

MIDI Implementation

Model: RD-08

Date: Mar.19,2024

Version: 1.00

The Scenes corresponding to each Bank Select are as follows.

BANK SELECT		PROGRAM	GROUP	NUMBER
MSB	LSB	NUMBER		
085	000	001 - 125	Scene	001 - 041
085	001	001 - 107	:	042 - 082
085	002	006 - 109	:	076 - 100

For details, refer to "RD-08 Sound List".

1. Data Reception

■ Channel Voice Messages

● Note Off

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

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

kk = note number: 00H - 7FH (0 - 127)

vv = Polyphonic Key Pressure: 00H - 7FH (0 - 127)

● Control Change

○ Bank Select (Controller number 0, 32)

Status	2nd byte	3rd byte
-----	-----	-----
BnH	00H	mmH
BnH	20H	11H

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

mm, 11 = Bank number: 00 00H - 7F 7FH (bank.1 - bank.16384)

* Not received when the Rx Bank parameter (SYSTEM: MIDI: MIDI RX) is OFF.

The Tones corresponding to each Bank Select are as follows.

BANK SELECT		PROGRAM	GROUP	NUMBER
MSB	LSB	NUMBER		
090	065	001 - 009	SN PR-A	0001 - 0009
089	064	001 - 015	SN PR-B	0001 - 0015
071	071	001 - 038	RD-08	0001 - 0038
087	092	001 - 128	PR-A	0001 - 0128
087	093	001 - 111	:	0129 - 0239
087	064	001 - 128	RR-B	0001 - 0128
087	065	001 - 128	:	0128 - 0256
087	066	001 - 128	:	0257 - 0384
087	067	001 - 075	:	0385 - 0459
087	068	001 - 128	PR-C	0001 - 0128
087	069	001 - 128	PR-D	0001 - 0128
087	070	001 - 128	:	0129 - 0256
087	071	001 - 128	:	0257 - 0384
087	072	001 - 128	:	0385 - 0512
087	073	001 - 128	:	0513 - 0640
087	074	001 - 128	:	0641 - 0768
087	075	001 - 128	:	0769 - 0896
087	076	001 - 128	:	0897 - 1024
087	077	001 - 085	:	1025 - 1109
087	078	001 - 128	PR-E	0001 - 0128
087	079	001 - 128	:	0129 - 0256
087	080	001 - 128	:	0257 - 0384
087	081	001 - 128	:	0385 - 0512
087	082	001 - 128	:	0513 - 0640
087	083	001 - 128	:	0641 - 0768
087	084	001 - 128	:	0769 - 0896
087	085	001 - 128	COMMON	0001 - 0128
087	086	001 - 128	:	0129 - 0256
087	087	001 - 128	:	0257 - 0384
087	088	001 - 128	:	0385 - 0512
087	089	001 - 128	:	0513 - 0640
087	090	001 - 128	:	0641 - 0768
087	091	001 - 069	:	0769 - 0837
071	007	001 - 128	USER	0001 - 0128
101	064	001 - 011	EXZ001	0001 - 0011

○ Modulation (Controller number 1)

Status	2nd byte	3rd byte
-----	-----	-----
BnH	01H	vvH

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

vv = Modulation depth: 00H - 7FH (0 - 127)

○ Breath type (Controller number 2)

Status	2nd byte	3rd byte
-----	-----	-----
BnH	02H	vvH

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

vv = Control value: 00H - 7FH (0 - 127)

○ Foot Type (Controller number 4)

Status	2nd byte	3rd byte
-----	-----	-----
BnH	04H	vvH

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

vv = Control value: 00H - 7FH (0 - 127)

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o Portamento Time (Controller number 5)

Status	2nd byte	3rd byte
-----	-----	-----
BnH	05H	vvH

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

vv = Portamento Time: 00H - 7FH (0 - 127)

* The Porta Time parameter (SCENE EDIT: ZONE SOUND: GENERAL) will change.

o Data Entry (Controller number 6, 38)

Status	2nd byte	3rd byte
-----	-----	-----
BnH	06H	mmH
BnH	26H	11H

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

mm, 11 = the value of the parameter specified by RPN/NRPN

mm = MSB, 11 = LSB

o Volume (Controller number 7)

Status	2nd byte	3rd byte
-----	-----	-----
BnH	07H	vvH

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

vv = Volume: 00H - 7FH (0 - 127)

* The Level parameter (SCENE EDIT: ZONE EDIT: INTERNAL) will change.

o Panpot (Controller number 10)

Status	2nd byte	3rd byte
-----	-----	-----
BnH	0AH	vvH

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

vv = Panpot: 00H - 40H - 7FH (Left - Center - Right)

* The Pan parameter (SCENE EDIT: ZONE EDIT: INTERNAL) will change.

o Expression (Controller number 11)

Status	2nd byte	3rd byte
-----	-----	-----
BnH	0BH	vvH

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

vv = Expression: 00H - 7FH (0 - 127)

o General Purpose Controller 1 (Controller number 16)

Status	2nd byte	3rd byte
-----	-----	-----
BnH	10H	vvH

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

vv = Control value: 00H - 7FH (0 - 127)

o General Purpose Controller 2 (Controller number 17)

Status	2nd byte	3rd byte
-----	-----	-----
BnH	11H	vvH

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

vv = Control value: 00H - 7FH (0 - 127)

o General Purpose Controller 3 (Controller number 18)

Status	2nd byte	3rd byte
-----	-----	-----
BnH	12H	vvH

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

vv = Control value: 00H - 7FH (0 - 127)

o General Purpose Controller 4 (Controller number 19)

Status	2nd byte	3rd byte
-----	-----	-----
BnH	13H	vvH

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

vv = Control value: 00H - 7FH (0 - 127)

o Hold 1 (Controller number 64)

Status	2nd byte	3rd byte
-----	-----	-----
BnH	40H	vvH

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

vv = Control value: 00H - 7FH (0 - 127) 0 - 63 = OFF, 64 - 127 = ON

o Portamento (Controller number 65)

Status	2nd byte	3rd byte
-----	-----	-----
BnH	41H	vvH

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

vv = Control value: 00H - 7FH (0 - 127) 0 - 63 = OFF, 64 - 127 = ON

* The Porta Sw parameter (SCENE EDIT: ZONE SOUND: GENERAL) will change.

o Sostenuto (Controller number 66)

Status	2nd byte	3rd byte
-----	-----	-----
BnH	42H	vvH

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

vv = Control value: 00H - 7FH (0 - 127) 0 - 63 = OFF, 64 - 127 = ON

o Soft (Controller number 67)

Status	2nd byte	3rd byte
-----	-----	-----
BnH	43H	vvH

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

vv = Control value: 00H - 7FH (0 - 127)

o Legato Foot Switch (Controller number 68)

Status	2nd byte	3rd byte
-----	-----	-----
BnH	44H	vvH

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

vv = Control value: 00H - 7FH (0 - 127) 0 - 63 = OFF, 64 - 127 = ON

* The Legato Sw parameter (SCENE EDIT: ZONE SOUND: GENERAL) will change.

o Resonance (Controller number 71)

Status	2nd byte	3rd byte
-----	-----	-----
BnH	47H	vvH

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

vv = Resonance value (relative change): 00H - 40H - 7FH (-64 - 0 - +63)

* The Resonance parameter (SCENE EDIT: ZONE SOUND: MODIFY) will change.

o Release Time (Controller number 72)

Status	2nd byte	3rd byte
-----	-----	-----
BnH	48H	vvH

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

vv = Release Time value (relative change): 00H - 40H - 7FH (-64 - 0 - +63)

* The Release parameter (SCENE EDIT: ZONE SOUND: MODIFY) will change.

o Attack time (Controller number 73)

Status	2nd byte	3rd byte
-----	-----	-----
BnH	49H	vvH

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

vv = Attack time value (relative change): 00H - 40H - 7FH (-64 - 0 - +63)

* The Attack parameter (SCENE EDIT: ZONE SOUND: MODIFY) will change.

o Cutoff (Controller number 74)

Status	2nd byte	3rd byte
-----	-----	-----
BnH	4AH	vvH

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

vv = Cutoff value (relative change): 00H - 40H - 7FH (-64 - 0 - +63)

* The Cutoff parameter (SCENE EDIT: ZONE SOUND: MODIFY) will change.

o Decay Time (Controller number 75)

Status	2nd byte	3rd byte
-----	-----	-----
BnH	4BH	vvH

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

vv = Decay Time value (relative change): 00H - 40H - 7FH (-64 - 0 - +63)

* The Decay parameter (SCENE EDIT: ZONE SOUND: MODIFY) will change.

o Vibrato Rate (Controller number 76)

Status	2nd byte	3rd byte
-----	-----	-----
BnH	4CH	vvH

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

vv = Vibrato Rate value (relative change): 00H - 40H - 7FH (-64 - 0 - +63)

* The Vib Rate parameter (SCENE EDIT: ZONE SOUND: MODIFY) will change.

o Vibrato Depth (Controller number 77)

Status	2nd byte	3rd byte
-----	-----	-----
BnH	4DH	vvH

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

vv = Vibrato Depth Value (relative change): 00H - 40H - 7FH (-64 - 0 - +63)

* The Vib Depth parameter (SCENE EDIT: ZONE SOUND: MODIFY) will change.

o Vibrato Delay (Controller number 78)

Status	2nd byte	3rd byte
-----	-----	-----
BnH	4EH	vvH

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

vv = Vibrato Delay value (relative change): 00H - 40H - 7FH (-64 - 0 - +63)

* The Vib Delay parameter (SCENE EDIT: ZONE SOUND: MODIFY) will change.

o General Purpose Controller 5 (Controller number 80)

Status	2nd byte	3rd byte
-----	-----	-----
BnH	50H	vvH

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

vv = Control value: 00H - 7FH (0 - 127)

o General Purpose Controller 6 (Controller number 81)

Status	2nd byte	3rd byte
-----	-----	-----
BnH	51H	vvH

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

vv = Control value: 00H - 7FH (0 - 127)

- o General Purpose Controller 7 (Controller number 82)

Status	2nd byte	3rd byte
-----	-----	-----
BnH	52H	vvH

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

vv = Control value: 00H - 7FH (0 - 127)

- o General Purpose Controller 8 (Controller number 83)

Status	2nd byte	3rd byte
-----	-----	-----
BnH	53H	vvH

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

vv = Control value: 00H - 7FH (0 - 127)

- o Portamento control (Controller number 84)

Status	2nd byte	3rd byte
-----	-----	-----
BnH	54H	kkH

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

kk = source note number: 00H - 7FH (0 - 127)

* A Note-on received immediately after a Portamento Control message will change continuously in pitch, starting from the pitch of the Source Note Number.

* If a voice is already sounding for a note number identical to the Source Note Number, this voice will continue sounding (i.e., legato) and will, when the next Note-on is received, smoothly change to the pitch of that Note-on.

* The rate of the pitch change caused by Portamento Control is determined by the Portamento Time value.

- o 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 - ch.16)

vv = Reverb Send Level: 00H - 7FH (0 - 127)

* The Rev Send parameter (SCENE EDIT: ZONE EDIT: INTERNAL) will change.

- o General Purpose Effect 3 (Chorus Send Level)
(Controller number 93)

Status	2nd byte	3rd byte
-----	-----	-----
BnH	5DH	vvH

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

vv = Chorus Send Level: 00H - 7FH (0 - 127)

* The Cho Send parameter (SCENE EDIT: ZONE EDIT: INTERNAL) will change.

- o 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 - ch.16)

mm = upper byte (MSB) of parameter number specified by RPN

11 = 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, 11H    Pitch Bend Sensitivity
                    mm: 00H - 18H (0 - 24 semitones)
                    11: ignored (processed as 00H)

                    Up to 2 octave can be specified in semitone steps.

* The Bend Range parameter (SCENE EDIT:ZONE EDIT:PITCH) will change.

00H, 01H  mmH, 11H    Channel Fine Tuning
                    mm, 11: 20 00H - 40 00H - 60 00H
                    (-4096 x 100 / 8192 - 0 - +4096 x 100 / 8192 cent)

```

* The Bend Range parameter (SCENE EDIT:ZONE EDIT:PITCH) will change.

* The Fine Tune parameter (SCENE EDIT:ZONE EDIT:INTERNAL) will change.

```
00H, 02H  mmH, 11H      Channel Coarse Tuning
                        mm: 10H - 40H - 70H (-48 - 0 - +48 semitones)
                        11: ignored (processed as 00H)
```

* The Coarse Tune parameter (SCENE EDIT:ZONE EDIT:INTERNAL) 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 - ch.16)

pp = Program number: 00H - 7FH (prog.1 - prog.128)

* Not received when the RX PC parameter (SYSTEM: MIDI: MIDI RX) is OFF.

● Channel Pressure

Status	2nd byte
-----	-----
DnH	vvH

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

vv = Channel Pressure: 00H - 7FH (0 - 127)

● Pitch Bend Change

Status	2nd byte	3rd byte
-----	-----	-----
EnH	llH	mmH

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

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

Controller	Reset value
Pitch Bend Change	+/-0 (center)
Polyphonic Key Pressure	0 (off)
Channel Pressure	0 (off)
Modulation	0 (off)
Breath Type	0 (min)
Foot Type	0 (min)
Expression	127 (max)
	However the controller will be at minimum.
Hold 1	0 (off)
Sostenuto	0 (off)
Soft	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 - ch.16)

* When All Notes Off is received, all notes on the corresponding channel will be turned off. However, if Hold 1 or Sostenuto 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 - ch.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 - ch.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 - ch.16)

mm = mono number: 00H - 10H (0 - 16)

* The same processing will be carried out as when All Notes Off is received.
* The Mono/Poly parameter (SCENE EDIT: ZONE SOUND: GENERAL) will change.

● POLY (Controller number 127)

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

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

* The same processing will be carried out as when All Notes Off is received.
* The Mono/Poly parameter (SCENE EDIT: ZONE SOUND: GENERAL) will change.

■ 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 System Exclusive messages and the Universal Realtime System Exclusive messages and the Data Request 1 (RQ1) messages and the Data Set 1 (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 will be transmitted.

● Universal Realtime System Exclusive Messages

○ Master Volume

Status	Data byte	Status
-----	-----	-----
F0H	7FH, 7FH, 04H, 01H, 11H, 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)
11H	Master Volume lower byte
mmH	Master Volume upper byte
F7H	EOX (End Of Exclusive)

* The lower byte (11H) of Master Volume will be handled as 00H.
 * The Master Volume will change.

○ Master Fine Tuning

Status	Data byte	Status
-----	-----	-----
F0H	7FH, 7FH, 04H, 03H, 11H, 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)
11H	Master Fine Tuning LSB
mmH	Master Fine Tuning MSB
F7H	EOX (End Of Exclusive)

mm, 11: 00 00H - 40 00H - 7F 7FH (-100 - 0 - +99.9 [cents])

* The MasterTune parameter (SYSTEM: GENERAL) will change.

○ Master Coarse Tuning

Status	Data byte	Status
-----	-----	-----
F0H	7FH, 7FH, 04H, 04H, 11H, 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)
11H	Master Coarse Tuning LSB
mmH	Master Coarse Tuning MSB
F7H	EOX (End Of Exclusive)

mmH: 28H - 40H - 58H (-24 - 0 - +24 [semitones])
 11H: ignored (processed as 00H)

* The MasKeyShift parameter (SYSTEM: GENERAL) will change.

● Global Parameter Control

○ Scale/Octave Tuning Adjust

Status	Data byte	Status
-----	-----	-----
F0H	7EH, 7FH, 08H, 08H, ffH, ggH, hhH, ssH...	F7

Byte	Explanation
----	-----
F0H	Exclusive status
7EH	ID number (Universal Non-realtime Message)
7FH	Device ID (Broadcast)
08H	Sub ID#1 (MIDI Tuning Standard)
08H	Sub ID#2 (scale/octave tuning 1-byte form)
ffH	Channel/Option byte 1
	bits 0 to 1 = channel 15 to 16
	bit 2 to 6 = Undefined
ggH	Channel byte 2
	bits 0 to 6 = channel 8 to 14
hhH	Channel byte 3
	bits 0 to 6 = channel 1 to 7
ssH	12 byte tuning offset of 12 semitones from C to B
	00H = -64 [cents]
	40H = 0 [cents] (equal temperament)
	7FH = +63 [cents]
F7H	EOX (End Of Exclusive)

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, 64H, 11H, aaH, bbH, ccH, ddH, ssH, ttH, uuH, vvH, sum	F7H

Byte	Remarks
----	-----
F0H	Exclusive status
41H	ID number (Roland)
dev	device ID (dev: 10H - 1FH, 7FH)
00H	model ID #1 (RD-08)
00H	model ID #2 (RD-08)
00H	model ID #3 (RD-08)
64H	model ID #4 (RD-08)
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)

● 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 64H.

- * 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".
- * For the checksum, refer to "How to calculate the checksum".
- * Not received when the Rx Exclusive parameter (SYSTEM:MIDI:MIDI RX) is OFF.

○ 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

o Data Set 1 (DT1)

This is the message that actually performs data transmission, and is used when you wish to transmit the data.

Status	Data byte	Status
-----	-----	-----
F0H	41H, dev, 00H, 00H, 00H, 5BH, 12H, aaH, bbH, ccH, ddH, eeH, ... ffH, sum	F7H
Byte	Explanation	
-----	-----	
F0H	Exclusive status	
41H	ID number (Roland)	
dev	Device ID (dev: 10H - 1FH, 7FH)	
00H	Model ID #1 (RD-08)	
00H	Model ID #2 (RD-08)	
00H	model ID #3 (RD-08)	
64H	model ID #4 (RD-08)	
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".
- * 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 "How to calculate the checksum".
- * Not received when the Rx Exclusive parameter (SYSTEM: MIDI: MIDI RX) is OFF.

2. Data Transmission

■ Channel Voice Messages

● Note Off

Status	2nd byte	3rd byte
-----	-----	-----
8nH	kkH	vvH

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

kk = note number: 00H - 7FH (0 - 127)

vv = note on velocity: 01H - 7FH (1 - 127)

● Control Change

* After upgrading, you can transmit the control change messages you choose by assigning their control change number to the CC# of the controller in question (such as a knob).

o Bank Select (Controller number 0, 32)

Status	2nd byte	3rd byte
-----	-----	-----
BnH	00H	mmH
BnH	20H	11H

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

mm, 11 = Bank number: 00 00H - 7F 7FH (bank.1 - bank.16384)

* These messages are transmitted when Scene or Tone is selected. But not transmitted when Tx PC (SYSTEM:MIDI:MIDI TX) or Tx Bank parameter (SYSTEM:MIDI:MIDI TX) is OFF.

o Modulation (Controller number 1)

Status	2nd byte	3rd byte
-----	-----	-----
BnH	01H	vvH

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

vv = Modulation depth: 00H - 7FH (0 - 127)

o Breath type (Controller number 2)

Status	2nd byte	3rd byte
-----	-----	-----
BnH	02H	vvH

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

vv = Control value: 00H - 7FH (0 - 127)

o Foot Type (Controller number 4)

Status	2nd byte	3rd byte
-----	-----	-----
BnH	04H	vvH

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

vv = Control value: 00H - 7FH (0 - 127)

o Portamento Time (Controller number 5)

Status	2nd byte	3rd byte
-----	-----	-----
BnH	05H	vvH

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

vv = Portamento Time: 00H - 7FH (0 - 127)

o Data Entry (Controller number 6, 38)

Status	2nd byte	3rd byte
-----	-----	-----
BnH	06H	mmH
BnH	26H	11H

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

mm, 11 = the value of the parameter specified by RPN/NRPN

mm = MSB, 11 = LSB

o Volume (Controller number 7)

Status	2nd byte	3rd byte
-----	-----	-----
BnH	07H	vvH

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

vv = Volume: 00H - 7FH (0 - 127)

o Panpot (Controller number 10)

Status	2nd byte	3rd byte
-----	-----	-----
BnH	0AH	vvH

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

vv = Panpot: 00H - 40H - 7FH (Left - Center - Right)

o Expression (Controller number 11)

Status	2nd byte	3rd byte
-----	-----	-----
BnH	0BH	vvH

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

vv = Expression: 00H - 7FH (0 - 127)

o General Purpose Controller 1 (Controller number 16)

Status	2nd byte	3rd byte
-----	-----	-----
BnH	10H	vvH

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

vv = Control value: 00H - 7FH (0 - 127)

o General Purpose Controller 2 (Controller number 17)

Status	2nd byte	3rd byte
-----	-----	-----
BnH	11H	vvH

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

vv = Control value: 00H - 7FH (0 - 127)

o General Purpose Controller 3 (Controller number 18)

Status	2nd byte	3rd byte
-----	-----	-----
BnH	12H	vvH

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

vv = Control value: 00H - 7FH (0 - 127)

o General Purpose Controller 4 (Controller number 19)

Status	2nd byte	3rd byte
-----	-----	-----
BnH	13H	vvH

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

vv = Control value: 00H - 7FH (0 - 127)

o Hold 1 (Controller number 64)

Status	2nd byte	3rd byte
-----	-----	-----
BnH	40H	vvH

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

vv = Control value: 00H - 7FH (0 - 127) 0-63 = OFF, 64-127 = ON

o Portamento (Controller number 65)

Status	2nd byte	3rd byte
-----	-----	-----
BnH	41H	vvH

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

vv = Control value: 00H - 7FH (0 - 127) 0-63 = OFF, 64-127 = ON

o Sostenuto (Controller number 66)

Status	2nd byte	3rd byte
-----	-----	-----
BnH	42H	vvH

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

vv = Control value: 00H - 7FH (0 - 127)

o Soft (Controller number 67)

Status	2nd byte	3rd byte
-----	-----	-----
BnH	43H	vvH

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

vv = Control value: 00H - 7FH (0 - 127)

o Legato Foot Switch (Controller number 68)

Status	2nd byte	3rd byte
-----	-----	-----
BnH	44H	vvH

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

vv = Control value: 00H - 7FH (0 - 127)

o Resonance (Controller number 71)

Status	2nd byte	3rd byte
-----	-----	-----
BnH	47H	vvH

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

vv = Resonance value (relative change): 00H - 40H - 7FH (-64 - 0 - +63)

o Release Time (Controller number 72)

Status	2nd byte	3rd byte
-----	-----	-----
BnH	48H	vvH

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

vv = Release Time value (relative change): 00H - 40H - 7FH (-64 - 0 - +63)

o Attack time (Controller number 73)

Status	2nd byte	3rd byte
-----	-----	-----
BnH	49H	vvH

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

vv = Attack time value (relative change): 00H - 40H - 7FH (-64 - 0 - +63)

o 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)

o General Purpose Controller 5 (Controller number 80)

Status	2nd byte	3rd byte
-----	-----	-----
BnH	50H	vvH

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

vv = Control value: 00H - 7FH (0 - 127)

o General Purpose Controller 6 (Controller number 81)

Status	2nd byte	3rd byte
-----	-----	-----
BnH	51H	vvH

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

vv = Control value: 00H - 7FH (0 - 127)

o General Purpose Controller 7 (Controller number 82)

Status	2nd byte	3rd byte
-----	-----	-----
BnH	52H	vvH

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

vv = Control value: 00H - 7FH (0 - 127)

o General Purpose Controller 8 (Controller number 83)

Status	2nd byte	3rd byte
-----	-----	-----
BnH	53H	vvH

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

vv = Control value: 00H - 7FH (0 - 127)

o Portamento control (Controller number 84)

Status	2nd byte	3rd byte
-----	-----	-----
BnH	54H	kkH

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

kk = source note number: 00H - 7FH (0 - 127)

o 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 - ch.16)

vv = Reverb Send Level: 00H - 7FH (0 - 127)

o General Purpose Effect 3 (Chorus Send Level) (Controller number 93)

Status	2nd byte	3rd byte
-----	-----	-----
BnH	5DH	vvH

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

vv = Chorus Send Level: 00H - 7FH (0 - 127)

o 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 - ch.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 transmits 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.
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)
00H, 02H	mmH, llH	Channel Coarse Tuning
		mm: 10H - 40H - 70H (-48 - 0 - +48 semitones)
		ll: ignored (processed as 00H)
00H, 05H	mmH, llH	Modulation Depth Range
		mm, ll: 00 00H - 06 00H
		(0 - 16384 x 600 / 16384 cent)
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

* These messages are transmitted when each value is set in SCENE EDIT:ZONE EDIT:EXTERNAL.

* After upgrading, these messages are transmitted when configured in SCENE EDIT : ZONE EDIT : EXTERNAL.

o General Controller

Status	2nd byte	3rd byte
-----	-----	-----
BnH	kkH	vvH

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

kk = Controller number: 00H - 77H (0 - 31, 33 - 95)

vv = Control value: 00H - 7FH (0 - 127)

● Program Change

Status	2nd byte
-----	-----
CnH	ppH

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

pp = Program number: 00H - 7FH (prog.1 - prog.128)

* These messages are transmitted when Scene or Tone is selected. But not transmitted when Tx PC parameter (SYSTEM:MIDI:MIDI TX) is OFF.

● Channel Pressure

Status	2nd byte
-----	-----
DnH	vvH

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

vv = Channel Pressure: 00H - 7FH (0 - 127)

● Pitch Bend Change

Status	2nd byte	3rd byte
-----	-----	-----
EnH	llH	mmH

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

mm, ll = Pitch Bend value: 00 00H - 40 00H - 7F 7FH (-8192 - 0 - +8191)

■ Channel Mode Messages

● MONO (Controller number 126)

Status	2nd byte	3rd byte
-----	-----	-----
BnH	7EH	mmH

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

mm = mono number: 00H - 10H (0 - 16)

● POLY (Controller number 127)

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

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

■ System Realtime Message

● Active Sensing

Status

FEH

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

■ System Exclusive Message

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

● Universal Non-realtime System Exclusive Messages

o Identity Reply Message

Receiving Identity Request Message, the RD-08 send this message

Status	Data byte	Status
-----	-----	-----
F0H	7EH, dev, 06H, 02H, 41H, 64H, 03H, 00H, 00H, 01H, 01H, 00H, 00H	F7H

Byte	Explanation
----	-----
F0H	Exclusive status
7EH	ID number (Universal Non-realtime Message)
10H	Device ID (dev: 10H - 1FH)
06H	Sub ID#1 (General Information)
02H	Sub ID#2 (Identity Reply)
41H	ID number (Roland)
64H 03H	Device family code
00H 00H	Device family number code
01H 01H 00H 00H	Software revision level
F7H	EOX (End of Exclusive)

● Data Transmission

o Data Set 1 (DT1)

Status	Data byte	Status
-----	-----	-----
F0H	41H, dev, 00H, 00H, 00H, 64H, 12H, aaH, bbH, ccH, ddH, eeH, ... ffH, sum	F7H

Byte	Explanation
----	-----
F0H	Exclusive status
41H	ID number (Roland)
dev	Device ID (dev: 10H - 1FH, 7FH)
00H	Model ID #1 (RD-08)
00H	Model ID #2 (RD-08)
00H	model ID #3 (RD-08)
64H	model ID #4 (RD-08)
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".

* 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. 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 RD-08 received them.

* Addresses and parameters that include an <*> are enabled after the instrument is upgraded.

RD-08 (ModelID = 00H 00H 00H 64H)

Start	Address	Description
-----	-----	-----
00 00 00 00	System	[System]
01 00 00 00	Temporary Scene	[Scene]
02 00 00 00	Setup	[Setup]
10 00 00 00	User Scene (001)	[Scene]
10 01 00 00	User Scene (002)	[Scene]
:	:	:
11 0C 00 00	User Scene (100)	[Scene]

* [System]

Offset	Address	Description
-----	-----	-----
00 00 00	System Common	[System Common]
00 01 00	System Control	[System Control]
00 02 00	System Chorus	[Chorus]
00 03 00	System Reverb	[Reverb]
00 04 00	Master EQ	[EQ]
00 05 00	Master Comp	[Comp]
00 06 00	Input Reverb	[Reverb]
00 07 00	Input EQ	[EQ]

* [Scene]

Offset	Address	Description
-----	-----	-----
00 00 00	Scene Common	[Scene Common]
00 10 00	Scene Tone (1)	[Scene Tone]
00 11 00	Scene Tone (2)	[Scene Tone]
00 12 00	Scene Tone (3)	[Scene Tone]
00 20 00	Scene EQ (1)	[Scene EQ]
00 21 00	Scene EQ (2)	[Scene EQ]
00 22 00	Scene EQ (3)	[Scene EQ]
00 30 00	Scene MFX (1)	[MFX]
00 32 00	Scene MFX (2)	[MFX]
00 34 00	Scene MFX (3)	[MFX]
00 40 00	Scene Zone (1)	[Scene Zone]
00 41 00	Scene Zone (2)	[Scene Zone]
00 42 00	Scene Zone (3)	[Scene Zone]
00 50 00	Scene IFX	[MFX]
00 52 00	Scene Chorus	[Chorus]
00 53 00	Scene Reverb	[Reverb]
00 54 00	Scene Sympathetic Resonance	[Sympathetic Resonance]

* [Setup]

Offset	Address	Description
-----	-----	-----
00 00	0aaa aaaa Scene BS MSB (CC# 0)	(0 - 127)
00 01	0aaa aaaa Scene BS LSB (CC# 32)	(0 - 127)
00 02	0aaa aaaa Scene PC (PC)	(0 - 127)
00 00 00 03	Total Size	

[System Common]			
	Offset		
	Address	Description	
#	00 00	0000 aaaa	
	00 01	0000 bbbb	
	00 02	0000 cccc	
	00 03	0000 dddd	Master Tune
			(24 - 2024)
			-1000 - 1000
	00 04	0aaa aaaa	Master Key Shift
			(40 - 88)
			-24 - 24
	00 05	000a aaaa	Scene Control Channel
			(0 - 16)
			1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,OFF
	00 06	0000 aaaa	(reserve) <*>
	00 07	0000 000a	Remote Keyboard
			(0 - 1)
			OFF, ON
	00 08	0000 000a	Control Source Select
			(0 - 1)
			SYS, SCENE
	00 09	0aaa aaaa	System Control Source (1)
			(0 - 96)
			OFF, CC01,CC02,CC03,CC04,CC05,CC06,
			CC07,CC08,CC09,CC10,CC11,CC12,CC13,CC14,CC15,CC16,
			CC17,CC18,CC19,CC20,CC21,CC22,CC23,CC24,CC25,CC26,
			CC27,CC28,CC29,CC30,CC31,CC33,CC34,CC35,CC36,CC37,
			CC38,CC39,CC40,CC41,CC42,CC43,CC44,CC45,CC46,CC47,
			CC48,CC49,CC50,CC51,CC52,CC53,CC54,CC55,CC56,CC57,
			CC58,CC59,CC60,CC61,CC62,CC63,CC64,CC65,CC66,CC67,
			CC68,CC69,CC70,CC71,CC72,CC73,CC74,CC75,CC76,CC77,
			CC78,CC79,CC80,CC81,CC82,CC83,CC84,CC85,CC86,CC87,
			CC88,CC89,CC90,CC91,CC92,CC93,CC94,CC95,BEND,AFT
	00 0A	0aaa aaaa	System Control Source (2)
			(0 - 96)
			OFF, CC01,CC02,CC03,CC04,CC05,CC06,
			CC07,CC08,CC09,CC10,CC11,CC12,CC13,CC14,CC15,CC16,
			CC17,CC18,CC19,CC20,CC21,CC22,CC23,CC24,CC25,CC26,
			CC27,CC28,CC29,CC30,CC31,CC33,CC34,CC35,CC36,CC37,
			CC38,CC39,CC40,CC41,CC42,CC43,CC44,CC45,CC46,CC47,
			CC48,CC49,CC50,CC51,CC52,CC53,CC54,CC55,CC56,CC57,
			CC58,CC59,CC60,CC61,CC62,CC63,CC64,CC65,CC66,CC67,
			CC68,CC69,CC70,CC71,CC72,CC73,CC74,CC75,CC76,CC77,
			CC78,CC79,CC80,CC81,CC82,CC83,CC84,CC85,CC86,CC87,
			CC88,CC89,CC90,CC91,CC92,CC93,CC94,CC95,BEND,AFT
	00 0B	0aaa aaaa	System Control Source (3)
			(0 - 96)
			OFF, CC01,CC02,CC03,CC04,CC05,CC06,
			CC07,CC08,CC09,CC10,CC11,CC12,CC13,CC14,CC15,CC16,
			CC17,CC18,CC19,CC20,CC21,CC22,CC23,CC24,CC25,CC26,
			CC27,CC28,CC29,CC30,CC31,CC33,CC34,CC35,CC36,CC37,
			CC38,CC39,CC40,CC41,CC42,CC43,CC44,CC45,CC46,CC47,
			CC48,CC49,CC50,CC51,CC52,CC53,CC54,CC55,CC56,CC57,
			CC58,CC59,CC60,CC61,CC62,CC63,CC64,CC65,CC66,CC67,
			CC68,CC69,CC70,CC71,CC72,CC73,CC74,CC75,CC76,CC77,
			CC78,CC79,CC80,CC81,CC82,CC83,CC84,CC85,CC86,CC87,
			CC88,CC89,CC90,CC91,CC92,CC93,CC94,CC95,BEND,AFT
	00 0C	0aaa aaaa	System Control Source (4)
			(0 - 96)
			OFF, CC01,CC02,CC03,CC04,CC05,CC06,
			CC07,CC08,CC09,CC10,CC11,CC12,CC13,CC14,CC15,CC16,
			CC17,CC18,CC19,CC20,CC21,CC22,CC23,CC24,CC25,CC26,
			CC27,CC28,CC29,CC30,CC31,CC33,CC34,CC35,CC36,CC37,
			CC38,CC39,CC40,CC41,CC42,CC43,CC44,CC45,CC46,CC47,
			CC48,CC49,CC50,CC51,CC52,CC53,CC54,CC55,CC56,CC57,
			CC58,CC59,CC60,CC61,CC62,CC63,CC64,CC65,CC66,CC67,
			CC68,CC69,CC70,CC71,CC72,CC73,CC74,CC75,CC76,CC77,
			CC78,CC79,CC80,CC81,CC82,CC83,CC84,CC85,CC86,CC87,
			CC88,CC89,CC90,CC91,CC92,CC93,CC94,CC95,BEND,AFT
#	00 0D	0000 aaaa	
	00 0E	0000 bbbb	System Tempo
			(20 - 250)
			20 - 250
	00 0F	0000 000a	Tempo Source
			(0 - 1)
			SCENE, SYS
	00 10	0000 000a	Receive Program Change
			(0 - 1)
			OFF, ON
	00 11	0000 000a	Receive Bank Select
			(0 - 1)
			OFF, ON
	00 12	0000 000a	(reserve) <*>
	00 13	0000 000a	(reserve) <*>
	00 14	0000 000a	(reserve) <*>
	00 15	0000 aaaa	Scale Tune Type
			(0 - 8)
			CUSTOM, EQUAL, JUST-MAJ, JUST-MIN, PYTHAGORE,
			KIRNBERGE, MEANTONE, WERCKMEIS, ARABIC
	00 16	0000 aaaa	Scale Tune Key
			(0 - 11)
			C, C#, D, D#, E, F, F#, G, G#, A, A#, B
	00 17	0aaa aaaa	Scale Tune for C
			(0 -

00 20	0aaa aaaa	Scale Tune for A	-64 - 63 (0 - 127)
00 21	0aaa aaaa	Scale Tune for A#	-64 - 63 (0 - 127)
00 22	0aaa aaaa	Scale Tune for B	-64 - 63 (0 - 127)
00 23	0000 000a	Local Switch	-64 - 63 (0 - 1)
00 24	0000 000a	(reserve) <*>	OFF, ON

00 00 00 25	Total Size		

[System Control]			
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,
		1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20, 21,22,23,24,25,26,27,28,29,30,31,32,33,34,35,36,37, 38,39,40,41,42,43,44,45,46,47,48,49,50,51,52,53,54, 55,56,57,58,59,60,61,62,63,64,65,66,67,68,69,70,71, 72,73,74,75,76,77,78,79,80,81,82,83,84,85,86,87,88, 89,90,91,92,93,94,95,96,97,98,99,100,101,102,103, 104,105,106,107,108,109,110,111,112,113,114,115, 116,117,118,119,120,121,122,123,124,125,126,127	
00 03	0000 0aaa	Keyboard Velocity Curve	(0 - 4) SPR LIGHT, LIGHT, MEDIUM, HEAVY, SPR HEAVY
00 04	0aaa aaaa	Keyboard Velocity Curve Offset	(54 - 73) -10 - 9
00 05	0aaa aaaa	Keyboard Velocity Delay Sens	(1 - 127) -63 - 63
00 06	0aaa aaaa	Keyboard Velocity Key Follow	(1 - 127) -63 - 63
00 07	0000 000a	Keyboard Off Position	(0 - 1) STANDARD, DEEP
00 08	0aaa aaaa	Wheel(1) Function	(0 - 97) OFF, MOD: CC01, BRETH: CC02, CC03, FOOT: CC04, PTIME: CC05, DENT: CC06, VOL: CC07, BAL: CC08, CC09, PAN: CC10, EXP: CC11, CC12, CC13, CC14, CC15, GEN-1: CC16, GEN-2: CC17, GEN-3: CC18, GEN-4: CC19, C20, CC21, CC22, CC23, CC24, CC25, CC26, CC27, CC28, CC29, CC30, CC31, OFF: CC32, CC33, CC34, CC35, CC36, CC37, DENT: CC38, CC39, CC40, CC41, CC42, CC43, CC44, CC45, CC46, CC47, CC48, CC49, CC50, CC51, CC52, CC53, CC54, CC55, CC56, CC57, CC58, CC59, CC60, CC61, CC62, CC63, HOLD1: CC64, PORTA: CC65, SOSTE: CC66, SOFT: CC67, LEGAT: CC68, HOLD2: CC69, CC70, RESO: CC71, RELES: CC72, ATTAK: CC73, CUTOFF: CC74, DECAY: CC75, VRATE: CC76, VDPH: CC77, VDLY: CC78, CC79, GEN-5: CC80, GEN-6: CC81, GEN-7: CC82, GEN-8: CC83, PCTRL: CC84, CC85, CC86, CC87, CC88, CC89, CC90, REV: CC91, TREM: CC92, CHO: CC93, CELST: CC94, PHASR: CC95, AFT, PITCH BEND
00 09	0aaa aaaa	Wheel(2) Function	(0 - 98) OFF, MOD: CC01, BRETH: CC02, CC03, FOOT: CC04, PTIME: CC05, DENT: CC06, VOL: CC07, BAL: CC08, CC09, PAN: CC10, EXP: CC11, CC12, CC13, CC14, CC15, GEN-1: CC16, GEN-2: CC17, GEN-3: CC18, GEN-4: CC19, C20, CC21, CC22, CC23, CC24, CC25, CC26, CC27, CC28, CC29, CC30, CC31, OFF: CC32, CC33, CC34, CC35, CC36, CC37, DENT: CC38, CC39, CC40, CC41, CC42, CC43, CC44, CC45, CC46, CC47, CC48, CC49, CC50, CC51, CC52, CC53, CC54, CC55, CC56, CC57, CC58, CC59, CC60, CC61, CC62, CC63, HOLD1: CC64, PORTA: CC65, SOSTE: CC66, SOFT: CC67, LEGAT: CC68, HOLD2: CC69, CC70, RESO: CC71, RELES: CC72, ATTAK: CC73, CUTOFF: CC74, DECAY: CC75, VRATE: CC76, VDPH: CC77, VDLY: CC78, CC79, GEN-5: CC80, GEN-6: CC81, GEN-7: CC82, GEN-8: CC83, PCTRL: CC84, CC85, CC86, CC87, CC88, CC89, CC90, REV: CC91, TREM: CC92, CHO: CC93, CELST: CC94, PHASR: CC95, AFT, BEND DOWN, BEND UP
00 0A	0aaa aaaa	Assignable Knob(1) Function <*>	(0 - 98) OFF, MOD: CC01, BRETH: CC02, CC03, FOOT: CC04, PTIME: CC05, DENT: CC06, VOL: CC07, BAL: CC08, CC09, PAN: CC10, EXP: CC11, CC12, CC13, CC14, CC15, GEN-1: CC16, GEN-2: CC17, GEN-3: CC18, GEN-4: CC19, C20, CC21, CC22, CC23, CC24, CC25, CC26, CC27, CC28, CC29, CC30, CC31, OFF: CC32, CC33, CC34, CC35, CC36, CC37, DENT: CC38, CC39, CC40, CC41, CC42, CC43, CC44, CC45, CC46, CC47, CC48, CC49, CC50, CC51, CC52, CC53, CC54, CC55, CC56, CC57, CC58, SOSTE: CC66, SOFT: CC67, CC63, HOLD1: CC64, PORTA: CC65, SOSTE: CC66, SOFT: CC67, LEGAT: CC68, HOLD2: CC69, CC70, RESO: CC71, RELES: CC72, ATTAK: CC73, CUTOFF: CC74, DECAY: CC75, VRATE: CC76, VDPH: CC77, VDLY: CC78, CC79, GEN-5: CC80, GEN-6: CC81, GEN-7: CC82, GEN-8: CC83, PCTRL: CC84, CC85, CC86, CC87, CC88, CC89, CC90, REV: CC91, TREM: CC92, CHO: CC93, CELST: CC94, PHASR: CC95, AFT, BEND DOWN, BEND UP
00 0B	0aaa aaaa	Assignable Knob(2) Function <*>	(0 - 98) OFF, MOD: CC01, BRETH: CC02, CC03, FOOT: CC04, PTIME: CC05, DENT: CC06, VOL: CC07, BAL: CC08, CC09, PAN: CC10, EXP: CC11, CC12, CC13, CC14, CC15, GEN-1: CC16, GEN-2: CC17, GEN-3: CC18, GEN-4: CC19, C20, CC21, CC22, CC23, CC24, CC25, CC26, CC27, CC28, CC29, CC30, CC31, OFF: CC32, CC33, CC34, CC35, CC36, CC37, DENT: CC38, CC39, CC40, CC41, CC42, CC43, CC44, CC45, CC46, CC47, CC48, CC49, CC50, CC51, CC52, CC53, CC54, CC55, CC56, CC57, CC58, SOSTE: CC66, SOFT: CC67, CC63, HOLD1: CC64, PORTA: CC65, SOSTE: CC66, SOFT: CC67, LEGAT: CC68, HOLD2: CC69, CC70, RESO: CC71, RELES: CC72, ATTAK: CC73, CUTOFF: CC74, DECAY: CC75, VRATE: CC76, VDPH: CC77, VDLY: CC78, CC79, GEN-5: CC80, GEN-6: CC81, GEN-7: CC82, GEN-8: CC83, PCTRL: CC84, CC85, CC86, CC87, CC88, CC89, CC90, REV: CC91, TREM: CC92, CHO: CC93, CELST: CC94, PHASR: CC95, AFT, BEND DOWN, BEND UP

MIDI Implementation

		CC43,CC44,CC45,CC46,CC47,CC48,CC49,CC50,CC51,CC52,CC53,CC54,CC55,CC56,CC57,CC58,CC59,CC60,CC61,CC62,CC63,HOLD1:CC64,PORTA:CC65,SOSTE:CC66,SOFT:CC67,LEGAT:CC68,HOLD2:CC69,CC70,RESO:CC71,RELES:CC72,ATTAK:CC73,CUTOF:CC74,DECAY:CC75,VRATE:CC76,VDPTH:CC77,VDLY:CC78,CC79,GEN-5:CC80,GEN-6:CC81,GEN-7:CC82,GEN-8:CC83,PCTRL:CC84,CC85,CC86,CC87,CC88,CC89,CC90,REV:CC91,TREM:CC92,CHO:CC93,CELST:CC94,PHASR:CC95,AFT,BEND DOWN,BEND UP	00 17 0000 000a FC(2) Polarity (0 - 1) STANDARD, REVERSE
			00 00 00 18 Total Size
			* [Scene Common]
00 0C	0aaa aaaa	Assignable Knob(3) Function <*> (0 - 98) OFF,MOD:CC01,BRETH:CC02,CC03,FOOT:CC04,PTIME:CC05,DENT:CC06,VOL:CC07,BAL:CC08,CC09,PAN:CC10,EXP:CC11,CC12,CC13,CC14,CC15,GEN-1:CC16,GEN-2:CC17,GEN-3:CC18,GEN-4:CC19,CC20,CC21,CC22,CC23,CC24,CC25,CC26,CC27,CC28,CC29,CC30,CC31,OFF:CC32,CC33,CC34,CC35,CC36,CC37,DENT:CC38,CC39,CC40,CC41,CC42,CC43,CC44,CC45,CC46,CC47,CC48,CC49,CC50,CC51,CC52,CC53,CC54,CC55,CC56,CC57,CC58,CC59,CC60,CC61,CC62,CC63,HOLD1:CC64,PORTA:CC65,SOSTE:CC66,SOFT:CC67,LEGAT:CC68,HOLD2:CC69,CC70,RESO:CC71,RELES:CC72,ATTAK:CC73,CUTOF:CC74,DECAY:CC75,VRATE:CC76,VDPTH:CC77,VDLY:CC78,CC79,GEN-5:CC80,GEN-6:CC81,GEN-7:CC82,GEN-8:CC83,PCTRL:CC84,CC85,CC86,CC87,CC88,CC89,CC90,REV:CC91,TREM:CC92,CHO:CC93,CELST:CC94,PHASR:CC95,AFT,BEND DOWN,BEND UP	Offset Address Description 00 00 0aaa aaaa NAME 1 (32 - 127) 00 01 0aaa aaaa NAME 2 (32 - 127) 00 02 0aaa aaaa NAME 3 (32 - 127) 00 03 0aaa aaaa NAME 4 (32 - 127) 00 04 0aaa aaaa NAME 5 (32 - 127) 00 05 0aaa aaaa NAME 6 (32 - 127) 00 06 0aaa aaaa NAME 7 (32 - 127) 00 07 0aaa aaaa NAME 8 (32 - 127) 00 08 0aaa aaaa NAME 9 (32 - 127) 00 09 0aaa aaaa NAME 10 (32 - 127) 00 0A 0aaa aaaa NAME 11 (32 - 127) 00 0B 0aaa aaaa NAME 12 (32 - 127) 00 0C 0aaa aaaa NAME 13 (32 - 127) 00 0D 0aaa aaaa NAME 14 (32 - 127) 00 0E 0aaa aaaa NAME 15 (32 - 127) 00 0F 0aaa aaaa NAME 16 (32 - 127) 00 10 0aaa aaaa Scene Level (0 - 127) # 00 11 0000 aaaa 00 12 0000 bbbb Scene Tempo (20 - 250) 20 - 250 00 13 0000 000a Chorus Source (0 - 1) 00 14 0000 000a Reverb Source SCENE, SYS (0 - 1) 00 15 0000 000a Keyboard Source SCENE, SYS (0 - 1) 00 16 0aaa aaaa Keyboard Velocity (0 - 127) REAL, 1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26,27,28,29,30,31,32,33,34,35,36,37,38,39,40,41,42,43,44,45,46,47,48,49,50,51,52,53,54,55,56,57,58,59,60,61,62,63,64,65,66,67,68,69,70,71,72,73,74,75,76,77,78,79,80,81,82,83,84,85,86,87,88,89,90,91,92,93,94,95,96,97,98,99,100,101,102,103,104,105,106,107,108,109,110,111,112,113,114,115,116,117,118,119,120,121,122,123,124,125,126,127 00 17 0000 0aaa Keyboard Velocity Curve (0 - 4) SPR LIGHT, LIGHT, MEDIUM, HEAVY, SPR HEAVY 00 18 0aaa aaaa Keyboard Velocity Curve Offset (54 - 73) -10 - 9 00 19 0aaa aaaa Keyboard Velocity Delay Sens (1 - 127) -63 - 63 00 1A 0aaa aaaa Keyboard Velocity Key Follow (1 - 127) -63 - 63 00 1B 0000 000a Keyboard Off Position (0 - 1) STANDARD, DEEP 00 1C 0aaa aaaa Wheel(1) Function (0 - 97) OFF,MOD:CC01,BRETH:CC02,CC03,FOOT:CC04,PTIME:CC05,DENT:CC06,VOL:CC07,BAL:CC08,CC09,PAN:CC10,EXP:CC11,CC12,CC13,CC14,CC15,GEN-1:CC16,GEN-2:CC17,GEN-3:CC18,GEN-4:CC19,CC20,CC21,CC22,CC23,CC24,CC25,CC26,CC27,CC28,CC29,CC30,CC31,OFF:CC32,CC33,CC34,CC35,CC36,CC37,DENT:CC38,CC39,CC40,CC41,CC42,CC43,CC44,CC45,CC46,CC47,CC48,CC49,CC50,CC51,CC52,CC53,CC54,CC55,CC56,CC57,CC58,CC59,CC60,CC61,CC62,CC63,HOLD1:CC64,PORTA:CC65,SOSTE:CC66,SOFT:CC67,LEGAT:CC68,HOLD2:CC69,CC70,RESO:CC71,RELES:CC72,ATTAK:CC73,CUTOF:CC74,DECAY:CC75,VRATE:CC76,VDPTH:CC77,VDLY:CC78,CC79,GEN-5:CC80,GEN-6:CC81,GEN-7:CC82,GEN-8:CC83,PCTRL:CC84,CC85,CC86,CC87,CC88,CC89,CC90,REV:CC91,TREM:CC92,CHO:CC93,CELST:CC94,PHASR:CC95,AFT,BEND DOWN,BEND UP
00 0E	0aaa aaaa	(reserve) <>	
00 0F	0aaa aaaa	(reserve) <>	
00 10	0aaa aaaa	(reserve) <>	
00 11	0aaa aaaa	Assignable Knob(8) Function (0 - 98) OFF,MOD:CC01,BRETH:CC02,CC03,FOOT:CC04,PTIME:CC05,DENT:CC06,VOL:CC07,BAL:CC08,CC09,PAN:CC10,EXP:CC11,CC12,CC13,CC14,CC15,GEN-1:CC16,GEN-2:CC17,GEN-3:CC18,GEN-4:CC19,CC20,CC21,CC22,CC23,CC24,CC25,CC26,CC27,CC28,CC29,CC30,CC31,OFF:CC32,CC33,CC34,CC35,CC36,CC37,DENT:CC38,CC39,CC40,CC41,CC42,CC43,CC44,CC45,CC46,CC47,CC48,CC49,CC50,CC51,CC52,CC53,CC54,CC55,CC56,CC57,CC58,CC59,CC60,CC61,CC62,CC63,HOLD1:CC64,PORTA:CC65,SOSTE:CC66,SOFT:CC67,LEGAT:CC68,HOLD2:CC69,CC70,RESO:CC71,RELES:CC72,ATTAK:CC73,CUTOF:CC74,DECAY:CC75,VRATE:CC76,VDPTH:CC77,VDLY:CC78,CC79,GEN-5:CC80,GEN-6:CC81,GEN-7:CC82,GEN-8:CC83,PCTRL:CC84,CC85,CC86,CC87,CC88,CC89,CC90,REV:CC91,TREM:CC92,CHO:CC93,CELST:CC94,PHASR:CC95,AFT,BEND DOWN,BEND UP	
00 12	0aaa aaaa	(reserve) <>	
00 13	0aaa aaaa	FC(1) Function (0 - 101) OFF,MOD:CC01,BRETH:CC02,CC03,FOOT:CC04,PTIME:CC05,DENT:CC06,VOL:CC07,BAL:CC08,CC09,PAN:CC10,EXP:CC11,CC12,CC13,CC14,CC15,GEN-1:CC16,GEN-2:CC17,GEN-3:CC18,GEN-4:CC19,CC20,CC21,CC22,CC23,CC24,CC25,CC26,CC27,CC28,CC29,CC30,CC31,OFF:CC32,CC33,CC34,CC35,CC36,CC37,DENT:CC38,CC39,CC40,CC41,CC42,CC43,CC44,CC45,CC46,CC47,CC48,CC49,CC50,CC51,CC52,CC53,CC54,CC55,CC56,CC57,CC58,CC59,CC60,CC61,CC62,CC63,HOLD1:CC64,PORTA:CC65,SOSTE:CC66,SOFT:CC67,LEGAT:CC68,HOLD2:CC69,CC70,RESO:CC71,RELES:CC72,ATTAK:CC73,CUTOF:CC74,DECAY:CC75,VRATE:CC76,VDPTH:CC77,VDLY:CC78,CC79,GEN-5:CC80,GEN-6:CC81,GEN-7:CC82,GEN-8:CC83,PCTRL:CC84,CC85,CC86,CC87,CC88,CC89,CC90,REV:CC91,TREM:CC92,CHO:CC93,CELST:CC94,PHASR:CC95,AFT,BEND DOWN,BEND UP	
00 14	0aaa aaaa	FC(2) Function (0 - 101) OFF,MOD:CC01,BRETH:CC02,CC03,FOOT:CC04,PTIME:CC05,DENT:CC06,VOL:CC07,BAL:CC08,CC09,PAN:CC10,EXP:CC11,CC12,CC13,CC14,CC15,GEN-1:CC16,GEN-2:CC17,GEN-3:CC18,GEN-4:CC19,CC20,CC21,CC22,CC23,CC24,CC25,CC26,CC27,CC28,CC29,CC30,CC31,OFF:CC32,CC33,CC34,CC35,CC36,CC37,DENT:CC38,CC39,CC40,CC41,CC42,CC43,CC44,CC45,CC46,CC47,CC48,CC49,CC50,CC51,CC52,CC53,CC54,CC55,CC56,CC57,CC58,CC59,CC60,CC61,CC62,CC63,HOLD1:CC64,PORTA:CC65,SOSTE:CC66,SOFT:CC67,LEGAT:CC68,HOLD2:CC69,CC70,RESO:CC71,RELES:CC72,ATTAK:CC73,CUTOF:CC74,DECAY:CC75,VRATE:CC76,VDPTH:CC77,VDLY:CC78,CC79,GEN-5:CC80,GEN-6:CC81,GEN-7:CC82,GEN-8:CC83,PCTRL:CC84,CC85,CC86,CC87,CC88,CC89,CC90,REV:CC91,TREM:CC92,CHO:CC93,CELST:CC94,PHASR:CC95,AFT,BEND DOWN,BEND UP	
00 15	0000 000a	Damper Polarity (0 - 1) STANDARD, REVERSE	
00 16	0000 000a	FC(1) Polarity (0 - 1) STANDARD, REVERSE	
00 1D	0000 000a	Wheel(1) Source (0 - 1) SCENE, SYS	
00 1E	0aaa aaaa	Wheel(2) Function (0 - 98) OFF,MOD:CC01,BRETH:CC02,CC03,FOOT:CC04,PTIME:CC05,DENT:CC06,VOL:CC07,BAL:CC08,CC09,PAN:CC10,EXP:CC11,CC12,CC13,CC14,CC15,GEN-1:CC16,GEN-2:CC17,GEN-3:CC18,GEN-4:CC19,CC20,CC21,CC22,CC23,CC24,CC25,CC26,CC27,CC28,CC29,CC30,CC31,OFF:CC32,CC33,CC34,CC35,CC36,CC37,DENT:CC38,CC39,CC40,CC41,CC42,CC43,CC44,CC45,CC46,CC47,CC48,CC49,CC50,CC51,CC52,CC53,CC54,CC55,CC56,CC57,CC58,CC59,CC60,CC61,CC62,CC63,HOLD1:CC64,PORTA:CC65,SOSTE:CC66,SOFT:CC67,LEGAT:CC68,HOLD2:CC69,CC70,RESO:CC71,RELES:CC72,ATTAK:CC73,CUTOF:CC74,DECAY:CC75,VRATE:CC76,VDPTH:CC77,VDLY:CC78,CC79,GEN-5:CC80,GEN-6:CC81,GEN-7:CC82,GEN-8:CC83,PCTRL:CC84,CC85,CC86,CC87,CC88,CC89,CC90,REV:CC91,TREM:CC92,CHO:CC93,CELST:CC94,PHASR:CC95,AFT,BEND DOWN,BEND UP	
00 1F	0000 000a	Wheel(2) Source (0 - 1) SCENE, SYS	
00 20	0aaa aaaa	Assignable Knob(1) Function <*> (0 - 98) OFF,MOD:CC01,BRETH:CC02,CC03,FOOT:CC04,PTIME:CC05,DENT:CC06,VOL:CC07,BAL:CC08,CC09,PAN:CC10,EXP:CC11,CC12,CC13,CC14,CC15,GEN-1:CC16,GEN-2:CC17,GEN-3:CC18,GEN-4:CC19,CC20,CC21,CC22,CC23,CC24,	

[illegible]

MIDI Implementation

* [Scene Tone]

Offset	Address	Description	
00 00	0aaa aaaa	Tone Bank Select MSB (CC#0)	(0 - 127)
00 01	0aaa aaaa	Tone Bank Select LSB (CC#32)	(0 - 127)
00 02	0aaa aaaa	Tone Program Change (PC)	(0 - 127)
00 03	0aaa aaaa	Part Level (CC#7)	(0 - 127)
00 04	0aaa aaaa	Part Pan (CC#10)	(0 - 127)
00 05	0aaa aaaa	Part Coarse Tune (RPN#2)	L64 - 63R (16 - 112)
00 06	0aaa aaaa	Part Fine Tune (RPN#1)	-48 - 48 (14 - 114)
00 07	0000 00aa	Part Mono/Poly	(0 - 2) MONO, POLY, TONE
00 08	0000 00aa	Part Legato Switch	(0 - 2) OFF, ON, TONE
00 09	000a aaaa	Part Bend Range	(0 - 25) 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, TONE
00 0A	0000 00aa	Part Portamento Switch (CC#65)	(0 - 2) OFF, ON, TONE
00 0B	0000 aaaa	Part Portamento Time (CC#5)	(0 - 128) 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, TONE
00 0D	0aaa aaaa	Part Cutoff Offset (CC#74)	(0 - 127) -64 - 63
00 0E	0aaa aaaa	Part Resonance Offset (CC#71)	(0 - 127) -64 - 63
00 0F	0aaa aaaa	Part Attack Time Offset (CC#73)	(0 - 127) -64 - 63
00 10	0aaa aaaa	Part Decay Time Offset (CC#75)	(0 - 127) -64 - 63
00 11	0aaa aaaa	Part Release Time Offset (CC#72)	(0 - 127) -64 - 63
00 12	0aaa aaaa	Part Vibrato Rate (CC#76)	(0 - 127) -64 - 63
00 13	0aaa aaaa	Part Vibrato Depth (CC#77)	(0 - 127) -64 - 63
00 14	0aaa aaaa	Part Vibrato Delay (CC#78)	(0 - 127) -64 - 63
00 15	0aaa aaaa	(reserve) <*>	-3 - 3
00 16	0aaa aaaa	Part Velocity Sens Offset	(1 - 127) -63 - 63
00 17	0000 0aaa	Part Velocity Curve Type	(0 - 4) OFF, 1, 2, 3, 4
00 18	0aaa aaaa	Part Chorus Send Level (CC#93)	(0 - 127)
00 19	0aaa aaaa	Part Reverb Send Level (CC#91)	(0 - 127)
00 1A	0000 00aa	Part Output Assign	(0 - 2) DRY, IFX, SYM-RESO
00 1B	0000 00aa	(reserve) <*>	
00 1C	0000 00aa	Bend Mode	(0 - 2) NORMAL, C+L, TONE
00 1D	0000 00aa	Unison Switch	(0 - 2) OFF, ON, TONE
00 1E	0000 000a	Follow Tone MFX	(0 - 1) OFF, ON
00 1F	0000 000a	Tone Color Type	(0 - 1) EQ, STEREO WIDTH
00 20	0aaa aaaa	Tone Color Level	(0 - 127)
00 21	0000 000a	Part Scale Tune Source	(0 - 1) SCENE, SYS
00 22	0000 aaaa	Part Scale Tune Type	(0 - 8) CUSTOM, EQUAL, JUST-MAJ, JUST-MIN, PYTHAGORE, KIRNBERGE, MEANTONE, WERCKMEIS, ARABIC
00 23	0000 aaaa	Part Scale Tune Key	(0 - 11) C, C#, D, D#, E, F, F#, G, G#, A, A#, B
00 24	0aaa aaaa	Part Scale Tune for C	(0 - 127) -64 - 63
00 25	0aaa aaaa	Part Scale Tune for C#	(0 - 127) -64 - 63
00 26	0aaa aaaa	Part Scale Tune for D	(0 - 127) -64 - 63
00 27	0aaa aaaa	Part Scale Tune for D#	(0 - 127) -64 - 63
00 28	0aaa aaaa	Part Scale Tune for E	(0 - 127) -64 - 63
00 29	0aaa aaaa	Part Scale Tune for F	(0 - 127) -64 - 63
00 2A	0aaa aaaa	Part Scale Tune for F#	(0 - 127) -64 - 63
00 2B	0aaa aaaa	Part Scale Tune for G	(0 - 127) -64 - 63
00 2C	0aaa aaaa	Part Scale Tune for G#	(0 - 127) -64 - 63
00 2D	0aaa aaaa	Part Scale Tune for A	(0 - 127) -64 - 63

00 2E	0aaa aaaa	Part Scale Tune for A#	(0 - 127) -64 - 63
00 2F	0aaa aaaa	Part Scale Tune for B	(0 - 127) -64 - 63
00 30	0000 aaaa	Receive Channel	(0 - 15) 1 - 16
00 31	0000 000a	(reserve) <*>	
00 32	0000 000a	(reserve) <*>	
00 33	0000 000a	(reserve) <*>	
00 34	0000 000a	(reserve) <*>	
00 35	0000 000a	(reserve) <*>	
00 36	0000 000a	(reserve) <*>	
00 37	0000 000a	(reserve) <*>	
00 38	0000 000a	(reserve) <*>	
00 39	0000 000a	(reserve) <*>	
00 3A	0000 000a	(reserve) <*>	
00 00 00 3B	Total Size		

* [Scene EQ]

Offset	Address	Description	
00 00	0aaa aaaa	EQ Input Gain	(40 - 88) -24 - +24 [dB]
00 01	0aaa aaaa	EQ Low Gain	(40 - 88) -24 - +24 [dB]
00 02	0aaa aaaa	EQ Mid Gain	(40 - 88) -24 - +24 [dB]
00 03	0aaa aaaa	EQ High Gain	(40 - 88) -24 - +24 [dB]
00 04	000a aaaa	EQ Low Frequency	(0 - 29) 20, 25, 31, 40, 50, 63, 80, 100, 125, 160, 200, 250, 315, 400, 500, 630, 800, 1000, 1250, 1600, 2000, 2500, 3150, 4000, 5000, 6300, 8000, 10000, 12600, 16000 [Hz]
00 05	000a aaaa	EQ Mid Frequency	(0 - 29) 20, 25, 31, 40, 50, 63, 80, 100, 125, 160, 200, 250, 315, 400, 500, 630, 800, 1000, 1250, 1600, 2000, 2500, 3150, 4000, 5000, 6300, 8000, 10000, 12600, 16000 [Hz]
00 06	000a aaaa	EQ High Frequency	(0 - 29) 20, 25, 31, 40, 50, 63, 80, 100, 125, 160, 200, 250, 315, 400, 500, 630, 800, 1000, 1250, 1600, 2000, 2500, 3150, 4000, 5000, 6300, 8000, 10000, 12600, 16000 [Hz]
00 07	0000 0aaa	EQ Mid Q	(0 - 5) 0.5, 1.0, 2.0, 4.0, 8.0, 16.0
00 08	0000 000a	Switch	(0 - 1) OFF, ON
00 00 00 09	Total Size		

* [Scene Zone]

Offset	Address	Description	
00 00	0000 000a	Keyboard Switch	(0 - 1) OFF, ON
00 01	0000 000a	(reserve) <*>	
00 02	0aaa aaaa	Velocity Max	(1 - 127)
00 03	0aaa aaaa	Keyboard Range Lower	(0 - 127)
00 04	0aaa aaaa	Keyboard Range Upper	(0 - 127)
00 05	0aaa aaaa	(reserve) <*>	
00 06	0aaa aaaa	(reserve) <*>	
00 07	0aaa aaaa	Velocity Range Lower	(1 - 127)
00 08	0aaa aaaa	Velocity Range Upper	(1 - 127)
00 09	0aaa aaaa	(reserve) <*>	
00 0A	0aaa aaaa	(reserve) <*>	
00 0B	0000 000a	Control Wheel(1)	(0 - 1) OFF, ON
00 0C	0000 000a	Control Wheel(2)	(0 - 1) OFF, ON
00 0D	0000 000a	Control Damper	(0 - 1) OFF, ON
00 0E	0000 000a	Control FC(1)	(0 - 1) OFF, ON
00 0F	0000 000a	Control FC(2)	(0 - 1) OFF, ON
00 10	0000 000a	Control Knob(1) <*>	(0 - 1) OFF, ON
00 11	0000 000a	Control Knob(2) <*>	(0 - 1) OFF, ON
00 12	0000 000a	Control Knob(3) <*>	(0 - 1) OFF, ON
00 13	0000 000a	Control Knob(4) <*>	(0 - 1) OFF, ON
00 14	0000 000a	(reserve) <*>	(0 - 1) OFF, ON
00 15	0000 000a	(reserve) <*>	(0 - 1) OFF, ON
00 16	0000 000a	(reserve) <*>	(0 - 1) OFF, ON
00 17	0000 000a	(reserve) <*>	(0 - 1) OFF, ON
00 18	0000 000a	External Control Volume Knob <*>	(0 - 1)

				OFF, ON					OFF,0,1,2,3,4,5,6,7,8,9,
	00 19	0000 00aa	Tx Mode <*>	(0 - 2)					10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,
				ON, INT, EXT					26,27,28,29,30,31,32,33,34,35,36,37,38,39,40,41,
	00 1A	0000 00aa	External MIDI Port <*>	(0 - 2)					42,43,44,45,46,47,48,49,50,51,52,53,54,55,56,57,
				ALL, MIDI, USB					58,59,60,61,62,63,64,65,66,67,68,69,70,71,72,73,
	00 1B	0000 aaaa	External Zone Tx Channel <*>	(0 - 15)					74,75,76,77,78,79,80,81,82,83,84,85,86,87,88,89,
				1 - 16					90,91,92,93,94,95,96,97,98,99,100,101,102,103,
#	00 1C	0000 aaaa							104,105,106,107,108,109,110,111,112,113,114,115,
	00 1D	0000 bbbb	External Bank MSB (CC#0) <*>	(0 - 128)					116,117,118,119,120,121,122,123,124,125,126,127
				OFF,0,1,2,3,4,5,6,7,8,9,	#	00 2E	0000 aaaa		
				10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,		00 2F	0000 bbbb	External Resonance Offset (CC#71) <*>	(0 - 128)
				26,27,28,29,30,31,32,33,34,35,36,37,38,39,40,41,					OFF,0,1,2,3,4,5,6,7,8,9,
				42,43,44,45,46,47,48,49,50,51,52,53,54,55,56,57,					10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,
				58,59,60,61,62,63,64,65,66,67,68,69,70,71,72,73,					26,27,28,29,30,31,32,33,34,35,36,37,38,39,40,41,
				74,75,76,77,78,79,80,81,82,83,84,85,86,87,88,89,					42,43,44,45,46,47,48,49,50,51,52,53,54,55,56,57,
				90,91,92,93,94,95,96,97,98,99,100,101,102,103,					58,59,60,61,62,63,64,65,66,67,68,69,70,71,72,73,
				104,105,106,107,108,109,110,111,112,113,114,115,					74,75,76,77,78,79,80,81,82,83,84,85,86,87,88,89,
				116,117,118,119,120,121,122,123,124,125,126,127					90,91,92,93,94,95,96,97,98,99,100,101,102,103,
#	00 1E	0000 aaaa							104,105,106,107,108,109,110,111,112,113,114,115,
	00 1F	0000 bbbb	External Bank LSB (CC#32) <*>	(0 - 128)					116,117,118,119,120,121,122,123,124,125,126,127
				OFF,0,1,2,3,4,5,6,7,8,9,	#	00 30	0000 aaaa		
				10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,		00 31	0000 bbbb	External Attack Time Offset (CC#73) <*>	(0 - 128)
				26,27,28,29,30,31,32,33,34,35,36,37,38,39,40,41,					OFF,0,1,2,3,4,5,6,7,8,9,
				42,43,44,45,46,47,48,49,50,51,52,53,54,55,56,57,					10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,
				58,59,60,61,62,63,64,65,66,67,68,69,70,71,72,73,					26,27,28,29,30,31,32,33,34,35,36,37,38,39,40,41,
				74,75,76,77,78,79,80,81,82,83,84,85,86,87,88,89,					42,43,44,45,46,47,48,49,50,51,52,53,54,55,56,57,
				90,91,92,93,94,95,96,97,98,99,100,101,102,103,					58,59,60,61,62,63,64,65,66,67,68,69,70,71,72,73,
				104,105,106,107,108,109,110,111,112,113,114,115,					74,75,76,77,78,79,80,81,82,83,84,85,86,87,88,89,
				116,117,118,119,120,121,122,123,124,125,126,127					90,91,92,93,94,95,96,97,98,99,100,101,102,103,
#	00 20	0000 aaaa							104,105,106,107,108,109,110,111,112,113,114,115,
	00 21	0000 bbbb	External Program Change (PC) <*>	(0 - 128)					116,117,118,119,120,121,122,123,124,125,126,127
				OFF,1,2,3,4,5,6,7,8,9,10,	#	00 32	0000 aaaa		
				11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26,		00 33	0000 bbbb	External Decay Time Offset (CC#75) <*>	(0 - 128)
				27,28,29,30,31,32,33,34,35,36,37,38,39,40,41,42,					OFF,0,1,2,3,4,5,6,7,8,9,
				43,44,45,46,47					

Offset	Address	Description
00 00	0000 000a	SymReso Switch (0 - 1) OFF, ON
00 01	0aaa aaaa	SymReso Depth (0 - 127)
00 02	0aaa aaaa	Cabinet Resonance (0 - 127)
00 03	00aa aaaa	AtkIn LFP (1 - 32) 16, 20, 25, 32, 40, 50, 63, 80, 100, 125, 160, 200, 250, 315, 400, 500, 630, 800, 1000, 1250, 1600, 2000, 2500, 3150, 4000, 5000, 6300, 8000, 10000, 12500, 15000, Bypass [Hz]
00 04	000a aaaa	AtkIn HFF (0 - 31) Bypass, 16, 20, 25, 32, 40, 50, 63, 80, 100, 125, 160, 200, 250, 315, 400, 500, 630, 800, 1000, 1250, 1600, 2000, 2500, 3150, 4000, 5000, 6300, 8000, 10000, 12500, 15000 [Hz]
00 05	000a aaaa	AtkInPkg Freq (1 - 31) 16, 20, 25, 32, 40, 50, 63, 80, 100, 125, 160, 200, 250, 315, 400, 500, 630, 800, 1000, 1250, 1600, 2000, 2500, 3150, 4000, 5000, 6300, 8000, 10000, 12500, 15000 [Hz]
00 06	000a aaaa	AtkInPkg Gain (0 - 30) -15 - +15 [dB]
00 07	0000 0aaa	AtkInPkg Q (0 - 4) 0.5, 1.0, 2.0, 4.0, 8.0
00 08	0aaa aaaa	(reserve) <*>
00 09	00aa aaaa	(reserve) <*>
00 0A	0aaa aaaa	(reserve) <*>
00 0B	00aa aaaa	Rev HF Damp 16, 20, 25, 32, 40, 50, 63, 80, 100, 125, 160, 200, 250, 315, 400, 500, 630, 800, 1000, 1250, 1600, 2000, 2500, 3150, 4000, 5000, 6300, 8000, 10000, 12500, 15000, Bypass [Hz]
00 0C	000a aaaa	Rev LF Damp (0 - 31) Bypass, 16, 20, 25, 32, 40, 50, 63, 80, 100, 125, 160, 200, 250, 315, 400, 500, 630, 800, 1000, 1250, 1600, 2000, 2500, 3150, 4000, 5000, 6300, 8000, 10000, 12500, 15000 [Hz]
00 0D	0aaa aaaa	(reserve) <*>
00 0E	0aaa aaaa	(reserve) <*>
00 0F	0aaa aaaa	(reserve) <*>
00 10	0aaa aaaa	(reserve) <*>
00 11	0aaa aaaa	(reserve) <*>
00 12	0aaa aaaa	Aliquot Level (0 - 127)
00 13	0aaa aaaa	Level (0 - 127)
00 14	0000 000a	(reserve) <*>
00 15	0000 000a	(reserve) <*>
00 16	0000 000a	(reserve) <*>
00 17	0aaa aaaa	(reserve) <*>
00 18	0aaa aaaa	(reserve) <*>
00 19	0aaa aaaa	(reserve) <*>
00 1A	0aaa aaaa	(reserve) <*>
00 1B	000a aaaa	(reserve) <*>
00 1C	0000 00aa	SymReso Part (0 - 3) OFF, UPPER1, UPPER2, LOWER
00 00 00 1D	Total Size	

Offset	Address	Description	
00 00	0aaa aaaa	EQ Input Gain	(40 - 88) -24 - +24 [dB]
00 01	0aaa aaaa	EQ Low Gain	(40 - 88) -24 - +24 [dB]
00 02	0aaa aaaa	EQ Mid1 Gain	(40 - 88) -24 - +24 [dB]
00 03	0aaa aaaa	EQ Mid2 Gain	(40 - 88) -24 - +24 [dB]
00 04	0aaa aaaa	EQ Mid3 Gain	(40 - 88) -24 - +24 [dB]
00 05	0aaa aaaa	EQ High Gain	(40 - 88) -24 - +24 [dB]
00 06	000a aaaa	EQ Low Frequency	(0 - 29) 20,25,31,40,50,63,80,100,125,160,200, 250,315,400,500,630,800,1000,1250,1600,2000,2500, 3150,4000,5000,6300,8000,10000,12600,16000 [Hz]
00 07	000a aaaa	EQ Mid1 Frequency	(0 - 29) 20,25,31,40,50,63,80,100,125,160,200, 250,315,400,500,630,800,1000,1250,1600,2000,2500,

[illegible]

#	00 34	0000 aaaa		
	00 35	0000 bbbb		
	00 36	0000 cccc		
	00 37	0000 dddd	Chorus Parameter 13	(12768 - 52768) -20000 - 20000
#	00 38	0000 aaaa		
	00 39	0000 bbbb		
	00 3A	0000 cccc		
	00 3B	0000 dddd	Chorus Parameter 14	(12768 - 52768) -20000 - 20000
#	00 3C	0000 aaaa		
	00 3D	0000 bbbb		
	00 3E	0000 cccc		
	00 3F	0000 dddd	Chorus Parameter 15	(12768 - 52768) -20000 - 20000
#	00 40	0000 aaaa		
	00 41	0000 bbbb		
	00 42	0000 cccc		
	00 43	0000 dddd	Chorus Parameter 16	(12768 - 52768) -20000 - 20000
#	00 44	0000 aaaa		
	00 45	0000 bbbb		
	00 46	0000 cccc		
	00 47	0000 dddd	Chorus Parameter 17	(12768 - 52768) -20000 - 20000
#	00 48	0000 aaaa		
	00 49	0000 bbbb		
	00 4A	0000 cccc		
	00 4B	0000 dddd	Chorus Parameter 18	(12768 - 52768) -20000 - 20000
#	00 4C	0000 aaaa		
	00 4D	0000 bbbb		
	00 4E	0000 cccc		
	00 4F	0000 dddd	Chorus Parameter 19	(12768 - 52768) -20000 - 20000
#	00 50	0000 aaaa		
	00 51	0000 bbbb		
	00 52	0000 cccc		
	00 53	0000 dddd	Chorus Parameter 20	(12768 - 52768) -20000 - 20000

	00 00 00 54	Total Size		

4. 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	
0	00H	32	20H	64	40H	96	60H	128	80H	160	100H
1	01H	33	21H	65	41H	97	61H	129	81H	161	101H
2	02H	34	22H	66	42H	98	62H	130	82H	162	102H
3	03H	35	23H	67	43H	99	63H	131	83H	163	103H
4	04H	36	24H	68	44H	100	64H	132	84H	164	104H
5	05H	37	25H	69	45H	101	65H	133	85H	165	105H
6	06H	38	26H	70	46H	102	66H	134	86H	166	106H
7	07H	39	27H	71	47H	103	67H	135	87H	167	107H
8	08H	40	28H	72	48H	104	68H	136	88H	168	108H
9	09H	41	29H	73	49H	105	69H	137	89H	169	109H
10	0AH	42	2AH	74	4AH	106	6AH	138	8AH	170	10AH
11	0BH	43	2BH	75	4BH	107	6BH	139	8BH	171	10BH
12	0CH	44	2CH	76	4CH	108	6CH	140	8CH	172	10CH
13	0DH	45	2DH	77	4DH	109	6DH	141	8DH	173	10DH
14	0EH	46	2EH	78	4EH	110	6EH	142	8EH	174	10EH
15	0FH	47	2FH	79	4FH	111	6FH	143	8FH	175	10FH
16	10H	48	30H	80	50H	112	70H	144	90H	176	110H
17	11H	49	31H	81	51H	113	71H	145	91H	177	111H
18	12H	50	32H	82	52H	114	72H	146	92H	178	112H
19	13H	51	33H	83	53H	115	73H	147	93H	179	113H
20	14H	52	34H	84	54H	116	74H	148	94H	180	114H
21	15H	53	35H	85	55H	117	75H	149	95H	181	115H
22	16H	54	36H	86	56H	118	76H	150	96H	182	116H
23	17H	55	37H	87	57H	119	77H	151	97H	183	117H
24	18H	56	38H	88	58H	120	78H	152	98H	184	118H
25	19H	57	39H	89	59H	121	79H	153	99H	185	119H
26	1AH	58	3AH	90	5AH	122	7AH	154	A0H	186	11AH
27	1BH	59	3BH	91	5BH	123	7BH	155	A1H	187	11BH
28	1CH	60	3CH	92	5CH	124	7CH	156	A2H	188	11CH
29	1DH	61	3DH	93	5DH	125	7DH	157	A3H	189	11DH
30	1EH	62	3EH	94	5EH	126	7EH	158	A4H	190	11EH
31	1FH	63	3FH	95	5FH	127	7FH	159	A5H	191	11FH

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 GS 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, al 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 aabccoddH and the data or size is eeFFH.

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

<Example> Setting program level to 74 (DT1).

According to the "Parameter Address Map", the start address of Temporary Scene is 01 00 00 00H, the offset address of Scene Common is 00 00 00H, and the address of Scene Level is 00 10H. Therefore the address is;

```
01 00 00 00H
00 00 00H
+) 00 10H
-----
01 00 00 10H
```

Level 74 of the Scene has the value of 4AH. So the system exclusive message should be sent is;

F0 41 10 00 00 00 64 12 01 00 00 10 4A ?? F7

(1) (2) (3) (4) (5) address data checksum (6)

(1) Exclusive Status (2) ID (Roland) (3) Device ID (17)
(4) Model ID (RD-08) (5) Command ID (DT1) (6) End of Exclusive

Then calculate the checksum.

01H + 00H + 00H + 10H + 4AH = 1 + 0 + 0 + 16 + 74 = 91 (sum)
91 (sum) / 128 = 0 (quotient) ... 91 (remainder)
checksum = 128 - 91 (remainder) = 37 = 25H

This means that F0 41 10 00 00 00 64 12 01 00 00 10 4A 25 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.

5. MIDI Implementation Chart

[Digital Piano]

Date : Mar.19,2024

Model RD-08

MIDI Implementation Chart

Version : 1.00

Function...		Transmitted	Recognized	Remarks
Basic Channel	Default	1-16	1-16	
	Changed	1-16	1-16	Memorized
Mode	Default Messages Altered	Mode 3 Mono, Poly *****	Mode 3 Mode 3, 4 (M=1)	*2
Note Number:	True Voice	0-127 *****	0-127 0-127	
Velocity	Note On Note Off	o o	o o	
After Touch	Key's Channel's	x o	o o	
Pitch Bend		o	o	
Control Change	0,32	o	o	*1 Bank select
	1	o	o	Modulation
	2	o	o	Breath type
	4	o	o	Foot type
	5	o	o	Portamento time
	6,38	o	o	Data entry
	7	o	o	Volume
	10	o	o	Panpot
	11	o	o	Expression
	16	o	o	General purpose controller 1
	17	o	o	General purpose controller 2
	18	o	o	General purpose controller 3
	19	o	o	General purpose controller 4
	64	o	o	Hold 1
	65	o	o	Portamento
	66	o	o	Sostenuto
	67	o	o	Soft
	68	o	o	Legato foot switch
	71	o	o	Resonance
	72	o	o	Release time
	73	o	o	Attack time
	74	o	o	Cutoff
	75	o	o	Decay time
	76	o	o	Vibrate rate
	77	o	o	Vibrate depth
	78	o	o	Vibrate delay
	80	o	o	General purpose controller 5
	81	o	o	General purpose controller 6
	82	o	o	General purpose controller 7
	83	o	o	General purpose controller 8
	84	o	o	Portamento control
	91	o	o (Reverb)	General purpose effects 1
	93	o	o (Chorus)	General purpose effects 3
	1-31,33-95	o	-	General purpose controller
	98,99	x	x	NRPN LSB,MSB
	100,101	o	o	RPN LSB,MSB
Program Change	:True Number	o *****	o 0-127	*1 *1 Program No.1-128
System Exclusive		o	*3	*1
System Common	:Song Position :Song Select :Tune Request	x x x	x x x	
System Real Time	:Clock :Commands	x x	x x	
Aux Messages	:All Sound Off	x	o	
	:Reset All Controllers	o	o	
	:Local On/Off	x	x	
	:All Notes Off	o	o (123,127)	
	:Active Sensing	x	o	
:System Reset		x	x	
Notes		*1 o x is selectable. *2 Recognized as M=1 even if M1. *3 Transmitted only when "Transmitted Edit Data" is ON or RQ1 is received.		

Mode 1 : OMNI ON, POLY
 Mode 3 : OMNI OFF, POLY

Mode 2 : OMNI ON, MONO
 Mode 4 : OMNI OFF, MONO

o : Yes
 x : No