

1. Receive data

■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)	

* Some instruments are not received in Rhythm set.

●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)	

○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		

○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)	

○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),	

○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)	

○General Purpose Controller 1 (Controller number 16)

Status	2nd byte	3rd byte
BnH	10H	vvH
n = MIDI channel number:	0H - FH (ch.1 - 16)	
vv = Control value:	00H - 7FH (0 - 127)	

○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	

○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	

○Sostenuto (Controller number 66)

Status	2nd byte	3rd byte
BnH	42H	vvH
n = MIDI channel number:	0H - FH (ch.1 - 16)	
vv = Control value:	00H - 7FH (0 - 127) 0 - 63 = OFF, 64 - 127 = ON	

○Soft (Controller number 67)

Status	2nd byte	3rd byte
BnH	43H	vvH
n = MIDI channel number:	0H - FH (ch.1 - 16)	
vv = Control value:	00H - 7FH (0 - 127)	

○Legato Foot Switch (Controller number 68)

Status	2nd byte	3rd byte
BnH	44H	vvH
n = MIDI channel number:	0H - FH (ch.1 - 16)	
vv = Control value:	00H - 7FH (0 - 127) 0 - 63 = OFF, 64 - 127 = ON	

○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 - 7FH (-64 - 0 - +63)	

○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 - 7FH (-64 - 0 - +63)	

○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 - 7FH (-64 - 0 - +63),	

○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 - 7FH (-64 - 0 - +63)	

○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 - 7FH (-64 - 0 - +63)	

○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 - 7FH (-64 - 0 - +63)	

○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 - 7FH (-64 - 0 - +63)	

MIDI Implementation

○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 - 7FH (-64 - 0 - +63)	

○Portamento Control (Controller number 84)

Status	2nd byte	3rd byte
BnH	54H	kkH
n = MIDI channel number:	0H - FH (ch.1 - 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.

○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)	

○Effect 3 (Chorus Send Level) (Controller number 93)

Status	2nd byte	3rd byte
BnH	5DH	vvH
n = MIDI channel number:	0H - FH (ch.1 - 16)	
vv = Chorus Send Level:	00H - 7FH (0 - 127)	

○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	Notes
<u>MSB, LSB</u>	<u>MSB, LSB</u>	
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

●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)	

●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)	

- * 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)
Breath Type	0 (min)
Expression	127 (max)
Hold 1	0 (off)
Sostenuto	0 (off)
Soft	0 (off)
Hold 2	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 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 - 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.

●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.

■System Realtime Message

●Timing Clock

●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, the initial value is 10H (17))
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. 7) will be transmitted.

○GM1 System On

Status	Data byte	Status
F0H	7EH, 7FH, 09H, 01H	F7H

Byte	Explanation
F0H	Exclusive status
7EH	ID number (Universal Non-realtime Message)
7FH	Device ID (Broadcast)
09H	Sub ID#1 (General MIDI Message)
01H	Sub ID#2 (General MIDI 1 On)
F7H	EOX (End Of Exclusive)

* Not received when the Rx GM/GM2 System On parameter (EDIT: System: Rx GM/GM2 System ON) is OFF.

○GM2 System On

Status	Data byte	Status
F0H	7EH 7FH 09H 03H	F7H

Byte	Explanation
F0H	Exclusive status
7EH	ID number (Universal Non-realtime Message)
7FH	Device ID (Broadcast)
09H	Sub ID#1 (General MIDI Message)
03H	Sub ID#2 (General MIDI 2 On)
F7H	EOX (End Of Exclusive)

* Not received when the Rx GM/GM2 System On parameter (EDIT: System: Rx GM/GM2 System ON) is OFF.

○GM System Off

Status	Data byte	Status
F0H	7EH, 7F, 09H, 02H	F7H

Byte	Explanation
F0H	Exclusive status
7EH	ID number (Universal Non-realtime Message)
7FH	Device ID (Broadcast)
09H	Sub ID#1 (General MIDI Message)
02H	Sub ID#2 (General MIDI Off)
F7H	EOX (End Of Exclusive)

* Not received when the Rx GS Reset parameter (EDIT: System: Rx GS Reset) is OFF.

●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.
* The Master Volume parameter (EDIT: System: Master Volume) will change.

○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])	

○Master Coarse Tuning

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

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)

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

MIDI Implementation

●Global Parameter Control

○Reverb Parameters

Status	Data byte	Status
F0H	7FH, 7FH, 04H, 05H, 01H, 01H, 01H, 01H, ppH, vvH	F7H

Byte	Explanation
F0H	Exclusive status
7FH	ID number (universal realtime message)
7FH	Device ID (Broadcast)
04H	Sub ID#1 (Device Control)
05H	Sub ID#2 (Global Parameter Control)
01H	Slot path length
01H	Parameter ID width
01H	Value width
01H	Slot path MSB
01H	Slot path LSB (Effect 0101: Reverb)
ppH	Parameter to be controlled.
vvH	Value for the parameter.
	pp=0 Reverb Type
	vv = 00H Small Room
	vv = 01H Medium Room
	vv = 02H Large Room
	vv = 03H Medium Hall
	vv = 04H Large Hall
	vv = 08H Plate
	pp=1 Reverb Time
	vv = 00H - 7FH 0 - 127
F7H	EOX (End Of Exclusive)

○Chorus Parameters

Status	Data byte	Status
F0H	7FH, 7FH, 04H, 05H, 01H, 01H, 01H, 02H, ppH, vvH	F7H

Byte	Explanation
F0H	Exclusive status
7FH	ID number (universal realtime message)
7FH	Device ID (Broadcast)
04H	Sub ID#1 (Device Control)
05H	Sub ID#2 (Global Parameter Control)
01H	Slot path length
01H	Parameter ID width
01H	Value width
01H	Slot path MSB
02H	Slot path LSB (Effect 0102: Chorus)
ppH	Parameter to be controlled.
vvH	Value for the parameter.
	pp=0 Chorus Type
	vv=0 Chorus1
	vv=1 Chorus2
	vv=2 Chorus3
	vv=3 Chorus4
	vv=4 FB Chorus
	vv=5 Flanger
	pp=1 Mod Rate
	vv= 00H - 7FH 0 - 127
	pp=2 Mod Depth
	vv = 00H - 7FH 0 - 127
	pp=3 Feedback
	vv = 00H - 7FH 0 - 127
	pp=4 Send To Reverb
	vv = 00H - 7FH 0 - 127
F7H	EOX (End Of Exclusive)

○Channel Pressure

Status	Data byte	Status
F0H	7FH, 7FH, 09H, 01H, 0nH, ppH, rrH	F7H

Byte	Explanation
F0H	Exclusive status
7FH	ID number (universal realtime message)
7FH	Device ID (Broadcast)
09H	Sub ID#1 (Controller Destination Setting)
01H	Sub ID#2 (Channel Pressure)
0nH	MIDI Channel (00 - 0F)
ppH	Controlled parameter
rrH	Controlled range
	pp=0 Pitch Control
	rr = 28H - 58H -24 - +24 [semitones]
	pp=1 Filter Cutoff Control
	rr = 00H - 7FH -9600 - +9450 [cents]
	pp=2 Amplitude Control
	rr = 00H - 7FH 0 - 200%
	pp=3 LFO Pitch Depth
	rr = 00H - 7FH 0 - 600 [cents]
	pp=4 LFO Filter Depth
	rr = 00H - 7FH 0 - 2400 [cents]
	pp=5 LFO Amplitude Depth
	rr = 00H - 7FH 0 - 100%
F7H	EOX (End Of Exclusive)

○Controller

Status	Data byte	Status
F0H	7FH, 7FH, 09H, 03H, 0nH, ccH, ppH, rrH	F7H

Byte	Explanation
F0H	Exclusive status
7FH	ID number (universal realtime message)
7FH	Device ID (Broadcast)
09H	Sub ID#1 (Controller Destination Setting)
03H	Sub ID#2 (Control Change)
0nH	MIDI Channel (00 - 0F)
ccH	Controller number (01 - 1F, 40 - 5F)
ppH	Controlled parameter
rrH	Controlled range
	pp=0 Pitch Control
	rr = 28H - 58H -24 - +24 [semitones]
	pp=1 Filter Cutoff Control
	rr = 00H - 7FH -9600 - +9450 [cents]
	pp=2 Amplitude Control
	rr = 00H - 7FH 0 - 200%
	pp=3 LFO Pitch Depth
	rr = 00H - 7FH 0 - 600 [cents]
	pp=4 LFO Filter Depth
	rr = 00H - 7FH 0 - 2400 [cents]
	pp=5 LFO Amplitude Depth
	rr = 00H - 7FH 0 - 100%
F7H	EOX (End Of Exclusive)

○Scale/Octave Tuning Adjust

Status	Data byte	Status
F0H	7EH, 7FH, 08H, 08H, ffH, ggH, hhH, ssH...	F7H

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)

○Key-based Instrument Controllers

Status	Data byte	Status
F0H	7FH, 7FH, 0AH, 01H, 0nH, kkH, nnH, vvH	F7H
Byte	Explanation	
F0H	Exclusive status	
7FH	ID number (universal realtime message)	
7FH	Device ID (Broadcast)	
0AH	Sub ID#1 (Key-Based Instrument Control)	
01H	Sub ID#2 (Controller)	
0nH	MIDI Channel (00 - 0F)	
kkH	Key Number	
nnH	Control Number	
vvH	Value	
	nn=07H Level	
	vv = 00H - 7FH 0 - 200% (Relative)	
	nn=0AH Pan	
	vv = 00H - 7FH Left - Right (Absolute)	
	nn=5BH Reverb Send	
	vv = 00H - 7FH 0 - 127 (Absolute)	
	nn=5D Chorus Send	
	vv = 00H - 7FH 0 - 127 (Absolute)	
:	:	
F7	EOX (End Of Exclusive)	

* This parameter affects drum instruments only.

●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 2BH.

○Data Request 1 RQ1 (11H)

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, 50H, 11H, aaH, bbH, ccH, ddH, ssH, ttH, uuH, vvH, sum	F7H
Byte	Remarks	
F0H	Exclusive status	
41H	ID number (Roland)	
dev	Devdevice ID (dev: 10H - 1FH, 7FH)	
00H	Model ID #1 (RD-700NX)	
00H	Model ID #2 (RD-700NX)	
50H	model ID #3 (RD-700NX)	
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. 9).

* For the checksum, refer to 13 page.

○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, 50H, 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, Initial value is 10H)	
00H	Model ID #1 (RD-700NX)	
00H	Model ID #2 (RD-700NX)	
50H	Model ID #3 (RD-700NX)	
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. 9).

* 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. 13.

2. Data Transmission

■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 of 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

- * By selecting a controller number that corresponds to the setting of parameters of controllers (Slider Assign, FC1/2 Pedal Assign), the RD-700NX can transmit any control change message.
- * These messages are not transmitted when External Layer Parameter is OFF.

○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)	

- * When Rec Mode is ON (EDIT: Utility: Rec Setting: Rec Mode), these messages are transmitted when Tone is selected.

○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)	

- * These messages are transmitted when Modulation lever is operated.

○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)	

- * These messages are transmitted when Portament Time is set in External Layer.

○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)	

- * These messages are transmitted when Layer Level Slider is operated.
- * These messages are transmitted when Volume value is set in External Layer.

○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)	

- * These messages are transmitted when Pan value is set in External Layer.

○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)	

- * These messages are transmitted when Damper pedal is operated.

○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)	

- * These messages are transmitted when Portament Swich is set in External Layer.

○Sostenuto (Controller number 66)

Status	2nd byte	3rd byte
BnH	42H	vvH
n = MIDI channel number:	0H - FH (ch.1 - 16)	
vv = Control value:	00H - 7FH (0 - 127)	

○Soft (Controller number 67)

Status	2nd byte	3rd byte
BnH	43H	vvH
n = MIDI channel number:	0H - FH (ch.1 - 16)	
vv = Control value:	00H - 7FH (0 - 127)	

○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 - 7FH (-64 - 0 - +63)	

- * These messages are transmitted when Resonance value is set in External Layer.

○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 - 7FH (-64 - 0 - +63)	

- * These messages are transmitted when Release Time is set in External Layer.

○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 - 7FH (-64 - 0 - +63)	

- * These messages are transmitted when Attack Time is set in External Layer.

○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 - 7FH (-64 - 0 - +63)	

- * These messages are transmitted when Cutoff value is set in External Layer.

○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)	

- * These messages are transmitted when Decay Time value is set in External Layer.

○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)	

* These messages are transmitted when Reverb value is set in External Layer.

○Effect 3 (Chorus Send Level) (Controller number 93)

Status	2nd byte	3rd byte
BnH	5DH	vvH
n = MIDI channel number:	0H - FH (ch.1 - 16)	
vv = Chorus Send Level:	00H - 7FH (0 - 127)	

* These messages are transmitted when Chorus value is set in External Layer.

○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 transmits the following RPNs.

RPN	Data entry	Notes
<u>MSB, LSB</u>	<u>MSB, LSB</u>	
00H, 00H	mmH, llH	Pitch Bend Sensitivity mm: 00H - 18H (0 - 24 semitones) ll: ignored (processed as 00H)
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

●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)

* When Rec Mode is ON (EDIT: Utility: Rec Setting: Rec Mode), these messages are transmitted when Tone is selected.

●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

●MONO (Controller number 126)

Status	2nd byte	3rd byte
BnH	7EH	01H
n = MIDI channel number:	0H - FH (ch.1 - 16)	

* These messages are transmitted when Mono/Poly value is set to MONO in External Layer.

●POLY (Controller number 127)

Status	2nd byte	3rd byte
BnH	7FH	00H
n = MIDI channel number:	0H - FH (ch.1 - 16)	

* These messages are transmitted when Mono/Poly value is set to POLY in External Layer.

■System Realtime Messages

●Timing Clock

Status
F8H

* This message will be transmitted if the Clock Out parameter (EDIT: SYSTEM: Clock Out) is ON.

●Start

Status
FAH

* This message is sent on START operation when START/STOP function is selected on Foot Controller or S1/S2 button.

●Stop

Status
FCH

* This message is sent on STOP operation when START/STOP function is selected on Foot Controller or S1/S2 button.

●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 RD-700NX.

●Universal Non-realtime System Exclusive Message

○Identity Reply Message

Receiving Identity Request Message, the RD-700NX send this message.

Status	Data byte	Status
F0H	7EH, dev, 06H, 02H, 41H, 2BH, 02H, 00H, 00H, 00H, 01H, 00H, 00H	F7H
Byte	Explanation	
F0H	Exclusive status	
7EH	ID number (Universal Non-realtime Message)	
dev	Device ID (use the same as the device ID of Roland)	
06H	Sub ID#1 (General Information)	
02H	Sub ID#2 (Identity Reply)	
41H	ID number (Roland)	
50H 02H	Device family code (RD-700NX)	
00H 00H	Device family number code (RD-700NX)	
00H 01H 00H 00H	Software revision level	
F7H	EOX (End of Exclusive)	

MIDI Implementation

●Data Transmission

○Data set 1DT1 (12H)

<u>Status</u>	<u>Data byte</u>	<u>Status</u>
F0H	41H, dev, 00H, 00H, 50H, 12H, aaH, bbH, F7H	
	ccH, ddH, eeH, ... ffH, sum	
<u>Byte</u>	<u>Explanation</u>	
F0H	Exclusive status	
41H	ID number (Roland)	
dev	Device ID (dev: 00H - 1FH, Initial value is 10H)	
00H	Model ID #1 (RD-700NX)	
00H	Model ID #2 (RD-700NX)	
50H	Model ID #3 (RD-700NX)	
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. 9).

* 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.

1 RD-700NX (Model ID = 00H 00H 50H)

○Individual Parameters

* Please don't use a parameter or a address marked <Reserved>.

* The parameters for Live Set are temporary. If you want to leave the parameters after the RD-700NX is turned off , execute Live Set Write.

Start	Address	Description
00 00 00 00	0000 0000	System
10 00 00 00	0000 0000	Live Set (Temporary)

* System

Offset	Address	Description
00 00 00	0000 0000	System Common
00 02 00	0000 0002	System Compressor
00 03 00	0000 0003	System Favorite Live Set
00 04 00	0000 0004	System V-Link
00 05 00	0000 0005	System Switch Assign

* Live Set

Offset	Address	Description
00 00 00	0000 0000	Live Set Common
00 02 00	0000 0002	Live Set Song/Rhythm
00 04 00	0000 0004	Live Set Chorus
00 06 00	0000 0006	Live Set Reverb
00 10 00	0000 0010	Live Set MPX (MPX: 01)
00 12 00	0000 0012	Live Set MPX (MPX: 02)
00 1E 00	0000 001E	Live Set MPX (MPX: 08)
00 20 00	0000 0020	Live Set Resonance
00 30 00	0000 0030	Live Set Internal Layer (Layer: 01)
00 31 00	0000 0031	Live Set Internal Layer (Layer: 02)
00 32 00	0000 0032	Live Set Internal Layer (Layer: 03)
00 33 00	0000 0033	Live Set Internal Layer (Layer: 04)
00 40 00	0000 0040	Live Set External Layer (Layer: 01)
00 41 00	0000 0041	Live Set External Layer (Layer: 02)
00 42 00	0000 0042	Live Set External Layer (Layer: 03)
00 43 00	0000 0043	Live Set External Layer (Layer: 04)
01 00 00	0000 0100	Live Set Tone (Layer: 01)
01 01 00	0000 0101	Live Set Tone (Layer: 02)
01 02 00	0000 0102	Live Set Tone (Layer: 03)
01 03 00	0000 0103	Live Set Tone (Layer: 04)
02 00 00	0000 0200	Live Set Piano (Layer: 01)
02 20 00	0000 0220	Live Set Piano (Layer: 02)
02 40 00	0000 0240	Live Set Piano (Layer: 03)
02 60 00	0000 0260	Live Set Piano (Layer: 04)
06 00 00	0000 0600	Live Set E.Piano (Layer: 01)
06 01 00	0000 0601	Live Set E.Piano (Layer: 02)
06 02 00	0000 0602	Live Set E.Piano (Layer: 03)
06 03 00	0000 0603	Live Set E.Piano (Layer: 04)
07 00 00	0000 0700	Live Set ToneWheel (Layer: 01)
07 01 00	0000 0701	Live Set ToneWheel (Layer: 02)
07 02 00	0000 0702	Live Set ToneWheel (Layer: 03)
07 03 00	0000 0703	Live Set ToneWheel (Layer: 04)

* System Common

Offset	Address	Description
# 00 00	0000 0000	Master Tune (24 - 2024)
00 04	0000 0004	Master Level (-100.0 - 100.0 [cent])
00 05	0000 0005	Live Set Control Channel (0 - 16)
00 06	0000 000a	Damper Polarity (0 - 1)
00 07	0000 000a	FC1 Polarity (0 - 1)
00 08	0000 000a	FC2 Polarity (0 - 1)
00 09	0000 000a	EQ Mode (0 - 1)
00 0A	0000 000a	Pedal Mode (0 - 1)
00 0B	0000 000a	S1/S2 Mode (0 - 1)
# 00 0C	0000 000a	System FC1 Assign (0 - 146)
# 00 0E	0000 000a	System FC2 Assign (0 - 146)

00 10	000a 000a	System S1 Assign (0 - 20)
00 11	000a 000a	System S2 Assign (0 - 20)
00 12	0000 000a	Tone Remain (0 - 1)
00 00 00 13		Total Size

* System Compressor

Offset	Address	Description
00 00	0000 000a	Compressor Switch (0 - 1)
00 01	0aaa 0aaa	Low band Attack time (0 - 100)
00 02	0aaa 0aaa	Low band Release time (0 - 100)
00 03	00aa 0aaa	Low band Threshold (-36, -35, -34, -33, -32, -31, -30, -29, -28, -27, -26, -25, -24, -23, -22, -21, -20, -19, -18, -17, -16, -15, -14, -13, -12, -11, -10, -9, -8, -7, -6, -5, -4, -3, -2, -1, 0 [dB])
00 04	0000 0aaa	Low band Ratio (1:1.0, 1:1.1, 1:1.2, 1:1.4, 1:1.6, 1:1.8, 1:2.0, 1:2.5, 1:3.2, 1:4.0, 1:5.6, 1:8.0, 1:16, 1:INF)
00 05	000a 0aaa	Low band Level (0 - 24)
00 06	0aaa 0aaa	Mid band Attack time (0 - 100)
00 07	0aaa 0aaa	Mid band Release time (0 - 100)
00 08	00aa 0aaa	Mid band Threshold (-36, -35, -34, -33, -32, -31, -30, -29, -28, -27, -26, -25, -24, -23, -22, -21, -20, -19, -18, -17, -16, -15, -14, -13, -12, -11, -10, -9, -8, -7, -6, -5, -4, -3, -2, -1, 0 [dB])
00 09	0000 0aaa	Mid band Ratio (1:1.0, 1:1.1, 1:1.2, 1:1.4, 1:1.6, 1:1.8, 1:2.0, 1:2.5, 1:3.2, 1:4.0, 1:5.6, 1:8.0, 1:16, 1:INF)
00 0A	000a 0aaa	Mid band Level (0 - 24)
00 0B	0aaa 0aaa	High band Attack time (0 - 100)
00 0C	0aaa 0aaa	High band Release time (0 - 100)
00 0D	00aa 0aaa	High band Threshold (-36, -35, -34, -33, -32, -31, -30, -29, -28, -27, -26, -25, -24, -23, -22, -21, -20, -19, -18, -17, -16, -15, -14, -13, -12, -11, -10, -9, -8, -7, -6, -5, -4, -3, -2, -1, 0 [dB])
00 0E	0000 0aaa	High band Ratio (1:1.0, 1:1.1, 1:1.2, 1:1.4, 1:1.6, 1:1.8, 1:2.0, 1:2.5, 1:3.2, 1:4.0, 1:5.6, 1:8.0, 1:16, 1:INF)
00 0F	000a 0aaa	High band Level (0 - 24)
00 10	0000 0aaa	Split Freq Low (0 - 13)
00 11	0000 0aaa	Split Freq High (0 - 13)
00 12	0aaa 0aaa	Knob Value (0 - 127)
00 00 00 13		Total Size

* System Favorite Live Set

Offset	Address	Description
00 00	0aaa 0aaa	One Touch Piano1 Current Number (0 - 127)
00 01	0aaa 0aaa	One Touch Piano2 Current Number (0 - 127)
00 02	0aaa 0aaa	One Touch Piano3 Current Number (0 - 127)
00 03	0aaa 0aaa	One Touch E.Piano1 Current Number (0 - 127)
00 04	0aaa 0aaa	One Touch E.Piano2 Current Number (0 - 127)
00 05	0aaa 0aaa	One Touch E.Piano3 Current Number (0 - 127)
00 06	0000 00aa	Favorite1 - 40 Live Set Category (0 - 3)
# 00 07	0000 00aa	One Touch Piano, One Touch E.Piano, Preset, User
# 01 23	0000 00aa	Favorite1 - 40 Live Set Number (0 - 299)
00 00 01 26		Total Size

* System V-Link

Offset	Address	Description
00 00	0000 000a	Mode (0 - 1)
00 01	0aaa 0aaa	Lowest No (0 - 127)
00 02	0000 0aaa	Transmit Channel (0 - 15)
00 03	0000 0aaa	Output Port (0 - 4)
00 04	0aaa 0aaa	Key Range Lower (0 - 87)
00 05	0aaa 0aaa	Key Range Upper (0 - 87)
00 06	0000 000a	Local Control (0 - 1)
		OFF, ON

MIDI Implementation

00 00 00 07 Total Size			
* System Switch Assign			
Offset	Address	Description	
00 00	000a aaaa	One Touch Piano Variation Number	(0 - 31)
00 01	000a aaaa	One Touch Piano Variation Number	(0 - 31)
00 02	000a aaaa	One Touch Piano Variation Number	(0 - 31)
00 03	000a aaaa	One Touch E.Piano Variation Number	(0 - 31)
00 04	000a aaaa	One Touch E.Piano Variation Number	(0 - 31)
00 05	000a aaaa	One Touch E.Piano Variation Number	(0 - 31)
00 06	00aa aaaa	Live Set Switch 1 Preset Variation Number	(0 - 63)
00 07	00aa aaaa	Live Set Switch 2 Preset Variation Number	(0 - 63)
:			
00 0F	00aa aaaa	Live Set Switch 10 Preset Variation Number	(0 - 63)
00 10	00aa aaaa	Live Set Switch 1 User Variation Number	(0 - 63)
00 11	00aa aaaa	Live Set Switch 2 User Variation Number	(0 - 63)
:			
00 19	00aa aaaa	Live Set Switch 10 User Variation Number	(0 - 63)
00 00 00 1A Total Size			

* Live Set Common			
Offset	Address	Description	
00 00	0aaa aaaa	Live Set Name 1	(32 - 127)
00 01	0aaa aaaa	Live Set Name 2	32 - 127 [ASCII]
:			
00 0F	0aaa aaaa	Live Set Name 16	(32 - 127)
:			
00 10	0aaa aaaa	Voice Reserve 1	(0 - 64)
00 11	0aaa aaaa	Voice Reserve 2	0 - 63, FULL
:			
00 1F	0aaa aaaa	Voice Reserve 16	(0 - 64)
:			
00 1F	0aaa aaaa	Voice Reserve 16	0 - 63, FULL
#	00 20	0000 000a 0000 bbbb 0000 cccc	Live Set Tempo (10 - 500)
#	00 23	0000 aaaa 0000 bbbb	PC 1 Assign (0 - 144) OFF, CC00 - CC127, BEND-UP, BEND-DOWN, AFTERTOUCH, OCT-UP, OCT-DOWN, START/STOP, TAP-TEMPO, RHY PLY/STP, SONG PLY/STP, SONG RESET, MFX1 SW, MFX2 SW, MFX1 CONTROL, MFX2 CONTROL, ROTARY SPEED, SOUND FOCUS VALUE
#	00 25	0000 aaaa 0000 bbbb	PC 2 Assign (0 - 144) OFF, CC00 - CC127, BEND-UP, BEND-DOWN, AFTERTOUCH, OCT-UP, OCT-DOWN, START/STOP, TAP-TEMPO, RHY PLY/STP, SONG PLY/STP, SONG RESET, MFX1 SW, MFX2 SW, MFX1 CONTROL, MFX2 CONTROL, ROTARY SPEED, SOUND FOCUS VALUE
00 27	0000 000a	Sound Focus Switch	(0 - 1) OFF, ON
00 28	000a aaaa	Sound Focus Type	(0 - 31) OFF, PIANO TYPE1, PIANO TYPE2, E.PIANO TYPE, SOUND LIFT, ENHANCER, MID BOOST
00 29	0aaa aaaa	Sound Focus Value	(0 - 127)
00 2A	000a aaaa	S1 Assign	(0 - 17) OFF, COUPLE+1OCT, COUPLE-1OCT, COUPLE+2OCT, COUPLE-2OCT, COUPLE+5TH, COUPLE-4TH, OCT-UP, OCT-DOWN, START/STOP, TAP-TEMPO, SONG PLY/STP, SONG RESET, SONG BWD, SONG FWD, MFX1 SW, MFX2 SW, ROTARY SPEED
00 2B	000a aaaa	S2 Assign	(0 - 17) OFF, COUPLE+1OCT, COUPLE-1OCT, COUPLE+2OCT, COUPLE-2OCT, COUPLE+5TH, COUPLE-4TH, OCT-UP, OCT-DOWN, START/STOP, TAP-TEMPO, SONG PLY/STP, SONG RESET, SONG BWD, SONG FWD, MFX1 SW, MFX2 SW, ROTARY SPEED
00 2C	0000 000a	S1 State	(0 - 1) OFF, ON
00 2D	0000 000a	S2 State	(0 - 1) OFF, ON
00 2E	0000 000a	EQ Switch	(0 - 1) OFF, ON
00 2F	000a aaaa	EQ Input Gain	(0 - 30) -15 - +15[dB]
00 30	0000 000a	EQ Low Type	(0 - 1) Shelving, Peaking
00 31	000a aaaa	EQ Low Frequency	(0 - 30) 16,20,25,31,40,50,63,80,100,125,160, 200,250,315,400,500,630,800,1000, 1250,1600,2000,2500,3150,4000,5000, 6300,8000,10000,12500,16000, [Hz]
00 32	0aaa aaaa	EQ Low Gain	(4 - 124) -12.0 - +12.0[dB] (1step = 0.2dB)
00 33	0000 0aaa	EQ Low Q	(0 - 4) 0.5, 1.0, 2.0, 4.0, 8.0
00 34	000a aaaa	EQ Mid Frequency	(0 - 30) 16,20,25,31,40,50,63,80,100,125,160, 200,250,315,400,500,630,800,1000, 1250,1600,2000,2500,3150,4000,5000, 6300,8000,10000,12500,16000, [Hz]
00 35	0aaa aaaa	EQ Mid Gain	(4 - 124) -12.0 - +12.0[dB] (1step = 0.2dB)
00 36	0000 0aaa	EQ Mid Q	(0 - 4) 0.5, 1.0, 2.0, 4.0, 8.0
00 37	000a aaaa	EQ Mid Frequency	(0 - 30) 16,20,25,31,40,50,63,80,100,125,160, 200,250,315,400,500,630,800,1000, 1250,1600,2000,2500,3150,4000,5000, 6300,8000,10000,12500,16000, [Hz]
00 38	0aaa aaaa	EQ Mid Gain	(4 - 124) -12.0 - +12.0[dB] (1step = 0.2dB)
00 39	0000 0aaa	EQ Mid Q	(0 - 4) 0.5, 1.0, 2.0, 4.0, 8.0
00 3A	0000 000a	EQ High Type	(0 - 1) Shelving, Peaking
00 3B	000a aaaa	EQ High Frequency	(0 - 30) 16,20,25,31,40,50,63,80,100,125,160,

00 3C	0aaa aaaa	EQ High Gain	200,250,315,400,500,630,800,1000, 1250,1600,2000,2500,3150,4000,5000, 6300,8000,10000,12500,16000, [Hz]
00 3D	0000 0aaa	EQ High Q	(4 - 124) -12.0 - +12.0[dB] (1step = 0.2dB) (0 - 4) 0.5, 1.0, 2.0, 4.0, 8.0
00 3E	0aaa aaaa	Key Touch Velocity	(0 - 127) REAL, 1 - 127
00 3F	0000 0aaa	Key Touch Curve Type	(1 - 5) SUPER LIGHT, LIGHT, MEDIUM, HEAVY, SUPER HEAVY
00 40	000a aaaa	Key Touch Curve offset	(54 - 73) -10 - +9
00 41	0aaa aaaa	Key Touch Velocity Delay Sens	(1 - 127) -63 - +63
00 42	0aaa aaaa	Key Touch Velocity Key Follow	(1 - 127) -63 - +63
00 43	0000 000a	Key Off Position	(0 - 1) STANDARD, DEEP
00 44	0000 000a	Slider Select	(0 - 1) LAYER LEVEL, CONTROL
#	00 45	0000 aaaa 0000 bbbb	Slider Assign (UPPER1) (0 - 133) OFF, CC00 - CC127, BEND-UP, BEND-DOWN, AFTERTOUCH, MFX1 CONTROL, MFX2 CONTROL
#	00 47	0000 aaaa 0000 bbbb	Slider Assign (UPPER2) (0 - 133) 0 - 134
#	00 49	0000 aaaa 0000 bbbb	Slider Assign (LOWER1) (0 - 133) 0 - 134
#	00 4B	0000 aaaa 0000 bbbb	Slider Assign (LOWER2) (0 - 133) 0 - 134
00 4D	0000 000a	Split Switch (Internal)	(0 - 1) OFF, ON
00 4E	0000 000a	Split Switch (External)	(0 - 1) OFF, ON
00 4F	0000 aaaa	Harmonic Bar Assign (LOWER2:ON)	(1 - 9) 16',5-1/3',8',4',2-2/3',1-3/5',2',1-1/3',1'
00 50	0000 aaaa	Harmonic Bar Assign (LOWER2:OFF)	(1 - 9)
00 51	0000 aaaa	Harmonic Bar Assign (LOWER1:ON)	(1 - 9)
00 52	0000 aaaa	Harmonic Bar Assign (LOWER1:OFF)	(1 - 9)
00 53	0000 aaaa	Harmonic Bar Assign (UPPER2:ON)	(1 - 9)
00 54	0000 aaaa	Harmonic Bar Assign (UPPER2:OFF)	(1 - 9)
00 55	0000 aaaa	Harmonic Bar Assign (UPPER1:ON)	(1 - 9)
00 56	0000 aaaa	Harmonic Bar Assign (UPPER1:OFF)	(1 - 9)
00 57	0000 0aaa	MFx Control Destination	(0 - 3) UPPER1, UPPER2, LOWER1, LOWRE2
00 00 00 58 Total Size			

* Live Set Song/Rhythm			
Offset	Address	Description	
00 00	0000 000a	(reserved)	
00 01	0aaa aaaa	Audio Level	(0 - 127)
00 02	0aaa aaaa	Song Level	(0 - 127)
00 04	0000 0aaa	Song Output Port	(0 - 5) ALL, INT, OUT1, OUT2, OUT3, USB
00 05	0000 aaaa	Rhythm Set for Rhythm Pattern	(0 - 13)
00 06	0aaa aaaa	Rhythm Level	(0 - 127)
00 07	0000 aaaa	Rhythm Pattern	(0 - 200)
00 08	0000 bbbb	Rhythm MIDI Out Channel	(0 - 16)
00 09	000a aaaa	Rhythm MIDI Out Channel	OFF,1-16
00 0A	0000 aaaa	Rhythm Output Port	(0 - 5) ALL, INT, OUT1, OUT2, OUT3, USB
00 00 00 0B Total Size			

* Live Set Chorus			
Offset	Address	Description	
00 00	0000 aaaa	Chorus Type	(0 - 3) OFF, CHORUS, DELAY, GM2 CHORUS
00 01	0aaa aaaa	Chorus Level	(0 - 127)
00 02	0000 0aaa	Chorus Output Select	(reserved)
00 03	0000 0aaa	Chorus Output Select	(0 - 2) MAIN, REV, MAIN+REV
#	00 04	0000 aaaa 0000 bbbb 0000 cccc 0000 dddd	Chorus Parameter 1 (12768 - 52768) -20000 - +20000
#	00 08	0000 aaaa 0000 bbbb 0000 cccc 0000 dddd	Chorus Parameter 2 (12768 - 52768) -20000 - +20000
:			
#	00 50	0000 aaaa 0000 bbbb 0000 cccc 0000 dddd	Chorus Parameter 20 (12768 - 52768) -20000 - +20000
00 00 00 54 Total Size			

* Live Set Reverb			
Offset	Address	Description	
00 00	0000 aaaa	Reverb Type	(0 - 6) OFF, REVERB, ROOM, HALL, PLATE, GM2 REVERB, CATHEDRAL
00 01	0aaa aaaa	Reverb Level	(0 - 127)
#	00 03	0000 aaaa 0000 bbbb 0000 cccc 0000 dddd	Reverb Parameter 1 (12768 - 52768) -20000 - +20000
#	00 07	0000 aaaa 0000 bbbb 0000 cccc 0000 dddd	Reverb Parameter 2 (12768 - 52768) -20000 - +20000
:			

MIDI Implementation

#	00 4F	0000 aaaa 0000 bbbb 0000 cccc 0000 dddd	Reverb Parameter 20	(12768 - 52768) -20000 - +20000

	00 00 00 53	Total Size		

* Live Set MPFX

Offset	Address	Description	
	00 00	0000 000a	MPFX Switch (0 - 1)
#	00 03	0000 aaaa 0000 bbbb	MPFX Type (0 - 255)
#	00 11	0000 aaaa 0000 bbbb 0000 cccc 0000 dddd	MPFX Parameter 1 (12768 - 52768) -20000 - +20000
#	00 15	0000 aaaa 0000 bbbb 0000 cccc 0000 dddd	MPFX Parameter 2 (12768 - 52768) -20000 - +20000
:			
#	01 0D	0000 aaaa 0000 bbbb 0000 cccc 0000 dddd	MPFX Parameter 32 (12768 - 52768) -20000 - +20000
	00 00 01 11	Total Size	

* Live Set Resonance

Offset	Address	Description	
	00 00	0000 000a	Resonance Switch (0 - 1)
#	00 11	0000 aaaa 0000 bbbb 0000 cccc 0000 dddd	Resonance Parameter 1 (12768 - 52768) -20000 - +20000
#	00 15	0000 aaaa 0000 bbbb 0000 cccc 0000 dddd	Resonance Parameter 2 (12768 - 52768) -20000 - +20000
:			
#	01 0D	0000 aaaa 0000 bbbb 0000 cccc 0000 dddd	Resonance Parameter 32 (12768 - 52768) -20000 - +20000
	00 00 01 11	Total Size	

* Live Set Internal Layer

Offset	Address	Description	
00 00	0aaa aaaa	Layer Level (CC# 7)	(0 - 127)
00 01	0aaa aaaa	Layer Pan (CC# 10)	(0 - 127)
00 02	0aaa aaaa	Chorus Amount	(0 - 127)
00 03	0aaa aaaa	Reverb Amount	(0 - 127)
00 04	0aaa aaaa	Keyboard Range Lower	(0 - 87)
00 05	0aaa aaaa	Keyboard Range Upper	A0 - UPPER (0 - 87) LOWER - C8
00 06	0aaa aaaa	Velocity Range Lower	(1 - 127)
00 07	0aaa aaaa	Velocity Range Upper	(1 - 127)
00 08	0aaa aaaa	Velocity Sensitivity	(1 - 127)
00 09	0aaa aaaa	Velocity Max	-63 - +63 (1 - 127)
00 0A	0aaa aaaa	Keyboard Transpose	(16 - 112) -48 - +48
00 0B	0000 000a	Layer Switch	(0 - 1) OFF, ON
00 0C	0000 000a	Receive Damper Switch	(0 - 1) OFF, ON
00 0D	0000 000a	Receive FC1 Switch	(0 - 1) OFF, ON
00 0E	0000 000a	Receive FC2 Switch	(0 - 1) OFF, ON
00 0F	0000 000a	Receive Modulation Switch	(0 - 1) OFF, ON
00 10	0000 000a	Receive Bender Switch	(0 - 1) OFF, ON
00 11	0000 000a	Receive Control Slider Switch (UPPER1)	(0 - 1) OFF, ON
00 12	0000 000a	Receive Control Slider Switch (UPPER2)	(0 - 1) OFF, ON
00 13	0000 000a	Receive Control Slider Switch (LOWER1)	(0 - 1) OFF, ON
00 14	0000 000a	Receive Control Slider Switch (LOWER2)	(0 - 1) OFF, ON
00 15	0000 000a	Receive S1 Switch	(0 - 1) OFF, ON
00 16	0000 000a	Receive S2 Switch	(0 - 1) OFF, ON
00 17	0000 000a	Receive Bank Select Switch	(0 - 1) OFF, ON
00 18	0000 000a	Receive Program Change Switch	(0 - 1) OFF, ON
00 19	0000 000a	Receive Bender Switch	(0 - 1) OFF, ON
00 1A	0000 000a	Receive Modulation Switch	(0 - 1) OFF, ON
00 1B	0000 000a	Receive Volume Switch	(0 - 1) OFF, ON
00 1C	0000 000a	Receive Pan Switch	(0 - 1) OFF, ON
00 1D	0000 000a	Receive Hold-1 Switch	(0 - 1) OFF, ON
00 1E	0000 000a	Receive Expression	(0 - 1) OFF, ON
00 00 00 1F	Total Size		

* Live Set External Layer

Offset	Address	Description	
	00 00	0aaa aaaa	Keyboard Range Lower (0 - 87)
	00 01	0aaa aaaa	Keyboard Range Upper A0 - UPPER (0 - 87) LOWER - C8
	00 02	0aaa aaaa	Velocity Range Lower (1 - 127)
	00 03	0aaa aaaa	Velocity Range Upper (1 - 127)
	00 04	0aaa aaaa	Velocity Sensitivity (1 - 127)
	00 05	0aaa aaaa	Velocity Max -63 - +63 (1 - 127)
	00 06	0aaa aaaa	Keyboard Transpose (16 - 112) -48 - +48
	00 07	0000 000a	Layer Switch (0 - 1) OFF, ON
	00 08	0000 000a	Damper Switch (0 - 1) OFF, ON
	00 09	0000 000a	FC1 Switch (0 - 1) OFF, ON
	00 0A	0000 000a	FC2 Switch (0 - 1) OFF, ON
	00 0B	0000 000a	Modulation Switch (0 - 1) OFF, ON
	00 0C	0000 000a	Bender Switch (0 - 1) OFF, ON
	00 0D	0000 000a	Control Switch (MPX) (0 - 1) OFF, ON
	00 0E	0000 000a	Control Slider Switch (UPPER1) (0 - 1) OFF, ON
	00 0F	0000 000a	Control Slider Switch (UPPER2) (0 - 1) OFF, ON
	00 10	0000 000a	Control Slider Switch (LOWER1) (0 - 1) OFF, ON
	00 11	0000 000a	Control Slider Switch (LOWER2) (0 - 1) OFF, ON
	00 12	0000 0aaa	Transmit Port (0 - 4) ALL, OUT1, OUT2, OUT3, USB
	00 13	0000 aaaa	Transmit Channel (0 - 15) 1 - 16
	00 14	0000 000a	Transmit Bank Select MSB Switch (0 - 1) OFF, ON
	00 15	0aaa aaaa	Transmit Bank Select MSB (CC# 0) (0 - 127)
	00 16	0000 000a	Transmit Bank Select LSB Switch (0 - 1) OFF, ON
	00 17	0aaa aaaa	Transmit Bank Select LSB (CC# 32) (0 - 127)
	00 18	0000 000a	Transmit Program Change Switch (0 - 1) OFF, ON
	00 19	0aaa aaaa	Transmit Program Change# (0 - 127)
	00 1A	0000 000a	Transmit Level Switch (0 - 1) OFF, ON
	00 1B	0aaa aaaa	Transmit Level (CC# 7) (0 - 127)
	00 1C	0000 000a	Transmit Pan Switch (0 - 1) OFF, ON
	00 1D	0aaa aaaa	Transmit Pan(CC# 10) (0 - 127) L64 - R63
	00 1E	0000 000a	Transmit Coarse Tune Switch (0 - 1) OFF, ON
	00 1F	0aaa aaaa	Transmit Coarse Tune (16 - 112) -48 - +48
	00 20	0000 000a	Transmit Fine Tune Switch (0 - 1) OFF, ON
	00 21	0aaa aaaa	Transmit Fine Tune (14 - 114) -50 - +50
	00 22	0000 000a	Transmit Mono/Poly Switch (0 - 1) OFF, ON
	00 23	0000 00aa	Transmit Mono/Poly (0 - 1) MONO, POLY
	00 24	0000 000a	Transmit Portamento Switch (0 - 1) OFF, ON
	00 25	0000 000a	Transmit Portamento Switch Value (0 - 1) OFF, ON
	00 26	0000 000a	Transmit Portamento Time Switch (0 - 1) OFF, ON
	00 27	0aaa aaaa	Transmit Portamento Time (0 - 127) -64 - +63
	00 28	0000 000a	Transmit Cutoff Switch (0 - 1) OFF, ON
	00 29	0aaa aaaa	Transmit Cutoff (0 - 127) -64 - +63
	00 2A	0000 000a	Transmit Resonance Switch (0 - 1) OFF, ON
	00 2B	0aaa aaaa	Transmit Resonance (0 - 127) -64 - +63
	00 2C	0000 000a	Transmit Attack Time Switch (0 - 1) OFF, ON
	00 2D	0aaa aaaa	Transmit Attack Time (0 - 127) -64 - +63
	00 2E	0000 000a	Transmit Decay Time Switch (0 - 1) OFF, ON
	00 2F	0aaa aaaa	Transmit Decay Time (0 - 127) -64 - +63
	00 30	0000 000a	Transmit Release Time Switch (0 - 1) OFF, ON
	00 31	0aaa aaaa	Transmit Release Time (0 - 127) -64 - +63
	00 32	0000 000a	Transmit Pitch Bend Range Switch (0 - 1) OFF, ON
	00 33	00aa aaaa	Transmit Pitch Bend Range (0 - 48)
	00 34	0000 000a	Transmit Modulation Depth Switch (0 - 1) OFF, ON
	00 35	0aaa aaaa	Transmit Modulation Depth (0 - 127) 0 - 100 Cent
	00 36	0000 000a	Transmit Chorus Level Switch (0 - 1) OFF, ON
	00 37	0aaa aaaa	Transmit Chorus Level (0 - 127)
	00 38	0000 000a	Transmit Reverb Level Switch (0 - 1) OFF, ON
	00 39	0aaa aaaa	Transmit Reverb Level (0 - 127)
	00 3A	0000 000a	Transmit Control Change 1 Switch (0 - 1) OFF, ON
	00 3B	0aaa aaaa	Transmit Control Change 1 Number (0 - 127)

MIDI Implementation

00 3C	0aaa aaaa	Transmit Control Change 1 Value	(0 - 127)
00 3D	0000 000a	Transmit Control Change 2 Switch	(0 - 1) OFF, ON
00 3E	0aaa aaaa	Transmit Control Change 2 Number	(0 - 127)
00 3F	0aaa aaaa	Transmit Control Change 2 Value	(0 - 127)
00 40	0000 000a	S1 Switch	(0 - 1) OFF, ON
00 41	0000 000a	S2 Switch	(0 - 1) OFF, ON
00 00 00 42	Total Size		

* Live Set 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#	(0 - 127)
00 03	0aaa aaaa	Coarse Tune	(16 - 112) -48 - +48
00 04	0aaa aaaa	Fine Tune	(14 - 114) -50 - +50
00 05	0000 00aa	Mono/Poly	(0 - 2) MONO, POLY, MONO/LEGATO
00 06	000a aaaa	Pitch Bend Range	(0 - 24)
00 07	0000 000a	Portamento Switch	(0 - 1) OFF, ON
00 08	0000 aaaa	Portamento Time	(0 - 127)
00 0A	0aaa aaaa	Cutoff	(0 - 127) -63 - +63
00 0B	0aaa aaaa	Resonance	(0 - 127) -63 - +63
00 0C	0aaa aaaa	Attack Time	(0 - 127) -63 - +63
00 0D	0aaa aaaa	Decay Time	(0 - 127) -63 - +63
00 0E	0aaa aaaa	Release Time	(0 - 127) -63 - +63
00 00 00 0F	Total Size		

* Live Set Piano

Offset	Address	Description	
00 00	0aaa aaaa	Tone Number	(0 - 8)
00 01	00aa aaaa	Stereo Width	(0 - 63)
00 02	0000 00aa	Nuance	(0 - 2) TYPE1, TYPE2, TYPE3
00 03	0aaa aaaa	Duplex Scale Level	(0 - 127)
00 04	0000 0aaa	Hammer Noise Level	(62 - 66) -2 - 2
00 05	0aaa aaaa	Damper Noise Level	(0 - 127)
00 06	0aaa aaaa	String Resonance Level	(0 - 127)
00 07	0aaa aaaa	Key Off Resonance Level	(0 - 127)
00 08	0aaa aaaa	Sound Lift	(0 - 127)
00 09	0000 aaaa	Tone Character	(59 - 69) -5 - 5
00 0A	0000 00aa	Stretch Tune Type	(0 - 2) OFF, PRST, USER
00 0B	0000 aaaa	MicroTune 1	(12 - 1012) -50.0 - +50.0
0000 bbbb			
0000 cccc			
0000 dddd			
00 0F	0000 aaaa	MicroTune 2	(12 - 1012) -50.0 - +50.0
0000 bbbb			
0000 cccc			
0000 dddd			
04 07	0000 aaaa	MicroTune 128	(12 - 1012) -50.0 - +50.0
0000 bbbb			
0000 cccc			
0000 dddd			
00 00 04 0B	Total Size		

* Live Set E.Piano

Offset	Address	Description	
00 00	0000 aaaa	Model Type	(0 - 11)
00 01	0000 000a	Tuning Type	(0 - 1) Type1, Type2
00 02	000a aaaa	ToneBar Fork Angle	(54 - 74) -10 - +10
00 03	000a aaaa	ToneBar Bell Level	(54 - 74) -10 - +10
00 04	000a aaaa	Bell Character	(54 - 74) -10 - +10
00 05	000a aaaa	Key Off Mute Sound Level	(54 - 74) -10 - +10
00 06	000a aaaa	HUM Noise Level	(54 - 74) -10 - +10
00 07	000a aaaa	Damper Sound Level	(54 - 74) -10 - +10
00 08	0000 0aaa	Pickup Distance	(62 - 66) -2 - +2
00 00 00 09	Total Size		

* Live Set ToneWheel

Offset	Address	Description	
00 00	0000 00aa	Percussion Harmonic	(0 - 2) OFF, 2ND, 3RD
00 01	0000 000a	Percussion Decay	(0 - 1) SLOW, FAST
00 02	0000 aaaa	Harmonic Bar 16'	(0 - 8)
00 03	0000 aaaa	Harmonic Bar 5-1/3'	(0 - 8)
00 04	0000 aaaa	Harmonic Bar 8'	(0 - 8)
00 05	0000 aaaa	Harmonic Bar 4'	(0 - 8)
00 06	0000 aaaa	Harmonic Bar 2-2/3'	(0 - 8)
00 07	0000 aaaa	Harmonic Bar 2'	(0 - 8)
00 08	0000 aaaa	Harmonic Bar 1-3/5'	(0 - 8)
00 09	0000 aaaa	Harmonic Bar 1-1/3'	(0 - 8)
00 0A	0000 aaaa	Harmonic Bar 1'	(0 - 8)
00 00 00 0B	Total Size		

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 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
    78 ...10
16 ) 4 ...14
    4 ... 4
    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 (Flute in GS).

<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 (= $64 \times 12 + 80 = 8192$) is 0, so this Pitch Bend Value is $28\ 00H - 40\ 00H = 40 \times 12 + 80 - (64 \times 12 + 80) = 5120 - 8192 = -3072$. 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 $-200 \times (-3072) \div (-8192) = -75$ 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, 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 check sum is calculated. We will assume that in the Exclusive message we are transmitting, the address is aa bb cc ddH and the data or size is ee ffH.

$aa + bb + cc + dd + ee + ff = \text{sum}$
 $\text{sum} \div 128 = \text{quotient} \dots \text{remainder}$
 $128 - \text{remainder} = \text{checksum}$

<Example1> Setting CHORUS TYPE to DELAY (DT1)

According to the "Parameter Address Map" (p. 9), the start address of Temporary Live Set is 10 00 00 00H, the offset address of CHORUS at Live Set is 04 00H, and the address of CHORUS TYPE is 00 00H. Therefore the address of CHORUS TYPE of Setup is;

```

10 00 00 00H
   04 00H
+ ) -----
   00 00H
10 00 04 00H

```

DELAY has the value of 02H.

So the system exclusive message should be sent is;

F0	41	10	00 00 50	12	10 00 04 00	02	??	F7
(1)	(2)	(3)	(4)	(5)	address	data	checksum	(6)
(1) Exclusive Status	(2) ID (Roland)	(3) Device ID (17)	(4) Model ID (RD-700NX)	(5) Command ID (DT1)	(6) End of Exclusive			

Then calculate the checksum.

$10H + 00H + 04H + 00H + 02H = 16 + 0 + 4 + 0 + 2 = 22 \text{ (sum)}$
 $22 \text{ (sum)} \div 128 = 0 \text{ (quotient)} \dots 22 \text{ (remainder)}$
 $\text{checksum} = 128 - 22 \text{ (remainder)} = 106 = 6AH$

This means that F0 41 10 00 50 12 10 00 04 00 02 6A F7 is the message should be sent.

<Example2> Getting Temporary Performance data (RQ1)

According to the "Parameter Address Map" (p. 9), the start address of Temporary Live Set is assigned as following:

10 00 00 00H	Live Set Common
:	
10 07 03 00H	Live Set Tone Wheel (Layer 4)

As the data size of Live Set Tone Wheel Parameter is 00 00 00 0BH, summation of the size and the start address of Setup Tone Wheel Parameter 4 at Temporary Setup will be;

```

10 07 03 00H
+ ) 00 00 00 0BH
10 07 03 0BH

```

And the size that have to be got should be;

```

10 07 03 0BH
- ) 10 00 00 00H
00 07 03 0BH

```

Therefore the system exclusive message should be sent is;

F0	41	10	00 00 50	11	10 00 00 00	00 07 03 0B	??	F7
(1)	(2)	(3)	(4)	(5)	address	data	checksum	(6)
(1) Exclusive Status	(2) ID (Roland)	(3) Device ID (17)	(4) Model ID (RD-700NX)	(5) Command ID (RQ1)	(6) End of Exclusive			

Calculating the checksum as shown in <Example 1>, we get a message of F0 41 10 00 50 11 10 00 00 00 07 03 0B 5B F7 to be transmitted.

MIDI Implementation

■ASCII Code Table

Live Set Name 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.

O : Yes
X : No