13. MIDI IMPLEMENTATION

MIDI Controller list

The following is a list of the MIDI Controller numbers used for all knobs and buttons on the front panel. See page 77.

- The reception and transmission of Controllers can be turned on/off. See page 66.
- Buttons that control "on/off" functions have a Controller value of "0" corresponding to the "off" position and a value of "on" corresponding to the "on" position.
- Buttons that step through various possibilities start with a Controller value of "0" for the "lowest" setting and then increment with a value of 1 for each step upwards.

If you want to send Controllers to Percussion Kits, proceed with caution! The Controller message you send will affect the percussion sound that was last selected for editing, by pressing a black key on the keyboard (see page 29).

Nord Lead 2X Parameter	MIDI Controller #	MIDI Controller Name
Gain	7	Main Volume
Oct Shift	17	General Purpose #2
Mod Wheel Destination	18	General Purpose #3
Unison	16	General Purpose #1
Poly/Legato/Mono	15	Undefined
Portamento Auto	65	Portamento On/Off
Portamento Time	5	Portamento Time
LFO 1 Rate	19	General Purpose #4
LFO 1 Waveform	20	Undefined
LFO 1 Destination	21	Undefined
LFO 1 Amount	22	Undefined
LFO 2/Arpeggio Rate	23	Undefined
LFO 2 Destination/Arpeggio Mode	24	Undefined
LFO 2 Amount/Arpeggio Range	25	Undefined
Modulation Envelope Attack	26	Undefined
Modulation Envelope Decay	27	Undefined
Modulation Envelope Destination	28	Undefined
Modulation Envelope Amount	29	Undefined

Nord Lead 2X Parameter	MIDI Controller #	MIDI Controller Name
Osc 1 Waveform	30	Undefined
Osc 2 Waveform	31	Undefined
Osc 2 Semitones	78	Sound Controller 9
Osc 2 Fine Tune	33	LSB for Controller 1
Oscillator FM Depth	70	Sound Controller 1 (Sound Variation)
Osc 2 Keyboard Tracking	34	LSB for Controller 2
Oscillator Pulse Width	79	Sound Controller 10
Oscillator Sync	35	LSB for Controller 3
Oscillator Mix	8	Balance
Amplifier Envelope Attack	73	Sound Controller 4 (Attack)
Amplifier Envelope Decay	36	LSB for Controller 4
Amplifier Envelope Sustain	37	LSB for Controller 5
Amplifier Envelope Release	72	Sound Controller 3 (Release)
Filter Envelope Attack	38	LSB for Controller 6
Filter Envelope Decay	39	LSB for Controller 7
Filter Envelope Sustain	40	LSB for Controller 8
Filter Envelope Release	41	LSB for Controller 9
Filter Mode	44	LSB for Controller 12
Filter Cutoff	74	Sound Controller 2 (Timbre)
Filter Resonance	42	LSB for Controller 10
Filter Envelope Amount	43	LSB for Controller 11
Filter Velocity	45	LSB for Controller 13
Filter Keyboard Track	46	LSB for Controller 14
Filter Distortion	80	

In addition to the above, following controllers are used:

- The Modulation wheel transmits and receives Controller 1.
- If the Pedal input is used with an expression pedal, this is transmitted and received as Controller 11.
- If the Pedal input is used for sustain, this is transmitted as Controller 64 (Damper Pedal)
- Bank Select messages are transmitted and received as Controller 32.

System Exclusive implementation

Numbers are in decimal except when preceded by a "$" character, in which case they are in hexadecimal format.

General Message format

Byte	Description
$F0	System Exclusive
$33	Manufacturer ID (clavia)
<Device ID>	= Global MIDI Channel, 0-15
$04	Model ID for Nord Lead 2X
<Message Type>	See each type of message, below.
<Message Specification>	See each type of message, below.
<Data 1>	This and following bytes depend on the Message Type and Message Specification. Some messages have no data bytes at all.
<Data 2>	
<Data 3>	
<etc.>	
$F7	End Of Exclusive

Patch Dumps

This message contains the actual Patch Dump. One complete message contains the data for one Patch. It is transmitted *from* the Nord Lead 2X in one of two cases:

- When a Patch Dump is initiated from the front panel.
- When a valid Patch Dump Request message has been received.

This message should be sent *to* the Nord Lead 2X when you want to replace a Patch currently in the instrument, with a new one.

The Message Type and Message Specification bytes in the Sys Ex message contains information about from which location the Patch Dump was sent. When a Patch is sent to the Nord Lead 2X, it will end up in this location.

- If the Sys Ex data *for a complete Bank* is sent (using the "Dump All" command), the Program location within the Bank is stored for each Patch. When any or all of these Patches are sent back to a Nord Lead 2X, they will be stored at their original Program Location, but in the Bank that is currently selected on the Nord Lead 2X.
- If the Sys Ex data for a single Patch is sent *using the "Dump One" command*, it is considered being sent from the *Edit Buffer of the selected Slot*. This means, that when the Patch is sent back to a Nord Lead 2X, it will not actually be stored, but temporarily placed in the Edit Buffer of its original Slot.

- If the Sys Ex data for a single Patch is sent *upon receiving a Patch Dump Request message*, either the Program Location or the Edit Buffer will be stored, depending on the Message Type byte in the Request message. This will also determine where the Patch will be placed when it is sent back to a Nord Lead 2X.

Byte (Hex)	Byte (Decimal)	Description
$F0	240	System Exclusive
$33	51	Manufacturer ID (clavia)
<Device ID>		= Global MIDI Channel. 0 to 15 ($0-$F).
$04	4	Model ID for Nord Lead 2X
$00 to $0A	0 to 10	Message Type specifies the Bank. 0=Edit Buffer, 1 to 10 =Bank 1 to 10
$00 to $03 or $00-$62	0 to 3 or 0 to 98	Message Specification specifies the exact memory location, see below.
<Patch Data 1>		See page 111.
<Patch Data 2>		
<Patch Data 3>		
:		
<Patch Data 132>		
$F7	247	End Of Exclusive

- If Message Type = 0 (Edit Buffer), the Message Specification can be 0 to 3, corresponding to Patch Slot buttons A to D.

- If Message Type = 1 to 10, then the Message Specification (00 to 98) corresponds to the Program Number within the Bank (01 to 99).

Percussion Kit Patch Dump

This message contains all settings in a Percussion Kit. It is transmitted *from* the Nord Lead 2X in one of two cases:

- When a Patch Dump is initiated from the front panel and a Percussion Kit is selected.

- When a valid Patch Dump Request message has been received, specifying a Percussion Kit location or an Edit Buffer containing a Percussion Kit.

Percussion Kit Patch Dump messages will also be sent if the “Dump All” command is used.

This message should be sent *to* the Nord Lead 2X when you want to replace a Percussion Kit currently in the instrument, with a new one. When it comes to the location of the received Percussion Kit Dumps, the same rules apply as when receiving regular Program Dumps.

Byte (Hex)	Byte (Decimal)	Description
$F0	240	System Exclusive
$33	51	Manufacturer ID (clavia)
<Device ID>		= Global MIDI Channel. 0 to 15 ($0-$F).
$04	4	Model ID for Nord Lead 2X
$00 to $04	0 to 4	Message Type specifies the Bank. 0=Edit Buffer, 1 to 4=Bank 1 to 4
$10 to $13 or $63-$6C	16 to 19 or 99 to 108	Message Specification specifies the exact memory location, see below.
<Patch Data 1>		Patch data for eight percussion sounds. See page 111.
<Patch Data 2>		
<Patch Data 3>		
:		
<Patch Data 1056>		
$F7	247	End Of Exclusive

- If Message Type = 0 (Edit Buffer), the Message Specification can be 16 to 19, corresponding to Patch Slot buttons A to D.

- If Message Type = 1 to 4, then the Message Specification (99 to 108) corresponds to the Percussion Kit locations (P0 to P9) of the selected Bank.

Patch Dump Request

This message is used for requesting the Nord Lead 2X to transmit one Patch or Percussion Kit Dump Message. The Message Type and Message Specification are used to specify which Patch should be transmitted.
This message is never transmitted *from* the Nord Lead 2X.

Byte (Hex)	Byte (Decimal)	Description
$F0	240	System Exclusive
$33	51	Manufacturer ID (clavia)
<Device ID>		= Global MIDI Channel. 0 to 15 ($0-$F).
$04	4	Model ID for Nord Lead 2X
$A to $E	10 to 14	Message Type specifies the Bank. $A=Edit Buffer, $B to $E=Bank 1 to 4

Byte (Hex)	Byte (Decimal)	Description
$00 to $03 or $00-$6C	0 to 3 or 0 to 108	Message Specification specifies the exact memory location, see below.
$F7	247	End Of Exclusive

- If Message Type = 10 (Edit Buffer), the Message Specification can be $00 to $03, corresponding to Patch Slot buttons A to D.

- If Message Type = 11 to 14, then the Message Specification (00 to 98) corresponds to the Program Number within the Bank (01 to 99).

Performance Dump

This message contains the actual Performance. One complete message contains the data for one Performance.

This message is transmitted *from* the Nord Lead 2X in one of two cases:

- When a Performance Dump is initiated from the front panel.

- When a valid Performance Request message has been received.

This message should be sent *to* the Nord Lead 2X when you want to replace a Performance currently in the instrument, with a new one. The Message Type and Message Specification then specify in which memory location the Performance should be stored.

Byte (Hex)	Byte (Decimal)	Description
$F0	240	System Exclusive
$33	51	Manufacturer ID (clavia)
<Device ID>		= Global MIDI Channel. 0 to 15 ($0-$F).
$04	4	Model ID for Nord Lead 2X
$1E or $1F-$22	30 or 31-34	Message Type specifies Performance Edit Buffer (30) or Performance Bank 1-4 (31-34)
$00 or $00-$63	0 or 0 to 99	Message Specification specifies the Performance number, see below.
<Perf. Data 1>		See page 112.
<Perf. Data 2>		
<Perf. Data 3>		
:		
<Perf. Data 708>		
$F7	247	End Of Exclusive

- If Message Type = 30 (Edit Buffer), the Message Specification should always 0.

- If Message Type = 31-34, the Message Specification corresponds to the Performance Number (00 to 99) within the selected Bank.

Performance Dump Request

This message is used for requesting the Nord Lead 2X to transmit one Performance Dump Message. The Message Type and Message Specification are used to specify which Performance should be transmitted.

This message is never transmitted *from* the Nord Lead 2X.

Byte (Hex)	Byte (Decimal)	Description
$F0	240	System Exclusive
$33	51	Manufacturer ID (clavia)
<Device ID>		= Global MIDI Channel. 0 to 15 ($0-$F).
$04	4	Model ID for Nord Lead 2X
$28 or $29-$2C	40 or 41-44	Message Type specifies Performance Edit Buffer (40) or Performance Banks 1-4. (41-44).
$00 or $00-$63	0 or 0 to 99	Message Specification specifies the Performance number, see below.
$F7	247	End Of Exclusive

- If Message Type = 40 (Edit Buffer), the Message Specification should always 0.

- If Message Type = 41 or 42, then the Message Specification (00 to 99) corresponds to the Performance Number (A0 to L9).

All Controllers Request

This message instructs the Nord Lead 2X to send all current Controller values for a specified Slot (see page 78). The message is never transmitted *from* the Nord Lead 2X.

Byte (Hex)	Byte (Decimal)	Description
$F0	240	System Exclusive
$33	51	Manufacturer ID (clavia)
<Device ID>		= Global MIDI Channel. 0 to 15 ($0-$F).
$04	4	Model ID for Nord Lead 2X
$14	20	Message Type specifies All Controllers Request.
$00-$03	0 to 3	Message Specification specifies the Slot.
$F7	247	End Of Exclusive

Patch and Performance Data Formats

In the Patch and Performance Dump Messages, the Data Bytes contain the actual Patch/Performance settings.

- All parameters are in 8 bit format, 2s complement (=signed). Each Byte is Nybbleized and coded into two MIDI bytes, with the low Nybble transmitted first.
- A Patch contains 66 parameters, which means the data block of a Patch Dump is transmitted in 132 (66*2) Bytes. See the “Patch Dump Format” table, below.
- A Performance consists of five blocks. The first four blocks contains the four Patches (A to D) This block is 528 MIDI Bytes (4*66*2). After this follows 180 (90*2) of data for parameters local to the Performance. See the “Performance Data Format” table, on page 112.

Patch Dump Format

Size	*Offset*	*Name*	*Min*	*Max*	*Comment*
1	0	osc2pitch	0	120	middle=60
1	1	osc2pitchfine	0	127	
1	2	mix	0	127	
1	3	cutoff	0	127	
1	4	resonance	0	127	
1	5	filterenvamt	0	127	
1	6	pw	0	127	
1	7	fmdepth	0	127	
1	8	filterenvattack	0	127	
1	9	filterenvdecay	0	127	
1	10	filterenvsustain	0	127	
1	11	filterenvrelease	0	127	
1	12	ampenvattack	0	127	
1	13	ampenvdecay	0	127	
1	14	ampenvsustain	0	127	
1	15	ampenvrelease	0	127	
1	16	portamento	0	127	
1	17	gain	0	127	
1	18	modenvattack	0	127	
1	19	modenvdecay	0	127	
1	20	modenvlevel	0	127	middle=64
1	21	lfo1rate	0	127	
1	22	lfo1level	0	127	
1	23	lfo2rate	0	127	
1	24	arprange	0	127	
1	25	osc2pitch_sens	-128	127	velocity/morf sens
1	26	osc2pitchfine_sens	-128	127	0=OFF
1	27	mix_sens	-128	127	
1	28	cutoff_sens	-128	127	
1	29	resonance_sens	-128	127	
1	30	filterenvamt_sens	-128	127	
1	31	pw_sens	-128	127	
1	32	fmdepth_sens	-128	127	
1	33	filterenvattack_sens	-128	127	
1	34	filterenvdecay_sens	-128	127	
1	35	filterenvsustain_sens	-128	127	
1	36	filterenvrelease_sens	-128	127	
1	37	ampenvattack_sens	-128	127	
1	38	ampenvdecay_sens	-128	127	
1	39	ampenvsustain_sens	-128	127	
1	40	ampenvrelease_sens	-128	127	
1	41	portamento_sens	-128	127	
1	42	gain_sens	-128	127	
1	43	modenvattack_sens	-128	127	
1	44	modenvdecay_sens	-128	127	
1	45	modenvlevel_sens	-128	127	
1	46	lfo1rate_sens	-128	127	
1	47	lfo1level_sens	-128	127	
1	48	lfo2rate_sens	-128	127	
1	49	arprange_sens	-128	127	
1	50	osc1waveform	0	3	3=sine
1	51	osc2waveform	0	3	3=noise
1	52	sync/ringmod/distortion	bit 0 = sync on/off, bit 1 = ring mod on/off, bit 4 = filter dist on/off		
1	53	filtertype	0	4	
1	54	osc2kbdtrack	0	1	

Size	Offset	Name	Min	Max	Comment
1	55	filterkbdtrack	0	3	
1	56	lfo1wave	0	4	
1	57	lfo1dest	0	4	
1	58	voicemode	0	2	
1	59	modwheeldest	0	4	
1	60	unison	0	1	
1	61	modenvdest	0	3	
1	62	auto	0	1	
1	63	filtervel	0	1	
1	64	octshift	0	4	
1	65	lfo2dest/arpmode	0	8	8 = off

For Percussion Kit Sys Ex Dumps, the above parameters will be repeated eight times, once for each sound in the Percussion Kit.

Performance Data Format

Size	Offset	Name	Min	Max	Comment
264	0	"performance_patch [A,B,C,D]"			see PATCH data format
4	264	"midichan [A,B,C,D]"	0	15	
4	268	"lfo1sync [A,B,C,D]"	0	7	
4	272	"lfo2sync [A,B,C,D]"	0	7	
4	276	"filterenvtrig [A,B,C,D]"	0	1	
4	280	"filterenvtrigmidichan [A,B,C,D]"	0	15	
4	284	"filterenvtrignotenr [A,B,C,D]"	23	127	23=off
4	288	"ampenvtrig [A,B,C,D]"	0	1	
4	292	"ampenvtrigmidichan [A,B,C,D]"	0	15	
4	296	"ampenvtrignotenr [A,B,C,D]"	23	127	23=off
4	300	"morftrig [A,B,C,D]"	0	1	
4	304	"morftrigmidichan [A,B,C,D]"	0	15	
4	308	"morftrignotenr [A,B,C,D]"	23	127	23=off
1	312	bendrange	0	8	
1	313	unisondetune	0	8	
1	314	outmode[cd]+ outmode[ab]	0	3	Upper nybble = mode for output c/d
1	315	globalmidichan	0	15	not received!!!
1	316	midiprogchange	0	1	not received!!!
1	317	midicntrl	0	1	not received!!!
1	318	mastertune	-99	99	not received!!!
1	319	pedaltype	0	2	not received!!!
1	320	localcontrol	0	1	not received!!!
1	321	Keyboard Octave Shift	0	4	not received!!!
1	322	selected_channel	0	3	
1	323	Arpeggio MIDI Out	0	1	not received!!!
4	324	"channel_actived [A,B,C,D]"	0	1	
4	328	"pgmselect [A,B,C,D]"	0	98	
4	332	"bankselect [A,B,C,D]"	0	3	
4	336	channel pressure amt. [A,B,C,D]	0	7	
4	340	channel pressure dest. [A,B,C,D]	0	4	
4	344	expression pedal amt. [A,B,C,D]	0	7	
4	348	expression pedal dest. [A,B,C,D]	0	4	
1	352	keyboard split	0	1	
1	353	splitpoint	0	127	

MIDI Implementation Chart

Model: Clavia Nord Lead 2X (Keyboard and Rack)
Date: 2003-04-01

Function		Transmitted	Recognized	Remarks
Basic Channel	Default Channel	1 – 16 1 – 16	1 – 16 1 – 16	
Mode	Default Messages Altered	Mode 3 X **********	Mode 3 X	
Note Number	 True Voice	0 – 127 **********	0 – 127 0 – 127	
Velocity	Note ON Note OFF	O v = 1 – 127 X	O v = 1 – 127 X	
After Touch	Key's Ch's	X X	X O	
Pitch Bender		O	O	
Control Change		O	O	See the MIDI implementation on page 103.
Prog Change	 True #	O 0 – 109	O 0 – 109	
System Exclusive		O	O	See the MIDI implementation on page 103.
System Common	: Song Pos : Song Sel : Tune	X X X	X X X	
System Real Time	: Clock : Commands	X X	O X	
Aux Mes- sages	: Local ON/OFF : All Notes Off : Active Sense : Reset	X X X X	X X X X	
Notes				

Mode 1: OMNI ON, POLY
Mode 2: OMNI ON, MONO
Mode 3: OMNI OFF, POLY
Mode 4: OMNI OFF, MONO

O: Yes
X: No