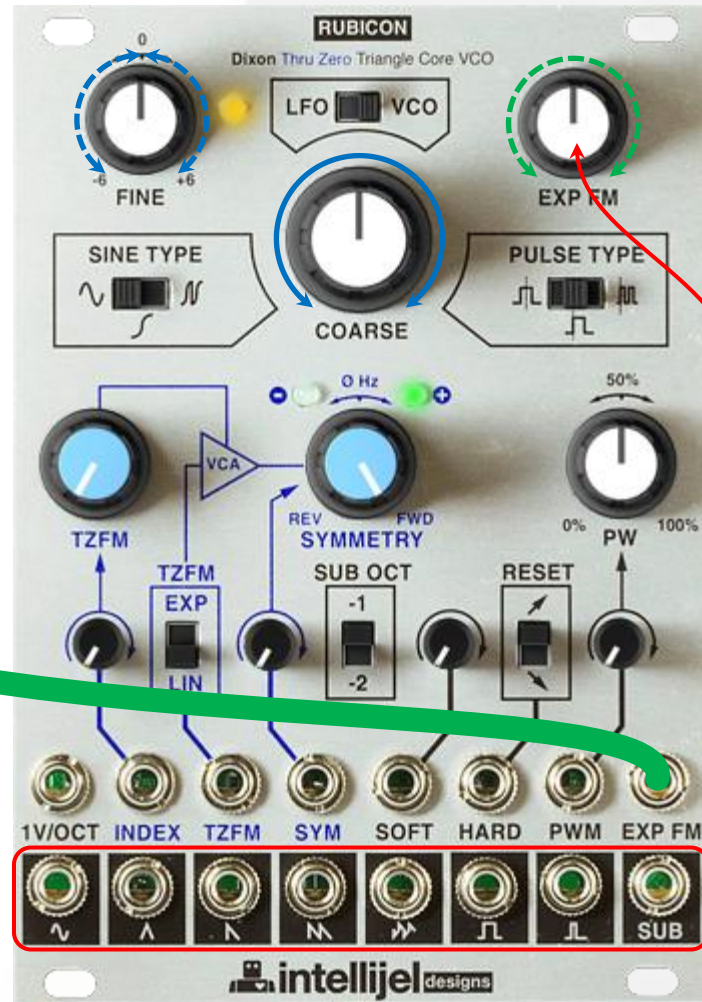
set **COARSE**  
LFO frequency

LFO OUTPUTS



# EXPOnential FM

EXP FM signal input



**EXP FM** : Input for traditional exponential FM. Does not go through zero.

Use for pitch bend and FM sounds that do not have to track the 1V/Oct input such as percussion.

The EXP FM knob attenuates this input.

Gives 1V/Octave response when the attenuator knob is turned fully CW.

unipolar attenuator for  
EXP FM input

OUTPUTS

# TZFM - Introduction

**RUBICON**  
Dixon Thru Zero Triangle Core VCO

0  
-6 FINE +6  
LFO VCO  
EXP FM  
SINE TYPE  
PULSE TYPE  
COARSE

0 Hz  
TZFM  
VCA  
REV SYMMETRY FWD  
SUB OCT  
-1  
-2  
RESET  
PW 0% 100% 50%

1V/OCT INDEX TZFM SYM SOFT HARD PWM EXP FM SUB

intellijel designs

set TZFM VCA bias

unipolar attenuator for INDEX signal IN

set TRZFM response type

set SYMMETRY bias

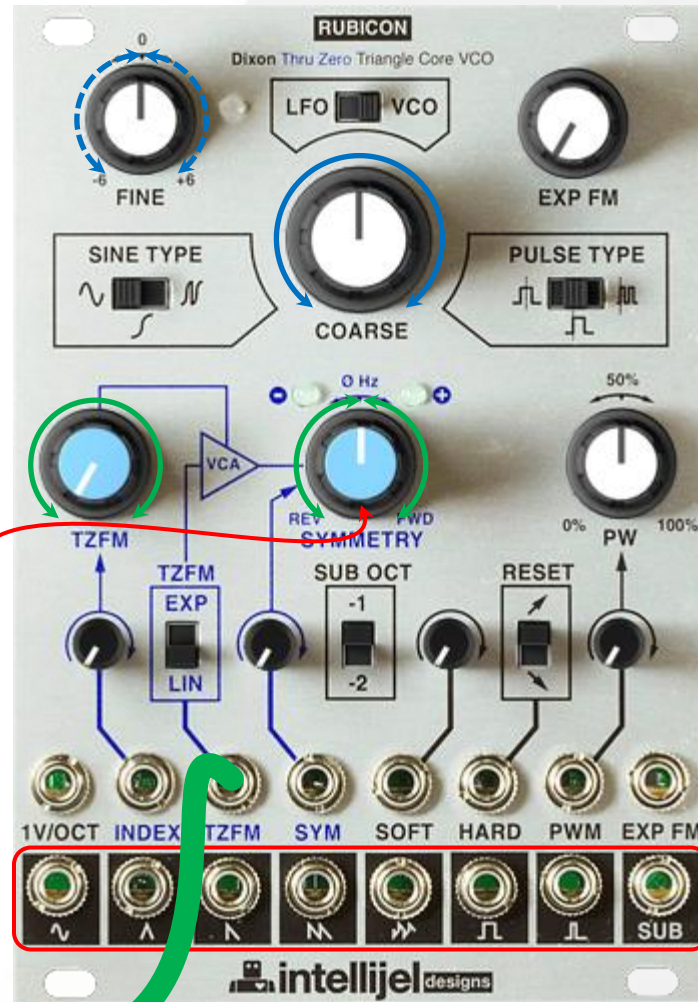
unipolar attenuator for SYMMETRY bias control signal IN

On the Rubicon panel, the "Index" input is the CV input for dynamic control of the TZFM CV input.

This TZFM input goes through a linear VCA, and the Index input controls this VCA (The Symmetry input does not go through a VCA, and therefore cannot be put under dynamic control -- that is the only difference between those two inputs).

Like the other modulation indices, it is 20% per volt.

# SYMMETRY set



**SYMMETRY** determines the direction and magnitude of the waveform through the linear FM circuit -- fully CW gives output at the positive base frequency, fully CCW gives output at the negative base frequency, and in the centre the VCO stops oscillating (zero frequency).

If fully CW, then a signal into TZFM gives conventional Linear FM. Ditto for fully CCW, but the output frequencies are negative (which simply means that all of the waveforms are backwards -- except the zigzag, strangely enough).

For normal VCO sounds set this at full CW.

**NOTE:** Symmetry affects 1V/Oct tracking! For the best tracking put **SYMMETRY** in full CW position.

TZFM signal input

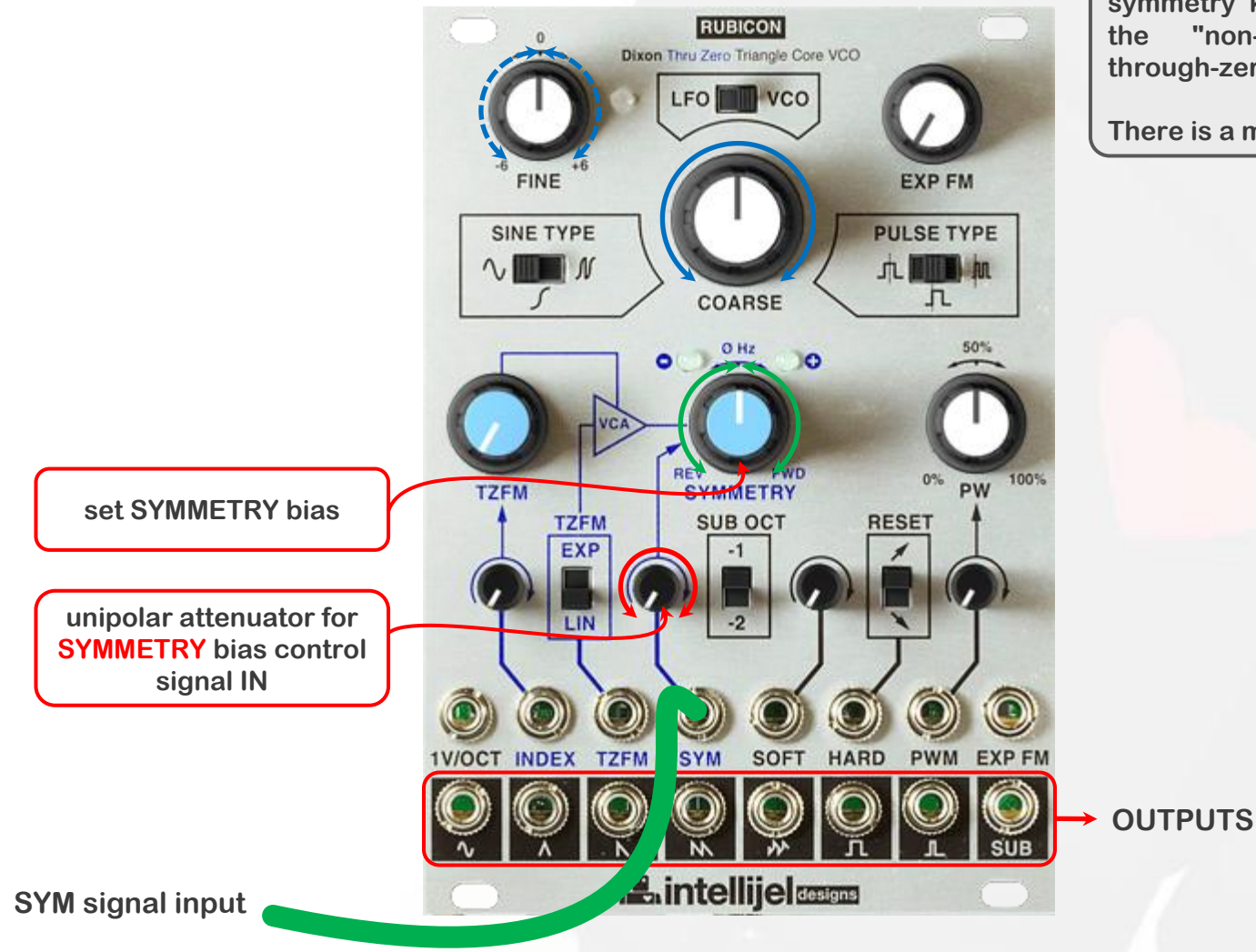
OUTPUTS



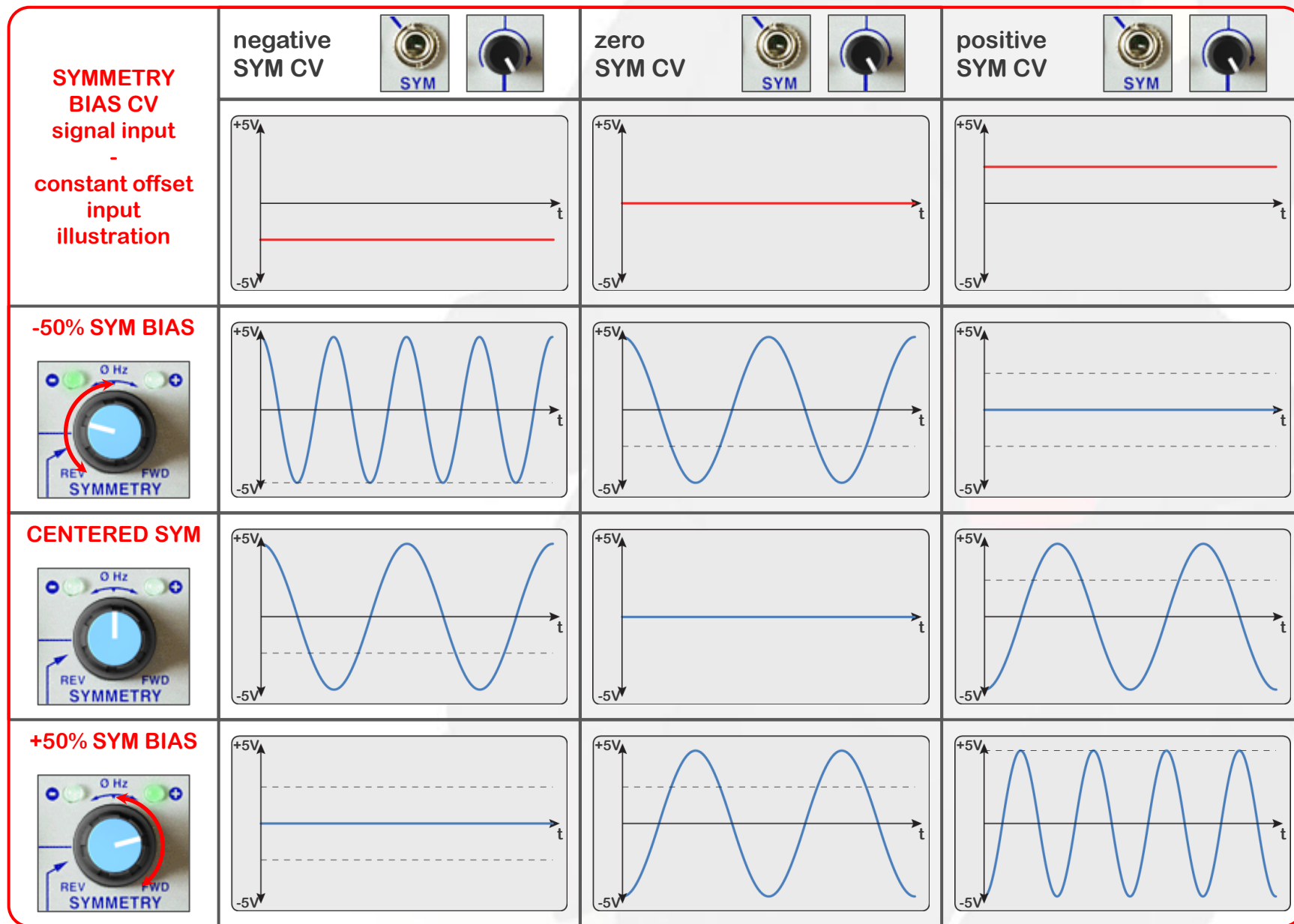
# SYMMETRY modulation

**SYM** input modulates the symmetry setting, and is equivalent to turning the symmetry knob back and forth. This is the "non-dynamic" modulation of through-zero FM.

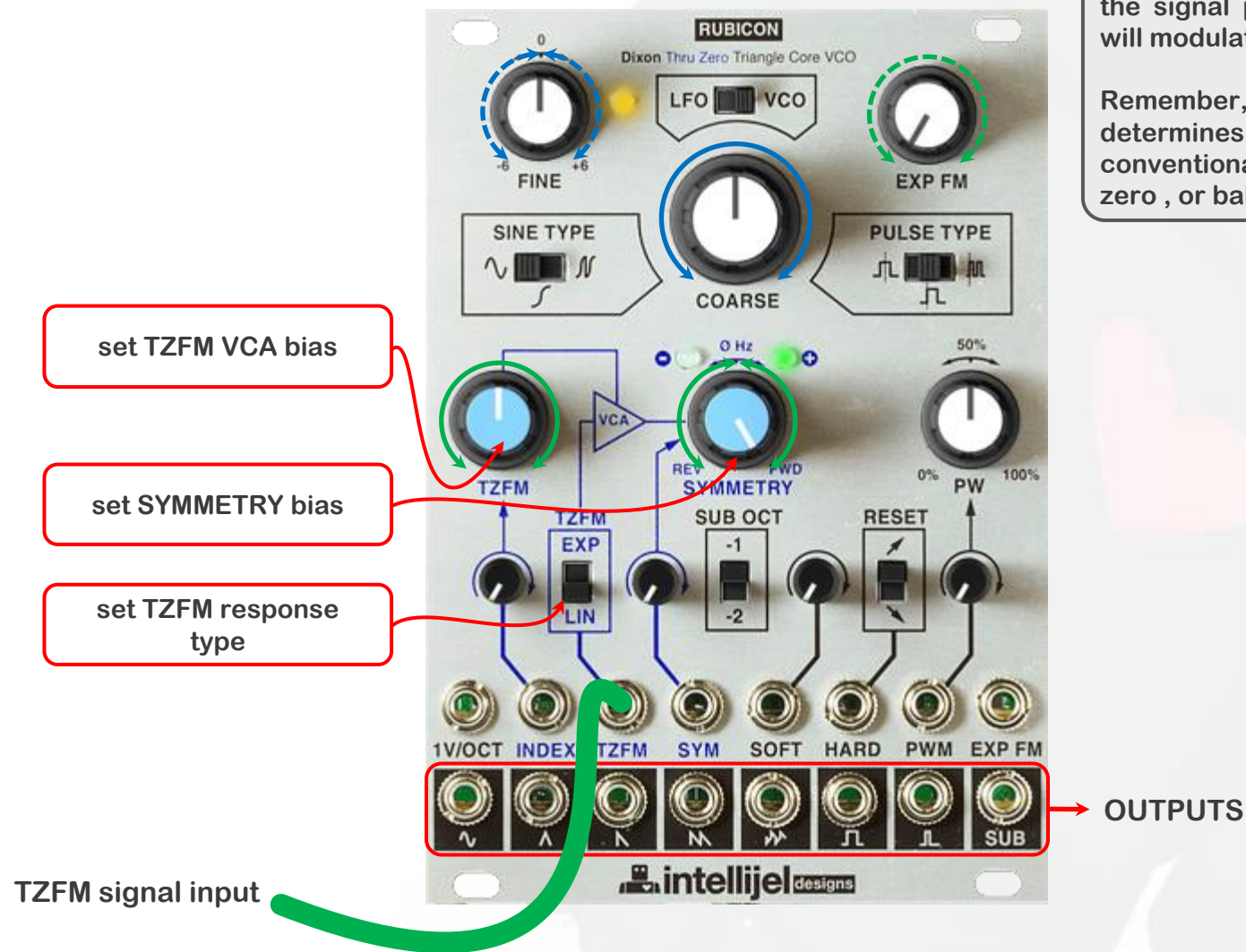
There is a mini attenuator on this input.



# SYMMETRY modulation chart (SINE out illustration)



## TZFM signal input



TZFM knob sets the Bias of the TZFM VCA. As the knob is turned CW more of the signal patched into the TZFM input will modulate the VCO frequency.

Remember, the SYMMETRY setting determines whether the FM is conventional linear, partially through-zero, or balanced through-zero.



# TZFM amplitude modulation with INDEX

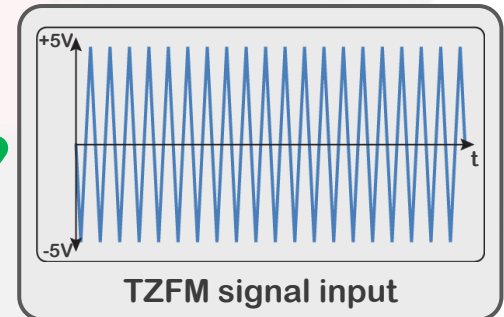
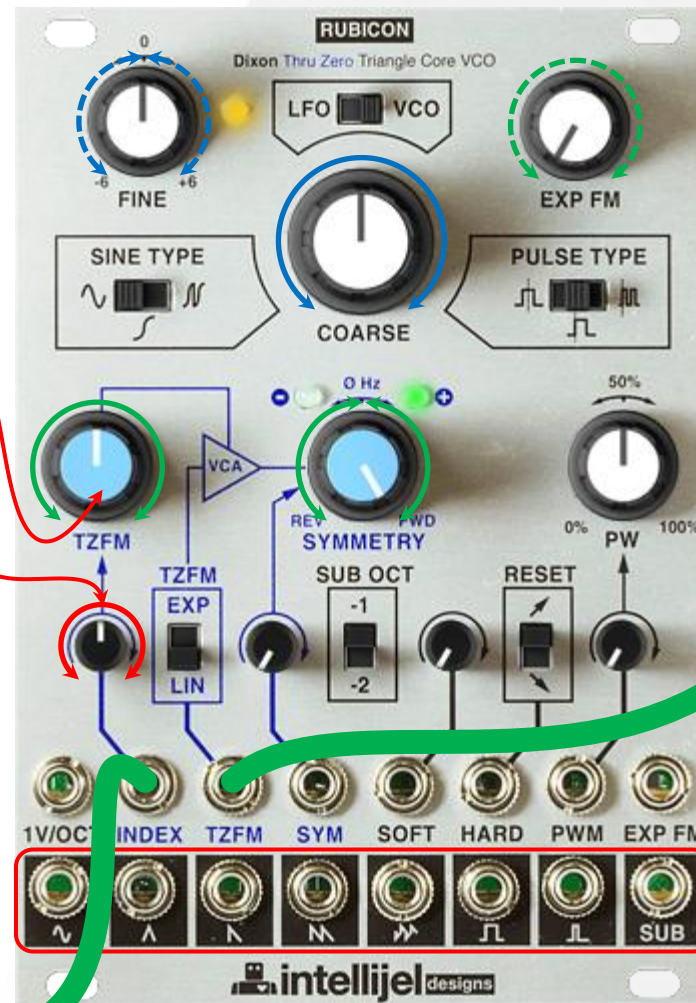
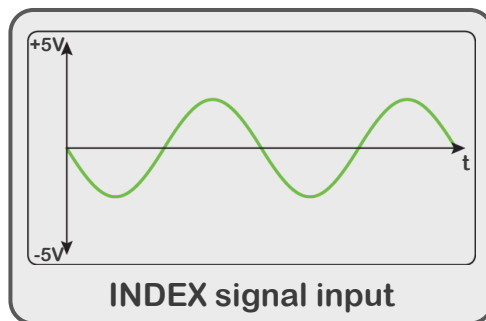
**INDEX** knob attenuates the audio/cv signal coming into the INDEX input below. This is the attenuated modulation input for a linear VCA which virtually turns the TZFM knob.

This is the "dynamic" modulation of through-zero FM. In other words, it modulates the modulation. It's the "adverb" to TZFM's "adjective" so to speak. That's why it is shown as the control input to a VCA on the panel.

The INDEX input is like the CV input of a VCA, and the TZFM knob is like the Bias of that VCA, where that VCA controls the degree of through-zero (or just linear) FM.

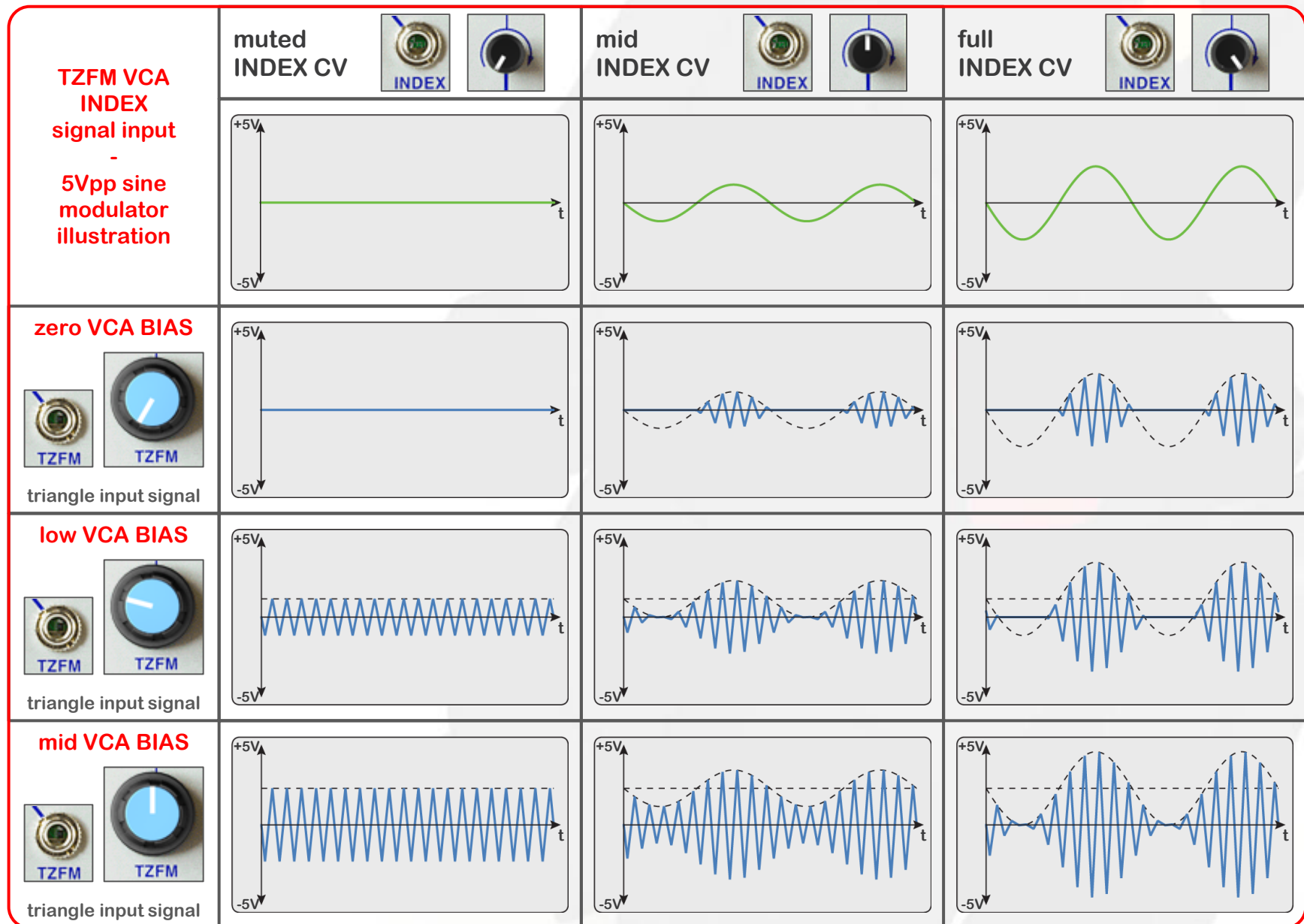
set TZFM VCA bias

unipolar attenuator for INDEX signal IN

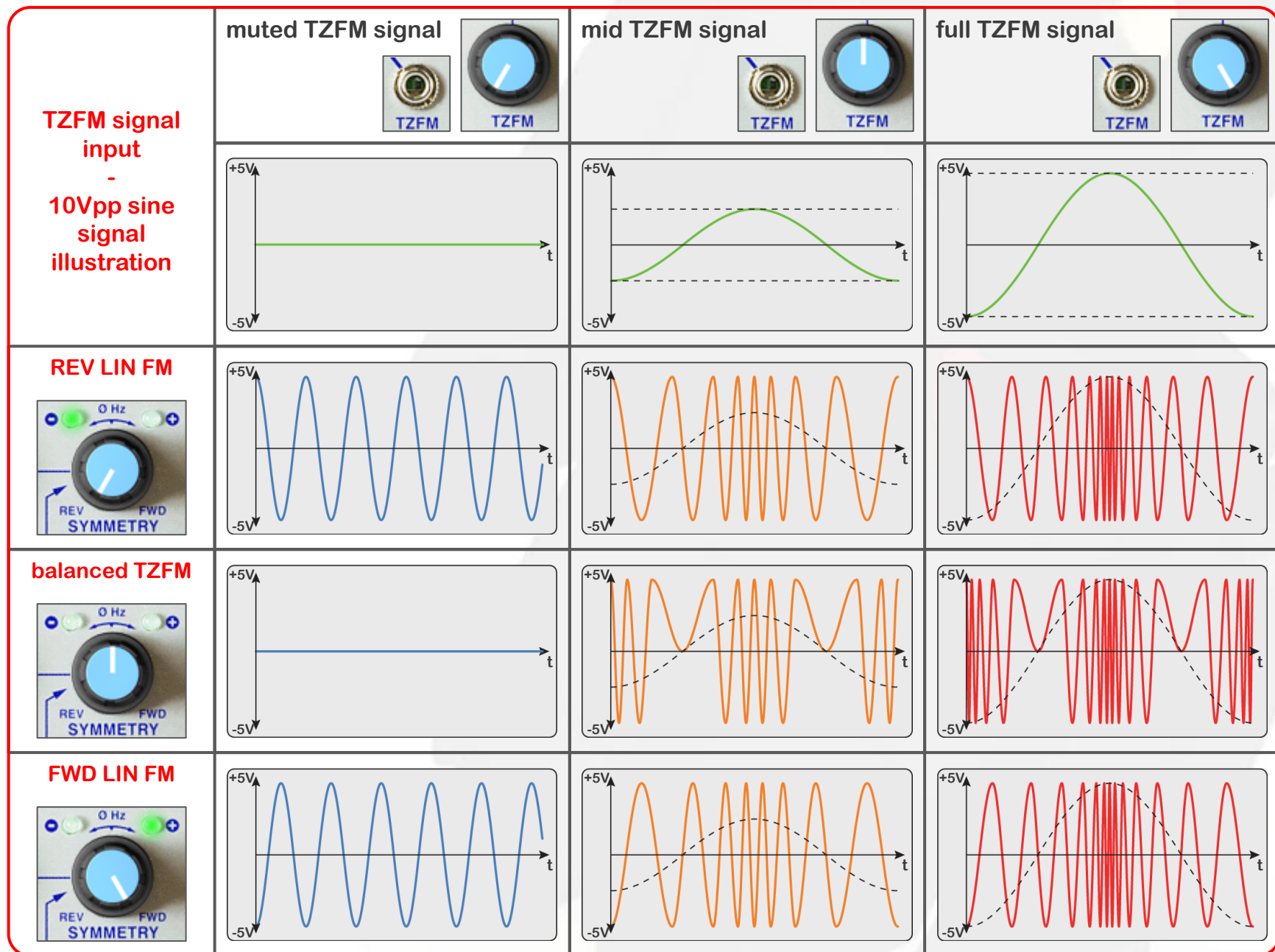


OUTPUTS

# TZFM VCA modulation chart (triangle TZFM input illustration)



# SYMMETRY vs TZFM signal input chart (SINE out illustration)



# TZFM EXP/LIN signal input response

**TZFM EXP/LIN** switch selects the type of FM modulation the TZFM input will be.

This switch determines whether the response of TZFM is linear or exponential.

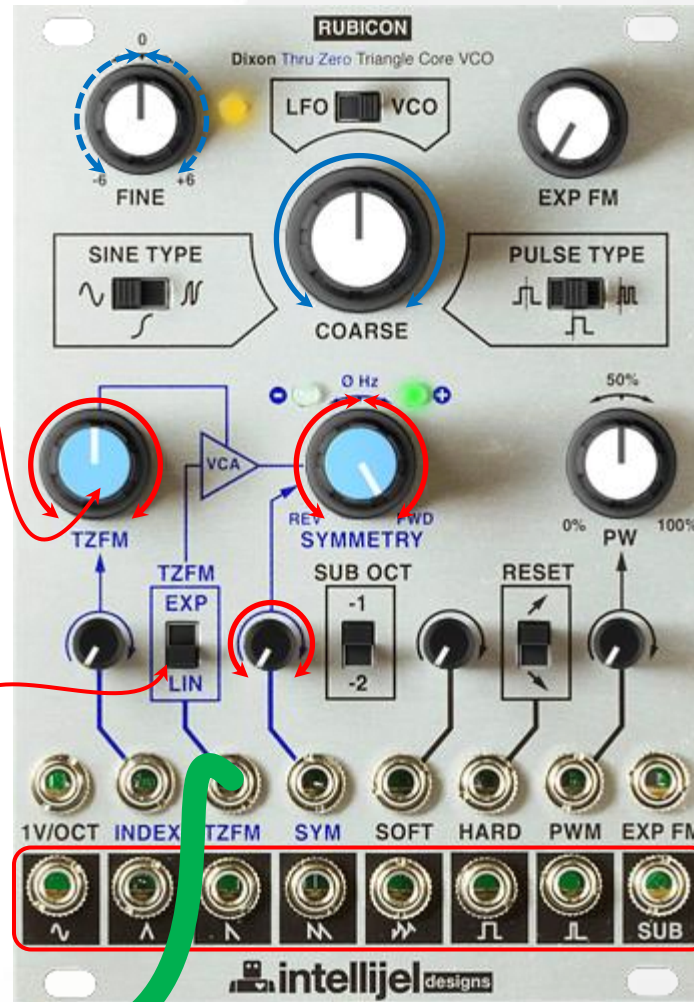
The exponential setting is not really 1V/Oct, and really just gives a more extreme response to the modulation signal.

Incidentally, setting the switch to EXP renders the responses of **TZFM**, **SYM**, and the **SYMMETRY** pot all exponential, while LIN renders them all linear.

set TZFM VCA bias

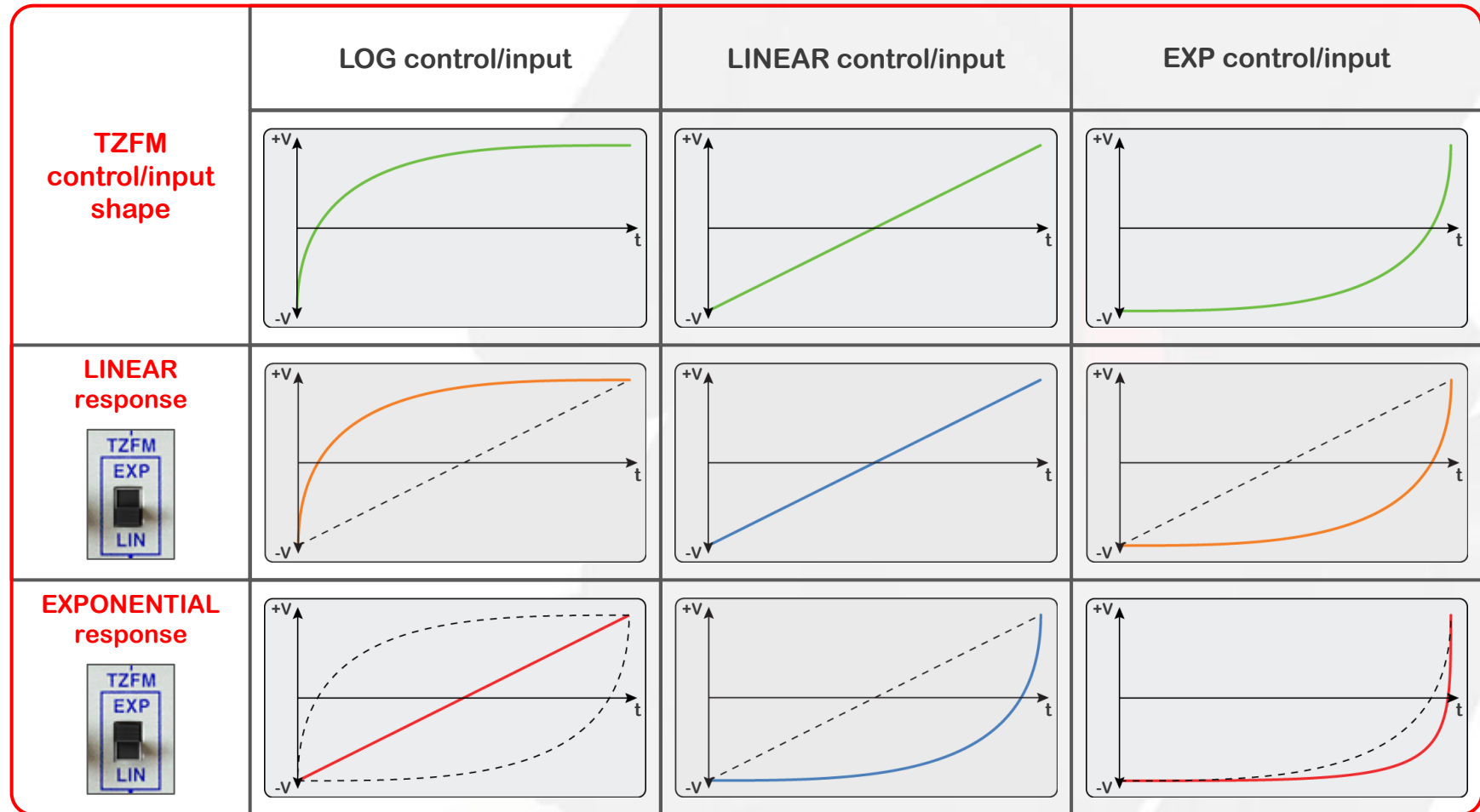
set TZFM response type

TZFM signal input



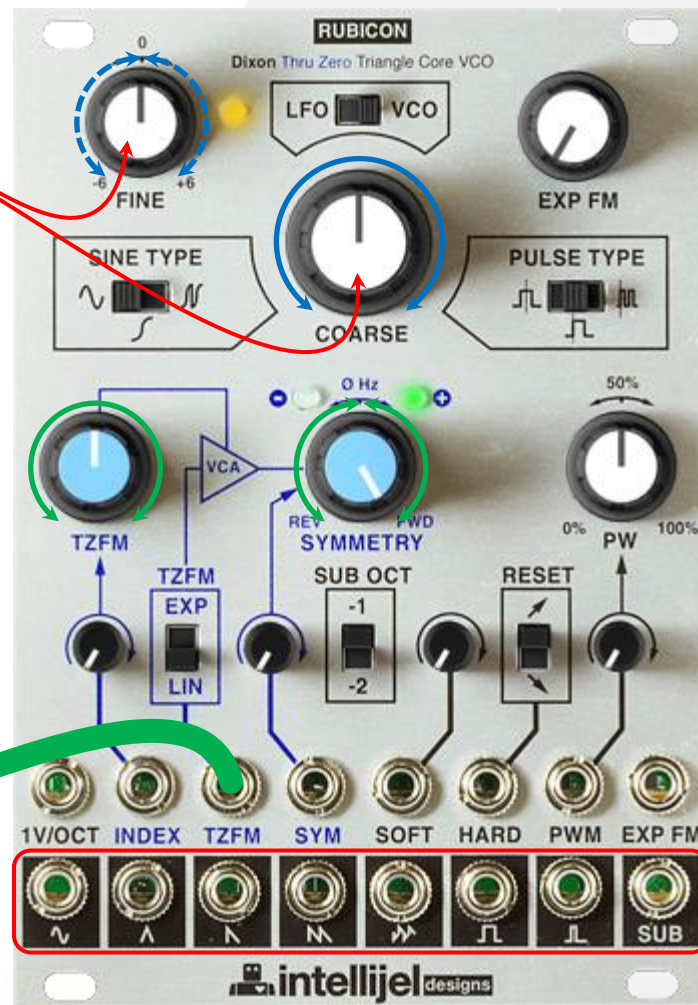
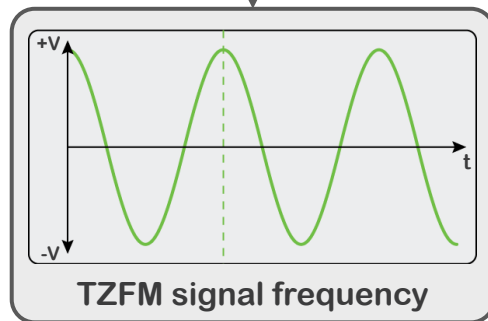
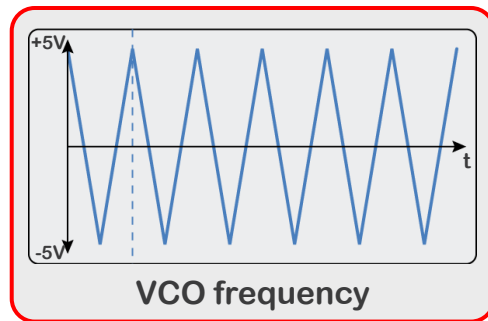
OUTPUTS

# TZFM EXP/LIN signal input response chart





## Using TZFM - Modulation rate (David G. Dixon)



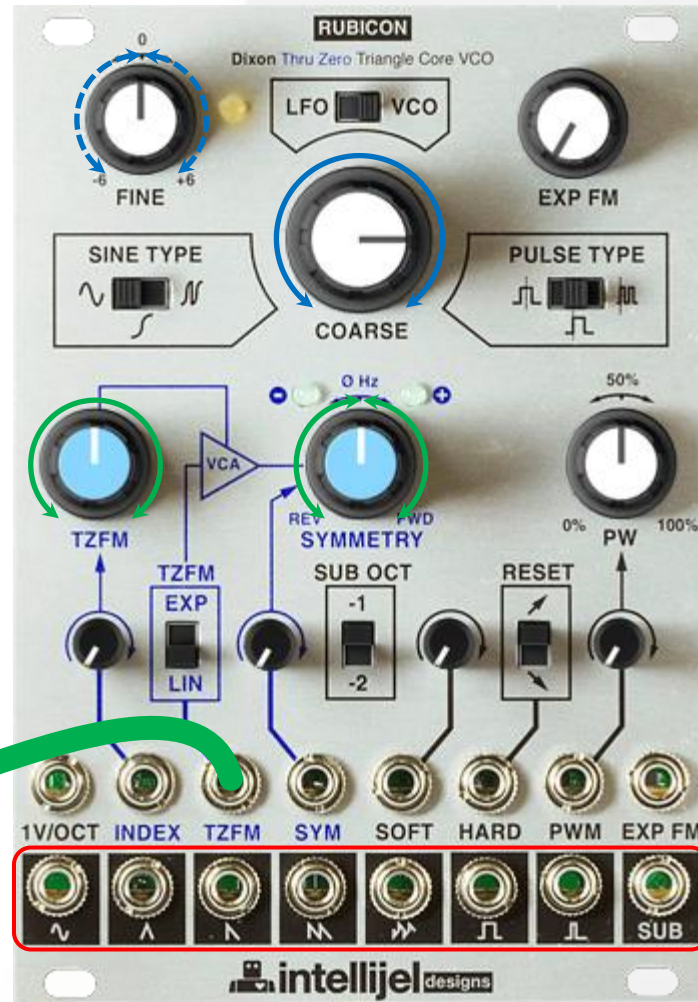
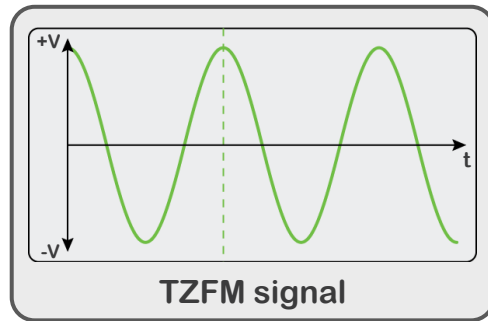
"About using the TZFM, the best (i.e., most musical) results will be obtained when the TZFM modulation signal has a lower frequency than the base frequency of the Rubicon (i.e., the frequency of the unmodulated VCO with the SYMMETRY pot cranked fully CW).

If the TZFM modulation signal is faster than the Rubicon's base frequency, then all you'll get is little wiggles on the waveform which aren't that interesting."

OUTPUTS



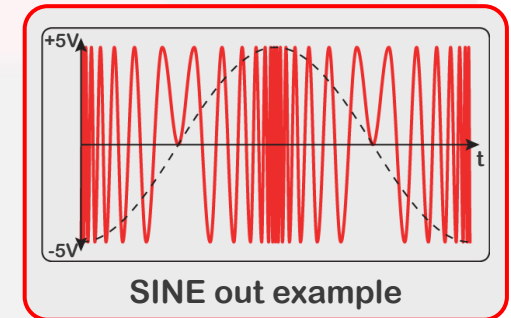
# Using TZFM - Balanced TZFM (David G. Dixon)



"If you want balanced TZFM (where the frequency is modulated through zero in a symmetrical fashion, going up to the same frequency in both the positive and negative directions), then set the SYMMETRY pot in the centre.

However, you must be aware that the unmodulated frequency of the VCO at this setting is actually zero, and even with the COARSE knob cranked way up, the frequency range you hear will still be relatively low. This is simply the nature of the beast.

Hence, if you want high frequencies with balanced TZFM, you'll really have to crank the COARSE pot up pretty high (which would give "base" frequencies well above the audio range under "normal" operating conditions)."

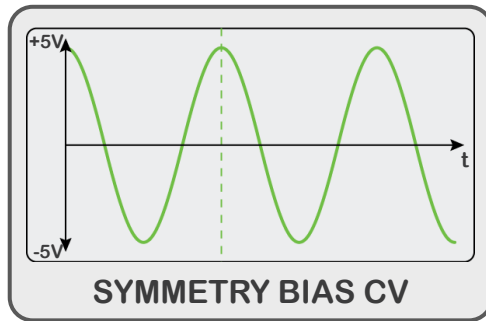


OUTPUTS

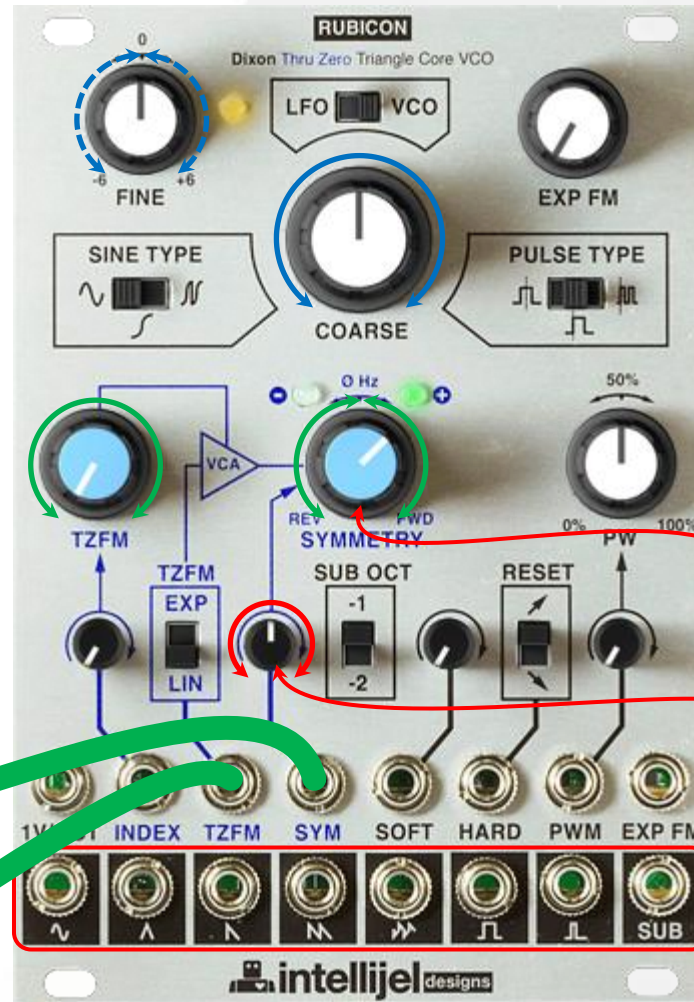
# Using TZFM - Example 1 (David G. Dixon)

"I personally find that the TZFM sounds are the most interesting when the SYMMETRY is adjusted to around 1:00 or 2:00 o'clock (or 10:00 to 11:00 o'clock).

However, YMMV. I also find the sound to be quite invigourating when the symmetry is modulated (by feeding a waveform, preferably sine, into the SYM input) and the symmetry knob is then slowly turned. As Martha used to say, "It's a good thing !"



TZFM signal



set SYMMETRY  
initial bias

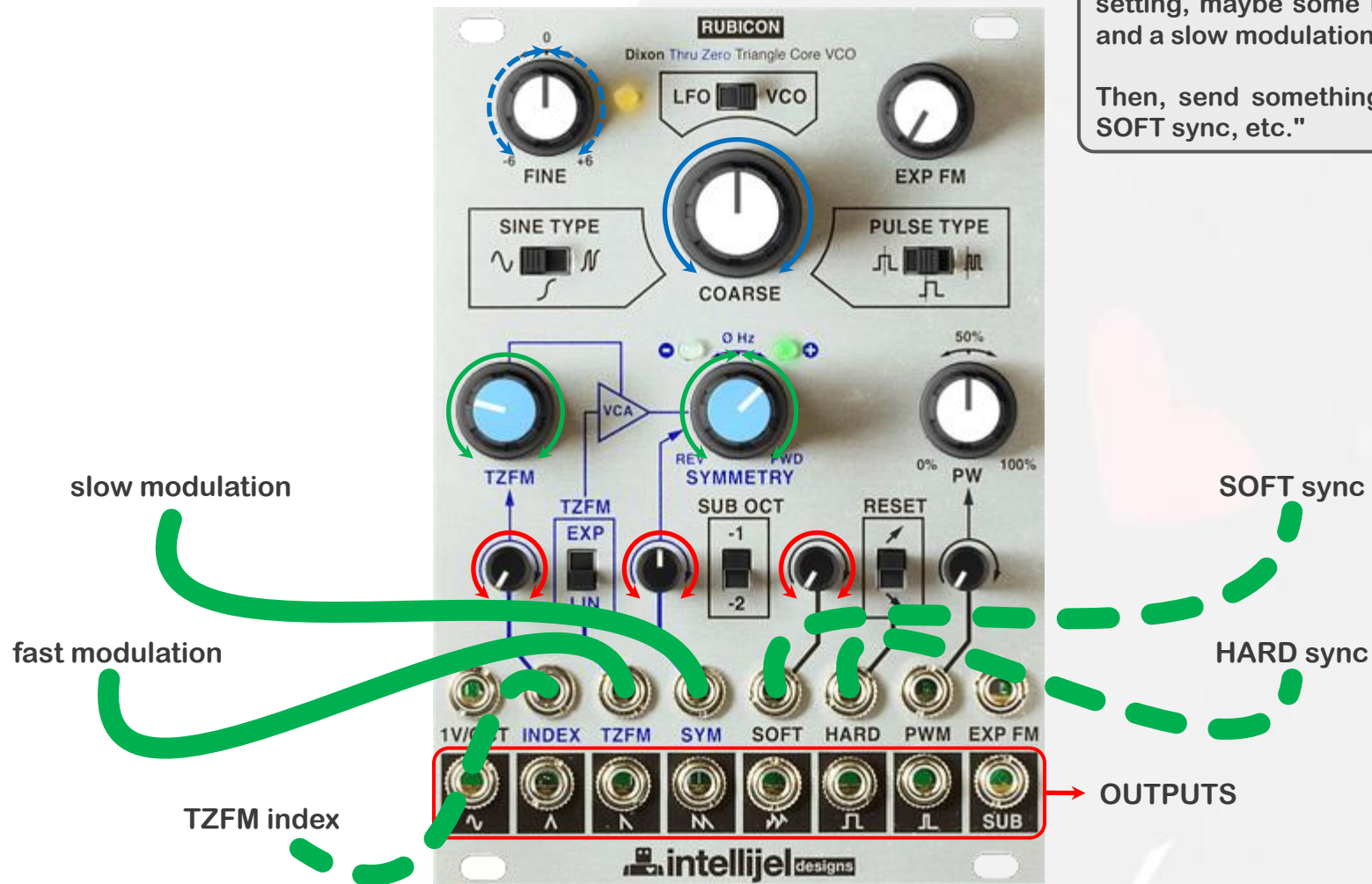
unipolar attenuator for  
SYMMETRY bias control  
signal IN

OUTPUTS

## Using TZFM - Example 2 (David G. Dixon)

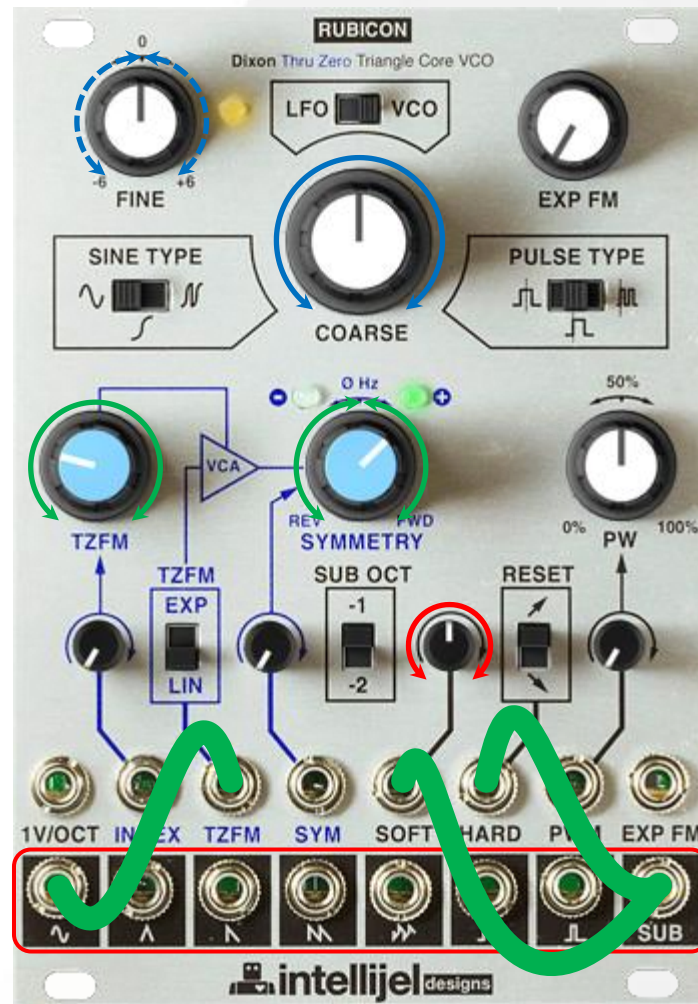
"Try relatively fast modulation to the TZFM input, modest TZFM attenuator setting, maybe some INDEX maybe not), and a slow modulation to the SYM input.

Then, send something else to HARD or SOFT sync, etc."



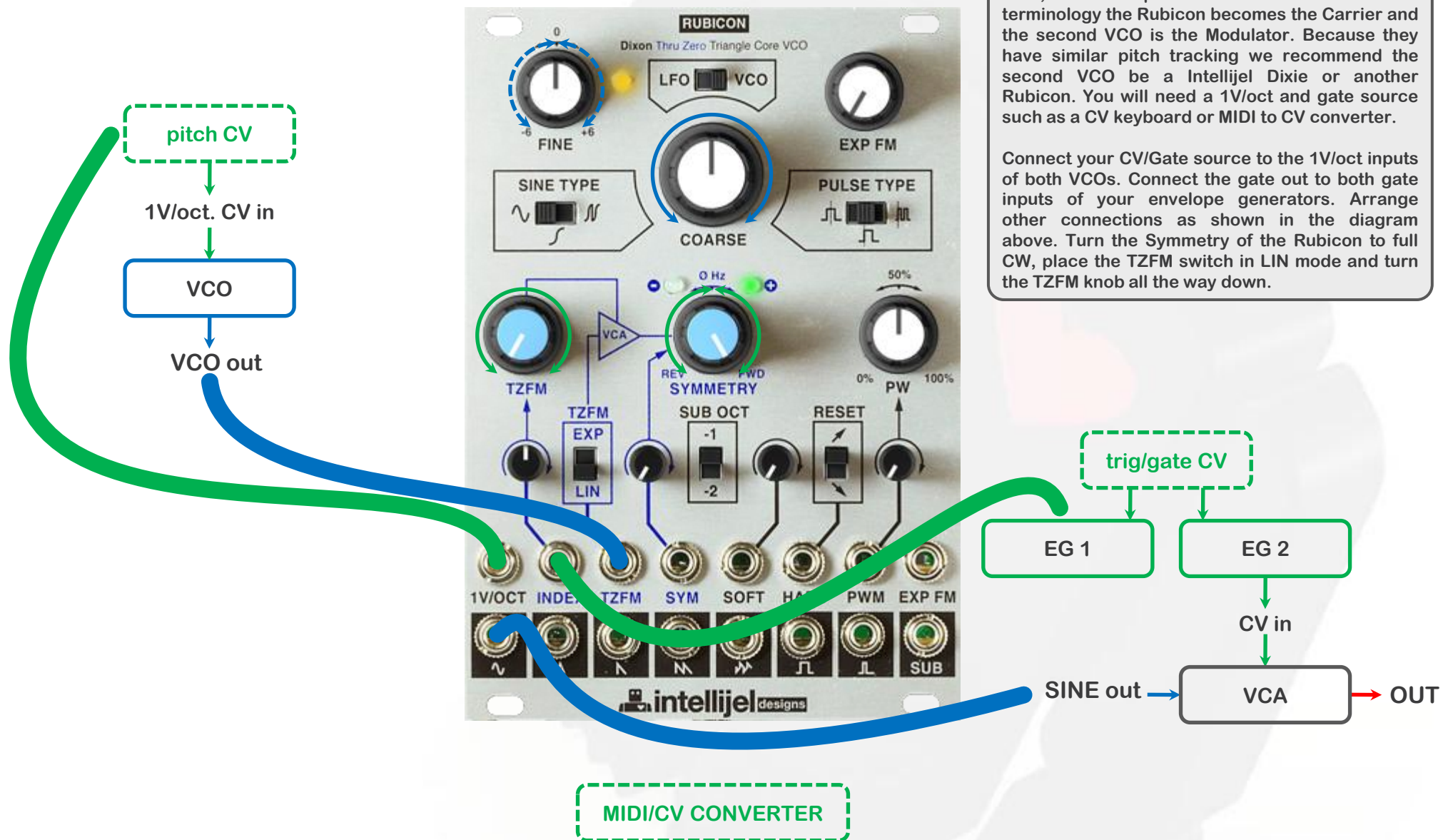


## Using TZFM - Example 3 (David G. Dixon)

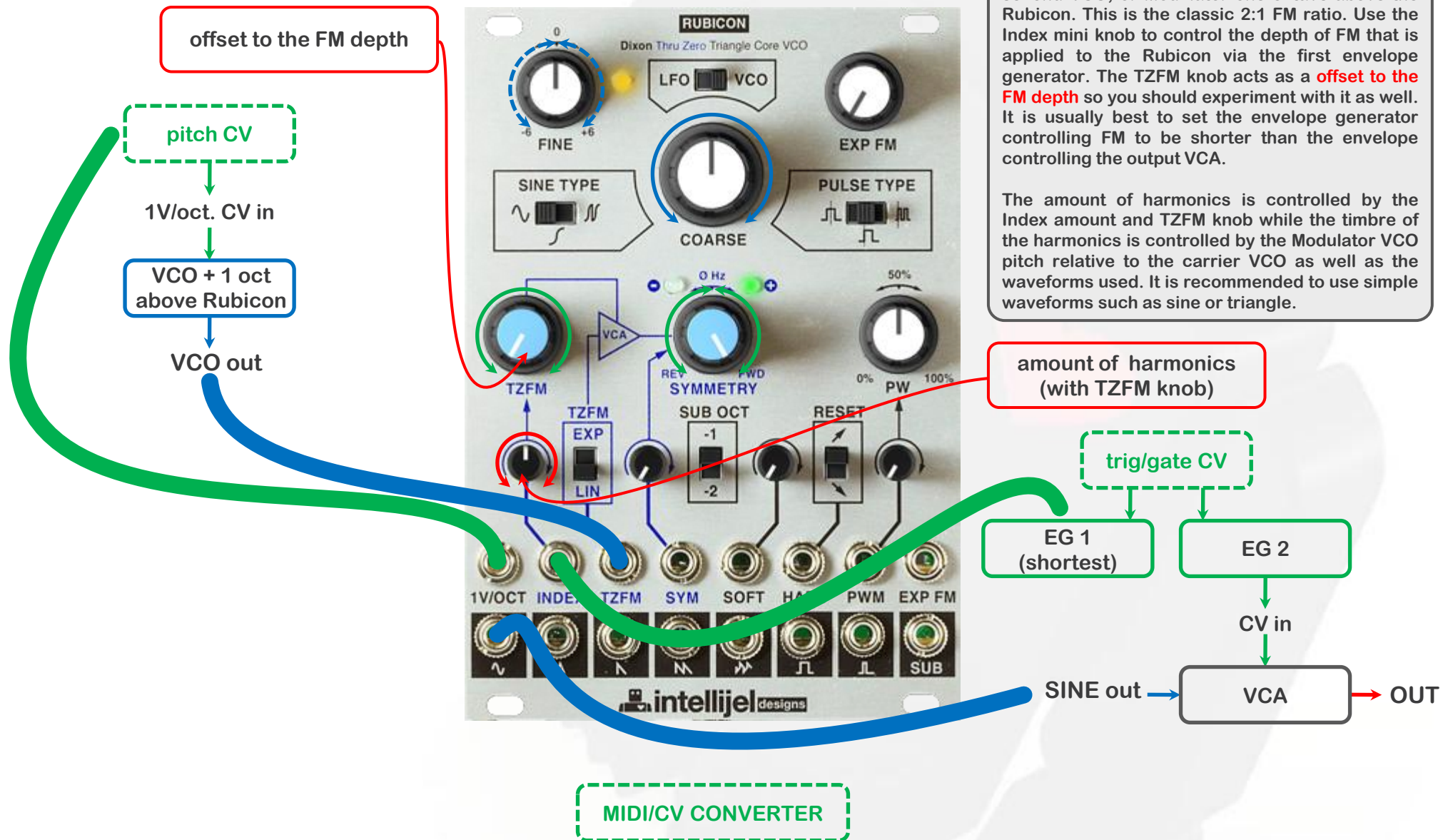


"You can also self modulate to interesting effect. Try sending the SUB output to HARD or SOFT at various attenuator settings, or the double sigmoid to TZFM, or whatever -- it may be total shite, or it may be the most amazing thing you've ever heard. Experiment !"

## Basic 2 Operator TZFM - step 1



## Basic 2 Operator TZFM - step 2





# Classic DCO style PWM Saw Strings



One of the special features of the Rubicon is the double frequency waveform outputs. These waves can be used for FM modulation or combined with the other waves to give a richer sound.

PWM saws can be created by using the Double Saw and Pulse outputs into a cross fader creates a saw wave that can be pulse modulated.

set DOUBLE-PULSE

DOUBLE-SAW  
out

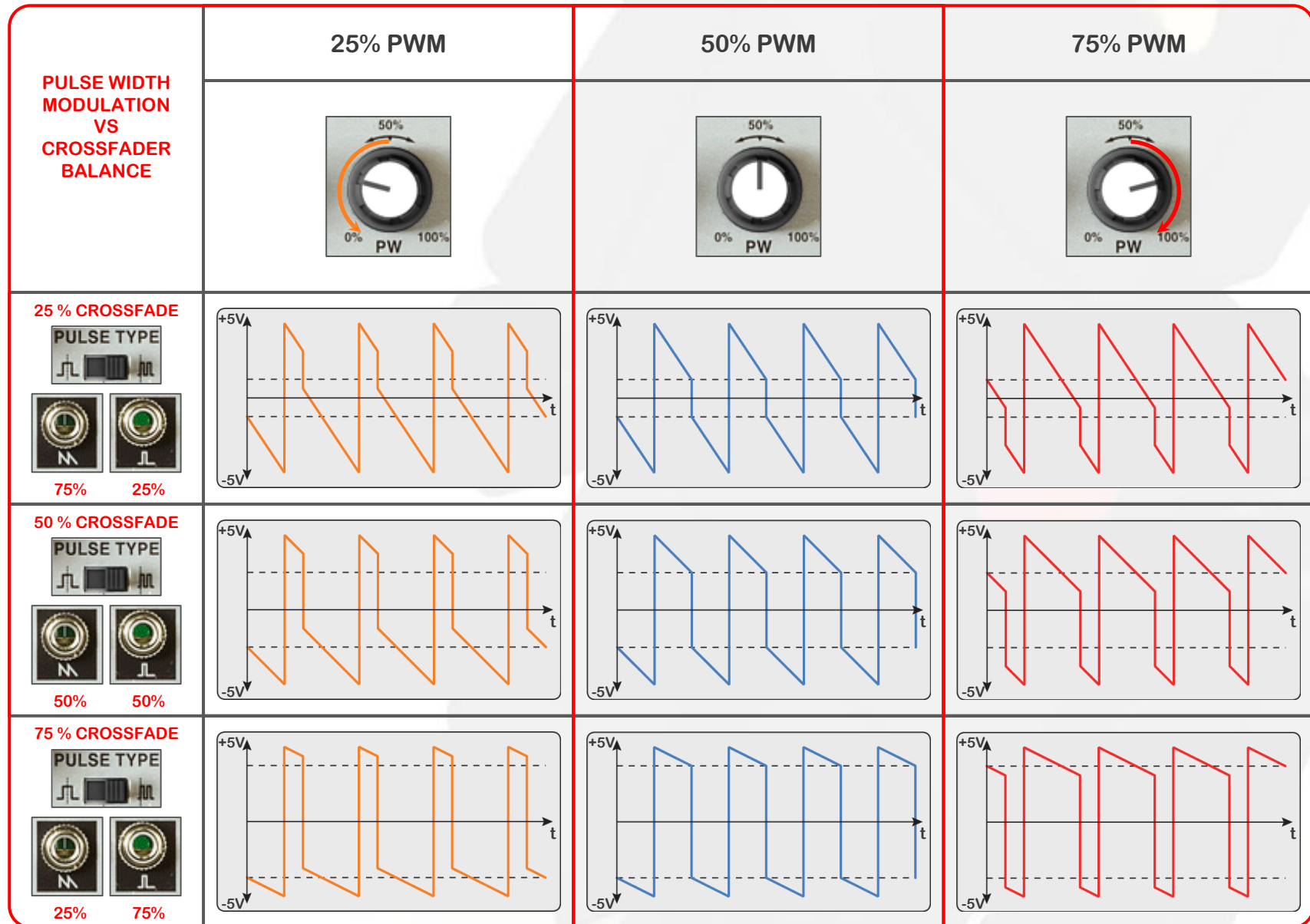
DOUBLE-PULSE  
out

CROSSFADER  
A in

CROSSFADER  
B in

CROSSFADER  
OUT

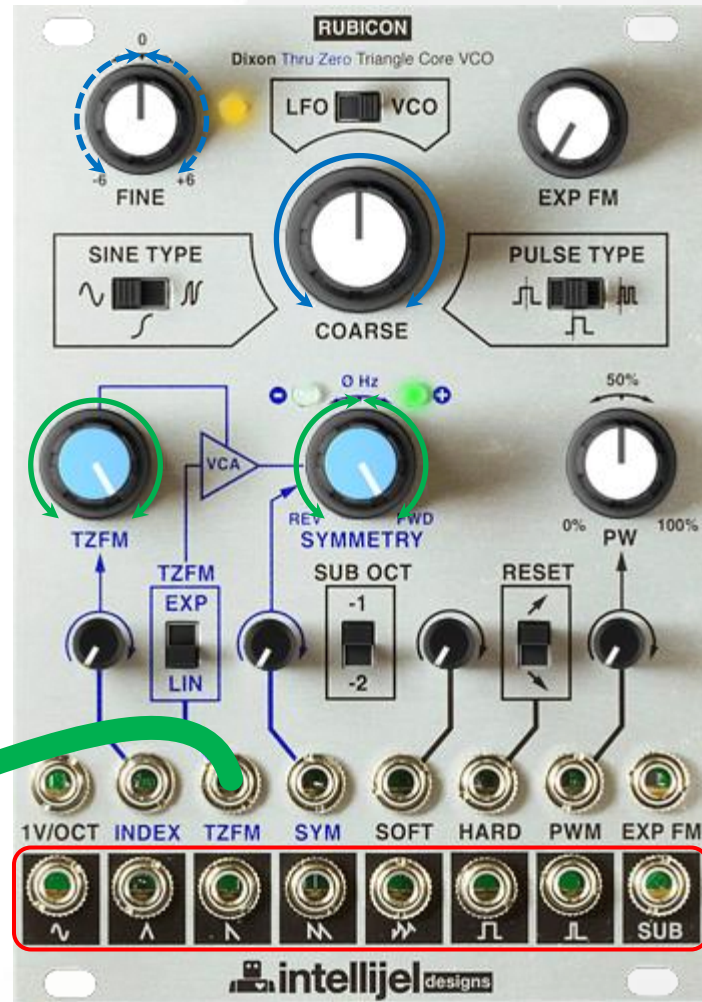
# Classic DCO style PWM Saw Strings chart



# TZFM vibrato

Use the TZFM VCA to get a classic vibrato effect .

sub-audio modulation

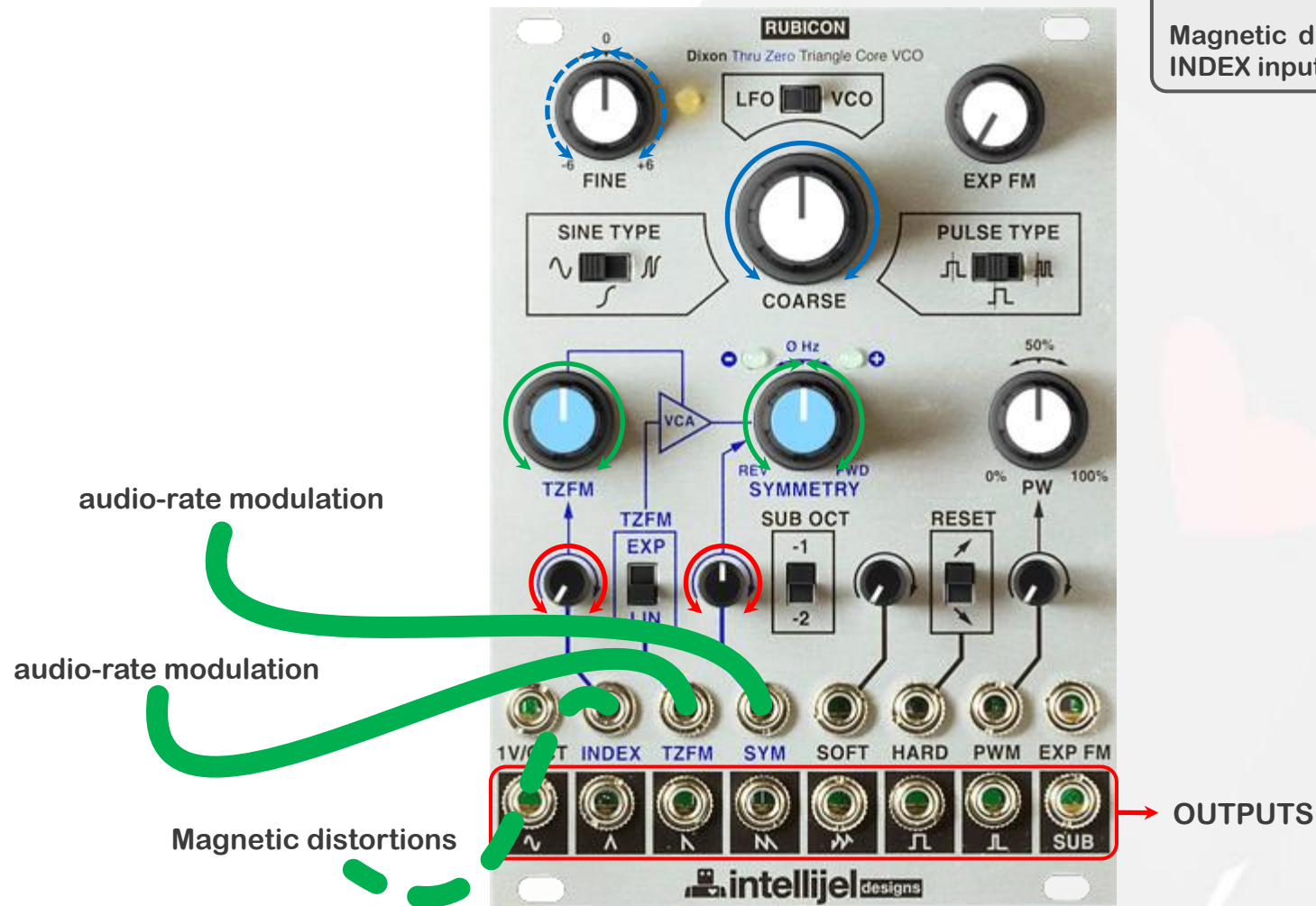


OUTPUTS

# Solar winds

Get solar winds by modulating SYMMETRY and TZFM at audio rate.

Magnetic distortions can be added with INDEX input.





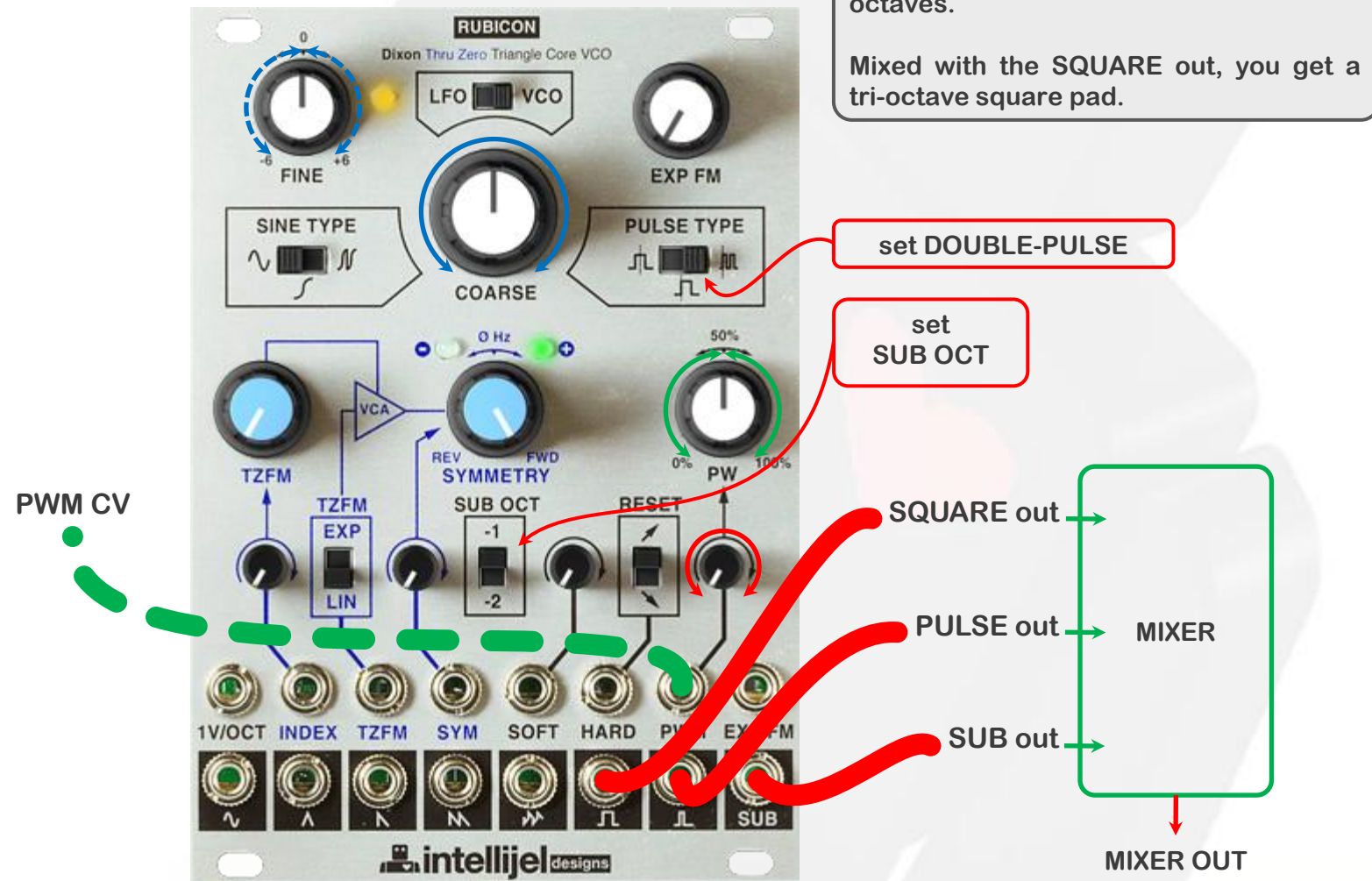
# Massive square

Mix SQUARE, PULSE and SUB outputs to get a massive square.

Taste with some PWM.

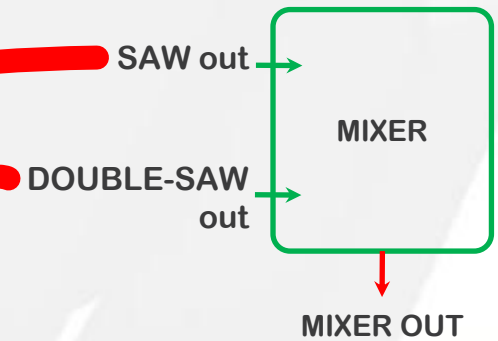
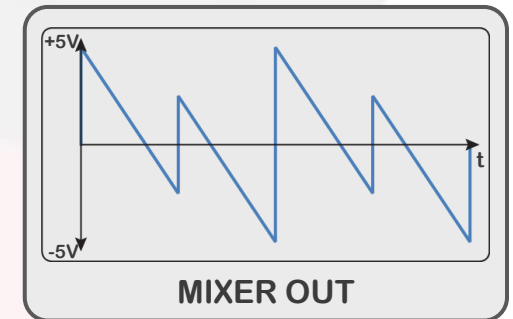


## Tri-octave square pad

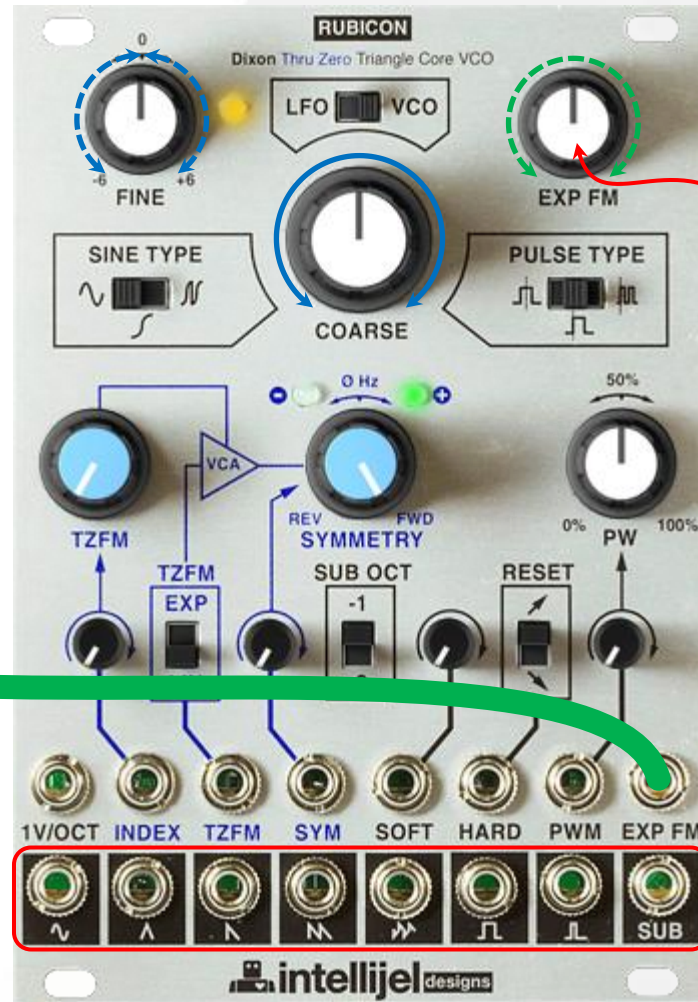
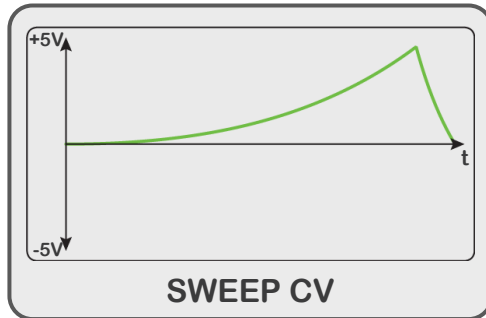




# Dual saw



# Classic FM sweep



unipolar attenuator for  
EXP FM input

OUTPUTS

# FM feedback loop

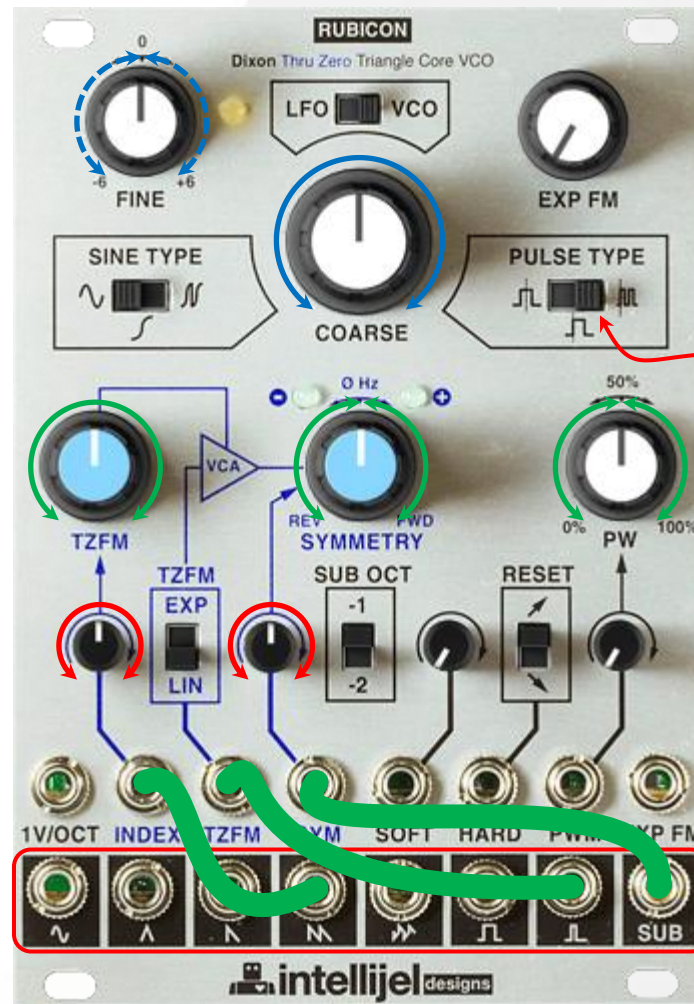


unipolar attenuator for  
EXP FM input

set DOUBLE-PULSE

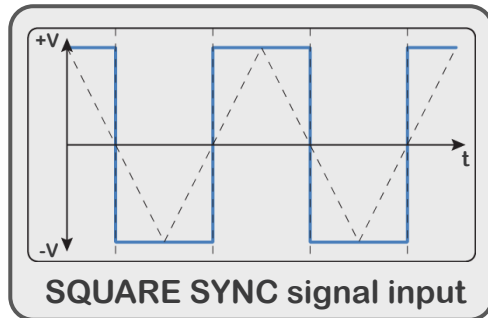
OUTPUTS

# TZFM feedback loop





# Space-folding (Danjel Van Tijn)



"Just discovered a cool trick with the Rubicon:

Use a modulation source (like a Dixie) and patch the square out into the Rubicon hard sync input. Take any other output form the Dixie and feed it to the TZFM input. Now listen/look at the triangle output while playing with the symmetry knob. By doing this I was able to control wavefolding of the triangle.

By playing with the hard sync direction switch and the exp/lin tzfm switch you can affect the shape/response. The pitch remains constant due to the sync so to play this you need to play the 1V/Oct input of the modulator (Dixie).

By modulating the symmetry CV input you will also vary the texture totally differently than simply changing the pitch."

set SHAPE/RESPONSE

set SHAPE/RESPONSE

SYMMETRY CV

folded TRIANGLE OUT