

CONTROLLER Mode

You can assign the following messages to the ribbon controllers (C1, C2) and rotary encoders (R1–R4) and use them for control.

Display	Explanation
CC	Control change. You can assign control changes 0–97.
CAF	Aftertouch.
PAF	Polyphonic aftertouch. You can assign keys C-1–G9.
P.Bend	Pitch bend.
Note	Note message. When you press the ribbon controller, a note-on corresponding to the position you pressed is transmitted. When you release the ribbon controller, a note-off is transmitted. The velocity is fixed at 127. * Supported only by ribbon controllers You can use the PATCH parameter “Note Scale” to select the scale.
SysEx1–SysEx4	System exclusive message. The system exclusive messages that are transmitted are specified by PATCH parameters.

MEMO

In the case of the ribbon controllers, you can make settings so that the value is held when you release your finger. Use the PATCH parameters “C1 Hold” and “C2 Hold” to specify this.

* This does not apply to Note.

How to Specify SysEx1–SysEx4

1. Press the [MODE] button to switch the CONTROLLER mode.
2. Press the [MENU] button to access the Select Menu screen.
3. Press the [▲] [▼] buttons to select “Patch,” and press the [INC] button.
4. Press the [▲] [▼] buttons to select “SysEx1, 2, 3, or 4,” and press the [INC] button.
5. Press the [DEC] [INC] buttons to select “Normal” or “Roland.”

In the case of Normal mode

The F0 at the beginning and the F7 at the end are specified automatically.
You can freely specify from 1 to 32 items of data between F0 and F7.

```
Type: Normal
F0 7E 7F 09 01
F7
S1:IMS S2:DEL S3:VARIABLE( 4)
```

1. Use the [▲] [▼] buttons to move to a line other than the line that shows Type.
2. Use the [◀] [▶] buttons to select the data that you want to edit.
3. Use the [DEC] [INC] buttons to edit the data.

* You can also use the rotary encoders to make changes.

Functions of the S1–S3 buttons

Button	Function
S1	Pressing this button inserts a data item before the current position.
S2	Pressing this button deletes the data at the current position.
S3	Specify the data that changes when you operate a rotary encoder or ribbon controller in CONTROLLER mode. Pressing the button once again at the same position turns this off, so that the same message is transmitted every time you operate the rotary encoder or ribbon controller.

In the case of Roland mode

You can specify the data of a Roland Type IV system exclusive message.
The F0 (exclusive status), Roland ID: 41, checksum, and F7 (end of exclusive) are specified automatically.
The header and the main body of the data are specified separately.

Setting the device ID

1. Use the [▲] [▼] [◀] [▶] buttons to select the data item that follows F0 41.

```
Type: Roland
F0 41 10 00 00 00 1B 12
00 00 00 00 00
00 F7
```

2. Use the [DEC] [INC] buttons to edit the data.

The range of this data is 10–1F.

* You can also use the rotary encoders to make changes.

Setting the model ID

The model ID consists of multiple data items of 00 and one data item that is not 00.

1. Use the [▲] [▼] [◀] [▶] buttons to select the data that follows the device ID.

* In some cases, multiple data items might be selected.



Functions of the S1 and S2 buttons

Button	Function
S1	Pressing this button inserts one 00 before the current position.
S2	Pressing this button deletes the 00 at the current position.

2. Press the [DEC] [INC] buttons to set the model ID.

* You can also use the rotary encoders to make changes.

Setting the command ID

1. Use the [▲] [▼] [◀] [▶] buttons to select the last data item of the FO 41 line.



2. Press the [DEC] [INC] buttons to set the Command ID.

The command ID is either 11 or 12.

* You can also use the rotary encoders to make changes.

Setting the address and data

1. Use the [▲] [▼] [◀] [▶] buttons to select something other than the Type line or the FO 41 line.



2. Use the [◀] [▶] buttons to select the data that you want to edit.

3. Use the [DEC] [INC] buttons to edit the data.

* You can also use the rotary encoders to make changes.

Functions of the S1–S3 buttons

Button	Function
S1	Pressing this button inserts an address or data item before the current position.
S2	Pressing this button deletes the address or data at the current position.
S3	Specify the data that changes when you operate a rotary encoder or ribbon controller in CONTROLLER mode. Pressing the button once again at the same position turns this off, so that the same message is transmitted every time you operate the rotary encoder or ribbon controller.

Panic Function

If a “stuck note” or other problem occurs, use the following action to transmit All Note Off and Reset All Controllers messages for all MIDI channels.

1. Press the [MODE] button to switch the CONTROLLER mode.
2. Press the [MENU] button to access the Select Menu screen.
3. To transmit an All Note Off message, press the [1] button.
To transmit a Reset All Controllers message, press the [2] button.

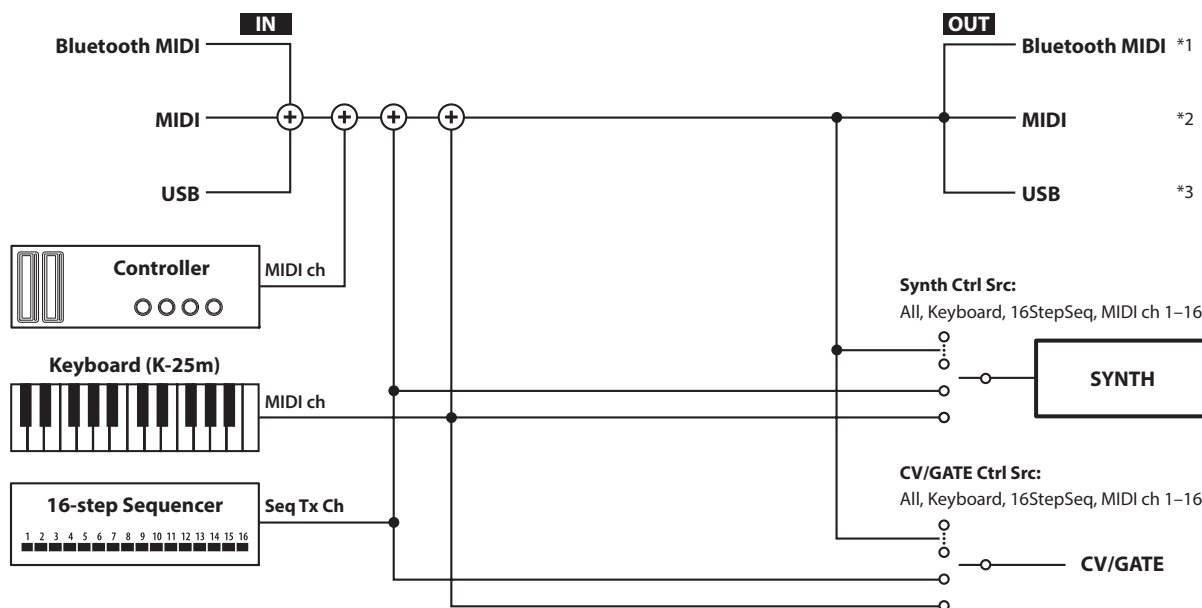
Tone List (SYNTH Mode)

The following tones are saved when the unit is shipped from the factory.

* The tone name and category are not displayed on this unit.

Bank	Tone	Category	
1	1	PWM Power Lead	Lead
	2	Soft Saw Lead	Lead
	3	Fat Pop Bass	Bass
	4	Clean Sqr Lead	Lead
	5	Pulse Pedal Bass	Bass
	6	70's E. Piano	Keyboard
	7	Soft Horn	Syn
	8	Deep PWM Bass	Bass
2	9	8 bit LFO Syn	Syn
	10	Digital Perc	Syn
	11	Sqr LFO Bass	Bass
	12	PWM Slicer	Syn
	13	Sqr Hit	Syn
	14	Communication	Fx
	15	PWM Lead	Lead
	16	Noise Shower	FX

MIDI Signal Flow



*1: The input signal from Bluetooth MIDI IN is not output.

*2: The input signal from MIDI IN is not output.

*3: The input signal from USB IN is not output.

1. Data Reception (Synth)

■ Channel Voice Messages

● Note off

Status	2nd byte	3rd byte
8nH	kkH	vvH
9nH	kkH	00H
n = MIDI channel number:	0H - FH (ch.1 - ch.16)	
kk = note number:	00H - 7FH (0 - 127)	
vv = note off velocity:	00H - 7FH (0 - 127)	

● Note on

Status	2nd byte	3rd byte
9nH	kkH	vvH
n = MIDI channel number:	0H - FH (ch.1 - ch.16)	
kk = note number:	00H - 7FH (0 - 127)	
vv = note on velocity:	01H - 7FH (1 - 127)	

● Control change

○ 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)	

○ 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

○ Resonance (Controller number 71)

Status	2nd byte	3rd byte
BnH	47H	vvH
n = MIDI channel number:	0H - FH (ch.1 - ch.16)	
vv = Resonance value (relative change):	00H - 40H - 7FH (-64 - 0 - +63)	

○ Release time (Controller number 72)

Status	2nd byte	3rd byte
BnH	48H	vvH
n = MIDI channel number:	0H - FH (ch.1 - ch.16)	
vv = Release time value (relative change):	00H - 40H - 7FH (-64 - 0 - +63)	

○ Attack time (Controller number 73)

Status	2nd byte	3rd byte
BnH	49H	vvH
n = MIDI channel number:	0H - FH (ch.1 - ch.16)	
vv = Attack time value (relative change):	00H - 40H - 7FH (-64 - 0 - +63)	

○ Cutoff (Controller number 74)

Status	2nd byte	3rd byte
BnH	4AH	vvH
n = MIDI channel number:	0H - FH (ch.1 - ch.16)	
vv = Cutoff value (relative change):	00H - 40H - 7FH (-64 - 0 - +63)	

○ Decay time (Controller number 75)

Status	2nd byte	3rd byte
BnH	4BH	vvH
n = MIDI channel number:	0H - FH (ch.1 - ch.16)	
vv = Decay time value (relative change):	00H - 40H - 7FH (-64 - 0 - +63)	

○ Vibrato rate (Controller number 76)

Status	2nd byte	3rd byte
BnH	4CH	vvH
n = MIDI channel number:	0H - FH (ch.1 - ch.16)	
vv = Vibrato depth value (relative change):	00H - 40H - 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 - ch.16)	
vv = Vibrato depth value (relative change):	00H - 40H - 7FH (-64 - 0 - +63)	

○ Pitch bend change

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

■ Channel Mode Messages

● All Sounds Off (Controller number 120)

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

● Reset all controllers (Controller number 121)

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

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

Controller	Reset value
Pitch bend change	±0 (Center)
Modulation	0 (off)
Hold 1	0 (off)

● All notes off (Controller number 123)

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

■ System Realtime Message

● 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.

2. Data Reception (CV/GATE)

■ Channel Voice Messages

● Note off

Status	2nd byte	3rd byte	
8nH	kkH	vvH	
9nH	kkH	00H	
n = MIDI channel number:			0H - FH (ch.1 - ch.16)
kk = note number:			00H - 7FH (0 - 127)
vv = note off velocity:			00H - 7FH (0 - 127)

● Note on

Status	2nd byte	3rd byte	
9nH	kkH	vvH	
n = MIDI channel number:			0H - FH (ch.1 - ch.16)
kk = note number:			00H - 7FH (0 - 127)
vv = note on velocity:			01H - 7FH (1 - 127)

● Pitch bend change

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

■ Channel Mode Messages

● All sounds off (Controller number 120)

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

● Reset all controllers (Controller number 121)

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

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

Controller	Reset value
Pitch bend change	±0 (Center)
Modulation	0 (off)
Hold 1	0 (off)

● All notes off (Controller number 123)

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

■ System Realtime Message

● 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.

3. Data Reception (Step Sequencer)

■ Channel Voice Messages

● Note off

Status	2nd byte	3rd byte	
8nH	kkH	vvH	
9nH	kkH	00H	
n = MIDI channel number:			0H - FH (ch.1 - ch.16)
kk = note number:			00H - 7FH (0 - 127)
vv = note off velocity:			00H - 7FH (0 - 127)

● Note on

Status	2nd byte	3rd byte	
9nH	kkH	vvH	
n = MIDI channel number:			0H - FH (ch.1 - ch.16)
kk = note number:			00H - 7FH (0 - 127)
vv = note on velocity:			01H - 7FH (1 - 127)

■ System Realtime Message

● Timing clock

Status
F8H

● Start

Status
FAH

● Stop

Status
FCH

4. Data Transmission (Step Sequencer)

■ Channel Voice Messages

● Note off

Status	2nd byte	3rd byte	
8nH	kkH	vvH	
9nH	kkH	00H	
n = MIDI channel number:			0H - FH (ch.1 - ch.16)
kk = note number:			00H - 7FH (0 - 127)
vv = note off velocity:			00H - 7FH (0 - 127)

● Note on

Status	2nd byte	3rd byte	
9nH	kkH	vvH	
n = MIDI channel number:			0H - FH (ch.1 - ch.16)
kk = note number:			00H - 7FH (0 - 127)
vv = note on velocity:			01H - 7FH (1 - 127)

● Control change

○ Resonance (Controller number 71)

Status	2nd byte	3rd byte	
BnH	47H	vvH	
n = MIDI channel number:			0H - FH (ch.1 - ch.16)
vv = Resonance value (relative change):			00H - 40H - 7FH (-64 - 0 - +63)

○ Cutoff (Controller number 74)

Status	2nd byte	3rd byte	
BnH	4AH	vvH	
n = MIDI channel number:			0H - FH (ch.1 - ch.16)
vv = Cutoff value (relative change):			00H - 40H - 7FH (-64 - 0 - +63)

■ System Realtime Message

● Timing clock

Status
F8H

● Start

Status
FAH

● Stop

Status
FCH

5. Data Transmission (Controller)

■ System exclusive messages

Status	Data byte	Status
FOH	iiH, ddH,, eeH	F7H
FOH:	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)	

■ Universal non-realtime system exclusive messages

● 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 (A-01) is 00H 00H 00H 1BH.

○ Data request 1 (RQ1)

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

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

Status	Data byte	Status
FOH	41H, dev, 00H, 00H, 00H, 1BH, 11H, aaH, bbH, ccH, ddH, ssH, ttH, uuH, vvH, sum	F7H

Byte	Remarks
FOH	Exclusive status
41H	ID number (Roland)
dev	device ID (dev: 10H - 1FH, 7FH)
00H	model ID #1 (A-01)
00H	model ID #2 (A-01)
00H	model ID #3 (A-01)
1BH	model ID #4 (A-01)
11H	command ID (RQ1)
aaH	address MSB
bbH	address
ccH	address
ddH	address LSB
ssH	size MSB
ttH	size
uuH	size
vvH	size LSB
sum	checksum
F7H	EOX (End Of Exclusive)

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

* For the checksum, refer to p. 12.

○ Data set 1 (DT1)

Status	Data byte	Status
F0H	41H, dev, 00H, 00H, 00H, 1BH, 12H, aaH, bbH, ccH, ddH, eeH, ... ffH, sum	F7H

Byte	Explanation
F0H	Exclusive status
41H	ID number (Roland)
dev	Device ID (dev: 10H - 1FH, 7FH)
00H	model ID #1 (A-01)
00H	model ID #2 (A-01)
00H	model ID #3 (A-01)
1BH	model ID #4 (A-01)
12H	command ID (DT1)
aaH	address MSB
bbH	address
ccH	address
ddH	address LSB
eeH	data: the actual data to be sent. Multiple bytes of data are transmitted in order starting from the address.
:	:
ffH	data
sum	checksum
F7H	EOX (End Of Exclusive)

- * The amount of data that can be transmitted at one time depends on the type of data, and data will be transmitted from the specified starting address and size. Refer to the address and size given in "Parameter Address Map" (p. 8).
- * Data larger than 256 bytes will be divided into packets of 256 bytes or less, and each packet will be sent at an interval of about 20 ms.
- * Regarding the checksum, please refer to p. 12.

6. Data Transmission (Controller)

■ Channel Voice Messages

● Note off

Status	2nd byte	3rd byte
8nH	kkH	vvH
9nH	kkH	00H
n = MIDI channel number:		0H - FH (ch.1 - ch.16)
kk = note number:		00H - 7FH (0 - 127)
vv = note off velocity:		00H - 7FH (0 - 127)

● Note on

Status	2nd byte	3rd byte
9nH	kkH	vvH
n = MIDI channel number:		0H - FH (ch.1 - ch.16)
kk = note number:		00H - 7FH (0 - 127)
vv = note on velocity:		01H - 7FH (1 - 127)

● Polyphonic key pressure

Status	2nd byte	3rd byte
AnH	kkH	vvH
n = MIDI channel number:		0H - FH (ch.1 - ch.16)
kk = note number:		00H - 7FH (0 - 127)
vv = Polyphonic key pressure		00H - 7FH (0 - 127)

● Control Change

Status	2nd byte	3rd byte
BnH	kkH	vvH
n = MIDI channel number:		0H - FH (ch.1 - ch.16)
kk = controller number:		00H - 7FH (0 - 97)
vv = value:		00H - 7FH (0 - 127)

● Program change

Status	2nd byte	
CnH	ppH	
n = MIDI channel number:		
pp = program number:		
		0H - FH (ch.1 - ch.16)
		00H - 7FH (prog.1 - prog.128)

● Channel aftertouch

Status	2nd byte	
DnH	vvH	
n = MIDI channel number:		
vv = Channel aftertouch:		
		0H - FH (ch.1 - ch.16)
		00H - 7FH (0 - 127)

● Pitch bend change

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

System Exclusive Message

<u>Status</u>	<u>Data byte</u>	<u>Status</u>
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)	

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 (A-01) is 00H 00H 00H 1BH.

* This is transmitted when you execute the SYSTEM setting Bulk Dump.

Data set 1 (DT1)

<u>Status</u>	<u>Data byte</u>	<u>Status</u>
F0H	41H, dev, 00H, 00H, 00H, 1BH, 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, 7FH)	
00H	model ID #1 (A-01)	
00H	model ID #2 (A-01)	
00H	model ID #3 (A-01)	
1BH	model ID #4 (A-01)	
12H	command ID (DT1)	
aaH	address MSB	
bbH	address	
ccH	address	
ddH	address LSB	
eeH	data: the actual data to be sent. Multiple bytes of data are transmitted in order starting from the address.	
:	:	
ffH	data	
sum	checksum	
F7H	EOX (End Of Exclusive)	

* The amount of data that can be transmitted at one time depends on the type of data, and data will be transmitted from the specified starting address and size. Refer to the address and size given in "Parameter Address Map" (p. 8).

* Data larger than 256 bytes will be divided into packets of 256 bytes or less, and each packet will be sent at an interval of about 20 ms.

* Regarding the checksum, please refer to p. 12.

7. Parameter Address Map

A-01 (Model ID = 00H 00H 00H 1BH)

Start Address	Description
00 00 00 00	System
00 01 00 00	Setup
00 20 00 00	Temporary Tone
00 30 00 00	Temporary Patch
00 40 00 00	Temporary Pattern
01 20 00 00	User Tone 1
01 21 00 00	User Tone 2
:	:
01 2F 00 00	User Tone 16
01 30 00 00	User Patch 1
01 31 00 00	User Patch 2
:	:
01 3F 00 00	User Patch 16
01 40 00 00	User Pattern 1
01 41 00 00	User Pattern 2
:	:
01 4F 00 00	User Pattern 16

* Command

Start Address	Description
10 00 00 00	Write System
11 20 00 00	Write User Tone 1
11 21 00 00	Write User Tone 2
:	:
11 2F 00 00	Write User Tone 16
11 30 00 00	Write User Patch 1
11 31 00 00	Write User Patch 2
:	:
11 3F 00 00	Write User Patch 16
11 40 00 00	Write User Pattern 1
11 41 00 00	Write User Pattern 2
:	:
11 4F 00 00	Write User Pattern 16
10 70 00 00	Write All

* System

Offset Address	Description	Range
00 00	0000 aaaa | 0000 aaaa | SYSTEM TEMPO	40 - 240
00 01	0aaa aaaa | | TEMPO SYNC AUTO, INTERNAL	0 - 1
00 02	0aaa aaaa | | LCD CONTRAST	0 - 9 1 - 10
00 03	0aaa aaaa | | AUTO OFF	0 - 1
00 04	0aaa aaaa | | ECO MODE	0 - 3
00 05	0aaa aaaa | | BLE SW	0 - 1
00 06	0aaa aaaa | | VELOCITY TOUCH	0 - 127 TOUCH, 1-127
00 07	0aaa aaaa | | VELOCITY CURVE	0 - 2 LIGHT, MEDIUM, HEAVY
00 08	0aaa aaaa | | TUNE	0 - 127 -64 - 63
00 09	0aaa aaaa | | CV SCALE	0 - 126 -63 - 63
00 0A	0000 aaaa | 0000 aaaa | CV FINE TUNE	0 - 200 -100 - 100
00 0B	0aaa aaaa | | CV REF NOTE	0 - 4 C0 - C4
00 0C	0aaa aaaa | | BLE NAME	0 - 9 OFF, 1 - 9
00 0D	0aaa aaaa | | reserve (LAST_PATCH)	0 - 15
00 0E	0aaa aaaa | | reserve (LAST_SYN)	0 - 15

00 0F	0aaa aaaa		reserve (LAST_PTN)	0 - 15
00 10	0aaa aaaa		reserve	
00 11	0aaa aaaa		reserve	
00 12	0aaa aaaa		reserve	
00 13	0aaa aaaa		reserve	
00 14	0aaa aaaa		reserve	
00 15	0aaa aaaa		reserve	
00 16	0aaa aaaa		reserve	
00 17	0aaa aaaa		reserve	
00 00 0A	Total Size			

* Setup

Offset	Address	Description		
00 00	0aaa aaaa		CURRENT MEMORY	1 - 16 0 - 15
00 01	0000 aaaa	0000 aaaa	TEMPO	40 - 240
00 02	0aaa aaaa		CURRENT PATTERN	1 - 16 0 - 15
00 03	0aaa aaaa		NEXT PATTERN	1 - 16 0 - 15
00 04	0aaa aaaa		SEQ START/STOP	0 - 1 STOP, START
00 05	0aaa aaaa		CURRENT STEP	1 - 16 0 - 15
00 06	0aaa aaaa		STEP ORDER MODE	0 - 6 NORMAL, EVENODD, ODDONLY, EVENONLY, ODDONLYEVENONLY, EVENONLYODDONLY, RANDOM
00 07	0aaa aaaa		SHUFFLE	20 - 80
00 08	0aaa aaaa		CURRENT PATCH	1 - 16 0 - 15
00 09	0aaa aaaa		reserve	
00 0A	0aaa aaaa		reserve	
00 0B	0aaa aaaa		reserve	
00 0C	0aaa aaaa		reserve	
00 0D	0aaa aaaa		reserve	
00 0E	0aaa aaaa		reserve	
00 0F	0aaa aaaa		reserve	
00 00 0B	Total Size			

*Tone

Offset	Address	Description		
00 00	0aaa aaaa		NAME1	ASCII
00 01	0aaa aaaa		NAME2	ASCII
00 02	0aaa aaaa		NAME3	ASCII
00 03	0aaa aaaa		NAME4	ASCII
00 04	0aaa aaaa		NAME5	ASCII
00 05	0aaa aaaa		NAME6	ASCII
00 06	0aaa aaaa		NAME7	ASCII
00 07	0aaa aaaa		NAME8	ASCII
00 08	0aaa aaaa		NAME9	ASCII
00 09	0aaa aaaa		NAME10	ASCII
00 0A	0aaa aaaa		NAME11	ASCII
00 0B	0aaa aaaa		NAME12	ASCII
00 0C	0aaa aaaa		NAME13	ASCII
00 0D	0aaa aaaa		NAME14	ASCII
00 0E	0aaa aaaa		NAME15	ASCII
00 0F	0aaa aaaa		NAME16	ASCII
00 10	0aaa aaaa		WAVE	0 - 3 SAW, SQR, PWM, NOISE
00 11	0aaa aaaa		PWM MOD	0 - 127
00 12	0aaa aaaa		OSC LFO MOD	0 - 127
00 13	0aaa aaaa		PWM MOD	0 - 127
00 14	0aaa aaaa		FILTER LPF TYPE	0 - 3 TYPE1, TYPE2, TYPE3, OFF
00 15	0aaa aaaa		FILTER LPF CUTOFF	0 - 127
00 16	0aaa aaaa		FILTER RESONANCE	0 - 127
00 17	0aaa aaaa		FILTER LFO MOD	0 - 127
00 18	0aaa aaaa		FILTER ENV	0 - 127
00 19	0aaa aaaa		ENV ATTACK	0 - 126
00 1A	0aaa aaaa		ENV DECAY	0 - 126
00 1B	0aaa aaaa		ENV SUSTAIN	0 - 127
00 1C	0aaa aaaa		ENV RELEASE	0 - 126

00 1D	0aaa aaaa		ENV MODE	0 - 1 ENV, GATE
00 1E	0aaa aaaa		LFO WAVE	0 - 3 SIN, SQR, SAW, RND
00 1F	0aaa aaaa		LFO RATE	0 - 127
00 20	0aaa aaaa		PORTA SW	0 - 1 OFF, ON
00 21	0aaa aaaa		PORTA TIME	1 - 126
00 22	0aaa aaaa		OCTAVE SHIFT	61 - 67 -3 - +3
00 23	0aaa aaaa		reserve	
00 24	0aaa aaaa		reserve	
00 25	0aaa aaaa		reserve	
00 26	0aaa aaaa		reserve	
00 27	0aaa aaaa		reserve	
00 00 08	Total Size			

* Patch

Offset	Address	Description		
00 00 00			Patch Common	
00 10 00			Patch Control1	
00 11 00			Patch Control2	
00 12 00			Patch Control3	
00 13 00			Patch Control4	
00 14 00			Patch Control5	
00 15 00			Patch Control6	
00 20 00			Patch Sysex1	
00 21 00			Patch Sysex2	
00 22 00			Patch Sysex3	
00 23 00			Patch Sysex4	

* Patch Common

Offset	Address	Description		
00 00	0aaa aaaa		NAME1	ASCII
00 01	0aaa aaaa		NAME2	ASCII
00 02	0aaa aaaa		NAME3	ASCII
00 03	0aaa aaaa		NAME4	ASCII
00 04	0aaa aaaa		NAME5	ASCII
00 05	0aaa aaaa		NAME6	ASCII
00 06	0aaa aaaa		NAME7	ASCII
00 07	0aaa aaaa		NAME8	ASCII
00 08	0aaa aaaa		NAME9	ASCII
00 09	0aaa aaaa		NAME10	ASCII
00 0A	0aaa aaaa		NAME11	ASCII
00 0B	0aaa aaaa		NAME12	ASCII
00 0C	0aaa aaaa		NAME13	ASCII
00 0D	0aaa aaaa		NAME14	ASCII
00 0E	0aaa aaaa		NAME15	ASCII
00 0F	0aaa aaaa		NAME16	ASCII
00 10	0aaa aaaa		MIDI CH	0 - 15 1 - 16
00 11	0aaa aaaa		TRANSPOSE	0 - 11 -5, -4, -3, -2, -1, 0, 1, 2, 3, 4, 5, 6
00 12	0aaa aaaa		OCTAVE	0 - 6 -3, -2, -1, 0, +1, +2, +3
00 13	0000 aaaa	0000 aaaa	PC	-1 - 127 OFF, 1 - 128
00 14	0000 aaaa	0000 aaaa	BANK MSB	-1 - 127 OFF, 0 - 127
00 15	0000 aaaa	0000 aaaa	BANK LSB	-1 - 127 OFF, 0 - 127
00 16	0aaa aaaa		SEQ_CH	0 - 15 1 - 16
00 17	0000 00aa		SYNTH_RX_SRC	0 - 18 ALL, KEY, SEQ, 1-16
00 18	0000 00aa		CVGATE_RX_SRC	0 - 18 ALL, KEY, SEQ, 1-16
00 19	0aaa aaaa		C1 HOLD	0 - 1 OFF, ON
00 1A	0aaa aaaa		C2 HOLD	0 - 1 OFF, ON
00 1B	0aaa aaaa		NOTE_SCALE	1 - 16 Chromatic, Major, Natural Minor, Harmonic Minor, Melodic Minor, Bluenote, Bluenote1, Dorian, Mixolydian, Wholetone, Diminished, Altered, Hungarian Minor, Insenpo, Ryukyuu, Persian

MIDI Implementation

00 1C	0aaa aaaa	CV PORTA SW	0 - 2 OFF, ALWAYS, LEGATO
00 1D	0aaa aaaa	CV_PORTA_TIME	1 - 127
00 1E	0aaa aaaa	CV_BEND_RANGE	0 - 12
00 1F	0aaa aaaa	reserve	
00 00 00 23	Total Size		

* Patch Control

Offset Address	Description	
00 00	0aaa aaaa	MODE 0 - 8 CC, CAF, PAF, PB, NOTE, EXC1, EXC2, EXC3, EXC4
00 01	0aaa aaaa	CCNUM 0 - 97
00 02	0aaa aaaa	PAFKEY 0 - 127
00 03	0aaa aaaa	DATA TYPE (Not used) 0 - 4 DT0, DT1, DT2, DT3, DT4
00 04	0aaa aaaa	VALUE LSB LSB 0 - 127
00 05	0aaa aaaa	VALUE LSB MSB 0 - 127
00 06	0aaa aaaa	VALUE MSB LSB (Not Used) 0 - 127
00 07	0aaa aaaa	VALUE MSB MSB (Not Used) 0 - 127
00 08	0aaa aaaa	reserve
00 09	0aaa aaaa	reserve
00 0A	0aaa aaaa	reserve
00 0B	0aaa aaaa	reserve
00 00 00 0C	Total Size	

* Patch Sysx

Offset Address	Description	
00 00	0aaa aaaa	TYPE NORMAL, ROLAND
00 01	0aaa aaaa	NUM OF DATA 1 - 32
00 02	0aaa aaaa	DEVICEID 16 - 31
00 03	0aaa aaaa	NUM OF MODELID 0 - 7
00 04	0aaa aaaa	MODELID 0 - 127
00 05	0aaa aaaa	COMMANDID 17 - 18
00 06	0000 aaaa 0000 aaaa	DATA START -1 - 31
00 07	0aaa aaaa	DATA TYPE (Not used) 0 - 4 DT0, DT1, DT2, DT3, DT4
00 08	0aaa aaaa	reserve
00 09	0aaa aaaa	reserve
00 0A	0aaa aaaa	reserve
00 0B	0aaa aaaa	reserve
00 0C	0aaa aaaa	DATA0 0 - 127
00 0D	0aaa aaaa	DATA1 0 - 127
00 0E	0aaa aaaa	DATA2 0 - 127
00 0F	0aaa aaaa	DATA3 0 - 127
00 10	0aaa aaaa	DATA4 0 - 127
00 11	0aaa aaaa	DATA5 0 - 127
00 12	0aaa aaaa	DATA6 0 - 127
00 13	0aaa aaaa	DATA7 0 - 127
00 14	0aaa aaaa	DATA8 0 - 127
00 15	0aaa aaaa	DATA9 0 - 127
00 16	0aaa aaaa	DATA10 0 - 127
00 17	0aaa aaaa	DATA11 0 - 127
00 18	0aaa aaaa	DATA12 0 - 127
00 19	0aaa aaaa	DATA13 0 - 127
00 1A	0aaa aaaa	DATA14 0 - 127
00 1B	0aaa aaaa	DATA15 0 - 127
00 1C	0aaa aaaa	DATA16 0 - 127
00 1D	0aaa aaaa	DATA17 0 - 127
00 1E	0aaa aaaa	DATA18 0 - 127
00 1F	0aaa aaaa	DATA19 0 - 127
00 20	0aaa aaaa	DATA20 0 - 127
00 21	0aaa aaaa	DATA21 0 - 127
00 22	0aaa aaaa	DATA22 0 - 127
00 23	0aaa aaaa	DATA23 0 - 127
00 24	0aaa aaaa	DATA24 0 - 127
00 25	0aaa aaaa	DATA25 0 - 127
00 26	0aaa aaaa	DATA26 0 - 127
00 27	0aaa aaaa	DATA27 0 - 127
00 28	0aaa aaaa	DATA28 0 - 127
00 29	0aaa aaaa	DATA29 0 - 127
00 2A	0aaa aaaa	DATA30 0 - 127
00 2B	0aaa aaaa	DATA31 0 - 127
00 00 00 11	Total Size	

* Pattern

Offset Address	Description
00 00 00	Pattern Common
00 10 00	Pattern Step
00 20 00	Pattern Name

* Pattern Common

Offset Address	Description
00 00	0aaa aaaa SCALE 0 - 3 8T, 16T, 1 6, 32
00 01	0aaa aaaa LAST STEP 0 - 15 1 - 16
00 02	0aaa aaaa OFF STEP MODE 0 - 1 REST, SKIP
00 03	0aaa aaaa reserve
00 00 00 04	Total Size

* Pattern Step

Offset Address	Description
00 00	0aaa aaaa SW (1) 0 - 2 OFF, ON, TIE
00 01	0aaa aaaa SW (2) 0 - 2 OFF, ON, TIE
00 02	0aaa aaaa SW (3) 0 - 2 OFF, ON, TIE
00 03	0aaa aaaa SW (4) 0 - 2 OFF, ON, TIE
00 04	0aaa aaaa SW (5) 0 - 2 OFF, ON, TIE
00 05	0aaa aaaa SW (6) 0 - 2 OFF, ON, TIE
00 06	0aaa aaaa SW (7) 0 - 2 OFF, ON, TIE
00 07	0aaa aaaa SW (8) 0 - 2 OFF, ON, TIE
00 08	0aaa aaaa SW (9) 0 - 2 OFF, ON, TIE
00 09	0aaa aaaa SW (10) 0 - 2 OFF, ON, TIE
00 0A	0aaa aaaa SW (11) 0 - 2 OFF, ON, TIE
00 0B	0aaa aaaa SW (12) 0 - 2 OFF, ON, TIE
00 0C	0aaa aaaa SW (13) 0 - 2 OFF, ON, TIE
00 0D	0aaa aaaa SW (14) 0 - 2 OFF, ON, TIE
00 0E	0aaa aaaa SW (15) 0 - 2 OFF, ON, TIE
00 0F	0aaa aaaa SW (16) 0 - 2 OFF, ON, TIE
00 10	0000 aaaa 0000 aaaa NOTE (1) -1 - 127 OFF, 0 - 127
00 11	0000 aaaa 0000 aaaa NOTE (2) -1 - 127 OFF, 0 - 127
00 12	0000 aaaa 0000 aaaa NOTE (3) -1 - 127 OFF, 0 - 127
00 13	0000 aaaa 0000 aaaa NOTE (4) -1 - 127 OFF, 0 - 127
00 14	0000 aaaa 0000 aaaa NOTE (5) -1 - 127 OFF, 0 - 127
00 15	0000 aaaa 0000 aaaa NOTE (6) -1 - 127 OFF, 0 - 127
00 16	0000 aaaa 0000 aaaa NOTE (7) -1 - 127 OFF, 0 - 127
00 17	0000 aaaa 0000 aaaa NOTE (8) -1 - 127 OFF, 0 - 127
00 18	0000 aaaa 0000 aaaa NOTE (9) -1 - 127 OFF, 0 - 127
00 19	0000 aaaa 0000 aaaa NOTE (10) -1 - 127 OFF, 0 - 127
00 1A	0000 aaaa 0000 aaaa NOTE (11) -1 - 127 OFF, 0 - 127
00 1B	0000 aaaa 0000 aaaa NOTE (12) -1 - 127 OFF, 0 - 127
00 1C	0000 aaaa 0000 aaaa NOTE (13) -1 - 127 OFF, 0 - 127
00 1D	0000 aaaa 0000 aaaa NOTE (14) -1 - 127 OFF, 0 - 127
00 1E	0000 aaaa 0000 aaaa NOTE (15) -1 - 127 OFF, 0 - 127
00 1F	0000 aaaa 0000 aaaa NOTE (16) -1 - 127 OFF, 0 - 127
00 20	0aaa aaaa VELOCITY (1) 0 - 127
00 21	0aaa aaaa VELOCITY (2) 0 - 127
00 22	0aaa aaaa VELOCITY (3) 0 - 127
00 23	0aaa aaaa VELOCITY (4) 0 - 127
00 24	0aaa aaaa VELOCITY (5) 0 - 127
00 25	0aaa aaaa VELOCITY (6) 0 - 127
00 26	0aaa aaaa VELOCITY (7) 0 - 127

00 27	0aaa aaaa		VELOCITY (8)	0 - 127
00 28	0aaa aaaa		VELOCITY (9)	0 - 127
00 29	0aaa aaaa		VELOCITY (10)	0 - 127
00 2A	0aaa aaaa		VELOCITY (11)	0 - 127
00 2B	0aaa aaaa		VELOCITY (12)	0 - 127
00 2C	0aaa aaaa		VELOCITY (13)	0 - 127
00 2D	0aaa aaaa		VELOCITY (14)	0 - 127
00 2E	0aaa aaaa		VELOCITY (15)	0 - 127
00 2F	0aaa aaaa		VELOCITY (16)	0 - 127

00 30	0aaa aaaa		GATE TIME (1)	10 - 90
00 31	0aaa aaaa		GATE TIME (2)	10 - 90
00 32	0aaa aaaa		GATE TIME (3)	10 - 90
00 33	0aaa aaaa		GATE TIME (4)	10 - 90
00 34	0aaa aaaa		GATE TIME (5)	10 - 90
00 35	0aaa aaaa		GATE TIME (6)	10 - 90
00 36	0aaa aaaa		GATE TIME (7)	10 - 90
00 37	0aaa aaaa		GATE TIME (8)	10 - 90
00 38	0aaa aaaa		GATE TIME (9)	10 - 90
00 39	0aaa aaaa		GATE TIME (10)	10 - 90
00 3A	0aaa aaaa		GATE TIME (11)	10 - 90
00 3B	0aaa aaaa		GATE TIME (12)	10 - 90
00 3C	0aaa aaaa		GATE TIME (13)	10 - 90
00 3D	0aaa aaaa		GATE TIME (14)	10 - 90
00 3E	0aaa aaaa		GATE TIME (15)	10 - 90
00 3F	0aaa aaaa		GATE TIME (16)	10 - 90

00 40	0000 aaaa	0000 aaaa	CONTROL1 (1)	-1 - 127
			OFF, 0	- 127
00 41	0000 aaaa	0000 aaaa	CONTROL1 (2)	-1 - 127
			OFF, 0	- 127
00 42	0000 aaaa	0000 aaaa	CONTROL1 (3)	-1 - 127
			OFF, 0	- 127
00 43	0000 aaaa	0000 aaaa	CONTROL1 (4)	-1 - 127
			OFF, 0	- 127
00 44	0000 aaaa	0000 aaaa	CONTROL1 (5)	-1 - 127
			OFF, 0	- 127
00 45	0000 aaaa	0000 aaaa	CONTROL1 (6)	-1 - 127
			OFF, 0	- 127
00 46	0000 aaaa	0000 aaaa	CONTROL1 (7)	-1 - 127
			OFF, 0	- 127
00 47	0000 aaaa	0000 aaaa	CONTROL1 (8)	-1 - 127
			OFF, 0	- 127
00 48	0000 aaaa	0000 aaaa	CONTROL1 (9)	-1 - 127
			OFF, 0	- 127
00 49	0000 aaaa	0000 aaaa	CONTROL1 (10)	-1 - 127
			OFF, 0	- 127
00 4A	0000 aaaa	0000 aaaa	CONTROL1 (11)	-1 - 127
			OFF, 0	- 127
00 4B	0000 aaaa	0000 aaaa	CONTROL1 (12)	-1 - 127
			OFF, 0	- 127
00 4C	0000 aaaa	0000 aaaa	CONTROL1 (13)	-1 - 127
			OFF, 0	- 127
00 4D	0000 aaaa	0000 aaaa	CONTROL1 (14)	-1 - 127
			OFF, 0	- 127
00 4E	0000 aaaa	0000 aaaa	CONTROL1 (15)	-1 - 127
			OFF, 0	- 127
00 4F	0000 aaaa	0000 aaaa	CONTROL1 (16)	-1 - 127
			OFF, 0	- 127

00 50	0000 aaaa	0000 aaaa	CONTROL2 (1)	-1 - 127
			OFF, 0	- 127
00 51	0000 aaaa	0000 aaaa	CONTROL2 (2)	-1 - 127
			OFF, 0	- 127
00 52	0000 aaaa	0000 aaaa	CONTROL2 (3)	-1 - 127
			OFF, 0	- 127
00 53	0000 aaaa	0000 aaaa	CONTROL2 (4)	-1 - 127
			OFF, 0	- 127
00 54	0000 aaaa	0000 aaaa	CONTROL2 (5)	-1 - 127
			OFF, 0	- 127
00 55	0000 aaaa	0000 aaaa	CONTROL2 (6)	-1 - 127
			OFF, 0	- 127
00 56	0000 aaaa	0000 aaaa	CONTROL2 (7)	-1 - 127
			OFF, 0	- 127
00 57	0000 aaaa	0000 aaaa	CONTROL2 (8)	-1 - 127
			OFF, 0	- 127
00 58	0000 aaaa	0000 aaaa	CONTROL2 (9)	-1 - 127
			OFF, 0	- 127
00 59	0000 aaaa	0000 aaaa	CONTROL2 (10)	-1 - 127
			OFF, 0	- 127
00 5A	0000 aaaa	0000 aaaa	CONTROL2 (11)	-1 - 127
			OFF, 0	- 127
00 5B	0000 aaaa	0000 aaaa	CONTROL2 (12)	-1 - 127
			OFF, 0	- 127
00 5C	0000 aaaa	0000 aaaa	CONTROL2 (13)	-1 - 127
			OFF, 0	- 127
00 5D	0000 aaaa	0000 aaaa	CONTROL2 (14)	-1 - 127
			OFF, 0	- 127
00 5E	0000 aaaa	0000 aaaa	CONTROL2 (15)	-1 - 127
			OFF, 0	- 127
00 5F	0000 aaaa	0000 aaaa	CONTROL2 (16)	-1 - 127
			OFF, 0	- 127

00 60	0aaa aaaa		reserve1 (1)	
00 61	0aaa aaaa		reserve1 (2)	
00 62	0aaa aaaa		reserve1 (3)	
00 63	0aaa aaaa		reserve1 (4)	
00 64	0aaa aaaa		reserve1 (5)	
00 65	0aaa aaaa		reserve1 (6)	
00 66	0aaa aaaa		reserve1 (7)	
00 67	0aaa aaaa		reserve1 (8)	
00 68	0aaa aaaa		reserve1 (9)	
00 69	0aaa aaaa		reserve1 (10)	
00 6A	0aaa aaaa		reserve1 (11)	
00 6B	0aaa aaaa		reserve1 (12)	
00 6C	0aaa aaaa		reserve1 (13)	
00 6D	0aaa aaaa		reserve1 (14)	

00 6E	0aaa aaaa		reserve1 (15)	
00 6F	0aaa aaaa		reserve1 (16)	
00 70	0aaa aaaa		reserve2 (1)	
00 71	0aaa aaaa		reserve2 (2)	
00 72	0aaa aaaa		reserve2 (3)	
00 73	0aaa aaaa		reserve2 (4)	
00 74	0aaa aaaa		reserve2 (5)	
00 75	0aaa aaaa		reserve2 (6)	
00 76	0aaa aaaa		reserve2 (7)	
00 77	0aaa aaaa		reserve2 (8)	
00 78	0aaa aaaa		reserve2 (9)	
00 79	0aaa aaaa		reserve2 (10)	
00 7A	0aaa aaaa		reserve2 (11)	
00 7B	0aaa aaaa		reserve2 (12)	
00 7C	0aaa aaaa		reserve2 (13)	
00 7D	0aaa aaaa		reserve2 (14)	
00 7E	0aaa aaaa		reserve2 (15)	
00 7F	0aaa aaaa		reserve2 (16)	

00 00 00 B0	Total Size			

* Pattern Name

Offset	Address	Description		
	00 00	0aaa aaaa	NAME1	ASCII
	00 01	0aaa aaaa	NAME2	ASCII
	00 02	0aaa aaaa	NAME3	ASCII
	00 03	0aaa aaaa	NAME4	ASCII
	00 04	0aaa aaaa	NAME5	ASCII
	00 05	0aaa aaaa	NAME6	ASCII
	00 06	0aaa aaaa	NAME7	ASCII
	00 07	0aaa aaaa	NAME8	ASCII
	00 08	0aaa aaaa	NAME9	ASCII
	00 09	0aaa aaaa	NAME10	ASCII
	00 0A	0aaa aaaa	NAME11	ASCII
	00 0B	0aaa aaaa	NAME12	ASCII
	00 0C	0aaa aaaa	NAME13	ASCII
	00 0D	0aaa aaaa	NAME14	ASCII
	00 0E	0aaa aaaa	NAME15	ASCII
	00 0F	0aaa aaaa	NAME16	ASCII

00 00 00 10	Total Size			

8. Supplementary Material

Decimal and Hexadecimal Table

(An "H" is appended to the end of numbers in hexadecimal notation.)

In MIDI documentation, data values and addresses/sizes of Exclusive messages, etc. are expressed as hexadecimal values for each 7 bits.

The following table shows how these correspond to decimal numbers.

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

D: decimal

H: hexadecimal

* Decimal values such as MIDI channel, bank select, and program change are listed as one greater than the values given in the above table.

* A 7-bit byte can express data in the range of 128 steps. For data where greater precision is required, we must use two or more bytes. For example, two hexadecimal numbers aa bbH expressing two 7-bit bytes would indicate a value of aa x 128+bb.

* In the case of values which have a +/- sign, 00H = -64, 40H = +/-0, and 7FH = +63, so that the decimal expression would be 64 less than the value given in the above chart. In the case of two types, 00 00H = -8192, 40 00H = +/-0, and 7F 7FH = +8191. For example, if aa bbH were expressed as decimal, this would be aa bbH - 40 00H = aa x 128+bb - 64 x 128.

* Data marked "Use nibbled data" is expressed in hexadecimal in 4-bit units. A value expressed as a 2-byte nibble 0a 0bH has the value of a x 16+b.

<Example 1>

What is the decimal expression of 5AH?

From the preceding table, 5AH = 90

<Example 2>

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

<Example 3>

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

<Example 4>

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

<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 with MIDI CH = 3, note number 62 (note name is D4), and velocity 95.

<Example 2> CE 19

CnH is the Program Change status, and n is the MIDI channel number. Since EH = 14 and 49H = 25, this is a Program Change message with MIDI CH = 15, program number 26.

<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 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.

Example of an Exclusive Message and Calculating a Checksum

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

How to calculate the checksum

(hexadecimal numbers are indicated by "H")

The checksum is a value derived by adding the address, size, and checksum itself and inverting the lower 7 bits.

Here's an example of how the checksum is calculated. We will assume that in the Exclusive message we are transmitting, the address is 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
    
```

ASCII Code Table

Patch Name etc., of MIDI data are described the ASCII code in the table below.

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

D: decimal

H: hexadecimal

* "SP" is space.

(Synthesizer)

Function...		Transmitted	Recognized	Remarks
Basic Channel	Default Changed	x	1-16	
Mode	Default Messages Altered	x	Mode 1, 2, 3, 4 (M=1)	
Note Number :	: True Voice	x	0-127	
Velocity	Note On	x	o	
	Note Off	x	x	
After Touch	Key's	x	x	
	Channel's			
Pitch Bend		x	o	
Control Change		1 x	o	Modulation
		5 x	o	Portamento time
		64 x	o	Hold
		71 x	o	Resonance
		72 x	o	Release time
		73 x	o	Attack time
		74 x	o	Cutoff
		75 x	o	Decay time
		76 x	o	Vibrato rate
		77 x	o	Vibrato dept
Program Change	: True Number	x	x	
System Exclusive		x	x	
System Common	: Song Position	x	x	
	: Song Select	x	x	
	: Tune Request	x	x	
System Real Time	: Clock	x	x	
	: Start	x	x	
	: Continue	x	x	
	: Stop	x	x	
Aux Messages	: All Sound Off	x	o	
	: Reset All Controllers	x	o	
	: Local On/Off	x	x	
	: All Notes Off	x	o	
	: Omni Mode Off	x	x	
	: Omni Mode On	x	x	
	: Mono Mode On	x	x	
	: Poly Mode On	x	x	
	: Active Sensing	x	o	
	: System Reset	x	x	
Notes				

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

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

O: Yes
X: No

(CV/GATE)

Function...		Transmitted	Recognized	Remarks
Basic Channel	Default Changed	x	1-16	
Mode	Default Messages Altered	x	Mode 1, 2, 3, 4 (M=1)	
Note Number :	: True Voice	x	0-127	
Velocity	Note On	x	x	
	Note Off	x	x	
After Touch	Key's	x	x	
	Channel's			
Pitch Bend		x	o	
Control Change		x	x	
Program Change	: True Number	x	x	
System Exclusive		x	x	
System Common	: Song Position	x	x	
	: Song Select	x	x	
	: Tune Request	x	x	
System Real Time	: Clock	x	x	
	: Start	x	x	
	: Continue	x	x	
	: Stop	x	x	
Aux Messages	: All Sound Off	x	o	
	: Reset All Controllers	x	o	
	: Local On/Off	x	x	
	: All Notes Off	x	o	
	: Omni Mode Off	x	x	
	: Omni Mode On	x	x	
	: Mono Mode On	x	x	
	: Poly Mode On	x	x	
	: Active Sensing	x	o	
	: System Reset	x	x	
Notes				

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

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

O: Yes
X: No

(SEQ)

Function...		Transmitted	Recognized	Remarks
Basic Channel	Default Changed	1-16	1-16	
Mode	Default Messages Altered	x	x	
Note Number :	: True Voice	0-127	0-127	
Velocity	Note On Note Off	o x	o x	
After Touch	Key's Channel's	x	x	
Pitch Bend		x	o	
Control Change		71 o 74 o	x x	Resonance Cutoff
Program Change	: True Number	x	x	
System Exclusive		x	x	
System Common	: Song Position : Song Select : Tune Request	x x x	x x x	
System Real Time	: Clock : Start : Continue : Stop	o o x o	o o x o	*1 *1 *1
Aux Messages	: All Sound Off : Reset All Controllers : Local On/Off : All Notes Off : Omni Mode Off : Omni Mode On : Mono Mode On : Poly Mode On : Active Sensing : System Reset	x x x x x x x x x x	x x x x x x x x x x	
Notes		*1 MIDI clock is Auto.		

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

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

O: Yes
X: No

(Controller)

Function...	Transmitted	Recognized	Remarks
Basic Channel Default Changed	1-16	x	
Mode Default Messages Altered	x	x	
Note Number : : True Voice	0-127	x	
Velocity Note On Note Off	o *1 x	x x	
After Touch Key's Channel's	o *2 o	x x	
Pitch Bend	o	x	
Control Change 0-97	o	x	
Program Change : True Number	o	x	
System Exclusive	o	o	
System Common : Song Position : Song Select : Tune Request	x x x	x x x	
System Real Time : Clock : Start : Continue : Stop	x x x x	x x x x	
Aux Messages : All Sound Off : Reset All Controllers : Local On/Off : All Notes Off : Omni Mode Off : Omni Mode On : Mono Mode On : Poly Mode On : Active Sensing : System Reset	x o *3 x o *3 x x x x x x	x x x x x x x x x x	
Notes	*1 Keyboard (K-25m) has Note On velocity. *2 Keyboard (K-25m) dose not support. *3 Panic Operation (in MENU)		

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

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

O: Yes
X: No