Prophet-5 MIDI Implementation

The Prophet-5 receives MIDI data according to the settings you have chosen in GLOBALS. In addition, there is interaction between some of the program parameters that determine the overall response of Prophet-5 to MIDI data. These are the GLOBALS parameters that affect response to MIDI:

MIDI Channel: All, 1…16—Selects which MIDI channel to send and receive data, 1 to 16. All receives on all 16 channels.

Param Xmit: Off, CC, NRPN—Changes to the values of front panel controls are transmitted via MIDI as Continuous Controllers (CC) or Non-Registered Parameter Number (NRPN). Transmission of parameters can also be turned off.

NRPNs are the preferred method of parameter transmission, since they cover the complete range of all parameters, while CCs are limited to a range of 128

Param Rcv: Off, CC, NRPN—Sets the method by which parameter changes are received via MIDI. As with transmission, NRPNs are the preferred method.

MIDI Control: On, Off— Sets the Prophet-5's ability to receive MIDI messages. When set to On, the synth will respond to MIDI controllers, including pitch wheel, mod wheel, pedal, and volume.

MIDI SysEx: MIDI, USB—When set to MIDI it will receive and transmit MIDI SysEx messages using the MIDI ports/cables When set to USB it will receive and transmit MIDI SysEx messages using the USB port/cable. MIDI SysEx messages are used when sending and receiving a variety of data including, programs, alternative tunings, system updates, and more.

MIDI Out: MIDI, USB, ALL—Sets the port, MIDI and/or USB, by which MIDI signals are sent.

MIDI Messages

Received Channel Messages

Status	Second	Third	Description
1000 nnnn	0kkkkkkk	0vvvvvvv	Note Off. Velocity is ignored
1001 nnnn	0kkkkkkk	0vvvvvvv	Note On. Note off if vvvvvvv = 0
1010 nnnn	0kkkkkkk	0vvvvvvv	Polyphonic Key Pressure
1011 nnnn	0vvvvvvv	0vvvvvvv	Control Change; see “Received Controller Messages”
1100 nnnn	0ppppppp		Program change, 0-39 for Programs 0-7 within Bank 1, 8-15 within Bank 2, 16-23 within Bank 4, and 24-31 within Bank 5
1101 nnnn	0vvvvvvv		Channel Pressure
1110 nnnn	0vvvvvvv	0vvvvvvv	Pitch Bend LS Byte then MS Byte

Notes: 0kkkkkkk Note number 0-127
nnnn Channel number 0 to 15 (MIDI channel 1-16). Ignored if MIDI channel set to ALL
0vvvvvvv Value

Received Controller Messages

Status	Second	Third	Description
1011 nnnn	0000 0001	0vvvvvvv	Mod Wheel: directly assignable controller
1011 nnnn	0000 0100	0vvvvvvv	Foot Controller: directly assignable controller
1011 nnnn	0100 1010	0vvvvvvv	Brightness: Added to filter cutoff frequency
1011 nnnn	0010 0000	0vvvvvvv	Bank Select: 1 - 5 select user banks 1 - 5; 6 - 9 select factory banks 1 - 4
1011 nnnn	0100 0000	0vvvvvvv	Damper pedal: Holds envelopes in Sustain if 0100 0000 or higher
1011 nnnn	0111 1011	0vvvvvvv	All Notes Off: Clear all MIDI notes
1011 nnnn	0111 1001	0vvvvvvv	Reset All Controllers: Clears all MIDI controllers to 0, MIDI volume to maximum

See subsequent sections for additional Continuous Controller (CC) and Non-Registered Parameter Number (NRPN) messages received.

Transmitted Channel Messages

Status	Second	Third	Description
1000 nnnn	0kkkkkkk	0000000	Note Off.
1001 nnnn	0kkkkkkk	0vvvvvvv	Note On.
1011 nnnn	0vvvvvvv	0vvvvvvv	Control Change; see “Transmitted Controller Messages”
1100 nnnn	0ppppppp		Program change
1101 nnnn	0vvvvvvv		Channel Pressure
1110 nnnn	0vvvvvvv	0vvvvvvv	Pitch Bend LS Byte then MS Byte

Notes: 0kkkkkkk Note number 0 — 127
nnnn Channel number 0 to 15 (MIDI channel 1-16). Ignored if MIDI channel set to ALL
0vvvvvvv Value

Transmitted Controller Messages

Status	Second	Third	Description
1011 nnnn	0000 0001	0vvvvvvv	Mod Wheel
1011 nnnn	0000 0010	0vvvvvvv	Breath Controller: When assigned to Pedal/CV
1011 nnnn	0000 0100	0vvvvvvv	Foot Controller: When assigned to Pedal/CV
1011 nnnn	0000 1101	0vvvvvvv	Expression: When assigned to Pedal/CV
1011 nnnn	0000 0111	0vvvvvvv	Volume: When assigned to Pedal/CV
1011 nnnn	0100 1010	0vvvvvvv	Brightness: Assigned to Pedal/CV
1011 nnnn	0010 0000	0vvvvvvv	Bank Select: 1 - 5
1011 nnnn	0100 0000	0vvvvvvv	Damper pedal: Sends 0 if off, 0111 1111 when on

See sections that follow for additional Continuous Controller (CC) and Non-Registered Parameter Number (NRPN) messages transmitted.

Additional Continuous Controllers Transmitted/Received

The following table details how MIDI Continuous Controllers (CCs) are mapped to Prophet-5 controls. They are transmitted when Param Xmit is set to CC, and recognized/received when Param Rcv is set to CC.

CC#	Param	Range
3	OSC A FREQUENCY	0-120
7	MASTER VOLUME	0-120
9	OSC B FREQUENCY	0-120
14	OSC B FINE TUNE	0-127
15	OSC A SAW ON/FF	0-1
20	OSC A SQUARE ON/OFF	0-1
21	OSC A PULSE WIDTH	0-120
22	OSC B PULSE WIDTH	0-120
23	OSC SYNC ON/OFF	0-1
24	OSC B LOW FREQ ON/OFF	0-1
25	OSC B KEYBOARD ON/OFF	0-1
26	GLIDE RATE	0-120
27	OSC A LEVEL	0-120
28	OSC B LEVEL	0-120
29	NOISE LEVEL	0-120
30	OSC B SAW ON/OFF	0-1
31	RESONANCE	0-120
35	FILTER KEYBOARD TRACK OFF/HALF/FULL	0-2
41	FILTER REV SELECT	0-1
46	LFO FREQUENCY	0-120
47	LFO INITIAL AMOUNT	0-120
52	OSC B TRI ON/OFF	0-1
53	LFO SOURCE MIX	0-120
54	LFO FREQ A ON/OFF	0-1
55	LFO FREQ B ON/OFF	0-1
56	LFO FREQ PW A ON/OFF	0-1
57	LFO FREQ PW B ON/OFF	0-1
58	LFO FILTER ON/OFF	0-1
59	POLY MOD FILT ENV AMOUNT	0-127
60	POLY MOD OSC B AMOUNT	0-120
61	POLY MOD FREQ A ON/OFF	0-1
62	POLY MOD PW ON/OFF	0-1

CC#	Param	Range
63	POLY MOD FILTER ON/OFF	0-1
70	PITCH WHEEL RANGE	0-11
71	RETRIGGER AND UNISON ASSIGN	0-3
73	CUTOFF	0-120
74	BRIGHTNESS	0-127
85	VINTAGE	0-127
86	PRESSURE FILTER	0-1
87	PRESSURE LFO	0-1
89	ENVELOPE FILTER AMOUNT	0-120
90	ENVELOPE FILTER VELOCITY ON/OFF	0-1
102	ENVELOPE VCA VELOCITY ON/OFF	0-1
103	ATTACK FILTER	0-120
104	ATTACK VCA	0-120
105	DECAY FILTER	0-120
106	DECAY VCA	0-120
107	SUSTAIN FILTER	0-120
108	SUSTAIN VCA	0-120
109	RELEASE FILTER	0-120
110	RELEASE VCA	0-120
111	RELEASE ON/OFF	0-1
112	UNISON ON/OFF	0-1
113	UNISON VOICE COUNT	0-10
114	UNISON DETUNE	0-7
116	OSC B SQUARE ON/OFF	0-1
117	LFO SAW ON/OFF	0-1
118	LFO TRI ON/OFF	0-1
119	LFO SQUARE ON/OFF	0-1

NRPN Messages

The Non-Registered Parameter Number (NRPN) MIDI messages are used to transmit and receive both global and program parameters. They are transmitted when MIDI Parameter Send is set to NRPN in GLOBALS, and received when MIDI Parameter Receive is set to NRPN in GLOBALS.

The messages are handled in standard MIDI format using the NRPN CC commands in running status byte format. Below is the format used for transmitting a NRPN parameter.

Transmitted NRPN Messages

Status	Description
1011 nnnn	Control Change
0110 0011	NRPN parameter number MSB CC
0vvv vvvv	Parameter Number MSB
0110 0010	NRPN parameter number LSB CC
0vvv vvvv	Parameter Number LSB
0000 0110	NRPN parameter value MSB CC
0vvv vvvv	Parameter value MSB
0010 0110	NRPN parameter value LSB CC
0vvv vvvv	Parameter value LSB

The parameter number can be found in the two tables below, one for global parameters, and the other for program parameters. The parameter numbers and the parameter values are broken into two 7-bit bytes for MIDI transmission; the LSB has the seven least-significant bits, and the MSB has the seven most-significant bits, though in most cases the MSB will be zero or one, and never more than two.

When receiving an NRPN, all messages do not necessarily need to be transmitted, since the synth will track the most recent NRPN number, though it is usually good practice to send the entire message above.

Once an NRPN is selected, the synth will also respond to NRPN Data Increment and Decrement commands, which some controllers utilize. Finally, it responds to one RPN (Registered Parameter Number) command, the RPN/NRPN Reset command, which can be handy for resetting the currently selected parameter to a known state.

Received NRPN Messages

Status	Second	Third	Description
1011 nnnn	0110 0011	0vvvvvvv	NRPN parameter number MSB CC
1011 nnnn	0110 0010	0vvvvvvv	NRPN parameter number LSB CC
1011 nnnn	0000 0110	0vvvvvvv	NRPN parameter value MSB CC
1011 nnnn	0010 0110	0vvvvvvv	NRPN parameter value LSB CC
1011 nnnn	0110 0000	0xxxxxxx	NRPN parameter value Increment
1011 nnnn	0110 0001	0xxxxxxx	NRPN parameter value Decrement
1011 nnnn	0010 0101	0111111	RPN parameter number MSB CC - Reset NRPN parameter number (when both MSB and LSB received)
1011 nnnn	0010 0100	0111111	RPN parameter number LSB CC - Reset NRPN parameter number (when both MSB and LSB received)

Control NRPN Data

The following table lists the Prophet-5's control NRPN data. It is received and transmitted but not saved as part of a program.

Name	NRPN	Range
OSC A FREQUENCY	0	0-120
OSC B FREQUENCY	1	0-120
OSC B FINE TUNE	2	0-127
OSC A SAW ON/FF	3	0-1
OSC A SQUARE ON/OFF	4	0-1
OSC B SAW ON/OFF	5	0-1
OSC B TRI ON/OFF	6	0-1
OSC B SQUARE ON/OFF	7	0-1
OSC A PULSE WIDTH	8	0-120
OSC B PULSE WIDTH	9	0-120
OSC SYNC ON/OFF	10	0-1
OSC B LOW FREQ ON/OFF	11	0-1
OSC B KEYBOARD ON/OFF	12	0-1
GLIDE RATE	13	0-120
OSC A LEVEL	14	0-120
OSC B LEVEL	15	0-120
NOISE LEVEL	16	0-120
CUTOFF	17	0-120
RESONANCE	18	0-120
FILTER KEYBOARD TRACK OFF/HALF/FULL	19	0-2
FILTER REV SELECT	20	0-1
LFO FREQUENCY	21	0-120
LFO INITIAL AMOUNT	22	0-120
LFO SAW ON/OFF	23	0-1
LFO TRI ON/OFF	24	0-1
LFO SQUARE ON/OFF	25	0-1

Name	NRPN	Range
LFO SOURCE MIX	26	0-120
LFO FREQ A ON/OFF	27	0-1
LFO FREQ B ON/OFF	28	0-1
LFO FREQ PW A ON/ OFF	29	0-1
LFO FREQ PW B ON/OFF	30	0-1
LFO FILTER ON/OFF	31	0-1
POLY MOD FILT ENV AMOUNT	32	0-127
POLY MOD OSC B AMOUNT	33	0-120
POLY MOD FREQ A ON/OFF	34	0-1
POLY MOD PW ON/OFF	35	0-1
POLY MOD FILTER ON/OFF	36	0-1
VINTAGE	37	0-127
AFTERTOUCH > FILTER	38	0-1
AFTERTOUCH > AMP	39	0-1
ENV FILTER AMOUNT	40	0-120
VELOCTIY > FILTER	41	0-1
VELOCITY > AMP	42	0-1
ATTACK FILTER	43	0-120
ATTACK VCA	44	0-120
DECAY FILTER	45	0-120
DECAY VCA	46	0-120
SUSTAIN FILTER	47	0-120
SUSTAIN VCA	48	0-120
RELEASE FILTER	49	0-120
RELEASE VCA	50	0-120
RELEASE SWITCH	51	0-1
UNISON ON/OFF	52	0-1
UNISON VOICE COUNT	53	0-10

Control NRPN Data (Continued)

The following table lists the Prophet-5's control NRPN data. It is received and transmitted but not saved as part of a program.

Name	NRPN	Range
UNISON DETUNE	54	0-7
UNISON NOTE	55-64	1-10
RESERVED	65-85	
PITCH WHEEL RANGE	86	0-11
RETRIGGER AND UNISON	87	0-3
RESERVED	88-94	
TRANSPOSE	4096	0-24
MIDI CHANNEL	4097	0-16
PARAM XMIT	4098	0-2
PARAM RCV	4099	0-2
MIDI CONTROL	4100	0-1
MIDI SYSEX	4101	0-1
MIDI OUT	4102	0-3
LOCAL CONTROL	4103	0-2
POT MODE	4104	0-2
SUSTAIN MODE	4105	0-1
PEDAL MODE	4106	0-1
ALT TUNINGS	4107	0-15
VEL RESPONSE	4108	0-7
AFTERTOUCH RESPONSE	4109	0-7

SysEx Messages

Universal System Exclusive Message (Device Inquiry)

Status	Description
1111 0000	System Exclusive (SysEx)
0111 1110	Non-realtime message
0vvv vvvv	If MIDI channel is set to 1 - 16, 0vvvvvvv must match (unless MIDI Channel = ALL); always responds if 0vvvvvvv = 0111 1111.
0000 0110	Inquiry Message
0000 0001	Inquiry Request
1111 0111	End of Exclusive (EOX)

The Prophet-5 responds with:

Status	Description
1111 0000	System Exclusive (SysEx)
0111 1110	Non-realtime message
0vvv vvvv	If MIDI Channel = ALL, 0vvvvvvv = 0111 1111. Otherwise 0vvvvvvv = Channel Number 0 - 15.
0000 0110	Inquiry Message
0000 0010	Inquiry Reply
0000 0001	DSI ID
0011 0001	Prophet-5 ID (Family LS)
0000 0001	Family MS
0000 0000	Family Member LS
0000 0000	Family Member MS
0000 nnnn	Main OS Version High Byte
0000 nnnn	Main OS Version Middle Byte
0000 nnnn	Main OS Version Low Byte
1111 0111	End of Exclusive (EOX)

Request Program Dump

Status	Description
1111 0000	System Exclusive (SysEx)
0000 0001	DSI ID
0011 0001	Prophet-5 ID
0000 0101	Request Program Transmit
0000 00vv	Bank Number, 0 - 7
0vvv vvvv	Program Number, 0 - 127
1111 0111	End of Exclusive (EOX)

The Prophet-5 will respond by sending out the program data in the format described below in *Program Data Dump*.

Request Program Edit Buffer Dump

Status	Description
1111 0000	System Exclusive (SysEx)
0000 0001	DSI ID
0011 0001	Prophet-5 ID
0000 0110	Request Program Edit Buffer Transmit
1111 0111	End of Exclusive (EOX)

The Prophet-5 will respond by sending out the current program edit buffer in the format described below in *Program Edit Buffer Data Dump*.

Request Global Parameter Dump

Status	Description
1111 0000	System Exclusive (SysEx)
0000 0001	DSI ID
0011 0001	Prophet-5 ID
0000 1110	Request Global Parameter Transmit
1111 0111	End of Exclusive (EOX)

The Prophet-5 will respond by sending out the current values of the global parameters in the format described in *Global Parameters Data Dump*.

Program Data Dump

Status	Description
1111 0000	System Exclusive (SysEx)
0000 0001	DSI ID
0011 0001	Prophet-5 ID
0000 0010	Program Data
0000 00vv	Group Number: 0 - 9
0vvv vvvv	Program Number: 0 - 39
0vvv vvvv	128 bytes expanded to 152 MIDI bytes in “packed MS bit” format
1111 0111	End of Exclusive (EOX)

Program Edit Buffer Data Dump

Status	Description
1111 0000	System Exclusive (SysEx)
0000 0001	DSI ID
0011 0001	Prophet-5 ID
0000 0011	Edit Buffer Data
0vvv vvvv	128 bytes expanded to 152 MIDI bytes in “packed MS bit” format
1111 0111	End of Exclusive (EOX)

Save Edit Buffer

Status	Description
1111 0000	System Exclusive (SysEx)
0000 0001	DSI ID
0011 0001	Prophet-5 ID
0000 0101	Request Program Transmit
0000 00vv	Bank Number, 0 - 7
0vvv vvvv	Program Number, 0 - 127
1111 0111	End of Exclusive (EOX)

Global Parameters Data Dump

Value	Description
1111 0000	System Exclusive (SysEx)
0000 0001	DSI ID
0011 0001	Prophet-5 ID
0000 1111	Main Parameter Data
0vvv vvvv	27 nibbles (LS then MS) for 32 Global parameters
1111 0111	End of Exclusive (EOX)

The Global Parameters Data Dump is not recognized when received. It is only transmitted when requested. NRPN messages are used to change Globals.

The 128 “packed” parameter bytes in the program dump follow the order of the NRPN list, one byte per parameter, and padded with zeros from the final parameter to the 128th byte.

Packed Data Format

Data is packed in 8 byte “packets”, with the MS bit stripped from 7 parameter bytes, and packed into an eighth byte, which is sent at the start of the 8 byte packet.

Example:

Input Data

```
1 A7 A6 A5 A4 A3 A2 A1 A0
2 B7 B6 B5 B4 B3 B2 B1 B0
3 C7 C6 C5 C4 C3 C2 C1 C0
4 D7 D6 D5 D4 D3 D2 D1 D0
5 E7 E6 E5 E4 E3 E2 E1 E0
6 F7 F6 F5 F4 F3 F2 F1 F0
7 G7 G6 G5 G4 G3 G2 G1 G0
```

Packed MIDI data

```
1   00 G7 F7 E7 D7 C7 B7 A7
2   00 A6 A5 A4 A3 A2 A1 A0
3   00 B6 B5 B4 B3 B2 B1 B0
4   00 C6 C5 C4 C3 C2 C1 C0
5   00 D6 D5 D4 D3 D2 D1 D0
6   00 E6 E5 E4 E3 E2 E1 E0
7   00 F6 F5 F4 F3 F2 F1 F0
8   00 G6 G5 G4 G3 G2 G1 G0
```