

Welcome & Conventions

Welcome! This cheat sheet describes the algorithms available in Expert Sleepers' **Disting Mk4** Eurorack module. There are so many great features crammed in to this tiny thing that I felt a compact algorithm guide would be helpful to master using it. I hope you find this guide to be useful. Please refer to the excellent manual for other functions and detailed algorithm info.

Choosing an algorithm: press **S** to enter menu, **S** again to select Algorithm, rotate **S** to choose an algorithm, then press **S** to switch to that algorithm. Click click twist click.

Example Algorithm

In/Out	
Z	top CV input
X	input
Y	input
A	output
B	output

Note: if X or Y is omitted from the left column, it is assumed to be a standard input.

Params	
param id	min/max - function
0	-31/31 - something fun

A-1 Precision Addder

In/Out	
Z	offset (+/- 10V in 1V steps)
A	$X + Y + \text{offset}$
B	$X - Y - \text{offset}$

Params	
0	0/1 - When 1, Z changes smoothly

A-2 Four Quadrant Multiplier

In/Out	
Z	scale (1/10 to 10x)
A	$X * Y * \text{scale}$
B	$-X * Y * \text{scale}$

Params	
0	0/1 - When 1, Z changes smoothly

A-3 Full-wave Rectifier

In/Out	
Z	mode (-0: independent, 0: combined)
A	$\text{abs}(X+Y)$ or $\text{abs}(X)$
B	$\text{abs}(X-Y)$ or $\text{abs}(Y)$

A-4 Minimum/Maximum

In/Out	
Z	gate (>2.5V, "HI"; <-1.5V, "LO")
A	$\text{min}(X, Y)$
B	$\text{max}(X, Y)$

A-5 Linear/Exponential Converter

In/Out	
Z	scale (Hz/V, centered on 1kHz)
A	$(2^X) * \text{scale}$
B	$\log_2(Y/\text{scale})$

A-6 Quantizer

In/Out	
Z	scale, function of Y
X	input CV, 1V/Oct
Y	$Z > 0$, transpose; $Z < 0$, trigger
A	$\text{quantize}(X)$
B	trigger on note change

Params	
0	-1/31 - input X attenuation
1	0/1 - transpose mode
2	-31/31 - key
3	0/31 - offset

A-7 Comparator

In/Out	
Z	hysteresis; in 0-4V, out 0-10V
A	gate from $X > Y$
B	inverted gate

A-8 Dual Waveshaper

In/Out	
Z	gain (negative inverts)
A	folded X
B	triangle-to-sine Y

B-1 Sample and Hold

In/Out	
Z	slew rate
A	X when $Y > 1V$
B	noise +/- 8V

Params	
0	0/1 - Mode (0 = Sample and Hold, 1 = Track and Hold)

Note: Pressing Z triggers a sample manually

B-2 Slew Rate Limiter

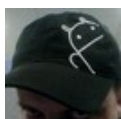
In/Out	
Z	slew rate
A	linear slew rate limited (X+Y)
B	log slew rate limited (X+Y)

B-3 Pitch and Envelope Tracker

In/Out	
Z	slew rate for envelope
A	1V/Oct pitch derived from X + Y
B	envelope derived from X

B-4 Clockable Delay/Echo

In/Out	
Z	feedback
X	signal
Y	clock input
A	output according to mode



B-4 Clockable Delay/Echo (cont)

B output according to mode

Params

0 -15/8 - delay time multiplier

1 0/2 - output mode

Output Mode

0 A is mix; B is delay only

1 A & B are mix

2 A * B are delay only

B-5 LFO

Z tune

X Hz/V frequency

Y waveshape

A saw -> sine -> triangle

B pulse -> square -> pulse

B-6 Clockable LFO

In/Out

Z integer multiplier / divider

X clock input

Y waveshape

A saw -> sine -> triangle

B pulse -> square -> pulse

Params

0 -1/31 - attenuation for A & B

B-7 VCO with Linear FM

Z tune +/- 0.5 octaves

X 1V/Oct pitch

Y linear FM input

A sine

B saw

Params

0 -16/8 - Octave shift

1 -1/31 - attenuation for A

2 -1/31 - attenuation for B

B-8 VCO with Waveshaping

In/Out

Z tune +/- 0.5 octaves

X 1V/Oct pitch

Y waveshape/PWM

A saw (fall) -> triangle -> saw (rise)

B pulse -> square -> pulse

C-1 Precision Adder (fractional offsets)

In/Out

Z offset

A X + Y + offset

B X - Y - offset

Params

0 1/12 - offset divisor

C-2 Voltage Controlled Delay Line

In/Out

Z feedback (bipolar)

X audio input

Y delay time

A delay output

B X + A mix

Params

0 -31/31 - Y offset

C-3 Clockable Ping Pong Delay (Feedback)

In/Out

Z feedback

X audio input

Y clock input

A left output

B right output

Params

0 0/1 - Output Mode (0 = mix, 1 = delay only)

1 -15/8 - Delay time multiplier

2 -32/32 - Input pan

C-4 Clockable Ping Pong Delay (Input Pan)

In/Out

Z input pan

X audio input

Y clock input

A left output

B right output

Params

0 0/31 - Feedback

1 -15/8 - Delay time multiplier

2 0/1 - Output Mode (0 = mix, 1 = delay only)

C-5 Resonator

In/Out

Z strike

X audio input

Y center frequency (pitch)

A audio output

B envelope of audio output

Params

0 -31/31 - Y offset

C-6 Vocoder

In/Out

Z decay time

X modular input

Y carrier input

A audio output

B envelope output

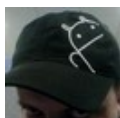
Params

0 0/1 - filter bank

Filter Bank

0 Half octave spacing, based on 100Hz

1 Third octave spacing, based on 250Hz



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C-7 Phaser

In/Out	
Z	feedback (bipolar)
X	audio input
Y	sweep
A	phase-shifted output plus input
B	phase-shifted output
Params	
0	-31/31 - Y offset
1	1/10 - Number of phaser stages

C-8 Bit Crusher

In/Out	
Z	bit reduction
X	signal input
Y	sample rate input
A	signal output
B	comparator output
Params	
0	-31/31 - Y offset
1	0/7 - bit reduction mode
2	0/7 - bit mangling mode

D-2 Tape Delay

In/Out	
Z	feedback
X	audio input
Y	tape speed
Params	
0	0/43 - Tape length
1	-9/8 - Fine length control
2	-8/16 - Tape speed
3	0/2 - Output mode
Output Modes	
0	A = mix, B = delay only
1	A & B are mix
2	A & B are delay only

D-3 Waveform Animator

In/Out	
Z	separation
X	audio input
Y	threshold
A	animated output
B	square waves output
Params	
0	-1/31 - LFO depth
1	-31/31 - Y offset
2	0/31 - LFO rate
3	-1/31 - Scale

D-4 State Variable Filter

In/Out	
Z	filter type
X	audio input
Y	filter frequency (1V/Oct)
A	LP->BP->HP
B	HP->BP->LP
Params	
0	0/31 - Filter resonance

D-5 LP/HP Filter

In/Out	
Z	filter resonance
X	audio input
Y	filter frequency (1V/Oct)
A	LP output
B	HP output

D-6 LP/BP Filter

In/Out	
Z	filter resonance
X	audio input
Y	filter frequency (1V/Oct)
A	LP output
B	BP output

D-7 BP/HP Filter

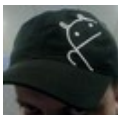
In/Out	
Z	filter resonance
X	audio input
Y	filter frequency (1V/Oct)
A	BP output
B	HP output

D-8 BP/Notch Filter

In/Out	
Z	filter resonance
X	audio input
Y	filter frequency (1V/Oct)
A	BP output
B	notch output

E-1 AR Envelope

In/Out	
Z	envelope times
X	trigger input
Y	trigger input
A	envelope output
B	envelope output
Params	
0	0/2 - Trigger Mode
1	0/1 - Z Mode
2	-32/32 - A attenuverter
3	-32/32 - B attenuverter
Trigger Mode	
0	AR (ASR)
1	AD
2	looped AD
Z Mode	
0	Z sweeps range of AD values
1	Z sets A & D to same values



E-2 AR Envelope (with push)

In/Out	
Z	envelope times
X	trigger input
Y	trigger input
A	envelope output
B	envelope output
Params	
0	0/2 - Trigger mode
Trigger Mode	
0	AR (ASR)
1	AD
2	looped AD
Note: pushing Z has the same effect as triggering via X/Y.	

E-4 AR Envelope & VCA (with push)

In/Out	
Z	envelope times
X	trigger input
Y	VCA input
A	envelope output
B	VCA output
Params	
0	0/2 - Trigger Mode
Trigger Mode	
0	AR (ASR)
1	AD
2	looped AD
Note: pushing Z has the same effect as triggering via X/Y.	

E-6 Dual AR Envelope (with push)

In/Out	
Z	envelope times
X	trigger input A
Y	trigger input B
A	envelope output A
B	envelope output B
Params	
0	0/2 - Trigger Mode
Trigger Mode	
0	AR (ASR)
1	AD
2	looped AD
Note: pushing Z has the same effect as triggering via X/Y.	

E-3 AR Envelope & VCA

In/Out	
Z	envelope times
X	trigger input
Y	VCA input
A	envelope output
B	VCA output
Params	
0	0/2 - Trigger Mode
1	0/1 - Z Mode
2	-32/32 - A attenuverter
3	-32/32 - B attenuverter
Trigger Mode	
0	AR (ASR)
1	AD
2	looped AD
Z Mode	
0	Z sweeps range of AD values
1	sets A & D to same values

E-5 Dual AR Envelope

In/Out	
Z	envelope times
X	trigger input A
Y	trigger input B
A	envelope output A
B	envelope output B
Params	
0	0/2 - Trigger Mode
1	0/1 - Z Mode
2	-32/32 - A attenuverter
3	-32/32 - B attenuverter
Trigger Mode	
0	AR (ASR)
1	AD
2	looped AD
Z Mode	
0	Z sweeps range of AD values
1	Z sets A & D to same values

E-7 Euro to Buchla Converter

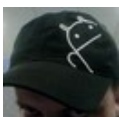
In/Out	
Z	tune +/- 0.5 octaves
X	1V/Oct
Y	gate
A	1.2V/Oct
B	gate/trigger

E-8 Buchla to Euro Converter

In/Out	
Z	tune +/- 0.5 octaves
X	1.2V/Oct
Y	gate/trigger
A	1V/Oct
B	trigger

F-1 Clockable AD Envelope (with mute)

In/Out	
Z	envelope shape
X	clock input
Y	mute input
A	envelope output
B	envelope output



F-1 Clockable AD Envelope (with mute) (cont)

Params

0	-15/8 - Delay time multiplier
1	-32/32 - A attenuverter
2	-32/32 - B attenuverter

F-2 Clockable AD Envelope (with gate)

In/Out

Z	envelope shape
X	clock input
Y	gate input
A	envelope output
B	envelope output

Params

0	-15/8 - Delay time multiplier
1	-32/32 - A attenuverter
2	-32/32 - B attenuverter

F-3 Clockable AD Envelope (with trigger)

In/Out

Z	envelope shape
X	clock input
Y	trigger input
A	envelope output
B	envelope output

Params

0	-15/8 - Delay time multiplier
1	-32/32 - A attenuverter
2	-32/32 - B attenuverter

F-4 Clockable AD Envelope & VCA

In/Out

Z	envelope shape
X	clock input
Y	VCA input
A	envelope output
B	VCA output

Params

0	-15/8 - Delay time multiplier
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F-4 Clockable AD Envelope & VCA (cont)

1	-32/32 - A attenuverter
2	-32/32 - B attenuverter

F-5 Shift Register Random CVs

In/Out

Z	randomness
X	clock input
Y	modify input
A	unipolar output
B	bipolar output

Params

0	0/1 Direction
1	1/16 - Length
2	0/31 - Slew rate
3	-1/31 - Output attenuator

F-6 Shift Register Random Quantized CVs

In/Out

Z	randomness
X	clock input
Y	modify input
A	quantized CV output
B	trigger output

Params

0	0/1 - Direction
1	1/16 - Length
2	0/15 - Scale
3	-1/31 - Output attenuator

F-7 Shift Register Random Triggers

In/Out

Z	randomness
X	clock input
Y	modify input
A	trigger output
B	inverse trigger output

Params

0	1/16 - Length
---	---------------

F-8 Shift Register Random Dual Triggers

In/Out

Z	randomness
X	clock input
Y	modify input
A	trigger output A
B	trigger output B

Params

0	1/16 - Length A
1	1/16 - Length B

G-1 ES-1 Emulation

In/Out

Z	trim
X	input 1
Y	input 2
A	output 1
B	output 2

G-2 ES-2 Emulation

In/Out

Z	trim
X	input 1
Y	input 2
A	output 1
B	output 2

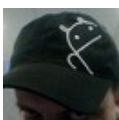
G-3 Pitch Reference

In/Out

Z	amplitude of A & B
X / Y	not used
A	sine
B	square

Params

0	0/11 - Semitone
1	-1/9 - Octave



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G-4 Frequency Reference

In/Out	
Z	amplitude of A & B
X / Y	not used
A	sine
B	square

Note: turning S sets frequency. Pushing Z advances the decimal place. See manual for details.

G-5 Tuner

In/Out	
Z	amplitude of B
X	input
Y	not used
A	copy of X
B	sine wave of pitch of X

G-6 MIDI Clock

In/Out	
Z	not used
X	clock input
Y	run/stop
A	clock output
B	clock output
Params	
0	-2/12 - Clock divisor for A
1	-2/12 - Clock divisor for B
2	0/11 - Clock divisor for MIDI clock output
3	0/1 - Y mode (0, Y is not used; 1, Y is run/stop)

G-7 MIDI->CV

In/Out	
Z	not used
X & Y	not used
A	pitch CV output
B	gate output

Note: receives MIDI from expansion board.

G-8 CV->MIDI

In/Out	
Z	mod wheel or velocity CV input
X	pitch CV input
Y	gate input
A &	not used
B	
Params	
0	0/99 - offset, in frames, between X & Y
1	0/1 - Z mode
Z Mode	
0	Z sets velocity of generated MIDI notes
1	Z generates CC1 (note: velocity fixed at 64)

H-1 Crossfade/Pan

In/Out	
Z	pan position/crossfade amount
A	mix of X & Y
B	inverted mix of X & Y
Params	
0	0/2 - Crossfade/pan law
Crossfade/pan law	
0	Equal gain (for phase-coherent material)
1	Equal power (for non-phase-coherent material)
2	Transition (DJ-style)

H-2 Dual Sample and Hold

In/Out	
Z	trigger
A	X when Z > 1V
B	Y when Z > 1V
Params	

H-2 Dual Sample and Hold (cont)

0	0/1 - Mode: (0, Sample & Hold; 1, Track * Hold)
---	---

Note: pushing Z triggers a sample manually.

H-3 Dual Quantizer (Z scale)

In/Out	
Z	scale
A	quantize(X)
B	quantize(Y)
Params	
0	-1/31 - X attenuation
1	-1/31 - Y attenuation
2	-31/31 - X transpose
3	-31/31 - Y transpose

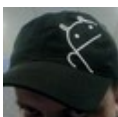
H-4 Dual Quantizer

In/Out	
Z	trigger
A	quantize(X)
B	quantize(Y)
Params	
0	-1/31 - X attenuation
1	-1/31 - Y attenuation
2	-16/16 - X scale/trigger mode
3	-16/16 - Y scale/trigger mode

Note: if 2/3 < 0, input Z > 1V to trigger

H-5 Dual Euclidean Patterns

In/Out	
Z	sets 'pulses' for pattern 2
X	clock input
Y	reset input
A	pattern 1
B	pattern 2
Params	
0	1/16 - Steps
1	1/16 - Pulses (pattern 1)
2	0/16 - Rotation



H-5 Dual Euclidean Patterns (cont)

3 0/31 - Pulse length

H-6 Dual Delayed Pulse Generator

In/Out

Z function

A pulse triggered by X

B pulse triggered by Y

Params

0 0/6 - Z mode

1 0/12 - Range

2 -1/31 - Delay

3 0/31 - Length

Z Mode/Function

0 delay

1 length

2 Output override (high). Z > 1V forces both outputs high

3 Output override (low). Z > 1V forces both outputs low

4 Input enable. Z < 1V disables input triggers.

5 Input disable. Z > 1V disables input triggers.

6 Z is an additional trigger input which triggers both outputs.

H-7 Noise

In/Out

Z blend

A noise, optionally scaled by X

B noise, optionally scaled by Y

Params

0 -1/3 - Type of A

1 -1/3 - Type of B

2 -1/31 - A Attenuation

3 -1/31 - B Attenuation

Noise Types

H-7 Noise (cont)

-1 Blended

0 Violet

1 White

2 Pink

3 Red

I-1 Audio Playback

In/Out

Z selects the sample

X retrigger CV

Y start position CV

A left audio output

B right audio output

I-2 Clocked Audio Playback

In/Out

Z selects the sample

X retrigger CV

Y clock

A left audio output

B right audio output

I-3 Audio Playback with V/Oct

In/Out

Z selects the sample

X retrigger CV

Y V/Oct pitch CV

A left audio output

B right audio output

Params

0 -8/8 - Octave shift

I-4 Audio Playback with Z Speed

In/Out

Z playback speed

X retrigger CV

Y start position CV

A left audio output

I-4 Audio Playback with Z Speed (cont)

B right audio output

Params

0 0/99 - selects the sample

I-5 Audio Playback with Reverse

In/Out

Z playback speed

X retrigger CV

Y selects the sample

A left audio output

B right audio output

Params

0 -49/49 - Y offset

I-6 Audio Playback with Scrub

In/Out

Z selects the sample

X not used

Y playback position

A left audio output

B right audio output

Params

0 1/99 - Speed limit

1 0/20 - Slew limit

2 -32/32 - Y offset

I-7 Dual Audio Playback

In/Out

Z selects the samples

X trigger A

Y trigger B

A left audio output

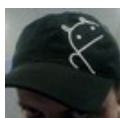
B right audio output

Params

0 0/1 - panning option

Panning Option

0 X triggers A, Y triggers B. Stereo samples mono-summed.



I-7 Dual Audio Playback (cont)

1 Mono samples are panned centrally, stereo samples are played in stereo.

I-8 Dual Audio Playback with Z Speed

In/Out

Z playback speed

X trigger A

Y trigger B

A left audio output

B right audio output

Params

0 0/99 - Selects sample A

1 0/99 - Selects sample B

2 0/1 - panning option (see I-7)

3 0/3 - selects which sample(s) are affected by Z

Z Speed

0 Both samples' speeds controlled by Z.

1 Sample A speed fixed; B variable.

2 Sample B speed fixed; A variable.

3 Both samples' speeds are fixed.

J-1 MIDI File Playback (Clocked)

In/Out

Z selects MIDI file

X clock

Y retrigger CV

A pitch CV output

B gate output

J-3 MIDI File Playback (Free Running)

In/Out

Z playback speed

X V/Oct speed CV

Y retrigger CV

A pitch CV output

B gate output

J-3 MIDI File Playback (Free Running) (cont)

Params

0 0/31 - Selects the MIDI file

J-4 Audio Playback with End CV

In/Out

Z end position or retrigger CV

X retrigger or end position CV

Y start position CV

A left audio output

B right audio output

Params

0 0/99 - selects the sample

Retrigger / End Position Controls

If Z is negative, X is retrigger and Z controls sample end point

If Z is positive, Z is retrigger input and X controls the sample end point.

J-5 Audio Recorder

In/Out

Z controls recording

X left audio input

Y right audio input

A left audio output

B right audio output

K-1 Wavetable VCO

In/Out

Z tune +/- 0.5 octaves

X 1V/Oct pitch input

Y wavetable input

A wavetable output

B sub-octave square output

Params

0 0/99 - selects the wavetable

1 -16/8 - octave shift

2 -31/31 - Y offset

K-5 Programmable Quantizer

In/Out

Z slew

Y pitch or retrigger

A quantized(X+Y)

B trigger on note change

Params

0 0/31 - Scale

1 -1/31 - X attenuation

2 -2/31 - Y attenuation (if -2, Y becomes a trigger)

3 -31/31 - Transpose

4 0/31 - Offset between X & Y

L-1 Stereo Reverb

In/Out

Z wet/dry

X left input

Y right input

A left output

B right output

Params

0 0/31 - Size

1 0/31 - Feedback

2 0/5 - Character

3 -1/31 - Lowpass filter

L-2 Mono-to-Stereo Reverb

In/Out

Z wet/dry

X audio input

Y feedback CV

A left output

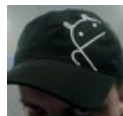
B right output

Params

0 0/31 - Size

1 0/31 - Feedback

2 0/5 - Character



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L-2 Mono-to-Stereo Reverb (cont)

3 -1/31 - Lowpass filter

L-3 Dual Reverb

In/Out

Z wet/dry

A X + reverb

B Y + reverb

Params

0 0/31 - Size

1 0/31 - Feedback

2 0/5 - Character

3 -1/31 - Lowpass filter

L-5 Stereo Chorus

In/Out

Z wet/dry

X audio input

Y LFO rate

A left output

B right output

Params

0 0/31 - LFO depth

1 -31/31 - Y offset

2 -31/31 - Feedback

3 -1/31 - Lowpass filter

L-6 Mono Chorus

In/Out

Z wet/dry

X audio input

Y LFO rate

A blended output

B wet output

L-8 Gate

In/Out

Z threshold

X left input

Y right input

A left output

B right output

Params

0 0/99 - Attack time

1 0/99 - Hold time

2 0/99 - Release time

3 0/99 - Lookahead

M-1 Delayed LFO

In/Out

Z LFO Speed

X trigger input

Y ramp time

A configurable output

B configurable output

Params

0 0/6 - Output type A

1 0/6 - Output type B

2 -32/32 - LFO speed range

3 -32/32 - Ramp time range

4 -32/32 - A attenuverter

5 -32/32 - B attenuverter

Output Types

0 ramp

1 triangle affected by rap

2 sine affected by ramp

3 square affected by ramp

4 triangle

5 sine

6 square

M-2 Scaled LFO

In/Out

Z LFO Speed

X min or offset

Y max or scale

A LFO A

B LFO B

Params

0 0/6 - Output type A

1 0/6 - Output type B

2 -32/32 - LFO speed range

3 0/1 - X/Y Mode

4 -48/48 - X offset

5 -48/48 - Y offset

Output Type

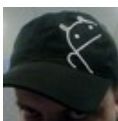
0 triangle

1 sine

2 square

3 rising ramp

4 falling ramp



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