

MIDI Implementation

Model: VariOS
Date: December 1, 2002
Version: 1.00

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-ch.16)
kk = Note number: 00H-7FH (0-127)
vv = Note Off velocity: 00H-7FH (0-127)

* This is not received if the part and note number that receives this message has a Trigger Mode setting of TRIGGER or DRUM.

● Note On

status	2nd byte	3rd byte
9nH	kkH	vvH

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

* If the sample assigned to the part and note number that receives this message has a Trigger Mode setting of TRIGGER, and if that note is sounding, this will function as note-off.

● Polyphonic Aftertouch

status	2nd byte	3rd byte
AnH	kkH	vvH

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

* When received on the control channel, this will affect all parts.

● Control Change

* Not received when the Receive switch (SYSTEM/MIDI/RX SW) is OFF.
* If this is received on the control channel (SYSTEM/MIDI/GENERAL), the effect will apply to all parts, unless otherwise noted for each item.

○ Modulation (Controller number 1)

status	2nd byte	3rd byte
BnH	01H	vvH

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

○ Portamento Time (Controller number 5)

status	2nd byte	3rd byte
BnH	05H	vvH

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

* This will affect the Portamento Time parameter of the sample assigned to the part that receives the message.
* Not received on the Control channel.

○ 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-ch.16)
mm,ll = the value of the parameter specified by RPN/NRPN
mm = MSB, ll = LSB

* Not received on the Control channel.

○ Volume (Controller number 7)

status	2nd byte	3rd byte
BnH	07H	vvH

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

○ Panpot (Controller number 10)

status	2nd byte	3rd byte
BnH	0AH	vvH

n = MIDI channel number: 0H-FH (ch.1-ch.16)
vv = Panpot: 00H-40H-7FH (0-64-127)

* Adjust the stereo location over 128 steps, where 0 is far left, 64 is center, and 127 is far right.

○ Expression (Controller number 11)

status	2nd byte	3rd byte
BnH	0BH	vvH

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

○ Hold 1 (Controller number 64)

status	2nd byte	3rd byte
BnH	40H	vvH

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

○ Portamento (Controller number 65)

status	2nd byte	3rd byte
BnH	41H	vvH

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

* This will change the Portamento Sw parameter setting of the sample assigned to the part that receives this.

* Not received on the Control channel.

○ Hold 2 (Controller number 69)

status	2nd byte	3rd byte
BnH	45H	vvH

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

○ Portamento Control (Controller number 84)

status	2nd byte	3rd byte
BnH	54H	kkH

n = MIDI channel number: 0H-FH (ch.1-ch.16)
kk = Source note number: 00H-7FH (0-127)

* A Note On message received immediately after a Portamento control will be sounded with the pitch changing smoothly from the source note number. If a voice is already sounding at the same note number as the source note number, that voice will change pitch to the pitch of the newly received Note On, and continue sounding (i.e., will be played legato).

* The speed of pitch change produced by portamento control will depend on the setting of the Portamento Time parameter of the sample assigned to the part that receives this.

* Not received on the Control channel.

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

(Controller number 91)

status	2nd byte	3rd byte
BnH	5BH	vvH

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

* The Reverb Send Level parameter will change.

* Not received on the Control channel.

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

(Controller number 93)

status	2nd byte	3rd byte
BnH	5DH	vvH

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

* The Chorus Send Level parameter will change.

* Not received on the Control channel.

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

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

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

mm = MSB of the parameter number specified by RPN

ll = LSB of the parameter number specified by RPN

* Not received on the Control channel.

<<< RPN >>>

Control Changes include RPN (Registered Parameter Numbers), which are extended parameters whose function is defined in the MIDI specification.

When using RPNs, first the RPN (Controller numbers 100 and 101; they can be sent in any order) is transmitted to specify the parameter you wish to control. Then, Data Entry messages (Controller numbers 6 and 38) are used to set the value of the specified parameter. Once an RPN parameter has been specified, all Data Entry messages received on that channel will modify the value of that parameter. In order to prevent accidents, when the desired setting has been made for the parameter, it is recommended that RPN be set to Null.

This device receives the following RPNs.

RPN	Data entry	
MSB LSB	MSB LSB	Notes
00H 00H	mmH llH	Pitch Bend Sensitivity mm: 00H-0CH (0-12 semitones) ll: ignored (processed as 00H) Up to 1 octave can be specified in semitone steps. * The Bend Range Up/Down parameters will also change.
00H 01H	mmH llH	Channel Fine Tuning mm, ll: 20 00H-40 00H-60 00H (-4096 *100 / 8192-0- +4096 *100 / 8192 cent) * The Fine Tune parameter (PERFORM/PART/SOUND/FINE) will change.
00H 02H	mmH llH	Channel Coarse Tuning mm: 34H-40H-4CH (-12-0- +12 semitones) ll: ignored (processed as 00H) * The Coarse Tune parameter will change.
7FH 7FH	mmH llH	RPN null RPN and NRPN will be set as "unspecified." Once this setting has been made, subsequent Data Entry messages will be ignored. (It is not necessary to transmit Data Entry for RPN Null settings.) Settings already made will not change. mm, ll: ignored

● Program Change

status	2nd byte
CnH	ppH

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

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

* Not received on the Control channel.

● Channel Aftertouch

status	2nd byte
DnH	vvH

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

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

* If this is received on the control channel, the effect will apply to all parts.

● Pitch Bend Change

status	2nd byte	3rd byte
EnH	llH	mmH

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

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

* If this is received on the control channel, the effect will apply to all parts.

■ Channel Mode Messages

● All Sound Off (Controller number 120)

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

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

- * When this message is received, all currently sounding notes on the corresponding channel will be turned off immediately.
- * If this is received on the control channel, all currently sounding notes of all parts will be silenced.

● Reset All Controllers (Controller number 121)

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

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

- * When this message is received, the following controllers will be set to their reset values.
- * If this is received on the control channel, the controllers of all parts will be set to their reset values.

Controller	Reset value
Pitch Bend Change	+/- 0 (center)
Polyphonic Key Pressure	0 (off)
Channel Pressure	0 (off)
Modulation	0 (off)
Expression	127 (maximum)
Hold 1	0 (off)
Hold 2	0 (off)
Panpot	64 (center)
RPN	Unset. Previously set data will not change.
NRPN	Unset. Previously set data will not change.
C1	64 (center)
C2	64 (center)
C3	64 (center)
VC	64 (center)

● All Notes Off (Controller number 123)

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

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

- * When All Notes Off is received, all currently sounding notes on the corresponding channel will be turned off. However, if Hold 1 is on, or if Hold 2 is on, the note will not stop sounding until these turn off.
- * If the sample of a note that is "on" has a Trigger Mode (SAMPLE/MODE) setting of TRIGGER or DRUM, that note will not turn off.
- * If this is received on the control channel, the effect will apply to the notes of all parts.

● Omni Off (Controller number 124)

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

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

- * All notes currently "on" for the part that receives this will be turned off. However, if the sample corresponding to one of these notes has a Trigger Mode setting of DRUM, that note will not turn off.
- * Not received on the Control channel.

● Omni On (Controller number 125)

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

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

- * All notes currently "on" for the part that receives this will be turned off. However, if the sample corresponding to one of these notes has a Trigger Mode setting of DRUM, that note will not turn off.
- * The VariOS cannot be switched to OMNI ON.
- * Not received on the Control channel.

● Mono (Controller number 126)

<u>status</u>	<u>2nd byte</u>	<u>3rd byte</u>
BnH	7EH	mmH
n = MIDI channel number: 0H-FH (ch.1-ch.16)		
mm = Mono number: 00H-10H (0-16)		

- * The sample assigned to that part will be switched to a Key Assign setting of SOLO.
- * All notes currently "on" for the part that receives this will be turned off. However, if the sample corresponding to one of these notes has a Trigger Mode setting of DRUM, that note will not turn off.
- * Not received on the Control channel.

● Poly (Controller number 127)

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

- * The sample assigned to that part will be switched to a Key Assign (SAMPLE/MODE) setting of POLY.
- * All notes currently "on" for the part that receives this will be turned off. However, if the sample corresponding to one of these notes has a Trigger Mode (SAMPLE/DRUM) setting of DRUM, that note will not turn off.
- * Not received on the Control channel.

■ System Realtime Messages

● Timing Clock

<u>status</u>
F8H

- * This message will be received if the Clock Source parameter is MIDI.

● Active Sensing

<u>status</u>
FEH

- * When an Active Sensing message is received, the unit will begin monitoring the interval at which MIDI messages are received. During monitoring, if more than 420 ms passes without a message being received, the same processing will be done as when All Sound Off, All Notes Off, and Reset All Controllers messages are received. Then monitoring will be halted.

■ System Exclusive Messages

<u>status</u>	<u>data byte</u>	<u>status</u>
F0H	iiH, ddH,, eeH	F7H

F0H: System Exclusive message status
 ii = ID number: This is the ID number (manufacturer ID) that specifies the manufacturer whose exclusive message this is. Roland's manufacturer ID is 41H. ID numbers 7EH and 7FH are defined in an expansion of the MIDI standard as Universal Non-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, the Data Request (RQ1) messages and the Data Set (DT1) messages will be set automatically.

● Universal Non-realtime System Exclusive Messages

○ Identity Request Message

When this message is received, Identity Reply message (p. 172) will be transmitted.

<u>status</u>	<u>data byte</u>	<u>status</u>
F0H	7EH, dev, 06H, 01H	F7H

<u>Byte</u>	<u>Explanation</u>
F0H	Exclusive status
7EH	ID number (Universal Non-realtime message)
dev	device ID (dev: 10H)
06H	sub ID#1 (General Information)
01H	sub ID#2 (Identity Request)
F7H	EOX (End of Exclusive)

- * The "dev" is own device number or 7FH (Broadcast).

● Data Transmission

The VariOS can transmit and receive the various parameters using System Exclusive messages.

The model ID of the exclusive messages used by this instrument is 00 1DH.

○ Data Request 1 (RQ1)

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

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

<u>Status</u>	<u>Data Byte</u>	<u>Status</u>
F0H	41H, dev, 00H, 1DH, 11H, aaH, bbH, ccH, ddH, ssH, ttH, uuH, vvH, sum	F7H

<u>Byte</u>	<u>Explanation</u>
F0H	Exclusive status
41H	ID number (Roland)
dev	device ID (dev: 10H)
00H	Model ID#1 (VariOS)
1DH	Model ID#2 (VariOS)
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 listed in Section 3 (p. 173).

- * For the checksum, refer to (p. 176).

○ Data Set 1 (DT1)

This message transmits the actual data, and is used when you wish to set the data of the receiving device.

<u>Status</u>	<u>Data Byte</u>	<u>Status</u>
F0H	41H, dev, 00H, 1DH, 12H, aaH, bbH, ccH, ddH, eeH, ... ffH, sum	F7H

<u>Byte</u>	<u>Explanation</u>
F0H	Exclusive status
41H	ID number (Roland)
dev	device ID (dev: 10H)
00H	Model ID#1 (VariOS)
1DH	Model ID#2 (VariOS)
12H	command ID (DT1)
aaH	address MSB
bbH	address
ccH	address
ddH	address LSB
eeH	data: The actual data to be transmitted. Multi-byte data is transmitted in the address order.
:	:
ffH	data
sum	checksum
F7H	EOX (End of Exclusive)

- * The amount of data that is transmitted at one time is fixed for the type of data, and only data of the fixed starting address and size will be transmitted. Refer to the Address and Size listed in Section 3 (p. 173).

- * Data whose size is greater than 128 bytes should be divided into packets of 128 bytes or less and transmitted. Successive "Data Set 1" messages should have at least 20 ms of time interval between them.

- * For the checksum, refer to (p. 176).

MIDI Implementation

2. Transmit Data

■ Channel Voice Messages

● Control Change

- * This is not transmitted if C1 Output Mode, C2 Output Mode, or C3 Output Mode is set to INT.
- * This is transmitted on the control channel if Knob Control is set to MULTI PART.

○ Bank Select (Controller number 0, 32)

<u>status</u>	<u>2nd byte</u>	<u>3rd byte</u>
BnH	00H	mmH
BnH	20H	llH

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

● Program Change

<u>status</u>	<u>2nd byte</u>
CnH	ppH

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

■ System Realtime Messages

● Active Sensing

status
FEH

* Transmitted at intervals of approximately 250 ms.

■ System Exclusive Messages

There is a kind of the Universal Non-realtime messages and the Data Set (DT1) messages in the System Exclusive messages transmitted by this device.

● Universal Non-realtime System Exclusive Messages

○ Identity Reply Message

When Identity Request message (p. 171) is received, this message will be transmitted.

<u>status</u>	<u>data byte</u>	<u>status</u>
F0H	7EH, dev, 06H, 02H, 41H, 1DH, 01H, 00H, 00H, aaH, bbH, ccH, ddH	F7H

<u>Byte</u>	<u>Explanation</u>
F0H	Exclusive status
7EH	ID number (Universal Non-realtime message)
dev	device ID (dev: 10H)
06H	sub ID#1 (General Information)
02H	sub ID#2 (Identity Reply)
41H	ID number (Roland)
1DH 01H	Device family code
00H 01H	Device family number code
aaH bbH ccH ddH	Software revision level
F7H	EOX (End of Exclusive)

● Data Transmission

○ Data Set 1 (DT1)

<u>Status</u>	<u>Data Byte</u>	<u>Status</u>
F0H	41H, dev, 00H, 1DH, 12H, aaH, bbH, ccH, ddH, eeH, ... ffH, sum	F7H

<u>Byte</u>	<u>Explanation</u>
F0H	Exclusive status
41H	ID number (Roland)
dev	device ID (dev: 10H–1FH)
00H	Model ID#1 (VariOS)
1DH	Model ID#2 (VariOS)
12H	command ID (DT1)
aaH	address MSB
bbH	address
ccH	address
ddH	address LSB
eeH	data: The actual data to be transmitted. Multi-byte data is transmitted in the address order.
:	:
ffH	data
sum	checksum
F7H	EOX (End of Exclusive)

- * The amount of data transmitted at one time is fixed for the type of data, and the data will be transmitted with the fixed starting address and size. Refer to the Address and Size listed in Section 3 (p. 173).
- * Large amounts of data must be divided into packets of 128 bytes or less, and transmitted at intervals of approximately 20 ms.
- * For the checksum, refer to (p. 176).

3. Parameter Address Map

1. VariOS (Model ID = 00H 1DH)

- * Addresses marked with # support only data request 1 (RQ1). Data set 1 (DT1) messages are ignored.
- * Addresses marked with "*" cannot be used as starting addresses.

Start Address	Description	
00 00 00 00	System	1-1
00 00 00 00	System Common	1-1-1
10 00 00 00	Performance	1-2
10 00 00 00	Performance Common	1-2-1
11 00 00 00	Performance Part 1	1-2-2
11 00 10 00	Performance Part 2	
:	:	
11 00 50 00	Performance Part 6	
20 00 00 00	Sample 1	1-3
20 01 00 00	Sample 2	
:	:	
20 7F 00 00	Sample 128	
30 00 00 00	Wave 1	1-4
30 01 00 00	Wave 2	
:	:	
30 7F 00 00	Wave 128	

■ 1-1. System

● 1-1-1. System Common

Offset Address	Description	
00 00	0000 aaaa	Master Tune 4274 - 4526
00 01*	0000 bbbb	(nibbled) (427.4 - 452.6)
00 02*	0000 cccc	
00 03*	0000 dddd	
00 04	00aa aaaa	Master Attenuation 0 - 60 (-60 - 0[dB])
00 05	0000 000a	MFx Sw 0 - 1 (OFF,ON)
00 06	0000 000a	Chorus Sw 0 - 1 (OFF,ON)
00 07	0000 000a	Reverb Sw 0 - 1 (OFF,ON)
00 11	000a aaaa	Control Channel 0 - 16 (1 - 16,OFF)
00 1C	0000 aaaa	Transpose Value 0 - 11 (-5 - +6 [semitone])
00 1D	0000 0aaa	Octave Shift 0 - 6 (-3 - +3 [octave])
00 21	0000 000a	Panic Key 0 - 128
00 22*	0bbb bbbb	(OFF,C-1 - G9)

*: Cannot start from this address

■ 1-2. Performance

● 1-2-1. Performance Common

Offset Address	Description	
00 00	00aa aaaa	Multi-FX Type 0 - 40 (0(THRU), 1 - 40)
00 01	0aaa aaaa	Multi-FX Parameter 1 0 - 127
00 02	0aaa aaaa	Multi-FX Parameter 2 0 - 127
00 03	0aaa aaaa	Multi-FX Parameter 3 0 - 127
00 04	0aaa aaaa	Multi-FX Parameter 4 0 - 127
00 05	0aaa aaaa	Multi-FX Parameter 5 0 - 127
00 06	0aaa aaaa	Multi-FX Parameter 6 0 - 127
00 07	0aaa aaaa	Multi-FX Parameter 7 0 - 127
00 08	0aaa aaaa	Multi-FX Parameter 8 0 - 127
00 09	0aaa aaaa	Multi-FX Parameter 9 0 - 127
00 0A	0aaa aaaa	Multi-FX Parameter 10 0 - 127
00 0B	0aaa aaaa	Multi-FX Parameter 11 0 - 127
00 0C	0aaa aaaa	Multi-FX Parameter 12 0 - 127
00 0D	0aaa aaaa	Multi-FX Parameter 13 0 - 127
00 0E	0aaa aaaa	Multi-FX Parameter 14 0 - 127
00 0F	0aaa aaaa	Multi-FX Parameter 15 0 - 127
00 10	0aaa aaaa	Multi-FX Parameter 16 0 - 127
00 11	0aaa aaaa	Multi-FX Parameter 17 0 - 127
00 12	0aaa aaaa	Multi-FX Parameter 18 0 - 127
00 13	0aaa aaaa	Multi-FX Parameter 19 0 - 127
00 14	0aaa aaaa	Multi-FX Parameter 20 0 - 127
00 15	0aaa aaaa	Multi-FX Parameter 21 0 - 127
00 16	0aaa aaaa	Multi-FX Parameter 22 0 - 127
00 17	0aaa aaaa	Multi-FX Parameter 23 0 - 127
00 18	0aaa aaaa	Multi-FX Parameter 24 0 - 127
00 19	0aaa aaaa	Multi-FX Parameter 25 0 - 127
00 1A	0aaa aaaa	Multi-FX Parameter 26 0 - 127
00 1B	0aaa aaaa	Multi-FX Parameter 27 0 - 127
00 1C	0aaa aaaa	Multi-FX Parameter 28 0 - 127
00 1D	0aaa aaaa	Multi-FX Parameter 29 0 - 127
00 1E	0aaa aaaa	Multi-FX Parameter 30 0 - 127
00 1F	0aaa aaaa	Multi-FX Parameter 31 0 - 127
00 20	0aaa aaaa	Multi-FX Parameter 32 0 - 127
00 21	0000 00aa	Multi-FX Output Assign 0 - 1 (MAIN,DIR)
00 22	0aaa aaaa	Multi-FX Master Level 0 - 127
00 23	0aaa aaaa	Multi-FX Chorus Send Level 0 - 127

00 24	0aaa aaaa	Multi-FX Reverb Send Level 0 - 127
00 25	0000 0aaa	Chorus Type 0 - 7 (CHORUS 1,CHORUS 2,CHORUS 3, CHORUS 4,FB CHORUS, FLANGER, SHORT DELAY,FB DELAY)
00 26	0aaa aaaa	Chorus Parameter 1 0 - 127
00 27	0aaa aaaa	Chorus Parameter 2 0 - 127
00 28	0aaa aaaa	Chorus Parameter 3 0 - 127
00 29	0aaa aaaa	Chorus Parameter 4 0 - 127
00 2A	0aaa aaaa	Chorus Parameter 5 0 - 127
00 2B	0aaa aaaa	Chorus Parameter 6 0 - 127
00 2C	0aaa aaaa	Chorus Parameter 7 0 - 127
00 2D	0aaa aaaa	Chorus Parameter 8 0 - 127
00 2E	0aaa aaaa	Chorus Parameter 9 0 - 127
00 2F	0aaa aaaa	Chorus Parameter 10 0 - 127
00 30	0aaa aaaa	Chorus Master Level 0 - 127
00 31	0aaa aaaa	Chorus Reverb Send Level 0 - 127
00 32	0000 aaaa	Reverb Type 0 - 8 (ROOM1,ROOM2,ROOM3,HALL1,HALL2, HALL3,GARAGE,PLATE,NLR)
00 33	0aaa aaaa	Reverb Parameter 1 0 - 127
00 34	0aaa aaaa	Reverb Parameter 2 0 - 127
00 35	0aaa aaaa	Reverb Parameter 3 0 - 127
00 36	0aaa aaaa	Reverb Parameter 4 0 - 127
00 37	0aaa aaaa	Reverb Parameter 5 0 - 127
00 38	0aaa aaaa	Reverb Parameter 6 0 - 127
00 39	0aaa aaaa	Reverb Parameter 7 0 - 127
00 3A	0aaa aaaa	Reverb Parameter 8 0 - 127
00 3B	0aaa aaaa	Reverb Parameter 9 0 - 127
00 3C	0aaa aaaa	Reverb Parameter 10 0 - 127
00 3D	0aaa aaaa	Reverb Parameter 11 0 - 127
00 3E	0aaa aaaa	Reverb Parameter 12 0 - 127
00 3F	0aaa aaaa	Reverb Parameter 13 0 - 127
00 40	0aaa aaaa	Reverb Parameter 14 0 - 127
00 41	0aaa aaaa	Reverb Parameter 15 0 - 127
00 42	0aaa aaaa	Reverb Parameter 16 0 - 127
00 43	0aaa aaaa	Reverb Parameter 17 0 - 127
00 44	0aaa aaaa	Reverb Parameter 18 0 - 127
00 45	0aaa aaaa	Reverb Parameter 19 0 - 127
00 46	0aaa aaaa	Reverb Parameter 20 0 - 127
00 47	0aaa aaaa	Reverb Parameter 21 0 - 127
00 48	0aaa aaaa	Reverb Parameter 22 0 - 127
00 49	0aaa aaaa	Reverb Parameter 23 0 - 127
00 4A	0aaa aaaa	Reverb Parameter 24 0 - 127
00 4B	0aaa aaaa	Reverb Master Level 0 - 127
00 4C	0000 aaaa	Master Tempo 2000 - 25000
00 4D*	0000 bbbb	(nibbled) (20.00 - 250.00)
00 4E*	0000 cccc	
00 4F*	0000 dddd	
00 50	0000 000a	Clock Source 0 - 1 (INT, MIDI)
00 55	000a aaaa	Master Coarse Tune 0 - 24 (-12 - +12 [semitone])
00 56	0aaa aaaa	Master Fine Tune 0 - 100 (-50 - +50 [cent])
00 57	0000 000a	Knob Control 0 - 1 (MULTI PART, CURRENT PART)
00 58	00aa aaaa	C1 Assign 0 - 60 (CC02 - CC05, CC07 - CC31, CC64 - CC95)
00 59	0000 00aa	C1 Output Mode 0 - 3 (OFF, INT, MIDI, INT&MIDI)
00 5A	00aa aaaa	C2 Assign 0 - 60 (CC02 - CC05, CC07 - CC31, CC64 - CC95)
00 5B	0000 00aa	C2 Output Mode 0 - 3 (OFF, INT, MIDI, INT&MIDI)
00 5C	00aa aaaa	C3 Assign 0 - 60 (CC02 - CC05, CC07 - CC31, CC64 - CC95)
00 5D	0000 00aa	C3 Output Mode 0 - 3 (OFF, INT, MIDI, INT&MIDI)
00 5E	00aa aaaa	VC Assign 0 - 60 (CC02 - CC05, CC07 - CC31, CC64 - CC95)
00 62	0000 aaaa	Voice Reserve 1 0 - 14
00 63	0000 aaaa	Voice Reserve 2 0 - 14
00 64	0000 aaaa	Voice Reserve 3 0 - 14
00 65	0000 aaaa	Voice Reserve 4 0 - 14
00 66	0000 aaaa	Voice Reserve 5 0 - 14
00 67	0000 aaaa	Voice Reserve 6 0 - 14
# 00 68	0aaa aaaa	Performance Name 1 32 - 126
# 00 69	0aaa aaaa	Performance Name 2 32 - 126
# 00 6A	0aaa aaaa	Performance Name 3 32 - 126
# 00 6B	0aaa aaaa	Performance Name 4 32 - 126
# 00 6C	0aaa aaaa	Performance Name 5 32 - 126
# 00 6D	0aaa aaaa	Performance Name 6 32 - 126
# 00 6E	0aaa aaaa	Performance Name 7 32 - 126
# 00 6F	0aaa aaaa	Performance Name 8 32 - 126
# 00 70	0aaa aaaa	Performance Name 9 32 - 126
# 00 71	0aaa aaaa	Performance Name 10 32 - 126
# 00 72	0aaa aaaa	Performance Name 11 32 - 126
# 00 73	0aaa aaaa	Performance Name 12 32 - 126
# 00 74	0aaa aaaa	Performance Name 13 32 - 126
# 00 75	0aaa aaaa	Performance Name 14 32 - 126
# 00 76	0aaa aaaa	Performance Name 15 32 - 126
# 00 77	0aaa aaaa	Performance Name 16 32 - 126

*: Cannot start from this address

● 1-2-2. Performance Part

Offset Address	Description	
00 00	0000 0aaa	Sample Number 0 - 127
00 01*	0bbb bbbb	(001 - 128)
00 03	0000 aaaa	Receive Channel 0 - 15 (1 - 16)
00 04	0aaa aaaa	Level 0 - 127
00 05	0aaa aaaa	Pan 0 - 127 (L64 - 63R)
00 06	000a aaaa	Coarse Tune 0 - 24 (-12 - +12 [semitone])
00 07	0aaa aaaa	Fine Tune 0 - 100 (-50 - +50 [cent])
00 08	0000 0aaa	Octave Shift 0 - 6

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		(-3 - +3 [octave])	
00 09	0000 000a	Pitch Sync Sw	0 - 1 (OFF, ON)
00 0A	0aaa aaaa	Keyboard Range Lower	0 - 127
00 0B	0aaa aaaa	Keyboard Range Upper	0 - 127 (C-1 - Upper) (Lower - G9)
00 0C	0000 00aa	Output Assign	0 - 2 (MAIN,M-FX,DIR)
00 0D	0aaa aaaa	Multi-FX Send Level	0 - 127
00 0E	0aaa aaaa	Chorus Send Level	0 - 127
00 0F	0aaa aaaa	Reverb Send Level	0 - 127
00 13	0000 000a	Tempo Sync Sw	0 - 1(OFF,ON)
00 14	0aaa aaaa	C1 Formant Depth	0 - 127 (-64 - +63)
00 15	0aaa aaaa	C1 Time Depth	0 - 127 (-64 - +63)
00 16	0aaa aaaa	C1 Pitch Depth	0 - 127 (-64 - +63)
00 17	0aaa aaaa	C1 Level Depth	0 - 127 (-64 - +63)
00 19	0aaa aaaa	C1 LFO Rate	0 - 127 (-64 - +63)
00 1A	0aaa aaaa	C1 LFO Formant Depth	0 - 127 (-64 - +63)
00 1B	0aaa aaaa	C1 LFO Pitch Depth	0 - 127 (-64 - +63)
00 1C	0aaa aaaa	C1 LFO Level Depth	0 - 127 (-64 - +63)
00 1D	0aaa aaaa	C1 LFO Pan Depth	0 - 127 (-64 - +63)
00 1E	0aaa aaaa	C2 Formant Depth	0 - 127 (-64 - +63)
00 1F	0aaa aaaa	C2 Time Depth	0 - 127 (-64 - +63)
00 20	0aaa aaaa	C2 Pitch Depth	0 - 127 (-64 - +63)
00 21	0aaa aaaa	C2 Level Depth	0 - 127 (-64 - +63)
00 23	0aaa aaaa	C2 LFO Rate	0 - 127 (-64 - +63)
00 24	0aaa aaaa	C2 LFO Formant Depth	0 - 127 (-64 - +63)
00 25	0aaa aaaa	C2 LFO Pitch Depth	0 - 127 (-64 - +63)
00 26	0aaa aaaa	C2 LFO Level Depth	0 - 127 (-64 - +63)
00 27	0aaa aaaa	C2 LFO Pan Depth	0 - 127 (-64 - +63)
00 28	0aaa aaaa	C3 Formant Depth	0 - 127 (-64 - +63)
00 29	0aaa aaaa	C3 Time Depth	0 - 127 (-64 - +63)
00 2A	0aaa aaaa	C3 Pitch Depth	0 - 127 (-64 - +63)
00 2B	0aaa aaaa	C3 Level Depth	0 - 127 (-64 - +63)
00 2D	0aaa aaaa	C3 LFO Rate	0 - 127 (-64 - +63)
00 2E	0aaa aaaa	C3 LFO Formant Depth	0 - 127 (-64 - +63)
00 2F	0aaa aaaa	C3 LFO Pitch Depth	0 - 127 (-64 - +63)
00 30	0aaa aaaa	C3 LFO Level Depth	0 - 127 (-64 - +63)
00 31	0aaa aaaa	C3 LFO Pan Depth	0 - 127 (-64 - +63)
00 32	0aaa aaaa	VC Formant Depth	0 - 127 (-64 - +63)
00 33	0aaa aaaa	VC Time Depth	0 - 127 (-64 - +63)
00 34	0aaa aaaa	VC Pitch Depth	0 - 127 (-64 - +63)
00 35	0aaa aaaa	VC Level Depth	0 - 127 (-64 - +63)
00 37	0aaa aaaa	VC LFO Rate	0 - 127 (-64 - +63)
00 38	0aaa aaaa	VC LFO Formant Depth	0 - 127 (-64 - +63)
00 39	0aaa aaaa	VC LFO Pitch Depth	0 - 127 (-64 - +63)
00 3A	0aaa aaaa	VC LFO Level Depth	0 - 127 (-64 - +63)
00 3B	0aaa aaaa	VC LFO Pan Depth	0 - 127 (-64 - +63)
00 3C	0aaa aaaa	MOD Formant Depth	0 - 127 (-64 - +63)
00 3D	0aaa aaaa	MOD Time Depth	0 - 127 (-64 - +63)
00 3E	0aaa aaaa	MOD Pitch Depth	0 - 127 (-64 - +63)
00 3F	0aaa aaaa	MOD Level Depth	0 - 127 (-64 - +63)
00 41	0aaa aaaa	MOD LFO Rate	0 - 127 (-64 - +63)
00 42	0aaa aaaa	MOD LFO Formant Depth	0 - 127 (-64 - +63)
00 43	0aaa aaaa	MOD LFO Pitch Depth	0 - 127 (-64 - +63)
00 44	0aaa aaaa	MOD LFO Level Depth	0 - 127 (-64 - +63)
00 45	0aaa aaaa	MOD LFO Pan Depth	0 - 127 (-64 - +63)
00 46	0aaa aaaa	AFT Formant Depth	0 - 127 (-64 - +63)
00 47	0aaa aaaa	AFT Time Depth	0 - 127 (-64 - +63)
00 48	0aaa aaaa	AFT Pitch Depth	0 - 127 (-64 - +63)
00 49	0aaa aaaa	AFT Level Depth	0 - 127 (-64 - +63)

00 4B	0aaa aaaa	AFT LFO Rate	0 - 127 (-64 - +63)
00 4C	0aaa aaaa	AFT LFO Formant Depth	0 - 127 (-64 - +63)
00 4D	0aaa aaaa	AFT LFO Pitch Depth	0 - 127 (-64 - +63)
00 4E	0aaa aaaa	AFT LFO Level Depth	0 - 127 (-64 - +63)
00 4F	0aaa aaaa	AFT LFO Pan Depth	0 - 127 (-64 - +63)
00 50	0000 aaaa	Hold1 Destination	0 - 8 (OFF, PAUSE, LOOP, EVENT STEP, STEP DIRECTION, POLY/SOLO, LOCK LEGATO)
00 51	0000 aaaa	Hold2 Destination	0 - 8 (OFF, PAUSE, LOOP, EVENT STEP, STEP DIRECTION, POLY/SOLO, LOCK LEGATO)
00 52	0aaa aaaa	Bend Formant Depth	0 - 127 (-64 - +63)
00 53	0aaa aaaa	Bend Time Depth	0 - 127 (-64 - +63)
00 54	0aaa aaaa	Bend Level Depth	0 - 127 (-64 - +63)
00 55	0aaa aaaa	Bend LFO Rate	0 - 127 (-64 - +63)
00 56	0aaa aaaa	Bend LFO Formant Depth	0 - 127 (-64 - +63)
00 57	0aaa aaaa	Bend LFO Pitch Depth	0 - 127 (-64 - +63)
00 58	0aaa aaaa	Bend LFO Level Depth	0 - 127 (-64 - +63)
00 59	0aaa aaaa	Bend LFO Pan Depth	0 - 127 (-64 - +63)
00 5B	0000 aaaa	Bend Range Up	0 - 12 (0 - +12)
00 5C	00aa aaaa	Bend Range Down	0 - 48 (0 - -48)
00 5F	0000 00aa	Keyboard Map	0 - 1 (PHRASE, GROOVE)
# 00 62	0aaa aaaa	Sample Name 1	32 - 126
# 00 63	0aaa aaaa	Sample Name 2	32 - 126
# 00 64	0aaa aaaa	Sample Name 3	32 - 126
# 00 65	0aaa aaaa	Sample Name 4	32 - 126
# 00 66	0aaa aaaa	Sample Name 5	32 - 126
# 00 67	0aaa aaaa	Sample Name 6	32 - 126
# 00 68	0aaa aaaa	Sample Name 7	32 - 126
# 00 69	0aaa aaaa	Sample Name 8	32 - 126
# 00 6A	0aaa aaaa	Sample Name 9	32 - 126
# 00 6B	0aaa aaaa	Sample Name 10	32 - 126
# 00 6C	0aaa aaaa	Sample Name 11	32 - 126
# 00 6D	0aaa aaaa	Sample Name 12	32 - 126

*: Cannot start from this address

■ 1-3. Sample

Offset Address	Description	
00 00	000a aaaa	Wave Gain 0 - 18 (0 - +18 [dB])
00 01	0000 0aaa	LFO Waveform 0 - 7 (TRI, SIN, SAW, SQR, TRP, S&H, RND, CHS)
00 02	0000 000a	LFO Key Trigger 0 - 1 (OFF, ON)
00 03	0aaa aaaa	LFO Rate 0 - 127
00 04	0000 0aaa	LFO Offset 0 - 4 (-100, -50, 0, +50, +100 [%])
00 05	0aaa aaaa	LFO Delay Time 0 - 127
00 06	0aaa aaaa	LFO Fade Time 0 - 127
00 07	0000 00aa	LFO Fade Mode 0 - 3 (ON-IN, ON-OUT, OFF-IN, OFF-OUT)
00 08	0000 000a	LFO External Sync 0 - 1 (OFF, CLK)
00 09	0000 000a	Pitch Control Sw 0 - 1 (OFF, ON)
00 0A	0000 aaaa	Pitch Keyfollow 0 - 15 (-100, -70, -50, -30, -10, 0, +10, +20, +30, +40, +50, +70, +100, +120, +150, +200)
00 0B	0aaa aaaa	Pitch LFO Depth 0 - 127 (-64 - +63)
00 0C	000a aaaa	Random Pitch Depth 0 - 30 (0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 20, 30, 40, 50, 60, 70, 80, 90, 100, 200, 300, 400, 500, 600, 700, 800, 900, 1000, 1100, 1200)
00 0D	0000 000a	Time Control Sw 0 - 1 (OFF, ON)
00 0E	0000 aaaa	Time Keyfollow 0 - 15 (-100, -70, -50, -30, -10, 0, +10, +20, +30, +40, +50, +70, +100, +120, +150, +200)
00 0F	000a aaaa	Human Feel 0 - 18
00 10	0000 000a	Formant Control Sw 0 - 1 (OFF, ON)
00 11	0000 aaaa	Formant Keyfollow 0 - 15 (-100, -70, -50, -30, -10, 0, +10, +20, +30, +40, +50, +70, +100, +120, +150, +200)
00 12	0aaa aaaa	Formant LFO Depth 0 - 127 (-64 - +63)
00 13	0000 00aa	Pan Control Mode 0 - 2 (OFF, CONTINUOUS, KEY-ON)
00 14	0000 aaaa	Pan Keyfollow 0 - 14 (-100, -70, -50, -40, -30, -20, -10, 0, +10, +20, +30, +40, +50, +70, +100)
00 15	00aa aaaa	Random Pan Depth 0 - 63
00 16	0aaa aaaa	Alternate Pan 0 - 127 (L64 - 63R)
00 17	0aaa aaaa	Pan LFO Depth 0 - 127 (L64 - 63R)

00 18	0aaa aaaa	Level LFO Depth	0 - 127 (-64 - +63)
00 19	0aaa aaaa	Velocity	0 - 127
00 1A	0000 0aaa	Velocity Curve	(REAL,1 - 127) 0 - 6 (TYPE1 - TYPE7)
00 1B	0aaa aaaa	Fade In	0 - 127 (0.00 - 2.00[sec])
00 1C	0aaa aaaa	Fade Out	0 - 127 (0.00 - 6.00[sec])
00 1D	0000 000a	Portamento Sw	0 - 1 (OFF, ON)
00 1E	0000 000a	Portamento Mode	0 - 1 (NORMAL, LEGATO)
00 1F	0000 000a	Portamento Type	0 - 1 (RATE, TIME)
00 20	0000 000a	Portamento Start	0 - 1 (PITCH, NOTE)
00 21	0aaa aaaa	Portamento Time	0 - 127
00 22	0000 000a	Portamento Formant Sw	0 - 1 (OFF, ON)
00 23	0000 000a	Portamento Time Sw	0 - 1 (OFF, ON)
00 24	0000 000a	Loop Sw	0 - 1 (OFF, ON)
00 25	0000 000a	Key Assign Mode	0 - 1 (POLY, SOLO)
00 26	0000 00aa	Playback Mode	0 - 2 (RETRIGGER, TIME SYNC, STEP)
00 27	0000 00aa	Trigger mode	0 - 2 (GATE, TRIGGER, DRUM)
00 29	0000 000a	Melody Cancel	0 - 1 (OFF, ON)
#	00 2C	0aaa aaaa	Sample Name 1 32 - 126
#	00 2D	0aaa aaaa	Sample Name 2 32 - 126
#	00 2E	0aaa aaaa	Sample Name 3 32 - 126
#	00 2F	0aaa aaaa	Sample Name 4 32 - 126
#	00 30	0aaa aaaa	Sample Name 5 32 - 126
#	00 31	0aaa aaaa	Sample Name 6 32 - 126
#	00 32	0aaa aaaa	Sample Name 7 32 - 126
#	00 33	0aaa aaaa	Sample Name 8 32 - 126
#	00 34	0aaa aaaa	Sample Name 9 32 - 126
#	00 35	0aaa aaaa	Sample Name 10 32 - 126
#	00 36	0aaa aaaa	Sample Name 11 32 - 126
#	00 37	0aaa aaaa	Sample Name 12 32 - 126

#: RQ1 only (can NOT be written by DT1)

1-4. Wave

Offset	Address	Description	
00 00	0000 000a	Original Tempo	200000 - 2500000
00 01*	0bbb bbbb		(20.0000 - 250.0000)
00 02*	0ccc cccc		
00 03*	0ddd dddd		
00 04	0000 00aa	Original Denominator	0 - 3 (2,4,8,16)
00 05	000a aaaa	Original Numerator	1 - 16
00 06	0aaa aaaa	Original Pitch	0 - 127
00 07	0aaa aaaa	Original Fine Tune	0 - 100 (-50 - +50 [cent])
#	00 08	0000 000a	Sample Type 0 - 1 (MONO, STEREO)
#	00 09	0000 00aa	Encode Type 0 - 3 (NO ENCODE, SOLO, BACKING, ENSEMBLE)
#	00 0A	0aaa aaaa	Loop Start Point 0 - 268435455
#	00 0B*	0bbb bbbb	
#	00 0C*	0ccc cccc	
#	00 0D*	0ddd dddd	
#	00 0E	0aaa aaaa	Loop End Point 0 - 268435455
#	00 0F*	0bbb bbbb	
#	00 10*	0ccc cccc	
#	00 11*	0ddd dddd	
#	00 12	0aaa aaaa	Number of Events 0 - 16383
#	00 13*	0bbb bbbb	
#	00 14	0aaa aaaa	Number of Samples 0 - 268435455
#	00 15*	0bbb bbbb	
#	00 16*	0ccc cccc	
#	00 17*	0ddd dddd	
#	00 18	000a aaaa	Original Key 0 - 31 (C=B(lower 4bit), major/minor(bit 4))
#	00 19	0000 aaaa	Original Tune 4274 - 4526 (nibbled)
#	00 1A*	0000 bbbb	
#	00 1B*	0000 cccc	
#	00 1C*	0000 dddd	

#: RQ1 only (can NOT be written by DT1)

*: Cannot start from this address

Address Block Map

The following is an outline of the address map for Exclusive messages.

Address(H)	Block	Sub Block	Reference
00 00 00 00	System common		1-1-1
10 00 00 00	Performance	Common	1-2-1
		Part 1	1-2-2
		:	
		Part 6	
20 00 00 00	Sample	Sample 001	1-3
		:	
		Sample 128	
30 00 00 00	Wave	Wave 001	1-4
		:	
		Wave 128	

4. Supplementary material

Decimal/Hexadecimal Table

(hexadecimal values are indicated by a following "H")

MIDI uses 7-bit hexadecimal values to indicate data values and the address and size of exclusive messages. The following table shows the correspondence between decimal and hexadecimal numbers.

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

D: decimal

H: hexadecimal

- * Decimal values such as MIDI channel, bank select, and program change are listed as one (1) 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.
- * For a signed number (+/-), 00H = -64, 40H = +/-0, and 7FH = +63. I.e., the decimal equivalent will be 64 less than the decimal value given in the above table. For a two-byte signed number, 00 00H = -8192, 40 00H = +/-0, and 7F 7FH = +8191. For example the decimal expression of aa bbH would be aa bbH - 40 00H = (aa x 128 + bb - 64 x 128).
- * Hexadecimal notation in two 4-bit units is used for data indicated as "nibbled." The nibbled two-byte value of 0a 0b H would be a x 16 + b.

<Example 1> What is the decimal equivalent of 5AH?

From the above table, 5AH = 90.

<Example 2> What is the decimal equivalent of the 7-bit hexadecimal values 12 34H?

From the above table, 12H = 18 and 34H = 52.

Thus, 18 x 128 + 52 = 2356.

MIDI Implementation

● Examples of Actual MIDI Messages

<Example 1> 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 of MIDI CH = 3, note number 62 (note name D4) and velocity 95.

<Example 2> 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.

<Example 3> 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 of the Pitch Bend value, and the 3rd byte (28H=40) is the MSB. However since the Pitch Bend is a signed number with 0 at 40 00H (= 64 x 128 + 0 = 8192), the Pitch Bend value in this case is 28 00H - 40 00H = 40 x 128 + 0 - (64 x 128 + 0) = 5120 - 8192 = -3072.

If we assume that the Pitch Bend Sensitivity is set to two semitones, the pitch will change only -200 cents for a Pitch Bend value of -8192 (00 00H). Thus, this message is specifying a Pitch Bend of -200 x (-3072) / (-8192) = -75 cents on MIDI CH = 11.

<Example 4> 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.

In Control Change messages, the 2nd byte is the controller number, and the 3rd byte is the parameter value. MIDI allows what is known as "running status," when if messages of the same status follow each other, it is permitted to omit the second and following status bytes. In the message above, running status is being used, meaning that the message has the following content.

B3 64 00 MIDI CH = 4, RPN parameter number LSB: 00H
 (B3) 65 00 MIDI CH = 4, RPN parameter number MSB: 00H
 (B3) 06 0C MIDI CH = 4, parameter value MSB: 0CH
 (B3) 26 00 MIDI CH = 4, parameter value LSB: 00H
 (B3) 64 7F MIDI CH = 4, RPN parameter number LSB: 7FH
 (B3) 65 7F MIDI CH = 4, RPN parameter number MSB: 7FH

Thus, this message transmits a parameter value of 0C 00H to RPN parameter number 00 00H on MIDI CH = 4, and then sets the RPN parameter number to 7F 7FH.

The function assigned to RPN parameter number 00 00H is Pitch Bend Sensitivity, and the MSB of the parameter value indicates semitone steps. Since the MSB of this parameter value is 0CH = 12, the maximum width of pitch bend is being set to +/-12 semitones (1 octave). (This instrument ignores the LSB of Pitch Bend Sensitivity, but it is best to transmit the LSB (parameter value 0) as well, so that the message can be correctly received by any device.)

Once the parameter number has been set for RPN or NRPN, all subsequent Data Entry messages on that channel will be effective. Thus, it is recommended that after you have made the change you want, you set the parameter number to 7F 7FH (an "unset" or "null" setting). The final (B3) 64 7F (B3) 65 7F is for this purpose.

It is not a good idea to store many events within the data of a song (e.g., a Standard MIDI File song) using running status as shown in <Example 4>. When the song is paused, fast-forwarded or rewound, the sequencer may not be able to transmit the proper status, causing the sound source to misinterpret the data. It is best to attach the proper status byte to all events.

It is also important to transmit RPN or NRPN parameter number settings and parameter values in the correct 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 (i.e., the time resolution of the sequencer)

● Examples of Exclusive Messages and Calculating the Checksum

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

○ How to calculate the checksum (hexadecimal numbers are indicated by 'H')

The checksum consists of a value whose lower 7 bits are 0 when the address, size and checksum itself are added. The following formula shows how to calculate the checksum when the exclusive message to be transmitted has an address of aa bb cc ddH, and data or size of e e f fH.

$$\begin{aligned} aa + bb + cc + dd + ee + ff &= \text{total} \\ \text{total} / 128 &= \text{quotient} \dots \text{remainder} \\ 128 - \text{remainder} &= \text{checksum} \end{aligned}$$

<Example 1> Setting the Performance Common REVERB TYPE to HALL 1 (DT1)

The "Parameter address map" indicates that the starting address of the Performance is 10 00 00 00H, that the Performance Common offset address is 00 00H, and that the REVERB TYPE address is 00 32H. Thus, the address is:

$$\begin{array}{r} 10\ 00\ 00\ 00\text{H} \\ \quad\quad\quad 00\ 00\text{H} \\ +) \quad\quad\quad 00\ 32\text{H} \\ \hline 10\ 00\ 00\ 32\text{H} \end{array}$$

Since HALL 1 is parameter value 03H,

F0	41	10	00	1D	12	10 00 00 32	03	??	F7
(1)	(2)	(3)	(4)	(5)	(6)	address	size	checksum	(7)

- (1) Exclusive status
- (2) ID number (Roland)
- (3) Device ID (17)
- (4) Model ID#1 (VariOS)
- (5) Model ID#2 (VariOS)
- (6) Command ID (DT1)
- (7) EOX

Next we calculate the checksum.

$$\begin{aligned} 10\text{H} + 00\text{H} + 00\text{H} + 32\text{H} + 03\text{H} &= 16 + 0 + 0 + 50 + 3 = 69 \text{ (sum)} \\ 69 \text{ (total)} / 128 &= 0 \text{ (quotient)} \dots 69 \text{ (remainder)} \\ \text{checksum} &= 128 - 69 \text{ (remainder)} = 59 = 3\text{BH} \end{aligned}$$

This means that F0 41 10 00 1D 12 01 00 00 32 03 3B F7 is the message we transmit.

● ASCII Code Table

On the VariOS, the following ASCII code set is used for processing data such as the Sample Name and the Performance Name.

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	^	126	7EH	
63	3FH	?	95	5FH	_			

D: decimal

H: hexadecimal

Note: SP indicates "space."