



Custom oscillator for KORGlogue SDK 2.0 synthesizers

Operations Manual

v.3.0-14

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# Introduction

FM64 is a custom oscillator for KORG NTS-1 mkII and NTS-3 synthesizers that reproduces Yamaha DX / TX series 6-operator FM synthesis with several additional features from Yamaha SY77 series and KORG opsix.

The oscillator must be pre populated with the Yamaha voice banks of your choice using the online constructor (see [Quick Start](#) section) before uploading to the synthesizer. For information on how to upload a custom oscillator to the synthesizer and how to activate it, please refer to the Synthesizer Owner's Manual for your KORG synthesizer model and KONTROL Editor Owner's manual.

Yamaha voice banks, or ROMs, are widely available on the Internet. Any VMEM packed voice bank for Yamaha DX1, DX5, DX7, DX7II, DX7s, TX7, TX802, TX816 both in SysEx (4104 bytes) or RAW (4096 bytes) will fit. Any other format, including voice banks for 4-operator Yamaha DX9, DX11, DX21, DX21, DX27s, DX100, TX81Z, will not work.

All the oscillator customization operations performed by the online constructor are done in JavaScript of your browser, so no actual upload occurs. Online constructor does not store any data, except for the your browser cookie setting for the last selected synthesizer model.

If you find a bug or wish to propose a new feature or improvement, don't hesitate to create a new issue at [GitHub](#) or just send me an email to [dukesrg@gmail.com](mailto:dukesrg@gmail.com).

This custom oscillator is open source and free. However you can support the development via [PayPal me](#) or [Revolut me](#).

# Quick start

The raw oscillator file has no banks inside and won't produce any sound. To make the oscillator work you must first populate it with the voice banks.

## Obtaining the oscillator with custom voices

1. Navigate to the [online constructor](#) web page.
2. Select your KORG synthesizer model to define the target format of the oscillator file.
3. Locate the FM64 oscillator row by the column **NAME**
4. Check the **SIZE** column of this row, the last multiplier is the maximum number of voice banks this oscillator can contain.
5. Click the **Upload** button located in the **CUSTOM DATA** column of this row.
6. In the file open dialog select one to several (up to obtained in step 4) voice bank files.
7. Check the **CUSTOM NAME** cell in this row. This name is generated from the names of the uploaded banks and you can alter it now. This name will be displayed by the Librarian and your synthesizer.
8. Click the **Download** button located in the **CUSTOM UNIT** cell of this row.
9. Now you can upload the oscillator file to your KORG synthesizer with the Librarian application.

prologue

minilogue xd

NTS-1 digital

2

5

7

8

4

USER OSCILLATORS																
	NAME	VERSION	API	SAMPLE	ALT	PARAM 1	PARAM 2	PARAM 3	PARAM 4	PARAM 5	PARAM 6	CUSTOM DATA	CUSTOM NAME	CUSTOM UNIT	SIZE	DESCRIPTION
1	FM63	1.5.0	1.5.0			Voice	Bank	Shape Assign	All Assign	S LFO Target	Algorithm	Upload		Download	4096 x 4	Yamaha D02/D03/T1 series voice banks
2	FM64	1.7.3	1.5.0	Velocity	FB scale	Voice 1	Det scal All	Rel offs All	Lvl offs Car	Algorithm	Lvl offs Mod	Upload		Download	4096 x 5	Yamaha DXT series voice banks
3	FM66	1.7.3	1.5.0	Velocity	FB scale	Voice 1	Det scal All	Rel offs All	Lvl offs Car	Algorithm	Waveforms C+M	Upload		Download	4096 x 4 512 x 8	Yamaha DXT series voice banks Plus 16-bit PCM waveforms
4	FM67	1.7.3	1.5.0	Velocity	FB scale	Voice 1	Det scal All	Rel offs All	Lvl offs Car	Algorithm	Waveforms C+M	Upload		Download	4096 x 3 512 x 16	Yamaha DXT series voice banks Plus 16-bit PCM waveforms
5	FM68	1.5.0	1.5.0			Voice	Bank	Shape Assign	All Assign	S LFO Target	Algorithm	Upload		Download	4096 x 2 1024 x 8	Yamaha DXT series voice banks Plus 16-bit PCM waveforms
6	FM69	1.7.3	1.5.0	Velocity	FB scale	Transpose 1	Voice Shift1	Split Point1	Voice Shift2	Split Point2	Voice Shift3	Upload		Download	4096 x 5	Yamaha DXT series voice banks
7	Morpheus	1.0-1	1.5.0			Mode	LFOX	LFOY	LFO Trigger	Interpolate		Upload		Download	16384 x 1	Raw wave, p-hw smoothed
8	Anthologie	0.7.6	1.5.0			Prog	Sub	Mode	AC 1	AC 2		Upload		Download	1024 x 25	Korg legacy series program data libraries
9	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
10	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
11	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
12	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
13	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
14	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
15	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
16	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

## Changing oscillator custom parameters

1. Proceed with steps 1 thru 7 of the [previous section](#).
2. Click on one of the highlighted values in the columns **SHAPE/A**, **ALT/B**, **PARAM 1**, **PARAM 2**, **PARAM 3**, **PARAM 4**, **PARAM 5**, **PARAM 6**, **PARAM 7**, **PARAM 8** of this row.
3. From the popup menu select the desired custom parameter for the parameter selected in step 2. You need to scroll with the mouse wheel to reach all of the available custom parameters.
4. Repeat steps 2 and 3 for other oscillator parameters you wish to reassign.
5. Proceed with steps 8 and 9 of the [previous section](#).

The screenshot shows the 'minilogue xd' patch editor interface. A table lists oscillator parameters. A red box highlights the 'Velocity' parameter in the 'SHAPE' column for the 'FM4' oscillator. A red circle with the number '2' is above the table, and a red circle with the number '3' is next to the 'Velocity' parameter. A dropdown menu is open for 'Velocity', showing a list of custom parameters including 'Voice 1', 'Voice 2', 'Voice 3', 'Split Point1', 'Split Point2', 'Transpore 1', 'Transpore 2', 'Transpore 3', 'Voice Shift1', 'Voice Shift2', 'Voice Shift3', 'Shape Assign', 'Alt Assign', 'FB offset', 'FB scale', 'Algorithm', 'Lvl offs All', 'Lvl offs Car', and 'Lvl offs Mod'.

NAME	VERSION	API	SHAPE	ALT	PARAM 1	PARAM 2	PARAM 3	PARAM 4	PARAM 5	PARAM 6	CUSTOM DATA	CUSTOM NAME	CUSTOM UNIT	SIZE	DESCRIPTION	
1	FM4	1.5.0	1.5.0	Velocity	FB scale	Voice 1	Det scal All	Rat offs All	Lvl offs Car	Algorithm	Lvl offs Mod	Upload		Download	4096 x 4	Yamaha DX210/211 series voice banks
2	FM4	1.7.0	1.5.0	Velocity	FB scale	Voice 1	Det scal All	Rat offs All	Lvl offs Car	Algorithm	Lvl offs Mod	Upload		Download	4096 x 4	Yamaha DX210/211 series voice banks
3	FM4	1.7.0	1.5.0	Velocity	FB scale	Voice 1	Det scal All	Rat offs All	Lvl offs Car	Algorithm	Lvl offs Mod	Upload		Download	4096 x 4	Yamaha DX210/211 series voice banks
4	FM4	1.7.0	1.5.0	Velocity	FB scale	Voice 1	Det scal All	Rat offs All	Lvl offs Car	Algorithm	Lvl offs Mod	Upload		Download	4096 x 4	Yamaha DX210/211 series voice banks
5	FM4	1.7.0	1.5.0	Velocity	FB scale	Voice 1	Det scal All	Rat offs All	Lvl offs Car	Algorithm	Lvl offs Mod	Upload		Download	4096 x 4	Yamaha DX210/211 series voice banks
6	FM4	1.7.0	1.5.0	Velocity	FB scale	Voice 1	Det scal All	Rat offs All	Lvl offs Car	Algorithm	Lvl offs Mod	Upload		Download	4096 x 4	Yamaha DX210/211 series voice banks
7	FM4	1.7.0	1.5.0	Velocity	FB scale	Voice 1	Det scal All	Rat offs All	Lvl offs Car	Algorithm	Lvl offs Mod	Upload		Download	4096 x 4	Yamaha DX210/211 series voice banks
8	FM4	1.7.0	1.5.0	Velocity	FB scale	Voice 1	Det scal All	Rat offs All	Lvl offs Car	Algorithm	Lvl offs Mod	Upload		Download	4096 x 4	Yamaha DX210/211 series voice banks
9	FM4	1.7.0	1.5.0	Velocity	FB scale	Voice 1	Det scal All	Rat offs All	Lvl offs Car	Algorithm	Lvl offs Mod	Upload		Download	4096 x 4	Yamaha DX210/211 series voice banks
10	FM4	1.7.0	1.5.0	Velocity	FB scale	Voice 1	Det scal All	Rat offs All	Lvl offs Car	Algorithm	Lvl offs Mod	Upload		Download	4096 x 4	Yamaha DX210/211 series voice banks
11	FM4	1.7.0	1.5.0	Velocity	FB scale	Voice 1	Det scal All	Rat offs All	Lvl offs Car	Algorithm	Lvl offs Mod	Upload		Download	4096 x 4	Yamaha DX210/211 series voice banks
12	FM4	1.7.0	1.5.0	Velocity	FB scale	Voice 1	Det scal All	Rat offs All	Lvl offs Car	Algorithm	Lvl offs Mod	Upload		Download	4096 x 4	Yamaha DX210/211 series voice banks
13	FM4	1.7.0	1.5.0	Velocity	FB scale	Voice 1	Det scal All	Rat offs All	Lvl offs Car	Algorithm	Lvl offs Mod	Upload		Download	4096 x 4	Yamaha DX210/211 series voice banks
14	FM4	1.7.0	1.5.0	Velocity	FB scale	Voice 1	Det scal All	Rat offs All	Lvl offs Car	Algorithm	Lvl offs Mod	Upload		Download	4096 x 4	Yamaha DX210/211 series voice banks
15	FM4	1.7.0	1.5.0	Velocity	FB scale	Voice 1	Det scal All	Rat offs All	Lvl offs Car	Algorithm	Lvl offs Mod	Upload		Download	4096 x 4	Yamaha DX210/211 series voice banks
16	FM4	1.7.0	1.5.0	Velocity	FB scale	Voice 1	Det scal All	Rat offs All	Lvl offs Car	Algorithm	Lvl offs Mod	Upload		Download	4096 x 4	Yamaha DX210/211 series voice banks

# Advanced features

Due to the hardware differences of KORG NTS-1 mkII and NTS-3 synthesizers, several features are exclusive to each model.

## NTS-1 mkII features

- Maximum voice banks is 4
- Channel Pressure and Aftertouch supported
- TBD

## NTS-3 features

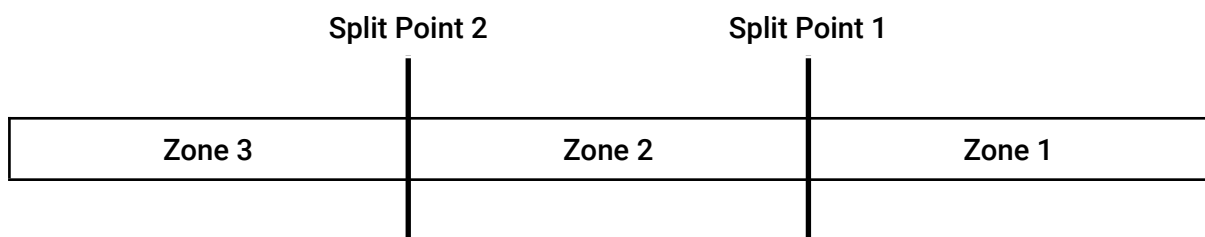
- Maximum voice banks is 1
- Gate arpeggiator
- Fine pitch touch control
- Scales
- TBD

## Velocity

Velocity can be controlled in different ways. By default the Note On event velocity is used. Using the Velocity custom parameter it is possible to override the velocity value with the enhanced 10-bit precision. The maximum Velocity parameter value of 127.75 enables Note On event velocity processing. While other values above 127.0 are saturated to that value. Channel Pressure and Aftertouch messages value also directly affects the velocity value in real time.

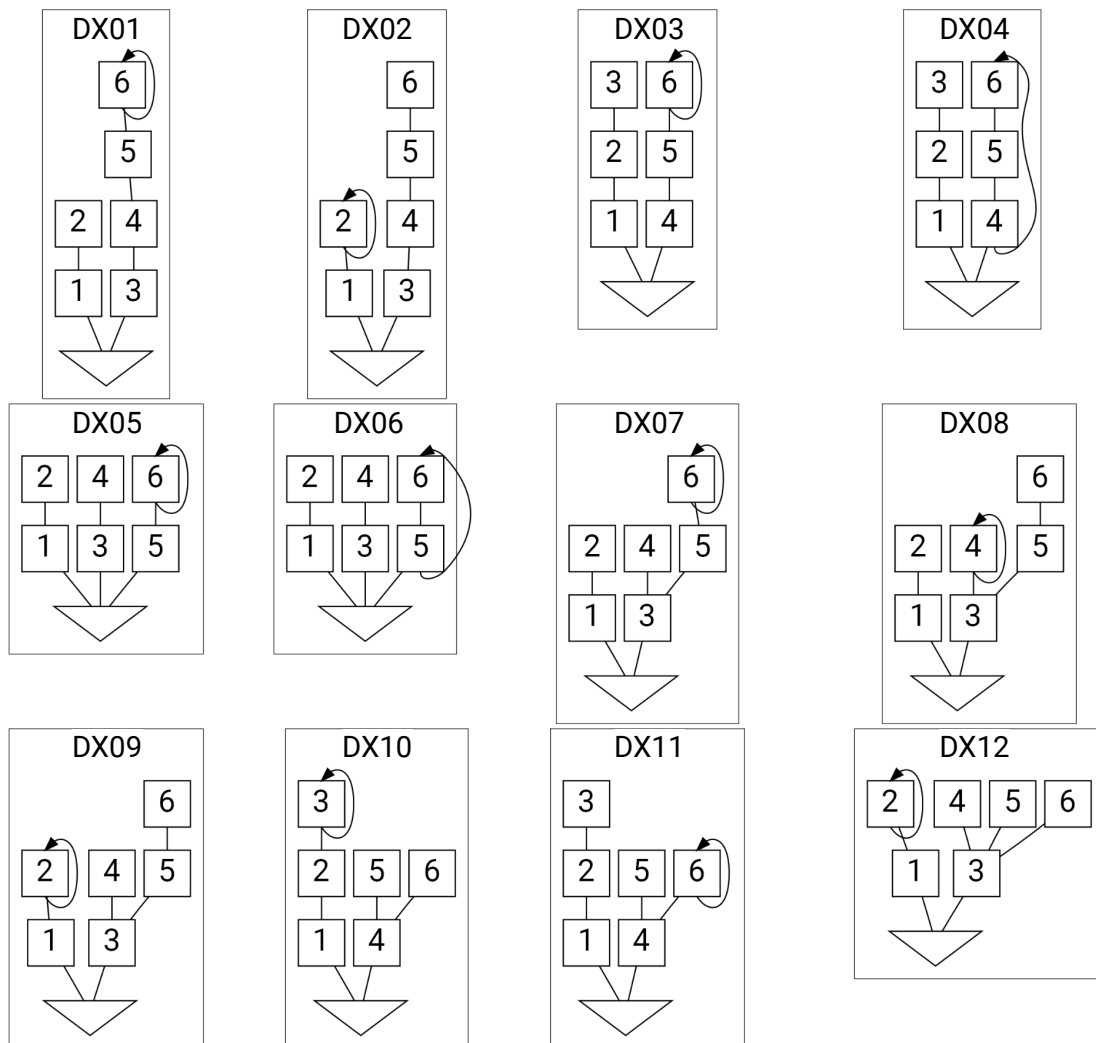
## Zones

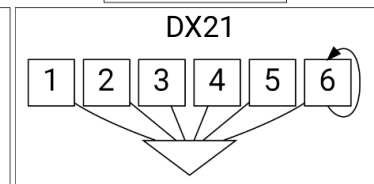
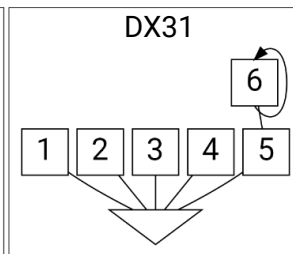
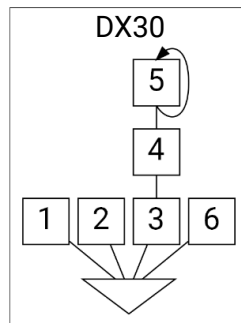
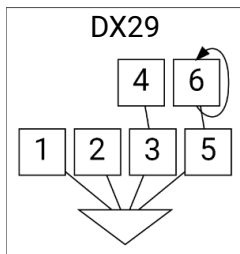
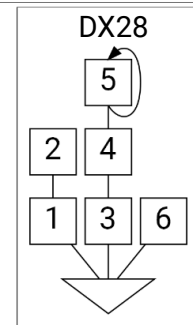
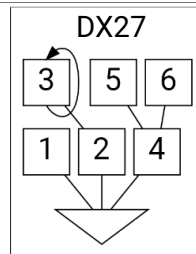
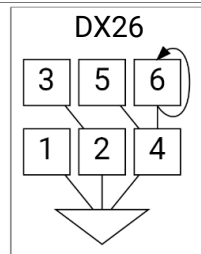
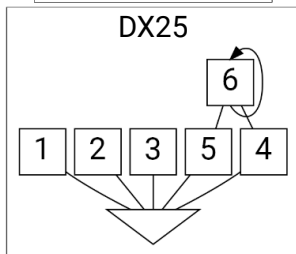
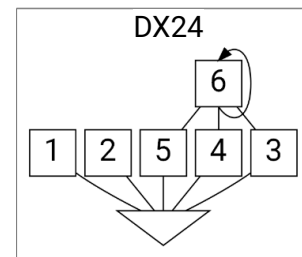
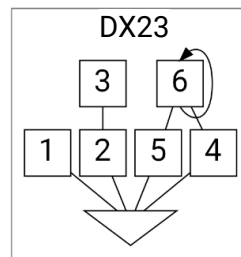
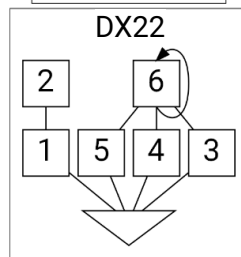
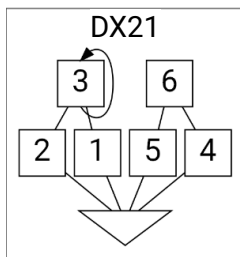
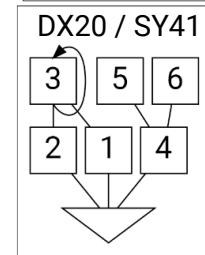
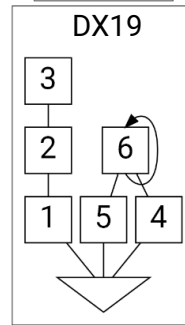
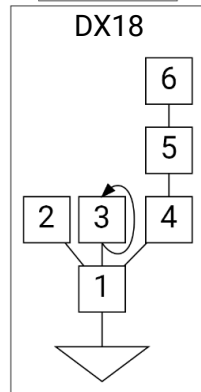
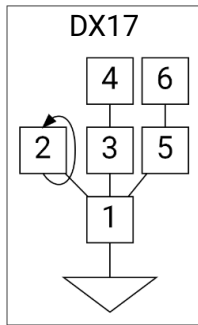
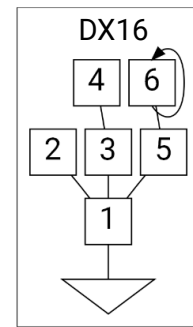
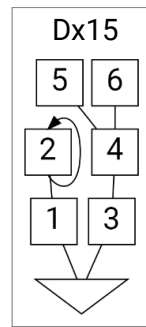
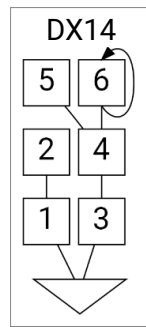
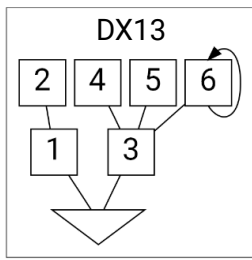
It is possible to split the keyboard to up to three zones and assign different voices to each of them. Split points determines the edge notes between two neighbor zones. Relative position of zones and split points are shown below:

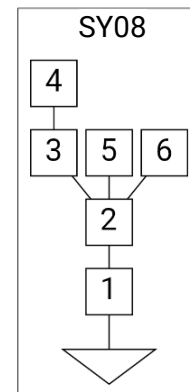
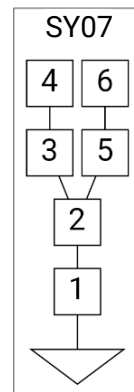
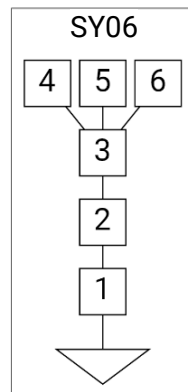
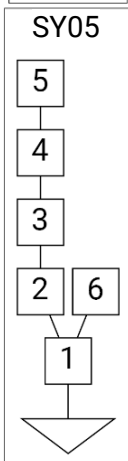
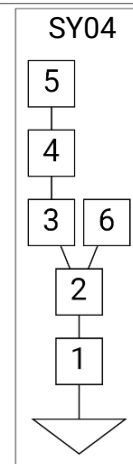
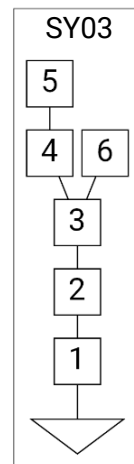
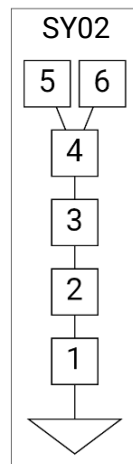
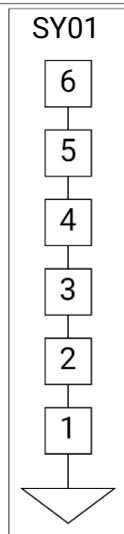
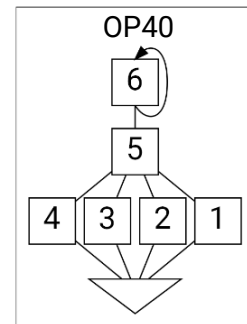
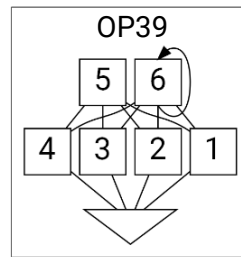
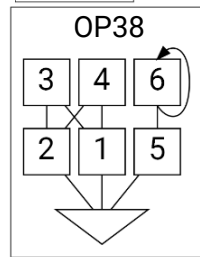
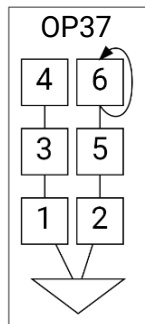
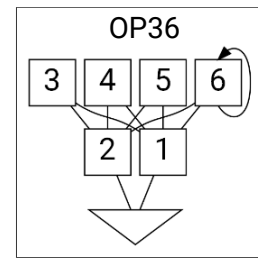
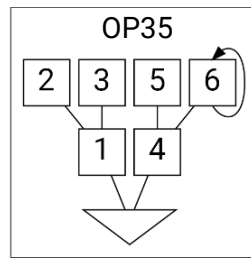
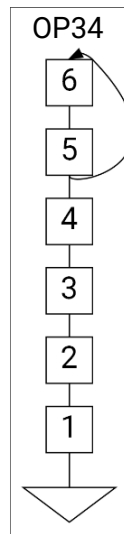
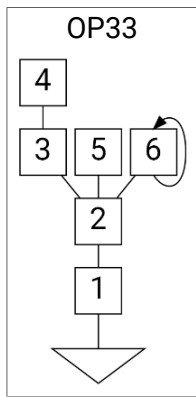


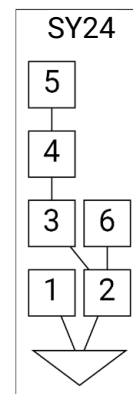
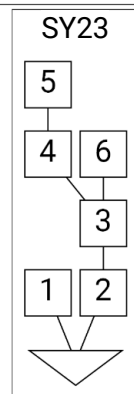
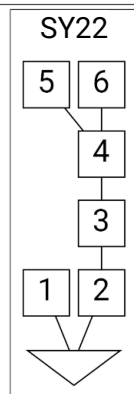
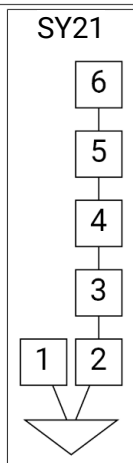
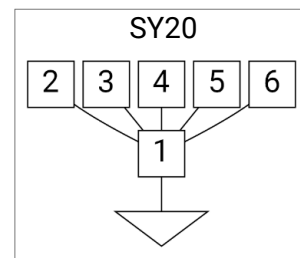
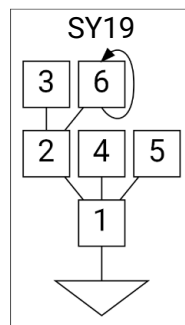
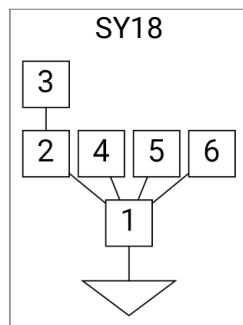
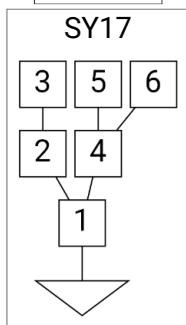
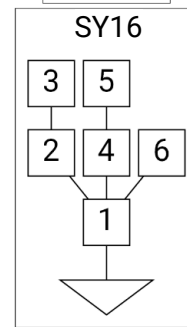
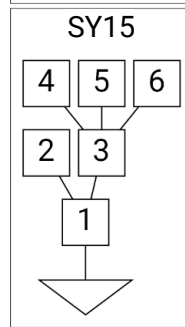
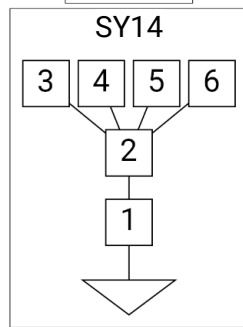
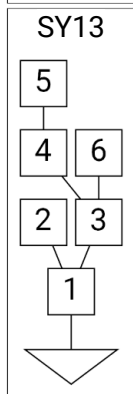
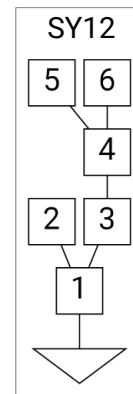
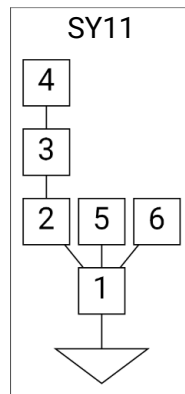
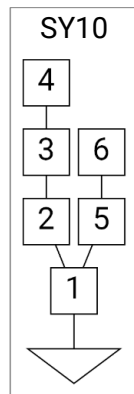
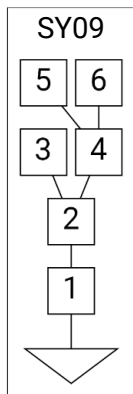
# Algorithms list

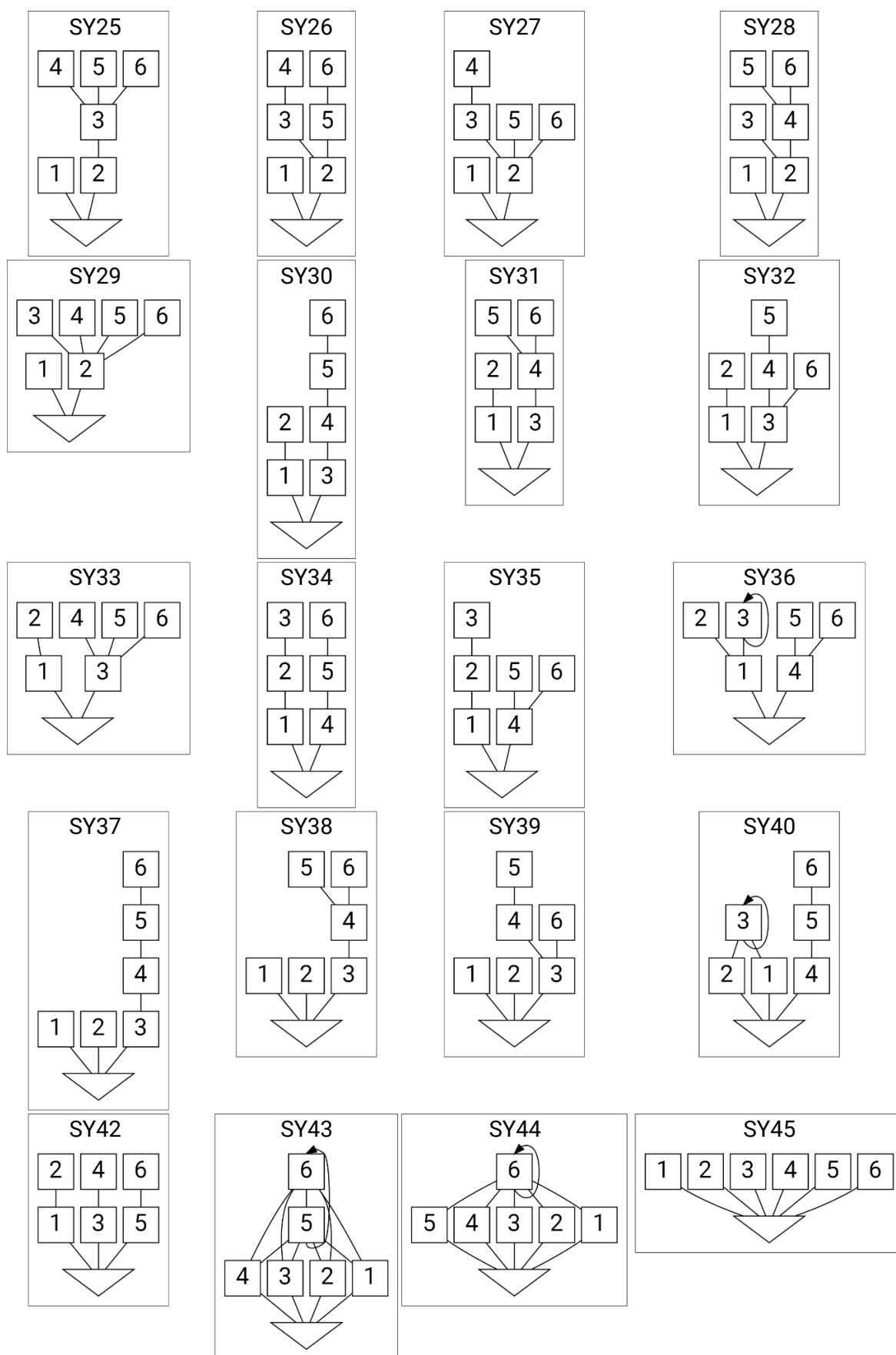
All oscillator variations support 32 Yamaha DX series and 8 additional KORG opsix algorithms. There are also 45 Yamaha SY77 / TG77 / SY99 algorithms supported with feedback count limitation, e.g. algorithm SY43 have a single feedback, unlike the original Yamaha SY77 series algorithm.











## Custom parameters list

#	Custom param	Range	Description
0	Velocity	0.0...127.75 <sup>(1)(5)</sup>	Note velocity
1	Voice	0...127	Voice for zone 1
2	Voice 2	0...127	Voice for zone 2
3	Voice 3	0...127	Voice for zone 3
4	Split Point1	C-1...G9	Split point between zone 1 and 2
5	Split Point2	C-1...G9	Split point between zone 2 and 3
6	Transpose	-128...127 <sup>(2)</sup>	Transpose for zone 1
7	Transpose 2	-128...127 <sup>(2)</sup>	Transpose for zone 2
8	Transpose 3	-128...127 <sup>(2)</sup>	Transpose for zone 3
9	Voice Shift1	-128...127	Voice shift for zone 1
10	Voice Shift2	-128...127	Voice shift for zone 2
11	Voice Shift3	-128...127	Voice shift for zone 3
12	-		
13	-		
14	FB offset	-8.0...7.984 <sup>(5)</sup>	Feedback 1 offset
15	FB2 offset	-8.0...7.984 <sup>(5)</sup>	Feedback 2 offset
16	FB scale	0.0...1.998 <sup>(5)</sup>	Feedback 1 multiplier
17	FB2 scale	0.0...1.998 <sup>(5)</sup>	Feedback 2 multiplier
18	FB route	0...36 <sup>(3)(5)</sup>	Feedback 1 route
19	FB2 route	0...36 <sup>(3)(5)</sup>	Feedback 2 route
20	Alg select	0...85 <sup>(4)(5)</sup>	Algorithm select
21	Alg offset	-128...127 <sup>(5)</sup>	Algorithm offset
22	Lvl offs All	-128.0...127.75	Level offset for all operators
23	Lvl offs Car	-128.0...127.75	Level offset for carriers
24	Lvl offs Mod	-128.0...127.75	Level offset for modulators
25	Lvl offs Op1	-128.0...127.75	Level offset for operator 1
26	Lvl offs Op2	-128.0...127.75	Level offset for operator 2
27	Lvl offs Op3	-128.0...127.75	Level offset for operator 3
28	Lvl offs Op4	-128.0...127.75	Level offset for operator 4
29	Lvl offs Op5	-128.0...127.75	Level offset for operator 5
30	Lvl offs Op6	-128.0...127.75	Level offset for operator 6

31	Lvl scal All	0.0...1.998	Level multiplier for all operators
32	Lvl scal Car	0.0...1.998	Level multiplier for carriers
33	Lvl scal Mod	0.0...1.998	Level multiplier for modulators
34	Lvl scal Op1	0.0...1.998	Level multiplier for operator 1
35	Lvl scal Op2	0.0...1.998	Level multiplier for operator 2
36	Lvl scal Op3	0.0...1.998	Level multiplier for operator 3
37	Lvl scal Op4	0.0...1.998	Level multiplier for operator 4
38	Lvl scal Op5	0.0...1.998	Level multiplier for operator 5
39	Lvl scal Op6	0.0...1.998	Level multiplier for operator 6
40	KLS offs All	-128.0...127.75	Keyboard level scaling offset for all operators
41	KLS offset Car	-128.0...127.75	Keyboard level scaling offset for carriers
42	KLS offset Mod	-128.0...127.75	Keyboard level scaling offset for modulators
43	KLS offset Op1	-128.0...127.75	Keyboard level scaling offset for operators 1
44	KLS offset Op2	-128.0...127.75	Keyboard level scaling offset for operators 2
45	KLS offset Op3	-128.0...127.75	Keyboard level scaling offset for operators 3
46	KLS offset Op4	-128.0...127.75	Keyboard level scaling offset for operators 4
47	KLS offset Op5	-128.0...127.75	Keyboard level scaling offset for operators 5
48	KLS offset Op6	-128.0...127.75	Keyboard level scaling offset for operators 6
49	KLS scal All	0.0...1.998	Keyboard level scaling multiplier for all operators
50	KLS scal Car	0.0...1.998	Keyboard level scaling multiplier carriers
51	KLS scal Mod	0.0...1.998	Keyboard level scaling multiplier modulators
52	KLS scal Op1	0.0...1.998	Keyboard level scaling multiplier for operator 1
53	KLS scal Op2	0.0...1.998	Keyboard level scaling multiplier for operator 2
54	KLS scal Op3	0.0...1.998	Keyboard level scaling multiplier for operator 3
55	KLS scal Op4	0.0...1.998	Keyboard level scaling multiplier for operator 4
56	KLS scal Op5	0.0...1.998	Keyboard level scaling multiplier for operator 5
57	KLS scal Op6	0.0...1.998	Keyboard level scaling multiplier for operator 6
58	KVS offs All	-8.0...7.984	Key velocity sensitivity offset for all operators
59	KVS offs Car	-8.0...7.984	Key velocity sensitivity offset for carriers
60	KVS offs Mod	-8.0...7.984	Key velocity sensitivity offset for operators
61	KVS offs Op1	-8.0...7.984	Key velocity sensitivity offset operator 1
62	KVS offs Op2	-8.0...7.984	Key velocity sensitivity offset operator 2
63	KVS offs Op3	-8.0...7.984	Key velocity sensitivity offset operator 3
64	KVS offs Op4	-8.0...7.984	Key velocity sensitivity offset operator 4

65	KVS offs Op5	-8.0...7.984	Key velocity sensitivity offset operator 5
66	KVS offs Op6	-8.0...7.984	Key velocity sensitivity offset operator 6
67	KVS scal All	0.0...1.998	Key velocity sensitivity multiplier for all operators
68	KVS scal Car	0.0...1.998	Key velocity sensitivity multiplier for carriers
69	KVS scal Mod	0.0...1.998	Key velocity sensitivity multiplier for modulators
70	KVS scal Op1	0.0...1.998	Key velocity sensitivity multiplier for operator 1
71	KVS scal Op2	0.0...1.998	Key velocity sensitivity multiplier for operator 2
72	KVS scal Op3	0.0...1.998	Key velocity sensitivity multiplier for operator 3
73	KVS scal Op4	0.0...1.998	Key velocity sensitivity multiplier for operator 4
74	KVS scal Op5	0.0...1.998	Key velocity sensitivity multiplier for operator 5
75	KVS scal Op6	0.0...1.998	Key velocity sensitivity multiplier for operator 6
76	Rat offs All	-128.0...127.75	EG rate offset for all operators
77	Rat offs Car	-128.0...127.75	EG rate offset for carriers
78	Rat offs Mod	-128.0...127.75	EG rate offset for modulators
79	Rat offs Op1	-128.0...127.75	EG rate offset for operator 1
80	Rat offs Op2	-128.0...127.75	EG rate offset for operator 2
81	Rat offs Op3	-128.0...127.75	EG rate offset for operator 3
82	Rat offs Op4	-128.0...127.75	EG rate offset for operator 4
83	Rat offs Op5	-128.0...127.75	EG rate offset for operator 5
84	Rat offs Op6	-128.0...127.75	EG rate offset for operator 6
85	Rat scal All	0.0...1.998	EG rate multiplier for all operators
86	Rat scal Car	0.0...1.998	EG rate multiplier for carriers
87	Rat scal Mod	0.0...1.998	EG rate multiplier for modulators
88	Rat scal Op1	0.0...1.998	EG rate multiplier for operator 1
89	Rat scal Op2	0.0...1.998	EG rate multiplier for operator 2
90	Rat scal Op3	0.0...1.998	EG rate multiplier for operator 3
91	Rat scal Op4	0.0...1.998	EG rate multiplier for operator 4
92	Rat scal Op5	0.0...1.998	EG rate multiplier for operator 5
93	Rat scal Op6	0.0...1.998	EG rate multiplier for operator 6
94	KRS offs All	-8.0...7.984	Keyboard EG rate scaling offset for all operators
95	KRS offs Car	-8.0...7.984	Keyboard EG rate scaling offset for carriers
96	KRS offs Mod	-8.0...7.984	Keyboard EG rate scaling offset for modulators
97	KRS offs Op1	-8.0...7.984	Keyboard EG rate scaling offset for operator 1
98	KRS offs Op2	-8.0...7.984	Keyboard EG rate scaling offset for operator 2

99	KRS offs Op3	-8.0...7.984	Keyboard EG rate scaling offset for operator 3
100	KRS offs Op4	-8.0...7.984	Keyboard EG rate scaling offset for operator 4
101	KRS offs Op5	-8.0...7.984	Keyboard EG rate scaling offset for operator 5
102	KRS offs Op6	-8.0...7.984	Keyboard EG rate scaling offset for operator 6
103	KRS scal All	0.0...1.998	Keyboard EG rate multiplier for all operators
104	KRS scal Car	0.0...1.998	Keyboard EG rate multiplier for carriers
105	KRS scal Mod	0.0...1.998	Keyboard EG rate multiplier for modulators
106	KRS scal Op1	0.0...1.998	Keyboard EG rate multiplier for operator 1
107	KRS scal Op2	0.0...1.998	Keyboard EG rate multiplier for operator 2
108	KRS scal Op3	0.0...1.998	Keyboard EG rate multiplier for operator 3
109	KRS scal Op4	0.0...1.998	Keyboard EG rate multiplier for operator 4
110	KRS scal Op5	0.0...1.998	Keyboard EG rate multiplier for operator 5
111	KRS scal Op6	0.0...1.998	Keyboard EG rate multiplier for operator 6
112	Det offs All	-128.0...127.75 <sup>(5)</sup>	Detune offset in cents for all operators
113	Det offs Car	-128.0...127.75 <sup>(5)</sup>	Detune offset in cents for carriers
114	Det offs Mod	-128.0...127.75 <sup>(5)</sup>	Detune offset in cents for modulators
115	Det offs Op1	-128.0...127.75 <sup>(5)</sup>	Detune offset in cents for operator 1
116	Det offs Op2	-128.0...127.75 <sup>(5)</sup>	Detune offset in cents for operator 2
117	Det offs Op3	-128.0...127.75 <sup>(5)</sup>	Detune offset in cents for operator 3
118	Det offs Op4	-128.0...127.75 <sup>(5)</sup>	Detune offset in cents for operator 4
119	Det offs Op5	-128.0...127.75 <sup>(5)</sup>	Detune offset in cents for operator 5
120	Det offs Op6	-128.0...127.75 <sup>(5)</sup>	Detune offset in cents for operator 6
121	Det scal All	0.0...1.998 <sup>(5)</sup>	Detune multiplier for all operators
122	Det scal Car	0.0...1.998 <sup>(5)</sup>	Detune multiplier for carriers
123	Det scal Mod	0.0...1.998 <sup>(5)</sup>	Detune multiplier for modulators
124	Det scal Op1	0.0...1.998 <sup>(5)</sup>	Detune multiplier for operator 1
125	Det scal Op2	0.0...1.998 <sup>(5)</sup>	Detune multiplier for operator 2
126	Det scal Op3	0.0...1.998 <sup>(5)</sup>	Detune multiplier for operator 3
127	Det scal Op4	0.0...1.998 <sup>(5)</sup>	Detune multiplier for operator 4
128	Det scal Op5	0.0...1.998 <sup>(5)</sup>	Detune multiplier for operator 5
129	Det scal Op6	0.0...1.998 <sup>(5)</sup>	Detune multiplier for operator 6
130	-		
131	-		
132	-		

133	-		
134	Waveform All	0...132 <sup>(5)</sup>	Waveform select for all operators
135	Waveform Car	0...132 <sup>(5)</sup>	Waveform select for carriers
136	Waveform Mod	0...132 <sup>(5)</sup>	Waveform select for modulators
137	Waveform Op1	0...132 <sup>(5)</sup>	Waveform select for operator 1
138	Waveform Op2	0...132 <sup>(5)</sup>	Waveform select for operator 2
139	Waveform Op3	0...132 <sup>(5)</sup>	Waveform select for operator 3
140	Waveform Op4	0...132 <sup>(5)</sup>	Waveform select for operator 4
141	Waveform Op5	0...132 <sup>(5)</sup>	Waveform select for operator 5
142	Waveform Op6	0...132 <sup>(5)</sup>	Waveform select for operator 6
143	-		
144	-		
145	-		
146	-		
147	-		
148	-		
149	-		
150	-		
151	-		
152	-		
153	-		
154	Input route	0...14 <sup>(6)</sup>	Audio In signal route
155	Arp	0...50 <sup>(7)</sup>	Gate arpeggiator pattern select
156	Scale	0...36 <sup>(8)</sup>	Scale select
157	Pitch	-64.0...+63.99	Fine pitch control

<sup>(1)</sup> : 0.0...127.5 - override NOTE ON velocity with the value (saturated to 127.0)  
127.75 - use NOTE ON velocity

<sup>(2)</sup> : semitones / notes

<sup>(3)</sup> : Keep - keep voice feedback route  
XtoY - feedback route source operator X to destination operator Y

<sup>(4)</sup> : Keep - keep voice algorithm  
dX01...dX32 - Yamaha DX series algorithms  
oP33...oP40 - KORG opsix additional algorithms  
SY01...SY45 - Yamaha SY77 / TG77 / SY99 algorithms

<sup>(5)</sup> : effective in real time (otherwise on the next NOTE ON event)

<sup>(6)</sup> : Thru - do not use audio input  
Op1W...Op6W - use audio input as operator waveform

Op1P...Op6P - modulate operator phase by audio input  
AMod - amplitude modulation of oscillator output by audio input  
RMod - ring modulation of oscillator output by audio input

<sup>(7)</sup> : 0 - Gate arpeggiator is off

1...50 - refer to gate arpeggiator pattern list in [KAOSSILATOR Parameter List](#)

<sup>(8)</sup> : 0 - Scale is off, fine pitch control is active

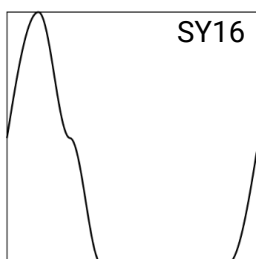
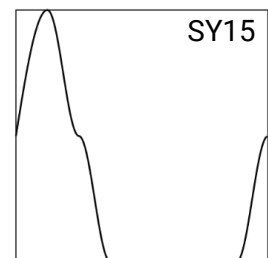
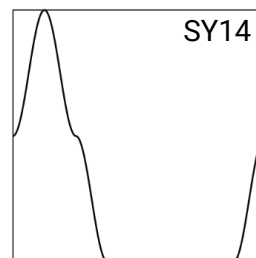
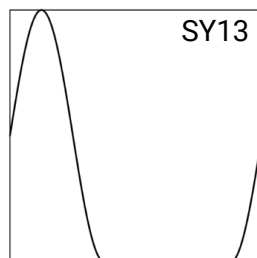
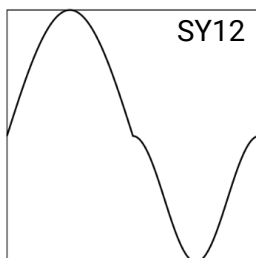
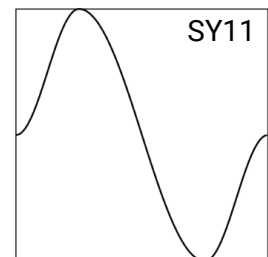
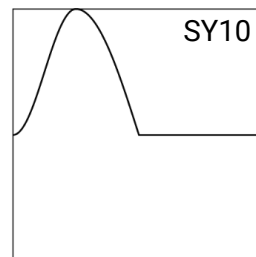
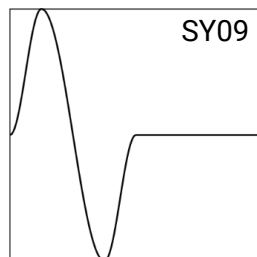
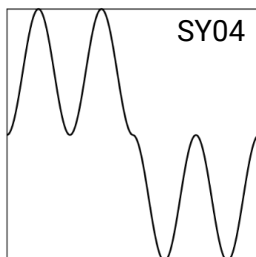
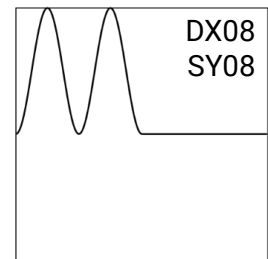
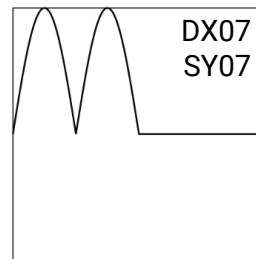
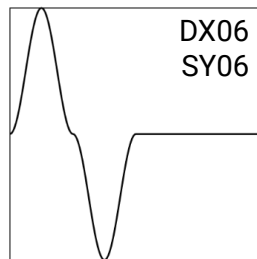
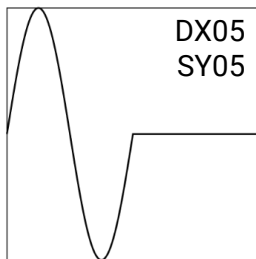
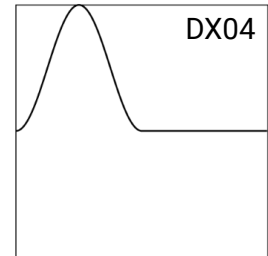
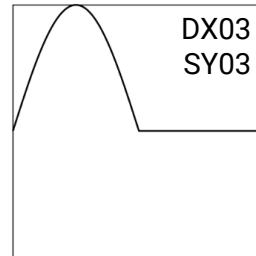
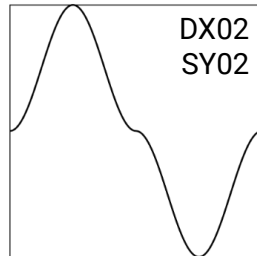
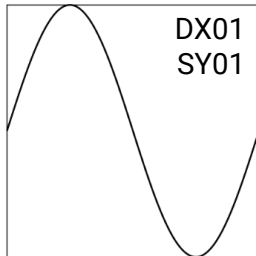
1...35 - refer to scale list in [KAOSSILATOR PRO+ Owner's Manual](#)

36 - bass tuning scale C F Bb Eb

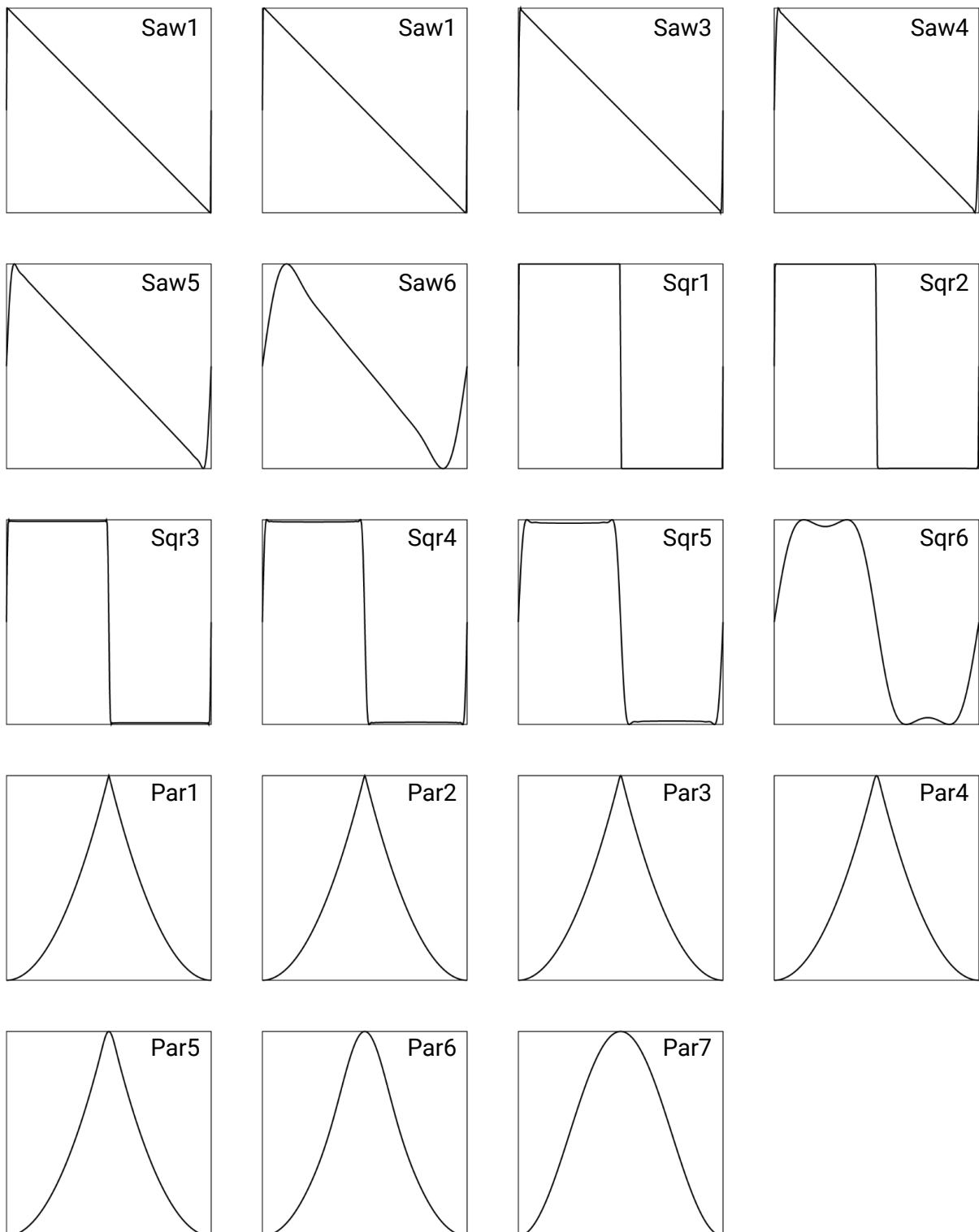
<sup>(9)</sup> : 0 - Scale is off, fine pitch control is active

# Waveforms list

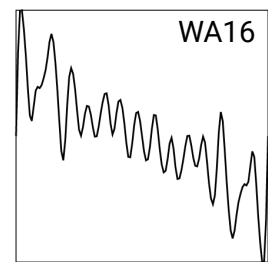
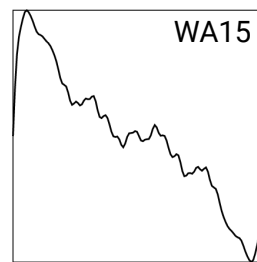
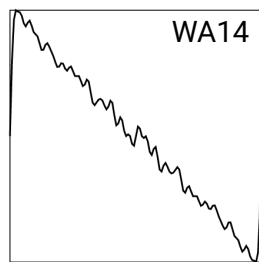
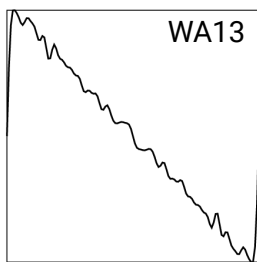
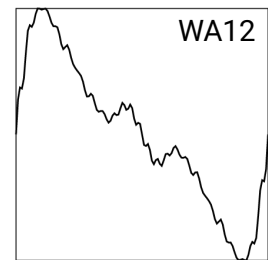
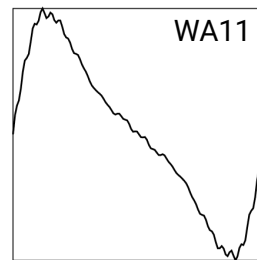
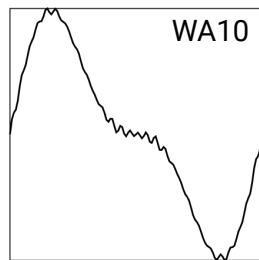
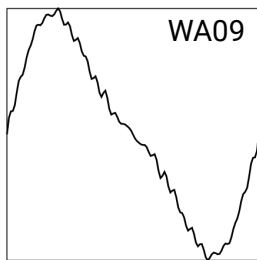
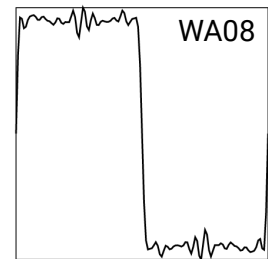
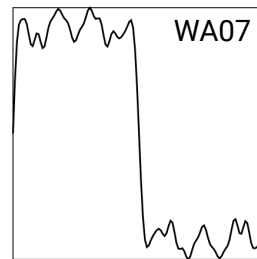
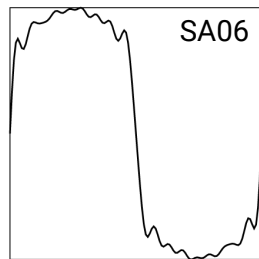
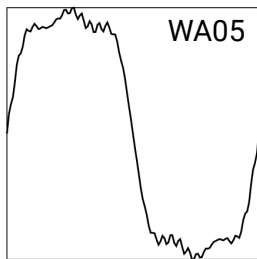
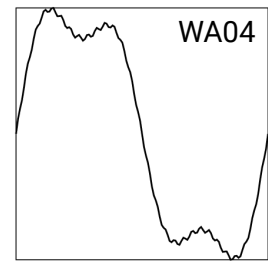
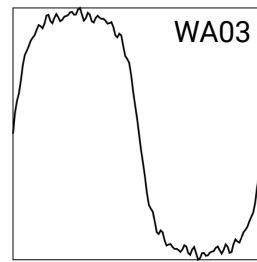
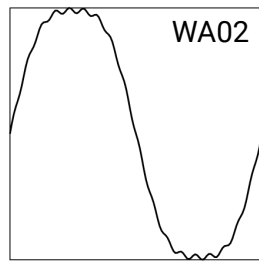
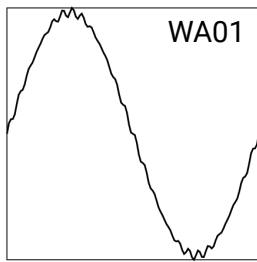
## Yamaha DX11 / TX81Z and SY77 / TG77 / SY99 waves



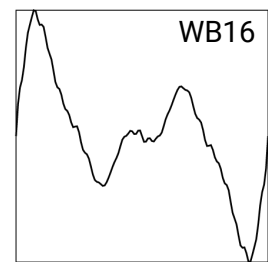
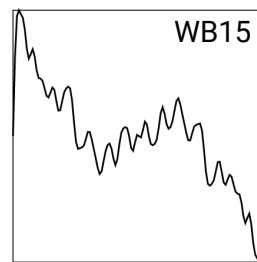
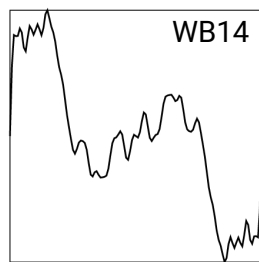
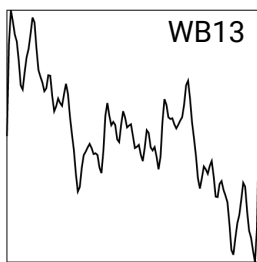
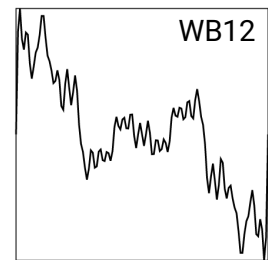
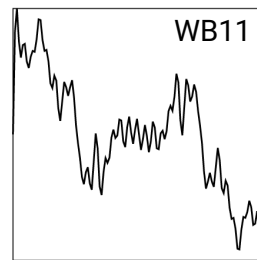
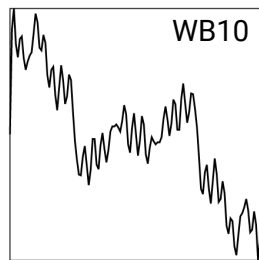
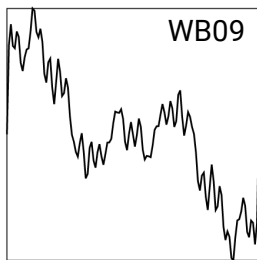
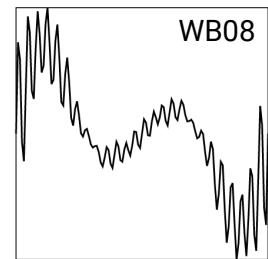
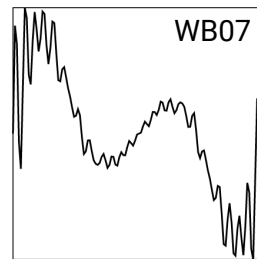
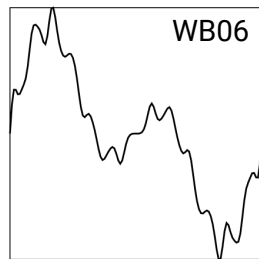
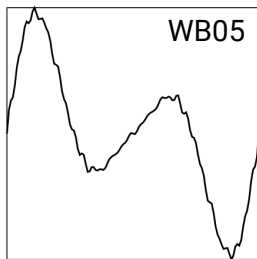
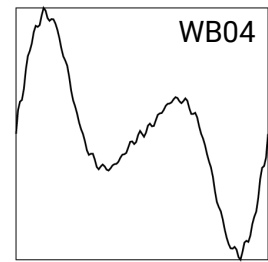
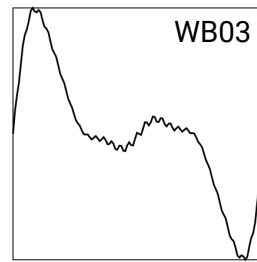
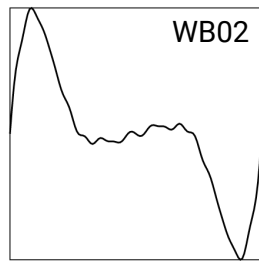
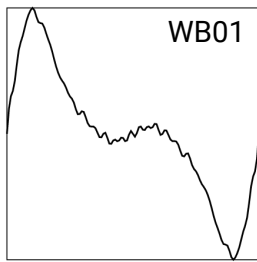
## Sawtooth, Square and Parabolic waves



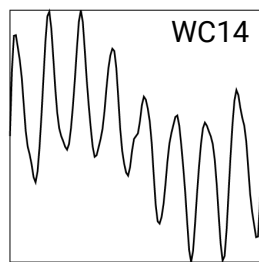
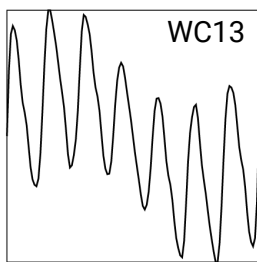
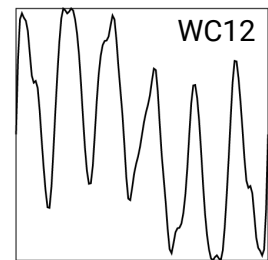
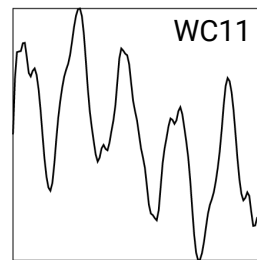
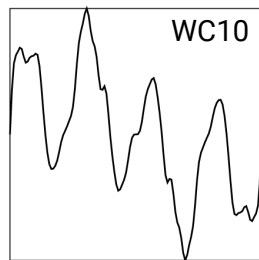
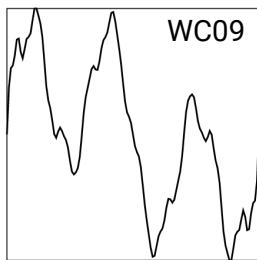
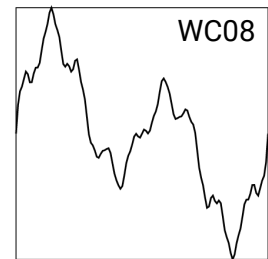
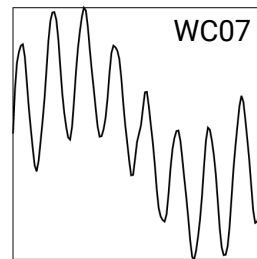
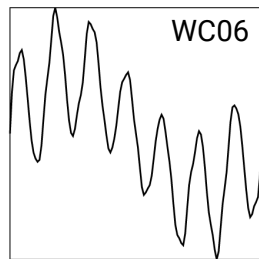
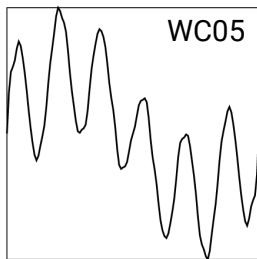
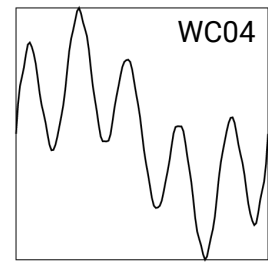
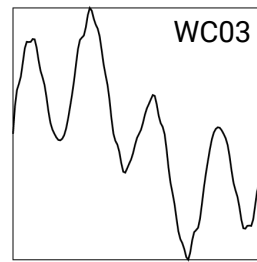
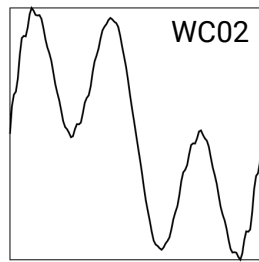
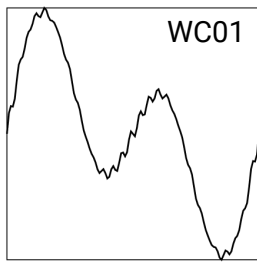
## Waves bank A



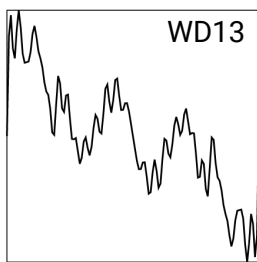
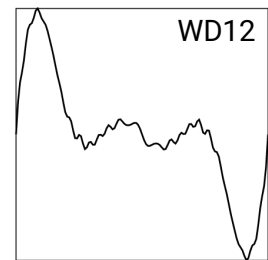
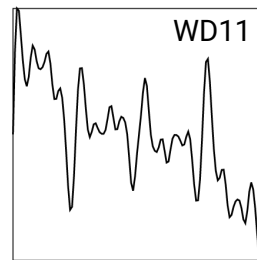
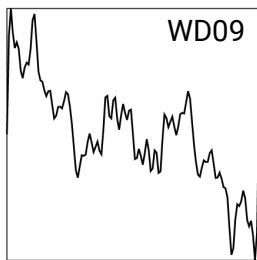
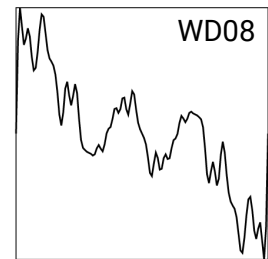
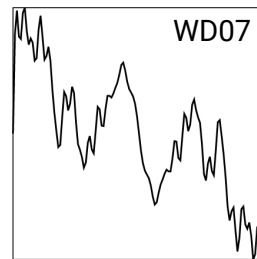
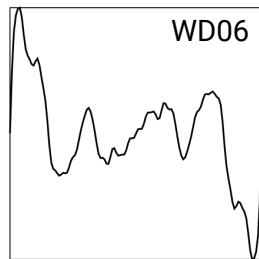
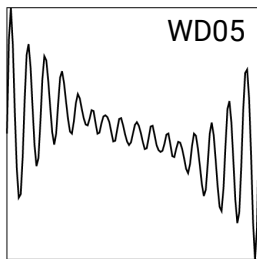
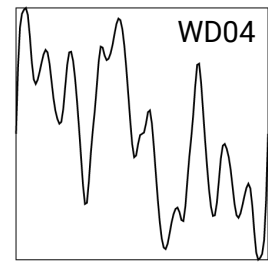
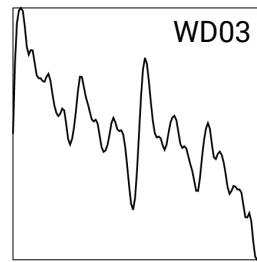
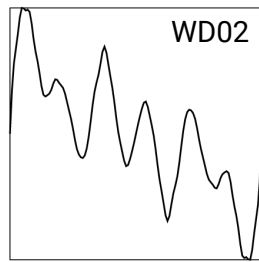
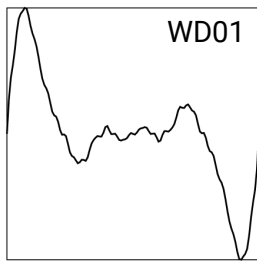
## Waves bank B



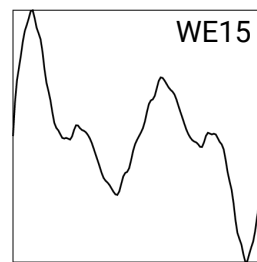
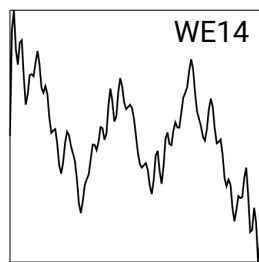
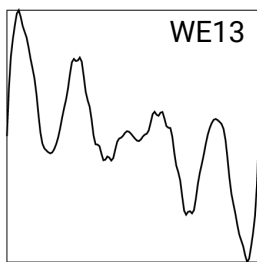
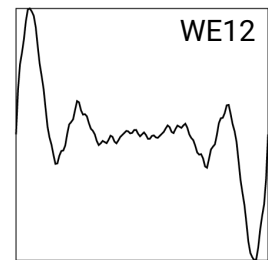
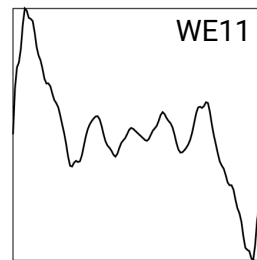
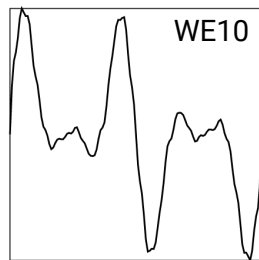
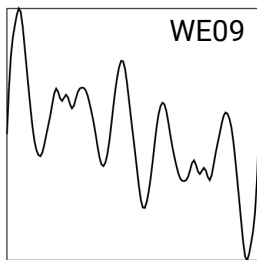
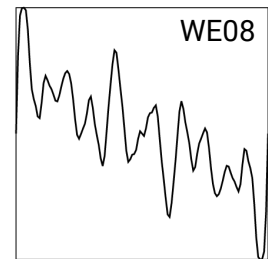
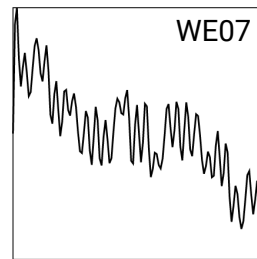
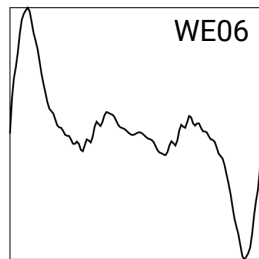
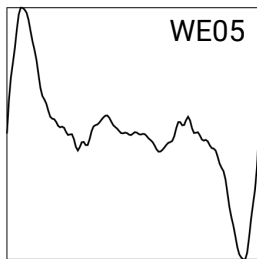
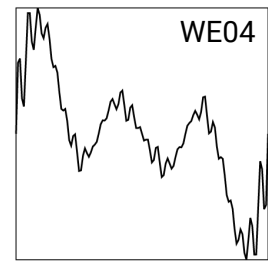
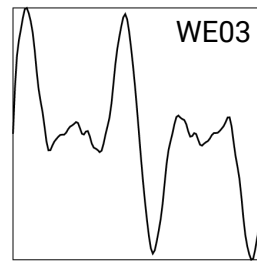
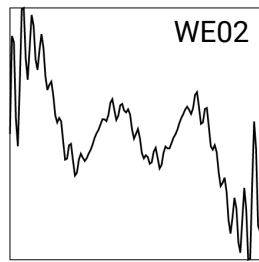
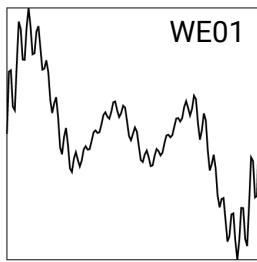
## Waves bank C



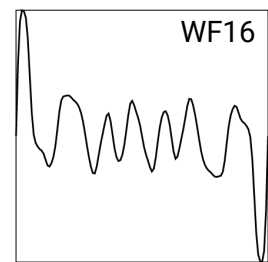
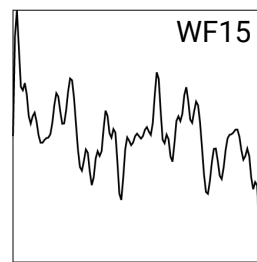
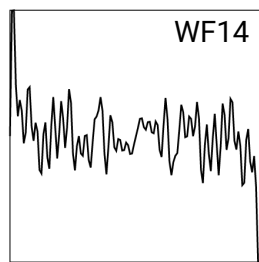
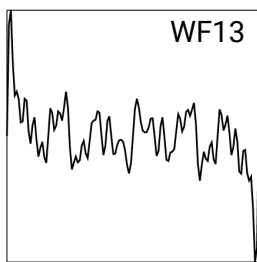
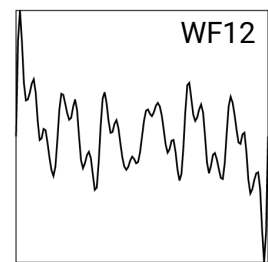
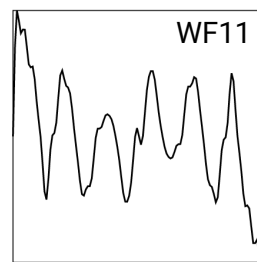
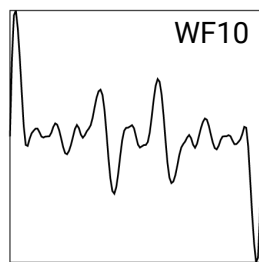
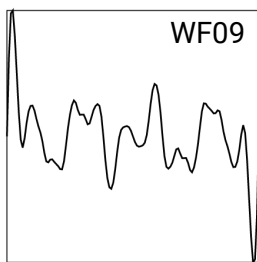
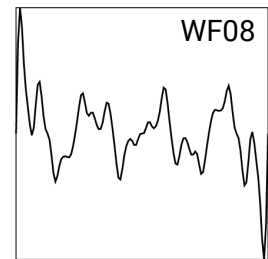
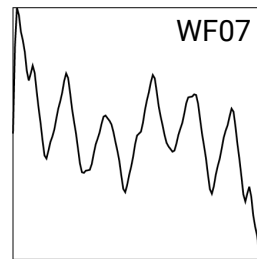
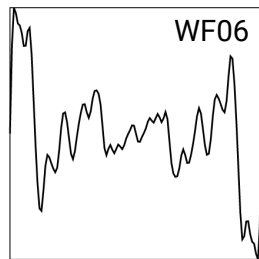
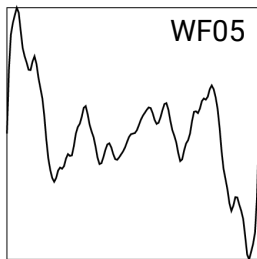
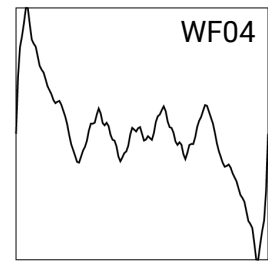
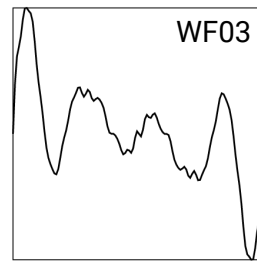
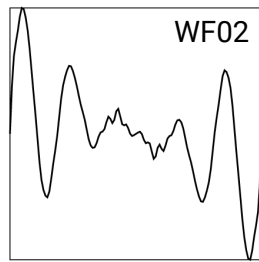
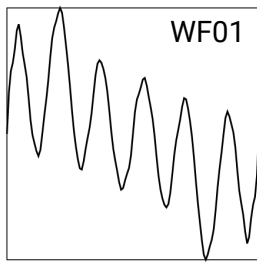
## Waves bank D



## Waves bank E



## Waves bank F



## Tips and tricks

- Transpose is also used to set the scale key for NTS-3
- The default parameters mapping for NTS-3 is Kaossilator-like:
  - X - Pitch, -12...+12
  - Y - Velocity, 0...127
  - Depth - Voice, 0...31
- NTS-3 mapping for Bass Guitar-like control (Scale #36):
  - X - Fine pitch control -12...0
  - Y - Transpose, +4...+5 (EADG, 5 frets)
  - Depth - Velocity, 0...127

## Known issues and limitations

- Native Yamaha DX / TX series LFO, Amp and pitch modulations are not supported due to performance limitations.
- All ascending EG stages (e.x. typical Attack) are exponential. Implementing the reference semi-linear behavior will introduce computational complexity that is not currently affordable.
- NTS-1 mkII Shape/A and Alt/B parameters values resolution are reduced to 10-bit while saved/restored with KORG KONTROL Editor
- NTS-1 mkII and NTS-3 CC/NRPN 14-bit values might not be mapped correctly to the corresponding parameter values, refer to <https://github.com/korginc/logue-sdk/issues/116>
- NTS-1 mkII and NTS-3 fractional numbers might not be displayed correctly, refer to <https://github.com/korginc/logue-sdk/issues/118>