Take 5 MIDI Implementation

The Take 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 the Take 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.

MIDI Param Snd: 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

MIDI 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 Take 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 Syx On: On, Off--- When set to On it will receive and transmit MIDI SysEx messages using the selected ports/cables. MIDI SysEx messages are used when sending and receiving a variety of data including, programs, alternative tunings, system updates, and more.

MIDI Syx Cable: 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 over a USB cable.

MIDI Out Select: 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: for programs 1-16 of the selected bank
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	0000 1011	0vvvvvvv	Expression: When assigned to Pedal/CV
1011 nnnn	0100 1010	0vvvvvvv	Brightness: Added to filter cutoff frequency
1011 nnnn	0010 0000	0vvvvvvv	Bank Select: 0 - 7 select user banks 1 - 8; 8 - 15 select factory banks 1 - 8
1011 nnnn	0100 0000	0vvvvvvv	Damper pedal: any non-zero value is on.
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 1011	0vvvvvvv	Expression: When assigned to Pedal/CV
1011 nnnn	0000 0111	0vvvvvvv	Volume
1011 nnnn	0100 1010	0vvvvvvv	Brightness: Assigned to Pedal/CV
1011 nnnn	0010 0000	0vvvvvvv	Bank Select: 0 - 7 select user banks 1 - 8; 8 - 15 select factory banks 1 - 8
1011 nnnn	0100 0000	0vvvvvvv	Damper pedal: Any non-zero value is 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 Take 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
1	Mod Wheel	0-127
2	Breath	0-127
3	BPM	0-127
4	Foot Controller	0-127
5	Glide Mode	0-4
6	Data Entry MSB	0-127
7	Master Volume	0-127
8	Osc1 Octave	0-4
9	Osc1 Fine Freq	0-127
10	Osc1 Shape	0-127
11	Expression Pedal	0-127
12	Voice Volume	0-127
13	Osc2 Octave	0-4
14	Osc2 Fine Freq	0-127
15	Osc2 Shape	0-127
16	FX On/Off	0-1
17	FX Type	0-8
18	FX Depth/Mix	0-127
19	FX Time	0-127
20	FX Feedback/Misc	0-127
21	FX Clock Sync On/Off	0-1
22	FX Clock Sync Rate	0-10
23	Reverb On/Off	0-1
24	Reverb Wet/Dry Mix	0-127
25	Reverb Size	0-127
26	Reverb Predelay	0-127
27	Reverb Decay	0-127
28	Reverb Tone	0-127
29	-1 Oct	0-1
30	-2 Oct	0-1
31	Unison On/Off	0-1
32	Bank Select LSB	0-127

CC#	Param	Range
33	Filter Cutoff	0-127
34	Filter Resonance	0-127
35	Filter Drive	0-127
36	Filter Key Tracking	0-127
37	Vintage	0-127
38	Data Entry LSB	0-127
39	Osc Sync	0-1
40	Osc1 Level	0-127
41	Osc2 Level	0-127
42	Sub Osc Level	0-127
43	Noise Level	0-127
44	FM On/Of	0-1
45	Env1 Delay	0-127
46	Env1 Attack	0-127
47	Env1 Decay	0-127
48	Env1 Sustain	0-127
49	Env1 Release	0-127
50	Env1 Amount	0-127
51	Env1 Vel. On/Off	0-1
52	Env2 Del	0-127
53	Env2 Attack	0-127
54	Env2 Decay	0-127
55	Env2 Sustain	0-127
56	Env2 Release	0-127
57	Env2 Amount	0-127
58	Env2 Vel. On/Off	0-1
59	Arp On/Off	0-1
60	Arp Mode	0-2
61	Arp Octave	0-2
62	Arp Repeats	0-3
63	Clock Divide	0-7
64	Sustain Pedal	0-127
65	Osc1 Glide Rate	0-127
66	Osc2 Glide Rate	0-127
67	Distortion	0-127
68	Glide On/Off	0-1

CC#	Param	Range
69	Env Routing	0-2
70	Unison Voice Count	0-5
71	Unison Detune	0-7
72	Unison Key Mode	0-2
73	Unison Retrigger	0-1
74	Brightness	0-127
75	LFO1 Freq	0-127
76	LFO1 Amount	0-127
77	LFO1 Shape	0-4
78	LFO1 Sync On/Off	0-1
79	LFO1 Note Reset	0-1
80	LFO2 Freq	0-127
81	LFO2 Amount	0-127
82	LFO2 Shape	0-4
83	LFO2 Sync On/Off	0-1
84	LFO2 Note Reset	0-1
85	Pitch Bend Range Up	0-12
86	Pitch Bend Range Down	0-24
87	Osc1 Key Tracking On/Off	0-1
88	Osc2 Key Tracking On/Off	0-1
89	Key Split Note	0-44

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 Take 5's control NRPN data. It is received and transmitted but not saved as part of a program.

Name	NRPN	Range
BPM	0	30-249
Program Volume	1	0-127
Osc1GlideRate	2	0-127
Osc2GlideRate	3	0-127
Glide On/Off	4	0-1
GlideMode	5	0-4
Osc12Sync	6	0-1
Osc1KeyOnOff	7	0-1
Osc1Octave	8	0-4
Osc1FreqFine	9	0-1400
Osc1Shape	10	0-127
FM On/Off	11	0-1
Osc2KeyOnOff	12	0-1
Osc2Octave	13	0-4
Osc2FreqFine	14	0-1400
Osc2Shape	15	0-127
FXOnOff	16	0-1
FXSelect	17	0-8
FXMix	18	0-127
FXTime	19	0-127
FXMisc	20	0-127
FXSync	21	0-1
FXSyncRate	22	0-10
ReverbOnOff	23	0-1
ReverbMix	24	0-127
ReverbSize	25	0-127
ReverbPredelay	26	0-127
ReverbDecay	27	0-127
ReverbTone	28	0-127

Name	NRPN	Range
FilterFreq	29	0-1023
FilterFreqMSB	30	n/a
FilterResonance	31	0-127
FilterDrive	32	0-127
FilterKeyAmt	33	0-127
Vintage	34	0-127
OverdriveAmt	35	0-127
Osc1Level	36	0-127
Osc2Level	37	0-127
Osc1SubLevel	38	0-127
NoiseLevel	39	0-127
Env1AuxDest	40	0-54
Env1Del	41	0-127
Env1Att	42	0-127
Env1Dec	43	0-127
Env1Sus	44	0-127
Env1Rel	45	0-127
Env1Amt	46	0-255
Env1VelocityOnOff	47	0-1
Env2Del	48	0-127
Env2Att	49	0-127
Env2Dec	50	0-127
Env2Sus	51	0-127
Env2Rel	52	0-127
Env2Amt	53	0-255
Env2VelocityOnOff	54	0-1
Env Routing	55	0-2
UnisonOn/Off	56	0-1
UnisonVoiceCount	57	0-5
UnisonDetune	58	0-7

Control NRPN Data (Continued)

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

Name	NRPN	Range
UnisonKeyMode	59	0-2
UnisonRetrigger	60	0-1
LFO1Freq	61	0-127
LFO1Amt	62	0-255
LFO1Shape	63	0-4
LFO1Sync	64	0-1
LFO1FreqSync	65	0-15
LFO1NoteReset	66	0-1
LFO2Freq	68	0-127
LFO2Amt	69	0-255
LFO2Shape	70	0-4
LFO2Sync	71	0-1
LFO2FreqSync	72	0-15
LFO2NoteReset	73	0-1
Pitch Bend Range Up	75	0-12
Pitch Bend Range Down	76	0-24
Mod1Source	77	0-19
Mod2Source	78	0-19
Mod3Source	79	0-19
Mod4Source	80	0-19
Mod5Source	81	0-19
Mod6Source	82	0-19
Mod7Source	83	0-19
Mod8Source	84	0-19
Mod9Source	85	0-19
Mod10Source	86	0-19
Mod11Source	87	0-19
Mod12Source	88	0-19
Mod13Source	89	0-19
Mod14Source	90	0-19
Mod15Source	91	0-19
Mod16Source	92	0-19

Name	NRPN	Range
Mod1Amt	93	0-255
Mod2Amt	94	0-255
Mod3Amt	95	0-255
Mod4Amt	96	0-255
Mod5Amt	97	0-255
Mod6Amt	98	0-255
Mod7Amt	99	0-255
Mod8Amt	100	0-255
Mod9Amt	101	0-255
Mod10Amt	102	0-255
Mod11Amt	103	0-255
Mod12Amt	104	0-255
Mod13Amt	105	0-255
Mod14Amt	106	0-255
Mod15Amt	107	0-255
Mod16Amt	108	0-54
Mod1Dest	109	0-54
Mod2Dest	110	0-54
Mod3Dest	111	0-54
Mod4Dest	112	0-54
Mod5Dest	113	0-54
Mod6Dest	114	0-54
Mod7Dest	115	0-54
Mod8Dest	116	0-54
Mod9Dest	117	0-54
Mod10Dest	118	0-54
Mod11Dest	119	0-54
Mod12Dest	120	0-54
Mod13Dest	121	0-54
Mod14Dest	122	0-54
Mod15Dest	123	0-54
Mod16Dest	124	0-54

Control NRPN Data (Continued)

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

Name	NRPN	Range
Arp On/Off	163	0-1
Arp Mode	164	0-2
Arp Range	165	0-2
Arp Repeats	166	0-3
Clock Division	167	0-7
Arp Relatch	168	0-1
-1 Oct	169	0-1
Key Slit Note	170	0-44
-2 Oct	171	0-1
SeqOnOff	4198	0-1
SeqRecordArm	4199	0-1

Global NRPN Data

The following table lists the Take 5's Global NRPN data.

Name	NRPN	Range
Master Course Tune	4096	0-24
Master Fine Tune	4097	0-100
MIDI Channel	4098	0-16
MIDI Clock Mode	4099	0-5
Clock Cable In	4100	0-1
Clock Cable Out	4101	0-2
MIDI Param Send	4102	0-2
MIDI Param Receive	4103	0-2
MIDI Control	4104	0-1
MIDI Sysex On/Off	4105	0-1
MIDI Sysex Cable	4106	0-1
MIDI Out Select	4107	0-3
MIDI Program Send	4108	0-1
MIDI Program Receive	4109	0-1
MIDI Arp Notes	4110	0-1
Local Control On/Off	4111	0-1
Mono/Stereo	4112	0-1
Pot Mode	4113	0-2
Pedal Function	4114	0-4
Pedal Polatiry	4115	0-1
Foot Funtion	4116	0-2
Scale (Alt Tune)	4117	0-63
Aftertouch On/Off	4118	0-1
Aftertouch Curve	4119	0-7
Velocity Curve	4120	0-6
Screen Saver On/Off	4121	0-1
Arp Beat Sync	4122	0-1

SysEx Messages

Universal System Exclusive Message (Device Inquiry)

Status	Description	Hex
1111 0000	System Exclusive (SysEx)	F0
0111 1110	Non-realtime message	7E
0vvv vvvv	If MIDI channel is set to 1 - 16, 0vvvvvvv must match (unless MIDI Channel = ALL); always responds if 0vvvvvvv = 0111 1111.	7F
0000 0110	Inquiry Message	06
0000 0001	Inquiry Request	01
1111 0111	End of Exclusive (EOX)	F7

The Take 5 responds with:

Status	Description	Hex
1111 0000	System Exclusive (SysEx)	F0
0111 1110	Non-realtime message	7E
0vvv vvvv	If MIDI Channel = ALL, 0vvvvvvv = 0111 1111. Otherwise 0vvvvvvv = Channel Number 0 - 15.	7F
0000 0110	Inquiry Message	06
0000 0010	Inquiry Reply	02
0000 0001	DSI ID	01
0011 0101	Take 5 ID (Family LS)	35
0000 0001	Family Member MS	1
0000 0000	Family ID LS	00
0000 0000	Family ID MS	00
0000 nnnn	Main OS Version High Byte	00
0000 nnnn	Main OS Version Middle Byte	00
0000 nnnn	Main OS Version Low Byte	00
1111 0111	End of Exclusive (EOX)	F7

Request Program Dump

Status	Description	
1111 0000	System Exclusive (SysEx)	F0
0000 0001	DSI ID	01
0011 0101	Take 5 ID	35
0000 0101	Request Program Transmit	05
0000 00vv	Bank Number, 0 - 7	00
0vvv vvvv	Program Number, 1 - 16	00
1111 0111	End of Exclusive (EOX)	F7

The Take 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)	F0
0000 0001	DSI ID	01
0011 0101	Take 5 ID	35
0000 0110	Request Program Edit Buffer Transmit	06
1111 0111	End of Exclusive (EOX)	F7

The Take 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)	F0
0000 0001	DSI ID	01
0011 0101	Take 5 ID	35
0000 1110	Request Global Parameter Transmit	0E
1111 0111	End of Exclusive (EOX)	F7

The Take 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 0101	Take 5 ID
0000 0010	Program Data
0000 00vv	Bank Number: 0 - 15
0vvv vvvv	Program Number: 1 - 16
0vvv vvvv	4096 bytes expanded to 4695 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 0101	Take 5 ID
0000 0011	Edit Buffer Data
0vvv vvvv	4096 bytes expanded to 4693 MIDI bytes in "packed MS bit" format
1111 0111	End of Exclusive (EOX)

Global Parameters Data Dump

Value	Description
1111 0000	System Exclusive (SysEx)
0000 0001	DSI ID
0011 0001	Take 5 ID
0000 1111	Main Parameter Data
0vvv vvvv	27 bytes expanded to 32 MIDI bytes in "packed MS bit" format
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.

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:

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