FM64

Custom oscillator for KORG logue SDK synthesizers

Operations Manual

v.1.9-22

Contents

Introduction

FM64 is a set of custom oscillator variations for KORG prologue, minilogue XD and NTS-1 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 and Sound Librarian Owner's Manual for your KORG synthesizer model.

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.

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.

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**, **ALT**, **PARAM 1**, **PARAM 2**, **PARAM 3**, **PARAM 4**, **PARAM 5**, **PARAM 6** 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.

Advanced features

Oscillator variations

Custom oscillators are limited both in space and performance so it is not possible to fit all the features in the single oscillator. For the enhanced creativity there are several precompiled oscillator variations with different sets of features. The following table summarizes differences between variations:

Feature \ Oscillator	FM64	FM65	FM66	FM67	FM68	FM69
Preset algorithm count	84	84	84	84	84	84
User algorithm count	-	16[1]	-	-	-	-
Voice bank count	4	4	4	4	2	5
Feedback count	1	2	1	2	1	1
Waveform count	1	1	8	126	1	1
Custom parameters count	127	139	140	139	127	127
Waveform customization			+			
Waveform pinch		+[1]				
Shape LFO route		+				
Chromatic mode	+	+	+	+	+	
Kit mode	+	+	+	+	+	+
AMP LUT depth x width (bits)	11 x 16	11 x 16	11 x 16	11 x 16	13 x 16	11 x 16
Mixing quality (bits)	32	16	32	32	32	32

(1) : user algorithm also imports Wave Width parameters

Velocity

Velocity is not passed natively to the custom oscillators. To control the voice velocity, the custom parameter is used. When Velocity is assigned to the Shape or Alt (Shift + Shape), the enhanced 10-bit precision will be used. By default velocity is assigned to the Shape knob. When Velocity is assigned to the oscillator parameter knob, it will have 7-bit precision and be limited to 100, similar to the first generation of Yamaha DX / TX series synthesizers.

Share and Alt assign

Shape Assign and Alt Assign custom parameters allows to assign any of the existing custom parameters to the Shape or Alt (Shift + Shape) respectively. Custom parameter numbers are specified in the Custom parameters list. Since Shape and Alt (Shift + Shape) are unipolar, positive custom parameter number only affects bipolar custom parameter value in a positive range and negative custom parameter number affects bipolar custom parameter in a negative range.

Shape LFO route

Shape LFO route modulates selected custom parameter with the native synth LFO. Negative custom parameter number inverts the Shape LFO phase applied to the custom parameter. When Shape LFO is routed to the Velocity, the full ±10-bit span is used. When routed to other custom parameters, the ±7-bit span is used. The resulting custom parameter value might exceed the supported value range, in that case the native synth LFO depth or Shape LFO scale custom parameter can be used to avoid artifacts. When changing the Shape LFO route custom parameter it is recommended to temporarily either set synth LFO depth to zero or synth LFO to target other than Shape to avoid side effects on the traversed custom parameters.

Chromatic and kit modes

There are two modes available in the oscillators depending on the variation. The chromatic mode is a standard mode for the keyboard instrument when keys controls the pitch of the oscillator, i.e. plays notes of the same voice. The kit mode is normally for drums, when each key plays different voice.

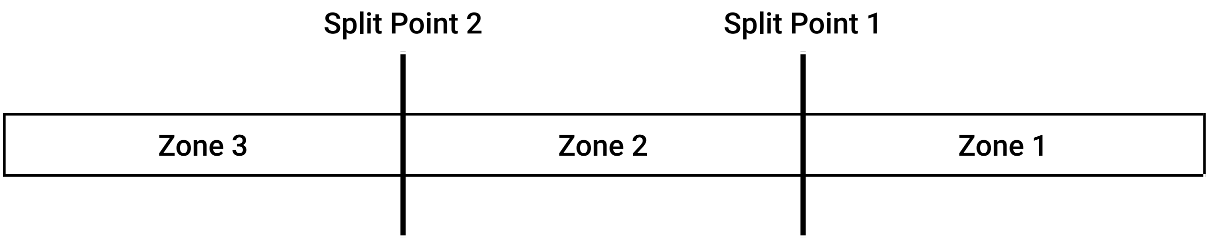
Banks and voices

For negative voices, banks are wrapped backwards, starting from the maximum available bank for the current oscillator variation regardless of the number of banks that uploaded into this oscillator in the online constructor. In the table below you can find the actual bank and voice mapping:

Banks \ Voice	-96…-65	-64…-33	-32…-1	0	1…32	33… 63	64…96
1	Bank 1	Bank 1	Bank 1	Kit mode	Bank 1	Bank 1	Bank 1
2	Bank 2	Bank 1	Bank 2	Kit mode	Bank 1	Bank 2	Bank 1
3	Bank 1	Bank 2	Bank 3	Kit mode	Bank 1	Bank 2	Bank 3
4	Bank 2	Bank 3	Bank 4	Kit mode	Bank 1	Bank 2	Bank 3
5	Bank 3	Bank 4	Bank 5	Kit mode	Bank 1	Bank 2	Bank 3
6	Bank 4	Bank 5	Bank 6	Kit mode	Bank 1	Bank 2	Bank 3

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:



Waveforms

Depending on the variation, an oscillator can support more than just one sine wave. Several variations also support waveform customization, that means they can be also altered with the online constructor. Waveforms can be selected with the custom parameters.

#	Waveform	#	Waveform
0	Sine	-1…-16	Waves bank A
1…7	Yamaha DX11 / TX81Z waves	-17…-32	Waves bank B
8…16	Yamaha SY77 / TG77 / SY99 waves	-33…-46	Waves bank C
17…22	Sawtooth waves	-47…-59	Waves bank D
23…28	Square waves	-60…-74	Waves bank E
29…35	Parabolic waves	-75…-90	Waves bank F

Waveform pinch

Several oscillator variations have waveform pinch control. This allows to add more harmonics using the same source waveform squeezed by a certain amount and complemented with silence to the end of the period. This is identical to KORG opsix Wave Width, but the actual value represents the length of the silence relative to the whole period. Thus resulting with the original waveform for the value of 0% and barely noticeable peak with the value of 99%. Extreme values could produce more noise since the source waveform resolution is limited.

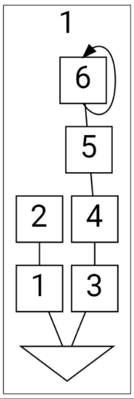
Algorithms list

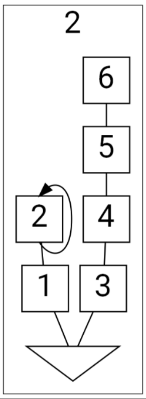
All oscillator variations support 32 Yamaha DX series and 8 additional KORG opsix algorithms. There are also 45 Yamaha SY77 / TG77 / SY99 algorithms supported with feedback count limitation. Several oscillator variations support additional user algorithms that can be imported with the online constructor from op6program files. Voice algorithm can be altered with custom parameters. Exact algorithm mapping shown in the following table:

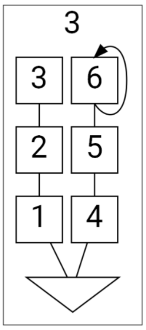
<table>
<tr><th>Synth \ Algorithm</th><th>1…19</th><th>20</th><th>21…32</th><th>33…40</th><th>41…80</th><th>81…84(1)</th><th>85…100</th></tr>
<tr><td>Yamaha DX series</td><td colspan="3">1…32</td><td colspan="4">-</td></tr>
<tr><td>KORG opsix</td><td colspan="4">1…40</td><td colspan="2">-</td><td>user(2)</td></tr>
<tr><td>Yamaha SY77 / TG77 / SY99</td><td>-</td><td>41</td><td colspan="2">-</td><td>1…40</td><td>42…45(1)</td><td>-</td></tr>
</table>

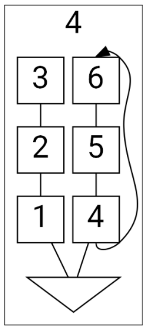
(1) : algorithm 82 have a single feedback, unlike the original Yamaha SY77 series algorithm 43

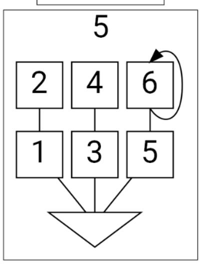
(2) : feedback custom parameters have no effect when user algorithm is selected

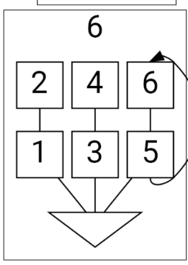


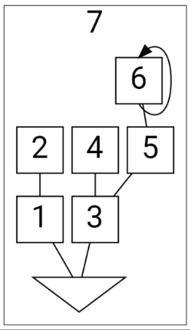


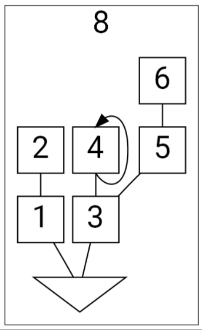


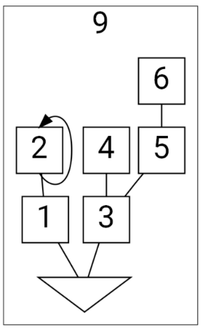


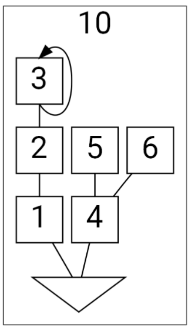


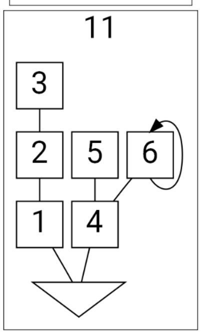


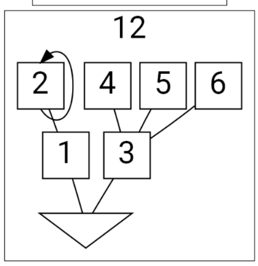


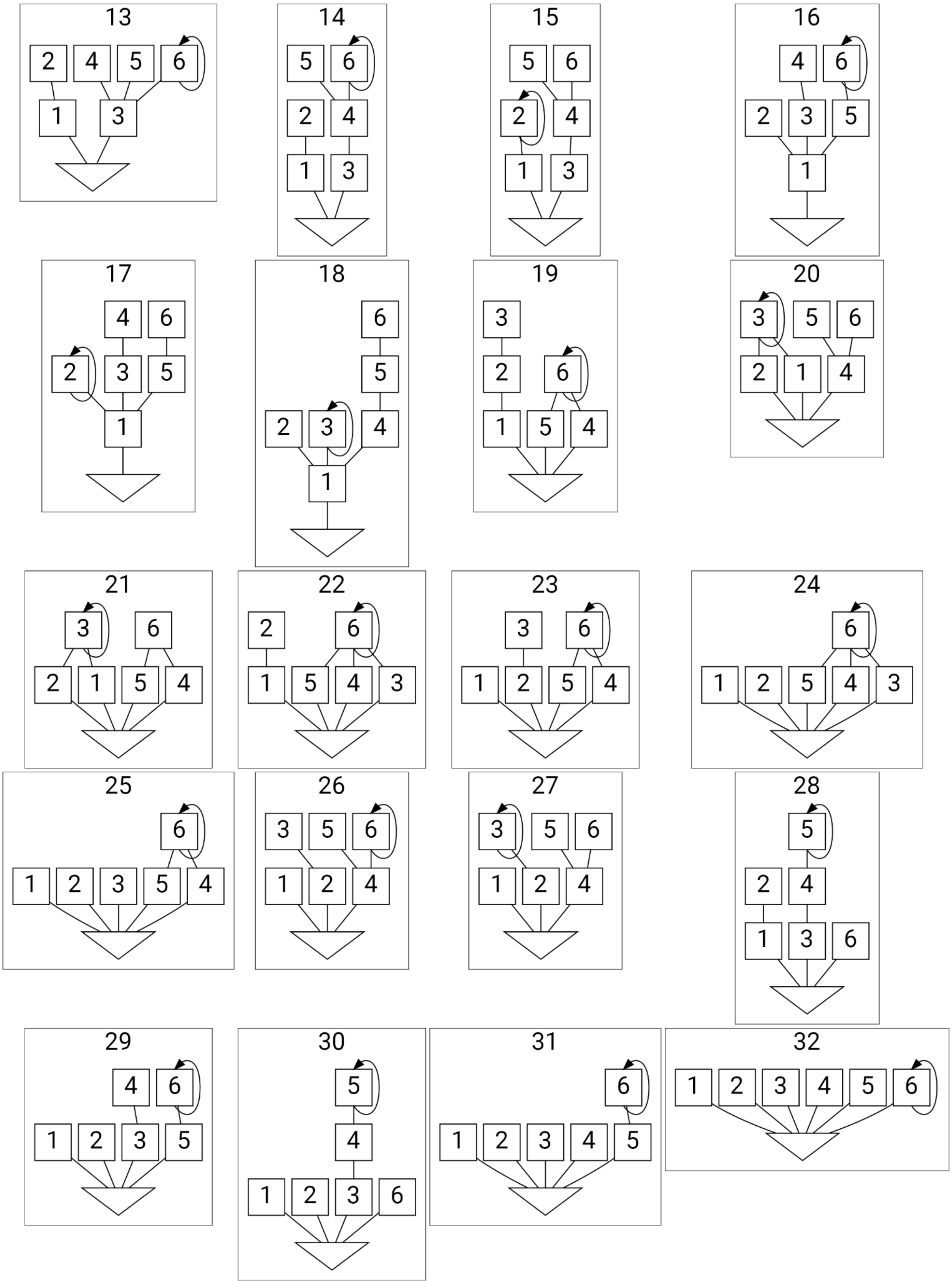








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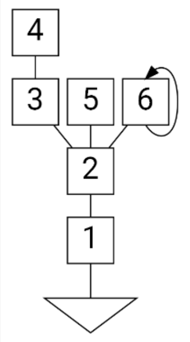

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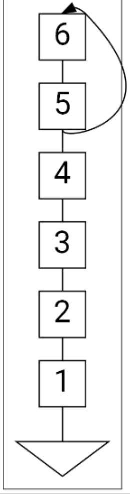

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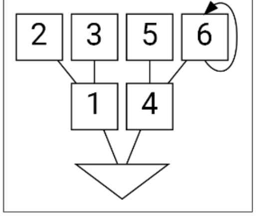

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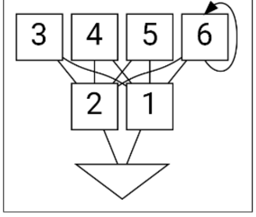

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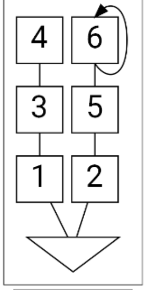

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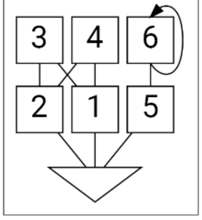

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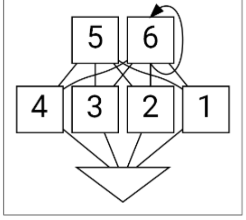

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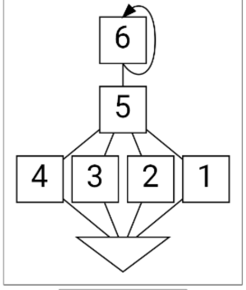

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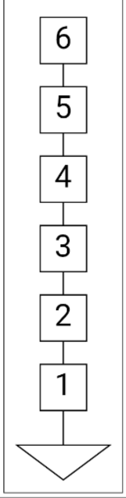

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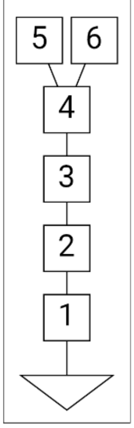

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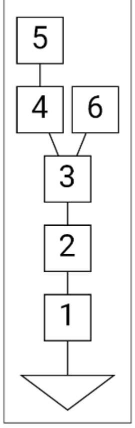

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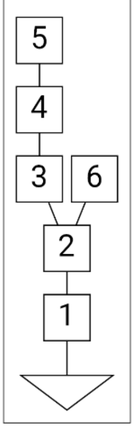

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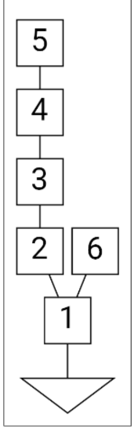

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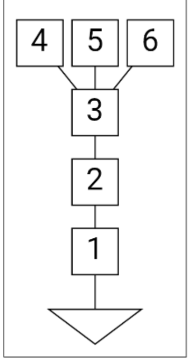

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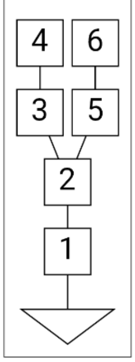

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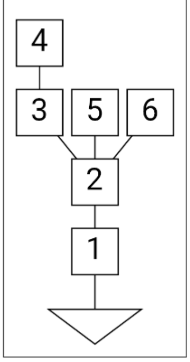

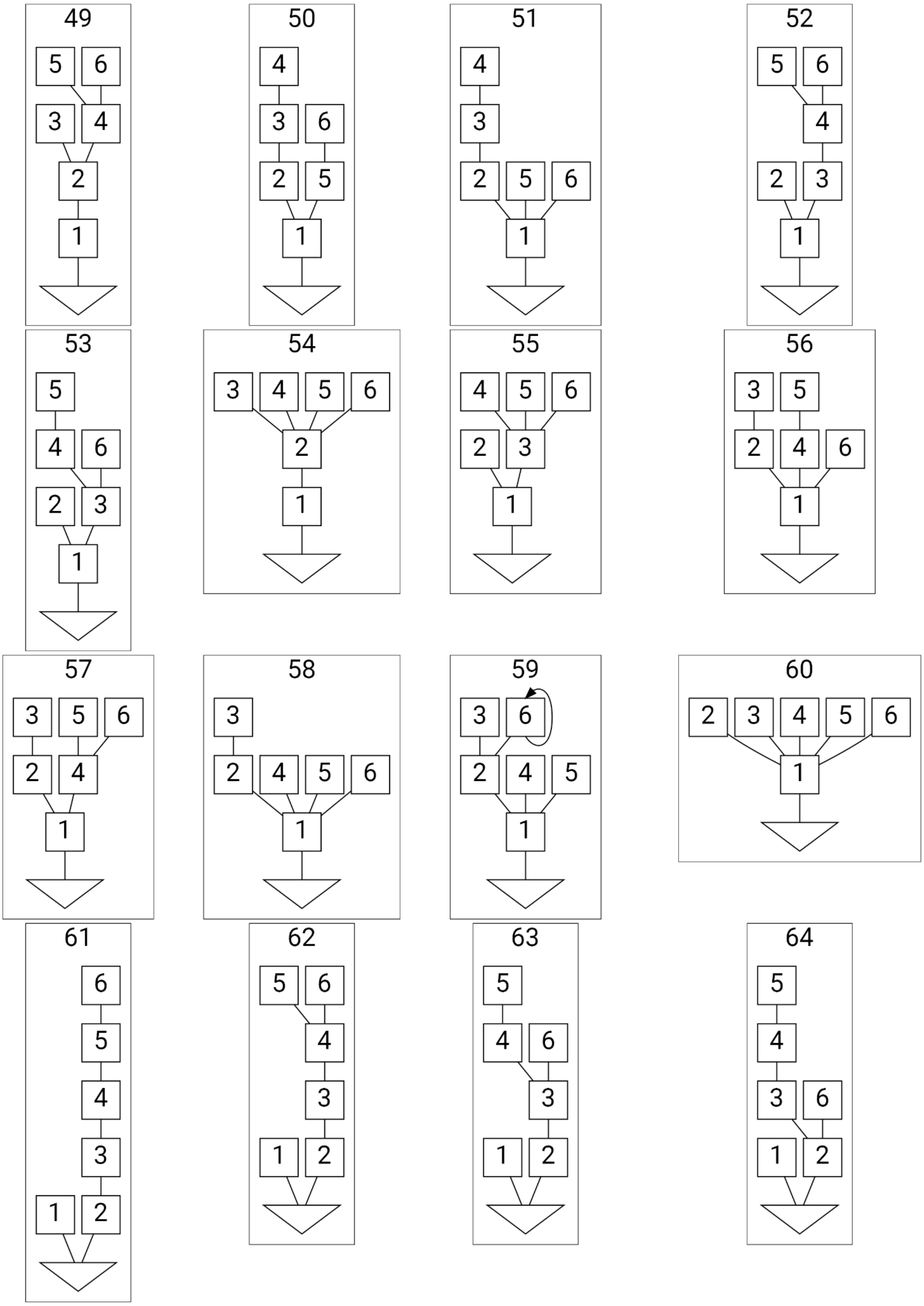
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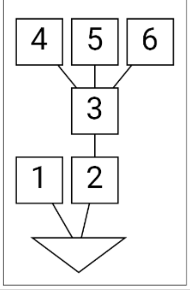

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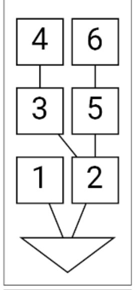

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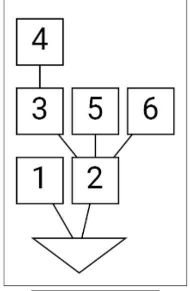

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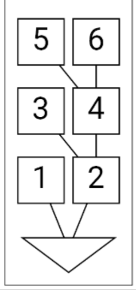

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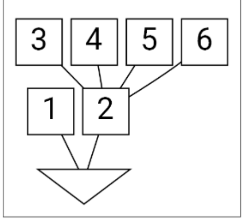

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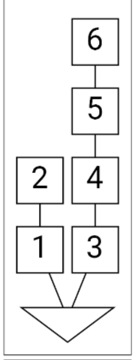

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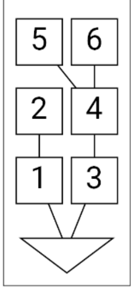

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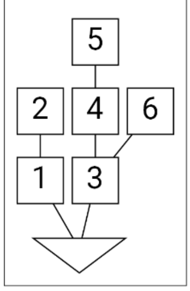

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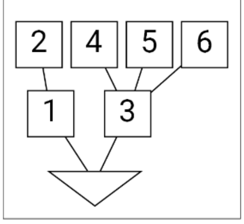

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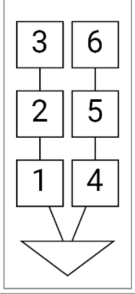

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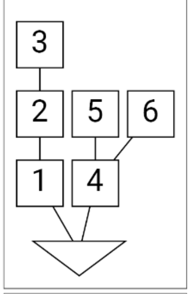

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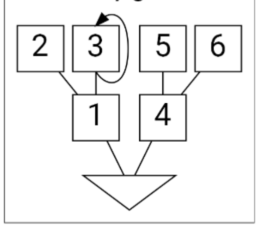

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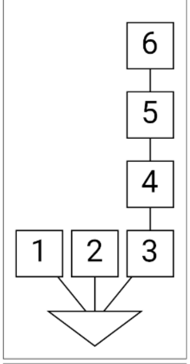

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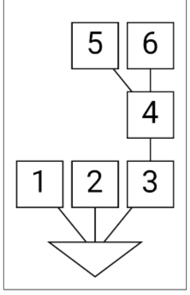

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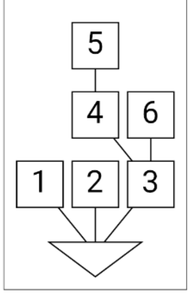

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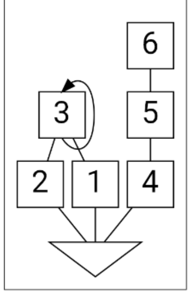

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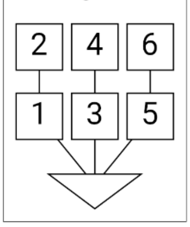

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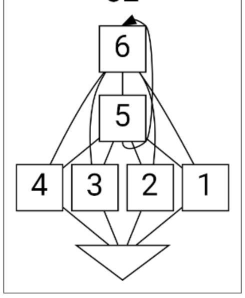

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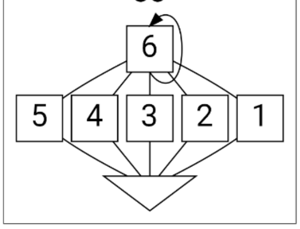

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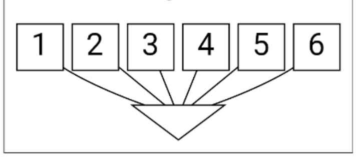


Custom parameters list

#	Custom param	Range	Description
0	Velocity	0…127 (1)(10)	Note velocity
1	Voice 1	-96…96	Voice for zone 1
2	Voice 2	-96…96	Voice for zone 2
3	Voice 3	-96…96	Voice for zone 3
4	Split Point1	1…101 (2)	Split point between zone 1 and 2
5	Split Point2	1…101 (2)	Split point between zone 2 and 3
6	Transpose 1	-99…100 (2)	Transpose for zone 1
7	Transpose 2	-99…100 (2)	Transpose for zone 2
8	Transpose 3	-99…100 (2)	Transpose for zone 3
9	Voice Shift1	-99…100	Voice shift for zone 1
10	Voice Shift2	-99…100	Voice shift for zone 2
11	Voice Shift3	-99…100	Voice shift for zone 3
12	Shape Assign	-99…99 (10)	Assign custom parameter # to Shape
13	Alt Assign	-99…99 (10)	Assign custom parameter # to Alt (Shift + Shape)
14	FB offset	-99…100 (3)(10)	Feedback 1 offset
15	FB2 offset	-99…100 (3)(10)	Feedback 2 offset
16	FB scale	-99…100 (4)(10)	Feedback 1 multiplier
17	FB2 scale	-99…100 (4)(10)	Feedback 2 multiplier
18	FB route	0…66 (5)(10)	Feedback 1 route
19	FB2 route	0…66 (5)(10)	Feedback 2 route
20	Alg select	0…100 (6)(10)	Algorithm select
21	Alg offset	-99…99(10)	Algorithm offset
22	Lvl offs All	-99…99	Level offset for all operators
23	Lvl offs Car	-99…99	Level offset for carriers
24	Lvl offs Mod	-99…99	Level offset for modulators
25	Lvl offs Op1	-99…99	Level offset for operator 1
26	Lvl offs Op2	-99…99	Level offset for operator 2
27	Lvl offs Op3	-99…99	Level offset for operator 3
28	Lvl offs Op4	-99…99	Level offset for operator 4
29	Lvl offs Op5	-99…99	Level offset for operator 5
30	Lvl offs Op6	-99…99	Level offset for operator 6

31	Lvl scal All	-99…100 [4]	Level multiplier for all operators
32	Lvl scal Car	-99…100 [4]	Level multiplier for carriers
33	Lvl scal Mod	-99…100 [4]	Level multiplier for modulators
34	Lvl scal Op1	-99…100 [4]	Level multiplier for operator 1
35	Lvl scal Op2	-99…100 [4]	Level multiplier for operator 2
36	Lvl scal Op3	-99…100 [4]	Level multiplier for operator 3
37	Lvl scal Op4	-99…100 [4]	Level multiplier for operator 4
38	Lvl scal Op5	-99…100 [4]	Level multiplier for operator 5
39	Lvl scal Op6	-99…100 [4]	Level multiplier for operator 6
40	KLS offs All	-99…99	Keyboard level scaling offset for all operators
41	KLS offset Car	-99…99	Keyboard level scaling offset for carriers
42	KLS offset Mod	-99…99	Keyboard level scaling offset for modulators
43	KLS offset Op1	-99…99	Keyboard level scaling offset for operators 1
44	KLS offset Op2	-99…99	Keyboard level scaling offset for operators 2
45	KLS offset Op3	-99…99	Keyboard level scaling offset for operators 3
46	KLS offset Op4	-99…99	Keyboard level scaling offset for operators 4
47	KLS offset Op5	-99…99	Keyboard level scaling offset for operators 5
48	KLS offset Op6	-99…99	Keyboard level scaling offset for operators 6
49	KLS scal All	-99…100 [4]	Keyboard level scaling multiplier for all operators
50	KLS scal Car	-99…100 [4]	Keyboard level scaling multiplier carriers
51	KLS scal Mod	-99…100 [4]	Keyboard level scaling multiplier modulators
52	KLS scal Op1	-99…100 [4]	Keyboard level scaling multiplier for operator 1
53	KLS scal Op2	-99…100 [4]	Keyboard level scaling multiplier for operator 2
54	KLS scal Op3	-99…100 [4]	Keyboard level scaling multiplier for operator 3
55	KLS scal Op4	-99…100 [4]	Keyboard level scaling multiplier for operator 4
56	KLS scal Op5	-99…100 [4]	Keyboard level scaling multiplier for operator 5
57	KLS scal Op6	-99…100 [4]	Keyboard level scaling multiplier for operator 6
58	KVS offs All	-99…100 [3]	Key velocity sensitivity offset for all operators
59	KVS offs Car	-99…100 [3]	Key velocity sensitivity offset for carriers
60	KVS offs Mod	-99…100 [3]	Key velocity sensitivity offset for operators
61	KVS offs Op1	-99…100 [3]	Key velocity sensitivity offset operator 1
62	KVS offs Op2	-99…100 [3]	Key velocity sensitivity offset operator 2
63	KVS offs Op3	-99…100 [3]	Key velocity sensitivity offset operator 3
64	KVS offs Op4	-99…100 [3]	Key velocity sensitivity offset operator 4

65	KVS offs Op5	-99…100 (3)	Key velocity sensitivity offset operator 5
66	KVS offs Op6	-99…100 (3)	Key velocity sensitivity offset operator 6
67	KVS scal All	-99…100 (4)	Key velocity sensitivity multiplier for all operators
68	KVS scal Car	-99…100 (4)	Key velocity sensitivity multiplier for carriers
69	KVS scal Mod	-99…100 (4)	Key velocity sensitivity multiplier for modulators
70	KVS scal Op1	-99…100 (4)	Key velocity sensitivity multiplier for operator 1
71	KVS scal Op2	-99…100 (4)	Key velocity sensitivity multiplier for operator 2
72	KVS scal Op3	-99…100 (4)	Key velocity sensitivity multiplier for operator 3
73	KVS scal Op4	-99…100 (4)	Key velocity sensitivity multiplier for operator 4
74	KVS scal Op5	-99…100 (4)	Key velocity sensitivity multiplier for operator 5
75	KVS scal Op6	-99…100 (4)	Key velocity sensitivity multiplier for operator 6
76	Rat offs All	-99…99	EG rate offset for all operators
77	Rat offs Car	-99…99	EG rate offset for carriers
78	Rat offs Mod	-99…99	EG rate offset for modulators
79	Rat offs Op1	-99…99	EG rate offset for operator 1
80	Rat offs Op2	-99…99	EG rate offset for operator 2
81	Rat offs Op3	-99…99	EG rate offset for operator 3
82	Rat offs Op4	-99…99	EG rate offset for operator 4
83	Rat offs Op5	-99…99	EG rate offset for operator 5
84	Rat offs Op6	-99…99	EG rate offset for operator 6
85	Rat scal All	-99…100 (4)	EG rate multiplier for all operators
86	Rat scal Car	-99…100 (4)	EG rate multiplier for carriers
87	Rat scal Mod	-99…100 (4)	EG rate multiplier for modulators
88	Rat scal Op1	-99…100 (4)	EG rate multiplier for operator 1
89	Rat scal Op2	-99…100 (4)	EG rate multiplier for operator 2
90	Rat scal Op3	-99…100 (4)	EG rate multiplier for operator 3
91	Rat scal Op4	-99…100 (4)	EG rate multiplier for operator 4
92	Rat scal Op5	-99…100 (4)	EG rate multiplier for operator 5
93	Rat scal Op6	-99…100 (4)	EG rate multiplier for operator 6
94	KRS offs All	-99…100 (3)	Keyboard EG rate scaling offset for all operators
95	KRS offs Car	-99…100 (3)	Keyboard EG rate scaling offset for carriers
96	KRS offs Mod	-99…100 (3)	Keyboard EG rate scaling offset for modulators
97	KRS offs Op1	-99…100 (3)	Keyboard EG rate scaling offset for operator 1
98	KRS offs Op2	-99…100 (3)	Keyboard EG rate scaling offset for operator 2

99	KRS offs Op3	-99…100 (3)	Keyboard EG rate scaling offset for operator 3
100	KRS offs Op4	-99…100 (3)	Keyboard EG rate scaling offset for operator 4
101	KRS offs Op5	-99…100 (3)	Keyboard EG rate scaling offset for operator 5
102	KRS offs Op6	-99…100 (3)	Keyboard EG rate scaling offset for operator 6
103	KRS scal All	-99…100 (4)	Keyboard EG rate multiplier for all operators
104	KRS scal Car	-99…100 (4)	Keyboard EG rate multiplier for carriers
105	KRS scal Mod	-99…100 (4)	Keyboard EG rate multiplier for modulators
106	KRS scal Op1	-99…100 (4)	Keyboard EG rate multiplier for operator 1
107	KRS scal Op2	-99…100 (4)	Keyboard EG rate multiplier for operator 2
108	KRS scal Op3	-99…100 (4)	Keyboard EG rate multiplier for operator 3
109	KRS scal Op4	-99…100 (4)	Keyboard EG rate multiplier for operator 4
110	KRS scal Op5	-99…100 (4)	Keyboard EG rate multiplier for operator 5
111	KRS scal Op6	-99…100 (4)	Keyboard EG rate multiplier for operator 6
112	Det offs All	-99…100 (7)(10)	Detune offset in cents for all operators
113	Det offs Car	-99…100 (7)(10)	Detune offset in cents for carriers
114	Det offs Mod	-99…100 (7)(10)	Detune offset in cents for modulators
115	Det offs Op1	-99…100 (7)(10)	Detune offset in cents for operator 1
116	Det offs Op2	-99…100 (7)(10)	Detune offset in cents for operator 2
117	Det offs Op3	-99…100 (7)(10)	Detune offset in cents for operator 3
118	Det offs Op4	-99…100 (7)(10)	Detune offset in cents for operator 4
119	Det offs Op5	-99…100 (7)(10)	Detune offset in cents for operator 5
120	Det offs Op6	-99…100 (7)(10)	Detune offset in cents for operator 6
121	Det scal All	-99…100 (4)(10)	Detune multiplier for all operators
122	Det scal Car	-99…100 (4)(10)	Detune multiplier for carriers
123	Det scal Mod	-99…100 (4)(10)	Detune multiplier for modulators
124	Det scal Op1	-99…100 (4)(10)	Detune multiplier for operator 1
125	Det scal Op2	-99…100 (4)(10)	Detune multiplier for operator 2
126	Det scal Op3	-99…100 (4)(10)	Detune multiplier for operator 3
127	Det scal Op4	-99…100 (4)(10)	Detune multiplier for operator 4
128	Det scal Op5	-99…100 (4)(10)	Detune multiplier for operator 5
129	Det scal Op6	-99…100 (4)(10)	Detune multiplier for operator 6
130	Waveform C+M	-77…77 (8)(10)	Waveform offset for carriers and modulators
131	Waveform 1+2	-77…77 (8)(10)	Waveform offset for operators 1 and 2
132	Waveform 3+4	-77…77 (8)(10)	Waveform offset for operators 3 and 4

133	Waveform 5+6	-77…77 (8)(10)	Waveform offset for operators 5 and 6
134	Waveform All	-90…35(10)	Waveform select for all operators
135	Waveform Car	-90…35(10)	Waveform select for carriers
136	Waveform Mod	-90…35(10)	Waveform select for modulators
137	Waveform Op1	-90…35(10)	Waveform select for operator 1
138	Waveform Op2	-90…35(10)	Waveform select for operator 2
139	Waveform Op3	-90…35(10)	Waveform select for operator 3
140	Waveform Op4	-90…35(10)	Waveform select for operator 4
141	Waveform Op5	-90…35(10)	Waveform select for operator 5
142	Waveform Op6	-90…35(10)	Waveform select for operator 6
143	WF pinch All	-99…99(10)	Waveform pinch offset for all operators
144	WF pinch Car	-99…99(10)	Waveform pinch offset for carriers
145	WF pinch Mod	-99…99(10)	Waveform pinch offset for modulators
146	WF pinch Op1	-99…99(10)	Waveform pinch offset for operator 1
147	WF pinch Op2	-99…99(10)	Waveform pinch offset for operator 2
148	WF pinch Op3	-99…99(10)	Waveform pinch offset for operator 3
149	WF pinch Op4	-99…99(10)	Waveform pinch offset for operator 4
150	WF pinch Op5	-99…99(10)	Waveform pinch offset for operator 5
151	WF pinch Op6	-99…99(10)	Waveform pinch offset for operator 6
152	S.LFO scale	-99…100(4)(10)	Shape LFO scale
153	S.LFO route	-99…100(9)(10)	Route Shape LFO to custom parameter #

(1) : 0...100 with the step of 1 when assigned to the oscillator parameter
0..127 with the step of 0.125 when assigned to the Shape or Alt (Shift + Shape)

(2) : semitones / notes

(3) : -6.93…+7 with the step of 0.07

(4) : x0.01…x2 multiplier with the step of 0.01

(5) : 0 - keep voice feedback route
higher digit - feedback source operator, 1…6 (0→1, 7...9→6)
lower digit - feedback destination operator, 1…6 (0→1, 7...9→6)

(6) : 0 - keep voice algorithm
1...100 - set algorithm explicitly

(7) : cents

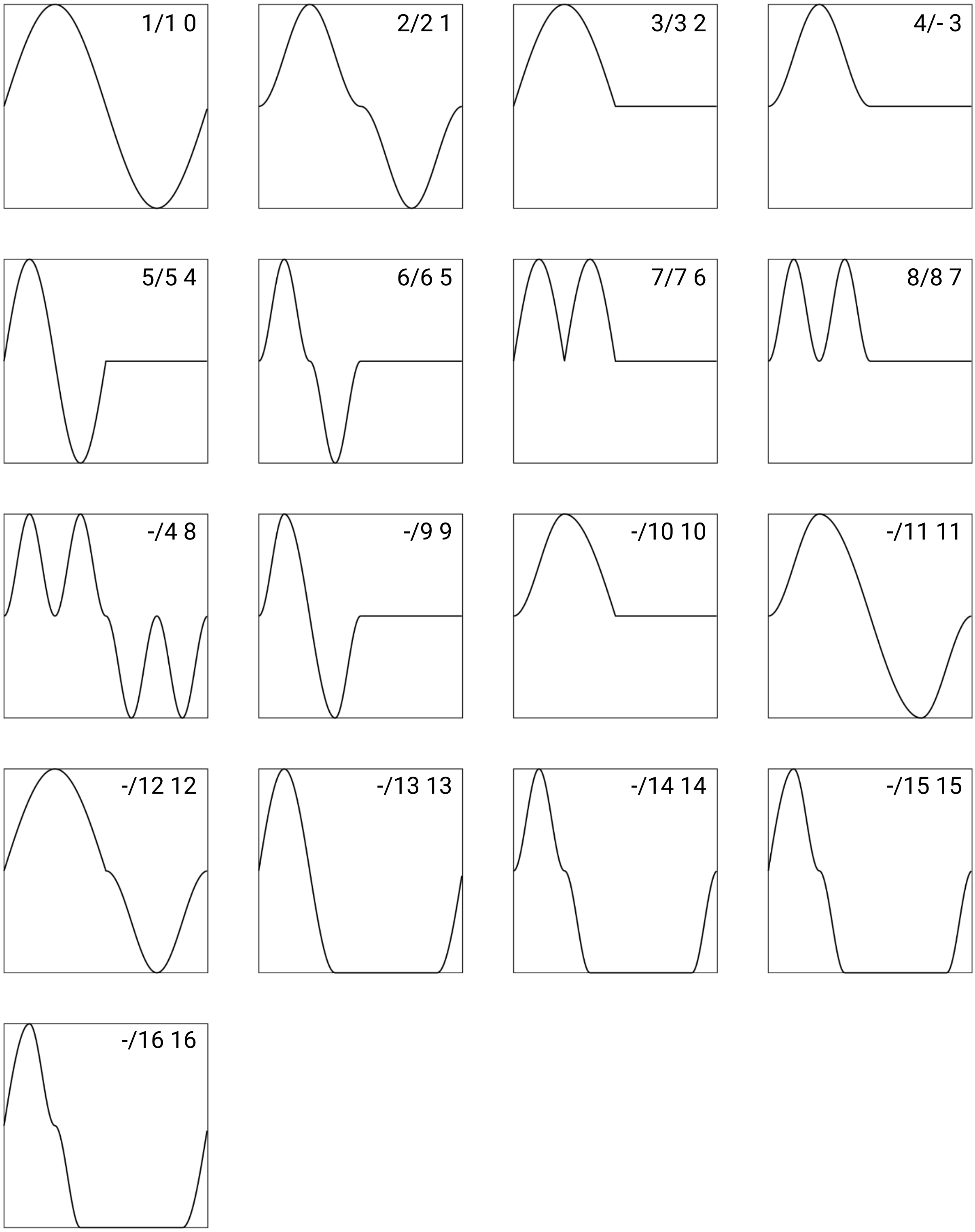
(8) : higher digit - carriers and odd operators,
lower digit - modulators and even operators

(9) : 100 - unrouted

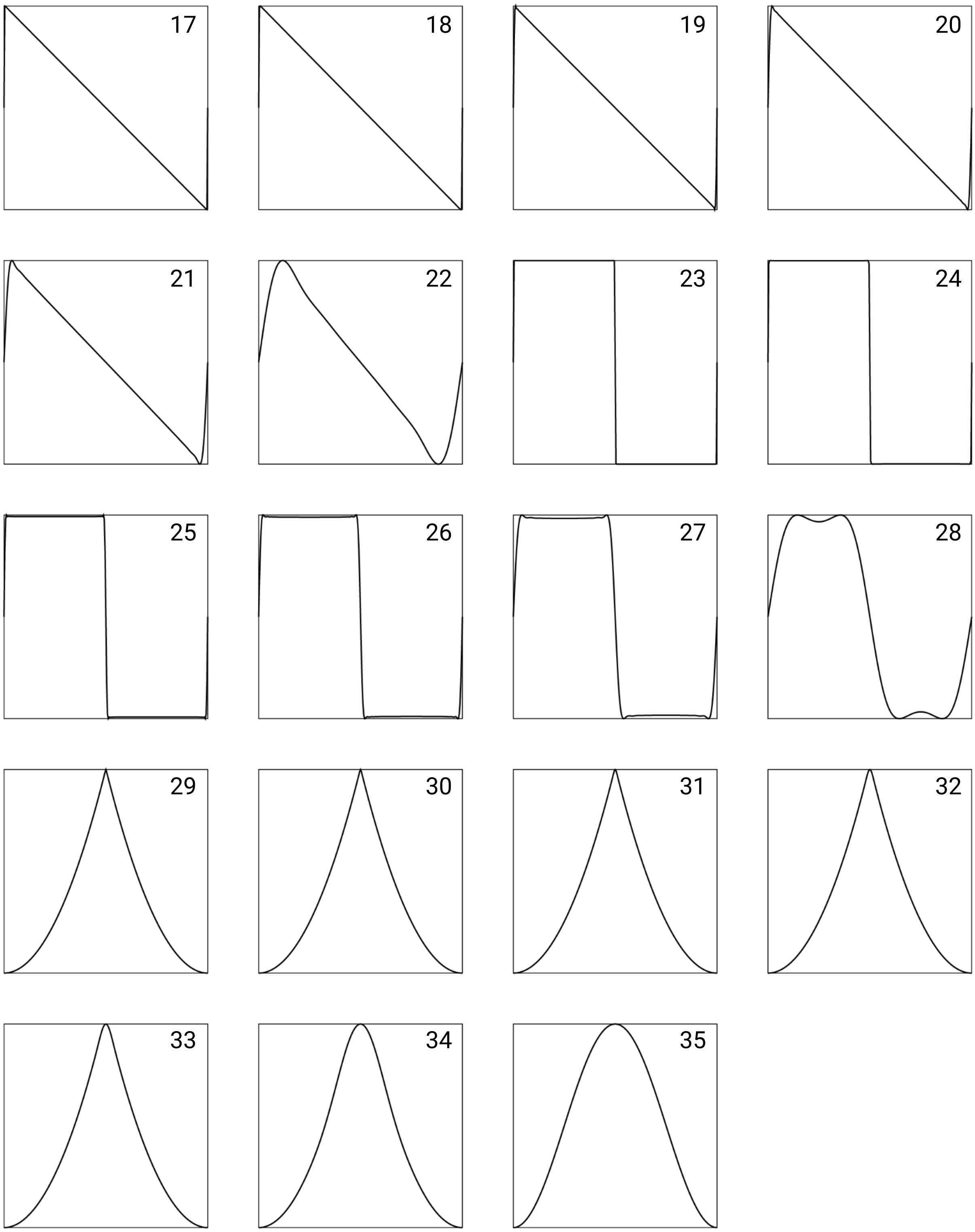
(10) : effective in real time (otherwise on the next NOTE ON event)

Waveforms list

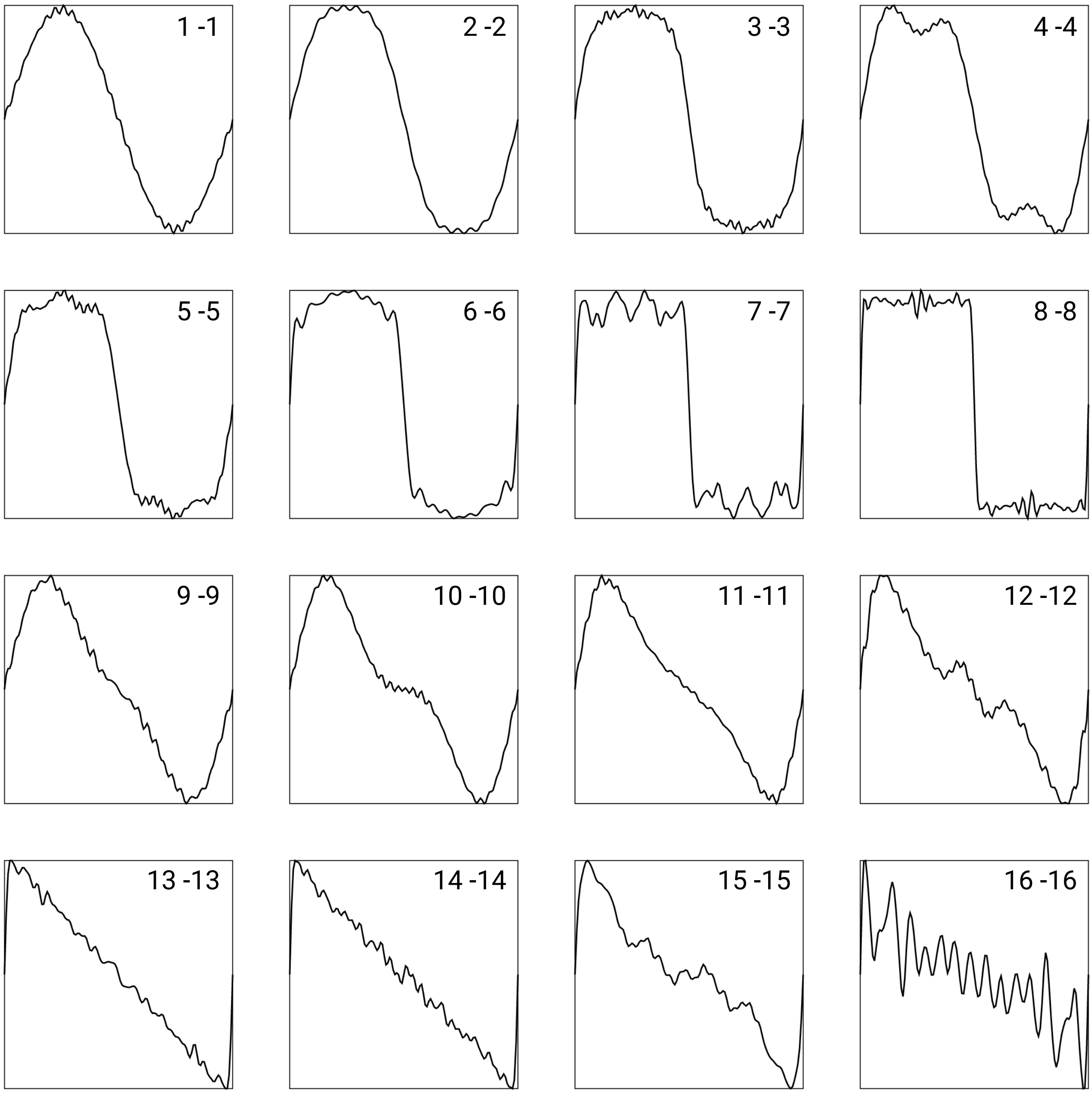
Yamaha DX11 / TX81Z and SY77 / TG77 / SY99 waves



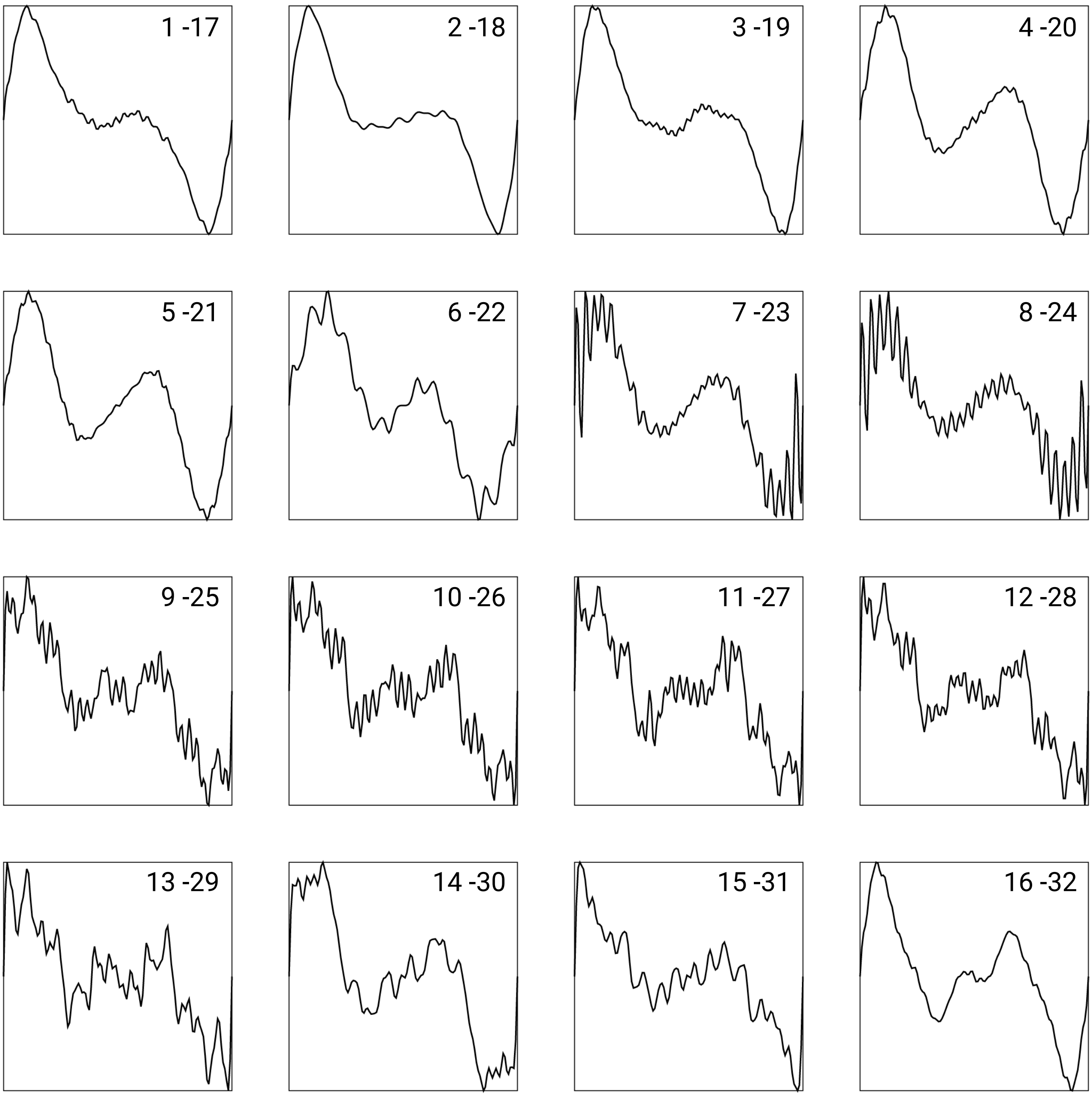
Sawtooth, Square and Parabolic waves



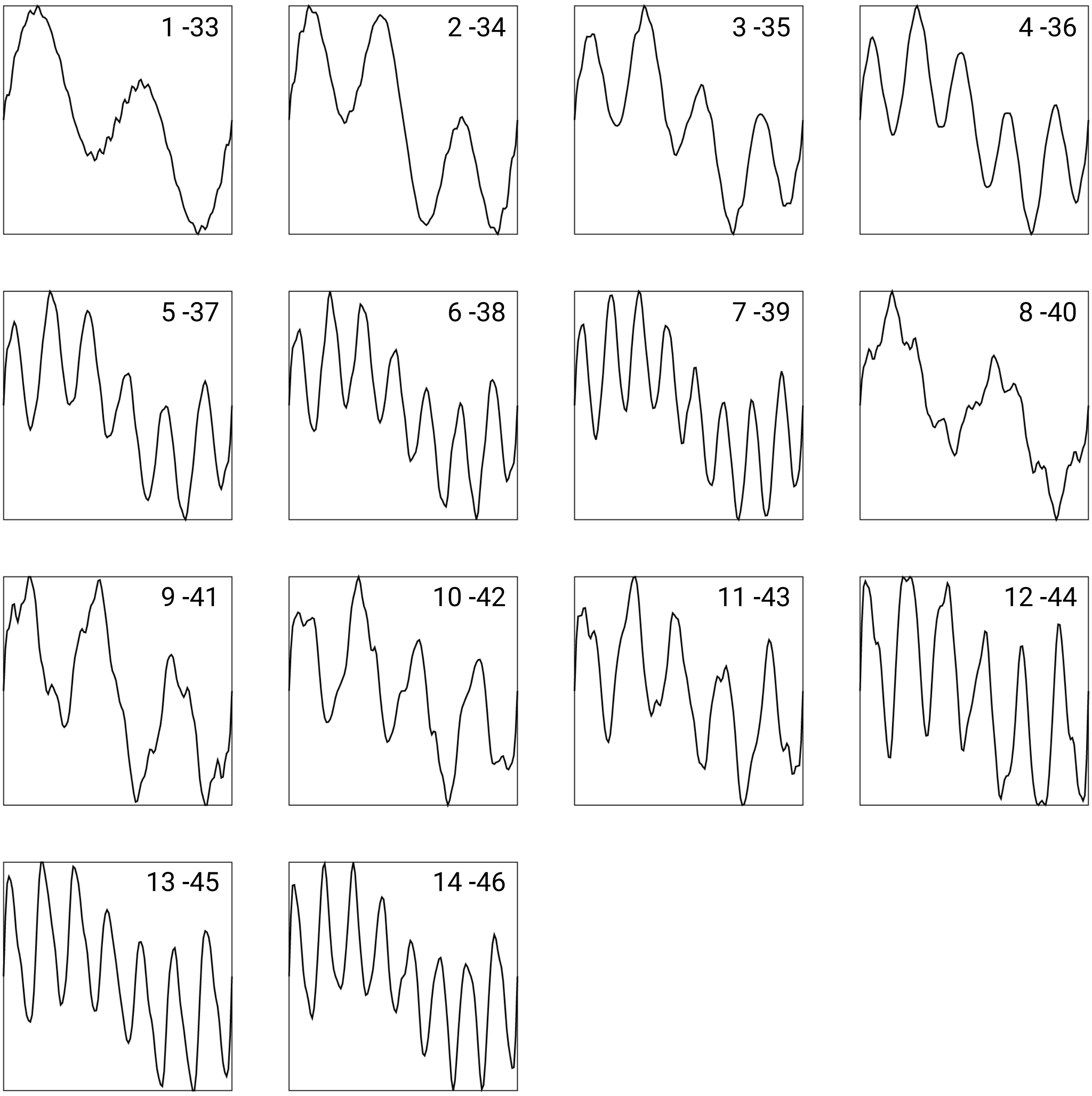
Waves bank A



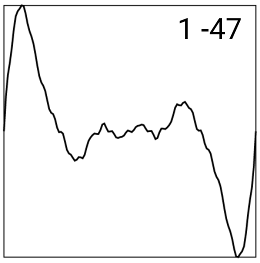
Waves bank B

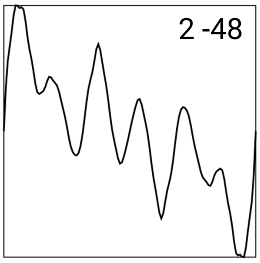

1 -17
2 -18
3 -19
4 -20
5 -21
6 -22
7 -23
8 -24
9 -25
10 -26
11 -27
12 -28
13 -29
14 -30
15 -31
16 -32

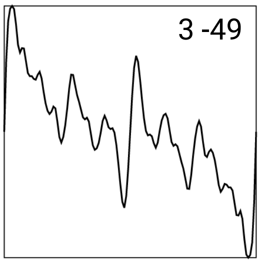
Waves bank C

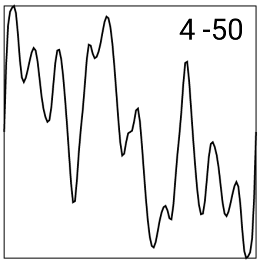


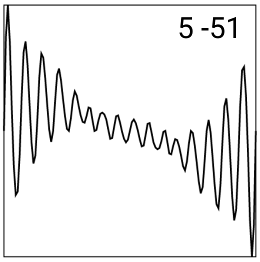
Waves bank D

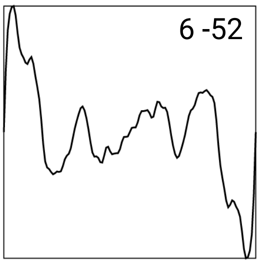


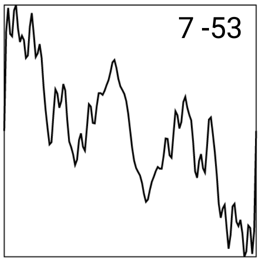


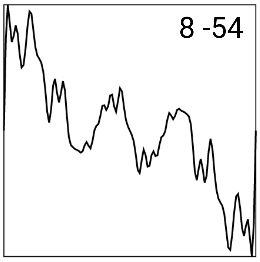


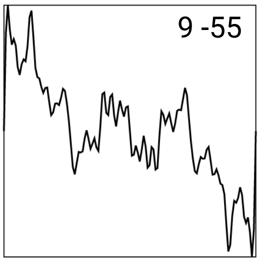


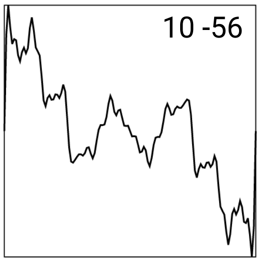


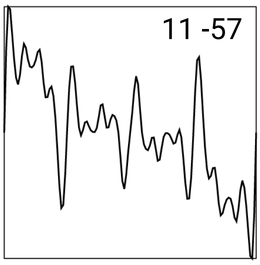


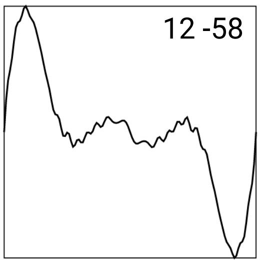


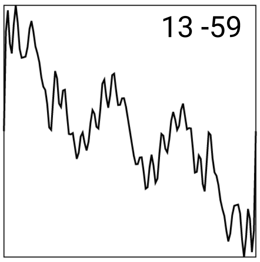




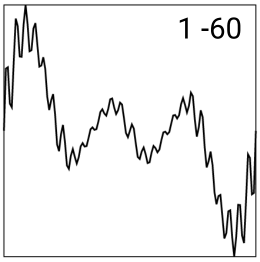


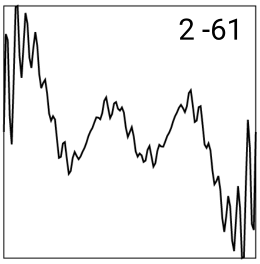


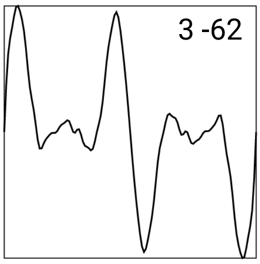


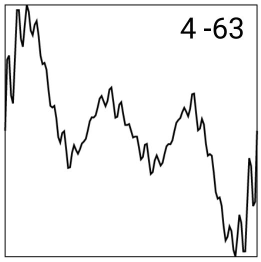


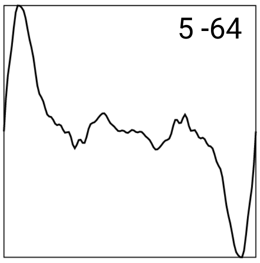
Waves bank E

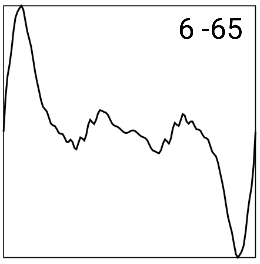

1 -60

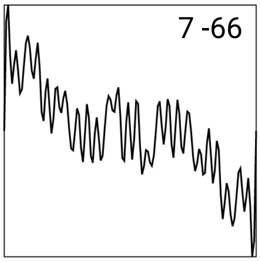

2 -61

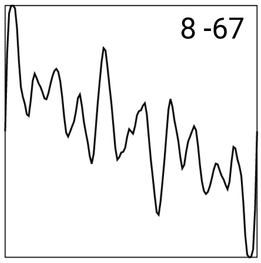

3 -62

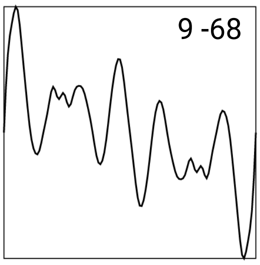

4 -63

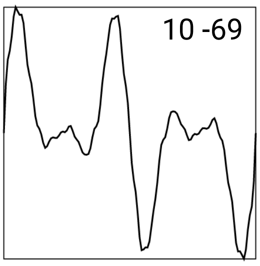

5 -64

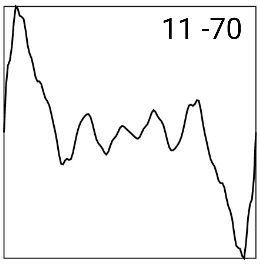

6 -65

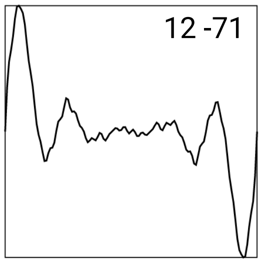

7 -66

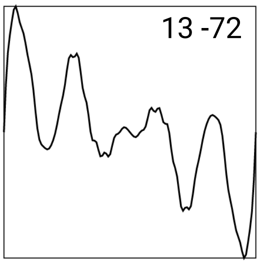

8 -67


9 -68

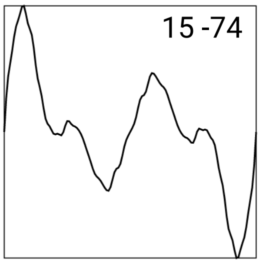

10 -69


11 -70

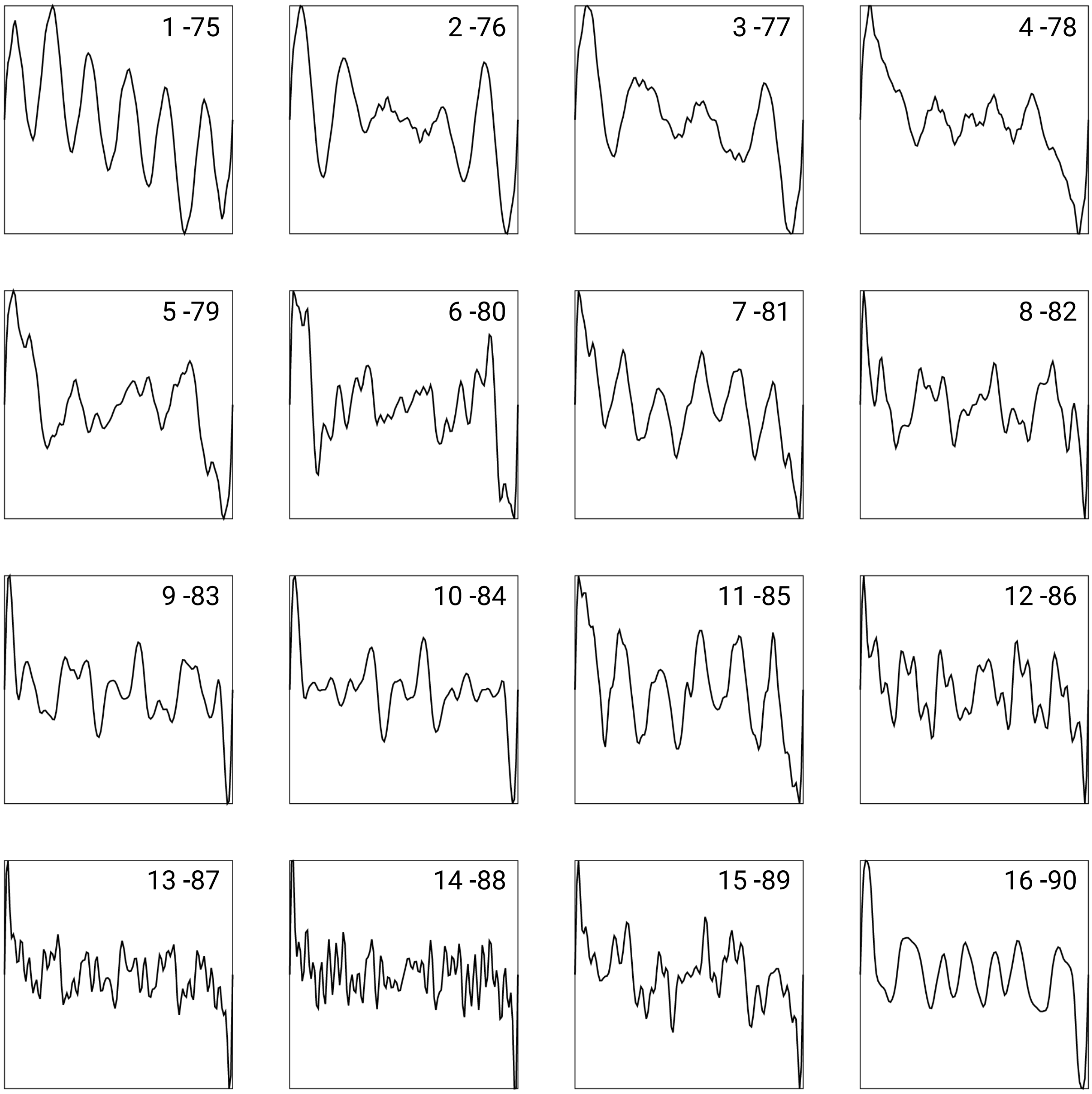

12 -71


13 -72


14 -73


15 -74

Waves bank F


1 -75
2 -76
3 -77
4 -78
5 -79
6 -80
7 -81
8 -82
9 -83
10 -84
11 -85
12 -86
13 -87
14 -88
15 -89
16 -90

Known issues and limitations

- prologue and minilogue XD synthesizers can produce distorted sound or hang when LFO is routed to the Shape. This is due to high CPU utilization of the oscillator and additional CPU load produced by the firmware code for the Shape LFO. To restore normal operation the synthesizer power cycle is needed.
- On prologue, restoring the assigned parameter value with program recall is only valid in case Shape assign is assigned to the Alt (Shift + Shape) due to a parameter initialization order of the current firmware. On minilogue XD in opposite, this is the only combination that won't restore the value of the assigned parameter.
- NTS-1 can produce distorted sound when more than 2 effects are enabled. This is due to high CPU utilization of the oscillator and shared CPU architecture of the NTS-1. Disable excessive effects to get normal sound from the oscillator.
- NTS-1, at least with the firmware up to 1.20, produces unipolar Shape LFO output in contradiction with the prologue and minilogue XD.
- 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.