Waldorf Wave System Exclusive Description (c) Waldorf Electronics/Werner Schönenberger
Doc: V2.0

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Operating System Version 1.400

1.) General Information

This document is prepared under great caution in a most precise manner.
Several experts took care in sorting and checking the available information
the best way possible.
However, we cannot guarantee that all information is absolutely correct,
nor can we guarantee that there won't be changes due to further software
enhancements.

All System Exclusive messages of the Wave have the following format :

Label	Bytes	Comment
SYSX	1	Always 0xF0
WALDORF	1	Always 0x3E
WAVE ID	1	Always 0x03
DEVICE ID	1	According to global parameter <Device Number>
MESSAGE ID	1	Specifies message type
LOCATION	nl	Specifies location of Dump, Number of bytes nl depends on MESSAGE ID
DATA	n	Number of data bytes n depending on MESSAGE ID
CHKSUM	1	sum of all bytes of LOCATION and DATA truncated to 7 bit **CHKSUM set to 0x00 will ignore the checksum test this makes it easier for real time DAW editing**
EOX	1	0xF7

Dumps are only accepted if the DEVICE ID fits the global parameter
<Device Number> or is set to 127, which means all units.
If a checksum error is detected, the whole message will be ignored.
An unknown message will lead to no reaction, it will be ignored
completely.

In all dumps there may be unused data-bytes. Those data-bytes
represent reserved, but yet unused parameters and should be set
to zero.

If not indicated differently, a databyte consists of a regular
MIDI-databyte (0x00 - 0x7F).

Otherwise:

ASCII: A MIDI databyte in the range of 20h..7Fh.
BYTE : Two consecutive nibbles form an 8-bit byte.
The MS nibble is sent first.
WORD : Four consecutive nibbles form a 16-bit word.
The MS nibble is sent first.

No other data formats will be provided.
Within a single message data formats may be mixed.

2.) MESSAGE IDs

Detailed information:

The diference between dumps and requests is determined by a high
or low bit 6. This means: requests occupy IDM-numbers 00h to 3Fh,
while the corresponding dumps have IDM-numbers 40h to 7Fh.
As you can see, a dump always has the same IDM-number as it's
request, the difference being a high (set) bit 6.

The Wave accepts and sends the following Dump MESSAGE IDs :

Label	Value	Bytes nl LOCATION	Bytes n of DATA	Description
SBPR	0x00	3	256	Soundprogram
SARR	0x01	2	512	Performance
SWAVE	0x02	4	128	Wave
SWTBL	0x03	2	266	Wave control table
SVT	0x04	1	128	Velocity Curve
STT	0x05	1	256	Tuning Table
SGLB	0x06	0	384	Global Parameters
SARRMAP	0x07	0	256	Performance Program Change Map
SBPRMAP	0x08	0	256	Sound Program Change Map
SBPRPAR	0x09	3	1	Sound Parameter
SARRPAR	0x0A	1	1	Performance Parameter
SINSPAR	0x0B	2	1	Instrument/External Parameter
SBULK	0x0F	0	1	Bulk Switch on/off

*** Note ***
SARRPAR and SINSPAR Dumps cannot be sent by the Wave with the current
Operating System Version, nevertheless they are properly received.

*** Note ***
Although the Wave offers Bulk Dumps of Soundbanks, Performance banks
and Arrangements, there is no System Exclusive implementation for these
data types.
Instead of this, the Wave sends out a sequence of single Dumps :

Dump Sequence for Soundbank :

1.	Bulk switch on	SBULK
2.	128 consecutive Sound Dumps	SBPR
3.	Bulk switch off	SBULK

Dump Sequence for Performance bank :

1.	Bulk switch on	SBULK
2.	128 consecutive Performance Dumps	SARR
3.	Bulk switch off	SBULK

Dump Sequence for Wavetable :

1.	Wave control table dump	SWTBL
2.	Wave Dumps for each needed userwave Rom waves 0-299 will not be sent.	SWAVE

Dump Sequence for Arrangement :

1.	Performance Dump	SARR
2.	Sound Dumps for each needed Sound	SBPR
	*** Dump without tables stops here ***	
3.	Dumps of needed Velocity curves	SVT
4.	Dumps of needed Tuning tables	STT
5.	Dumps of needed Wavetables (see above)	SWTBL

The Wave accepts and sends the following Request MESSAGE IDs :
(all DATA fields have 0 Bytes)

Label	Value	Bytes nl of LOCATION	Description
RQBPR	0x40	1	Soundprogram
RQARR	0x41	0	Performance
RQWAVE	0x42	4	Wave
RQWTBL	0x43	1	Wavetable
RQVT	0x44	1	Velocity Curve
RQTT	0x45	1	Tuning Table
RQGLB	0x46	0	Global Parameters
RQARRMAP	0x47	0	Performance Program Change Map
RQBPRMAP	0x48	0	Sound Program Change Map

3.) Detailed Messages

3.a) SBPR (Soundprogram Dump)
Format :

SYSX	1	0xF0
WALDORF	1	0x3E
WAVE ID	1	0x03
DEVICE ID	1	See global parameter <Device Number>
MESSAGE ID	1	0x00 (SBPR)
LOCATION	3	Instrument and Sound Number Byte 0: Instrument number Byte 1: Bank number, 0: bank A, 1: bank B Byte 2: Sound Number
DATA	256	Soundprogram data (see description below)
CHKSUM	1	sum of all bytes of DATA and LOCATION, truncted to 7 bit
EOX	1	0xF7

Format of Soundprogram :

Byte	description	
0	Oscillator 1 octave	(0=-2, 0x10=-1, 0x20=0, 0x30=+1, 0x40=+2)
1	Oscillator 1 semitone	(16-112, 1 semitone equals a value of 4)
2	Oscillator 1 detune	(14-114 represents -50...+50)
3	Oscillator 1 bend range	(16-112 in steps of 4, represents -12...+12, 12 means global.)
4	Oscillator 1 pitch mode	(0: norm, 1-4: random 1-4,5: fixed)
5	Oscillator 1 mod 1 source	(0-**39**, see modifier table)
6	Oscillator 1 mod 1 control	(0-**39**, see modifier table)
7	Oscillator 1 mod 1 amount	(0-127, represents -64...+63)
8	Oscillator 1 mod 2 source	(0-**39**, see modifier table)
9	Oscillator 1 mod 2 amount	(0-127, represents -64...+63)
10	Oscillator 1 mod 2 quantize	(0-7)
11	unused	
12	Oscillator 2 octave	(0=-2, 0x10=-1, 0x20=0, 0x30=+1, 0x40=+2)
13	Oscillator 2 semitone	
14	Oscillator 2 detune	
15	Oscillator 2 bend range	
16	Oscillator 2 pitch mode	
17	Oscillator 2 mod 1 source	
18	Oscillator 2 mod 1 control	
19	Oscillator 2 mod 1 amount	
20	Oscillator 2 mod 2 source	
21	Oscillator 2 mod 2 amount	
22	Oscillator 2 mod 2 quantize	
23	Oscillator 2 link	(0: off, 1: on)
24	**CHOPPER: output mod control**	**(0-39, see modifier table)**
25	Wavetable	(0-127 represents wavetables 1-128)
26	Wave 1 wave pos	(0-63)

27	Wave 1 wave phase	(0-127, 0 means free start)
28	Wave 1 start mod source	(0-**39**, see modifier table)
29	Wave 1 start mod amount	(0-127, represents -64...+63)
30	Wave 1 envel amount	(0-127, represents -64...+63)
31	Wave 1 envel velo amount	(0-127, represents -64...+63)
32	Wave 1 kb tracking	(0-127, represents -64...+63)
33	Wave 1 kb center	(0-127, represents C-2...G9)
34	Wave 1 mod 1 source	(0-**39**, see modifier table)
35	Wave 1 mod 1 control	(0-**39**, see modifier table)
36	Wave 1 mod 1 amount	(0-127, represents -64...+63)
37	Wave 1 mod 2 source	(0-**39**, see modifier table)
38	Wave 1 mod 2 amount	(0-127, represents -64...+63)
39	Wave 1 mod 2 quantize	(0-7)
40	Wave 1 stepped/smooth	(0: stepped, 1: smooth)
41	**CHOPPER: rate mod source**	**(0-39, see modifier table)**
42	Wave 2 startwave	
43	Wave 2 wave phase	
44	Wave 2 start mod source	
45	Wave 2 start mod amount	
46	Wave 2 envelope amount	
47	Wave 2 envelope velo amount	
48	Wave 2 keytrack	
49	Wave 2 keycenter	
50	Wave 2 mod 1 source	
51	Wave 2 mod 1 control	
52	Wave 2 mod 1 amount	
53	Wave 2 mod 2 source	
54	Wave 2 mod 2 amount	
55	Wave 2 mod 2 quantize	
56	Wave 2 stepped/smooth	
57	Wave 2 link	(0: off, 1: on)
58	**CHOPPER: output mod amount**	**(0-127, represents -64...+63)**
59	Wave 1 volume	(0-112, in steps of 16, => 0-7)
60	Wave 2 volume	(0-112, in steps of 16, => 0-7)
61	Noise volume	(0-112, in steps of 16, => 0-7)
62	Wave 1 volume mod source	(0-**39**, see modifier table)
63	Wave 1 volume mod amount	(8-120 in steps of 8, => -7...+7)
64	Wave 2 volume mod source	(0-**39**, see modifier table)
65	Wave 2 volume mod amount	(8-120 in steps of 8, => -7...+7)
66	Noise volume mod source	(0-**39**, see modifier table)
67	Noise volume mod amount	(8-120 in steps of 8, => -7...+7)
68	Amplifier envelope amount	(0-127, represents -64...+63)
69	Amplifier envelope velocity amount	(0-127, => -64...+63)
70	Amplifier keytrack	(0-127, represents -64...+63)
71	Amplifier keycenter	(0-127, represents C-2...G9)
72	Amplifier mod 1 source	(0-**39**, see modifier table)
73	Amplifier mod 1 control	(0-**39**, see modifier table)
74	Amplifier mod 1 amount	(0-127, represents -64...+63)
75	Amplifier mod 2 source	(0-**39**, see modifier table)
76	Amplifier mod 2 amount	(0-127, represents -64...+63)
77	**CHOPPER: output mod source**	**(0-39, see modifier table)**
78	Filter mode	(0: lowpass, 1: Highpass, 2: Bandpass, 3: Dual)
79	Lowpass filter frequency	(0-127)
80	Filter resonance	(0-127)
81	Filter envelope amount	(0-127, represents -64...+63)
82	Filter velocity amount	(0-127, represents -64...+63)
83	Filter keytrack	(0-127, represents -64...+63)
84	Filter keycenter	(0-127, represents C-2...G9)
85	Filter mod 1 source	(0-**39**, see modifier table)
86	Filter mod 1 control	(0-**39**, see modifier table)
87	Filter mod 1 amount	(0-127, represents -64...+63)
88	Filter mod 2 source	(0-**39**, see modifier table)
89	Filter mod 2 amount	(0-127, represents -64...+63)
90	Filter resonance mod source	(0-**39**, see modifier table)

91	Filter resonance mod control	(0**-39**, see modifier table)
92	Filter resonance mod amount	(0-127, represents -64...+63)
93	Dual mode highpass frq	(0-127)
94	Dual mode highpass envelope select	(0: Amp, 1:Filter, 2: Wave, 1: Free)
95	Dual mode highpass envelope amount	(0-127, represents -64...+63)
96	Dual mode highpass velocity amount	(0-127, represents -64...+63)
97	Dual mode highpass keytrack	(0-127, represents -64...+63)
98	Dual mode highpass keycenter	(0-127, represents C-2...G9)
99	Dual mode highpass mod 1 source	(0**-39**, see modifier table)
100	Dual mode highpass mod 1 control	(0**-39**, see modifier table)
101	Dual mode highpass mod 1 amount	(0-127, represents -64...+63)
102	Dual mode highpass mod 2 source	(0**-39**, see modifier table)
103	Dual mode highpass mod 2 amount	(0-127, represents -64...+63)
104	Bandpass filter bandwidth	(0-127)
105	**CHOPPER: rate mod amount**	**(0-127, represents -64...+63)**
106	Amplifier envelope attack	(0-127)
107	Amplifier envelope decay	(0-127)
108	Amplifier envelope sustain	(0-127)
109	Amplifier envelope release	(0-127)
110	Amplifier envelope attack mod source	(0**-39**, see modifier table)
111	Amplifier envelope attack mod amount	(0-127, represents -64...+63)
112	Amplifier envelope decay mod source	(0**-39**, see modifier table)
113	Amplifier envelope decay mod amount	(0-127, represents -64...+63)
114	Amplifier envelope sustain mod source	(0**-39**, see modifier table)
115	Amplifier envelope sustain mod amount	(0-127, represents -64...+63)
116	Amplifier envelope release mod source	(0**-39**, see modifier table)
117	Amplifier envelope release mod amount	(0-127, represents -64...+63)
118	**CHOPPER: Sync Mode**	**(0=free; 1=MIDI; 2=MIDI-Beat; 3=LFO1; 4=LFO2 8=Voice Sync; 16=Retrig; 32=Step8; 64=Step16 Bit 0-2 = fix values Bit 3-6 = combinations (ORed with fix values) Bit 7 = 0 e.g. 0b01011011 = 0x5B => step16 = set + (0bx1xxxxx) step8 = not set + (0bxx0xxxxx) retrig = set + (0bxxx1xxxx) voice sync = set + (0bxxxx1xxx) Sync mode = LFO1 (0bxxxxx011))**
119	Filter envelope delay	(0-127)
120	Filter envelope attack	(0-127)
121	Filter envelope decay	(0-127)
122	Filter envelope sustain	(0-127)
123	Filter envelope release	(0-127)
124	**CHOPPER: Steps 9-15 On/Off**	**(bitwise on of 0x00...0x7F)**
125	**CHOPPER: Steps 9-7 On/Off**	**(bitwise on of 0x00...0x7F)**
126	Filter envelope attack mod source	(0**-39**, see modifier table)
127	Filter envelope attack mod amount	(0-127, represents -64...+63)
128	Filter envelope decay mod source	(0**-39**, see modifier table)
129	Filter envelope decay mod amount	(0-127, represents -64...+63)
130	Filter envelope sustain mod source	(0**-39**, see modifier table)
131	Filter envelope sustain mod amount	(0-127, represents -64...+63)
132	Filter envelope release mod source	(0**-39**, see modifier table)
133	Filter envelope release mod amount	(0-127, represents -64...+63)
134	**CHOPPER: Endstep**	**(1-16)**
135	Wave envelope time 1	(0-127)
136	Wave envelope level 1	(0-127)
137	Wave envelope time 2	(0-127)
138	Wave envelope level 2	(0-127)
139	Wave envelope time 3	(0-127)
140	Wave envelope level 3	(0-127)
141	Wave envelope time 4	(0-127)
142	Wave envelope level 4	(0-127)
143	Wave envelope time 5	(0-127)
144	Wave envelope level 5	(0-127)
145	Wave envelope time 6	(0-127)

146	Wave envelope level 6	(0-127)
147	Wave envelope time 7	(0-127)
148	Wave envelope level 7	(0-127)
149	Wave envelope time 8	(0-127)
150	Wave envelope level 8	(0-127)
151	Wave envelope time mod source	(0-**39**, see modifier table)
152	Wave envelope time mod amount	(0-127, represents -64...+63)
153	Wave envelope level mod source	(0-**39**, see modifier table)
154	Wave envelope level mod amount	(0-127, represents -64...+63)
155	Wave envelope key off point	(0-7 represents point 1-8)
156	Wave envelope loop start point	(0-7 represents point 1-8)
157	Wave envelope loop on/off	(0: off,1: on)
158	**CHOPPER: Speed Rate**	**(0-127)**
159	Free envelope time 1	(0-127)
160	Free envelope level 1	(0-127, represents -64...+63)
161	Free envelope time 2	(0-127)
162	Free envelope level 2	(0-127, represents -64...+63)
163	Free envelope time 3	(0-127)
164	Free envelope level 3	(0-127, represents -64...+63)
165	Free envelope time 4	(0-127)
166	Free envelope level 4	(0-127, represents -64...+63)
167	Free envelope time mod source	(0-**39**, see modifier table)
168	Free envelope time mod amount	(0-127, represents -64...+63)
169	Free envelope level mod source	(0-**39**, see modifier table)
170	Free envelope level mod amount	(0-127, represents -64...+63)
171	Free envelope zero axis	(0-127, represents -64...+63)
172	Lfo 1 rate	(0-127)
173	Lfo 1 shape	(0: sine, 1:tri, 2: saw,3: pulse,4: rnd, 5: S&H)
174	Lfo 1 symmetry	(0-127, represents -64...+63)
175	Lfo 1 humanize	(0-7)
176	Lfo 1 rate mod source	(0-**39**, see modifier table)
177	Lfo 1 rate mod amount	(0-127, represents -64...+63)
178	Lfo 1 level mod source	(0-**39**, see modifier table)
179	Lfo 1 level mod control	(0-**39**, see modifier table)
180	Lfo 1 level mod amount	(0-127, represents -64...+63)
181	Lfo 1 sync	(0: off, 1: Sync, 2: Retrig)
182	Lfo 2 rate	
183	Lfo 2 shape	
184	Lfo 2 symmetry	
185	Lfo 2 humanize	
186	Lfo 2 rate mod source	
187	Lfo 2 rate mod amount	
188	Lfo 2 level mod source	
189	Lfo 2 level mod control	
190	Lfo 2 level mod amount	
191	Lfo 2 sync	
192	Control ramp trigger source	(0-**39**, see modifier table)
193	Control ramp rate	(0-127, represents -64...+63)
194	Panning source 1	(0-**39**, see modifier table)
195	Panning control 1	(0-**39**, see modifier table)
196	Panning amount 1	(0-127, represents -64...+63)
197	Panning source 2	(0-**39**, see modifier table)
198	Panning amount 2	(0-127, represents -64...+63)
199	Control comparator source	(0-**39**, see modifier table)
200	Control comparator threshold	(0-127, represents -64...+63)
201	Control mixer source 1	(0-**39**, see modifier table)
202	Control mixer amount 1	(0-127, represents -64...+63)
203	Control mixer source 2	(0-**39**, see modifier table)
204	Control mixer amount 2	(0-127, represents -64...+63)
205	Control mixer source 2	(0-**39**, see modifier table)
206	Control mixer amount 2	(0-127, represents -64...+63)
207	Control delay source	(0-**39**, see modifier table)
208	Control delay time	(0-127)
209	Control delay t mod source	(0-**39**, see modifier table)
210	Control delay t mod amount	(0-127, represents -64...+63)

211	Control shaper source	(0-**39**, see modifier table)
212	Control shaper ref point 1	(0-127, represents -64...+63)
213	Control shaper ref point 2	(0-127, represents -64...+63)
214	Control shaper ref point 3	(0-127, represents -64...+63)
215	Control shaper ref point 4	(0-127, represents -64...+63)
216	Control shaper ref point 5	(0-127, represents -64...+63)
217	Control shaper ref point 6	(0-127, represents -64...+63)
218	Control shaper ref point 7	(0-127, represents -64...+63)
219	Control shaper ref point 8	(0-127, represents -64...+63)
220	Control shaper ref point 9	(0-127, represents -64...+63)
221	Sample & hold source	(0-**39**, see modifier table)
222	Sample & hold rate	(0-127)
223	Sample & hold rate mod source	(0-**39**, see modifier table)
224	Sample & hold rate mod amount	(0-127, represents -64...+63)
225	**LFO1 phase shift**	**(0-90, represents off-360 step of 4)**
226	Aux level mod source	(0-**39**, see modifier table)
227	Aux level mod control	(0-**39**, see modifier table)
228	Aux level mod amount	(0-127, represents -64...+63)
229	Aux level min	(0-127)
230	**LFO2 MIDI Sync**	**(0=no Sync; 1= MIDI Sync; 2= MIDI Beat Sync)**
231	**LFO1 MIDI Sync**	**(0=no Sync; 1= MIDI Sync; 2= MIDI Beat Sync)**
232	**LFO2 phase shift**	**(0-90, represents off-360 step of 4)**
233	Glide mode	(1: Porta, 2: Gliss.,3: MIDIPorta, 4: MIDIGliss., 5: Fingered Porta, 6: Fingered Glissando)
234	Glide rate	(0-127)
235	Glide slope	(0: Time, 1: Distance)
236	Glide time mod source	(0-**39**, see modifier table)
237	Glide time mod amount	(0-127, represents -64...+63)
238	Glide on/off	(0: off, 1: on)
239	Valid flag	(0x55)
240-255	Name	(ASCII)

Modifier table:

Index	Modifier
0	Lfo 1
1	Lfo 2
2	Volume Envelope
3	Filter Emvelope
4	Wave Envelope
5	Free Envelope
6	Ctrl Ramp
7	Ctrl Mixer
8	Ctrl Delay
9	Ctrl Shaper
10	Ctrl Sample & Hold
11	Comparator Pos
12	Comparator Neg
13	Keytrack
14	Velocity
15	Release Velocity
16	Channel Pressure
17	Poly Pressure
18	Playspeed
19	More Keys
20	Less Keys
21	Pitch Bend
22	Modwheel
23	Free Wheel Up
24	Free Wheel Down
25	Free Wheel Bipolar
26	Sustain
27	Pedal 1
28	Pedal 2

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29      Button 1
30      Button 2
31      Volume Ctrl (7)
32      Pan Ctrl
33      Breath Control
34      Control X
35      Control Y
36      Midi Clock
37      Minimum
38      Maximum
39      Chopper (LFO3)
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3.b) SARR (Performance Dump)

Format :

SYSX	1	0xF0
WALDORF	1	0x3E
WAVE ID	1	0x03
DEVICE ID	1	according to global parameter <Device Number>
MESSAGE ID	1	0x01 (SARR)
LOCATION	2	Bank and performance number Byte 0: Bank number, 0: bank A, 1: bank B Byte 1: Performance number 0-127 according to Performances 1-128
DATA	512	Performance data (see description below)
CHKSUM	1	sum of all bytes of DATA and LOCATION, truncted to 7 bit
EOX	1	0xF7

Format of Performance data :

Byte	description	
0	Instruments master volume	(0-127)
1	Externals master volume	(0-127)
2	Free wheel up	(MIDI controllers 0-100)
3	Free wheel down	(MIDI controllers 0-100)
4	Button 1	(MIDI controllers 0-100)
5	Button 2	(MIDI controllers 0-100)
6	Button 1 mode	(0: touch, 1: toggle)
7	Button 2 mode	(0: touch, 1: toggle)
8	Fader 1 assign	(0-15, 0-7: instr. 1-8, 8-15: external 1-8)
9	Fader 1 control	(0-127, see Fader control table)
10	Fader 2 assign	(0-15, 0-7: instr. 1-8, 8-15: external 1-8)
11	Fader 2 control	(0-127, see Fader control table)
12	Fader 3 assign	(0-15, 0-7: instr. 1-8, 8-15: external 1-8)
13	Fader 3 control	(0-127, see Fader control table)
14	Fader 4 assign	(0-15, 0-7: instr. 1-8, 8-15: external 1-8)
15	Fader 4 control	(0-127, see Fader control table)
16	Fader 5 assign	(0-15, 0-7: instr. 1-8, 8-15: external 1-8)
17	Fader 5 control	(0-127, see Fader control table)
18	Fader 6 assign	(0-15, 0-7: instr. 1-8, 8-15: external 1-8)
19	Fader 6 control	(0-127, see Fader control table)
20	Fader 7 assign	(0-15, 0-7: instr. 1-8, 8-15: external 1-8)
21	Fader 7 control	(0-127, see Fader control table)
22	Fader 8 assign	(0-15, 0-7: instr. 1-8, 8-15: external 1-8)
23	Fader 8 control	(0-127, see Fader control table)
24	Main edit active instrument number	(0-7: instr. 1-8)
25	unused	
26	Pedal 1 MIDI controller	(0-120)
27	Pedal 2 MIDI controller	(0-120)
28	Controller X	(0-120)
29	Controller Y	(0-120)
30	Aux master Volume	(0-127)
31	unused	
32-47	Multi program name	(ASCII)
48	Valid flag	(0x55)
49-63	unused	
64-95	Instrument 1 data	(see Instrument data description)
96-127	Instrument 2 data	(see Instrument data description)
128-159	Instrument 3 data	(see Instrument data description)
160-191	Instrument 4 data	(see Instrument data description)
192-123	Instrument 5 data	(see Instrument data description)
224-255	Instrument 6 data	(see Instrument data description)
256-287	Instrument 7 data	(see Instrument data description)
288-319	Instrument 8 data	(see Instrument data description)
320-343	External 1 data	(see External data description)
344-367	External 2 data	(see External data description)
368-391	External 3 data	(see External data description)
392-415	External 4 data	(see External data description)
416-439	External 5 data	(see External data description)
440-463	External 6 data	(see External data description)
464-487	External 7 data	(see External data description)
488-511	External 8 data	(see External data description)

Format of Instrument Data:

Byte	description	
0	Sound number	(0-127 represents 1-128)
1	Sound Bank	(0: bank A, 1: bank B)
2	Midi Channel	(0-16, 0: Base,)
3	Source	(0: Off, 1: Keys, 2: Midi, 3: Mix)
4	Volume	(0-127)
5	Pan	(0-127, represents -64...+63)
6	Pan Mode	(0: off, 1: on, 2: inverse)
7	Aux Volume	(0-127)
8	unused	
9	Transpose offset	(4-124, represents -60...+60)
10	Detune	(14-114, represents -50...+50)
11	MIDI Output Port	(0: off,1: A, 2: B,3: A+B)
12	Audio Routing	(1-4, 1: Aux only, 2: main, 3: sub 1, 4: sub 2)
13	Status	(0: On/Solo, 1:Mute)
14	Edit Enable	(0: off, 1:on)
15	Voice Allocation Mode	(0-22, 0: dynamic,1-16: poly1-16, 17: last retr, 18: low retr, 19: high retr, 20: last single, 21: low single, 22: high single trigger)
16	Audio Input	(0-4, 0: off, 1-4: Input 1-4)
17	Key Limit Low	(0-127, represents C-2...G9)
18	Key Limit High	(0-127, represents C-2...G9)
19	Velocity Limit Low	(1-127)
20	Velocity Limit High	(1-127)
21	Velocity Table	(0-11, 0:global, 1:lin+, 2:lin-, 3:exp+, 4:exp-, 5:xfade+, 6:xfade-, 7:full, 8-11:user1-user4)
22	Temperment	(0-11, 0: global, 1: lin+, 2: hmt, 3: lin-, 4-7: rand1-rand4, 8-11: user1-user4)
23	unused	
24	Midi Filters Bitvector (bit set = on, bit cleared = off)	

Bit	Switch
0	Prog. Change on/off
1	Pitch Wheel on/off
2	Modwheel on/off
3	After Touch on/off
4	Volume Ctrl on/off
5	Sustain Pedal on/off
6	Panning Ctrl on/off
7	Always cleared

25-31	unused	

Format of External Data:

Byte	description	
0	Program number	(0-127)
1	Bank	(0: bank A, 1: bank B)
2	Channel	(0-16, 0: base)
3	Volume	(0-127)
4	Panning	(0-127, 0:off, 1-127 => l63 - r63)
5	Modwheel scale	(13-114, 13: off, 14-114 => -200%...+200%)
6	Pitchbend scale	(13-114, 13: off, 14-114 => -200%...+200%)
7	Transpose offset	(4-124, represents -60...+60)
8	Detune	(14-114, represents -50...+50)
9	MIDI Output Port	(0: off,1: A, 2: B,3: A+B)
10	Status	(0: On/Solo, 1:Mute)
11	unused	
12	Key Limit Low	(0-127, represents C-2...G9)
13	Key Limit High	(0-127, represents C-2...G9)
14	Velocity Limit Low	(1-127)
15	Velocity Limit High	(1-127)
16	Velocity Table	(0-11, 0:global, 1:lin+, 2:lin-, 3:exp+, 4:exp-, 5:xfade+, 6:xfade-, 7:full, 8-11:user1-user4)
17	unused	
18	Midi Filters Bitvector	(bit set = on, bit cleared = off)

Bit	Switch

```
        0     Prog. Change  on/off
        1     Free  Wheel   on/off
        2     Buttons       on/off
        3     Aftertouch    on/off
        4     Pedal 1       on/off
        5     Pedal 2       on/off
        6     Sustain Pedal on/off
        7     Always cleared
        --------------------------
19      Keys on/off
20-23   unused
-------------------------------------------------------------------------------
```

3.c) SWAVE (Wave Data Dump)

Format :

SYSX	1	0xF0
WALDORF	1	0x3E
WAVE ID	1	0x03
DEVICE ID	1	according to global parameter <Device Number>
MESSAGE ID	1	0x02 (SWAVE)
LOCATION	4	Wave number in format WORD (0 - 1299)
DATA	128	64 Wavesamples in format BYTE
CHKSUM	1	sum of all bytes of DATA and LOCATION, truncted to 7 bit
EOX	1	0xF7

3.d) SWTBL (Wavetable Dump)

Format :

SYSX	1	0xF0
WALDORF	1	0x3E
WAVE ID	1	0x03
DEVICE ID	1	according to global parameter <Device Number>
MESSAGE ID	1	0x03 (SWTB)
LOCATION	1	Wavetable number (64-127)
DATA	276	Wave control table (see description below)
CHKSUM	1	sum of all bytes of DATA and LOCATION, truncted to 7 bit
EOX	1	0xF7

Wave control table format :

Byte	description
0-8	Wavetable Name (ASCII)
9	valid flag (0x55)
10-275	64 Wavenumbers in format WORD. If a Wavenumber is not in the range from 0 to 1299, this waveposition will be interpolated between the previous and the following defined position except for the last three positions, which then will become a tri, saw and a square wave.

*** Important Note ! ***

Anytime a Wave control table is dumped, all user Waves used by this table will be dumped too.

3.e) SVT (Velocity curve Dump)

Format :

SYSX	1	0xF0
WALDORF	1	0x3E
WAVE ID	1	0x03
DEVICE ID	1	according to global parameter <Device Number>
MESSAGE ID	1	0x04 (SVT)
LOCATION	1	Velocity curve number (0-3, represents curve 1-4)
DATA	128	Value for each incoming Velocity (1-127)
CHKSUM	1	sum of all bytes of DATA and LOCATION, truncted to 7 bit
EOX	1	0xF7

3.f) STT (Tuning table Dump)

Format :

SYSX	1	0xF0
WALDORF	1	0x3E
WAVE ID	1	0x03
DEVICE ID	1	according to global parameter <Device Number>
MESSAGE ID	1	0x05 (STT)
LOCATION	1	Tuning table number (0-3, represents tables 1-4)
DATA	256	128 entries for MIDI keys 0-127, each entry consists of one byte defining the note (0-127, represents C-2...G9) and one byte defining detune (14-114 represents -50...+50)
CHKSUM	1	sum of all bytes of DATA and LOCATION, truncted to 7 bit
EOX	1	0xF7

3.g) SGLB (Global Parameter Dump)

Format :

SYSX	1	0xF0
WALDORF	1	0x3E
WAVE ID	1	0x03
DEVICE ID	1	according to global parameter <Device Number>
MESSAGE ID	1	0x06 (SGLB)
LOCATION	0	
DATA	384	Global Parameters (see table)
CHKSUM	1	sum of all bytes of DATA and LOCATION, truncted to 7 bit
EOX	1	0xF7

Description of Global Parameters :

Byte	description	
0	global stereo width	(0-127 represents l63 - r64)
1	master tune	(14-114 represents -50...+50)
2	global bend range	(16-112 in steps of 4, represents -12...+12)
3	global Tuning table	(0-3 represents table 1-4)
4	global Velocity cuve	(0-3 represents curve 1-4)
5	program change voice mode	(0: ring, 1: shut)
6	performance program change map on/off	(0: off, 1: on)
7	sound program change map on/off	(0: off, 1: on)
8	local on/off	(0: off, 1: on)
9	panel transmit	(0: off, 1: on)
10	unused	
11	System Volume to Externals	(0: off, 1: on)
12	Display mode	(0: normal, 1: inverse)
13	Base channel	(0-16, 0: omni)
14	unused	
15	Device Number	(0-127, 127 means all units)
16	unused	
17	unused	
18	System volume	(0-127)
19	Bank switch receive	(0: off, 1: on)
20	Display Knobs mode	(0: Icon, 1: Text)
21	Send Active Sensing	(0: off, 1: on)
22	Transmit Running Status	(0: off, 1: on)
23	unused	
24	unused	
25	Keyboard shift	(52: octave down, 64: normal, 76: oct. up)
26	Global Parameters Valid flag	(0x55)
27	Show SysEx changes	(0: off, 1: on)
28	Pedal 1 polarity	(0: closing switch, 1: opening switch)
29	Glide window length	(0-10)
30	HMT mode	(0-15, see HMT mode table
31	HMT Scale	(0-10)
32	Bank number	(0: A, 1: B)
33	Pedal 2 polarity	(0: closing switch, 1: opening switch)
34	Pedal 3 polarity	(0: closing switch, 1: opening switch)
35	System Exclusive MIDI out port	(0: off, 1: A, 2: B)
36-63	unused	
64-383	32 MIDI Channel Names, first 16 for Port A, each name consists	

of 9 ASCII characters and a terminating 0.

HMT mode table:

Value	Description
0	Standard
1	Standard with natural 7th
2	Horizontal
3	C major / A minor
4	G major / E minor #
5	D major / B minor ##
6	A major / F# minor ###
7	E major / C# minor ####
8	B major / G# minor #####
9	F# major / D# minor ######
10	Gb major / Eb minor bbbbbb (same as F# major / D# minor)
11	Db major / Bb minor bbbbb
12	Ab major / F minor bbbb
13	Eb major / C minor bbb
14	Bb major / G minor bb
15	F major / d minor b

3.h) SARRMAP (Performance Program Change Map Dump)

Format :

SYSX	1	0xF0
WALDORF	1	0x3E
WAVE ID	1	0x03
DEVICE ID	1	according to global parameter <Device Number>
MESSAGE ID	1	0x07 (SARRMAP)
LOCATION	0	
DATA	256	128 entries for Program change 1-128, each entry consists of one byte defining the Bank (0: A, 1: B) and one byte defining the Performance number (0-127 represents 1-128)
CHKSUM	1	sum of all bytes of DATA and LOCATION, truncted to 7 bit
EOX	1	0xF7

3.i) SBPRMAP (Sound Program Change Map Dump)

Format :

SYSX	1	0xF0
WALDORF	1	0x3E
WAVE ID	1	0x03
DEVICE ID	1	according to global parameter <Device Number>
MESSAGE ID	1	0x08 (SBPRMAP)
LOCATION	0	
DATA	256	128 entries for Program change 1-128, each entry consists of one byte defining the Bank (0: A, 1: B) and one byte defining the Sound number (0-127 represents 1-128)
CHKSUM	1	sum of all bytes of DATA and LOCATION, truncted to 7 bit
EOX	1	0xF7

3.k) SBPRPAR (Sound parameter Dump)

Format #1: **all, except parameter 118, 124, 125**

SYSX	1	0xF0
WALDORF	1	0x3E
WAVE ID	1	0x03
DEVICE ID	1	according to global parameter <Device Number>
MESSAGE ID	1	0x09 (SBPRPAR)
LOCATION	3	byte 0 : instrument number (0-7, represents 1-8) byte 1-2 : offset of parameter (see Sound Dump format) in format BYTE (0-255)
DATA	1	New value of parameter defined by location
CHKSUM	1	sum of all bytes of DATA and LOCATION, truncted to 7 bit
EOX	1	0xF7

Format #2: Special for CHOPPER Bytes (118, 124, 125) which requires Bit Set functionality

SYSX	**1**	**0xF0**
WALDORF	**1**	**0x3E**
WAVE ID	**1**	**0x03**
DEVICE ID	**1**	**according to global parameter <Device Number>**
MESSAGE ID	**1**	**0x09 (SBPRPAR)**
LOCATION	**3**	**byte 0 : instrument number (0-7, represents 1-8)** **byte 1-2 : offset of parameter (see Sound Dump format) in format BYTE (0-255)**
DATA	**2**	**byte 0 : Bit Position (0-7)** **byte 1 : Bit Function (0 = clear; 1 = set; 2 = toggle) Value (0=free; 1=MIDI; 2=MIDI-Beat; 3=LFO1; 4=LFO2) => for SyncMode Bit Position 0-2 only (see Parameter offset 118 CHOPPER: Sync Mode)**
CHKSUM	**1**	**sum of all bytes of DATA and LOCATION, truncted to 7 bit**
EOX	**1**	**0xF7**

3.l) SARRPAR (Performance parameter Dump)

Format :

SYSX	1	0xF0
WALDORF	1	0x3E
WAVE ID	1	0x03
DEVICE ID	1	according to global parameter <Device Number>
MESSAGE ID	1	0x0A (SARRPAR)
LOCATION	1	offset of parameter (see Performance Data format)
DATA	1	New value of parameter defined by location
CHKSUM	1	sum of all bytes of DATA and LOCATION, truncted to 7 bit
EOX	1	0xF7

3.m) SINSPAR (Instrument / External parameter Dump)

Format :

SYSX	1	0xF0
WALDORF	1	0x3E
WAVE ID	1	0x03
DEVICE ID	1	according to global parameter <Device Number>
MESSAGE ID	1	0x0B (SINSPAR)
LOCATION	2	byte 0 : instrument number (0-7, for Instruments 1-8, 8-15 for Externals 1-8) byte 1 : offset of parameter (see Inst./Ext. Data format)
DATA	1	New value of parameter defined by location
CHKSUM	1	sum of all bytes of DATA and LOCATION, truncted to 7 bit
EOX	1	0xF7

3.n) SBULK (Bulk Switch on/off)

Format :

SYSX	1	0xF0
WALDORF	1	0x3E
WAVE ID	1	0x03
DEVICE ID	1	according to global parameter <Device Number>
MESSAGE ID	1	0x0F (SBULK)
LOCATION	0	
DATA	1	0: Bulk Dump off, (default), Incoming Dumps will go to an Editbuffer, if available. 1: Bulk on, Incoming Dumps will replace the original Data.
CHKSUM	1	sum of all bytes of DATA and LOCATION, truncted to 7 bit
EOX	1	0xF7

4.) Detailed Requests

4.a) RQBPR (Soundprogram Dump Request)
Format :

SYSX	1	0xF0
WALDORF	1	0x3E
WAVE ID	1	0x03
DEVICE ID	1	See global parameter <Device Number>
MESSAGE ID	1	0x40 (RQBPR)
LOCATION	1	Instrument number
DATA	0	
CHKSUM	1	sum of all bytes of DATA and LOCATION, truncted to 7 bit
EOX	1	0xF7

4.b) RQARR (Performance Dump Request)
Format :

SYSX	1	0xF0
WALDORF	1	0x3E
WAVE ID	1	0x03
DEVICE ID	1	according to global parameter <Device Number>
MESSAGE ID	1	0x41 (RQARR)
LOCATION	2	Bank and performance number Byte 0: Bank number, 0: bank A, 1: bank B Byte 1: Performance number 0-127 according to Performances 1-128
DATA	0	
CHKSUM	1	sum of all bytes of DATA and LOCATION, truncted to 7 bit
EOX	1	0xF7

4.c) RQWAVE (Wave Data Dump Request)
Format :

SYSX	1	0xF0
WALDORF	1	0x3E
WAVE ID	1	0x03
DEVICE ID	1	according to global parameter <Device Number>
MESSAGE ID	1	0x42 (RQWAVE)
LOCATION	4	Wave number in format WORD (0 - 1299)
DATA	0	
CHKSUM	1	sum of all bytes of DATA and LOCATION, truncted to 7 bit
EOX	1	0xF7

4.d) RQWTB (Wavetable Dump Request)
Format :

SYSX	1	0xF0
WALDORF	1	0x3E
WAVE ID	1	0x03
DEVICE ID	1	according to global parameter <Device Number>
MESSAGE ID	1	0x43 (RQWTB)
LOCATION	1	Wavetable number (64-127)
DATA	0	
CHKSUM	1	sum of all bytes of DATA and LOCATION, truncted to 7 bit
EOX	1	0xF7

4.e) RQVT (Velocity curve Dump Request)

Format :

SYSX	1	0xF0
WALDORF	1	0x3E
WAVE ID	1	0x03
DEVICE ID	1	according to global parameter <Device Number>
MESSAGE ID	1	0x44 (RQVT)
LOCATION	1	Velocity curve number (0-3, represents curve 1-4)
DATA	0	
CHKSUM	1	sum of all bytes of DATA and LOCATION, truncted to 7 bit
EOX	1	0xF7

4.f) RQTT (Tuning table Dump Request)

Format :

SYSX	1	0xF0
WALDORF	1	0x3E
WAVE ID	1	0x03
DEVICE ID	1	according to global parameter <Device Number>
MESSAGE ID	1	0x45 (RQTT)
LOCATION	1	Tuning table number (0-3, represents tables 1-4)
DATA	0	
CHKSUM	1	sum of all bytes of DATA and LOCATION, truncted to 7 bit
EOX	1	0xF7

4.g) RQGLB (Global Parameter Dump Request)

Format :

SYSX	1	0xF0
WALDORF	1	0x3E
WAVE ID	1	0x03
DEVICE ID	1	according to global parameter <Device Number>
MESSAGE ID	1	0x46 (RQGLB)
LOCATION	0	
DATA	0	
CHKSUM	1	sum of all bytes of DATA and LOCATION, truncted to 7 bit
EOX	1	0xF7

4.h) RQARRMAP (Performance Program Change Map Dump Request)

Format :

SYSX	1	0xF0
WALDORF	1	0x3E
WAVE ID	1	0x03
DEVICE ID	1	according to global parameter <Device Number>
MESSAGE ID	1	0x47 (RQARRMAP)
LOCATION	0	
DATA	0	
CHKSUM	1	sum of all bytes of DATA and LOCATION, truncted to 7 bit
EOX	1	0xF7

4.i) RQBPRMAP (Sound Program Change Map Dump Request)

Format :

SYSX	1	0xF0
WALDORF	1	0x3E
WAVE ID	1	0x03
DEVICE ID	1	according to global parameter <Device Number>
MESSAGE ID	1	0x48 (RQBPRMAP)
LOCATION	0	
DATA	0	
CHKSUM	1	sum of all bytes of DATA and LOCATION, truncted to 7 bit
EOX	1	0xF7