

Monomachine SysEx description

This is a document describing the MIDI system exclusive messages of the Elektron Monomachine SFX6/60 v 1.22

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Conventions in this document

Bits are labeled from 0 and upwards.

7 bit data are referred to as data.

8 bit data are referred to as bytes.

How the checksums are calculated

The checksum is generated from the data marked in blue in the tables.

It is the lower 14 bits of the sum of all the indicated data.

How the message length is calculated

The length at the end of the message is the number of bytes starting from version and ending with the checksum.

Packing Method

All dump packages on the Monomachine are packed. After that they are 7-bit encoded.

To unpack check if bit 7 is set. If it is the low 7 bits indicate that the next byte should be repeated this number of times in the resulting unpacked data structure.

If bit 7 is not set the byte should just be stored in the unpacked data structure.

An 8-bit data, XX, repeated 1 time is encoded 0x81 XX.

A 7-bit data, YY, repeated 1 time is encoded YY.

How the 7 bit encoding is generated

As a SysEx message only allows 7 bit data, 8 bit data blocks are converted as follows:

The first data contains the MSB of the following, up to, 7 data, data[0..6]. Bit 6 is the MSB bit of data[0] and bit 0 is the MSB of data[6]. 7 bytes encodes to 8 data. 8 bytes encodes to 10 data.

Global Message

Pos	Data	Description
0x00	0xF0 0x00 0x20 0x3C 0x03 0x00	Monomachine header
0x06	0x50	Global message
0x07	0x03	Version
0x08	0x01	Revision
0x09	[0 ... 7]	Original position of message
0x0A	Variable length packed data	
	[0 ... 127]	Checksum (bit 7...13)
	[0 ... 127]	Checksum (bit 0...6)
	[0 ... 127]	Message length (bit 7...13)
	[0 ... 127]	Message length (bit 0...6)
	0xF7	End of SysEx

Structure of unpacked Global Message

Pos	Data	Description
0x00	[0 ... 15]	Midi channel Autotrack
0x01	[0 ... 15]	Midi channel
0x02	[0 ... 6]	Midi channel Span
0x03	[0 ... 15]	Midi channel Multi trig
0x04	[0 ... 15]	Midi channel Multi map
0x05	Bit 0 Clock In Bit 4 Ctrl In Bit 5 Clock Out Bit 6 Ctrl Out?	External sync
0x06	[0 ... 1]	Transport In
0x07	[0 ... 1]	Sequencer Out
0x08	[0 ... 1]	Arp Out
0x09	[0 ... 1]	Keyboard Out
0x0A	[0 ... 1]	Transport Out
0x0B	[0 ... 1]	Midi clock Out
0x0C	[0 ... 1]	Pgm change Out
0x0D	[0 ... 5, 16=OFF] bit 6 set means no internal trig.	Note (not used)

Pos	Data	Description
0x0E	[0 ... 127]	Gate (not used)
0x0F	[0 ... 127]	Sense (not used)
0x10	[0 ... 127]	Minimum velocity (not used)
0x11	[0 ... 127]	Maximum velocity (not used)
0x12	6 x [0 ... 15]	Midi Machine Midi channels
0x18	CL1,CL2,CL3,CL4 [0...127,-1=AT]	CC Destinations channel 1
...	...	...
0x2C	CL1,CL2,CL3,CL4 [0...127,-1=AT]	CC Destinations channel 6
0x30	6 x [0 ... 1]	Midi seq legato (always 1)
0x36	6 x ...	Legato (unused)
0x3C	32 x [0 ... 127]	Map range
0x5C	32 x [0 ... 127]	Map pattern
0x7C	32 x [0 ... 63]	Map offset
0x9C	32 x [0 ... 63]	Map length
0xBC	32 x [-48 ... 48]	Map transpose
0xDC	32 x [0 = DIRECT 1 = 1, 2 = 2, 3 = 4, 4 = 8 5 = 16, 6 = 32, 7 = 64]	Map timing
0xFC	0 = 3 x STEREO + AB = MIX 1 = 3 x STEREO 2 = 6 x MONO	Global routing
0xFD	[0 ... 1]	Pgm change In
0xFE	[0 = <i>TIGHT</i> , 1 = <i>FULL</i>]	<i>Joystick Shape</i>
0xFF	[0 = <i>LINEAR</i> , 1 = <i>SOFT</i> , 2 ...127 = <i>FIXED</i>]	<i>Velocity curve</i>
0x100	[0 ... 127]	<i>Fixed velocity</i>
0x101	[0 = 24 ppr, 1 ... 127 = 32 ppr]	<i>Knob speed</i>
0x102	2 x ...	<i>Unused</i>
0x104	32 bit integer big endian	Base freq

Kit Message

Pos	Data	Description
0x00	0xF0 0x00 0x20 0x3C 0x03 0x00	Monomachine header
0x06	0x52	Kit message
0x07	0x02	Version
0x08	0x01	Revision
0x09	[0 ... 63]	Original position of message
0x0A	Variable length packed data	
	[0 ... 127]	Checksum (bit 7...13)
	[0 ... 127]	Checksum (bit 0...6)
	[0 ... 127]	Message length (bit 7...13)
	[0 ... 127]	Message length (bit 0...6)
	0xF7	End of SysEx

Structure of unpacked Kit Message

Pos	Data	Description
0x00	11 x ASCII	Name of kit, zero padded
0x0B	6 x [0 ... 127]	Level
0x11	72 bytes total: 8 x Synthesis 8 x Amp 8 x Filter 8 x Effects 8 x LFO 1 8 x LFO 2 8 x LFO 3 8 x MIDI 8 x track ADSR(only 1 & 4 are used, must be equal) ...	Parameters of track 1
0x179	72 bytes total	Parameters of track 6
0x1C1	6 x [0...]	Machine indexes
0x1C7	6 x ?	Patch type
0x1CD	X	Unused
0x1CE	16 bit big endian	Patch bus in

Pos	Data	Description
0x1D0	[0,1]	Modifier mirror Left/Right
0x1D1	[0,1]	Modifier mirror Up/Down
0x1D2	Structure (72 bytes): [TRK][DEST][INT/MIDI] [0...5][0...5][0=INTERNAL,1=MIDI] Range: [0 ... 8] DEST: 0 = pos pitch bend 1 = neg pitch bend 2 = pos modulation wheel 3 = neg modulation wheel 4 = velocity 5 = key follow	Track Modifier Dest Page
0x21A	Structure (72 bytes): [0...5][0...5][0=INTERNAL,1=MIDI] Range: [0 ... 7]	Track Modifier Control
0x262	Structure (72 bytes): [0...5][0...5][0=INTERNAL,1=MIDI] Range: [-64 ... 63]	Track Modifier Range
0x2AA	[0,1]	Modifier LP Key track
0x2AB	[0,1]	Modifier HP Key track
0x2AC	0 = ONLY LEGATO 1 = ALWAYS	Trig Portamento
0x2AD	6 x [0 ... 5]	Trig track
0x2B3	[0,1]	Trig Legato Amp
0x2B4	[0,1]	Trig legato filter
0x2B5	[0,1]	Trig Legato LFO
0x2B6	0 = ALL 1 = SPLIT KEY, 2 = SEQ START 3 = SEQ TRANSPOSE	Common Multimode
0x2B7	0 = DIRECT 1 = 1, 2 = 2, 3 = 4, 4 = 8 5 = 16, 6 = 32, 7 = 64	Common timing
0x2B8	[0 ... 127]	Split key
0x2B9	[0 ... 5]	Split range

Pattern Message

Pos	Data	Description
0x00	0xF0 0x00 0x20 0x3C 0x03 0x00	Monomachine header
0x06	0x67	Pattern message
0x07	0x05	Version
0x08	0x01	Revision
0x09	[0 ... 127]	Original position of message
0x0A	Variable length packed data	
	[0 ... 127]	Checksum (bit 7...13)
	[0 ... 127]	Checksum (bit 0...6)
	[0 ... 127]	Message length (bit 7...13)
	[0 ... 127]	Message length (bit 0...6)
	0xF7	End of SysEx

Structure of unpacked Pattern Message

Pos	Data	Description
0x00	6 x (64-bit big endian bitmap)	Amp trigs
0x30	6 x (64-bit big endian bitmap)	Filter trigs
0x60	6 x (64-bit big endian bitmap)	LFO trigs
0x90	6 x (64-bit big endian bitmap)	Off trigs
0xC0	6 x (64-bit big endian bitmap)	Midi note on trigs
0xF0	6 x (64-bit big endian bitmap)	Midi note off trigs
0x120	6 x (64-bit big endian bitmap)	Trigless trigs
0x150	6 x (64-bit big endian bitmap)	Chord trigs
0x180	6 x (64-bit big endian bitmap)	Midi trigless
0x1B0	6 x (64-bit big endian bitmap)	Slide patterns
0x1E0	6 x (64-bit big endian bitmap)	Swing patterns
0x210	6 x (64-bit big endian bitmap)	MIDI slide patterns
0x240	6 x (64-bit big endian bitmap)	MIDI swing patterns
0x270	32 bit integer big endian	Swing amount
0x274	6 x (64-bit big endian bitmap)	Locked parameter bitmap
0x2A4	6 x 64 positions	Note nbr
0x424	[0 ... 64]	Length

Pos	Data	Description
0x425	[0 = 1x, 1 = 2x, 2 = 3/4x, 3 = 3/2x]	Tempo multiplier
0x426	[0 ... 63]	Kit
0x427	[-48 ... 48]	Pattern Transpose
0x428	6 x [-48 ... 48]	Track transpose
0x42E	6 x [0 ... 3] 0 = CHROMATIC 1 = MAJOR 2 = MINOR 3 = FIXED	Track transpose scale
0x434	6 x [0 ... 11] 0 = C	Track transpose key
0x43A	6 x [-48 ... 48]	Midi track transpose
0x440	6 x [0 ... 3] 0 = CHROMATIC 1 = MAJOR 2 = MINOR 3 = FIXED	Midi track transpose scale
0x446	6 x [0 ... 11] 0 = C	Midi track transpose key
0x44C	6 x [0 ... 4] ARP_PLAY_TRUE 0 ARP_PLAY_UP 1 ARP_PLAY_DOWN 2 ARP_PLAY_CYCLIC 3 ARP_PLAY_RND 4	Arp play
0x452	6 x [0 ... 3] ARP_MODE_OFF 0 ARP_MODE_KEY 1 ARP_MODE_SID 2 ARP_MODE_ADD 3	Arp mode
0x458	6 x [0 ... 8]	Arp Octave range
0x45E	6 x [0 ... 95]	Arp multiplier
0x464	6 x [0 ... 7] bit 0 = AMP bit 1 = Filter bit 2 = LFO	Arp destination
0x46A	6 x [1 ... 16]	Arp Seq length
0x470	6 x 16 [0 ... 128] -1 = OFF 64 = no offset	Arp Seq pattern
0x4D0	6 x [0 ... 4]	Midi Arp play
0x4D6	6 x [0 ... 3]	Midi Arp Mode

Pos	Data	Description
0x4DC	6 x [0 ... 8]	Midi Arp Octave range
0x4E2	6 x [0 ... 95]	Midi Arp multiplier
0x4E8	6 x [1 ... 16]	Midi Arp Seq length
0x4EE	6 x 16 [0 ... 128] -1 = OFF 64 = no offset	Midi Arp Seq pattern
0x54E	4 x X	Unused
0x552	16 bit big endian [0 ... 400]	Midi notes used
0x554	[0 ... 192]	Chord notes used
0x555	X	Unused
0x556	[0 ... 62]	Locks used
0x557	62 x 64	Locks
0x14D7	X	Unused
0x14D8	400 x 16 bit big endian (800 bytes) [xxxxxxxxyyyyzzzzzz] x=midi note y=track z=position	Midi notes
0x17F8	192 x 16 bit big endian (384 bytes) [xxxxxxxxyyyyzzzzzz] x=midi note y=track z=position	Chord notes

Unpacked size: 0x1978

Song Message

Pos	Data	Description
0x00	0xF0 0x00 0x20 0x3C 0x03 0x00	Monomachine header
0x06	0x69	Song message
0x07	0x02	Version
0x08	0x01	Revision
0x09	[0 ... 23]	Original position of message
0x0A	Variable length packed data	
	[0 ... 127]	Checksum (bit 7...13)
	[0 ... 127]	Checksum (bit 0...6)
	[0 ... 127]	Message length (bit 7...13)
	[0 ... 127]	Message length (bit 0...6)
	0xF7	End of SysEx

Structure of unpacked Song Message

Pos	Data	Description
0x00	16 x ASCII	Name of song, zero padded
0x10	200 x SONG ROW (4800 bytes)	Song rows

Song row structure

Pos	Data	Description
0x00	[0 ... 127] -1=end of song -2=jump/halt/loop -3=remark	Pattern
0x01	[0 ... 63]	Kit
0x02	[0=INF, 1 ... 63]	Loop
0x03	[0 ... 199]	Jump
0x04	Bitmask	Mute
0x05	Bitmask	Mute MIDI
0x06	[0 ... 63]	Pattern Start
0x07	[0 ... 63]	Pattern End
0x08	[-48 ... 48]	Pattern transpose

Pos	Data	Description
0x09	6 x [-48 ... 48]	Track Transpose
0x0F	6 x [-48 ... 48]	MIDI Track Transpose
0x15	X	Unused
0x16	16 bit	Tempo

DigiPRO Draw waveform format

Pos	Data	Description
0x00	0xF0 0x00 0x20 0x3C 0x03 0x00	Monomachine header
0x06	0x5D	DigiPRO Draw waveform
0x07	0x01	Version
0x08	0x01	Revision
0x09	[0 ... 63]	Original position
0x0A	4x[0 ... 127]	ASCII Name
0x0E	7-bit encoded wavedata	
0x1B6E	[0 ... 127]	Checksum (bit 7...13)
0x1B6F	[0 ... 127]	Checksum (bit 0...6)
0x1B70	0x36	Message length (bit 7...13)
0x1B71	0x69	Message length (bit 0...6)
0x1B72	0xF7	End of SysEx

Document revision history

Version 0.1 First one.

Version 0.2 Added DigiPRO Draw waveform format

Version 0.3 Pattern double tempo becomes tempo multiplier

Version 0.4 Original position was erroneously inside the packed data structures. Fixed.

Version 0.5 Corrected offsets in the global, kit, pattern and song row structure.

Version 0.6 Updated global with mechanical settings.