

VCO I: 1v/oct, AM/FM, PWM, Sync
VCO II: 1v/oct, FM, PWM, Sync

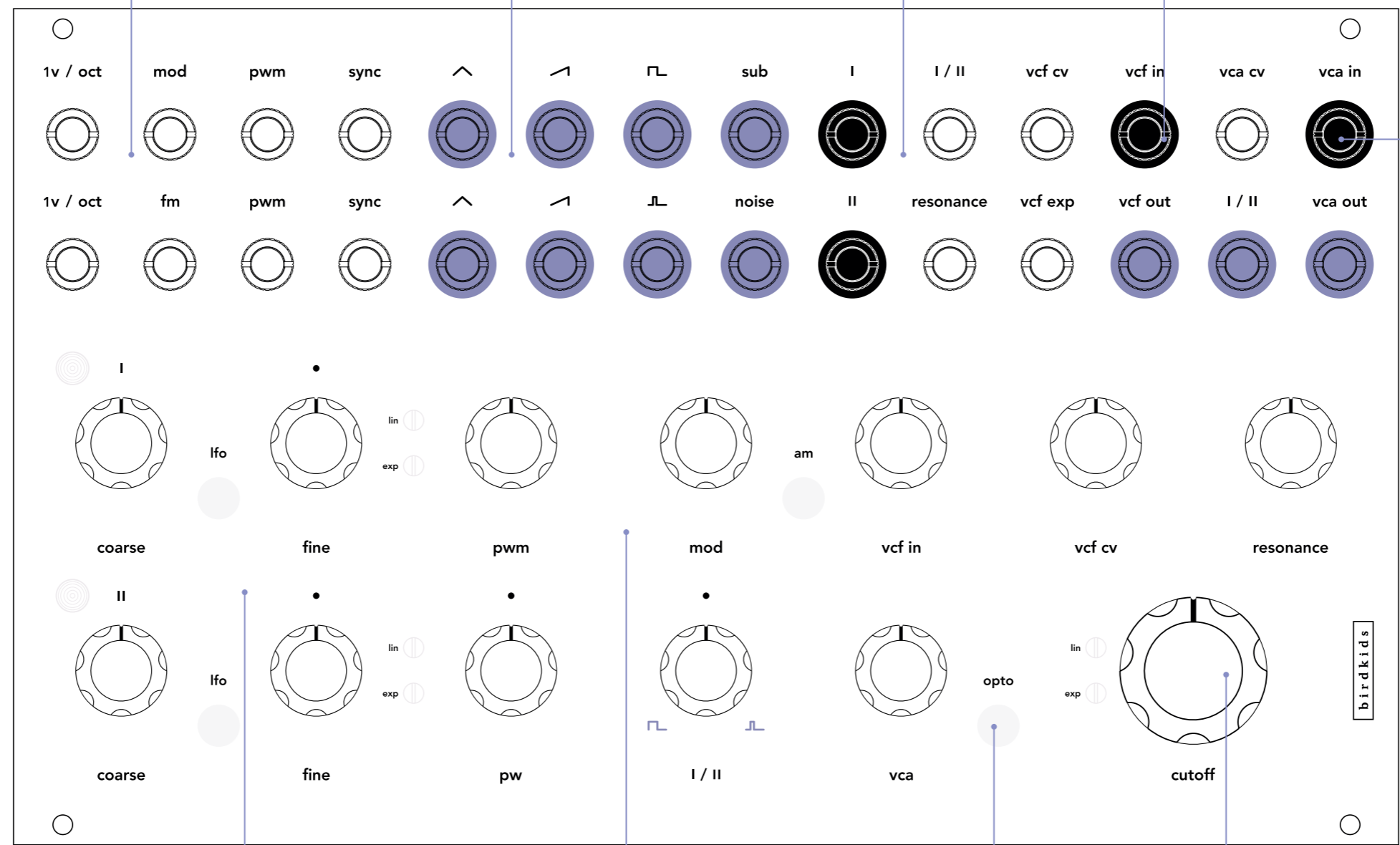
VCO I: Tri, Saw, Square, Sub
VCO II: Tri, Saw, Pulse (variable)
 Noise Generator (White)

Audio in I
 Audio in II
 Audio out
 CV modulation in

Audio in
 Audio out
 Exponential modulation CV in
 Linear modulation CV in
 Resonance CV modulation in

VCA Audio in
 VCA Audio out
 VCA CV in

Dual VCOs **Waveforms** **Crossfader** **VCF** **VCA**



VCO Range / controls

Audio: C1 up to C9
LFO: via ^{lfo} switch (0.1Hz - ca. 16Hz)
Coarse: +/- 2.5 Octaves
Fine: +/- 8 Semitones

VCO Modulation controls

PWM: VCO I / VCO II (normalized)
PW: VCO II variable 10% to 90%
FM_{mod}: VCO I / VCO II (normalized)
AM_{mod}: VCO I via ^{am} switch.

Crossfader / VCA controls

Crossfader: I / II (Square / Pulse norm'd)
VCA: VCA CV amount (5V norm'd)
VCA: Opto distortion via ^{opto} switch

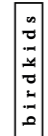
VCF controls

VCF input gain (Crossfader out norm'd)
 Cutoff Frequency
 Linear CV modulation amount
 Resonance CV amount (5V norm'd)



Designed and assembled by birds kids
 in Vienna, Austria

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Technical Definitions

Group	Module	Identification	Function	Characteristic	Voltage Range	Functional Range	In/Out Impedance	Anotation
CV IN	VCO I	1V/OCT	Pitch VCO I	1V/Oct	-3v to 5v	C1 to C9	680k	
	VCO I	MOD	FM VCO I	340Hz/V	+/- 5v	+/- 1700Hz	8k	
			AM VCO I	-3.3dB/V	+/- 5v	0 to -16.2dB	8k	Rectification of input signal
	VCO I	PWM	PWM VCO I	-8%/V	+/- 5v	10% to 90%	10k	
	VCO I	SYNC	Sync VCO I	0.5V Threshold	+/- 5v	0.1Hz to 20k	20k	SYNC frequency must be lower than VCO frequency
	VCO II	1V/OCT	Pitch VCO II	1V/Oct	-3v to 5v	C1 to C9	680k	
	VCO II	FM	FM VCO II	340Hz/V	+/- 5v	+/- 1700Hz	47k	
	VCO II	PWM	PWM VCO II	-8%/V	+/- 5v	10% to 90%	100k	
	VCO II	SYNC	Sync VCO II	0.5V Threshold	+/- 5v	0.1Hz to 20k	20k	SYNC frequency must be lower than VCO frequency
	VCF	VCF CV	VCF Linear modulation	3800Hz/V*	+/- 5v	0.3Hz to 19k*	5k	Linear modulation i.e. for envelope modulation. *Characteristic depending on RESONANCE value
	VCF	VCF EXP	VCF Exponential modulation	1V/Oct	-3v to 5v	0.3Hz to 19k*	680k	*Functional range depending on CUTOFF value
	VCF	RESONANCE	VCF Resonance modulation	20%/V	0-5v	0% to 100%	10k	
	VCA	VCA CV	VCA Linear modulation	9.6dB/V*	0-5v	-46dB to +2dB	8k	*0V = -46dB
	Crossfader	I / II	Crossfader modulation	20%/V*	+/- 5v	100% I to 100% II	100k	*0V (Center) = 50% I and 50% II



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Group	Module	Identification	Function	Characteristic	Voltage Range	Functional Range	In/Out Impedance	Anotation
AUDIO OUT	VCO I	TRIANGLE	Triangle VCO I	Bipolar	+/- 5v	F-7 to C9	1k	
	VCO I	SQUARE	Square VCO I	Bipolar	+/- 5v	F-7 to C9	1k	50% pulsewidth
	VCO I	SAW	Saw VCO I	Bipolar	+/- 5v	F-7 to C9	1k	Rising ramp
	VCO I	SUB	Sub VCO I	Bipolar	+/- 5v	F-8 to C8	1k	SUB one octave below SAW VCO I
	VCO II	TRIANGLE	Triangle VCO II	Bipolar	+/- 5v	F-7 to C9	1k	
	VCO II	PULSE	Pulse VCO II	Bipolar	+/- 5v	F-7 to C9	1k	Adjustable pulsewidth 10% to 90%
	VCO II	SAW	Saw VCO II	Bipolar	+/- 5v	F-7 to C9	1k	
	Noise Source	NOISE	White Noise	Bipolar	+/- 5v	-	1k	
	VCF	VCF OUT	VCF output, Filter	Bipolar	+/- 5v	0.3Hz to 19kHz	1k	RESONANCE = 0V
			VCF output, Self Resonance	Bipolar	+/- 5v	27Hz to 16kHz	1k	RESONANCE = 5V
	VCA	VCA OUT	VCA output, clean	Bipolar	+/- 5v	-46dB to +2dB	1k	OPTO Switch = OFF
			VCA output, Opto drive	Bipolar	+/- 5v	-46dB to +2dB	1k	OPTO Switch = ON, Harmonic distortion
	I / II	CROSSFADER OUT	Crossfader output	Bipolar	+/- 5v	100% I to 100% II	1k	*0V = -46dB



Group	Module	Identification	Function	Characteristic	Voltage Range	In/Out Impedance	Anotation
AUDIO IN	VCF	VCF IN	VCF audio input	Bipolar	+/- 5v	200k	
	VCA	VCA IN	VCA audio input	Bipolar	+/- 5v	20k	
	Crossfader	I	Crossfader audio Input I	Bipolar	+/- 5v	20k	
	Crossfader	II	Crossfader audio Input II	Bipolar	+/- 5v	20k	

Group	Module	Identification	Function	Characteristic	Functional Range	Anotation
TOGGLES	VCO I	LFO VCO I	Toggles between Audio and LFO mode	ON:LFO / OFF:AUDIO	AUDIO-LFO	
	VCO II	LFO VCO II	Toggles between Audio and LFO mode	ON:LFO / OFF:AUDIO	AUDIO-LFO	
	FM/AM	AM VCO I	Toggles between FM and AM circuits for VCO I	ON:AM / OFF:FM	FM-AM	
	VCA	OPTO	Toggles between clean and harmonic distortion	ON:OPTO / OFF:CLEAN	CLEAN-OPTO	



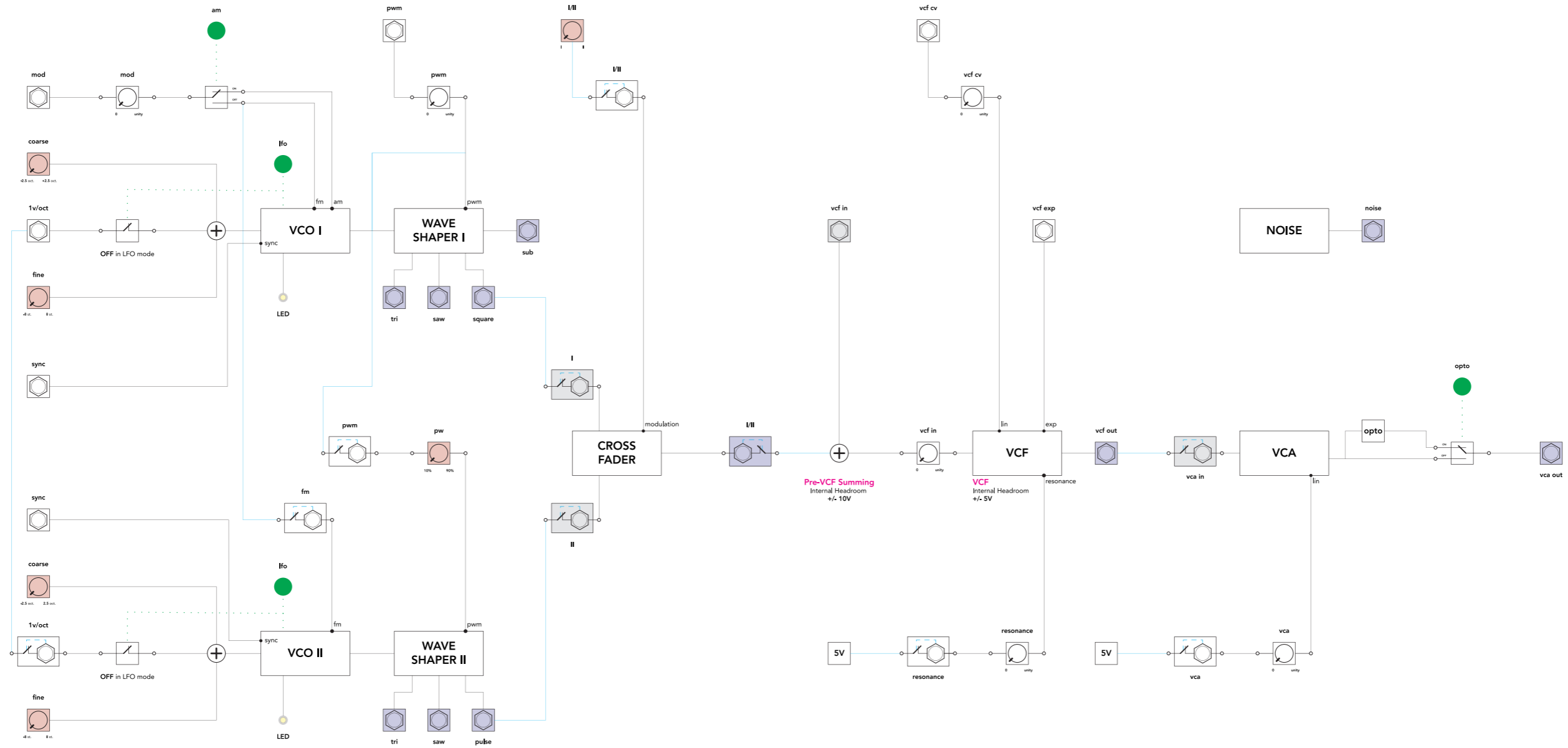
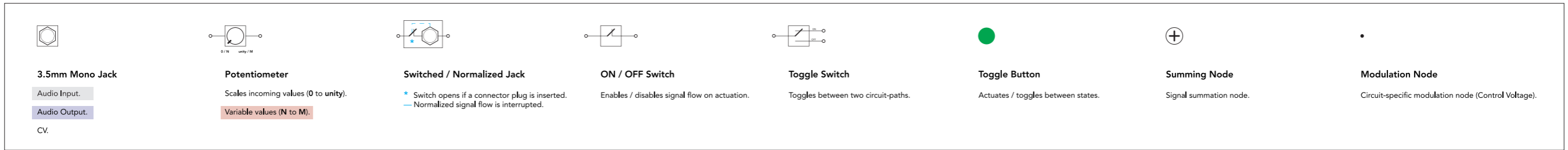
Group	Module	Identification	Function	Characteristic	Functional Range	Anotation
CONTROLS	VCO I	COARSE	Coarse Pitch VCO I	Logarithmic	+/- 2.5 octaves	
	VCO I	FINE	Fine Pitch VCO I	Logarithmic	+/- 8 semitones	
	VCO II	COARSE	Coarse Pitch VCO II	Logarithmic	+/- 2.5 octaves	
	VCO II	FINE	Fine Pitch VCO II	Logarithmic	+/- 8 semitones	
	VCO II	PW	Pulse Width VCO II	Linear	10% to 90%	
	VCO I	PWM	PWM CV Amount	Linear	0 to max	
	VCO I	MOD	MOD CV Amount	Logarithmic	0 to max	
	VCF	VCF IN	Filter Input Amount	Logarithmic	0 to max	
	VCF	VCF CV	VCF CV Amount	Logarithmic	0 to max	
	VCF	CUTOFF	VCF Cutoff frequency	Logarithmic	0.3Hz to 19k	
	VCF	RESONANCE	VCF Resonance	Linear	0 to max	
	VCA	VCA	VCA Gain Control	Linear	-46dB to +2dB	
	Crossfader	I / II	Crossfader Control	Logarithmic	100% I to 100% II	



Group	Module	Identification	Function	Anotation
LED	VCO I	VCO I Signal	VCO I Signal visualisation	LFO:perceivable Oscillation / AUDIO: Oscillation not perceivable
	VCO II	VCO II Signal	VCO II Signal visualisation	LFO:perceivable Oscillation / AUDIO: Oscillation not perceivable

Group	Module	Identification	Function	Characteristic	Functional Range	Anotation
TRIMMER	VCO I	VCO I LIN	VCO I Initial frequency setting	Linear	+/- 20%	
	VCO I	VCO I EXP	VCO I Exponential characteristic	Logarithmic	+/- 10%	
	VCO II	VCO I LIN	VCO II Initial frequency setting	Linear	+/- 20%	
	VCO II	VCO II EXP	VCO II Exponential characteristic	Logarithmic	+/- 10%	
	VCF	VCF LIN	VCF Initial frequency setting	Linear	+/- 20%	
	VCF	VCF EXP	VCF Exponential characteristic	Logarithmic	+/- 10%	





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