MIDI Implementation

Model: JD-Xi
Date: May 1, 2015
Version: 1.00

1. Data Reception (Sound Source Section)

■ Channel Voice Messages

● Note off

Status	2nd byte	3rd byte
8nH	kkH	vvH
9nH	kkH	00H

n = MIDI channel number: 0H – FH (ch.1 – 16)
kk = note number: 00H – 7FH (0 – 127)
vv = note off velocity: 00H – 7FH (0 – 127)

● Note on

Status	2nd byte	3rd byte
9nH	kkH	vvH

n = MIDI channel number: 0H – FH (ch.1 – 16)
kk = note number: 00H – 7FH (0 – 127)
vv = note on velocity: 01H – 7FH (1 – 127)

● Polyphonic Key Pressure

Status	2nd byte	3rd byte
AnH	kkH	vvH

n = MIDI channel number: 0H – FH (ch.1 – 16)
kk = note number: 00H – 7FH (0 – 127)
vv = Polyphonic Key Pressure: 00H – 7FH (0 – 127)

 * Not received when the Receive Polyphonic Key Pressure parameter (SysEx) is OFF.

● Control Change

○ Bank Select (Controller number 0, 32)

Status	2nd byte	3rd byte
BnH	00H	mmH
BnH	20H	llH

n = MIDI channel number: 0H – FH (ch.1 – 16)
mm, ll = Bank number: 00 00H – 7F 7FH (bank.1 – bank.16384)

 * Not received when the Receive Bank Select parameter (SysEx) is OFF.

The Programs corresponding to each Bank Select are as follows.

BANK SELECT MSB	LSB	PROGRAM NUMBER	GROUP	NUMBER
085	000	001 - 064	User Bank Program (E)	E01 - E64
085	000	065 - 128	User Bank Program (F)	F01 - F64
085	001	001 - 064	User Bank Program (G)	G01 - G64
085	001	065 - 128	User Bank Program (H)	H01 - H64
085	064	001 - 064	Preset Bank Program (A)	A01 - A64
085	064	065 - 128	Preset Bank Program (B)	B01 - B64
085	065	001 - 064	Preset Bank Program (C)	C01 - C64
085	065	065 - 128	Preset Bank Program (D)	D01 - D64
085	096	001 - 064	Extra Bank Program (S)	S01 - S64
:	:	:	:	:
085	103	001 - 064	Extra Bank Program (Z)	Z01 - Z64

The SuperNATURAL Synth Tones corresponding to each Bank Select are as follows.

BANK SELECT MSB	LSB	PROGRAM NUMBER	GROUP	NUMBER
095	064	001 - 128	SuperNATURAL Synth Tone	001 - 128
095	065	001 - 128	SuperNATURAL Synth Tone	129 - 256

The Analog Synth Tones corresponding to each Bank Select are as follows.

BANK SELECT MSB	LSB	PROGRAM NUMBER	GROUP	NUMBER
094	064	001 - 064	Analog Synth Tone	001 - 064

The Drum Kits corresponding to each Bank Select are as follows.

BANK SELECT MSB	LSB	PROGRAM NUMBER	GROUP	NUMBER
086	064	001 - 033	Drum Kit	001 - 033

○ Modulation (Controller number 1)

Status	2nd byte	3rd byte
BnH	01H	vvH

n = MIDI channel number: 0H – FH (ch.1 – 16)
vv = Modulation depth: 00H – 7FH (0 – 127)

 * Not received when the Receive Modulation parameter (SysEx) is OFF.

○ Portamento Time (Controller number 5)

Status	2nd byte	3rd byte
BnH	05H	vvH

n = MIDI channel number: 0H – FH (ch.1 – 16)
vv = Portamento Time: 00H – 7FH (0 – 127)

 * The Portamento Time parameter (TONE:COMMON) will change.

○ Data Entry (Controller number 6, 38)

Status	2nd byte	3rd byte
BnH	06H	mmH
BnH	26H	llH

n = MIDI channel number: 0H – FH (ch.1 – 16)
mm, ll = the value of the parameter specified by RPN/NRPN
mm = MSB, ll = LSB

○ Volume (Controller number 7)

Status	2nd byte	3rd byte
BnH	07H	vvH

n = MIDI channel number: 0H – FH (ch.1 – 16)
vv = Volume: 00H – 7FH (0 – 127)

 * Not received when the Receive Volume parameter (SysEx) is OFF.
 * The Part Level parameter (PROG:MAIN) will change.

○ Panpot (Controller number 10)

Status	2nd byte	3rd byte
BnH	0AH	vvH

n = MIDI channel number: 0H – FH (ch.1 – 16)
vv = Panpot: 00H – 40H – 7FH (Left – Center – Right),

 * Not received when the Receive Pan parameter (SysEx) is OFF.
 * The Part Pan parameter (PROG:MAIN) will change.

○ Expression (Controller number 11)

Status	2nd byte	3rd byte
BnH	0BH	vvH

n = MIDI channel number: 0H – FH (ch.1 – 16)
vv = Expression: 00H – 7FH (0 – 127)

 * Not received when the Receive Expression parameter (SysEx) is OFF.

○ Hold 1 (Controller number 64)

Status	2nd byte	3rd byte
BnH	40H	vvH

n = MIDI channel number: 0H – FH (ch.1 – 16)
vv = Control value: 00H – 7FH (0 – 127) 0-63 = OFF, 64-127 = ON

* Not received when the Receive Hold-1 parameter (SysEx) is OFF.

○ Portamento (Controller number 65)

Status	2nd byte	3rd byte
BnH	41H	vvH

n = MIDI channel number: 0H – FH (ch.1 – 16)
vv = Control value: 00H – 7FH (0 – 127) 0-63 = OFF, 64-127 = ON

* The Part Portamento Switch parameter (PROG:PITCH) will change.

○ Resonance (Controller number 71)

Status	2nd byte	3rd byte
BnH	47H	vvH

n = MIDI channel number: 0H – FH (ch.1 – 16)
vv= Resonance value (relative change): 00H – 40H – 7FH (–64 – 0 – +63),

* The Part Resonance Offset parameter (PROG:OFFSET) will change.

○ Release Time (Controller number 72)

Status	2nd byte	3rd byte
BnH	48H	vvH

n = MIDI channel number: 0H – FH (ch.1 – 16)
vv = Release Time value (relative change): 00H – 40H – 7FH (–64 – 0 – +63),

* The Part Release Time Offset parameter (PROG:OFFSET) will change.

○ Attack time (Controller number 73)

Status	2nd byte	3rd byte
BnH	49H	vvH

n = MIDI channel number: 0H – FH (ch.1 – 16)
vv = Attack time value (relative change): 00H – 40H – 7FH (–64 – 0 – +63),

* The Part Attack Time Offset parameter (PROG:OFFSET) will change.

○ Cutoff (Controller number 74)

Status	2nd byte	3rd byte
BnH	4AH	vvH

n = MIDI channel number: 0H – FH (ch.1 – 16)
vv = Cutoff value (relative change):   00H – 40H – 7FH (–64 – 0 – +63)

* The Part Cutoff Offset parameter (PROG:OFFSET) will change.

○ Decay Time (Controller number 75)

Status	2nd byte	3rd byte
BnH	4BH	vvH

n = MIDI channel number: 0H – FH (ch.1 – 16)
vv = Decay Time value (relative change): 00H – 40H – 7FH (–64 – 0 – +63)

* The Part Decay Time Offset parameter (PROG:OFFSET) will change.

○ Vibrato Rate (Controller number 76)

Status	2nd byte	3rd byte
BnH	4CH	vvH

n = MIDI channel number: 0H – FH (ch.1 – 16)
vv = Vibrato Rate value (relative change): 00H – 40H – 7FH (–64 – 0 – +63)

* The Part Vibrato Rate parameter (PROG:OFFSET) will change.

○ Vibrato Depth (Controller number 77)

Status	2nd byte	3rd byte
BnH	4DH	vvH

n = MIDI channel number: 0H – FH (ch.1 – 16)
vv = Vibrato Depth Value (relative change): 00H – 40H – 7FH (–64 – 0 – +63)

* The Part Vibrato Depth parameter (PROG:OFFSET) will change.

○ Vibrato Delay (Controller number 78)

Status	2nd byte	3rd byte
BnH	4EH	vvH

n = MIDI channel number: 0H – FH (ch.1 – 16)
vv = Vibrato Delay value (relative change): 00H – 40H – 7FH (–64 – 0 – +63)

* The Part Vibrato Delay parameter (PROG:OFFSET) will change.

○ General Purpose Effect 1 (Reverb Send Level) (Controller number 91)

Status	2nd byte	3rd byte
BnH	5BH	vvH

n = MIDI channel number: 0H – FH (ch.1 – 16)
vv = Reverb Send Level: 00H – 7FH (0 – 127)

* The Part Reverb Send Level parameter (PROG:MAIN) will change.

○ General Purpose Effect 4 (Delay Send Level) (Controller number 94)

Status	2nd byte	3rd byte
BnH	5EH	vvH

n = MIDI channel number: 0H – FH (ch.1 – 16)
vv = Delay Send Level: 00H – 7FH (0 – 127)

* The Part Delay Send Level parameter (PROG:MAIN) will change.

○ NRPN MSB/LSB (Controller number 98, 99)

Status	2nd byte	3rd byte
BnH	63H	mmH
BnH	62H	llH

n = MIDI channel number: 0H – FH (ch.1 – 16)
mm = upper byte (MSB) of parameter number specified by NRPN
ll = lower byte (LSB) of parameter number specified by NRPN

<<< NRPN >>>
The NRPN (Non Registerd Parameter Number) message allows an extended range of control changes to be used. On this unit, NRPN messages can be used to modify sound parameters etc.

To use these messages, you must first use NRPN messages (Controller number 98 and 99, their order does not matter) to specify the parameter to be controlled, and then use Data Entry messages to specify the value of the specified parameter. Once an NRPN parameters has been specified, all Data Entry messages received on that channel will modify the value of that parameter. To prevent accidents, it is recomended that you set RPN Null (RPN Number = 7FH/7FH) when you have finished setting the value of the desired parameter.

* For more about the NRPN that JD-Xi receive, refer to Control Change Message List (p. 14).

○ RPN MSB/LSB (Controller number 100, 101)

Status	2nd byte	3rd byte
BnH	65H	mmH
BnH	64H	llH

n = MIDI channel number: 0H – FH (ch.1 – 16)
mm = upper byte (MSB) of parameter number specified by RPN
ll = lower byte (LSB) of parameter number specified by RPN

<<< RPN >>>
Control Changes include RPN (Registered Parameter Numbers), which are extended.
When using RPNs, first RPN (Controller numbers 100 and 101; they can be sent in any order) should be sent in order to select the parameter, then Data Entry (Controller numbers 6 and 38) should be sent to set the value. Once RPN messages are received, Data Entry messages that is received at the same MIDI channel after that are recognized as changing toward the value of the RPN messages. In order not to make any mistakes, transmitting RPN Null is recommended after setting parameters you need.

This device receives the following RPNs.

RPN		Data entry		
MSB,	LSB	MSB,	LSB	Notes
00H,	00H	mmH,	llH	Pitch Bend Sensitivity

          mm: 00H – 18H (0 – 24 semitones)
          ll: ignored (processed as 00H)
          Up to 2 octave can be specified in semitone steps.
       * The Part Pitch Bend Range parameter (PROG:PITCH) will change.

| 00H, | 01H | mmH, | llH | Channel Fine Tuning |

          mm, ll: 20 00H – 40 00H – 60 00H
          (–4096 x 100 / 8192 – 0 – +4096 x 100 / 8192 cent)
       * The Part Fine Tune parameter (PROG:PITCH) will change.

| 00H, | 02H | mmH, | llH | Channel Coarse Tuning |

          mm: 10H – 40H – 70H (–48 – 0 – +48 semitones)
          ll: ignored (processed as 00H)
       * The Part Coarse Tune parameter (PROG:PITCH) will change.

| 7FH, | 7FH | ---, | --- | RPN null |

          RPN and NRPN will be set as "unspecified." Once this setting has been made, subsequent
          Parameter values that were previously set will not change.
mm, ll: ignored

● Program Change

Status	2nd byte
CnH	ppH

n = MIDI channel number: 0H – FH (ch.1 – 16)
pp = Program number: 00H – 7FH (prog.1 – prog.128)

 * Not received when the Receive Program Change parameter (SysEx) is OFF.

● Channel Pressure

Status	2nd byte
DnH	vvH

n = MIDI channel number: 0H – FH (ch.1 – 16)
vv = Channel Pressure: 00H – 7FH (0 – 127)

 * Not received when the Receive Channel Press parameter (SysEx) is OFF.

● Pitch Bend Change

Status	2nd byte	3rd byte
EnH	llH	mmH

n = MIDI channel number: 0H – FH (ch.1 – 16)
mm, ll = Pitch Bend value: 00 00H – 40 00H – 7F 7FH (–8192 – 0 – +8191)

 * Not received when the Receive Pitch Bend parameter (SysEx) is OFF.

■ Channel Mode Messages

● All Sounds Off (Controller number 120)

Status	2nd byte	3rd byte
BnH	78H	00H

n = MIDI channel number: 0H – FH (ch.1 – 16)

 * When this message is received, all notes currently sounding on the corresponding channel will be turned off.

● Reset All Controllers (Controller number 121)

Status	2nd byte	3rd byte
BnH	79H	00H

n = MIDI channel number: 0H – FH (ch.1 – 16)

 * When this message is received, the following controllers will be set to their reset values.

Controller	Reset value
Pitch Bend Change	+/–0 (center)
Channel Pressure	0 (off)
Modulation	0 (off)
Expression	127 (max)
	However the controller will be at minimum.
Hold 1	0 (off)
RPN	unset; previously set data will not change
NRPN	unset; previously set data will not change

● All Notes Off (Controller number 123)

Status	2nd byte	3rd byte
BnH	7BH	00H

n = MIDI channel number: 0H – FH (ch.1 – 16)

 * When All Notes Off is received, all notes on the corresponding channel will be turned off. However, if Hold 1 is ON, the sound will be continued until these are turned off.

● OMNI OFF (Controller number 124)

Status	2nd byte	3rd byte
BnH	7CH	00H

n = MIDI channel number: 0H – FH (ch.1 – 16)

 * The same processing will be carried out as when All Notes Off is received.

● OMNI ON (Controller number 125)

Status	2nd byte	3rd byte
BnH	7DH	00H

n = MIDI channel number: 0H – FH (ch.1 – 16)

 * The same processing will be carried out as when All Notes Off is received. OMNI ON will not be turned on.

● MONO (Controller number 126)

Status	2nd byte	3rd byte
BnH	7EH	mmH

n = MIDI channel number: 0H – FH (ch.1 – 16)
mm = mono number: 00H – 10H (0 – 16)

 * The same processing will be carried out as when All Notes Off is received.
 * Not received on the Analog part.

● POLY (Controller number 127)

Status	2nd byte	3rd byte
BnH	7FH	00H

n = MIDI channel number: 0H – FH (ch.1 – 16)

* The same processing will be carried out as when All Notes Off is received.
* Not received on the Analog part.

■ System Realtime Message

● Timing Clock

Status
F8H

* Received when Sync Mode parameter (SYSTEM:MIDI) is set to SLAVE.

● Active Sensing

Status
FEH

* When Active Sensing is received, the unit will begin monitoring the intervals of all further messages. While monitoring, if the interval between messages exceeds 420 ms, the same processing will be carried out as when All Sounds Off, All Notes Off and Reset All Controllers are received, and message interval monitoring will be halted.

■ System Exclusive Message

Status	Data byte	Status
F0H	iiH, ddH, ...,eeH	F7H

F0H:	System Exclusive Message status
ii = ID number:	an ID number (manufacturer ID) to indicate the manufacturer whose Exclusive message this is. Roland's manufacturer ID is 41H. ID numbers 7EH and 7FH are extensions of the MIDI standard; Universal Non-realtime Messages (7EH) and Universal Realtime Messages (7FH).
dd,...,ee = data:	00H – 7FH (0 – 127)
F7H:	EOX (End Of Exclusive)

Of the System Exclusive messages received by this device, the Universal Non-realtime messages and the Universal Realtime messages and the Data Request (RQ1) messages and the Data Set (DT1) messages will be set automatically.

● Universal Non-realtime System Exclusive Messages

○ Identity Request Message

Status	Data byte	Status
F0H	7EH, dev, 06H, 01H	F7H

Byte	Explanation
F0H	Exclusive status
7EH	ID number (Universal Non-realtime Message)
dev	Device ID (dev: 10H – 1FH, 7FH)
06H	Sub ID#1 (General Information)
01H	Sub ID#2 (Identity Request)
F7H	EOX (End Of Exclusive)

* When this message is received, Identity Reply message (p. 6) will be transmitted.

● Universal Realtime System Exclusive Messages

○ Master Volume

Status	Data byte	Status
F0H	7FH, 7FH, 04H, 01H, llH, mmH	F7H

Byte	Explanation
F0H	Exclusive status
7FH	ID number (universal realtime message)
7FH	Device ID (Broadcast)
04H	Sub ID#1 (Device Control)
01H	Sub ID#2 (Master Volume)
llH	Master Volume lower byte
mmH	Master Volume upper byte
F7H	EOX (End Of Exclusive)

* The lower byte (llH) of Master Volume will be handled as 00H.

○ Master Fine Tuning

Status	Data byte	Status
F0H	7FH, 7FH, 04H, 03H, llH, mmH	F7H

Byte	Explanation
F0H	Exclusive status
7FH	ID number (universal realtime message)
7FH	Device ID (Broadcast)
04H	Sub ID#1 (Device Control)
03H	Sub ID#2 (Master Fine Tuning)
llH	Master Fine Tuning LSB
mmH	Master Fine Tuning MSB
F7H	EOX (End Of Exclusive)

mm, ll: 00 00H – 40 00H – 7F 7FH (–100 – 0 – +99.9 [cents])

* The Master Tune parameter (SYSTEM:SOUND) will change.

○ Master Coarse Tuning

Status	Data byte	Status
F0H	7FH, 7FH, 04H, 04H, llH, mmH	F7

Byte	Explanation
F0H	Exclusive status
7FH	ID number (universal realtime message)
7FH	Device ID (Broadcast)
04H	Sub ID#1 (Device Control)
04H	Sub ID#2 (Master Coarse Tuning)
llH	Master Coarse Tuning LSB
mmH	Master Coarse Tuning MSB
F7H	EOX (End Of Exclusive)

llH:	ignored (processed as 00H)
mmH:	28H – 40H – 58H (–24 – 0 – +24 [semitones])

* The Master Key Shift parameter (SysEx) will change.

● Data Transmission

This instrument can use exclusive messages to exchange many varieties of internal settings with other devices.

The model ID of the exclusive messages used by this instrument is 00H 00H 00H 0EH.

○ Data Request 1 (RQ1)

This message requests the other device to transmit data. The address and size indicate the type and amount of data that is requested.

When a Data Request message is received, if the device is in a state in which it is able to transmit data, and if the address and size are appropriate, the requested data is transmitted as a Data Set 1 (DT1) message. If the conditions are not met, nothing is transmitted.

Status	data byte	status
F0H	41H, dev, 00H, 00H, 00H, 0EH, 11H, aaH, bbH, ccH,	F7H
	ddH, ssH, ttH, uuH, vvH, sum	

Byte	Remarks
F0H	Exclusive status
41H	ID number (Roland)
dev	device ID (dev: 10H – 1FH, 7FH)
00H	model ID #1 (JD-Xi)
00H	model ID #2 (JD-Xi)
00H	model ID #3 (JD-Xi)
0EH	model ID #4 (JD-Xi)
11H	command ID (RQ1)
aaH	address MSB
bbH	address
ccH	address
ddH	address LSB
ssH	size MSB
ttH	size
uuH	size
vvH	size LSB
sum	checksum
F7H	EOX (End Of Exclusive)

* The size of data that can be transmitted at one time is fixed for each type of data. And data requests must be made with a fixed starting address and size. Refer to the address and size given in Parameter Address Map (p. 8).
* For the checksum, refer to p. 16.

○ Data set 1 (DT1)

Status	Data byte	Status
F0H	41H, dev, 00H, 00H, 00H, 0EH, 12H, aaH, bbH,	F7H
	ccH, ddH, eeH, ... ffH, sum	

Byte	Explanation	
F0H	Exclusive status	
41H	ID number (Roland)	
dev	Device ID (dev: 10H – 1FH, 7FH)	
00H	Model ID #1 (JD-Xi)	
00H	Model ID #2 (JD-Xi)	
00H	Model ID #3 (JD-Xi)	
0EH	Model ID #4 (JD-Xi)	
12H	Command ID (DT1)	
aaH	Address MSB:	upper byte of the starting address of the data to be sent
bbH	Address:	upper middle byte of the starting address of the data to be sent
ccH	Address:	lower middle byte of the starting address of the data to be sent
ddH	Address LSB:	lower byte of the starting address of the data to be sent.
eeH	Data:	the actual data to be sent. Multiple bytes of data are transmitted in order starting from the address.
:	:	
ffH	Data	
sum	Checksum	
F7H	EOX (End Of Exclusive)	

* The amount of data that can be transmitted at one time depends on the type of data, and data will be transmitted from the specified starting address and size. Refer to the address and size given in Parameter Address Map (p. 8).
* Data larger than 256 bytes will be divided into packets of 256 bytes or less, and each packet will be sent at an interval of about 20 ms.
* Regarding the checksum, please refer to p. 16.

2. Data Transmission (Sound Source Section)

■ Channel Voice Messages

● Note off

Status	2nd byte	3rd byte
8nH	kkH	vvH

n = MIDI channel number:	0H – FH (ch.1 – 16)
kk = note number:	00H – 7FH (0 – 127)
vv = note off velocity:	00H – 7FH (0 – 127)

● Note on

Status	2nd byte	3rd byte
9nH	kkH	vvH

n = MIDI channel number:	0H – FH (ch.1 – 16)
kk = note number:	00H – 7FH (0 – 127)
vv = note on velocity:	01H – 7FH (1 – 127)

● Control Change

○ Bank Select (Controller number 0, 32)

Status	2nd byte	3rd byte
BnH	00H	mmH
BnH	20H	llH

n = MIDI channel number:	0H – FH (ch.1 – 16)
mm, ll = Bank number:	00 00H – 7F 7FH (bank.1 – bank.16384)

* These messages are transmitted when Program, Tone or Drum Kit is selected. But not transmitted when Transmit Bank Select parameter (SysEx) is OFF.

○ Modulation (Controller number 1)

Status	2nd byte	3rd byte
BnH	01H	vvH

n = MIDI channel number:	0H – FH (ch.1 – 16)
vv = Modulation depth:	00H – 7FH (0 – 127)

○ Portamento Time (Controller number 5)

Status	2nd byte	3rd byte
BnH	05H	vvH

n = MIDI channel number:	0H – FH (ch.1 – 16)
vv = Portamento Time:	00H – 7FH (0 – 127)

○ Data Entry (Controller number 6, 38)

Status	2nd byte	3rd byte
BnH	06H	mmH
BnH	26H	llH

n = MIDI channel number: 0H – FH (ch.1 – 16)
mm, ll = the value of the parameter specified by RPN/NRPN
mm = MSB, ll = LSB

○ NRPN MSB/LSB (Controller number 98, 99)

Status	2nd byte	3rd byte
BnH	63H	mmH
BnH	62H	llH

n = MIDI channel number: 0H – FH (ch.1 – 16)
mm = upper byte (MSB) of parameter number specified by NRPN
ll = lower byte (LSB) of parameter number specified by NRPN

<<< NRPN >>>

The NRPN (Non Registerd Parameter Number) message allows an extended range of control changes to be used. On this unit, NRPN messages can be used to modify sound parameters etc.

To use these messages, you must first use NRPN messages (Controller number 98 and 99, their order does not matter) to specify the parameter to be controlled, and then use Data Entry messages to specify the value of the specified parameter. Once an NRPN parameters has been specified, all Data Entry messages received on that channel will modify the value of that parameter. To prevent accidents, it is

recomended that you set RPN Null (RPN Number = 7FH/7FH) when you have
finished setting the value of the desired parameter.

* For more about the NRPN that JD-Xi transmit, refer to Control Change
  Message List (p. 14).

● Program Change

Status	2nd byte
CnH	ppH

n = MIDI channel number: 0H – FH (ch.1 – 16)
pp = Program number: 00H – 7FH (prog.1 – prog.128)

* These messages are transmitted when Program, Tone or Drum Kit is
  selected. But not transmitted when Transmit Program Change parameter
  (SysEx) is OFF.

● Pitch Bend Change

Status	2nd byte	3rd byte
EnH	llH	mmH

n = MIDI channel number: 0H – FH (ch.1 – 16)
mm, ll = Pitch Bend value: 00 00H – 40 00H – 7F 7FH (-8192
– 0 – +8191)

■ System Realtime Messages

● Active Sensing

Status
FEH

* This message is transmitted at intervals of approximately 250 msec.

■ System Exclusive Messages

Universal Non-realtime System Exclusive Message and Data Set 1 (DT1)
are the only System Exclusive messages transmitted by the JD-Xi

● Universal Non-realtime System Exclusive Message

○ Identity Reply Message (JD-Xi)
Receiving Identity Request Message (p. 4), the JD-Xi send this
message.

Status	Data byte	Status
F0H	7EH, dev, 06H, 02H, 41H, 0EH, 03H,	F7H
	00H, 00H, 00H, 03H, 00H, 00H	

Byte	Explanation
F0H	Exclusive status
7EH	ID number (Universal Non-realtime Message)
dev	Device ID (dev: 10H – 1FH)
06H	Sub ID#1 (General Information)
02H	Sub ID#2 (Identity Reply)
41H	ID number (Roland)
0EH 03H	Device family code
00H 00H	Device family number code
00H 03H 00H 00H	Software revision level
F7H	EOX (End of Exclusive)

● Data Transmission

○ Data set 1 (DT1)

Status	Data byte	Status
F0H	41H, dev, 00H, 00H, 00H, 0EH, 12H, aaH, bbH,	F7H
	ccH, ddH, eeH, ... ffH, sum	

Byte	Explanation	
F0H	Exclusive status	
41H	ID number (Roland)	
dev	Device ID (dev: 00H – 1FH, 7FH)	
00H	Model ID #1 (JD-Xi)	
00H	Model ID #2 (JD-Xi)	
00H	Model ID #3 (JD-Xi)	
0EH	Model ID #4 (JD-Xi)	
12H	Command ID (DT1)	
aaH	Address MSB:	upper byte of the starting address of the data to be sent
bbH	Address:	upper middle byte of the starting address of the data to be sent
ccH	Address:	lower middle byte of the starting address of the data to be sent
ddH	Address LSB:	lower byte of the starting address of the data to be sent
eeH	Data:	the actual data to be sent. Multiple bytes of data are transmitted in order starting from the address.
:	:	
ffH	Data	
sum	Checksum	
F7H	EOX (End Of Exclusive)	

* The amount of data that can be transmitted at one time depends on
  the type of data, and data will be transmitted from the specified
  starting address and size. Refer to the address and size given in
  Parameter Address Map (p. 8).
* Data larger than 256 bytes will be divided into packets of 256
  bytes or less, and each packet will be sent at an interval of about
  20 ms.

3. Data Reception (Sequencer Section)

3.1 Messages recorded during recording

■ Channel Voice Messages

● Note off

Status	2nd byte	3rd byte
8nH	kkH	vvH
9nH	kkH	00H

n = MIDI channel number: 0H – FH (ch.1 – 16)
kk = note number: 00H – 7FH (0 – 127)
vv = note off velocity: 00H – 7FH (0 – 127)

● Note on

Status	2nd byte	3rd byte
9nH	kkH	vvH

n = MIDI channel number: 0H – FH (ch.1 – 16)
kk = note number: 00H – 7FH (0 – 127)
vv = note on velocity: 01H – 7FH (1 – 127)

● Control Change

Status	2nd byte	3rd byte
BnH	01H	vvH

n=MIDI channel number: 0H – FH (ch.1 – ch.16)
kk=Control number: 00H – 78H (0 – 120)
vv=value: 00H – 7FH (0 – 127)

 * kk = 00H and kk = 20H are not recorded.

● Channel Aftertouch

Status	2nd byte
DnH	vvH

n = MIDI channel number: 0H – FH (ch.1 – 16)
vv=Channel Aftertouch: 00H – 7FH (0 – 127)

● Pitch Bend Change

Status	2nd byte	3rd byte
EnH	llH	mmH

n = MIDI channel number: 0H – FH (ch.1 – 16)
mm, ll = Pitch Bend value: 00 00H – 40 00H – 7F 7FH (–8192 – 0 – +8191)

■ Channel Mode Messages

● All Sounds Off (Controller number 120)

Status	2nd byte	3rd byte
BnH	78H	00H

n = MIDI channel number: 0H – FH (ch.1 – 16)

 * The same processing will be done as when an All Note Off message is
   received.

● Reset All Controllers (Controller number 121)

Status	2nd byte	3rd byte
BnH	79H	00H

n = MIDI channel number: 0H – FH (ch.1 – 16)

● Omni Off (Controller number 124)

Status	2nd byte	3rd byte
BnH	7CH	00H

n = MIDI channel number: 0H – FH (ch.1 – 16)

 * The same processing will be done as when an All Note Off message is
   received.

● Omni On (Controller number 125)

Status	2nd byte	3rd byte
BnH	7DH	00H

n = MIDI channel number: 0H – FH (ch.1 – 16)

 * The same processing will be done as when an All Note Off message is
   received.

● Mono (Controller number 126)

Status	2nd byte	3rd byte
BnH	7EH	mmH

n = MIDI channel number: 0H – FH (ch.1 – 16)
mm = mono number: 00H – 10H (0 – 16)

 * The same processing will be done as when an All Note Off message is
   received.

● Poly (Controller number 127)

Status	2nd byte	3rd byte
BnH	7FH	00H

n = MIDI channel number: 0H – FH (ch.1 – 16)

 * The same processing will be done as when an All Note Off message is
   received.

■ System Exclusive Messages

Status	Data byte	Status
F0H	iiH, ddH, ..., eeH	F7H

F0H: System Exclusive message status
ii=ID number: This is the ID number (manufacturer ID) that specifies the manufacturer whose exclusive message this is. Roland's manufacturer ID is 41H. ID numbers 7EH and 7FH are defined in an expansion of the MIDI standard as Universal Non-real-time messages (7EH) and Universal Realtime Messages (7FH).
dd,..., ee = data: 00H – 7FH (0 – 127)
F7H: EOX (End of System Exclusive)

 * MIDI Machine Control and MIDI Time code is not recorded.

3.2 Messages not recorded during recording

■ Channel mode messages

● Local On/Off (Controller number 122)

Status	2nd byte	3rd byte
BnH	7AH	vvH

n=MIDI channel number: 0H – FH (ch.1 – ch.16)
vv=Value: 00H, 7FH (Local Off, Local On)

● All notes off (Controller number 123)

Status	2nd byte	3rd byte
BnH	7BH	00H

n=MIDI channel number: 0H – FH (ch.1 – ch.16)

 * When an All Note Off message is received, all notes of the
   corresponding channel that are on will be sent Note Off's, and the
   resulting Note Off messages will be recorded.

3.3 Messages acknowledged for synchronization

■ System Realtime Messages

● Timing Clock

<u>Status</u>
F8H

* Received when Sync Mode parameter (SYSTEM:MIDI) is set to SLAVE.

● Start

<u>Status</u>
FAH

* Received when Sync Mode parameter (SYSTEM:MIDI) is set to SLAVE.

● Continue

<u>Status</u>
FBH

* The same processing will be carried out as when Start is received.
* Received when Sync Mode parameter (SYSTEM:MIDI) is set to SLAVE.

● Stop

<u>Status</u>
FCH

* Received when Sync Mode parameter (SYSTEM:MIDI) is set to SLAVE.

4. Data transmission (Sequencer Section)

4.1 Messages transmitted during playing

Recorded messages are transmitted during playback.

4.2 Messages that are generated and transmitted

Messages are generated and transmitted to synchronize with other devices.

■ System Realtime Messages

● Timing Clock

<u>Status</u>
F8H

● Start

<u>Status</u>
FAH

● Stop

<u>Status</u>
FCH

5. Parameter Address Map

* Transmission of "#" marked address is divided to some packets. For example, ABH in hexadecimal notation will be divided to 0AH and 0BH, and is sent/received in this order.
* "<*>" marked address or parameters are ignored when the JD-Xi received them.

JD-Xi (ModelID = 00H 00H 00H 0EH)

```
+------------------------------------------------------------------+
| Start                                                            |
|     Address  |                 Description                       |
|--------------+---------------------------------------------------|
| 01 00 00 00  | Setup                                             |
|--------------+---------------------------------------------------|
| 02 00 00 00  | System                                            |
|--------------+---------------------------------------------------|
| 18 00 00 00  | Temporary Program                                 |
| 19 00 00 00  | Temporary Tone (Digital Synth Part 1)             |
| 19 20 00 00  | Temporary Tone (Digital Synth Part 2)             |
| 19 40 00 00  | Temporary Tone (Analog Synth Part)                |
| 19 60 00 00  | Temporary Tone (Drums Part)                       |
+------------------------------------------------------------------+
```

* System
```
+------------------------------------------------------------------+
| Offset                                                           |
|     Address  |                 Description                       |
|--------------+---------------------------------------------------|
|    00 00 00  | System Common                                     |
|    00 03 00  | System Controller                                 |
+------------------------------------------------------------------+
```

* Temporary Tone
```
+------------------------------------------------------------------+
| Offset                                                           |
|     Address  |                 Description                       |
|--------------+---------------------------------------------------|
|    01 00 00  | Temporary SuperNATURAL Synth Tone                 |
|    02 00 00  | Temporary Analog Synth Tone                       |
|    10 00 00  | Temporary Drum Kit                                |
+------------------------------------------------------------------+
```

* Program
```
+------------------------------------------------------------------+
| Offset                                                           |
|     Address  |                 Description                       |
|--------------+---------------------------------------------------|
|    00 00 00  | Program Common                                    |
|    00 01 00  | Program Vocal Effect                              |
|    00 02 00  | Program Effect 1                                  |
|    00 04 00  | Program Effect 2                                  |
|    00 06 00  | Program Delay                                     |
|    00 08 00  | Program Reverb                                    |
|    00 20 00  | Program Part (Digital Synth Part 1)               |
|    00 21 00  | Program Part (Digital Synth Part 2)               |
|    00 22 00  | Program Part (Analog Synth Part)                  |
|    00 23 00  | Program Part (Drums Part)                          |
|    00 30 00  | Program Zone (Digital Synth Part 1)               |
|    00 31 00  | Program Zone (Digital Synth Part 2)               |
|    00 32 00  | Program Zone (Analog Synth Part)                  |
|    00 33 00  | Program Zone (Drums Part)                          |
|    00 40 00  | Program Controller                                |
+------------------------------------------------------------------+
```

* SuperNATURAL Synth Tone
```
+------------------------------------------------------------------+
| Offset                                                           |
|     Address  |                 Description                       |
|--------------+---------------------------------------------------|
|    00 00 00  | SuperNATURAL Synth Tone Common                    |
|    00 20 00  | SuperNATURAL Synth Tone Partial (1)               |
|    00 21 00  | SuperNATURAL Synth Tone Partial (2)               |
|    00 22 00  | SuperNATURAL Synth Tone Partial (3)               |
|    00 50 00  | SuperNATURAL Synth Tone Modify                    |
+------------------------------------------------------------------+
```

* Analog Synth Tone
```
+------------------------------------------------------------------+
| Offset                                                           |
|     Address  |                 Description                       |
|--------------+---------------------------------------------------|
|    00 00 00  | Analog Synth Tone                                 |
+------------------------------------------------------------------+
```

* Drum Kit
```
+------------------------------------------------------------------+
| Offset                                                           |
|     Address  |                 Description                       |
|--------------+---------------------------------------------------|
|    00 00 00  | Drum Kit Common                                   |
|    00 2E 00  | Drum Kit Partial (Key # 36)                       |
|    00 30 00  | Drum Kit Partial (Key # 37)                       |
|        :                                                         |
|    00 76 00  | Drum Kit Partial (Key # 72)                       |
+------------------------------------------------------------------+
```

* Setup
```
+------------------------------------------------------------------+
| Offset                                                           |
|     Address  |                 Description                       |
|--------------+---------------------------------------------------|
|    00 00     | 0000 000a  | (reserve) <*>                        |
|    00 01     | 0aaa aaaa  | (reserve) <*>                        |
|        :                                                         |
```

```
|------------+-----------+------------------------------------------------|
|     00 03  | 0aaa aaaa | (reserve) <*>                                  |
|------------+-----------+------------------------------------------------|
|     00 04  | 0aaa aaaa | Program BS MSB (CC# 0)            (0 - 127)     |
|     00 05  | 0aaa aaaa | Program BS LSB (CC# 32)           (0 - 127)     |
|     00 06  | 0aaa aaaa | Program PC (PC)                   (0 - 127)     |
|------------+-----------+------------------------------------------------|
|     00 07  | 0aaa aaaa | (reserve) <*>                                  |
|     00 08  | 0aaa aaaa | (reserve) <*>                                  |
|       :    |           |                                                |
|     00 3A  | 0aaa aaaa | (reserve) <*>                                  |
|------------+-----------+------------------------------------------------|
| 00 00 00 3B | Total Size                                                |
+-------------+------------------------------------------------------------+
```

* System Common

```
+------------+-----------+------------------------------------------------+
| Offset     |           |                                                |
|   Address  |           |                Description                     |
|------------+-----------+------------------------------------------------|
|#    00 00  | 0000 aaaa |                                                |
|            | 0000 bbbb |                                                |
|            | 0000 cccc |                                                |
|            | 0000 dddd | Master Tune                      (24 - 2024)   |
|            |           |                         -100.0 - 100.0 [cent]  |
|     00 04  | 00aa aaaa | Master Key Shift                 (40 - 88)     |
|            |           |                                  -24 - +24     |
|     00 05  | 0aaa aaaa | Master Level                     (0 - 127)     |
|     00 06  | 0000 000a | (reserve) <*>                                  |
|     00 07  | 0000 000a | (reserve) <*>                                  |
|     00 08  | 0000 000a | (reserve) <*>                                  |
|------------+-----------+------------------------------------------------|
|     00 09  | 000a aaaa | (reserve) <*>                                  |
|     00 0A  | 000a aaaa | (reserve) <*>                                  |
|       :    |           |                                                |
|     00 10  | 000a aaaa | (reserve) <*>                                  |
|------------+-----------+------------------------------------------------|
|     00 11  | 000a aaaa | Program Control Channel          (0 - 16)      |
|            |           |                                  1 - 16, OFF   |
|------------+-----------+------------------------------------------------|
|     00 12  | 0aaa aaaa | (reserve) <*>                                  |
|     00 13  | 0aaa aaaa | (reserve) <*>                                  |
|       :    |           |                                                |
|     00 28  | 0000 000a | (reserve) <*>                                  |
|------------+-----------+------------------------------------------------|
|     00 29  | 0000 000a | Receive Program Change           (0 - 1)       |
|            |           |                                  OFF, ON       |
|     00 2A  | 0000 000a | Receive Bank Select              (0 - 1)       |
|            |           |                                  OFF, ON       |
|------------+-----------+------------------------------------------------|
| 00 00 00 2B | Total Size                                                |
+-------------+------------------------------------------------------------+
```

* System Controller

```
+------------+-----------+------------------------------------------------+
| Offset     |           |                                                |
|   Address  |           |                Description                     |
|------------+-----------+------------------------------------------------|
|     00 00  | 0000 000a | Transmit Program Change          (0 - 1)       |
|            |           |                                  OFF, ON       |
|     00 01  | 0000 000a | Transmit Bank Select             (0 - 1)       |
|            |           |                                  OFF, ON       |
|     00 02  | 0aaa aaaa | Keyboard Velocity                (0 - 127)     |
|            |           |                                  REAL, 1 - 127 |
|     00 03  | 0000 00aa | Keyboard Velocity Curve          (1 - 3)       |
|            |           |                          LIGHT, MEDIUM, HEAVY  |
|     00 04  | 000a aaaa | Keyboard Velocity Curve Offset   (54 - 73)     |
|            |           |                                  -10 - +9      |
|------------+-----------+------------------------------------------------|
|     00 05  | 0000 0aaa | (reserve) <*>                                  |
|     00 06  | 0000 000a | (reserve) <*>                                  |
|       :    |           |                                                |
|     00 10  | 0aaa aaaa | (reserve) <*>                                  |
|------------+-----------+------------------------------------------------|
| 00 00 00 11 | Total Size                                                |
+-------------+------------------------------------------------------------+
```

* Program Common

```
+------------+-----------+------------------------------------------------+
| Offset     |           |                                                |
|   Address  |           |                Description                     |
|------------+-----------+------------------------------------------------|
|     00 00  | 0aaa aaaa | Program Name 1                   (32 - 127)    |
|            |           |                               32 - 127 [ASCII] |
|     00 01  | 0aaa aaaa | Program Name 2                   (32 - 127)    |
|            |           |                               32 - 127 [ASCII] |
|     00 02  | 0aaa aaaa | Program Name 3                   (32 - 127)    |
|            |           |                               32 - 127 [ASCII] |
|     00 03  | 0aaa aaaa | Program Name 4                   (32 - 127)    |
|            |           |                               32 - 127 [ASCII] |
|     00 04  | 0aaa aaaa | Program Name 5                   (32 - 127)    |
|            |           |                               32 - 127 [ASCII] |
|     00 05  | 0aaa aaaa | Program Name 6                   (32 - 127)    |
|            |           |                               32 - 127 [ASCII] |
|     00 06  | 0aaa aaaa | Program Name 7                   (32 - 127)    |
|            |           |                               32 - 127 [ASCII] |
|     00 07  | 0aaa aaaa | Program Name 8                   (32 - 127)    |
|            |           |                               32 - 127 [ASCII] |
|     00 08  | 0aaa aaaa | Program Name 9                   (32 - 127)    |
|            |           |                               32 - 127 [ASCII] |
|     00 09  | 0aaa aaaa | Program Name 10                  (32 - 127)    |
|            |           |                               32 - 127 [ASCII] |
|     00 0A  | 0aaa aaaa | Program Name 11                  (32 - 127)    |
|            |           |                               32 - 127 [ASCII] |
|     00 0B  | 0aaa aaaa | Program Name 12                  (32 - 127)    |
|            |           |                               32 - 127 [ASCII] |
|------------+-----------+------------------------------------------------|
|     00 0C  | 0aaa aaaa | (reserve) <*>                                  |
|     00 0D  | 0aaa aaaa | (reserve) <*>                                  |
|       :    |           |                                                |
|     00 0F  | 0aaa aaaa | (reserve) <*>                                  |
```

```
|     00 10  | 0aaa aaaa | Program Level                    (0 - 127)     |
|#    00 11  | 0000 aaaa |                                                |
|            | 0000 bbbb |                                                |
|            | 0000 cccc |                                                |
|            | 0000 dddd | Program Tempo                    (500 - 30000) |
|            |           |                                5.00 - 300.00   |
|     00 15  | 0000 aaaa | (reserve) <*>                                  |
|------------+-----------+------------------------------------------------|
|     00 16  | 0000 aaaa | Vocal Effect                     (0 - 2)       |
|            |           |                      OFF, VOCODER, AUTO-PITCH  |
|------------+-----------+------------------------------------------------|
|     00 17  | 0000 000a | (reserve) <*>                                  |
|     00 18  | 0000 000a | (reserve) <*>                                  |
|       :    |           |                                                |
|     00 1A  | 0000 000a | (reserve) <*>                                  |
|------------+-----------+------------------------------------------------|
|     00 1B  | 0000 00aa | (reserve) <*>                                  |
|     00 1C  | 0aaa aaaa | Vocal Effect Number              (0 - 20)      |
|            |           |                                  1 - 21        |
|     00 1D  | 0000 aaaa | Vocal Effect Part                (0 - 1)       |
|            |           |                                  1 - 2         |
|------------+-----------+------------------------------------------------|
|     00 1E  | 0000 000a | Auto Note Switch                 (0 - 1)       |
|            |           |                                  OFF, ON       |
|------------+-----------+------------------------------------------------|
| 00 00 00 1F | Total Size                                                |
+-------------+------------------------------------------------------------+
```

* Program Vocal Effect

```
+------------+-----------+------------------------------------------------+
| Offset     |           |                                                |
|   Address  |           |                Description                     |
|------------+-----------+------------------------------------------------|
|     00 00  | 0aaa aaaa | Level                            (0 - 127)     |
|     00 01  | 0aaa aaaa | Pan                              (0 - 127)     |
|            |           |                                  L64 - 63R     |
|     00 02  | 0aaa aaaa | Delay Send Level                 (0 - 127)     |
|     00 03  | 0aaa aaaa | Reverb Send Level                (0 - 127)     |
|     00 04  | 0000 0aaa | Output Assign                    (0 - 4)       |
|            |           |                     EFX1, EFX2, DLY, REV, DIR  |
|     00 05  | 0000 000a | Auto Pitch Switch                (0 - 1)       |
|            |           |                                  OFF, ON       |
|     00 06  | 0000 0aaa | Auto Pitch Type                  (0 - 3)       |
|            |           |                  SOFT, HARD, ELECTRIC1, ELECTRIC2|
|     00 07  | 0000 000a | Auto Pitch Scale                 (0 - 1)       |
|            |           |                          CHROMATIC, Maj(Min)   |
|     00 08  | 000a aaaa | Auto Pitch Key                   (0 - 23)      |
|            |           |                   C, Db, D, Eb, E, F, F#, G,   |
|            |           |         Ab, A, Bb, B, Cm, C#m, Dm, D#m,        |
|            |           |         Em, Fm, F#m, Gm, G#m, Am, Bbm, Bm      |
|     00 09  | 0000 aaaa | Auto Pitch Note                  (0 - 11)      |
|            |           |                   C, C#, D, D#, E, F,          |
|            |           |                   F#, G, G#, A, A#, B          |
|     00 0A  | 000a aaaa | Auto Pitch Gender                (0 - 20)      |
|            |           |                                  -10 - +10     |
|     00 0B  | 0000 00aa | Auto Pitch Octave                (0 - 2)       |
|            |           |                                  -1 - +1       |
|     00 0C  | 0aaa aaaa | Auto Pitch Balance               (0 - 100)     |
|            |           |                          D100:0W - D0:100W     |
|------------+-----------+------------------------------------------------|
|     00 0D  | 0000 000a | Vocoder Switch                   (0 - 1)       |
|            |           |                                  OFF, ON       |
|     00 0E  | 0000 00aa | Vocoder Envelope                 (0 - 2)       |
|            |           |                          SHARP, SOFT, LONG     |
|     00 0F  | 0aaa aaaa | Vocoder Mic Sens                 (0 - 127)     |
|     00 10  | 0aaa aaaa | Vocoder Synth Level              (0 - 127)     |
|     00 11  | 0aaa aaaa | Vocoder Mic Mix Level            (0 - 127)     |
|     00 12  | 0aaa aaaa | Vocoder Mic HPF                  (0 - 13)      |
|     00 13  | 0000 aaaa |                                  BYPASS,       |
|            |           |          1000, 1250, 1600, 2000, 2500,         |
|            |           |          3150, 4000, 5000, 6300, 8000,         |
|            |           |          10000, 12500, 16000 [Hz]              |
|     00 14  | 0aaa aaaa | (reserve) <*>                                  |
|------------+-----------+------------------------------------------------|
|     00 15  | 0000 000a | (reserve) <*>                                  |
|     00 16  | 0aaa aaaa | (reserve) <*>                                  |
|     00 17  | 0aaa aaaa | (reserve) <*>                                  |
|------------+-----------+------------------------------------------------|
| 00 00 00 18 | Total Size                                                |
+-------------+------------------------------------------------------------+
```

* Program Effect 1

```
+------------+-----------+------------------------------------------------+
| Offset     |           |                                                |
|   Address  |           |                Description                     |
|------------+-----------+------------------------------------------------|
|     00 00  | 0aaa aaaa | EFX1 Type                        (0 - 4)       |
|     00 01  | 0aaa aaaa | EFX1 Level                       (0 - 127)     |
|     00 02  | 0aaa aaaa | EFX1 Delay Send Level            (0 - 127)     |
|     00 03  | 0aaa aaaa | EFX1 Reverb Send Level           (0 - 127)     |
|     00 04  | 0000 00aa | EFX1 Output Assign               (0 - 1)       |
|            |           |                                  DIR, EFX2     |
|------------+-----------+------------------------------------------------|
|     00 05  | 0aaa aaaa | (reserve) <*>                                  |
|     00 06  | 0aaa aaaa | (reserve) <*>                                  |
|       :    |           |                                                |
|     00 10  | 000a aaaa | (reserve) <*>                                  |
|------------+-----------+------------------------------------------------|
|#    00 11  | 0000 aaaa |                                                |
|            | 0000 bbbb |                                                |
|            | 0000 cccc |                                                |
|            | 0000 dddd | EFX1 Parameter 1               (12768 - 52768) |
|            |           |                                -20000 - +20000 |
|#    00 15  | 0000 aaaa |                                                |
|            | 0000 bbbb |                                                |
|            | 0000 cccc |                                                |
|            | 0000 dddd | EFX1 Parameter 2               (12768 - 52768) |
|            |           |                                -20000 - +20000 |
|       :    |           |                                                |
```

```
|#    01 0D | 0000 aaaa |                                                    |        00 01 | 0000 000a | Part Switch                          1 - 16
|          | 0000 bbbb |                                                    |              |           |                                    (0 - 1)
|          | 0000 cccc |                                                    |              |           |                                   OFF, ON
|          | 0000 dddd | EFX1 Parameter 32            (12768 - 52768)       |        00 02 | 0000 000a | (reserve)                              (1)
|          |           |                             -20000 - +20000       |        00 03 | 0000 000a | (reserve)                              (1)
|-----------+           |                                                    |        00 04 | 0000 000a | (reserve)                              (1)
| 00 00 01 11 | Total Size                                                   |        00 05 | 0000 000a | (reserve)                              (1)
+------------------------------------------------------------------+         |-----------+-----------+                                
                                                                             |        00 06 | 0aaa aaaa | Tone Bank Select MSB (CC# 0)        (0 - 127)
                                                                             |        00 07 | 0aaa aaaa | Tone Bank Select LSB (CC# 32)       (0 - 127)
* Program Effect 2                                                           |        00 08 | 0aaa aaaa | Tone Program Number (PC)            (0 - 127)
                                                                             |-----------+-----------+                                
+------------------------------------------------------------------+         |        00 09 | 0aaa aaaa | Part Level (CC# 7)                  (0 - 127)
| Offset                                                            |         |        00 0A | 0aaa aaaa | Part Pan (CC# 10)                   (0 - 127)
|   Address |           |             Description                  |         |              |           |                                  L64 - 63R
|-----------+-----------+------------------------------------------+         |        00 0B | 0aaa aaaa | Part Coarse Tune (RPN# 2)          (16 - 112)
| 00 00 | 0aaa aaaa | EFX2 Type                    (0, 5 - 8)       |         |              |           |                                   -48 - +48
| 00 01 | 0aaa aaaa | EFX2 Level                   (0 - 127)        |         |        00 0C | 0aaa aaaa | Part Fine Tune (RPN# 1)           (14 - 114)
| 00 02 | 0aaa aaaa | EFX2 Delay Send Level        (0 - 127)        |         |              |           |                                   -50 - +50
| 00 03 | 0aaa aaaa | EFX2 Reverb Send Level       (0 - 127)        |         |        00 0D | 0000 00aa | Part Mono/Poly (MONO ON/POLY ON)    (0 - 2)
| 00 04 | 0000 00aa | (reserve) <*>                                |         |              |           |                             MONO, POLY, TONE
|-----------+           |                                          |         |        00 0E | 0000 00aa | Part Legato Switch (CC# 68)         (0 - 2)
| 00 05 | 0aaa aaaa | (reserve) <*>                                |         |              |           |                              OFF, ON, TONE
| 00 06 | 0aaa aaaa | (reserve) <*>                                |         |        00 0F | 000a aaaa | Part Pitch Bend Range (RPN# 0)     (0 - 25)
|   :       |                                                      |         |              |           |                             0 - 24, TONE
| 00 10 | 000a aaaa | (reserve) <*>                                |         |        00 10 | 0000 00aa | Part Portamento Switch (CC# 65)     (0 - 2)
|-----------+           |                                          |         |              |           |                              OFF, ON, TONE
|#    00 11 | 0000 aaaa |                                          |         |#       00 11 | 0000 aaaa |                                  
|          | 0000 bbbb |                                           |         |              | 0000 bbbb | Part Portamento Time               (0 - 128)
|          | 0000 cccc |                                           |         |        00 13 | 0aaa aaaa | Part Cutoff Offset (CC# 74)      0 - 127, TONE
|          | 0000 dddd | EFX2 Parameter 1            (12768 - 52768)|         |              |           |                                    (0 - 127)
|          |           |                            -20000 - +20000|         |              |           |                                   -64 - +63
|#    00 15 | 0000 aaaa |                                          |         |        00 14 | 0aaa aaaa | Part Resonance Offset (CC# 71)      (0 - 127)
|          | 0000 bbbb |                                           |         |              |           |                                   -64 - +63
|          | 0000 cccc |                                           |         |        00 15 | 0aaa aaaa | Part Attack Time Offset (CC# 73)    (0 - 127)
|          | 0000 dddd | EFX2 Parameter 2           (12768 - 52768) |         |              |           |                                   -64 - +63
|          |           |                            -20000 - +20000|         |        00 16 | 0aaa aaaa | Part Decay Time Offset (CC# 75)     (0 - 127)
|   :       |                                                      |         |              |           |                                   -64 - +63
|#    01 0D | 0000 aaaa |                                          |         |        00 17 | 0aaa aaaa | Part Release Time Offset (CC# 72)   (0 - 127)
|          | 0000 bbbb |                                           |         |              |           |                                   -64 - +63
|          | 0000 cccc |                                           |         |        00 18 | 0aaa aaaa | Part Vibrato Rate (CC# 76)          (0 - 127)
|          | 0000 dddd | EFX2 Parameter 32          (12768 - 52768) |         |              |           |                                   -64 - +63
|          |           |                            -20000 - +20000|         |        00 19 | 0aaa aaaa | Part Vibrato Depth (CC# 77)         (0 - 127)
|-----------+           |                                          |         |              |           |                                   -64 - +63
| 00 00 01 11 | Total Size                                          |         |        00 1A | 0aaa aaaa | Part Vibrato Delay (CC# 78)         (0 - 127)
+------------------------------------------------------------------+         |              |           |                                   -64 - +63
                                                                             |-----------+-----------+                                
* Program Delay                                                             |        00 1B | 0000 0aaa | Part Octave Shift                  (61 - 67)
                                                                             |              |           |                                    -3 - +3
+------------------------------------------------------------------+         |        00 1C | 0aaa aaaa | Part Velocity Sens Offset          (1 - 127)
| Offset                                                            |         |              |           |                                   -63 - +63
|   Address |           |             Description                  |         |        00 1D | 0000 0000 | (reserve) <*>                    
|-----------+-----------+------------------------------------------+         |        00 1E | 0000 000a | (reserve) <*>                    
| 00 00 | 0000 aaaa | (reserve) <*>                                |         |        00 1F | 0000 0000 | (reserve) <*>                    
| 00 01 | 0aaa aaaa | Delay Level                  (0 - 127)        |         |        00 20 | 0000 0000 | (reserve) <*>                    
| 00 02 | 0000 00aa | (reserve) <*>                                |         |        00 21 | 0aaa aaaa | Velocity Range Lower               (1 - 127)
| 00 03 | 0aaa aaaa | Delay Reverb Send Level      (0 - 127)        |         |              |           |                                 1 - UPPER
|-----------+           |                                          |         |        00 22 | 0aaa aaaa | Velocity Range Upper               (0 - 127)
|#    00 04 | 0000 aaaa |                                          |         |              |           |                               LOWER - 127
|          | 0000 bbbb |                                           |         |        00 23 | 0aaa aaaa | Velocity Fade Width Lower           (0 - 127)
|          | 0000 cccc |                                           |         |        00 24 | 0aaa aaaa | Velocity Fade Width Upper           (0 - 127)
|          | 0000 dddd | Delay Parameter 1          (12768 - 52768) |         |        00 25 | 0000 000a | Mute Switch                        (0 - 1)
|          |           |                            -20000 - +20000|         |              |           |                                  OFF, MUTE
|#    00 08 | 0000 aaaa |                                          |         |-----------+-----------+                                
|          | 0000 bbbb |                                           |         |        00 26 | 0aaa aaaa | (reserve) <*>                    
|          | 0000 cccc |                                           |         |        00 27 | 0aaa aaaa | (reserve) <*>                    
|          | 0000 dddd | Delay Parameter 2          (12768 - 52768) |         |   :          |           |                                
|          |           |                            -20000 - +20000|         |        00 29 | 0aaa aaaa | (reserve) <*>                    
|   :       |                                                      |         |-----------+-----------+                                
|#    00 60 | 0000 aaaa |                                          |         |        00 2A | 0aaa aaaa | (reserve) <*>                    
|          | 0000 bbbb |                                           |         |        00 2B | 0aaa aaaa | Part Delay Send Level (CC# 94)      (0 - 127)
|          | 0000 cccc |                                           |         |        00 2C | 0aaa aaaa | Part Reverb Send Level (CC# 91)     (0 - 127)
|          | 0000 dddd | Delay Parameter 24         (12768 - 52768) |         |        00 2D | 0000 0aaa | Part Output Assign                 (0 - 4)
|          |           |                            -20000 - +20000|         |              |           |                       EFX1, EFX2, DLY, REV, DIR
|-----------+           |                                          |         |        00 2E | 0000 000a | (reserve) <*>                    
| 00 00 00 64 | Total Size                                          |         |-----------+-----------+                                
+------------------------------------------------------------------+         |        00 2F | 0aaa aaaa | Part Scale Tune Type               (0 - 8)
                                                                             |              |           |           CUSTOM, EQUAL, JUST-MAJ, JUST-MIN,
* Program Reverb                                                            |              |           |        PYTHAGORE, KIRNBERGE, MEANTONE,
                                                                             |              |           |                      WERCKMEIS, ARABIC
+------------------------------------------------------------------+         |        00 30 | 0aaa aaaa | Part Scale Tune Key                (0 - 11)
| Offset                                                            |         |              |           |              C, C#, D, D#, E, F, F#, G, G#,
|   Address |           |             Description                  |         |              |           |                                   A, A#, B
|-----------+-----------+------------------------------------------+         |        00 31 | 0aaa aaaa | Part Scale Tune for C               (0 - 127)
| 00 00 | 0000 aaaa | (reserve) <*>                                |         |              |           |                                   -64 - +63
| 00 01 | 0aaa aaaa | Reverb Level                 (0 - 127)        |         |        00 32 | 0aaa aaaa | Part Scale Tune for C#              (0 - 127)
| 00 02 | 0000 00aa | (reserve) <*>                                |         |              |           |                                   -64 - +63
|-----------+           |                                          |         |        00 33 | 0aaa aaaa | Part Scale Tune for D               (0 - 127)
|#    00 03 | 0000 aaaa |                                          |         |              |           |                                   -64 - +63
|          | 0000 bbbb |                                           |         |        00 34 | 0aaa aaaa | Part Scale Tune for D#              (0 - 127)
|          | 0000 cccc |                                           |         |              |           |                                   -64 - +63
|          | 0000 dddd | Reverb Parameter 1         (12768 - 52768) |         |        00 35 | 0aaa aaaa | Part Scale Tune for E               (0 - 127)
|          |           |                            -20000 - +20000|         |              |           |                                   -64 - +63
|#    00 07 | 0000 aaaa |                                          |         |        00 36 | 0aaa aaaa | Part Scale Tune for F               (0 - 127)
|          | 0000 bbbb |                                           |         |              |           |                                   -64 - +63
|          | 0000 cccc |                                           |         |        00 37 | 0aaa aaaa | Part Scale Tune for F#              (0 - 127)
|          | 0000 dddd | Reverb Parameter 2         (12768 - 52768) |         |              |           |                                   -64 - +63
|          |           |                            -20000 - +20000|         |        00 38 | 0aaa aaaa | Part Scale Tune for G               (0 - 127)
|   :       |                                                      |         |              |           |                                   -64 - +63
|#    00 5F | 0000 aaaa |                                          |         |        00 39 | 0aaa aaaa | Part Scale Tune for G#              (0 - 127)
|          | 0000 bbbb |                                           |         |              |           |                                   -64 - +63
|          | 0000 cccc |                                           |         |        00 3A | 0aaa aaaa | Part Scale Tune for A               (0 - 127)
|          | 0000 dddd | Reverb Parameter 24        (12768 - 52768) |         |              |           |                                   -64 - +63
|          |           |                            -20000 - +20000|         |        00 3B | 0aaa aaaa | Part Scale Tune for A#              (0 - 127)
|-----------+           |                                          |         |              |           |                                   -64 - +63
| 00 00 00 63 | Total Size                                          |         |        00 3C | 0aaa aaaa | Part Scale Tune for B               (0 - 127)
+------------------------------------------------------------------+         |              |           |                                   -64 - +63
                                                                             |-----------+-----------+                                
* Program Part                                                              |        00 3D | 0000 000a | Receive Program Change             (0 - 1)
                                                                             |              |           |                                   OFF, ON
+------------------------------------------------------------------+         |        00 3E | 0000 000a | Receive Bank Select                (0 - 1)
| Offset                                                            |         |              |           |                                   OFF, ON
|   Address |           |             Description                  |
|-----------+-----------+------------------------------------------+
| 00 00 | 0000 aaaa | Receive Channel              (0 - 15)         |
```

```
|  00 3F | 0000 000a | Receive Pitch Bend              (0 - 1) |
|        |           |                              OFF, ON   |
|  00 40 | 0000 000a | Receive Polyphonic Key Pressure (0 - 1) |
|        |           |                              OFF, ON   |
|  00 41 | 0000 000a | Receive Channel Pressure       (0 - 1) |
|        |           |                              OFF, ON   |
|  00 42 | 0000 000a | Receive Modulation             (0 - 1) |
|        |           |                              OFF, ON   |
|  00 43 | 0000 000a | Receive Volume                 (0 - 1) |
|        |           |                              OFF, ON   |
|  00 44 | 0000 000a | Receive Pan                    (0 - 1) |
|        |           |                              OFF, ON   |
|  00 45 | 0000 000a | Receive Expression             (0 - 1) |
|        |           |                              OFF, ON   |
|  00 46 | 0000 000a | Receive Hold-1                 (0 - 1) |
|        |           |                              OFF, ON   |
+--------+-----------+----------------------------------------+
|  00 47 | 0000 0aaa | (reserve)                          (0) |
+--------+-----------+----------------------------------------+
|  00 48 | 0aaa aaaa | (reserve) <*>                          |
|  00 49 | 0aaa aaaa | (reserve) <*>                          |
|     :  |           |                                        |
|  00 4B | 0aaa aaaa | (reserve) <*>                          |
+--------+-----------+----------------------------------------+
| 00 00 00 4C | Total Size                                   |
+-------------+-------------------------------------------+
```

* Program Zone

```
+----------------------------------------------------------+
| Offset    |                                              |
|   Address |               Description                    |
+-----------+----------------------------------------------+
|  00 00 | 0aaa aaaa | (reserve) <*>                         |
|  00 01 | 0aaa aaaa | (reserve) <*>                         |
|     :  |           |                                       |
|  00 02 | 0000 000a | (reserve) <*>                         |
|  00 03 | 0000 000a | Arpeggio Switch                (0 - 1) |
|        |           |                              OFF, ON   |
|  00 04 | 0000 000a | (reserve) <*>                         |
|  00 05 | 0000 000a | (reserve) <*>                         |
|     :  |           |                                       |
|  00 0D | 0000 000a | (reserve) <*>                         |
+--------+-----------+---------------------------------------+
|# 00 0E | 0000 aaaa |                                       |
|        | 0000 bbbb | (reserve) <*>                         |
|     :  |           |                                       |
|  00 18 | 0aaa aaaa | (reserve) <*>                         |
|  00 19 | 0000 0aaa | Zone Octave Shift             (61 - 67) |
|        |           |                            -3 - +3     |
|  00 1A | 0000 aaaa | (reserve) <*>                         |
|  00 1B | 0aaa aaaa | (reserve) <*>                         |
|     :  |           |                                       |
|  00 22 | 0aaa aaaa | (reserve) <*>                         |
+--------+-----------+---------------------------------------+
| 00 00 00 23 | Total Size                                  |
+-------------+-------------------------------------------+
```

* Program Controller

```
+----------------------------------------------------------+
| Offset    |                                              |
|   Address |               Description                    |
+-----------+----------------------------------------------+
|  00 00 | 0000 000a | (reserve) <*>                         |
|  00 01 | 0aaa aaaa | Arpeggio Grid                  (0 - 8) |
|        |           |       04_, 08_, 08L, 08H, 08t,         |
|        |           |       16_, 16L, 16H, 16t               |
|  00 02 | 0aaa aaaa | Arpeggio Duration              (0 - 9) |
|        |           |       30, 40, 50, 60, 70, 80, 90,      |
|        |           |       100, 120, FUL                    |
|  00 03 | 0000 000a | Arpeggio Switch                (0 - 1) |
|        |           |                              OFF, ON   |
|  00 04 | 0aaa aaaa | (reserve) <*>                         |
|  00 05 | 0aaa aaaa | Arpeggio Style               (0 - 127) |
|        |           |                            1 - 128     |
|  00 06 | 0aaa aaaa | Arpeggio Motif                (0 - 11) |
|        |           | UP/L, UP/H, UP/_, dn/L, dn/H,          |
|        |           | dn/_, Ud/L, Ud/H, Ud/_, rn/L,          |
|        |           |                    rn/_, PHRASE        |
|  00 07 | 0000 0aaa | Arpeggio Octave Range        (61 - 67) |
|        |           |                            -3 - +3     |
|  00 08 | 0000 000a | (reserve) <*>                         |
|  00 09 | 0aaa aaaa | Arpeggio Accent Rate         (0 - 100) |
|  00 0A | 0aaa aaaa | Arpeggio Velocity            (0 - 127) |
|        |           |                         REAL, 1 - 127  |
|  00 0B | 0000 aaaa | (reserve) <*>                         |
+--------+-----------+---------------------------------------+
| 00 00 00 0C | Total Size                                  |
+-------------+-------------------------------------------+
```

* SuperNATURAL Synth Tone Common

```
+----------------------------------------------------------+
| Offset    |                                              |
|   Address |               Description                    |
+-----------+----------------------------------------------+
|  00 00 | 0aaa aaaa | Tone Name 1                  (32 - 127) |
|        |           |                  32 - 127 [ASCII]      |
|  00 01 | 0aaa aaaa | Tone Name 2                  (32 - 127) |
|        |           |                  32 - 127 [ASCII]      |
|  00 02 | 0aaa aaaa | Tone Name 3                  (32 - 127) |
|        |           |                  32 - 127 [ASCII]      |
|  00 03 | 0aaa aaaa | Tone Name 4                  (32 - 127) |
|        |           |                  32 - 127 [ASCII]      |
|  00 04 | 0aaa aaaa | Tone Name 5                  (32 - 127) |
|        |           |                  32 - 127 [ASCII]      |
|  00 05 | 0aaa aaaa | Tone Name 6                  (32 - 127) |
|        |           |                  32 - 127 [ASCII]      |
|  00 06 | 0aaa aaaa | Tone Name 7                  (32 - 127) |
|        |           |                  32 - 127 [ASCII]      |
|  00 07 | 0aaa aaaa | Tone Name 8                  (32 - 127) |
|        |           |                  32 - 127 [ASCII]      |
```

```
|  00 08 | 0aaa aaaa | Tone Name 9                  (32 - 127) |
|        |           |                  32 - 127 [ASCII]      |
|  00 09 | 0aaa aaaa | Tone Name 10                 (32 - 127) |
|        |           |                  32 - 127 [ASCII]      |
|  00 0A | 0aaa aaaa | Tone Name 11                 (32 - 127) |
|        |           |                  32 - 127 [ASCII]      |
|  00 0B | 0aaa aaaa | Tone Name 12                 (32 - 127) |
|        |           |                  32 - 127 [ASCII]      |
+--------+-----------+---------------------------------------+
|  00 0C | 0aaa aaaa | Tone Level                   (0 - 127) |
+--------+-----------+---------------------------------------+
|# 00 0D | 0000 aaaa |                                       |
|        | 0000 bbbb |                                       |
|        | 0000 cccc | (reserve) <*>                         |
|  00 10 | 0000 000a | (reserve) <*>                         |
|  00 11 | 0000 000a | (reserve) <*>                         |
+--------+-----------+---------------------------------------+
|  00 12 | 0000 000a | Portamento Switch              (0 - 1) |
|        |           |                              OFF, ON   |
|  00 13 | 0aaa aaaa | Portamento Time (CC# 5)      (0 - 127) |
|  00 14 | 0000 00aa | Mono Switch                    (0 - 1) |
|        |           |                              OFF, ON   |
|  00 15 | 0000 0aaa | Octave Shift                 (61 - 67) |
|        |           |                            -3 - +3     |
|  00 16 | 000a aaaa | Pitch Bend Range Up           (0 - 24) |
|  00 17 | 000a aaaa | Pitch Bend Range Down         (0 - 24) |
|  00 18 | 0000 0aaa | (reserve) <*>                         |
+--------+-----------+---------------------------------------+
|  00 19 | 0000 000a | Partial1 Switch                (0 - 1) |
|        |           |                              OFF, ON   |
|  00 1A | 0000 000a | Partial1 Select                (0 - 1) |
|        |           |                              OFF, ON   |
|  00 1B | 0000 000a | Partial2 Switch                (0 - 1) |
|        |           |                              OFF, ON   |
|  00 1C | 0000 000a | Partial2 Select                (0 - 1) |
|        |           |                              OFF, ON   |
|  00 1D | 0000 000a | Partial3 Switch                (0 - 1) |
|        |           |                              OFF, ON   |
|  00 1E | 0000 000a | Partial3 Select                (0 - 1) |
|        |           |                              OFF, ON   |
+--------+-----------+---------------------------------------+
|  00 1F | 0000 00aa | RING Switch                    (0 - 2) |
|        |           |                         OFF, ---, ON   |
+--------+-----------+---------------------------------------+
|  00 20 | 0000 000a | (reserve) <*>                         |
|  00 21 | 0000 00aa | (reserve) <*>                         |
|     :  |           |                                       |
|  00 2D | 0000 000a | (reserve) <*>                         |
+--------+-----------+---------------------------------------+
|  00 2E | 0000 000a | Unison Switch                  (0 - 1) |
|        |           |                              OFF, ON   |
|  00 2F | 0000 000a | (reserve) <*>                         |
|  00 30 | 0000 000a | (reserve) <*>                         |
|  00 31 | 0000 000a | Portamento Mode                (0 - 1) |
|        |           |                      NORMAL, LEGATO    |
|  00 32 | 0000 000a | Legato Switch                  (0 - 1) |
|        |           |                              OFF, ON   |
|  00 33 | 0000 000a | (reserve) <*>                         |
|  00 34 | 0aaa aaaa | Analog Feel                  (0 - 127) |
|  00 35 | 0aaa aaaa | Wave Shape                   (0 - 127) |
|  00 36 | 0aaa aaaa | Tone Category                (0 - 127) |
|# 00 37 | 0000 aaaa |                                       |
|        | 0000 bbbb |                                       |
|        | 0000 cccc |                                       |
|        | 0000 dddd | (reserve) <*>                         |
|  00 3B | 0000 0aaa | (reserve) <*>                         |
|  00 3C | 0000 00aa | Unison Size                    (0 - 3) |
|        |           |                         2, 4, 6, 8     |
|  00 3D | 0aaa aaaa | (reserve) <*>                         |
|  00 3E | 0aaa aaaa | (reserve) <*>                         |
|  00 3F | 0aaa aaaa | (reserve) <*>                         |
+--------+-----------+---------------------------------------+
| 00 00 00 40 | Total Size                                  |
+-------------+-------------------------------------------+
```

* SuperNATURAL Synth Tone Modify

```
+----------------------------------------------------------+
| Offset    |                                              |
|   Address |               Description                    |
+-----------+----------------------------------------------+
|  00 00 | 0aaa aaaa | (reserve) <*>                         |
+--------+-----------+---------------------------------------+
|  00 01 | 0aaa aaaa | Attack Time Interval Sens    (0 - 127) |
|  00 02 | 0aaa aaaa | Release Time Interval Sens   (0 - 127) |
|  00 03 | 0aaa aaaa | Portamento Time Interval Sens (0 - 127) |
|  00 04 | 0000 00aa | Envelope Loop Mode             (0 - 2) |
|        |           |       OFF, FREE-RUN, TEMPO-SYNC         |
|  00 05 | 000a aaaa | Envelope Loop Sync Note       (0 - 19) |
|        |           |  16, 12, 8, 4, 2, 1, 3/4, 2/3, 1/2,    |
|        |           |  3/8, 1/3, 1/4, 3/16, 1/6, 1/8, 3/32,  |
|        |           |  1/12, 1/16, 1/24, 1/32                |
|  00 06 | 0000 000a | Chromatic Portamento           (0 - 1) |
|        |           |                              OFF, ON   |
|  00 07 | 0aaa aaaa | (reserve) <*>                         |
|  00 08 | 0aaa aaaa | (reserve) <*>                         |
|     :  |           |                                       |
|  00 24 | 0aaa aaaa | (reserve) <*>                         |
+--------+-----------+---------------------------------------+
| 00 00 00 25 | Total Size                                  |
+-------------+-------------------------------------------+
```

* SuperNATURAL Synth Tone Partial

```
+----------------------------------------------------------+
| Offset    |                                              |
|   Address |               Description                    |
+-----------+----------------------------------------------+
|  00 00 | 0000 0aaa | OSC Wave                       (0 - 7) |
|        |           |       SAW, SQR, PW-SQR, TRI, SINE,      |
|        |           |       NOISE, SUPER-SAW, PCM            |
|  00 01 | 00aa aaaa | OSC Wave Variation             (0 - 2) |
|        |           |                         A, B, C        |
```

11

```
|       00 02 | 0000 00aa | (reserve) <*>
|       00 03 | 00aa aaaa | OSC Pitch                          (40 - 88)
|             |            |                                   -24 - +24
|       00 04 | 0aaa aaaa | OSC Detune                         (14 - 114)
|             |            |                                   -50 - +50
|       00 05 | 0aaa aaaa | OSC Pulse Width Mod Depth          (0 - 127)
|       00 06 | 0aaa aaaa | OSC Pulse Width                    (0 - 127)
|       00 07 | 0aaa aaaa | OSC Pitch Env Attack Time          (0 - 127)
|       00 08 | 0aaa aaaa | OSC Pitch Env Decay                (0 - 127)
|       00 09 | 0aaa aaaa | OSC Pitch Env Depth                (1 - 127)
|             |            |                                   -63 - +63
+-------------+------------+-----------------------------------------------
|       00 0A | 0000 0aaa | FILTER Mode                        (0 - 7)
|             |            | BYPASS, LPF, HPF, BPF, PKG,
|             |            |                 LPF2, LPF3, LPF4
|       00 0B | 0000 000a | FILTER Slope                       (0 - 1)
|             |            |                                   -12, -24 [dB]
|       00 0C | 0aaa aaaa | FILTER Cutoff                      (0 - 127)
|       00 0D | 00aa aaaa | FILTER Cutoff Keyfollow            (54 - 74)
|             |            |                                   -100 - +100
|       00 0E | 0aaa aaaa | FILTER Env Velocity Sens           (1 - 127)
|             |            |                                   -63 - +63
|       00 0F | 0aaa aaaa | FILTER Resonance                   (0 - 127)
|       00 10 | 0aaa aaaa | FILTER Env Attack Time             (0 - 127)
|       00 11 | 0aaa aaaa | FILTER Env Decay Time              (0 - 127)
|       00 12 | 0aaa aaaa | FILTER Env Sustain Level           (0 - 127)
|       00 13 | 0aaa aaaa | FILTER Env Release Time            (0 - 127)
|       00 14 | 0aaa aaaa | FILTER Env Depth                   (1 - 127)
|             |            |                                   -63 - +63
+-------------+------------+-----------------------------------------------
|       00 15 | 0aaa aaaa | AMP Level                          (0 - 127)
|       00 16 | 0aaa aaaa | AMP Level Velocity Sens            (1 - 127)
|             |            |                                   -63 - +63
|       00 17 | 0aaa aaaa | AMP Env Attack Time                (0 - 127)
|       00 18 | 0aaa aaaa | AMP Env Decay Time                 (0 - 127)
|       00 19 | 0aaa aaaa | AMP Env Sustain Level              (0 - 127)
|       00 1A | 0aaa aaaa | AMP Env Release Time               (0 - 127)
|       00 1B | 0aaa aaaa | AMP Pan                            (0 - 127)
|             |            |                                   L64 - 63R
+-------------+------------+-----------------------------------------------
|       00 1C | 0000 0aaa | LFO Shape                          (0 - 5)
|             |            | TRI, SIN, SAW, SQR, S&H, RND
|       00 1D | 0aaa aaaa | LFO Rate                           (0 - 127)
|       00 1E | 0000 000a | LFO Tempo Sync Switch              (0 - 1)
|             |            |                                   OFF, ON
|       00 1F | 000a aaaa | LFO Tempo Sync Note                (0 - 19)
|             |            |    16, 12, 8, 4, 2, 1, 3/4, 2/3, 1/2,
|             |            |    3/8, 1/3, 1/4, 3/16, 1/6, 1/8, 3/32,
|             |            |                 1/12, 1/16, 1/24, 1/32
|       00 20 | 0aaa aaaa | LFO Fade Time                      (0 - 127)
|       00 21 | 0000 000a | LFO Key Trigger                    (0 - 1)
|             |            |                                   OFF, ON
|       00 22 | 0aaa aaaa | LFO Pitch Depth                    (1 - 127)
|             |            |                                   -63 - +63
|       00 23 | 0aaa aaaa | LFO Filter Depth                   (1 - 127)
|             |            |                                   -63 - +63
|       00 24 | 0aaa aaaa | LFO Amp Depth                      (1 - 127)
|             |            |                                   -63 - +63
|       00 25 | 0aaa aaaa | LFO Pan Depth                      (1 - 127)
|             |            |                                   -63 - +63
+-------------+------------+-----------------------------------------------
|       00 26 | 0000 0aaa | Modulation LFO Shape               (0 - 5)
|             |            | TRI, SIN, SAW, SQR, S&H, RND
|       00 27 | 0aaa aaaa | Modulation LFO Rate                (0 - 127)
|       00 28 | 0000 000a | Modulation LFO Tempo Sync Switch   (0 - 1)
|             |            |                                   OFF, ON
|       00 29 | 000a aaaa | Modulation LFO Tempo Sync Note     (0 - 19)
|             |            |    16, 12, 8, 4, 2, 1, 3/4, 2/3, 1/2,
|             |            |    3/8, 1/3, 1/4, 3/16, 1/6, 1/8, 3/32,
|             |            |                 1/12, 1/16, 1/24, 1/32
|       00 2A | 0aaa aaaa | OSC Pulse Width Shift              (0 - 127)
|       00 2B | 0000 000a | (reserve) <*>
|       00 2C | 0aaa aaaa | Modulation LFO Pitch Depth         (1 - 127)
|             |            |                                   -63 - +63
|       00 2D | 0aaa aaaa | Modulation LFO Filter Depth        (1 - 127)
|             |            |                                   -63 - +63
|       00 2E | 0aaa aaaa | Modulation LFO Amp Depth           (1 - 127)
|             |            |                                   -63 - +63
|       00 2F | 0aaa aaaa | Modulation LFO Pan Depth           (1 - 127)
|             |            |                                   -63 - +63
+-------------+------------+-----------------------------------------------
|       00 30 | 0aaa aaaa | Cutoff Aftertouch Sens             (1 - 127)
|             |            |                                   -63 - +63
|       00 31 | 0aaa aaaa | Level Aftertouch Sens              (1 - 127)
|             |            |                                   -63 - +63
|       00 32 | 0aaa aaaa | (reserve) <*>
|       00 33 | 0aaa aaaa | (reserve) <*>
+-------------+------------+-----------------------------------------------
|       00 34 | 0000 00aa | Wave Gain                          (0 - 3)
|             |            |                                   -6, 0, +6, +12 [dB]
|#      00 35 | 0000 aaaa |
|             | 0000 bbbb |
|             | 0000 cccc |
|             | 0000 dddd | Wave Number                        (0 - 16384)
|             |            |                                   OFF, 1 - 16384
|       00 39 | 0aaa aaaa | HPF Cutoff                         (0 - 127)
|       00 3A | 0aaa aaaa | Super Saw Detune                   (0 - 127)
|       00 3B | 0aaa aaaa | Modulation LFO Rate Control        (1 - 127)
|             |            |                                   -63 - +63
|       00 3C | 000a aaaa | AMP Level Keyfollow                (54 - 74)
|             |            |                                   -100 - +100
+-------------+------------+-----------------------------------------------
| 00 00 00 3D | Total Size |
+-------------+------------+-----------------------------------------------

* Analog Synth Tone

+-------------+------------+-----------------------------------------------
| Offset      |            |
|     Address |            |           Description
+-------------+------------+-----------------------------------------------
|       00 00 | 0aaa aaaa | Tone Name 1                        (32 - 127)
```

```
|             |            |                                   32 - 127 [ASCII]
|       00 01 | 0aaa aaaa | Tone Name 2                        (32 - 127)
|             |            |                                   32 - 127 [ASCII]
|       00 02 | 0aaa aaaa | Tone Name 3                        (32 - 127)
|             |            |                                   32 - 127 [ASCII]
|       00 03 | 0aaa aaaa | Tone Name 4                        (32 - 127)
|             |            |                                   32 - 127 [ASCII]
|       00 04 | 0aaa aaaa | Tone Name 5                        (32 - 127)
|             |            |                                   32 - 127 [ASCII]
|       00 05 | 0aaa aaaa | Tone Name 6                        (32 - 127)
|             |            |                                   32 - 127 [ASCII]
|       00 06 | 0aaa aaaa | Tone Name 7                        (32 - 127)
|             |            |                                   32 - 127 [ASCII]
|       00 07 | 0aaa aaaa | Tone Name 8                        (32 - 127)
|             |            |                                   32 - 127 [ASCII]
|       00 08 | 0aaa aaaa | Tone Name 9                        (32 - 127)
|             |            |                                   32 - 127 [ASCII]
|       00 09 | 0aaa aaaa | Tone Name 10                       (32 - 127)
|             |            |                                   32 - 127 [ASCII]
|       00 0A | 0aaa aaaa | Tone Name 11                       (32 - 127)
|             |            |                                   32 - 127 [ASCII]
|       00 0B | 0aaa aaaa | Tone Name 12                       (32 - 127)
|             |            |                                   32 - 127 [ASCII]
+-------------+------------+-----------------------------------------------
|       00 0C | 0aaa aaaa | (reserve) <*>
+-------------+------------+-----------------------------------------------
|       00 0D | 0000 0aaa | LFO Shape                          (0 - 5)
|             |            | TRI, SIN, SAW, SQR, S&H, RND
|       00 0E | 0aaa aaaa | LFO Rate                           (0 - 127)
|       00 0F | 0aaa aaaa | LFO Fade Time                      (0 - 127)
|       00 10 | 0000 000a | LFO Tempo Sync Switch              (0 - 1)
|             |            |                                   OFF, ON
|       00 11 | 000a aaaa | LFO Tempo Sync Note                (0 - 19)
|             |            |    16, 12, 8, 4, 2, 1, 3/4, 2/3, 1/2,
|             |            |    3/8, 1/3, 1/4, 3/16, 1/6, 1/8, 3/32,
|             |            |                 1/12, 1/16, 1/24, 1/32
|       00 12 | 0aaa aaaa | LFO Pitch Depth                    (1 - 127)
|             |            |                                   -63 - +63
|       00 13 | 0aaa aaaa | LFO Filter Depth                   (1 - 127)
|             |            |                                   -63 - +63
|       00 14 | 0aaa aaaa | LFO Amp Depth                      (1 - 127)
|             |            |                                   -63 - +63
|       00 15 | 0000 000a | LFO Key Trigger                    (0 - 1)
|             |            |                                   OFF, ON
+-------------+------------+-----------------------------------------------
|       00 16 | 0000 0aaa | OSC Waveform                       (0 - 2)
|             |            |                 SAW, TRI, PW-SQR
|       00 17 | 00aa aaaa | OSC Pitch Coarse                   (40 - 88)
|             |            |                                   -24 - +24
|       00 18 | 0aaa aaaa | OSC Pitch Fine                     (14 - 114)
|             |            |                                   -50 - +50
|       00 19 | 0aaa aaaa | OSC Pulse Width                    (0 - 127)
|       00 1A | 0aaa aaaa | OSC Pulse Width Mod Depth          (0 - 127)
|       00 1B | 0aaa aaaa | OSC Pitch Env Velocity Sens        (1 - 127)
|             |            |                                   -63 - +63
|       00 1C | 0aaa aaaa | OSC Pitch Env Attack Time          (0 - 127)
|       00 1D | 0aaa aaaa | OSC Pitch Env Decay                (0 - 127)
|       00 1E | 0aaa aaaa | OSC Pitch Env Depth                (1 - 127)
|             |            |                                   -63 - +63
|       00 1F | 0000 00aa | Sub Oscillator Type                (0 - 2)
|             |            |                 OFF, OCT-1, OCT-2
+-------------+------------+-----------------------------------------------
|       00 20 | 0000 0aaa | Filter Switch                      (0 - 1)
|             |            |                 BYPASS, LPF
|       00 21 | 0aaa aaaa | Filter Cutoff                      (0 - 127)
|       00 22 | 00aa aaaa | Filter Cutoff Keyfollow            (54 - 74)
|             |            |                                   -100 - +100
|       00 23 | 0aaa aaaa | Filter Resonance                   (0 - 127)
|       00 24 | 0aaa aaaa | Filter Env Velocity Sens           (1 - 127)
|             |            |                                   -63 - +63
|       00 25 | 0aaa aaaa | Filter Env Attack Time             (0 - 127)
|       00 26 | 0aaa aaaa | Filter Env Decay Time              (0 - 127)
|       00 27 | 0aaa aaaa | Filter Env Sustain Level           (0 - 127)
|       00 28 | 0aaa aaaa | Filter Env Release Time            (0 - 127)
|       00 29 | 0aaa aaaa | Filter Env Depth                   (1 - 127)
|             |            |                                   -63 - +63
+-------------+------------+-----------------------------------------------
|       00 2A | 0aaa aaaa | AMP Level                          (0 - 127)
|       00 2B | 000a aaaa | AMP Level Keyfollow                (54 - 74)
|             |            |                                   -100 - +100
|       00 2C | 0aaa aaaa | AMP Level Velocity Sens            (1 - 127)
|             |            |                                   -63 - +63
|       00 2D | 0aaa aaaa | AMP Env Attack Time                (0 - 127)
|       00 2E | 0aaa aaaa | AMP Env Decay Time                 (0 - 127)
|       00 2F | 0aaa aaaa | AMP Env Sustain Level              (0 - 127)
|       00 30 | 0aaa aaaa | AMP Env Release Time               (0 - 127)
+-------------+------------+-----------------------------------------------
|       00 31 | 0000 000a | Portamento Switch                  (0 - 1)
|             |            |                                   OFF, ON
|       00 32 | 0aaa aaaa | Portamento Time (CC# 5)            (0 - 127)
|       00 33 | 0000 000a | Legato Switch                      (0 - 1)
|             |            |                                   OFF, ON
|       00 34 | 0000 0aaa | Octave Shift                       (61 - 67)
|             |            |                                   -3 - +3
|       00 35 | 000a aaaa | Pitch Bend Range Up                (0 - 24)
|       00 36 | 000a aaaa | Pitch Bend Range Down              (0 - 24)
|       00 37 | 0000 0aaa | (reserve) <*>
+-------------+------------+-----------------------------------------------
|       00 38 | 0aaa aaaa | LFO Pitch Modulation Control       (1 - 127)
|             |            |                                   -63 - +63
|       00 39 | 0aaa aaaa | LFO Filter Modulation Control      (1 - 127)
|             |            |                                   -63 - +63
|       00 3A | 0aaa aaaa | LFO Amp Modulation Control         (1 - 127)
|             |            |                                   -63 - +63
|       00 3B | 0aaa aaaa | LFO Rate Modulation Control        (1 - 127)
|             |            |                                   -63 - +63
+-------------+------------+-----------------------------------------------
|       00 3C | 0aaa aaaa | (reserve) <*>
|       00 3D | 0aaa aaaa | (reserve) <*>
|             |            |        :
|       00 3F | 0aaa aaaa | (reserve) <*>
+-------------+------------+-----------------------------------------------
```

```
| 00 00 00 40 | Total Size                                            |
+-------------+-------------------------------------------------------+


* Drum Kit Common
+------------------------------------------------------------------+
| Offset                                                           |
|   Address   |                  Description                        |
+-------------+----------------------------------------------------+
|   00 00     | 0aaa aaaa | Kit Name 1                   (32 - 127) |
|             |           |                        32 - 127 [ASCII] |
|   00 01     | 0aaa aaaa | Kit Name 2                   (32 - 127) |
|             |           |                        32 - 127 [ASCII] |
|   00 02     | 0aaa aaaa | Kit Name 3                   (32 - 127) |
|             |           |                        32 - 127 [ASCII] |
|   00 03     | 0aaa aaaa | Kit Name 4                   (32 - 127) |
|             |           |                        32 - 127 [ASCII] |
|   00 04     | 0aaa aaaa | Kit Name 5                   (32 - 127) |
|             |           |                        32 - 127 [ASCII] |
|   00 05     | 0aaa aaaa | Kit Name 6                   (32 - 127) |
|             |           |                        32 - 127 [ASCII] |
|   00 06     | 0aaa aaaa | Kit Name 7                   (32 - 127) |
|             |           |                        32 - 127 [ASCII] |
|   00 07     | 0aaa aaaa | Kit Name 8                   (32 - 127) |
|             |           |                        32 - 127 [ASCII] |
|   00 08     | 0aaa aaaa | Kit Name 9                   (32 - 127) |
|             |           |                        32 - 127 [ASCII] |
|   00 09     | 0aaa aaaa | Kit Name 10                  (32 - 127) |
|             |           |                        32 - 127 [ASCII] |
|   00 0A     | 0aaa aaaa | Kit Name 11                  (32 - 127) |
|             |           |                        32 - 127 [ASCII] |
|   00 0B     | 0aaa aaaa | Kit Name 12                  (32 - 127) |
|             |           |                        32 - 127 [ASCII] |
+-------------+----------------------------------------------------+
|   00 0C     | 0aaa aaaa | Kit Level                     (0 - 127) |
|   00 0D     | 0000 000a | (reserve) <*>                           |
# |   00 0E   | 0000 aaaa |                                        |
|             | 0000 bbbb | (reserve) <*>                          |
|     :       |           |                                        |
|   00 11     | 0000 aaaa | (reserve) <*>                          |
+-------------+----------------------------------------------------+
| 00 00 00 12 | Total Size                                          |
+------------------------------------------------------------------+


* Drum Kit Partial
+------------------------------------------------------------------+
| Offset                                                           |
|   Address   |                  Description                        |
+-------------+----------------------------------------------------+
|   00 00     | 0aaa aaaa | Partial Name 1               (32 - 127) |
|             |           |                        32 - 127 [ASCII] |
|   00 01     | 0aaa aaaa | Partial Name 2               (32 - 127) |
|             |           |                        32 - 127 [ASCII] |
|   00 02     | 0aaa aaaa | Partial Name 3               (32 - 127) |
|             |           |                        32 - 127 [ASCII] |
|   00 03     | 0aaa aaaa | Partial Name 4               (32 - 127) |
|             |           |                        32 - 127 [ASCII] |
|   00 04     | 0aaa aaaa | Partial Name 5               (32 - 127) |
|             |           |                        32 - 127 [ASCII] |
|   00 05     | 0aaa aaaa | Partial Name 6               (32 - 127) |
|             |           |                        32 - 127 [ASCII] |
|   00 06     | 0aaa aaaa | Partial Name 7               (32 - 127) |
|             |           |                        32 - 127 [ASCII] |
|   00 07     | 0aaa aaaa | Partial Name 8               (32 - 127) |
|             |           |                        32 - 127 [ASCII] |
|   00 08     | 0aaa aaaa | Partial Name 9               (32 - 127) |
|             |           |                        32 - 127 [ASCII] |
|   00 09     | 0aaa aaaa | Partial Name 10              (32 - 127) |
|             |           |                        32 - 127 [ASCII] |
|   00 0A     | 0aaa aaaa | Partial Name 11              (32 - 127) |
|             |           |                        32 - 127 [ASCII] |
|   00 0B     | 0aaa aaaa | Partial Name 12              (32 - 127) |
|             |           |                        32 - 127 [ASCII] |
+-------------+----------------------------------------------------+
|   00 0C     | 0000 000a | Assign Type                    (0 - 1) |
|             |           |                          MULTI, SINGLE |
|   00 0D     | 000a aaaa | Mute Group                    (0 - 31) |
|             |           |                            OFF, 1 - 31 |
+-------------+----------------------------------------------------+
|   00 0E     | 0aaa aaaa | Partial Level                 (0 - 127) |
|   00 0F     | 0aaa aaaa | Partial Coarse Tune           (0 - 127) |
|             |           |                               C-1 - G9 |
|   00 10     | 0aaa aaaa | Partial Fine Tune            (14 - 114) |
|             |           |                              -50 - +50 |
|   00 11     | 000a aaaa | Partial Random Pitch Depth    (0 - 30) |
|             |           |             0, 1, 2, 3, 4, 5, 6, 7, 8, 9, |
|             |           |           10, 20, 30, 40, 50, 60, 70, 80, |
|             |           |          90, 100, 200, 300, 400, 500,     |
|             |           |          600, 700, 800, 900, 1000, 1100,  |
|             |           |                                    1200   |
|   00 12     | 0aaa aaaa | Partial Pan                   (0 - 127) |
|             |           |                               L64 - 63R |
|   00 13     | 00aa aaaa | Partial Random Pan Depth      (0 - 63) |
|   00 14     | 0aaa aaaa | Partial Alternate Pan Depth   (1 - 127) |
|             |           |                               L63 - 63R |
|   00 15     | 0000 000a | Partial Env Mode               (0 - 1) |
|             |           |                            NO-SUS, SUSTAIN |
+-------------+----------------------------------------------------+
|   00 16     | 0aaa aaaa | Partial Output Level          (0 - 127) |
|   00 17     | 0aaa aaaa | (reserve) <*>                           |
|   00 18     | 0aaa aaaa | (reserve) <*>                           |
|   00 19     | 0aaa aaaa | Partial Chorus Send Level     (0 - 127) |
|   00 1A     | 0aaa aaaa | Partial Reverb Send Level     (0 - 127) |
|   00 1B     | 0000 aaaa | Partial Output Assign          (0 - 4) |
|             |           |        EFX1, EFX2, DLY, REV, DIR         |
+-------------+----------------------------------------------------+
|   00 1C     | 00aa aaaa | Partial Pitch Bend Range      (0 - 48) |
|   00 1D     | 0000 000a | Partial Receive Expression     (0 - 1) |
|             |           |                                OFF, ON |
|   00 1E     | 0000 000a | Partial Receive Hold-1         (0 - 1) |
|             |           |                                OFF, ON |
|   00 1F     | 0000 000a | (reserve) <*>                           |
```

```
+-------------+----------------------------------------------------+
|   00 20     | 0000 00aa | WMT Velocity Control           (0 - 2) |
|             |           |                      OFF, ON, RANDOM   |
+-------------+----------------------------------------------------+
|   00 21     | 0000 000a | WMT1 Wave Switch               (0 - 1) |
|             |           |                                OFF, ON |
|   00 22     | 0000 00aa | WMT1 Wave Group Type              (0) |
# |   00 23   | 0000 aaaa |                                        |
|             | 0000 bbbb |                                        |
|             | 0000 cccc |                                        |
|             | 0000 dddd | WMT1 Wave Group ID         (0 - 16384) |
|             |           |                        OFF, 1 - 16384  |
# |   00 27   | 0000 aaaa |                                        |
|             | 0000 bbbb |                                        |
|             | 0000 cccc |                                        |
|             | 0000 dddd | WMT1 Wave Number L (Mono)  (0 - 16384) |
|             |           |                        OFF, 1 - 16384  |
# |   00 2B   | 0000 aaaa |                                        |
|             | 0000 bbbb |                                        |
|             | 0000 cccc |                                        |
|             | 0000 dddd | WMT1 Wave Number R         (0 - 16384) |
|             |           |                        OFF, 1 - 16384  |
|   00 2F     | 0000 00aa | WMT1 Wave Gain                 (0 - 3) |
|             |           |                   -6, 0, +6, +12 [dB]  |
|   00 30     | 0000 000a | WMT1 Wave FXM Switch           (0 - 1) |
|             |           |                                OFF, ON |
|   00 31     | 0000 00aa | WMT1 Wave FXM Color            (0 - 3) |
|             |           |                                  1 - 4 |
|   00 32     | 000a aaaa | WMT1 Wave FXM Depth           (0 - 16) |
|   00 33     | 0000 000a | WMT1 Wave Tempo Sync           (0 - 1) |
|             |           |                                OFF, ON |
|   00 34     | 0aaa aaaa | WMT1 Wave Coarse Tune        (16 - 112) |
|             |           |                              -48 - +48 |
|   00 35     | 0aaa aaaa | WMT1 Wave Fine Tune          (14 - 114) |
|             |           |                              -50 - +50 |
|   00 36     | 0aaa aaaa | WMT1 Wave Pan                 (0 - 127) |
|             |           |                               L64 - 63R |
|   00 37     | 0000 000a | WMT1 Wave Random Pan Switch    (0 - 1) |
|             |           |                                OFF, ON |
|   00 38     | 0000 00aa | WMT1 Wave Alternate Pan Switch (0 - 2) |
|             |           |                       OFF, ON, REVERSE |
|   00 39     | 0aaa aaaa | WMT1 Wave Level               (0 - 127) |
|   00 3A     | 0aaa aaaa | WMT1 Velocity Range Lower     (1 - 127) |
|             |           |                             1 - UPPER  |
|   00 3B     | 0aaa aaaa | WMT1 Velocity Range Upper     (1 - 127) |
|             |           |                            LOWER - 127 |
|   00 3C     | 0aaa aaaa | WMT1 Velocity Fade Width Lower (0 - 127)|
|   00 3D     | 0aaa aaaa | WMT1 Velocity Fade Width Upper (0 - 127)|
+-------------+----------------------------------------------------+
|   00 3E     | 0000 000a | WMT2 Wave Switch               (0 - 1) |
|             |           |                                OFF, ON |
|   00 3F     | 0000 00aa | WMT2 Wave Group Type              (0) |
# |   00 40   | 0000 aaaa |                                        |
|             | 0000 bbbb |                                        |
|             | 0000 cccc |                                        |
|             | 0000 dddd | WMT2 Wave Group ID         (0 - 16384) |
|             |           |                        OFF, 1 - 16384  |
# |   00 44   | 0000 aaaa |                                        |
|             | 0000 bbbb |                                        |
|             | 0000 cccc |                                        |
|             | 0000 dddd | WMT2 Wave Number L (Mono)  (0 - 16384) |
|             |           |                        OFF, 1 - 16384  |
# |   00 48   | 0000 aaaa |                                        |
|             | 0000 bbbb |                                        |
|             | 0000 cccc |                                        |
|             | 0000 dddd | WMT2 Wave Number R         (0 - 16384) |
|             |           |                        OFF, 1 - 16384  |
|   00 4C     | 0000 00aa | WMT2 Wave Gain                 (0 - 3) |
|             |           |                   -6, 0, +6, +12 [dB]  |
|   00 4D     | 0000 000a | WMT2 Wave FXM Switch           (0 - 1) |
|             |           |                                OFF, ON |
|   00 4E     | 0000 00aa | WMT2 Wave FXM Color            (0 - 3) |
|             |           |                                  1 - 4 |
|   00 4F     | 000a aaaa | WMT2 Wave FXM Depth           (0 - 16) |
|   00 50     | 0000 000a | WMT2 Wave Tempo Sync           (0 - 1) |
|             |           |                                OFF, ON |
|   00 51     | 0aaa aaaa | WMT2 Wave Coarse Tune        (16 - 112) |
|             |           |                              -48 - +48 |
|   00 52     | 0aaa aaaa | WMT2 Wave Fine Tune          (14 - 114) |
|             |           |                              -50 - +50 |
|   00 53     | 0aaa aaaa | WMT2 Wave Pan                 (0 - 127) |
|             |           |                               L64 - 63R |
|   00 54     | 0000 000a | WMT2 Wave Random Pan Switch    (0 - 1) |
|             |           |                                OFF, ON |
|   00 55     | 0000 00aa | WMT2 Wave Alternate Pan Switch (0 - 2) |
|             |           |                       OFF, ON, REVERSE |
|   00 56     | 0aaa aaaa | WMT2 Wave Level               (0 - 127) |
|   00 57     | 0aaa aaaa | WMT2 Velocity Range Lower     (1 - 127) |
|             |           |                             1 - UPPER  |
|   00 58     | 0aaa aaaa | WMT2 Velocity Range Upper     (1 - 127) |
|             |           |                            LOWER - 127 |
|   00 59     | 0aaa aaaa | WMT2 Velocity Fade Width Lower (0 - 127)|
|   00 5A     | 0aaa aaaa | WMT2 Velocity Fade Width Upper (0 - 127)|
+-------------+----------------------------------------------------+
|   00 5B     | 0000 000a | WMT3 Wave Switch               (0 - 1) |
|             |           |                                OFF, ON |
|   00 5C     | 0000 00aa | WMT3 Wave Group Type              (0) |
# |   00 5D   | 0000 aaaa |                                        |
|             | 0000 bbbb |                                        |
|             | 0000 cccc |                                        |
|             | 0000 dddd | WMT3 Wave Group ID         (0 - 16384) |
|             |           |                        OFF, 1 - 16384  |
# |   00 61   | 0000 aaaa |                                        |
|             | 0000 bbbb |                                        |
|             | 0000 cccc |                                        |
|             | 0000 dddd | WMT3 Wave Number L (Mono)  (0 - 16384) |
|             |           |                        OFF, 1 - 16384  |
# |   00 65   | 0000 aaaa |                                        |
|             | 0000 bbbb |                                        |
|             | 0000 cccc |                                        |
|             | 0000 dddd | WMT3 Wave Number R         (0 - 16384) |
|             |           |                        OFF, 1 - 16384  |
```

13

00 69	0000 00aa	WMT3 Wave Gain	(0 - 3)	
			-6, 0, +6, +12 [dB]	
00 6A	0000 000a	WMT3 Wave FXM Switch	(0 - 1)	
			OFF, ON	
00 6B	0000 00aa	WMT3 Wave FXM Color	(0 - 3)	
			1 - 4	
00 6C	000a aaaa	WMT3 Wave FXM Depth	(0 - 16)	
00 6D	0000 000a	WMT3 Wave Tempo Sync	(0 - 1)	
			OFF, ON	
00 6E	0aaa aaaa	WMT3 Wave Coarse Tune	(16 - 112)	
			-48 - +48	
00 6F	0aaa aaaa	WMT3 Wave Fine Tune	(14 - 114)	
			-50 - +50	
00 70	0aaa aaaa	WMT3 Wave Pan	(0 - 127)	
			L64 - 63R	
00 71	0000 000a	WMT3 Wave Random Pan Switch	(0 - 1)	
			OFF, ON	
00 72	0000 00aa	WMT3 Wave Alternate Pan Switch	(0 - 2)	
			OFF, ON, REVERSE	
00 73	0aaa aaaa	WMT3 Wave Level	(0 - 127)	
00 74	0aaa aaaa	WMT3 Velocity Range Lower	(1 - 127)	
			1 - UPPER	
00 75	0aaa aaaa	WMT3 Velocity Range Upper	(1 - 127)	
			LOWER - 127	
00 76	0aaa aaaa	WMT3 Velocity Fade Width Lower	(0 - 127)	
00 77	0aaa aaaa	WMT3 Velocity Fade Width Upper	(0 - 127)	
00 78	0000 000a	WMT4 Wave Switch	(0 - 1)	
			OFF, ON	
00 79	0000 00aa	WMT4 Wave Group Type	(0)	
# 00 7A	0000 aaaa			
	0000 bbbb			
	0000 cccc			
	0000 dddd	WMT4 Wave Group ID	(0 - 16384)	
			OFF, 1 - 16384	
# 00 7E	0000 aaaa			
	0000 bbbb			
	0000 cccc			
	0000 dddd	WMT4 Wave Number L (Mono)	(0 - 16384)	
			OFF, 1 - 16384	
# 01 02	0000 aaaa			
	0000 bbbb			
	0000 cccc			
	0000 dddd	WMT4 Wave Number R	(0 - 16384)	
			OFF, 1 - 16384	
01 06	0000 00aa	WMT4 Wave Gain	(0 - 3)	
			-6, 0, +6, +12 [dB]	
01 07	0000 000a	WMT4 Wave FXM Switch	(0 - 1)	
			OFF, ON	
01 08	0000 00aa	WMT4 Wave FXM Color	(0 - 3)	
			1 - 4	
01 09	000a aaaa	WMT4 Wave FXM Depth	(0 - 16)	
01 0A	0000 000a	WMT4 Wave Tempo Sync	(0 - 1)	
			OFF, ON	
01 0B	0aaa aaaa	WMT4 Wave Coarse Tune	(16 - 112)	
			-48 - +48	
01 0C	0aaa aaaa	WMT4 Wave Fine Tune	(14 - 114)	
			-50 - +50	
01 0D	0aaa aaaa	WMT4 Wave Pan	(0 - 127)	
			L64 - 63R	
01 0E	0000 000a	WMT4 Wave Random Pan Switch	(0 - 1)	
			OFF, ON	
01 0F	0000 00aa	WMT4 Wave Alternate Pan Switch	(0 - 2)	
			OFF, ON, REVERSE	
01 10	0aaa aaaa	WMT4 Wave Level	(0 - 127)	
01 11	0aaa aaaa	WMT4 Velocity Range Lower	(1 - 127)	
			1 - UPPER	
01 12	0aaa aaaa	WMT4 Velocity Range Upper	(1 - 127)	
			LOWER - 127	
01 13	0aaa aaaa	WMT4 Velocity Fade Width Lower	(0 - 127)	
01 14	0aaa aaaa	WMT4 Velocity Fade Width Upper	(0 - 127)	
01 15	000a aaaa	Pitch Env Depth	(52 - 76)	
			-12 - +12	
01 16	0aaa aaaa	Pitch Env Velocity Sens	(1 - 127)	
			-63 - +63	
01 17	0aaa aaaa	Pitch Env Time 1 Velocity Sens	(1 - 127)	
			-63 - +63	
01 18	0aaa aaaa	Pitch Env Time 4 Velocity Sens	(1 - 127)	
			-63 - +63	
01 19	0aaa aaaa	Pitch Env Time 1	(0 - 127)	
01 1A	0aaa aaaa	Pitch Env Time 2	(0 - 127)	
01 1B	0aaa aaaa	Pitch Env Time 3	(0 - 127)	
01 1C	0aaa aaaa	Pitch Env Time 4	(0 - 127)	
01 1D	0aaa aaaa	Pitch Env Level 0	(1 - 127)	
			-63 - +63	
01 1E	0aaa aaaa	Pitch Env Level 1	(1 - 127)	
			-63 - +63	
01 1F	0aaa aaaa	Pitch Env Level 2	(1 - 127)	
			-63 - +63	
01 20	0aaa aaaa	Pitch Env Level 3	(1 - 127)	
			-63 - +63	
01 21	0aaa aaaa	Pitch Env Level 4	(1 - 127)	
			-63 - +63	
01 22	0000 0aaa	TVF Filter Type	(0 - 6)	
			OFF, LPF, BPF, HPF, PKG, LPF2,	
			LPF3	
01 23	0aaa aaaa	TVF Cutoff Frequency	(0 - 127)	
01 24	0000 0aaa	TVF Cutoff Velocity Curve	(0 - 7)	
			FIXED, 1 - 7	
01 25	0aaa aaaa	TVF Cutoff Velocity Sens	(1 - 127)	
			-63 - +63	
01 26	0aaa aaaa	TVF Resonance	(0 - 127)	
01 27	0aaa aaaa	TVF Resonance Velocity Sens	(1 - 127)	
			-63 - +63	
01 28	0aaa aaaa	TVF Env Depth	(1 - 127)	
			-63 - +63	
01 29	0000 0aaa	TVF Env Velocity Curve Type	(0 - 7)	
			FIXED, 1 - 7	
01 2A	0aaa aaaa	TVF Env Velocity Sens	(1 - 127)	
			-63 - +63	

01 2B	0aaa aaaa	TVF Env Time 1 Velocity Sens	(1 - 127)	
			-63 - +63	
01 2C	0aaa aaaa	TVF Env Time 4 Velocity Sens	(1 - 127)	
			-63 - +63	
01 2D	0aaa aaaa	TVF Env Time 1	(0 - 127)	
01 2E	0aaa aaaa	TVF Env Time 2	(0 - 127)	
01 2F	0aaa aaaa	TVF Env Time 3	(0 - 127)	
01 30	0aaa aaaa	TVF Env Time 4	(0 - 127)	
01 31	0aaa aaaa	TVF Env Level 0	(0 - 127)	
01 32	0aaa aaaa	TVF Env Level 1	(0 - 127)	
01 33	0aaa aaaa	TVF Env Level 2	(0 - 127)	
01 34	0aaa aaaa	TVF Env Level 3	(0 - 127)	
01 35	0aaa aaaa	TVF Env Level 4	(0 - 127)	
01 36	0000 0aaa	TVA Level Velocity Curve	(0 - 7)	
			FIXED, 1 - 7	
01 37	0aaa aaaa	TVA Level Velocity Sens	(1 - 127)	
			-63 - +63	
01 38	0aaa aaaa	TVA Env Time 1 Velocity Sens	(1 - 127)	
			-63 - +63	
01 39	0aaa aaaa	TVA Env Time 4 Velocity Sens	(1 - 127)	
			-63 - +63	
01 3A	0aaa aaaa	TVA Env Time 1	(0 - 127)	
01 3B	0aaa aaaa	TVA Env Time 2	(0 - 127)	
01 3C	0aaa aaaa	TVA Env Time 3	(0 - 127)	
01 3D	0aaa aaaa	TVA Env Time 4	(0 - 127)	
01 3E	0aaa aaaa	TVA Env Level 1	(0 - 127)	
01 3F	0aaa aaaa	TVA Env Level 2	(0 - 127)	
01 40	0aaa aaaa	TVA Env Level 3	(0 - 127)	
01 41	0000 000a	One Shot Mode	(0 - 1)	
			OFF, ON	
01 42	0aaa aaaa	Relative Level	(0 - 127)	
			-64 - +63	
00 00 01 43	Total Size			

6. Control Change Message List (Knob operation)

■ SuperNATURAL Synth Tone

Parameter	Partial	Controller Number	Value
Cutoff	1 - 3	102 - 104	0 - 127
Resonance	1 - 3	105 - 107	0 - 127
Level	1 - 3	117 - 119	0 - 127
Envelope	1 - 3	NRPN MSB:0, LSB:124 - 126	0 - 127
LFO Shape	1 - 3	NRPN MSB:0, LSB:3 - 5	0 - 5
LFO Rate	1 - 3	16 - 18	0 - 127
LFO Pitch Depth	1 - 3	NRPN MSB:0, LSB:15 - 17	0 - 127
LFO Filter Depth	1 - 3	NRPN MSB:0, LSB:18 - 20	0 - 127
LFO Amp Depth	1 - 3	NRPN MSB:0, LSB:21 - 23	0 - 127

■ Analog Synth Tone

Parameter	Controller Number	Value
Cutoff	102	0 - 127
Resonance	105	0 - 127
Level	117	0 - 127
Envelope	NRPN MSB:0, LSB:124	0 - 127
LFO Shape	NRPN MSB:0, LSB:3	0 - 5
LFO Rate	16	0 - 127
LFO Pitch Depth	NRPN MSB:0, LSB:15	0 - 127
LFO Filter Depth	NRPN MSB:0, LSB:18	0 - 127
LFO Amp Depth	NRPN MSB:0, LSB:21	0 - 127
Pulse Width	NRPN MSB:0, LSB:37	0 - 127

■ Drum Kit

Parameter	Note	Controller Number	Value
Cutoff	36 - 72	NRPN MSB:89, LSB:Note	0 - 127
Resonance	36 - 72	NRPN MSB:92, LSB:Note	0 - 127
Level	36 - 72	NRPN MSB:64, LSB:Note	0 - 127
Envelope	36 - 72	NRPN MSB:119, LSB:Note	0 - 127

■ Effects

Parameter	Controller Number	Value
Effect 1	14	0 - 127
Effect 2	15	0 - 127
Delay	13	0 - 127
Reverb	12	0 - 127
Vocoder (Level)	83	0 - 127

7. Supplementary Material

■ Decimal and Hexadecimal Table

(An "H" is appended to the end of numbers in hexadecimal notation.)
In MIDI documentation, data values and addresses/sizes of Exclusive messages, etc. are expressed as hexadecimal values for each 7 bits. The following table shows how these correspond to decimal numbers.

D	H		D	H		D	H		D	H
0	00H		32	20H		64	40H		96	60H
1	01H		33	21H		65	41H		97	61H
2	02H		34	22H		66	42H		98	62H
3	03H		35	23H		67	43H		99	63H
4	04H		36	24H		68	44H		100	64H
5	05H		37	25H		69	45H		101	65H
6	06H		38	26H		70	46H		102	66H
7	07H		39	27H		71	47H		103	67H
8	08H		40	28H		72	48H		104	68H
9	09H		41	29H		73	49H		105	69H
10	0AH		42	2AH		74	4AH		106	6AH
11	0BH		43	2BH		75	4BH		107	6BH
12	0CH		44	2CH		76	4CH		108	6CH
13	0DH		45	2DH		77	4DH		109	6DH
14	0EH		46	2EH		78	4EH		110	6EH
15	0FH		47	2FH		79	4FH		111	6FH
16	10H		48	30H		80	50H		112	70H
17	11H		49	31H		81	51H		113	71H
18	12H		50	32H		82	52H		114	72H
19	13H		51	33H		83	53H		115	73H
20	14H		52	34H		84	54H		116	74H
21	15H		53	35H		85	55H		117	75H
22	16H		54	36H		86	56H		118	76H
23	17H		55	37H		87	57H		119	77H
24	18H		56	38H		88	58H		120	78H
25	19H		57	39H		89	59H		121	79H
26	1AH		58	3AH		90	5AH		122	7AH
27	1BH		59	3BH		91	5BH		123	7BH
28	1CH		60	3CH		92	5CH		124	7CH
29	1DH		61	3DH		93	5DH		125	7DH
30	1EH		62	3EH		94	5EH		126	7EH
31	1FH		63	3FH		95	5FH		127	7FH

D: decimal
H: hexadecimal

* Decimal values such as MIDI channel, bank select, and program change are listed as one greater than the values given in the above table.
* A 7-bit byte can express data in the range of 128 steps. For data where greater precision is required, we must use two or more bytes. For example, two hexadecimal numbers aa bbH expressing two 7-bit bytes would indicate a value of aa x 128+bb.
* In the case of values which have a +/– sign, 00H = –64, 40H = +/–0, and 7FH = +63, so that the decimal expression would be 64 less than the value given in the above chart. In the case of two types, 00 00H = –8192, 40 00H = +/–0, and 7F 7FH = +8191. For example, if aa bbH were expressed as decimal, this would be aa bbH – 40 00H = aa x 128+bb – 64 x 128.
* Data marked "Use nibbled data" is expressed in hexadecimal in 4-bit units. A value expressed as a 2-byte nibble 0a 0bH has the value of a x 16+b.

<Example1> What is the decimal expression of 5AH?
From the preceding table, 5AH = 90

<Example2> What is the decimal expression of the value 12 34H given as hexadecimal for each 7 bits?
From the preceding table, since 12H = 18 and 34H = 52
18 x 128+52 = 2356

<Example3> What is the decimal expression of the nibbled value 0A 03 09 0D?
From the preceding table, since 0AH = 10, 03H = 3, 09H = 9, 0DH = 13
((10 x 16+3) x 16+9) x 16+13 = 41885

<Example4> What is the nibbled expression of the decimal value 1258?

```
16 ) 1258
16 )   78 ...10
16 )    4 ...14
        0 ... 4
```

Since from the preceding table, 0 = 00H, 4 = 04H, 14 = 0EH, 10 = 0AH, the result is: 00 04 0E 0AH.

■ Examples of Actual MIDI Messages

<Example1> 92 3E 5F
9n is the Note-on status, and n is the MIDI channel number. Since 2H = 2, 3EH = 62, and 5FH = 95, this is a Note-on message with MIDI CH = 3, note number 62 (note name is D4), and velocity 95.

<Example2> CE 49
CnH is the Program Change status, and n is the MIDI channel number. Since EH = 14 and 49H = 73, this is a Program Change message with MIDI CH = 15, program number 74.

<Example3> EA 00 28
EnH is the Pitch Bend Change status, and n is the MIDI channel number. The 2nd byte (00H = 0) is the LSB and the 3rd byte (28H = 40) is the MSB, but Pitch Bend Value is a signed number in which 40 00H (= 64 x 12+80 = 8192) is 0, so this Pitch Bend Value is
28 00H – 40 00H = 40 x 12+80 – (64 x 12+80) = 5120 – 8192 = –3072

If the Pitch Bend Sensitivity is set to 2 semitones, –8192 (00 00H) will cause the pitch to change –200 cents, so in this case –200 x (–3072) / (–8192) = –75 cents of Pitch Bend is being applied to MIDI channel 11.

<Example4> B3 64 00 65 00 06 0C 26 00 64 7F 65 7F
BnH is the Control Change status, and n is the MIDI channel number. For Control Changes, the 2nd byte is the control number, and the 3rd byte is the value. In a case in which two or more messages consecutive messages have the same status, MIDI has a provision called "running status" which allows the status byte of the second and following messages to be omitted. Thus, the above messages have the following meaning.

```
 B3   64 00 MIDI ch.4, lower byte of RPN parameter number: 00H
(B3)  65 00 (MIDI ch.4) upper byte of RPN parameter number: 00H
(B3)  06 0C (MIDI ch.4) upper byte of parameter value:      0CH
(B3)  26 00 (MIDI ch.4) lower byte of parameter value:      00H
(B3)  64 7F (MIDI ch.4) lower byte of RPN parameter number: 7FH
(B3)  65 7F (MIDI ch.4) upper byte of RPN parameter number: 7FH
```

In other words, the above messages specify a value of 0C 00H for RPN parameter number 00 00H on MIDI channel 4, and then set the RPN parameter number to 7F 7FH.

RPN parameter number 00 00H is Pitch Bend Sensitivity, and the MSB of the value indicates semitone units, so a value of 0CH = 12 sets the maximum pitch bend range to +/–12 semitones (1 octave). (On this sound generators the LSB of Pitch Bend Sensitivity is ignored, but the LSB should be transmitted anyway (with a value of 0) so that operation will be correct on any device.)

Once the parameter number has been specified for RPN or NRPN, all Data Entry messages transmitted on that same channel will be valid, so after the desired value has been transmitted, it is a good idea to set the parameter number to 7F 7FH to prevent accidents. This is the reason for the (B3) 64 7F (B3) 65 7F at the end.

It is not desirable for performance data (such as Standard MIDI File data) to contain many events with running status as given in <Example 4>. This is because if playback is halted during the song and then rewound or fast-forwarded, the sequencer may not be able to transmit the correct status, and the sound generator will then misinterpret the data. Take care to give each event its own status.

It is also necessary that the RPN or NRPN parameter number setting and the value setting be done in the proper order. On some sequencers, events occurring in the same (or consecutive) clock may be transmitted in an order different than the order in which they were received. For this reason it is a good idea to slightly skew the time of each event (about 1 tick for TPQN = 96, and about 5 ticks for TPQN = 480).

* TPQN: Ticks Per Quarter Note

■ Example of an Exclusive Message and Calculating a Checksum

Roland Exclusive messages (RQ1, DT1) are transmitted with a checksum at the end (before F7) to make sure that the message was correctly received. The value of the checksum is determined by the address and data (or size) of the transmitted Exclusive message.

● How to calculate the checksum

(hexadecimal numbers are indicated by "H")
The checksum is a value derived by adding the address, size, and checksum itself and inverting the lower 7 bits.
Here's an example of how the checksum is calculated. We will assume that in the Exclusive message we are transmitting, the address is aabbccddH and the data or size is eeffH.

```
aa + bb + cc + dd + ee + ff = sum
sum / 128 = quotient ... remainder
128 - remainder = checksum
```

<Example> Setting Effect 1 Reverb Send Level of Program to 100 (DT1)
According to the Parameter Address Map (p. 8), the start address of Temporary Program is 18 00 00 00H, the offset address of Effect 1 at Program is 02 00H, and the address of Reverb Send Level is 00 03H. Therefore the address of Reverb Send Level is;

```
    18 00 00 00H
          02 00H
+)        00 03H
    18 00 02 03H
```

64H = 100
So the system exclusive message should be sent is;

```
F0    41    10    00 00 00 0E  12   18 00 02 03  64    ??          F7
(1)   (2)   (3)   (4)          (5)  address      data  checksum    (6)
```

(1) Exclusive Status   (2) ID (Roland)   (3) Device ID (17)
(4) Model ID (JD-Xi)   (5) Command ID (DT1)   (6) End of Exclusive

Then calculate the checksum.

```
18H + 00H + 02H + 03H + 64H = 24 + 0 + 2 + 3 + 100 = 129 (sum)
129 (sum) / 128 = 1 (quotient) ... 1 (remainder)
checksum = 128 - 1 (remainder) = 127 = 7FH
```

This means that F0 41 10 00 00 00 0E 12 18 00 02 03 64 7F F7 is the message should be sent.

ASCII Code Table
Program Name, etc., of MIDI data are described the ASCII code in the table below.

D	H	Char	D	H	Char	D	H	Char
32	20H	SP	64	40H	@	96	60H	`
33	21H	!	65	41H	A	97	61H	a
34	22H	"	66	42H	B	98	62H	b
35	23H	#	67	43H	C	99	63H	c
36	24H	$	68	44H	D	100	64H	d
37	25H	%	69	45H	E	101	65H	e
38	26H	&	70	46H	F	102	66H	f
39	27H	'	71	47H	G	103	67H	g
40	28H	(	72	48H	H	104	68H	h
41	29H	)	73	49H	I	105	69H	i
42	2AH	*	74	4AH	J	106	6AH	j
43	2BH	+	75	4BH	K	107	6BH	k
44	2CH	,	76	4CH	L	108	6CH	l
45	2DH	-	77	4DH	M	109	6DH	m
46	2EH	.	78	4EH	N	110	6EH	n
47	2FH	/	79	4FH	O	111	6FH	o
48	30H	0	80	50H	P	112	70H	p
49	31H	1	81	51H	Q	113	71H	q
50	32H	2	82	52H	R	114	72H	r
51	33H	3	83	53H	S	115	73H	s
52	34H	4	84	54H	T	116	74H	t
53	35H	5	85	55H	U	117	75H	u
54	36H	6	86	56H	V	118	76H	v
55	37H	7	87	57H	W	119	77H	w
56	38H	8	88	58H	X	120	78H	x
57	39H	9	89	59H	Y	121	79H	y
58	3AH	:	90	5AH	Z	122	7AH	z
59	3BH	;	91	5BH	[	123	7BH	{
60	3CH	<	92	5CH	\	124	7CH		
61	3DH	=	93	5DH	]	125	7DH	}
62	3EH	>	94	5EH	^			
63	3FH	?	95	5FH	_			

D: decimal
H: hexadecimal

* "SP" is space.

MIDI Implementation Chart

(Sound Source Section)

Function...		Transmitted	Recognized	Remarks
Basic	Default	1–16	1–16	
Channel	Changed	1–16	1–16	
Mode	Default	Mode 3	Mode 3	*2
	Messages	x	Mode 3, 4(M=1)	
	Altered	**************		
Note		0–108	0–127	
Number :	True Voice	**************	0–127	
Velocity	Note On	o	o	
	Note Off	o	o	
After	Key's	x	o *1	
Touch	Channel's	x	o *1	
Pitch Bend		o	o *1	
Control **Change**	0,32	o	o *1	Bank select
	1	o	o *1	Modulation
	5	o	o	Portamento time
	6,38	o	o	Data entry
	7	x	o *1	Volume
	10	x	o *1	Panpot
	11	x	o *1	Expression
	12–18	o	o	*4
	64	x	o *1	Hold 1
	65	x	o	Portamento
	71	x	o	Resonance
	72	x	o	Release time
	73	x	o	Attack time
	74	x	o	Cutoff
	75	x	o	Decay time
	76	x	o	Vibrate rate
	77	x	o	Vibrate depth
	78	x	o	Vibrate delay
	83	o	o	*4
	98,99	o	o	NRPN LSB,MSB *4
	100,101	x	o	RPN LSB,MSB
	102–119	o	o	*4
Program		o *1	o *1	
Change	: True Number	**************	0–127	Program No.1–128
System **Exclusive**		o *3	o	
System **Common**	: Song Position	x	x	
	: Song Select	x	x	
	: Tune Request	x	x	
System **Real Time**	:Clock	x	o	
	:Commands	x	x	
Aux **Messages**	:All Sound Off	x	o (120, 126, 127)	
	:Reset All Controllers	x	o	
	:Local On/Off	x	x	
	:All Notes Off	x	o (123, 127)	
	:Active Sensing	o	o	
	:System Reset	x	x	
Notes	*1 o x is selectable (using System Exclusive Messages).			
	*2 Recognized as M=1 even if M1.			
	*3 Transmitted only when "Transmitted Edit Data" is ON or RQ1is received.			
	*4 Refer to Control Change Message List (p. 14) about function of each controller number.			

Mode 1 : OMNI ON, POLY   Mode 2 : OMNI ON, MONO   O : Yes
Mode 3 : OMNI OFF, POLY   Mode 4 : OMNI OFF, MONO   X : No

MIDI Implementation Chart

(Sequencer section)

Function...		Transmitted	Recognized	Remarks
Basic	Default	All channel	All channel	There is not specific
Channel	Changed	x	1-16	basic channel
Mode	Default	x	x	
	Messages	x	x	
	Altered	**************		
Note		0-127	0-127	
Number :	: True Voice	**************	0-127	
Velocity	Note On	o	o	
	Note Off	o	o	
After	Key's	x	x	
Touch	Channel's	o	o	
Pitch Bend		o	o	
Control				
Change	0-119	o	o	
Program		x	x	
Change	: True Number	**************		
System Exclusive		o	o	
System	: Song Position	x	x	
Common	: Song Select	x	x	
	: Tune Request	x	x	
System	:Clock	o	o *1	
Real Time	:Commands	o	o *1	
	: All Sound Off	o	o *2	
	: Reset All Controllers	o	o	
	: Local On/Off	x	x	
	: All Notes Off	x	x *3	
Aux	: Omni Mode Off	o	o *2	
Messages	: Omni Mode On	o	o *2	
	: Mono Mode On	o	o *2	
	: Poly Mode On	o	o *2	
	: Active Sensing	o	o	
	: System Reset	x	x	
Notes	*1 o x is selectable.				
	*2 First, a note-off message is recorded for each note that is currently on; then this message itself is recorded			
	*3 The All Notes Off message itself is not recorded; a note-off message is recorded for each note that is currently on			

Mode 1 : OMNI ON, POLY	Mode 2 : OMNI ON, MONO	O : Yes
Mode 3 : OMNI OFF, POLY	Mode 4 : OMNI OFF, MONO	X : No