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)

* Not received when the Rx Bank Select (EDIT: Part Parameter: Rx Bank Select) is OFF.
* The SETUP, Rhythms, and Tones corresponding to each Bank Select are as follows.
* The SRX series corresponding to each Bank Select are to see the SRX series owner's manual.

```
BANK SELECT  | PROGRAM  | GROUP              | NUMBER
MSB  | LSB   | NUMBER   |                    |
-----+-------+----------+--------------------+-----------
000  |       | 001 - 128| GM Tone            |
 :   |       |          |                    |
032  |       | 001 - 128| GM Tone            |
085  | 000   | 001 - 100| SETUP              | 001 - 100
086  | 064   | 001 - 005| Rhythm Set         | 263 - 267
087  | 064   | 001 - 026| Tone (PIANO)       | 001 - 026
     | 065   | 001 - 021| Tone (E.PIANO)     | 037 - 057
     | 066   | 001 - 031| Tone (CLAV/MALLET) | 058 - 088
     | 067   | 001 - 022| Tone (ORGAN)       | 099 - 120
     | 068   | 001 - 026| Tone (STRINGS)     | 121 - 146
     | 069   | 001 - 024| Tone (PAD)         | 147 - 170
     | 070   | 001 - 038| Tone (GTR/BASS)    | 171 - 208
     | 071   | 001 - 028| Tone (BRASS/WINDS) | 209 - 236
     | 072   | 001 - 026| Tone (VOICE/SYNTH) | 237 - 262
     |   :   |          |                    |
092  | 000 - | 001 -    | SRX Rhythm         | 001 -
     |   :   |          |                    |
093  | 000 - | 001 -    | SRX Patch          | 001 -
     |   :   |          |                    |
112  | 000   | 001 - 010| TW-Organ           | 089 - 098
113  | 000   | 001 - 010| S.NaturlEP         | 027 - 036
120  | 000   | 001 - 057| GM2 Rhythm         | 268 - 276
121  | 000 - | 001 - 128| GM2 Tone           | 277 - 532
```

○Modulation (Controller number 1)

Status	2nd byte	3rd byte
BnH	01H	vvH

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

* Not received when the Rx Modulation (EDIT: Part Parameter: Rx Modulation) is OFF.

○Portamento Time (Controller number 5)

Status	2nd byte	3rd byte
BnH	05H	vvH

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

* The Portament Time parameter (Tone Info: Portament Time) will change.

○Data Entry (Controller number 6, 38)

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

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

○Volume (Controller number 7)

Status	2nd byte	3rd byte
BnH	07H	vvH

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

* Not received when the Rx Volume (EDIT: Part Parameter: Rx Volume) is OFF.
* The Part Level parameter will change.

○Panpot (Controller number 10)

Status	2nd byte	3rd byte
BnH	0AH	vvH

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

* Not received when the Rx Pan (EDIT: Part Parameter: Rx Pan) is OFF.
* The pan parameter (EDIT: Part Parameter: Pan) will change.

○Expression (Controller number 11)

Status	2nd byte	3rd byte
BnH	0BH	vvH

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

○ 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

* Not received when the Rx Hold-1 (EDIT: Part Parameter: Rx Hold-1) is OFF.

○Portamento (Controller number 65)

Status	2nd byte	3rd byte
BnH	41H	vvH

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

* The Portamento Sw parameter (Tone Info: Portament Sw) will change.

○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)

* The Resonanse parameter (Tone Info: Resonance) will change.

❍**Release Time (Controller number 72)**

Status	2nd byte	3rd byte
BnH	48H	vvH
n = MIDI channel number:		0H - FH (ch.1 - 16)
vv = Release Time value (relative change):		00H - 7FH (-64 - 0 - +63)

* The Release Time parameter (Tone Info: Release Time) will change.

❍**Attack time (Controller number 73)**

Status	2nd byte	3rd byte
BnH	49H	vvH
n = MIDI channel number:		0H - FH (ch.1 - 16)
vv = Attack time value (relative change):		00H - 7FH (-64 - 0 - +63),

* The Attack Time parameter (Tone Info: Attack Time) will change.

❍**Cutoff (Controller number 74)**

Status	2nd byte	3rd byte
BnH	4AH	vvH
n = MIDI channel number:		0H - FH (ch.1 - 16)
vv = Cutoff value (relative change):		00H - 7FH (-64 - 0 - +63)

* The Cutoff parameter (Tone Info: Cutoff) will change.

❍**Decay Time (Controller number 75)**

Status	2nd byte	3rd byte
BnH	4BH	vvH
n = MIDI channel number:		0H - FH (ch.1 - 16)
vv = Decay Time value (relative change):		00H - 7FH (-64 - 0 - +63)

* The Decay parameter (Tone Info: Decay) will change.

❍**Vibrato Rate (Controller number 76)**

Status	2nd byte	3rd byte
BnH	4CH	vvH
n = MIDI channel number:		0H - FH (ch.1 - 16)
vv = Vibrato Rate value (relative change):		00H - 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)

❍**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)

* The Reverb Amount parameter (Tone Info: Reverb Amount) will change.

❍**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)

* The Chorus Amount parameter (Tone Info: Chorus Amount) will change.

❍**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 MSB, LSB	Data entry MSB, LSB	Notes
00H, 00H	mmH, llH	Pitch Bend Sensitivity mm: 00H - 18H (0 - 24 semitones) ll: ignored (processed as 00H) Up to 2 octave can be specified in semitone steps. * The Bend Range parameter (Tone Info: Bend Range) will change.
00H, 01H	mmH, llH	Channel Fine Tuning mm, ll: 20 00H - 40 00H - 60 00H (-4096 x 100 / 8192 - 0 - +4096 x 100 / 8192 cent) * The Fine Tune parameter (Tone Info: Fine Tune) will change.
00H, 02H	mmH, llH	Channel Coarse Tuning mm: 10H - 40H - 70H (-48 - 0 - +48 semitones) ll: ignored (processed as 00H) * The Coarse Tune parameter (Tone Info: Coarse Tune) will change.
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)

* Not received when the Rx Program Change parameter (EDIT: Part Parameter: Rx Program Chanage) is OFF.

●Pitch Bend Change

Status	2nd byte	3rd byte
EnH	llH	mmH
n = MIDI channel number:		0H - FH (ch.1 - 16)
mm, ll = Pitch Bend value:		00 00H - 40 00H - 7F 7FH (-8192 - 0 - +8191)

* Not received when the Rx Bender parameter (EDIT: Part Parameter: Rx Bender) is OFF.

■Channel Mode Messages

●All Sounds Off (Controller number 120)

Status	2nd byte	3rd byte
BnH	78H	00H
n = MIDI channel number:		0H - FH (ch.1 - 16)

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

●Reset All Controllers (Controller number 121)

Status	2nd byte	3rd byte
BnH	79H	00H
n = MIDI channel number:		0H - FH (ch.1 - 16)

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

Controller	Reset value
Pitch Bend Change	±0 (center)
Channel Pressure	0 (off)
Modulation	0 (off)
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.
* The Mono/Poly parameter (Tone Info: Mono/Poly) will change.

●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.
* The Mono/Poly parameter (Tone Info: Mono/Poly) will change.

■System Realtime Message

●Timing Clock

Status
F8H

* This message will be received if the Clock Source parameter (EDIT: SYSTEM: Clock Source) is EXT.

●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 (1 - 32), 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. 8) 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])

●Global Parameter Control

○Reverb Parameters

Status	Data byte	Status
F0H	7FH, 7FH, 04H, 05H, 01H, 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, 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, 2BH, 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-700GX)
00H	Model ID #2 (RD-700GX)
2BH	model ID #3 (RD-700GX)
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 14 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, 2BH, 12H, aaH, bbH,	F7H
	ccH, ddH, eeH, ... ffH, sum	

Byte	Explanation
F0H	Exclusive status
41H	ID number (Roland)
dev	Device ID (dev: 10H - 1FH, 7FH, Initial value is 10H)
00H	Model ID #1 (RD-700GX)
00H	Model ID #2 (RD-700GX)
2BH	Model ID #3 (RD-700GX)
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. 14.

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-700GX can transmit any control change message.
* These messages are not transmitted when EXTERNAL Zone 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 Zone.

○**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 ZONE LEVEL Slider is operated.
* These messages are transmitted when Volume value is set in EXTERNAL Zone.

○**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 Zone.

○**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 Swicth is set in EXTERNAL Zone.

○**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 Zone.

○**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 Zone.

○**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 Zone.

○**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 Zone.

○**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 Zone.

○**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 Zone.

○**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 Zone.

○**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 MSB, LSB	Data entry MSB, LSB	Notes
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 Zone.

●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 Zone.

■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-700GX.

●Universal Non-realtime System Exclusive Message

○Identity Reply Message

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

Status	Data byte	Status
F0H	7EH, dev, 06H, 02H, 41H, 2BH, 02H,	F7H
	00H, 00H, 00H, 01H, 00H, 00H	

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)
2BH 02H	Device family code (RD-700GX)
00H 00H	Device family number code (RD-700GX)
00H 01H 00H 00H	Software revision level
F7H	EOX (End of Exclusive)

●Data Transmission

○Data set 1DT1 (12H)

Status	Data byte	Status
F0H	41H, dev, 00H, 00H, 2BH, 12H, aaH, bbH,	F7H
	ccH, ddH, eeH, ... ffH, sum	

Byte	Explanation
F0H	Exclusive status
41H	ID number (Roland)
dev	Device ID (dev: 00H - 1FH, Initial value is 10H)
00H	Model ID #1 (RD-700GX)
00H	Model ID #2 (RD-700GX)
2BH	Model ID #3 (RD-700GX)
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-700GX (Model ID = 00H 00H 2BH)

○Indivisual Parameters

* These messages are transmitted when Bulk Dump funcion is executed.
* Please don't use a parameter or a address marked <Reserved>.
* The parameters for Setup are temporary. If you want to leave the parameters after the RD-700GX is turned off , execute SETUP Write.

```
+------------------------------------------------------------+
| Start                                                      |
|     Address    |           Description                     |
+------------------------------------------------------------+
| 00 00 00 00    | System                                    |
|                |                                           |
| 10 00 00 00    | Setup (Temporary)                         |
+------------------------------------------------------------+
```

* System

```
+------------------------------------------------------------+
| Offset                                                     |
|    Address     |           Description                     |
+------------------------------------------------------------+
|  00 00 00      | System Common                             |
|  00 02 00      | System Sound Control                      |
|  00 03 00      | System Favorite SETUP                     |
|  00 04 00      | System V-Link                             |
+------------------------------------------------------------+
```

* SETUP

```
+------------------------------------------------------------+
| Offset                                                     |
|    Address     |           Description                     |
+------------------------------------------------------------+
|  00 00 00      | SETUP Common                              |
|  00 02 00      | SETUP Rhythm/Arpeggio/AudioKey            |
|                |                                           |
|  00 03 00      | SETUP Sound Control                       |
|  00 04 00      | SETUP Chorus                              |
|  00 06 00      | SETUP Reverb                              |
|                |                                           |
|  00 10 00      | SETUP MFX (UPPER1 MFX1)                    |
|  00 12 00      | SETUP MFX (UPPER1 MFX2)                    |
|     :                                                      |
|  00 1E 00      | SETUP MFX (LOWER2 MFX2)                    |
|                |                                           |
|  00 30 00      | SETUP Internal Zone (UPPER1)              |
|  00 31 00      | SETUP Internal Zone (UPPER2)              |
|  00 32 00      | SETUP Internal Zone (LOWER1)              |
|  00 33 00      | SETUP Internal Zone (LOWER2)              |
|  00 40 00      | SETUP External Zone (UPPER1)              |
|  00 41 00      | SETUP External Zone (UPPER2)              |
|  00 42 00      | SETUP External Zone (LOWER1)              |
|  00 43 00      | SETUP External Zone (LOWER2)              |
|                |                                           |
|  01 00 00      | SETUP Part (Part: 01)                     |
|  01 01 00      | SETUP Part (Part: 02)                     |
|     :                                                      |
|  01 0F 00      | SETUP Part (Part: 16)                     |
|  02 00 00      | SETUP Part Piano(Part: 01)                |
|  02 20 00      | SETUP Part Piano(Part: 02)                |
|     :                                                      |
|  05 60 00      | SETUP Part Piano(Part: 16)                |
|  06 00 00      | SETUP Part E.Piano(Part: 01)              |
|  06 01 00      | SETUP Part E.Piano(Part: 02)              |
|     :                                                      |
|  06 0F 00      | SETUP Part E.Piano(Part: 16)              |
|  07 00 00      | SETUP Part ToneWheel(Part: 01)            |
|  07 01 00      | SETUP Part ToneWheel(Part: 02)            |
|     :                                                      |
|  07 0F 00      | SETUP Part ToneWheel(Part: 16)            |
+------------------------------------------------------------+
```

* System Common

Offset Address		Description	
# 00 00	0000 aaaa		
	0000 bbbb		
	0000 cccc		
	0000 dddd	Master Tune	(24 – 2024)
			-100.0 - 100.0 [cent]
00 04	0aaa aaaa	Master Level	(0 – 127)
00 05	000a aaaa	SETUP Control Channel	(0 – 16)
			1 – 16, OFF
00 06	0000 000a	Clock Source	(0 – 1)
			INT, MIDI
00 07	0000 000a	Clock Out	(0 – 1)
			OFF, ON
00 08	0000 000a	Damper Polarity	(0 – 1)
			STANDARD, REVERSE
00 09	0000 000a	FC1 Polarity	(0 – 1)
			STANDARD, REVERSE
00 0A	0000 000a	FC2 Polarity	(0 – 1)
			STANDARD, REVERSE
00 0B	0000 000a	EQ Mode	(0 – 1)
			SETUP, SYSTEM
00 0C	0000 000a	SoundControl Mode	(0 – 1)
			SETUP, SYSTEM
00 0D	0000 000a	Pedal Mode	(0 – 1)
			SETUP, SYSTEM
00 0E	0000 000a	S1S2 Mode	(0 – 1)
			SETUP, SYSTEM
00 0F	0aaa aaaa	Audio Level	(0 – 127)
			0-127
00 10	0aaa aaaa	System FC1 Assign	(0 – 111)
			OFF, CC01 – CC31, CC33 – CC95,
			BEND-UP, BEND-DOWN, AFTERTOUCH,
			OCT-UP, OCT-DOWN, START/STOP,
			TAP-TEMPO, RHY PLY/STP, ARPEGGIO SW,
			SNG PLY/STP, AUDIOKEY ON/OFF,
			MFX1 ON/OFF,MFX2 ON/OFF,
			MFX1 CONTROL, MFX2 CONTROL,
			SETUP-UP, SETUP-DOWN
00 11	0aaa aaaa	System FC2 Assign	(0 – 111)
			OFF, CC01 – CC31, CC33 – CC95,

Offset Address		Description	
			BEND-UP, BEND-DOWN, AFTERTOUCH,
			OCT-UP, OCT-DOWN, START/STOP,
			TAP-TEMPO, RHY PLY/STP, ARPEGGIO SW,
			SNG PLY/STP, AUDIOKEY ON/OFF,
			MFX1 ON/OFF,MFX2 ON/OFF,
			MFX1 CONTROL, MFX2 CONTROL,
			SETUP-UP, SETUP-DOWN
00 12	0000 aaaa	System S1 Assign	(0 – 14)
			OFF, COUPLE+1OCT, COUPLE-1OCT,
			COUPLE+2OCT, COUPLE-2OCT,
			COUPLE+5TH, COUPLE-4TH,
			OCT-UP, OCT-DOWN, START/STOP,
			TAP-TEMPO, SNG PLY/STP,
			SETUP-UP, SETUP-DOWN, PANEL LOCK
00 13	0000 aaaa	System S2 Assign	(0 – 14)
			OFF, COUPLE+1OCT, COUPLE-1OCT,
			DCOUPLE+2OCT, COUPLE-2OCT,
			COUPLE+5TH, COUPLE-4TH,
			OCT-UP, OCT-DOWN, STADRT/STOP,
			TAP-TEMPO, SNG PLY/STP,
			SETUP-UP, SETUP-DOWN, PANEL LOCK
00 14	0000 000a	Tone Remain	(0 – 1)
			OFF, ON
00 00 00 15		Total Size	

* System Sound Control

Offset Address		Description	
00 00	0aaa aaaa	Low band Attack time	(0 – 100)
00 01	0aaa aaaa	Low band Release time	(0 – 100)
00 02	00aa aaaa	Low band Threshold	(0 – 36)
			-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 03	0000 aaaa	Low band Ratio	(0 – 13)
			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 04	000a aaaa	Low band Level	(0 – 24)
			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 [dB]
00 05	0aaa aaaa	Mid band Attack time	(0 – 100)
00 06	0aaa aaaa	Mid band Release time	(0 – 100)
00 07	00aa aaaa	Mid band Threshold	(0 – 36)
			-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 08	0000 aaaa	Mid band Ratio	(0 – 13)
			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 09	000a aaaa	Mid band Level	(0 – 24)
			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 [dB]
00 0A	0aaa aaaa	High band Attack time	(0 – 100)
00 0B	0aaa aaaa	High band Release time	(0 – 100)
00 0C	00aa aaaa	High band Threshold	(0 – 36)
			-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 0D	0000 aaaa	High band Ratio	(0 – 13)
			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 0E	000a aaaa	High band Level	(0 – 24)
			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 [dB]
00 0F	0000 0aaa	Split Freq Low	(0 – 6)
			200, 250, 315, 400, 500,
			630, 800 [Hz]
00 10	0000 0aaa	Split Freq High	(0 – 6)
			2000, 2500, 3150, 4000, 5000,
			6300, 8000 [Hz]
00 00 00 11		Total Size	

* System Favorite SETUP

Offset Address		Description	
00 00	0aaa aaaa	Favorite SETUP0 (Bank A)	(0 – 100)
00 01	0aaa aaaa	Favorite SETUP1 (Bank A)	(0 – 100)
00 02	0aaa aaaa	Favorite SETUP2 (Bank A)	(0 – 100)
00 03	0aaa aaaa	Favorite SETUP3 (Bank A)	(0 – 100)
00 04	0aaa aaaa	Favorite SETUP4 (Bank A)	(0 – 100)
00 05	0aaa aaaa	Favorite SETUP5 (Bank A)	(0 – 100)
00 06	0aaa aaaa	Favorite SETUP6 (Bank A)	(0 – 100)
00 07	0aaa aaaa	Favorite SETUP7 (Bank A)	(0 – 100)
00 08	0aaa aaaa	Favorite SETUP8 (Bank A)	(0 – 100)
00 09	0aaa aaaa	Favorite SETUP9 (Bank A)	(0 – 100)
00 0A	0aaa aaaa	Favorite SETUP0 (Bank B)	(0 – 100)
00 0B	0aaa aaaa	Favorite SETUP1 (Bank B)	(0 – 100)
00 0C	0aaa aaaa	Favorite SETUP2 (Bank B)	(0 – 100)
00 0D	0aaa aaaa	Favorite SETUP3 (Bank B)	(0 – 100)
00 0E	0aaa aaaa	Favorite SETUP4 (Bank B)	(0 – 100)
00 0F	0aaa aaaa	Favorite SETUP5 (Bank B)	(0 – 100)
00 10	0aaa aaaa	Favorite SETUP6 (Bank B)	(0 – 100)
00 11	0aaa aaaa	Favorite SETUP7 (Bank B)	(0 – 100)
00 12	0aaa aaaa	Favorite SETUP8 (Bank B)	(0 – 100)
00 13	0aaa aaaa	Favorite SETUP9 (Bank B)	(0 – 100)
00 14	0aaa aaaa	Favorite SETUP0 (Bank C)	(0 – 100)
00 15	0aaa aaaa	Favorite SETUP1 (Bank C)	(0 – 100)
00 16	0aaa aaaa	Favorite SETUP2 (Bank C)	(0 – 100)
00 17	0aaa aaaa	Favorite SETUP3 (Bank C)	(0 – 100)
00 18	0aaa aaaa	Favorite SETUP4 (Bank C)	(0 – 100)
00 19	0aaa aaaa	Favorite SETUP5 (Bank C)	(0 – 100)
00 1A	0aaa aaaa	Favorite SETUP6 (Bank C)	(0 – 100)
00 1B	0aaa aaaa	Favorite SETUP7 (Bank C)	(0 – 100)
00 1C	0aaa aaaa	Favorite SETUP8 (Bank C)	(0 – 100)
00 1D	0aaa aaaa	Favorite SETUP9 (Bank C)	(0 – 100)
00 1E	0aaa aaaa	Favorite SETUP0 (Bank D)	(0 – 100)
00 1F	0aaa aaaa	Favorite SETUP1 (Bank D)	(0 – 100)
00 20	0aaa aaaa	Favorite SETUP2 (Bank D)	(0 – 100)
00 21	0aaa aaaa	Favorite SETUP3 (Bank D)	(0 – 100)
00 22	0aaa aaaa	Favorite SETUP4 (Bank D)	(0 – 100)
00 23	0aaa aaaa	Favorite SETUP5 (Bank D)	(0 – 100)
00 24	0aaa aaaa	Favorite SETUP6 (Bank D)	(0 – 100)
00 25	0aaa aaaa	Favorite SETUP7 (Bank D)	(0 – 100)
00 26	0aaa aaaa	Favorite SETUP8 (Bank D)	(0 – 100)
00 27	0aaa aaaa	Favorite SETUP9 (Bank D)	(0 – 100)
00 00 00 28		Total Size	

```
* System V-Link
+--------------+-------------------------------------------------------+
| Offset       |                                                       |
|   Address    |                    Description                        |
+--------------+-------------------------------------------------------+
|   00 00      | 0000 000a | Switch                          (0 - 1)   |
|              |           |                                 OFF,ON     |
|   00 01      | 0000 000a | Mode                            (0 - 1)   |
|              |           |                             BANK/PC.NOTE   |
|   00 02      | 0aaa aaaa | Lowest No                       (0 - 127) |
|   00 03      | 0000 aaaa | Transmit Channel                (0 - 15)  |
|   00 04      | 0000 0aaa | Output Port                     (0 - 4)   |
|              |           |                 ALL, OUT1, OUT2, OUT3, USB |
|   00 05      | 0aaa aaaa | Key Range Lower                 (0 - 87)  |
|   00 06      | 0aaa aaaa | Key Range Upper                 (0 - 87)  |
|   00 07      | 0000 000a | Local Control                   (0 - 1)   |
|              |           |                                 OFF, ON    |
+--------------+-------------------------------------------------------+
| 00 00 00 08  | Total Size                                            |
+--------------+-------------------------------------------------------+


* SETUP Common
+--------------+-------------------------------------------------------+
| Offset       |                                                       |
|   Address    |                    Description                        |
+--------------+-------------------------------------------------------+
|   00 00      | 0aaa aaaa | SETUP Name 1                    (32 - 127) |
|              |           |                            32 - 127 [ASCII]|
|   00 01      | 0aaa aaaa | SETUP Name 2                    (32 - 127) |
|   00 02      | 0aaa aaaa | SETUP Name 3                    (32 - 127) |
|   00 03      | 0aaa aaaa | SETUP Name 4                    (32 - 127) |
|   00 04      | 0aaa aaaa | SETUP Name 5                    (32 - 127) |
|   00 05      | 0aaa aaaa | SETUP Name 6                    (32 - 127) |
|   00 06      | 0aaa aaaa | SETUP Name 7                    (32 - 127) |
|   00 07      | 0aaa aaaa | SETUP Name 8                    (32 - 127) |
|   00 08      | 0aaa aaaa | SETUP Name 9                    (32 - 127) |
|   00 09      | 0aaa aaaa | SETUP Name 10                   (32 - 127) |
|   00 0A      | 0aaa aaaa | SETUP Name 11                   (32 - 127) |
|   00 0B      | 0aaa aaaa | SETUP Name 12                   (32 - 127) |
+--------------+-------------------------------------------------------+
|   00 0C      | 0aaa aaaa | Voice Reserve 1                 (0 - 64)   |
|              |           |                            0 - 63, FULL    |
|   00 0D      | 0aaa aaaa | Voice Reserve 2                 (0 - 64)   |
|   00 0E      | 0aaa aaaa | Voice Reserve 3                 (0 - 64)   |
|   00 0F      | 0aaa aaaa | Voice Reserve 4                 (0 - 64)   |
|   00 10      | 0aaa aaaa | Voice Reserve 5                 (0 - 64)   |
|   00 11      | 0aaa aaaa | Voice Reserve 6                 (0 - 64)   |
|   00 12      | 0aaa aaaa | Voice Reserve 7                 (0 - 64)   |
|   00 13      | 0aaa aaaa | Voice Reserve 8                 (0 - 64)   |
|   00 14      | 0aaa aaaa | Voice Reserve 9                 (0 - 64)   |
|   00 15      | 0aaa aaaa | Voice Reserve 10                (0 - 64)   |
|   00 16      | 0aaa aaaa | Voice Reserve 11                (0 - 64)   |
|   00 17      | 0aaa aaaa | Voice Reserve 12                (0 - 64)   |
|   00 18      | 0aaa aaaa | Voice Reserve 13                (0 - 64)   |
|   00 19      | 0aaa aaaa | Voice Reserve 14                (0 - 64)   |
|   00 1A      | 0aaa aaaa | Voice Reserve 15                (0 - 64)   |
|   00 1B      | 0aaa aaaa | Voice Reserve 16                (0 - 64)   |
+--------------+-------------------------------------------------------+
| # 00 1C      | 0000 000a |                                           |
|              | 0000 bbbb |                                           |
|              | 0000 cccc | SETUP Tempo                     (10 - 500)|
+--------------+-------------------------------------------------------+
| # 00 1F      | 0000 000a |                                           |
|              | 0000 bbbb |                                           |
|              | 0000 cccc | Upper [Piano] Tone Category     (0 - 511) |
| # 00 22      | 0000 000a |                                           |
|              | 0000 bbbb |                                           |
|              | 0000 cccc | Upper [E.Piano] Tone Category   (0 - 511) |
| # 00 25      | 0000 000a |                                           |
|              | 0000 bbbb |                                           |
|              | 0000 cccc | Upper [CLAV/MALLET] Tone Category (0 - 511)|
| # 00 28      | 0000 000a |                                           |
|              | 0000 bbbb |                                           |
|              | 0000 cccc | Upper [ORGAN] Tone Category     (0 - 511) |
| # 00 2B      | 0000 000a |                                           |
|              | 0000 bbbb |                                           |
|              | 0000 cccc | Upper [STRINGS] Tone Category   (0 - 511) |
| # 00 2E      | 0000 000a |                                           |
|              | 0000 bbbb |                                           |
|              | 0000 cccc | Upper [PAD] Tone Category       (0 - 511) |
| # 00 31      | 0000 000a |                                           |
|              | 0000 bbbb |                                           |
|              | 0000 cccc | Upper [GUITAR/BASS] Tone Category (0 - 511)|
| # 00 34      | 0000 000a |                                           |
|              | 0000 bbbb |                                           |
|              | 0000 cccc | Upper [BRASS/WINDS] Tone Category (0 - 511)|
| # 00 37      | 0000 000a |                                           |
|              | 0000 bbbb |                                           |
|              | 0000 cccc | Upper [VOICE/SYNTH] Tone Category (0 - 511)|
| # 00 3A      | 0000 000a |                                           |
|              | 0000 bbbb |                                           |
|              | 0000 cccc | Upper [RHY/GM2] Tone Category   (0 - 511) |
+--------------+-------------------------------------------------------+
| # 00 5B      | 0000 000a |                                           |
|              | 0000 bbbb |                                           |
|              | 0000 cccc | Lower [Piano] Tone Category     (0 - 511) |
| # 00 5E      | 0000 000a |                                           |
|              | 0000 bbbb |                                           |
|              | 0000 cccc | Lower [E.Piano] Tone Category   (0 - 511) |
| # 00 61      | 0000 000a |                                           |
|              | 0000 bbbb |                                           |
|              | 0000 cccc | Lower [CLAV/MALLET] Tone Category (0 - 511)|
| # 00 64      | 0000 000a |                                           |
|              | 0000 bbbb |                                           |
|              | 0000 cccc | Lower [ORGAN] Tone Category     (0 - 511) |
| # 00 67      | 0000 000a |                                           |
|              | 0000 bbbb |                                           |
|              | 0000 cccc | Lower [STRINGS] Tone Category   (0 - 511) |
| # 00 6A      | 0000 000a |                                           |
|              | 0000 bbbb |                                           |
|              | 0000 cccc | Lower [PAD] Tone Category       (0 - 511) |
| # 00 6D      | 0000 000a |                                           |
|              | 0000 bbbb |                                           |
|              | 0000 cccc | Lower [GUITAR/BASS] Tone Category (0 - 511)|
| # 00 70      | 0000 000a |                                           |
|              | 0000 bbbb |                                           |
|              | 0000 cccc | Lower [BRASS/WINDS] Tone Category (0 - 511)|
| # 00 73      | 0000 000a |                                           |
|              | 0000 bbbb |                                           |
|              | 0000 cccc | Lower [VOICE/SYNTH] Tone Category (0 - 511)|
| # 00 76      | 0000 000a |                                           |
|              | 0000 bbbb |                                           |
|              | 0000 cccc | Lower [RHY/GM2] Tone Category   (0 - 511) |
+--------------+-------------------------------------------------------+
|   01 17      | 0aaa aaaa | FC 1 Assign                     (0 - 109) |
|              |           |              OFF, CC01 - CC31, CC33 - CC95,|
|              |           |         BEND-UP, BEND-DOWN, AFTERTOUCH,    |
|              |           |           OCT-UP, OCT-DOWN, START/STOP,    |
|              |           |      TAP-TEMPO, RHY PLY/STP, ARPEGGIO SW,  |
|              |           |           AUDIOKEY ON/OFF,SNG PLY/STP,     |
|              |           |            MFX1 ON/OFF, MFX2 ON/OFF,       |
|              |           |            MFX1 CONTROL, MFX2 CONTROL      |
|   01 18      | 0aaa aaaa | FC 2 Assign                     (0 - 109) |
|              |           |              OFF, CC01 - CC31, CC33 - CC95,|
|              |           |         BEND-UP, BEND-DOWN, AFTERTOUCH,    |
|              |           |           OCT-UP, OCT-DOWN, START/STOP,    |
|              |           |      TAP-TEMPO, RHY PLY/STP, ARPEGGIO SW,  |
|              |           |           AUDIOKEY ON/OFF,SNG PLY/STP,     |
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|              |           |            MFX1 ON/OFF, MFX2 ON/OFF,       |
|              |           |            MFX1 CONTROL, MFX2 CONTROL      |
+--------------+-------------------------------------------------------+
|   01 19      | 0000 00aa | MFX Knob1 Assgin                (0 - 2)   |
|              |           |                         OFF, MFX1, TEMPO   |
|   01 1A      | 0000 00aa | MFX Knob2 Assgin                (0 - 2)   |
|              |           |                         OFF, MFX2, TEMPO,  |
|   01 1B      | 0000 aaaa | S1 Assign                       (0 - 11)  |
|              |           |          OFF, COUPLE+1OCT, COUPLE-1OCT,    |
|              |           |          COUPLE+2OCT, COUPLE-2OCT,         |
|              |           |          COUPLE+5TH, COUPLE-4TH,           |
|              |           |          OCT-UP, OCT-DOWN, START/STOP,     |
|              |           |          TAP-TEMPO, SNG PLY/STP            |
|   01 1C      | 0000 aaaa | S2 Assign                       (0 - 11)  |
|              |           |          OFF, COUPLE+1OCT, COUPLE-1OCT,    |
|              |           |          COUPLE+2OCT, COUPLE-2OCT,         |
|              |           |          COUPLE+5TH, COUPLE-4TH,           |
|              |           |          OCT-UP, OCT-DOWN, START/STOP,     |
|              |           |          TAP-TEMPO, SNG PLY/STP            |
|   01 1D      | 0000 000a | S1 State                        (0 - 1)   |
|              |           |                                 OFF, ON    |
|   01 1E      | 0000 000a | S2 State                        (0 - 1)   |
|              |           |                                 OFF, ON    |
+--------------+-------------------------------------------------------+
|   01 1F      | 0000 000a | EQ Switch                       (0 - 1)   |
|              |           |                                 OFF, ON    |
|   01 20      | 000a aaaa | EQ Input Gain                   (0 - 30)  |
|              |           |                             -15 - +15[dB]  |
|   01 21      | 0000 000a | EQ Low Type                     (0 - 1)   |
|              |           |                         Shelving, Peaking  |
|   01 22      | 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]        |
|   01 23      | 0aaa aaaa | EQ Low Gain                     (4 - 124) |
|              |           |         -12.0 - +12.0[dB] (1step = 0.2dB)  |
|   01 24      | 0000 0aaa | EQ Low Q                        (0 - 4)   |
|              |           |             0.5, 1.0, 2.0, 4.0, 8.0        |
|   01 25      | 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]        |
|   01 26      | 0aaa aaaa | EQ Mid Gain                     (4 - 124) |
|              |           |         -12.0 - +12.0[dB] (1step = 0.2dB)  |
|   01 27      | 0000 0aaa | EQ Mid Q                        (0 - 4)   |
|              |           |             0.5, 1.0, 2.0, 4.0, 8.0        |
|   01 28      | 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]        |
|   01 29      | 0aaa aaaa | EQ Mid Gain                     (4 - 124) |
|              |           |         -12.0 - +12.0[dB] (1step = 0.2dB)  |
|   01 2A      | 0000 0aaa | EQ Mid Q                        (0 - 4)   |
|              |           |             0.5, 1.0, 2.0, 4.0, 8.0        |
|   01 2B      | 0000 000a | EQ High Type                    (0 - 1)   |
|              |           |                         Shelving, Peaking  |
|   01 2C      | 000a aaaa | EQ High 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]        |
|   01 2D      | 0aaa aaaa | EQ High Gain                    (4 - 124) |
|              |           |         -12.0 - +12.0[dB] (1step = 0.2dB)  |
|   01 2E      | 0000 0aaa | EQ High Q                       (0 - 4)   |
|              |           |             0.5, 1.0, 2.0, 4.0, 8.0        |
+--------------+-------------------------------------------------------+
|   01 2F      | 0aaa aaaa | Key Touch Velocity              (0 - 127) |
|              |           |                            REAL, 1 - 127   |
|   01 30      | 0000 0aaa | Key Touch Curve Type            (1 - 5)   |
|              |           |                        SUPER LIGHT, LIGHT, |
|              |           |              MEDIUM, HEAVY, SUPER HEAVY    |
|   01 31      | 000a aaaa | Key Touch Curve offset          (54 - 73) |
|              |           |                             -10 - +9       |
|   01 32      | 0aaa aaaa | Key Touch Velocity Delay Sens   (1 - 127) |
|              |           |                             -63 - +63      |
|   01 33      | 0aaa aaaa | Key Touch Velocity Key Follow   (1 - 127) |
|              |           |                             -63 - +63      |
|   01 34      | 0000 000a | Key Touch Mode                  (0 - 1)   |
|              |           |                            MODE1, MODE2    |
+--------------+-------------------------------------------------------+
|   01 35      | 0000 000a | Slider Select                   (0 - 1)   |
|              |           |                   ZONE LEVEL, CONTROL      |
|   01 36      | 0aaa aaaa | Slider Assign (UPPER1)          (0 - 97)  |
|              |           |              OFF, CC01 - CC31, CC33 - CC95,|
|              |           |         BEND-UP, BEND-DOWN, AFTERTOUCH,    |
|   01 37      | 0aaa aaaa | Slider Assign (UPPER2)          (0 - 97)  |
|   01 38      | 0aaa aaaa | Slider Assign (LOWER1)          (0 - 97)  |
|   01 39      | 0aaa aaaa | Slider Assign (LOWER2)          (0 - 97)  |
+--------------+-------------------------------------------------------+
|   01 3B      | 0000 000a | Split Switch (Internal)         (0 - 1)   |
|              |           |                                 OFF, ON    |
|   01 3C      | 0000 000a | Split Switch (External)         (0 - 1)   |
|              |           |                                 OFF, ON    |
+--------------+-------------------------------------------------------+
|   01 3D      | 0000 00aa | MFX Source                      (0 - 3)   |
|              |           |          UPPER1,UPPER2,LOWER1,LOWER2       |
|   01 3E      | 0000 00aa | MFX Destination                 (0 - 2)   |
|              |           |          NORMAL, SAME MFX PART, ALL PART   |
+--------------+-------------------------------------------------------+
|   01 3F      | 0000 000a | Reverb Switch                   (0 - 1)   |
|              |           |                                 OFF, ON    |
|   01 40      | 0000 000a | Chorus Switch                   (0 - 1)   |
|              |           |                                 OFF, ON    |
+--------------+-------------------------------------------------------+
|   01 41      | 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'|
|   01 42      | 0000 aaaa | Harmonic Bar Assign (LOWER2:OFF)(1 - 9)   |
|   01 43      | 0000 aaaa | Harmonic Bar Assign (LOWER1:ON) (1 - 9)   |
|   01 44      | 0000 aaaa | Harmonic Bar Assign (LOWER1:OFF)(1 - 9)   |
|   01 45      | 0000 aaaa | Harmonic Bar Assign (UPPER2:ON) (1 - 9)   |
|   01 46      | 0000 aaaa | Harmonic Bar Assign (UPPER2:OFF)(1 - 9)   |
|   01 47      | 0000 aaaa | Harmonic Bar Assign (UPPER1:ON) (1 - 9)   |
|   01 48      | 0000 aaaa | Harmonic Bar Assign (UPPER1:OFF)(1 - 9)   |
+--------------+-------------------------------------------------------+
|   01 49      | 0000 000a | V-Link Switch                   (0 - 1)   |
|              |           |                                 OFF,ON     |
+--------------+-------------------------------------------------------+
|   01 4A      | 0000 00aa | Current Control Zone            (0 - 3)   |
|              |           |          UPPER1,UPPER2,LOWER1,LOWER2       |
+--------------+-------------------------------------------------------+
| 00 00 01 4D  | Total Size                                            |
+--------------+-------------------------------------------------------+
```

* SETUP Rhythm/Arpeggio

```
+------------------------------------------------------------------------+
| Offset   |                                                             |
|  Address |                    Description                              |
|----------+-------------------------------------------------------------|
| #  00 00 | 0000 aaaa |                                                 |
|          | 0000 bbbb | Rhythm Pattern                     (0 - 199)    |
|    00 02 | 0aaa aaaa | Rhythm Accent                      (0 - 100)    |
|    00 03 | 0000 000a | Rhythm Set Change Enable           (0 - 1)      |
|    00 04 | 000a aaaa | Rhythm MIDI Out Channel            (0 - 16)     |
|          |           |                               OFF,1-16          |
|    00 05 | 0000 0aaa | Rhythm Output Port                 (0 - 5)      |
|          |           |              ALL, INT, OUT1, OUT2, OUT3, USB    |
|----------+-------------------------------------------------------------|
|    00 06 | 0000 0aaa | Arpeggio Zone                      (0 - 4)      |
|          |           |            ALL,UPPER1,UPPER2,LOWER1,LOWER2      |
|    00 07 | 0000 000a | Arpeggio Switch                    (0 - 1)      |
|          |           |                               OFF,ON            |
|    00 08 | 0aaa aaaa | Arpeggio Style                     (0 - 149)    |
|    00 09 | 0000 aaaa | Arpeggio Motif                     (0 - 11)     |
|          |           |       UP(L),UP(H&L).UP(_),DOWN(L),DOWN(L&H),    |
|          |           |       DOWN_,UP&DOWN(L),UP&DOWN(L&H),UP&DOWN(_), |
|          |           |            RANDOM(L),RANDOM(_),RHASE            |
|    00 0A | 0aaa aaaa | Arpeggio Accent                    (0 - 100)    |
|          |           |                               0 - 100%          |
|    00 0B | 0aaa aaaa | Arpeggio Velocity                  (0 - 127)    |
|          |           |                               REAL,1 - 127      |
|    00 0C | 0000 0aaa | Arpeggio Octave Range              (61 - 67)    |
|          |           |                               -3 - +3           |
|    00 0D | 0000 000a | Arpeggio Hold                      (0 - 1)      |
|          |           |                               OFF,ON            |
|    00 0E | 0aaa aaaa | Key Range Lower                    (0 - 87)     |
|    00 0F | 0aaa aaaa | Key Range Upper                    (0 - 87)     |
|    00 10 | 0000 aaaa | Rhythm Arpeggio Grid               (0 - 8)      |
|          |           |           1/4, 1/8, 1/8L, 1/8H, 1/12,           |
|          |           |           1/16, 1/16L, 1/16H, 1/24              |
|    00 11 | 0000 aaaa | Rhythm Arpeggio Duration           (0 - 9)      |
|          |           |           30, 40, 50, 60, 70, 80, 90, 100, 120, FULL |
|----------+-------------------------------------------------------------|
| 00 00 00 12 | Total Size                                               |
+------------------------------------------------------------------------+
```

* Setup Sound Control

```
+------------------------------------------------------------------------+
| Offset   |                                                             |
|  Address |                    Description                              |
|----------+-------------------------------------------------------------|
|    00 00 | 0000 000a | SoundControl Switch                (0 - 1)      |
|          |           |                               OFF,ON            |
|    00 01 | 0aaa aaaa | Low band Attack time               (0 - 100)    |
|    00 02 | 0aaa aaaa | Low band Release time              (0 - 100)    |
|    00 03 | 00aa aaaa | Low band Threshold                 (0 - 36)     |
|          |           | -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 aaaa | Low band Ratio                     (0 - 13)     |
|          |           | 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 aaaa | Low band Level                     (0 - 24)     |
|          |           | 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 [dB]                            |
|    00 06 | 0aaa aaaa | Mid band Attack time               (0 - 100)    |
|    00 07 | 0aaa aaaa | Mid band Release time              (0 - 100)    |
|    00 08 | 00aa aaaa | Mid band Threshold                 (0 - 36)     |
|          |           | -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 aaaa | Mid band Ratio                     (0 - 13)     |
|          |           | 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 aaaa | Mid band Level                     (0 - 24)     |
|          |           | 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 [dB]                            |
|    00 0B | 0aaa aaaa | High band Attack time              (0 - 100)    |
|    00 0C | 0aaa aaaa | High band Release time             (0 - 100)    |
|    00 0D | 00aa aaaa | High band Threshold                (0 - 36)     |
|          |           | -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 aaaa | High band Ratio                    (0 - 13)     |
|          |           | 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 aaaa | High band Level                    (0 - 24)     |
|          |           | 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 [dB]                            |
|    00 10 | 0000 0aaa | Split Freq Low                     (0 - 6)      |
|          |           |            200, 250, 315, 400, 500,            |
|          |           |            630, 800 [Hz]                        |
|    00 11 | 0000 0aaa | Split Freq High                    (0 - 6)      |
|          |           |            2000, 2500, 3150, 4000, 5000,       |
|          |           |            6300, 8000 [Hz]                      |
|----------+-------------------------------------------------------------|
| 00 00 00 12 | Total Size                                               |
+------------------------------------------------------------------------+
```

* SETUP 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 00aa |                                    (reserved)   |
|    00 03 | 0000 00aa | Chorus Output Select               (0 - 2)      |
|          |           |            MAIN, REV, MAIN+REV                 |
|----------+-------------------------------------------------------------|
| #  00 04 | 0000 aaaa |                                                 |
|       :  |     :     | Chorus Parameter 1-20         (12768 - 52768)  |
| #  00 50 | 0000 aaaa |                               -20000 - +20000  |
|----------+-------------------------------------------------------------|
| 00 00 00 54 | Total Size                                               |
+------------------------------------------------------------------------+
```

* SETUP Reverb

```
+------------------------------------------------------------------------+
| Offset   |                                                             |
|  Address |                    Description                              |
|----------+-------------------------------------------------------------|
|    00 00 | 0000 aaaa | Reverb Type                        (0 - 6)      |
|          |           |       OFF, REVERB, SRV ROOM, SRV HALL,          |
|          |           |       SRV PLATE, GM2 REVERB, CATHEDRAL          |
|    00 01 | 0aaa aaaa | Reverb Level                       (0 - 127)    |
|----------+-------------------------------------------------------------|
| #  00 03 | 0000 aaaa |                                                 |
|       :  |     :     | Reverb Parameter 1-20         (12768 - 52768)  |
| #  00 4F | 0000 aaaa |                               -20000 - +20000  |
|----------+-------------------------------------------------------------|
| 00 00 00 53 | Total Size                                               |
+------------------------------------------------------------------------+
```

* SETUP MFX

```
+------------------------------------------------------------------------+
| Offset   |                                                             |
|  Address |                    Description                              |
|----------+-------------------------------------------------------------|
| #  00 02 | 0000 aaaa |                                                 |
|          | 0000 bbbb | MFX Type                           (0 - 255)    |
|----------+-------------------------------------------------------------|
| #  00 10 | 0000 aaaa |                                                 |
|       :  |     :     | MFX Parameter 1-32            (12768 - 52768)  |
|    01 0C | 0000 aaaa |                               -20000 - +20000  |
|----------+-------------------------------------------------------------|
| 00 00 01 10 | Total Size                                               |
+------------------------------------------------------------------------+
```

* SETUP Internal Zone

```
+------------------------------------------------------------------------+
| Offset   |                                                             |
|  Address |                    Description                              |
|----------+-------------------------------------------------------------|
|    00 00 | 0aaa aaaa | Keyboard Range Lower               (0 - 87)     |
|          |           |                               A0 - UPPER        |
|    00 01 | 0aaa aaaa | Keyboard Range 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)    |
|          |           |                               -63 - +63         |
|    00 05 | 0aaa aaaa | Velocity Max                       (1 - 127)    |
|----------+-------------------------------------------------------------|
|    00 06 | 0aaa aaaa | keyboard Transpose                 (16 - 112)   |
|          |           |                               -48 - +48         |
|----------+-------------------------------------------------------------|
|    00 07 | 0000 000a | Zone 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 Slider Swtch (UPPER1)      (0 - 1)      |
|          |           |                               OFF, ON           |
|    00 0E | 0000 000a | Control Slider Swtch (UPPER2)      (0 - 1)      |
|          |           |                               OFF, ON           |
|    00 0F | 0000 000a | Control Slider Swtch (LOWER1)      (0 - 1)      |
|          |           |                               OFF, ON           |
|    00 10 | 0000 000a | Control Slider Swtch (LOWER2)      (0 - 1)      |
|          |           |                               OFF, ON           |
|    00 11 | 0000 000a | S1 Switch                          (0 - 1)      |
|          |           |                               OFF, ON           |
|    00 12 | 0000 000a | S2 Switch                          (0 - 1)      |
|          |           |                               OFF, ON           |
|    00 14 | 0000 aaaa | Part Assign                        (0 - 15)     |
|          |           |                               1 - 16            |
|----------+-------------------------------------------------------------|
| 00 00 00 15 | Total Size                                               |
+------------------------------------------------------------------------+
```

* SETUP External Zone

```
+------------------------------------------------------------------------+
| Offset   |                                                             |
|  Address |                    Description                              |
|----------+-------------------------------------------------------------|
|    00 00 | 0aaa aaaa | Keyboard Range Lower               (0 - 87)     |
|          |           |                               A0 - UPPER        |
|    00 01 | 0aaa aaaa | Keyboard Range 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)    |
|          |           |                               -63 - +63         |
|    00 05 | 0aaa aaaa | Velocity Max                       (1 - 127)    |
|----------+-------------------------------------------------------------|
|    00 06 | 0aaa aaaa | keyboard Transpose                 (16 - 112)   |
|          |           |                               -48 - +48         |
|----------+-------------------------------------------------------------|
|    00 07 | 0000 000a | Zone 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 (MFX)               (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           |
```

Offset Address		Description	Value
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	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)
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)
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	

* SETUP Part

Offset Address		Description	Value
00 00	0000 aaaa	Receive Channel	(0 - 15) 1 - 16
00 01	0000 000a	Mute Switch	(0 - 1) OFF, ON
00 02	0aaa aaaa	Tone Bank Select MSB (CC# 0)	(0 - 127)
00 03	0aaa aaaa	Tone Bank Select LSB (CC# 32)	(0 - 127)
00 04	0aaa aaaa	Tone Program Change#	(0 - 127)
00 05	0aaa aaaa	Part Level (CC# 7)	(0 - 127)
00 06	0aaa aaaa	Part Pan (CC# 10)	(0 - 127) L64 - 63R
00 07	0aaa aaaa	Coarse Tune	(16 - 112) -48 - +48
00 08	0aaa aaaa	Fine Tune	(14 - 114) -50 - +50
00 09	0000 00aa	Mono/Poly	(0 - 2) MONO, POLY, MONO/LEGATO
00 0A	000a aaaa	Pitch Bend Range	(0 - 24)
00 0B	0000 000a	Portamento Switch	(0 - 1) OFF, ON
# 00 0C	0000 aaaa 0000 bbbb	Portamento Time	(0 - 127)
00 0E	0aaa aaaa	Cutoff	(0 - 127) -63 - +63
00 0F	0aaa aaaa	Resonance	(0 - 127) -63 - +63
00 10	0aaa aaaa	Attack Time	(0 - 127) -63 - +63
00 11	0aaa aaaa	Decay Time	(0 - 127) -63 - +63
00 12	0aaa aaaa	Release Time	(0 - 127) -63 - +63
00 13	0aaa aaaa	Chorus Amount	(0 - 127)
00 14	0aaa aaaa	Reverb Amount	(0 - 127)
00 15	0000 000a	MFX1 Switch	(0 - 1) OFF, ON
# 00 16	0000 aaaa 0000 bbbb	MFX1 Type	(0 - 255)
00 18	0000 000a	MFX2 Switch	(0 - 1) OFF, ON
# 00 19	0000 aaaa 0000 bbbb	MFX2 Type	(0 - 255)
00 1B	0000 000a	Receive Bank Select Switch	(0 - 1) OFF, ON
00 1C	0000 000a	Receive Program Change Switch	(0 - 1) OFF, ON
00 1D	0000 000a	Receive Bender Switch	(0 - 1) OFF, ON
00 1E	0000 000a	Receive Modulation Switch	(0 - 1)

Offset Address		Description	Value
00 1F	0000 000a	Receive Volume Switch	OFF, ON (0 - 1)
00 20	0000 000a	Receive Pan Switch	OFF, ON (0 - 1)
00 21	0000 000a	Receive Hold-1 Switch	OFF, ON (0 - 1)
00 22	0000 000a	Receive Expression	OFF, ON (0 - 1) OFF, ON
00 00 00 23		Total Size	

* Setup Piano Setting

Offset Address		Description	Value
00 00	000a aaaa	Tone Number	(0 - 25)
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	KeyOffSound Level	(0 - 127)
00 08	0aaa aaaa	Velocity Gain Squeeze	(0 - 127)
00 09	0000 000a	Stretch Tune	(0 - 1) OFF, Default
00 0A	0000 aaaa	Micro Tune Type	(0 - 15) PRST, USER, 1 - 14
# 00 0B : # 04 07	0000 aaaa : 0000 aaaa	MicroTune1 - 128	(12 - 1012) -50.0 - +50.0
04 0B	0000 00aa	DYNAMICS	(0 - 3) OFF, Type1, Type2, Type3
04 0C	0aaa aaaa	DYNAMICS LEVEL	(1 - 127)
00 00 04 0D		Total Size	

* Setup E.Piano Setting

Offset Address		Description	Value
00 00	0000 0aaa	ModelType	(0 - 7)
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 Lebel	(54 - 74) -10 - +10
00 04	000a aaaa	Bell Character	(54 - 74) -10 - +10
00 05	000a aaaa	KeyOff Mute Sound Level	(54 - 74) -10 - +10
00 06	000a aaaa	HAM Noise Lelve	(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	

* SETUP ToneWheel Setting

Offset Address		Description	Value
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
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 (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 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, 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 = sum

sum ÷ 128 = quotient ... remainder

128 - remainder = checksum

<Example1> Setting CHORUS TYPE to DELAY (DT1)

According to the "Parameter Address Map" (p. 9), the start address of Temporary Setup is 10 00 00 00H, the offset address of CHORUS at Setup 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 2B	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-700GX)   (5) Command ID (DT1)   (6) End of Exclusive

Then calculate the checksum.

10H + 00H + 04H + 00H + 02H = 16 + 0 + 4 + 0 + 2 = 22 (sum)

22 (sum) ÷ 128 = 0 (quotient) ... 22 (remainder)

checksum = 128 - 22 (remainder) = 106 = 6AH

This means that F0 41 10 00 43 12 10 00 04 00 02 6A F7 is the message should be sent.

<Example2> Getting Temporary Performance data (RQ1)

cf.) This operation is the same as Bulk Dump Temporary function in Utility.

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

10 00 00 00H   Setup Common

              :

10 07 0F 00H   Setup Part Tone Wheel (Part: 16)

As the data size of Setup Tone Wheel Parameter is 00 00 00 0BH, summation of the size and the start address of Setup Tone Wheel Parameter 16 at Temporary Setup will be;

```
   10 07 0F 00H
+) 00 00 00 0BH
   10 07 0F 0BH
```

And the size that have to be got should be;

```
   10 07 0F 0BH
-) 10 00 00 00H
   00 07 0F 0BH
```

Therefore the system exclusive message should be sent is;

F0	41	10	00 00 2B	11	10 00 00 00	00 07 0F 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-700GX)   (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 00 2B 11 10 00 00 00 00 07 0F 0B 41 F7 to be transmitted.

■ASCII Code Table

Setup 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.