

# Studiologic Sledge

## MIDI patch-dump content (presumed & incomplete)

Version 1.0 (2020-06-16)

### 1) IMPORTANT DISCLAIMER!

The content of this document is neither created, nor supplied nor endorsed by Studiologic or Waldorf Music, the joint manufacturers of the Sledge synthesizer. This document reflects the experience of the music community in using the instrument. None of the information herein has been officially confirmed by the companies named above. It may be incomplete or even erroneous. Anyone using this data and information does so at his/her own risk!

...so be careful!

### 2) ABOUT THIS DOCUMENT

The sound engine of the Studiologic Sledge synthesiser was designed by Waldorf Music (as clearly indicated by the Waldorf logo on the instrument) and has been widely described as a "cut down" version of the Waldorf Blofeld. Due to the strong similarity between the Sledge and the Blofeld sound engine, many users have tried to swap soundpatches between both instruments with varying degrees of success. In order to manage and manipulate patch data outside the Sledge, a detailed description of the MIDI patch-dump architecture would be beneficial, but such a spec-sheet has never been officially published.

This document describes the structure of the Sledge Patch-dump with the suspected or confirmed meaning of the data. The underlying assumption is that the Sledge patch-dump probably shares many elements with the Blofeld one. Since the Blofeld patch-dump is well documented, this was regularly used for comparison and as a clue to a potential meaning.

Where data is "confirmed", it means that this could be verified by editing a patch and comparing the patch-dumps before and after the edit. When this is not the case, data patterns across many patches and similarities with the Blofeld structure suggested an identification. Much data is still unidentified.

### 3) DATA

- SNDD Index: the line position in the Sledge patch-dump.
- Meaning: the patch parameter defined by the data.
- Sledge specs (yes/no): some data may not be editable from the Sledge front pannel but still be transmitted as a specific value in the patch dump.
- Values: the range of the MIDI data for that specific patch element (in hexadecimal format).
- Hypothesis: an indication of the degree of certainty about the meaning.

#### 4) SLEDGE PATCH DUMP STRUCTURE (presumed & incomplete)

| SNDD Index | Meaning                      | Sledge Specs | Values (hex)                                                                                      | Hypothesis          |
|------------|------------------------------|--------------|---------------------------------------------------------------------------------------------------|---------------------|
| 0          | Marks Start of Sysex         | yes          | F0                                                                                                | certain             |
| 1          | Waldorf Music ID             | yes          | 3E                                                                                                | certain             |
| 2          | Sledge ID                    | yes          | 15                                                                                                | certain             |
| 3          | Device ID                    | yes          | 00                                                                                                | certain             |
| 4          | SNDD (Sound Dump)            | yes          | 10                                                                                                | certain             |
| 5          | Patch Location (Midi Bank#)  | yes          | 00-7F                                                                                             | certain             |
| 6          | Patch Location (Midi Patch#) | yes          | 00-7F                                                                                             | certain             |
| 7          | still unknown                |              |                                                                                                   | not yet             |
| 8          | Osc 1 Octave, in steps of 12 | yes          | 1C = 64' / 28 = 28' / 34 = 16' / 40 = 8' / 4C = 4' / 58 = 2'                                      | certain             |
| 9          | OSC 1 Semitone               | yes          | 34 to 4C (-12 to +12 semitones)                                                                   | certain             |
| 10         | still unknown                |              |                                                                                                   | not yet             |
| 11         | Osc 1 Bend Range             | no           | 42 (pitch bend: + 2)                                                                              | probably as Blofeld |
| 12         | Osc 1 Keytrack               | no           | 60                                                                                                | probably as Blofeld |
| 13         | Osc 1 FM Source              | no           | 00 = off                                                                                          | probably as Blofeld |
| 14         | still unknown                |              |                                                                                                   | not yet             |
| 15         | OSC 1 Shape                  | yes          | 00 = pulse / 01 = var pulse / 02 = saw / 03 = triangle / 04 = sine / 05 = wavetable / 06 = sample | certain             |
| 16         | Osc 1 Pulsewidth (Wave)      | yes          | 00 to 7F                                                                                          | certain             |
| 17         | still unknown                |              |                                                                                                   | not yet             |
| 18         | still unknown                |              |                                                                                                   | not yet             |
| 19         | still unknown                |              |                                                                                                   | not yet             |
| 20         | still unknown                |              |                                                                                                   | not yet             |
| 21         | OSC 1 Wavetable / Sample     | yes          | 00 to 41                                                                                          | certain             |
| 22         | still unknown                |              |                                                                                                   | not yet             |
| 23         | still unknown                |              |                                                                                                   | not yet             |
| 24         | Osc 2 Octave, in steps of 12 | yes          | 1C = 64' / 28 = 28' / 34 = 16' / 40 = 8' / 4C = 4' / 58 = 2'                                      | certain             |
| 25         | OSC 2 Semitone               | yes          | 34 to 4C (-12 to +12 semitones)                                                                   | certain             |
| 26         | OSC 2 Detune                 | yes          | 00 - 7F                                                                                           | certain             |
| 27         | Osc 2 Bend Range             | no           | 42 (pitch bend: + 2)                                                                              | probably as Blofeld |
| 28         | Osc 2 Keytrack               | no           | 60                                                                                                | probably as Blofeld |
| 29         | Osc 2 FM Source              | no           | 01 = OSC 1 (fixed on Sledge)                                                                      | probably as Blofeld |
| 30         | still unknown                |              |                                                                                                   | not yet             |
| 31         | OSC 2 Shape                  | yes          | 00 = pulse / 01 = var pulse / 02 = saw / 03 = triangle / 04 = sine / 05 = wavetable / 06 = sample | certain             |
| 32         | Osc 2 Pulsewidth             | yes          | 00 to 7F                                                                                          | certain             |
| 33         | still unknown                |              |                                                                                                   | not yet             |
| 34         | still unknown                |              |                                                                                                   | not yet             |
| 35         | still unknown                |              |                                                                                                   | not yet             |

|    |                              |     |                                                                                                   |                     |
|----|------------------------------|-----|---------------------------------------------------------------------------------------------------|---------------------|
| 36 | still unknown                |     |                                                                                                   | not yet             |
| 37 | still unknown                |     |                                                                                                   | not yet             |
| 38 | still unknown                |     |                                                                                                   | not yet             |
| 39 | still unknown                |     |                                                                                                   | not yet             |
| 40 | Osc 3 Octave, in steps of 12 | yes | $1C = 64' / 28 = 28' / 34 = 16' / 40 = 8' / 4C = 4' / 58 = 2'$                                    | certain             |
| 41 | OSC 3 Semitone               | yes | 34 to 4C (-12 to +12 semitones)                                                                   | certain             |
| 42 | OSC 3 Detune                 | yes | 00 - 7F                                                                                           | certain             |
| 43 | Osc 3 Bend Range             | no  | 42 (pitch bend: + 2)                                                                              | probably as Blofeld |
| 44 | Osc 3 Keytrack               | no  | 60                                                                                                | probably as Blofeld |
| 45 | Osc 3 FM Source              | no  | 02 = OSC 2 (fixed on Sledge)                                                                      | probably as Blofeld |
| 46 | still unknown                |     |                                                                                                   | not yet             |
| 47 | OSC 3 Shape                  | yes | 00 = pulse / 01 = var pulse / 02 = saw / 03 = triangle / 04 = sine / 05 = wavetable / 06 = sample | certain             |
| 48 | Osc 3 Pulsewidth             | yes | 00 to 7F                                                                                          | certain             |
| 49 | still unknown                |     |                                                                                                   | not yet             |
| 50 | still unknown                |     |                                                                                                   | not yet             |
| 51 | still unknown                |     |                                                                                                   | not yet             |
| 52 | still unknown                |     |                                                                                                   | not yet             |
| 53 | still unknown                |     |                                                                                                   | not yet             |
| 54 | still unknown                |     |                                                                                                   | not yet             |
| 55 | still unknown                |     |                                                                                                   | not yet             |
| 56 | SYNC OSC 2 to OSC 3          | yes | 00 = off / 01 = on                                                                                | certain             |
| 57 | still unknown                |     |                                                                                                   | not yet             |
| 58 | still unknown                |     |                                                                                                   | not yet             |
| 59 | still unknown                |     |                                                                                                   | not yet             |
| 60 | Glide                        | yes | 00 = off / 01 = on                                                                                | certain             |
| 61 | still unknown                |     |                                                                                                   | not yet             |
| 62 | still unknown                |     |                                                                                                   | not yet             |
| 63 | still unknown                |     |                                                                                                   | not yet             |
| 64 | Glide Rate                   | yes | 00 to 7F                                                                                          | certain             |
| 65 | Allocation Mode (Mono)       | yes | 00 = poly / 01 = mono                                                                             | certain             |
| 66 | still unknown                |     |                                                                                                   | not yet             |
| 67 | still unknown                |     |                                                                                                   | not yet             |
| 68 | Mixer Osc 1 Level            | yes | 00 - 7F                                                                                           | certain             |
| 69 | Mixer Osc 1 - on/off         | yes | 00 = off / 01 = on                                                                                | certain             |
| 70 | Mixer Osc 2 Level            | yes | 00 - 7F                                                                                           | certain             |
| 71 | Mixer Osc 2 - on/off         | yes | 00 = off / 01 = on                                                                                | certain             |
| 72 | Mixer Osc 3 Level            | yes | 00 - 7F                                                                                           | certain             |
| 73 | Mixer Osc 3 - on/off         | yes | 00 = off / 01 = on                                                                                | certain             |
| 74 | Mixer Noise Level            | yes | 00 to 7F                                                                                          | certain             |
| 75 | Mixer Noise - on/off         | yes | 00 = off / 01 = on                                                                                | certain             |
| 76 | Mixer Noise Colour           | yes | 14 = pink noise / 64 = white noise                                                                | certain             |
| 77 | still unknown                |     |                                                                                                   | not yet             |
| 78 | still unknown                |     |                                                                                                   | not yet             |
| 79 | still unknown                |     |                                                                                                   | not yet             |
| 80 | still unknown                |     |                                                                                                   | not yet             |

|     |                                                 |     |                                                                                             |                     |
|-----|-------------------------------------------------|-----|---------------------------------------------------------------------------------------------|---------------------|
| 81  | still unknown                                   |     |                                                                                             | not yet             |
| 82  | still unknown                                   |     |                                                                                             | not yet             |
| 83  | still unknown                                   |     |                                                                                             | not yet             |
| 84  | Filter Type                                     | yes | 01 = LP/24dB / 02 = LP/12dB / 03 = BP/24dB / 04 = BP/12dB / 05 = HP/24dB / 06 = HP/12dB / = | certain             |
| 85  | Filter Cutoff                                   | yes | 00 to 7F                                                                                    | certain             |
| 86  | still unknown                                   |     |                                                                                             | not yet             |
| 87  | Filter Resonance                                | yes | 00 to 7F                                                                                    | certain             |
| 88  | Filter Drive                                    | yes | 00 to 7F                                                                                    | certain             |
| 89  | still unknown                                   |     |                                                                                             | not yet             |
| 90  | still unknown                                   |     |                                                                                             | not yet             |
| 91  | still unknown                                   |     |                                                                                             | not yet             |
| 92  | still unknown                                   |     |                                                                                             | not yet             |
| 93  | Filter Keytrack                                 | yes | 00 to 7F                                                                                    | certain             |
| 94  | Filter Env amount                               | yes | 00 to 7F                                                                                    | certain             |
| 95  | Filter Env Velocity                             | no  | 40 (centered)                                                                               | probably as Blofeld |
| 96  | Filter Mod Source                               | no  | 00 = off                                                                                    | probably as Blofeld |
| 97  | Filter Mod Amount                               | no  | 40 (centered)                                                                               | probably as Blofeld |
| 98  | Filter FM Source                                | no  | 00 = off                                                                                    | probably as Blofeld |
| 99  | Filter 1 FM Amount                              | no  | 00 = off                                                                                    | probably as Blofeld |
| 100 | Filter 1 Pan                                    | no  | 40 (centered)                                                                               | probably as Blofeld |
| 101 | Filter 1 Pan Source                             | no  | 00 = off                                                                                    | probably as Blofeld |
| 102 | Filter 1 Pan Amount                             | no  | 40 (centered)                                                                               | probably as Blofeld |
| 103 | still unknown                                   |     |                                                                                             | not yet             |
| 104 | still unknown                                   |     |                                                                                             | not yet             |
| 105 | still unknown                                   |     |                                                                                             | not yet             |
| 106 | still unknown                                   |     |                                                                                             | not yet             |
| 107 | still unknown                                   |     |                                                                                             | not yet             |
| 108 | Split Mode - Split Point                        | yes | 00-7F (7F = layered)                                                                        | certain             |
| 109 | still unknown                                   |     |                                                                                             | not yet             |
| 110 | still unknown                                   |     |                                                                                             | not yet             |
| 111 | still unknown                                   |     |                                                                                             | not yet             |
| 112 | still unknown                                   |     |                                                                                             | not yet             |
| 113 | Split Mode - Lower Patch Location (Midi Bank#)  | yes | 00-7F                                                                                       | certain             |
| 114 | Split Mode - Lower Patch Location (Midi Patch#) | yes | 00-7F                                                                                       | certain             |
| 115 | still unknown                                   |     |                                                                                             | not yet             |
| 116 | still unknown                                   |     |                                                                                             | not yet             |
| 117 | still unknown                                   |     |                                                                                             | not yet             |
| 118 | still unknown                                   |     |                                                                                             | not yet             |
| 119 | still unknown                                   |     |                                                                                             | not yet             |
| 120 | still unknown                                   |     |                                                                                             | not yet             |
| 121 | still unknown                                   |     |                                                                                             | not yet             |
| 122 | still unknown                                   |     |                                                                                             | not yet             |
| 123 | still unknown                                   |     |                                                                                             | not yet             |
| 124 | still unknown                                   |     |                                                                                             | not yet             |

|     |                                         |     |                                                                          |         |
|-----|-----------------------------------------|-----|--------------------------------------------------------------------------|---------|
| 125 | still unknown                           |     |                                                                          | not yet |
| 126 | still unknown                           |     |                                                                          | not yet |
| 127 | still unknown                           |     |                                                                          | not yet |
| 128 | still unknown                           |     |                                                                          | not yet |
| 129 | Amplifier Velocity                      | yes | 00 to 7F                                                                 | certain |
| 130 | still unknown                           |     |                                                                          | not yet |
| 131 | still unknown                           |     |                                                                          | not yet |
| 132 | still unknown                           |     |                                                                          | not yet |
| 133 | still unknown                           |     |                                                                          | not yet |
| 134 | still unknown                           |     |                                                                          | not yet |
| 135 | Effect 1 Type                           | yes | 00 = off / 01 = chorus / 02 = flanger / 03 = phaser                      | certain |
| 136 | still unknown                           |     |                                                                          | not yet |
| 137 | Effect 1 Parameter 1: Rate              | yes | 00 to 7F                                                                 | certain |
| 138 | Effect 1 Parameter 2: Depth             | yes | 00 to 7F                                                                 | certain |
| 139 | still unknown                           |     |                                                                          | not yet |
| 140 | still unknown                           |     |                                                                          | not yet |
| 141 | still unknown                           |     |                                                                          | not yet |
| 142 | still unknown                           |     |                                                                          | not yet |
| 143 | still unknown                           |     |                                                                          | not yet |
| 144 | still unknown                           |     |                                                                          | not yet |
| 145 | still unknown                           |     |                                                                          | not yet |
| 146 | still unknown                           |     |                                                                          | not yet |
| 147 | still unknown                           |     |                                                                          | not yet |
| 148 | still unknown                           |     |                                                                          | not yet |
| 149 | still unknown                           |     |                                                                          | not yet |
| 150 | still unknown                           |     |                                                                          | not yet |
| 151 | Effect 2 Type (affectedd by Split Mode) | yes | 00 = off / 01 = reverb / 02 = delay / 03 = delay & reverb                | certain |
| 152 | still unknown                           |     |                                                                          | not yet |
| 153 | Effect 2 Parameter 1: Level             | yes | 00 to 7F                                                                 | certain |
| 154 | Effect 2 Parameter 2: Time              | yes | 00 to 7F                                                                 | certain |
| 155 | still unknown                           |     |                                                                          | not yet |
| 156 | still unknown                           |     |                                                                          | not yet |
| 157 | still unknown                           |     |                                                                          | not yet |
| 158 | still unknown                           |     |                                                                          | not yet |
| 159 | still unknown                           |     |                                                                          | not yet |
| 160 | still unknown                           |     |                                                                          | not yet |
| 161 | still unknown                           |     |                                                                          | not yet |
| 162 | still unknown                           |     |                                                                          | not yet |
| 163 | still unknown                           |     |                                                                          | not yet |
| 164 | still unknown                           |     |                                                                          | not yet |
| 165 | still unknown                           |     |                                                                          | not yet |
| 166 | still unknown                           |     |                                                                          | not yet |
| 167 | LFO 1 Shape                             | yes | 00 = sine / 01 = triangle / 02 = pulse / 03 = saw / 04 = ramp / 05 = s&h | certain |
| 168 | LFO 1 Speed                             | yes | 00 to 7F                                                                 | certain |

|     |                                |     |                                                                                                                                                                   |         |
|-----|--------------------------------|-----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| 169 | still unknown                  |     |                                                                                                                                                                   | not yet |
| 170 | still unknown                  |     |                                                                                                                                                                   | not yet |
| 171 | still unknown                  |     |                                                                                                                                                                   | not yet |
| 172 | still unknown                  |     |                                                                                                                                                                   | not yet |
| 173 | still unknown                  |     |                                                                                                                                                                   | not yet |
| 174 | still unknown                  |     |                                                                                                                                                                   | not yet |
| 175 | LFO 1 Destination              | yes | 00 = OSC 1 / [01 = unknown, OSC 2?] / 02 = OSC 3 / 03 = PWM/wave / 4 = VOL / 05 = Cutoff / 06 = OSC 1+2 / [07 = unknown, OSC 1+3?] / 08 = OSC 2+3 / 9 = OSC 1+2+3 | certain |
| 176 | still unknown                  |     |                                                                                                                                                                   | not yet |
| 177 | still unknown                  |     |                                                                                                                                                                   | not yet |
| 178 | still unknown                  |     |                                                                                                                                                                   | not yet |
| 179 | LFO 2 Shape                    | yes | 00 = sine / 01 = triangle / 02 = pulse / 03 = saw / 04 = ramp / 05 = s&h                                                                                          | certain |
| 180 | LFO 2 Speed                    | yes | 00 to 7F                                                                                                                                                          | certain |
| 181 | still unknown                  |     |                                                                                                                                                                   | not yet |
| 182 | still unknown                  |     |                                                                                                                                                                   | not yet |
| 183 | still unknown                  |     |                                                                                                                                                                   | not yet |
| 184 | still unknown                  |     |                                                                                                                                                                   | not yet |
| 185 | still unknown                  |     |                                                                                                                                                                   | not yet |
| 186 | still unknown                  |     |                                                                                                                                                                   | not yet |
| 187 | LFO2 Destination               | yes | 00 = OSC 1 / 01 = unknown? / 02 = OSC 3 / 03 = PWM/FM / 4 = VOL / 05 = Cutoff / 06 = OSC 1+2 / 07 = unknown? / 08 = OSC 2+3 / 9 = OSC 1+2+3                       | certain |
| 188 | LFO 2 depth                    |     |                                                                                                                                                                   | not yet |
| 189 | still unknown                  |     |                                                                                                                                                                   | not yet |
| 190 | still unknown                  |     |                                                                                                                                                                   | not yet |
| 191 | Wheel Modulation Shape         | yes | 00 = sine / 01 = triangle / 02 = pulse / 03 = saw / 04 = ramp / 05 = s&h                                                                                          | certain |
| 192 | wheel Modulation Speed         | yes | 00 to 7F                                                                                                                                                          | certain |
| 193 | still unknown                  |     |                                                                                                                                                                   | not yet |
| 194 | still unknown                  |     |                                                                                                                                                                   | not yet |
| 195 | still unknown                  |     |                                                                                                                                                                   | not yet |
| 196 | still unknown                  |     |                                                                                                                                                                   | not yet |
| 197 | still unknown                  |     |                                                                                                                                                                   | not yet |
| 198 | still unknown                  |     |                                                                                                                                                                   | not yet |
| 199 | Wheel Destination              | yes | 00 = OSC 1 / [01 = unknown, OSC 2?] / 02 = OSC 3 / 03 = PWM/wave / 4 = VOL / 05 = Cutoff / 06 = OSC 1+2 / [07 = unknown, OSC 1+3?] / 08 = OSC 2+3 / 9 = OSC 1+2+3 | certain |
| 200 | wheel depth                    |     |                                                                                                                                                                   | not yet |
| 201 | still unknown                  |     |                                                                                                                                                                   | not yet |
| 202 | still unknown                  |     |                                                                                                                                                                   | not yet |
| 203 | Trigger (Filter Envelope Mode) | yes | 00 = multiple / 01 = single (on Sledge: same value as 215)                                                                                                        | certain |

|     |                                   |     |                                                            |         |
|-----|-----------------------------------|-----|------------------------------------------------------------|---------|
| 204 | still unknown                     |     |                                                            | not yet |
| 205 | still unknown                     |     |                                                            | not yet |
| 206 | Filter Envelope Attack            | yes | 00 to 7F                                                   | certain |
| 207 | still unknown                     |     |                                                            | not yet |
| 208 | Filter Envelope Decay             | yes | 00 to 7F                                                   | certain |
| 209 | Filter Envelope Sustain           | yes | 00 to 7F                                                   | certain |
| 210 | still unknown                     |     |                                                            | not yet |
| 211 | still unknown                     |     |                                                            | not yet |
| 212 | Filter Envelope Release           | yes | 00 to 7F                                                   | certain |
| 213 | still unknown                     |     |                                                            | not yet |
| 214 | still unknown                     |     |                                                            | not yet |
| 215 | Trigger (Amplifier Envelope Mode) | yes | 00 = multiple / 01 = single (on Sledge: same value as 203) | certain |
| 216 | still unknown                     |     |                                                            | not yet |
| 217 | still unknown                     |     |                                                            | not yet |
| 218 | Amplifier Envelope Attack         | yes | 00 to 7F                                                   | certain |
| 219 | still unknown                     |     |                                                            | not yet |
| 220 | Amplifier Envelope Decay          | yes | 00 to 7F                                                   | certain |
| 221 | Amplifier Envelope Sustain        | yes | 00 to 7F                                                   | certain |
| 222 | still unknown                     |     |                                                            | not yet |
| 223 | still unknown                     |     |                                                            | not yet |
| 224 | Amplifier Envelope Release        | yes | 00 to 7F                                                   | certain |
| 225 | still unknown                     |     |                                                            | not yet |
| 226 | still unknown                     |     |                                                            | not yet |
| 227 | still unknown                     |     |                                                            | not yet |
| 228 | still unknown                     |     |                                                            | not yet |
| 229 | still unknown                     |     |                                                            | not yet |
| 230 | still unknown                     |     |                                                            | not yet |
| 231 | still unknown                     |     |                                                            | not yet |
| 232 | still unknown                     |     |                                                            | not yet |
| 233 | still unknown                     |     |                                                            | not yet |
| 234 | still unknown                     |     |                                                            | not yet |
| 235 | still unknown                     |     |                                                            | not yet |
| 236 | still unknown                     |     |                                                            | not yet |
| 237 | still unknown                     |     |                                                            | not yet |
| 238 | still unknown                     |     |                                                            | not yet |
| 239 | still unknown                     |     |                                                            | not yet |
| 240 | still unknown                     |     |                                                            | not yet |
| 241 | still unknown                     |     |                                                            | not yet |
| 242 | still unknown                     |     |                                                            | not yet |
| 243 | still unknown                     |     |                                                            | not yet |
| 244 | still unknown                     |     |                                                            | not yet |
| 245 | still unknown                     |     |                                                            | not yet |
| 246 | still unknown                     |     |                                                            | not yet |
| 247 | still unknown                     |     |                                                            | not yet |
| 248 | still unknown                     |     |                                                            | not yet |

|     |                                              |    |                    |                     |
|-----|----------------------------------------------|----|--------------------|---------------------|
| 249 | still unknown                                |    |                    | not yet             |
| 250 | still unknown                                |    |                    | not yet             |
| 251 | still unknown                                |    |                    | not yet             |
| 252 | Modifier 1 Source A                          | no | 10 = keytrack      | probably as Blofeld |
| 253 | Modifier 1 Source B                          | no | 0D = Pressure      | probably as Blofeld |
| 254 | Modifier 1 Operation                         | no | 06 = MAX           | probably as Blofeld |
| 255 | Modifier 1 Constant                          | no | 40 = centered      | probably as Blofeld |
| 256 | Modifier 2 Source A                          | no | 19 = Modifier 1    | probably as Blofeld |
| 257 | Modifier 2 Source B                          | no | 05 = LFO3 (wheel?) | probably as Blofeld |
| 258 | Modifier 2 Operation                         | no | 02 = *             | probably as Blofeld |
| 259 | Modifier 2 Constant                          | no | 40 = centered      | probably as Blofeld |
| 260 | Modifier 3 Source A (inactive)               | no | 00 = off           | probably as Blofeld |
| 261 | Modifier 3 Source B (inactive)               | no | 00 = off           | probably as Blofeld |
| 262 | Modifier 3 Operation (inactive)              | no | 00 = +             | probably as Blofeld |
| 263 | Modifier 3 Constant (inactive)               | no | 40 = centered      | probably as Blofeld |
| 264 | Modifier 4 Source A (inactive)               | no | 00 = off           | probably as Blofeld |
| 265 | Modifier 4 Source B (inactive)               | no | 00 = off           | probably as Blofeld |
| 266 | Modifier 4 Operation (inactive)              | no | 00 = +             | probably as Blofeld |
| 267 | Modifier 4 Constant (inactive)               | no | 40 = centered      | probably as Blofeld |
| 268 | Modulation source = 1 (LFO1)                 | no |                    | cf. 5) MODULATION   |
| 269 | Modulation matrix destination LFO1 (1 of 3)  | no |                    | cf. 5) MODULATION   |
| 270 | LFO1 modulation depth (1 of 3)               | no | 0-7F               | cf. 5) MODULATION   |
| 271 | Modulation source = 1 (LFO1)                 | no |                    | cf. 5) MODULATION   |
| 272 | Modulation matrix destination LFO1 (2 of 3)  | no |                    | cf. 5) MODULATION   |
| 273 | LFO1 modulation depth (2 of 3)               | no | 0-7F               | cf. 5) MODULATION   |
| 274 | Modulation source = 1 (LFO1)                 | no |                    | cf. 5) MODULATION   |
| 275 | Modulation matrix destination LFO1 (3 of 3)  | no |                    | cf. 5) MODULATION   |
| 276 | LFO1 modulation depth (3 of 3)               | no | 0-7F               | cf. 5) MODULATION   |
| 277 | Modulation source = 3 (LFO2)                 | no |                    | cf. 5) MODULATION   |
| 278 | Modulation matrix destination LFO2 (1 of 3)  | no |                    | cf. 5) MODULATION   |
| 279 | LFO2 modulation depth (1 of 3)               | no | 0-7F               | cf. 5) MODULATION   |
| 280 | Modulation source = 3 (LFO2)                 | no |                    | cf. 5) MODULATION   |
| 281 | Modulation matrix destination LFO2 (2 of 3)  | no |                    | cf. 5) MODULATION   |
| 282 | LFO2 modulation depth (2 of 3)               | no | 0-7F               | cf. 5) MODULATION   |
| 283 | Modulation source = 3 (LFO2)                 | no |                    | cf. 5) MODULATION   |
| 284 | Modulation matrix destination LFO2 (3 of 3)  | no |                    | cf. 5) MODULATION   |
| 285 | LFO2 modulation depth (3 of 3)               | no | 0-7F               | cf. 5) MODULATION   |
| 286 | Modulation source = 1A (Modifier 2 / wheel)  | no |                    | cf. 5) MODULATION   |
| 287 | modulation matrix destination wheel (1 of 3) | no |                    | cf. 5) MODULATION   |
| 288 | wheel modulation depth (1 of 3)              | no | 0-7F               | cf. 5) MODULATION   |
| 289 | Modulation source = 1A (Modifier 2 / wheel)  | no |                    | cf. 5) MODULATION   |
| 290 | modulation matrix destination wheel (2 of 3) | no |                    | cf. 5) MODULATION   |
| 291 | wheel modulation depth (2 of 3)              | no | 0-7F               | cf. 5) MODULATION   |

|     |                                              |     |                                                                  |                     |
|-----|----------------------------------------------|-----|------------------------------------------------------------------|---------------------|
| 292 | Modulation source = 1A (Modifier 2 / wheel)  | no  |                                                                  | cf. 5) MODULATION   |
| 293 | modulation matrix destination wheel (3 of 3) | no  |                                                                  | cf. 5) MODULATION   |
| 294 | wheel modulation depth (3 of 3)              | no  | 0-7F                                                             | cf. 5) MODULATION   |
| 295 | Modulation 10 Source                         | no  | 00 (off)                                                         | probably as Blofeld |
| 296 | Modulation 10 Destination                    | no  | 00 (pitch)                                                       | probably as Blofeld |
| 297 | Modulation 10 Amount                         | no  | 40 (centered)                                                    | probably as Blofeld |
| 298 | Modulation 11 Source                         | no  | 00 (off)                                                         | probably as Blofeld |
| 299 | Modulation 11 Destination                    | no  | 00 (pitch)                                                       | probably as Blofeld |
| 300 | Modulation 11 Amount                         | no  | 40 (centered)                                                    | probably as Blofeld |
| 301 | Modulation 12 Source                         | no  | 00 (off)                                                         | probably as Blofeld |
| 302 | Modulation 12 Destination                    | no  | 00 (pitch)                                                       | probably as Blofeld |
| 303 | Modulation 12 Amount                         | no  | 40 (centered)                                                    | probably as Blofeld |
| 304 | Modulation 13 Source                         | no  | 00 (off)                                                         | probably as Blofeld |
| 305 | Modulation 13 Destination                    | no  | 00 (pitch)                                                       | probably as Blofeld |
| 306 | Modulation 13 Amount                         | no  | 40 (centered)                                                    | probably as Blofeld |
| 307 | Modulation 14 Source                         | no  | 00 (off)                                                         | probably as Blofeld |
| 308 | Modulation 14 Destination                    | no  | 00 (pitch)                                                       | probably as Blofeld |
| 309 | Modulation 14 Amount                         | no  | 40 (centered)                                                    | probably as Blofeld |
| 310 | Modulation 15 Source                         | no  | 00 (off)                                                         | probably as Blofeld |
| 311 | Modulation 15 Destination                    | no  | 00 (pitch)                                                       | probably as Blofeld |
| 312 | Modulation 15 Amount                         | no  | 40 (centered)                                                    | probably as Blofeld |
| 313 | Modulation 16 Source                         | no  | 00 (off)                                                         | probably as Blofeld |
| 314 | Modulation 16 Destination                    | no  | 00 (pitch)                                                       | probably as Blofeld |
| 315 | Modulation 16 Amount                         | no  | 40 (centered)                                                    | probably as Blofeld |
| 316 | still unknown                                |     |                                                                  | not yet             |
| 317 | still unknown                                |     |                                                                  | not yet             |
| 318 | Arpeggiator Mode                             | yes | 00 = off / 01 = on / 02 = latch                                  | certain             |
| 319 | Arpeggiator Pattern                          | no  | 00 = off (not editable on Sledge)                                | probably as Blofeld |
| 320 | still unknown                                |     |                                                                  | not yet             |
| 321 | Arpeggiator Clock                            | yes | 00 to 2A (1/96 clean to 64 bars)                                 | certain             |
| 322 | Arpeggiator Length                           | yes | 00 to 2B (1/96 to legato)                                        | certain             |
| 323 | Arpeggiator Octave (Range)                   | yes | 00 = 1 octave / 01 = 2 octaves / 03 = 4 octaves / 04 = 5 octaves | certain             |
| 324 | Arpeggiator Direction                        | yes | 00 = up / 01 = down / 02 = alt up / 03 = alt down                | certain             |
| 325 | Arpeggiator Sort Order                       | yes | 00 = as played / 01 = reversed / 02 = lo > hi / 03 = hi > lo     | certain             |
| 326 | Arp velocity: each note                      | no  |                                                                  | probably as Blofeld |
| 327 | Arp timing factor                            | no  |                                                                  | probably as Blofeld |
| 328 | still unknown                                |     |                                                                  | not yet             |
| 329 | Arp pattern reset: off                       | no  |                                                                  | probably as Blofeld |
| 330 | Arp pattern length: 16 notes                 | no  |                                                                  | probably as Blofeld |
| 331 | still unknown                                |     |                                                                  | not yet             |
| 332 | still unknown                                |     |                                                                  | not yet             |
| 333 | Arpeggiator Tempo                            | yes | 00 to 7F                                                         | certain             |

|     |                                                                                       |    |    |                     |
|-----|---------------------------------------------------------------------------------------|----|----|---------------------|
| 334 | Arpeggiator pattern : step = normal / glid<br>e= off / accent = velocity unchanged 1  | no | 04 | probably as Blofeld |
| 335 | Arpeggiator pattern : step = normal / glid<br>e= off / accent = velocity unchanged 2  | no | 04 | probably as Blofeld |
| 336 | Arpeggiator pattern : step = normal / glid<br>e= off / accent = velocity unchanged 3  | no | 04 | probably as Blofeld |
| 337 | Arpeggiator pattern : step = normal / glid<br>e= off / accent = velocity unchanged 4  | no | 04 | probably as Blofeld |
| 338 | Arpeggiator pattern : step = normal / glid<br>e= off / accent = velocity unchanged 5  | no | 04 | probably as Blofeld |
| 339 | Arpeggiator pattern : step = normal / glid<br>e= off / accent = velocity unchanged 6  | no | 04 | probably as Blofeld |
| 340 | Arpeggiator pattern : step = normal / glid<br>e= off / accent = velocity unchanged 7  | no | 04 | probably as Blofeld |
| 341 | Arpeggiator pattern : step = normal / glid<br>e= off / accent = velocity unchanged 8  | no | 04 | probably as Blofeld |
| 342 | Arpeggiator pattern : step = normal / glid<br>e= off / accent = velocity unchanged 9  | no | 04 | probably as Blofeld |
| 343 | Arpeggiator pattern : step = normal / glid<br>e= off / accent = velocity unchanged 10 | no | 04 | probably as Blofeld |
| 344 | Arpeggiator pattern : step = normal / glid<br>e= off / accent = velocity unchanged 11 | no | 04 | probably as Blofeld |
| 345 | Arpeggiator pattern : step = normal / glid<br>e= off / accent = velocity unchanged 12 | no | 04 | probably as Blofeld |
| 346 | Arpeggiator pattern : step = normal / glid<br>e= off / accent = velocity unchanged 13 | no | 04 | probably as Blofeld |
| 347 | Arpeggiator pattern : step = normal / glid<br>e= off / accent = velocity unchanged 14 | no | 04 | probably as Blofeld |
| 348 | Arpeggiator pattern : step = normal / glid<br>e= off / accent = velocity unchanged 15 | no | 04 | probably as Blofeld |
| 349 | Arpeggiator pattern : step = normal / glid<br>e= off / accent = velocity unchanged 16 | no | 04 | probably as Blofeld |
| 350 | Arpeggiator pattern & timing 1                                                        | no | 44 | probably as Blofeld |
| 351 | Arpeggiator pattern & timing 2                                                        | no | 44 | probably as Blofeld |
| 352 | Arpeggiator pattern & timing 3                                                        | no | 44 | probably as Blofeld |
| 353 | Arpeggiator pattern & timing 4                                                        | no | 44 | probably as Blofeld |
| 354 | Arpeggiator pattern & timing 5                                                        | no | 44 | probably as Blofeld |
| 355 | Arpeggiator pattern & timing 6                                                        | no | 44 | probably as Blofeld |
| 356 | Arpeggiator pattern & timing 7                                                        | no | 44 | probably as Blofeld |
| 357 | Arpeggiator pattern & timing 8                                                        | no | 44 | probably as Blofeld |
| 358 | Arpeggiator pattern & timing 9                                                        | no | 44 | probably as Blofeld |
| 359 | Arpeggiator pattern & timing 10                                                       | no | 44 | probably as Blofeld |
| 360 | Arpeggiator pattern & timing 11                                                       | no | 44 | probably as Blofeld |
| 361 | Arpeggiator pattern & timing 12                                                       | no | 44 | probably as Blofeld |
| 362 | Arpeggiator pattern & timing 13                                                       | no | 44 | probably as Blofeld |
| 363 | Arpeggiator pattern & timing 14                                                       | no | 44 | probably as Blofeld |

|     |                                 |     |                                                                                                                                                      |                     |
|-----|---------------------------------|-----|------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|
| 364 | Arpeggiator pattern & timing 15 | no  | 44                                                                                                                                                   | probably as Blofeld |
| 365 | Arpeggiator pattern & timing 16 | no  | 44                                                                                                                                                   | probably as Blofeld |
| 366 | still unknown                   |     |                                                                                                                                                      | not yet             |
| 367 | still unknown                   |     |                                                                                                                                                      | not yet             |
| 368 | still unknown                   |     |                                                                                                                                                      | not yet             |
| 369 | still unknown                   |     |                                                                                                                                                      | not yet             |
| 370 | Name Char 1                     | yes | 20 to 7F (ASCII characters)                                                                                                                          | certain             |
| 371 | Name Char 2                     | yes | 20 to 7F (ASCII characters)                                                                                                                          | certain             |
| 372 | Name Char 3                     | yes | 20 to 7F (ASCII characters)                                                                                                                          | certain             |
| 373 | Name Char 4                     | yes | 20 to 7F (ASCII characters)                                                                                                                          | certain             |
| 374 | Name Char 5                     | yes | 20 to 7F (ASCII characters)                                                                                                                          | certain             |
| 375 | Name Char 6                     | yes | 20 to 7F (ASCII characters)                                                                                                                          | certain             |
| 376 | Name Char 7                     | yes | 20 to 7F (ASCII characters)                                                                                                                          | certain             |
| 377 | Name Char 8                     | yes | 20 to 7F (ASCII characters)                                                                                                                          | certain             |
| 378 | Name Char 9                     | yes | 20 to 7F (ASCII characters)                                                                                                                          | certain             |
| 379 | Name Char 10                    | yes | 20 to 7F (ASCII characters)                                                                                                                          | certain             |
| 380 | Name Char 11                    | yes | 20 to 7F (ASCII characters)                                                                                                                          | certain             |
| 381 | Name Char 12                    | yes | 20 to 7F (ASCII characters)                                                                                                                          | certain             |
| 382 | Name Char 13                    | no  | 20 to 7F (ASCII characters) / by default: 20 (blank space)                                                                                           | probably as Blofeld |
| 383 | Name Char 14                    | no  | 21 to 7F (ASCII characters) / by default: 20 (blank space)                                                                                           | probably as Blofeld |
| 384 | Name Char 15                    | no  | 22 to 7F (ASCII characters) / by default: 20 (blank space)                                                                                           | probably as Blofeld |
| 385 | Name Char 16                    | no  | 23 to 7F (ASCII characters) / by default: 20 (blank space)                                                                                           | probably as Blofeld |
| 386 | Category                        | yes | 00 = Init / 01 = Arp / 02 = Atmo / 03 = Bass / 04 = Drum / 05 = FX / 06 = Keys / 07 = Lead / 08 = Mono / 09 = Pad / 0A = Perc / 0B = Poly / 0C = Seq | certain             |
| 387 | still unknown                   |     |                                                                                                                                                      | not yet             |
| 388 | still unknown                   |     |                                                                                                                                                      | not yet             |
| 389 | still unknown                   |     |                                                                                                                                                      | not yet             |
| 390 | Checksum                        | yes | CALCULATION                                                                                                                                          | certain             |
| 391 | End of SysEx                    | yes | F7                                                                                                                                                   | certain             |

## 5) EVIDENCE FOR MODULATION STRUCTURE

in detail for LFO1:

|                                             | Index      | cutoff   | OSC1     | OSC1+2   | OSC1+2+3 | OSC2+3   | OSC3     | PWM      | Volume   |
|---------------------------------------------|------------|----------|----------|----------|----------|----------|----------|----------|----------|
| <b>LFO1 destination</b>                     | <b>175</b> | <b>5</b> | <b>0</b> | <b>6</b> | <b>9</b> | <b>8</b> | <b>2</b> | <b>3</b> | <b>4</b> |
| Modulation source = 1 (LFO1)                | 268        | 1        | 1        | 1        | 1        | 1        | 1        | 1        | 1        |
| modulation matrix destination LFO1 (1 of 3) | 269        | 14       | 1        | 1        | 1        | 4        | 7        | 3        | 1E       |
| LFO1 modulation depth (1 of 3)              | 270        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        |
| Modulation source = 1 (LFO1)                | 271        | 1        | 1        | 1        | 1        | 1        | 1        | 1        | 1        |
| modulation matrix destination LFO1 (2 of 3) | 272        | 0        | 0        | 4        | 4        | 7        | 0        | 6        | 0        |
| LFO1 modulation depth (2 of 3)              | 273        | 40       | 40       | 0        | 0        | 0        | 40       | 0        | 40       |
| Modulation source = 1 (LFO1)                | 274        | 1        | 1        | 1        | 1        | 1        | 1        | 1        | 1        |
| modulation matrix destination LFO1 (3 of 3) | 275        | 0        | 0        | 0        | 7        | 0        | 0        | 9        | 0        |
| LFO1 modulation depth (3 of 3)              | 276        | 40       | 40       | 40       | 0        | 40       | 40       | 0        | 40       |
| LFO1 modulation depth (1 of 3)              | 270        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        |

The arrangement for LFO2 and wheel are analogous:

- LFO2: index 187 (for destinations) and index 277-285 (with modulation source = 03h)
- wheel: index 199 (for destinations) and index 286-294 (with modulation source = 1Ah)