

AE-BRISA MIDI Implementation

Model : AE-BRISA

Date : Sep 1, 2025

Version : 1.00

1. Data Reception

■ Channel Voice Messages

● Note Off

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

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

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 (ch.1)

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

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

● Control Change

* If you select a controller number that corresponds to an MFX Src 1-4 parameter, the respective effect is applied according to the setting.

○ Bank Select (Controller number 0, 32)

Status	2nd byte	3rd byte
BnH	00H	mmH
BnH	20H	llH

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

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

The Tones corresponding to each Bank Select are as follows.

BANK SELECT		PROGRAM NUMBER	GROUP
MSB	LSB		
085	000	001 - 048	UserBank
085	064	001 -	Preset

○ Modulation (Controller number 1)

Status	2nd byte	3rd byte
BnH	01H	vvH

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

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

○ Breath Type (Controller number 2)

Status	2nd byte	3rd byte
BnH	02H	vvH

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

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 (ch.1)

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

* Part Portamento Time parameter (Tone Part) will change.

○ Data Entry (Controller number 6, 38)

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

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

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 (ch.1)

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

* The Part Level parameter (Tone Part) will change.

○ Panpot (Controller number 10)

Status	2nd byte	3rd byte
BnH	0AH	vvH

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

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

* The Part Pan parameter (Tone Part) will change.

○ Expression (Controller number 11)

Status	2nd byte	3rd byte
BnH	0BH	vvH

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

○ Hold 1 (Controller number 64)
Status 2nd byte 3rd byte
BnH 40H vvH

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

* Part Portamento Switch parameter (Tone Part) will change.

○ Sostenuto (Controller number 66)
Status 2nd byte 3rd byte
BnH 42H vvH

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

○ Legato Foot Switch (Controller number 68)
Status 2nd byte 3rd byte
BnH 44H vvH

n = MIDI channel number: 0H (ch.1)
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 (ch.1)
vv = Resonance value (relative change): 00H - 40H - 7FH (-64 - 0 - +63)
* Part Resonance Offset parameter (Tone Part) will change.

○ Release Time (Controller number 72)
Status 2nd byte 3rd byte
BnH 48H vvH

n = MIDI channel number: 0H (ch.1)
vv = Release Time value (relative change): 00H - 40H - 7FH (-64 - 0 - +63)
* Part Release Time Offset parameter (Tone Part) will change.

○ Attack time (Controller number 73)
Status 2nd byte 3rd byte
BnH 49H vvH

n = MIDI channel number: 0H (ch.1)
vv = Attack time value (relative change): 00H - 40H - 7FH (-64 - 0 - +63)
* Part Attack Time Offset parameter (Tone Part) will change.

○ Cutoff (Controller number 74)
Status 2nd byte 3rd byte
BnH 4AH vvH

n = MIDI channel number: 0H (ch.1)
vv = Cutoff value (relative change): 00H - 40H - 7FH (-64 - 0 - +63)
* Part Cutoff Offset parameter (Tone Part) will change.

○ Decay Time (Controller number 75)
Status 2nd byte 3rd byte
BnH 4BH vvH

n = MIDI channel number: 0H (ch.1)
vv = Decay Time value (relative change): 00H - 40H - 7FH (-64 - 0 - +63)
* Part Decay Time Offset parameter (Tone Part) will change.

○ Vibrato Rate (Controller number 76)
Status 2nd byte 3rd byte
BnH 4CH vvH

n = MIDI channel number: 0H (ch.1)
vv = Vibrato Rate value (relative change): 00H - 40H - 7FH (-64 - 0 - +63)
* Part Vibrato Rate parameter (Tone Part) will change.

○ Vibrato Depth (Controller number 77)
Status 2nd byte 3rd byte
BnH 4DH vvH

n = MIDI channel number: 0H (ch.1)
vv = Vibrato Depth Value (relative change): 00H - 40H - 7FH (-64 - 0 - +63)
* Part Vibrato Depth parameter (Tone Part) will change.

○ 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 - 40H - 7FH (-64 - 0 - +63)
 * Part Vibrato Delay parameter (Tone Part) will change.

○ Portamento control (Controller number 84)
 Status 2nd byte 3rd byte
 BnH 54H kkH

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

○ General Purpose Effect 1 (Reverb Send Level)
 (Controller number 91)
 Status 2nd byte 3rd byte
 BnH 5BH vvH

n = MIDI channel number: 0H (ch.1)
 vv = Reverb Send Level: 00H - 7FH (0 - 127)
 * Part Reverb Send parameter (Tone Part) will change.

○ General Purpose Effect 3 (Chorus Send Level)
 (Controller number 93)
 Status 2nd byte 3rd byte
 BnH 5DH vvH

n = MIDI channel number: 0H (ch.1)
 vv = Chorus Send Level: 00H - 7FH (0 - 127)
 * Part Chorus Send Level parameter (Tone Part) will change.

○ General Purpose Effect 4 (Delay Send Level)
 (Controller number 94)
 Status 2nd byte 3rd byte
 BnH 5EH vvH

n = MIDI channel number: 0H (ch.1)
 vv = Delay Send Level: 00H - 7FH (0 - 127)
 * Part Delay Send Level parameter (Tone Part) 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 (ch.1)
 mm = upper byte (MSB) of parameter number specified by RPN
 ll = lower byte (LSB) of parameter number specified by RPN
 <<< RPN >>>

Control Changes include RPN (Registered Parameter Numbers), which are extended.
 When using RPNs, first RPN (Controller numbers 100 and 101; they can be sent in any order) should be sent in order to select the parameter, then Data Entry (Controller numbers 6 and 38) should be sent to set the value. Once RPN messages are received, Data Entry messages that is received at the same MIDI channel after that are recognized as changing toward the value of the RPN messages. In order not to make any mistakes, transmitting RPN Null is recommended after setting parameters you need.
 This device receives the following RPNs.

RPN	Data entry	Notes
MSB, LSB	MSB, LSB	Pitch Bend Sensitivity
00H, 00H	mmH, llH	mm: 00H - 18H (0 - 24 semitones)
		ll: ignored (processed as 00H)
		Up to 2 octave can be specified in semitone steps.

* Part Fine Tune parameter (Tone Part) will change.

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

* Part Coarse Tune parameter (Tone Part) will change.

7FH, 7FH	---, ---	RPN null
		RPN and NRPN will be set as "unspecified."
		Once this setting has been made, subsequent Parameter values that were previously set will not change.
		mm, ll: ignored

● Program Change
 Status 2nd byte
 CnH ppH

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

● Channel Pressure
 Status 2nd byte
 DnH vvH

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

● Pitch Bend Change

Status	2nd byte	3rd byte
EnH	lH	mmH

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

* 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 (ch.1)

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

Controller	Reset value
Pitch Bend Change	+/-0 (center)
Polyphonic Key Pressure	0 (off)
Channel Pressure	0 (off)
Modulation	0 (off)
Breath Type	0 (min)
Foot Type	0 (min)
Expression	127 (max)
	However the controller will be at minimum.
Hold 1	0 (off)
Sostenuto	0 (off)
Soft	0 (off)
RPN	unset; previously set data will not change
NRPN	unset; previously set data will not change

● All Notes Off

(Controller number 123)

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

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

* 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 (ch.1)

* 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 (ch.1)

* 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 (ch.1)

● POLY (Controller number 127)

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

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

■ 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.

■ System Exclusive Message

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)

The System Exclusive messages received by this device are the Universal Nonrealtime System Exclusive messages and the Universal Realtime System Exclusive messages and the Data Request (RQ1) messages and the Data Set (DT1) messages.

● Universal Non-realtime System Exclusive Messages

○ Identity Request Message

Status	Data byte	Status
FOH	7EH, dev, 06H, 01H	F7H

Byte	Explanation
FOH	Exclusive status
7EH	ID number (Universal Non-realtime Message)
dev	Device ID (dev: 10H – 1FH, 7FH)
06H	Sub ID#1 (General Information)
01H	Sub ID#2 (Identity Request)
F7H	E0X (End Of Exclusive)

* When this message is received, Identity Reply message will be transmitted.

● Data Transmission

This instrument can use exclusive messages to exchange many varieties of internal settings with other devices.

The model ID of the exclusive messages used by this instrument is 00H 00H 00H 65H.

○ 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, 01H, 06H, 08H, 11H, aaH, bbH, ccH, ddH, ssH, ttH, uuH, vvH, sum	F7H

Byte	Explanation
FOH	Exclusive status
41H	ID number (Roland)
dev	device ID (dev: 10H – 1FH, 7FH)
01H	model ID #1 (AE-BRISA)
06H	model ID #2 (AE-BRISA)
08H	model ID #3 (AE-BRISA)
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	E0X (End Of Exclusive)

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

* For the checksum, refer to "How to calculate the checksum".

○ 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
FOH	41H, dev, 01H, 06H, 08H, 12H, aaH, bbH, ccH, ddH, eeH, ... ffH, sum	F7H

Byte	Explanation
FOH	Exclusive status
41H	ID number (Roland)
dev	device ID (dev: 10H – 1FH, 7FH)
01H	model ID #1 (AE-BRISA)
06H	model ID #2 (AE-BRISA)
08H	model ID #3 (AE-BRISA)
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	E0X (End Of Exclusive)

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

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

* For the checksum, refer to "How to calculate the checksum".

2. Data Transmission

■ Channel Voice Messages

● Note Off

Status	2nd byte	3rd byte
8nH	kkH	vvH

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

kk = Note number: 00H – 7FH (0 – 127)

vv = Note off velocity: 00H – 7FH (0 – 127)

● Note On

Status	2nd byte	3rd byte
9nH	kkH	vvH

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

kk = Note number: 00H – 7FH (0 – 127)

vv = Note on velocity: 01H – 7FH (1 – 127)

● Control Change

* By selecting a controller number that corresponds to the setting of parameters of controllers, this unit can transmit any control change message.

○ 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 – ch.16)

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

○ Modulation (Controller number 1)

Status	2nd byte	3rd byte
BnH	01H	vvH

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

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

○ Breath Type (Controller number 2)

Status	2nd byte	3rd byte
BnH	02H	vvH

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

vv = 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)

○ 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

○ 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 (Left – Center – Right)

* The Part Pan parameter (SCENE/PART/OUTPUT) will change.

○ 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 = 0FF, 64-127 = 0N

○ 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 - 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 - 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 - 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 - 16)
 vv = Cutoff value (relative change): 00H - 40H - 7FH (-64 - 0 - +63)

● Channel Pressure
 Status 2nd byte
 DnH vvH

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

● Pitch Bend Change
 Status 2nd byte 3rd byte
 EnH 11H 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)

■ System Realtime Message

● Active Sensing

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

■ System Exclusive Message

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

● Universal Non-realtime System Exclusive Messages

○ Identity Reply Message
 Status data byte Status
 FOH 7EH, 7F, 06H, 02H, 41H, 08H, 06H, 01H, 00H, F7H
 01H, 01H, 00H, 01H,
 Byte Explanation
 FOH Exclusive status
 7EH ID number (Universal Non-realtime Message)
 dev Device ID (dev: 10H - 1FH, 7FH)
 06H Sub ID#1 (General Information)
 02H Sub ID#2 (Identity Reply)
 41H ID number (Roland)
 08H 06H Device family code
 01H 00H Device family number code.....
 00H 01H 00H 00H Software revision level
 F7H EOX (End Of Exclusive)

● Data Transmission

○ Data set 1 (DT1)
 Status data byte Status
 FOH 41H, dev, 01H, 06H, 08H, 12H, aaH, bbH, F7H
 ccH, ddH, eeH, ... ffH, sum,
 Byte Explanation
 FOH Exclusive status
 41H ID number (Roland)
 dev device ID (dev: 10H - 1FH, 7FH)
 01H model ID #1 (AE-BRISA)
 06H model ID #2 (AE-BRISA)
 08H model ID #3 (AE-BRISA)
 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 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.
* 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.

AE-BRISA (Model ID = 01H 06H 08H)

Start Address	Description	
00 00 00 00	System	[System]
00 10 00 00	Setup	[Setup]
01 00 00 00	Temporary Tone	[Tone]
02 04 00 00	Temporary Favorite	[Favorite Bank]
40 00 00 00	Preset Tone (001)	[Tone]
40 01 00 00	Preset Tone (002)	[Tone]
⋮		
43 7F 00 00	Preset Tone (512)	[Tone]
50 00 00 00	User Tone (001)	[Tone]
50 01 00 00	User Tone (002)	[Tone]
⋮		
50 7F 00 00	User Tone (048)	[Tone]
60 00 00 00	User Favorite (001)	[Favorite Bank]
60 01 00 00	User Favorite (002)	[Favorite Bank]
⋮		
60 0B 00 00	User Favorite (012)	[Favorite Bank]

* [System]

Offset Address	Description	
00 00 00	System Common	[System Common]
00 02 00	S1 Assign	[Assign2]
00 03 00	S2 Assign	[Assign2]
00 04 00	Thumb Assign	[Assign2]
00 15 00	Breath Assign	[Assign8]
00 17 00	Motion Tilt Assign	[Assign4]
00 18 00	Motion Roll Assign	[Assign4]
00 19 00	S1 MIDI OUT	[Assign2 MIDI]
00 1A 00	S2 MIDI OUT	[Assign2 MIDI]
00 1B 00	Thumb MIDI OUT	[Assign2 MIDI]
00 2C 00	Breath MIDI OUT	[Assign8 MIDI]
00 2E 00	Motion Tilt MIDI OUT	[Assign4 MIDI]
00 2F 00	Motion Roll MIDI OUT	[Assign4 MIDI]

* [Tone]

Offset Address	Description	
00 00 00	Tone Common	[Tone Common]
00 01 00	S1 Assign	[Assign2]
00 02 00	S2 Assign	[Assign2]
00 03 00	Thumb Assign	[Assign2]
00 04 00	Breath Assign	[Assign8]
00 08 00	Motion Tilt Assign	[Assign4]
00 09 00	Motion Roll Assign	[Assign4]
00 30 00	Tone Part	[Tone Part]

* [Favorite Bank]

Offset Address	Description	
00 00 00	Favorite (01)	[Favorite]
00 00 04	Favorite (02)	[Favorite]
⋮		
00 00 10	Favorite (05)	[Favorite]

* [Setup]

Offset Address	Description	
00 00	0aaa aaaa Tone BS MSB (CC# 0)	(0 - 127)
00 01	0aaa aaaa Tone BS LSB (CC# 32)	(0 - 127)

00 02	0aaa aaaa	Tone PC (PC)	(0 - 127)
00 03	0000 aaaa	Favorite Bank Number	(0 - 4)
00 04	0000 aaaa	Favorite Number	(0 - 11)
00 00 00 05	Total Size		

* [System Common]

Offset	Address	Description	
00 00	0000 0aaa	Display Contrast	(1 - 5)
00 01	0000 0aaa	Auto Display Off	(0 - 6)
00 02	0000 00aa	Auto Power Off	(0 - 2)
00 03	0000 000a	Menu Startup Mode	(0 - 1)
00 04	0000 000a	Edit Confirm	(0 - 1)
00 05	0000 000a	Favorite Shortcut	(0 - 1)
00 06	0000 000a	Phones Mono/Stereo	(0 - 1)
00 07	0000 00aa	Speaker Out	(0 - 2)
00 08	000a aaaa	Phones Volume	(0 - 20)
00 09	000a aaaa	Speaker Volume	(0 - 20)
# 00 0A	0000 aaaa		
00 0B	0000 bbbb		
00 0C	0000 cccc		
00 0D	0000 dddd	Master Tune	(24 - 2024)
00 0E	0000 000a	Transpose Source	(0 - 1)
00 0F	0aaa aaaa	Transpose	(59 - 70)
00 10	0000 0aaa	Fingering Mode	(0 - 4)
00 11	0000 aaaa	Key Delay	(0 - 10)
00 12	0000 000a	Hold Mode	(0 - 1)
00 14	0000 000a	Octave Mode	(0 - 1)
00 15	000a aaaa	Bend Range	(0 - 25)
00 30	0000 00aa	S1 Assign Source	(0 - 2)
00 31	0000 00aa	S2 Assign Source	(0 - 2)
00 32	0000 00aa	Thumb Assign Source	(0 - 2)
00 33	0000 00aa	Breath Assign Source	(0 - 2)
00 35	0000 00aa	Motion Roll Assign Source	(0 - 2)
00 36	0000 00aa	Motion Tilt Assign Source	(0 - 2)
00 38	0000 000a	Motion Roll Mode	(0 - 1)
00 39	0000 000a	Motion Tilt Mode	(0 - 1)
# 00 3A	0000 aaaa		
00 3B	0000 bbbb	Motion Roll Center	(38 - 218)
# 00 3C	0000 aaaa		
00 3D	0000 bbbb	Motion Tilt Center	(38 - 218)
00 3E	0000 aaaa	Motion Roll Vib Sense	(0 - 9)
00 3F	0000 aaaa	Motion Tilt Vib Sense	(0 - 9)
00 40	00aa aaaa	Breath Offset	(0 - 49)
00 41	0000 aaaa	Breath Curve	(1 - 10)
00 46	0000 aaaa	Harmonics Center	(0 - 10)
00 48	000a aaaa	Harmonics Delay	(0 - 20)
00 4A	0000 000a	Harmonics Polarity	(0 - 1)
00 65	0000 aaaa	MIDI Tx Channel	(0 - 15)
00 66	0aaa aaaa	MIDI Tx Velocity	(0 - 127)
00 00 00 67	Total Size		

* [Assign2]

Offset	Address	Description
--------	---------	-------------

00 00	0aaa aaaa	Function (0 - 114) Off, CC 01, Breath, Breath Sub, Articulation, Portamento Time, CC 06, Volume, CC 08, CC 09, Pan, Expression, CC 12, CC 13, CC 14, CC 15, CC 16, CC 17, CC 18, CC 19, CC 20, CC 21, CC 22, CC 23, CC 24, CC 25, CC 26, CC 27, CC 28, CC 29, CC 30, CC 31, CC 33, CC 34, CC 35, CC 36, CC 37, CC 38, CC 39, CC 40, CC 41, CC 42, CC 43, CC 44, CC 45, CC 46, CC 47, CC 48, CC 49, CC 50, CC 51, CC 52, CC 53, CC 54, CC 55, CC 56, CC 57, CC 58, CC 59, CC 60, CC 61, CC 62, CC 63, CC 64, CC 65, CC 66, CC 67, CC 68, CC 69, CC 70, Resonance, Release, Attack, Cutoff, Decay, Vibrato Rate, Vibrato Depth, Vibrato Delay, CC 79, CC 80, CC 81, CC 82, CC 83, CC 84, CC 85, CC 86, CC 87, CC 88, CC 89, CC 90, CC 91, CC 92, CC 93, CC 94, CC 95, Bend Down, Bend Up, After Touch, Oct -1, Oct +1, Tone Down, Tone Up, Favorite Down, Favorite Up, Favorite Bank Down, Favorite Bank Up, IFX Sw, Oct Down, Oct Up, Transpose Down, Transpose Up, Harmony/Drone Sw, Hold Mode Sw, Harmony Scale, Harmony Key
00 01	0aaa aaaa	Input Min (0 - 127)
00 02	0aaa aaaa	Input Max (0 - 127)
00 03	0aaa aaaa	Output Min (0 - 127)
00 04	0aaa aaaa	Output Max (0 - 127)
00 05	0000 000a	Mode (0 - 1)
00 06	0000 aaaa	Latch, Momentary (0 - 11) Curve 1 Linear, 2 Exp L, 3 Exp M1, 4 Exp M2, 5 Exp H, 6 Log L, 7 Log M1, 8 Log M2, 9 Log H, 10 S-Shape, 11 Reverse S, 12 Step
00 07	0aaa aaaa	Function (0 - 114)
00 08	0aaa aaaa	Input Min (0 - 127)
00 09	0aaa aaaa	Input Max (0 - 127)
00 0A	0aaa aaaa	Output Min (0 - 127)
00 0B	0aaa aaaa	Output Max (0 - 127)
00 0C	0000 000a	Mode (0 - 1)
00 0D	0000 aaaa	Curve (0 - 11)
00 00 00 0E	Total Size	

* [Assign4]

Offset Address	Description	
00 00	0aaa aaaa	Function (0 - 114) Off, CC 01, Breath, Breath Sub, Articulation, Portamento Time, CC 06, Volume, CC 08, CC 09, Pan, Expression, CC 12, CC 13, CC 14, CC 15, CC 16, CC 17, CC 18, CC 19, CC 20, CC 21, CC 22, CC 23, CC 24, CC 25, CC 26, CC 27, CC 28, CC 29, CC 30, CC 31, CC 33, CC 34, CC 35, CC 36, CC 37, CC 38, CC 39, CC 40, CC 41, CC 42, CC 43, CC 44, CC 45, CC 46, CC 47, CC 48, CC 49, CC 50, CC 51, CC 52, CC 53, CC 54, CC 55, CC 56, CC 57, CC 58, CC 59, CC 60, CC 61, CC 62, CC 63, CC 64, CC 65, CC 66, CC 67, CC 68, CC 69, CC 70, Resonance, Release, Attack, Cutoff, Decay, Vibrato Rate, Vibrato Depth, Vibrato Delay, CC 79, CC 80, CC 81, CC 82, CC 83, CC 84, CC 85, CC 86, CC 87, CC 88, CC 89, CC 90, CC 91, CC 92, CC 93, CC 94, CC 95, Bend Down, Bend Up, After Touch, Oct -1, Oct +1, Tone Down, Tone Up, Favorite Down, Favorite Up, Favorite Bank Down, Favorite Bank Up, IFX Sw, Oct Down, Oct Up, Transpose Down, Transpose Up, Harmony/Drone Sw, Hold Mode Sw, Harmony Scale, Harmony Key
00 01	0aaa aaaa	Input Min (0 - 127)
00 02	0aaa aaaa	Input Max (0 - 127)
00 03	0aaa aaaa	Output Min (0 - 127)
00 04	0aaa aaaa	Output Max (0 - 127)
00 05	0000 000a	Mode (0 - 1)
00 06	0000 aaaa	Latch, Momentary (0 - 11) Curve 1 Linear, 2 Exp L, 3 Exp M1, 4 Exp M2, 5 Exp H, 6 Log L, 7 Log M1, 8 Log M2, 9 Log H, 10 S-Shape, 11 Reverse S, 12 Step
00 07	0aaa aaaa	Function (0 - 114)
00 08	0aaa aaaa	Input Min (0 - 127)
00 09	0aaa aaaa	Input Max (0 - 127)
00 0A	0aaa aaaa	Output Min (0 - 127)
00 0B	0aaa aaaa	Output Max (0 - 127)
00 0C	0000 000a	Mode (0 - 1)
00 0D	0000 aaaa	Curve (0 - 11)
00 0E	0aaa aaaa	Function (0 - 114)
00 0F	0aaa aaaa	Input Min (0 - 127)
00 10	0aaa aaaa	Input Max (0 - 127)
00 11	0aaa aaaa	Output Min (0 - 127)
00 12	0aaa aaaa	Output Max (0 - 127)
00 13	0000 000a	Mode (0 - 1)
00 14	0000 aaaa	Curve (0 - 11)
00 15	0aaa aaaa	Function (0 - 114)
00 16	0aaa aaaa	Input Min (0 - 127)
00 17	0aaa aaaa	Input Max (0 - 127)

00 18	0aaa aaaa	Output Min	(0 - 127)
00 19	0aaa aaaa	Output Max	(0 - 127)
00 1A	0000 000a	Mode	(0 - 1)
00 1B	0000 aaaa	Curve	(0 - 11)
00 00 00 1C	Total Size		

* [Assign8]

Offset Address	Description		
00 00	0aaa aaaa	Function Off, CC 01, Breath, Breath Sub, Articulation, Portamento Time, CC 06, Volume, CC 08, CC 09, Pan, Expression, CC 12, CC 13, CC 14, CC 15, CC 16, CC 17, CC 18, CC 19, CC 20, CC 21, CC 22, CC 23, CC 24, CC 25, CC 26, CC 27, CC 28, CC 29, CC 30, CC 31, CC 33, CC 34, CC 35, CC 36, CC 37, CC 38, CC 39, CC 40, CC 41, CC 42, CC 43, CC 44, CC 45, CC 46, CC 47, CC 48, CC 49, CC 50, CC 51, CC 52, CC 53, CC 54, CC 55, CC 56, CC 57, CC 58, CC 59, CC 60, CC 61, CC 62, CC 63, CC 64, CC 65, CC 66, CC 67, CC 68, CC 69, CC 70, Resonance, Release, Attack, Cutoff, Decay, Vibrato Rate, Vibrato Depth, Vibrato Delay, CC 79, CC 80, CC 81, CC 82, CC 83, CC 84, CC 85, CC 86, CC 87, CC 88, CC 89, CC 90, CC 91, CC 92, CC 93, CC 94, CC 95, Bend Down, Bend Up, After Touch, Oct -1, Oct +1, Tone Down, Tone Up, Favorite Down, Favorite Up, Favorite Bank Down, Favorite Bank Up, IFX Sw, Oct Down, Oct Up, Transpose Down, Transpose Up, Harmony/Drone Sw, Hold Mode Sw, Harmony Scale, Harmony Key	(0 - 114)
00 01	0aaa aaaa	Input Min	(0 - 127)
00 02	0aaa aaaa	Input Max	(0 - 127)
00 03	0aaa aaaa	Output Min	(0 - 127)
00 04	0aaa aaaa	Output Max	(0 - 127)
00 05	0000 000a	Mode	(0 - 1)
00 06	0000 aaaa	Curve 1 Linear, 2 Exp L, 3 Exp M1, 4 Exp M2, 5 Exp H, 6 Log L, 7 Log M1, 8 Log M2, 9 Log H, 10 S-Shape, 11 Reverse S, 12 Step	(0 - 11)
00 07	0aaa aaaa	Function	(0 - 114)
00 08	0aaa aaaa	Input Min	(0 - 127)
00 09	0aaa aaaa	Input Max	(0 - 127)
00 0A	0aaa aaaa	Output Min	(0 - 127)
00 0B	0aaa aaaa	Output Max	(0 - 127)
00 0C	0000 000a	Mode	(0 - 1)
00 0D	0000 aaaa	Curve	(0 - 11)
00 0E	0aaa aaaa	Function	(0 - 114)
00 0F	0aaa aaaa	Input Min	(0 - 127)
00 10	0aaa aaaa	Input Max	(0 - 127)
00 11	0aaa aaaa	Output Min	(0 - 127)
00 12	0aaa aaaa	Output Max	(0 - 127)
00 13	0000 000a	Mode	(0 - 1)
00 14	0000 aaaa	Curve	(0 - 11)
00 15	0aaa aaaa	Function	(0 - 114)
00 16	0aaa aaaa	Input Min	(0 - 127)
00 17	0aaa aaaa	Input Max	(0 - 127)
00 18	0aaa aaaa	Output Min	(0 - 127)
00 19	0aaa aaaa	Output Max	(0 - 127)
00 1A	0000 000a	Mode	(0 - 1)
00 1B	0000 aaaa	Curve	(0 - 11)
00 1C	0aaa aaaa	Function	(0 - 114)
00 1D	0aaa aaaa	Input Min	(0 - 127)
00 1E	0aaa aaaa	Input Max	(0 - 127)
00 1F	0aaa aaaa	Output Min	(0 - 127)
00 20	0aaa aaaa	Output Max	(0 - 127)
00 21	0000 000a	Mode	(0 - 1)
00 22	0000 aaaa	Curve	(0 - 11)
00 23	0aaa aaaa	Function	(0 - 114)
00 24	0aaa aaaa	Input Min	(0 - 127)
00 25	0aaa aaaa	Input Max	(0 - 127)
00 26	0aaa aaaa	Output Min	(0 - 127)
00 27	0aaa aaaa	Output Max	(0 - 127)
00 28	0000 000a	Mode	(0 - 1)
00 29	0000 aaaa	Curve	(0 - 11)
00 2A	0aaa aaaa	Function	(0 - 114)
00 2B	0aaa aaaa	Input Min	(0 - 127)
00 2C	0aaa aaaa	Input Max	(0 - 127)
00 2D	0aaa aaaa	Output Min	(0 - 127)
00 2E	0aaa aaaa	Output Max	(0 - 127)
00 2F	0000 000a	Mode	(0 - 1)
00 30	0000 aaaa	Curve	(0 - 11)
00 31	0aaa aaaa	Function	(0 - 114)
00 32	0aaa aaaa	Input Min	(0 - 127)
00 33	0aaa aaaa	Input Max	(0 - 127)
00 34	0aaa aaaa	Output Min	(0 - 127)
00 35	0aaa aaaa	Output Max	(0 - 127)
00 36	0000 000a	Mode	(0 - 1)
00 37	0000 aaaa	Curve	(0 - 11)
00 00 00 38	Total Size		

* [Assign2 MIDI]

Offset Address	Description	
00 00	0aaa aaaa	Function (0 - 98) Off, CC 01, CC 02, CC 03, CC 04, CC 05, CC 06, CC 07, CC 08, CC 09, CC 10, CC 11, CC 12, CC 13, CC 14, CC 15, CC 16, CC 17, CC 18, CC 19, CC 20, CC 21, CC 22, CC 23, CC 24, CC 25, CC 26, CC 27, CC 28, CC 29, CC 30, CC 31, CC 33, CC 34, CC 35, CC 36, CC 37, CC 38, CC 39, CC 40, CC 41, CC 42, CC 43, CC 44, CC 45, CC 46, CC 47, CC 48, CC 49, CC 50, CC 51, CC 52, CC 53, CC 54, CC 55, CC 56, CC 57, CC 58, CC 59, CC 60, CC 61, CC 62, CC 63, CC 64, CC 65, CC 66, CC 67, CC 68, CC 69, CC 70, CC 71, CC 72, CC 73, CC 74, CC 75, CC 76, CC 77, CC 78, CC 79, CC 80, CC 81, CC 82, CC 83, CC 84, CC 85, CC 86, CC 87, CC 88, CC 89, CC 90, CC 91, CC 92, CC 93, CC 94, CC 95, Bend Down, Bend Up, After Touch, Start(FA)/Stop(FC)
00 01	0aaa aaaa	Input Min (0 - 127)
00 02	0aaa aaaa	Input Max (0 - 127)
00 03	0aaa aaaa	Output Min (0 - 127)
00 04	0aaa aaaa	Output Max (0 - 127)
00 05	0000 000a	Mode (0 - 1) Latch, Momentary
00 06	0000 aaaa	Curve (0 - 11) 1 Linear, 2 Exp L, 3 Exp M1, 4 Exp M2, 5 Exp H, 6 Log L, 7 Log M1, 8 Log M2, 9 Log H, 10 S-Shape, 11 Reverse S, 12 Step
00 07	0aaa aaaa	Function (0 - 98)
00 08	0aaa aaaa	Input Min (0 - 127)
00 09	0aaa aaaa	Input Max (0 - 127)
00 0A	0aaa aaaa	Output Min (0 - 127)
00 0B	0aaa aaaa	Output Max (0 - 127)
00 0C	0000 000a	Mode (0 - 1)
00 0D	0000 aaaa	Curve (0 - 11)
00 00 00 0E	Total Size	

* [Assign4 MIDI]

Offset Address	Description	
00 00	0aaa aaaa	Function (0 - 98) Off, CC 01, CC 02, CC 03, CC 04, CC 05, CC 06, CC 07, CC 08, CC 09, CC 10, CC 11, CC 12, CC 13, CC 14, CC 15, CC 16, CC 17, CC 18, CC 19, CC 20, CC 21, CC 22, CC 23, CC 24, CC 25, CC 26, CC 27, CC 28, CC 29, CC 30, CC 31, CC 33, CC 34, CC 35, CC 36, CC 37, CC 38, CC 39, CC 40, CC 41, CC 42, CC 43, CC 44, CC 45, CC 46, CC 47, CC 48, CC 49, CC 50, CC 51, CC 52, CC 53, CC 54, CC 55, CC 56, CC 57, CC 58, CC 59, CC 60, CC 61, CC 62, CC 63, CC 64, CC 65, CC 66, CC 67, CC 68, CC 69, CC 70, CC 71, CC 72, CC 73, CC 74, CC 75, CC 76, CC 77, CC 78, CC 79, CC 80, CC 81, CC 82, CC 83, CC 84, CC 85, CC 86, CC 87, CC 88, CC 89, CC 90, CC 91, CC 92, CC 93, CC 94, CC 95, Bend Down, Bend Up, After Touch, Start(FA)/Stop(FC)
00 01	0aaa aaaa	Input Min (0 - 127)
00 02	0aaa aaaa	Input Max (0 - 127)
00 03	0aaa aaaa	Output Min (0 - 127)
00 04	0aaa aaaa	Output Max (0 - 127)
00 05	0000 000a	Mode (0 - 1) Latch, Momentary
00 06	0000 aaaa	Curve (0 - 11) 1 Linear, 2 Exp L, 3 Exp M1, 4 Exp M2, 5 Exp H, 6 Log L, 7 Log M1, 8 Log M2, 9 Log H, 10 S-Shape, 11 Reverse S, 12 Step
00 07	0aaa aaaa	Function (0 - 98)
00 08	0aaa aaaa	Input Min (0 - 127)
00 09	0aaa aaaa	Input Max (0 - 127)
00 0A	0aaa aaaa	Output Min (0 - 127)
00 0B	0aaa aaaa	Output Max (0 - 127)
00 0C	0000 000a	Mode (0 - 1)
00 0D	0000 aaaa	Curve (0 - 11)
00 0E	0aaa aaaa	Function (0 - 98)
00 0F	0aaa aaaa	Input Min (0 - 127)
00 10	0aaa aaaa	Input Max (0 - 127)
00 11	0aaa aaaa	Output Min (0 - 127)
00 12	0aaa aaaa	Output Max (0 - 127)
00 13	0000 000a	Mode (0 - 1)
00 14	0000 aaaa	Curve (0 - 11)
00 15	0aaa aaaa	Function (0 - 98)
00 16	0aaa aaaa	Input Min (0 - 127)
00 17	0aaa aaaa	Input Max (0 - 127)
00 18	0aaa aaaa	Output Min (0 - 127)
00 19	0aaa aaaa	Output Max (0 - 127)
00 1A	0000 000a	Mode (0 - 1)
00 1B	0000 aaaa	Curve (0 - 11)
00 00 00 1C	Total Size	

* [Assign8 MIDI]

Offset Address	Description	
00 00	0aaa aaaa	Function (0 - 98) Off, CC 01, CC 02, CC 03, CC 04, CC 05, CC 06, CC 07, CC 08, CC 09, CC 10, CC 11, CC 12, CC 13, CC 14, CC 15, CC 16, CC 17, CC 18, CC 19, CC 20, CC 21, CC 22, CC 23, CC 24, CC 25, CC 26, CC 27, CC 28, CC 29, CC 30, CC 31, CC 33, CC 34, CC 35, CC 36, CC 37, CC 38, CC 39, CC 40, CC 41, CC 42, CC 43, CC 44, CC 45, CC 46, CC 47, CC 48, CC 49, CC 50, CC 51, CC 52, CC 53, CC 54, CC 55, CC 56, CC 57, CC 58, CC 59, CC 60, CC 61, CC 62, CC 63, CC 64, CC 65, CC 66, CC 67, CC 68, CC 69, CC 70, CC 71, CC 72, CC 73, CC 74, CC 75, CC 76, CC 77, CC 78, CC 79, CC 80, CC 81, CC 82, CC 83, CC 84, CC 85, CC 86, CC 87, CC 88, CC 89, CC 90, CC 91, CC 92, CC 93, CC 94, CC 95, Bend Down, Bend Up, After Touch, Start (FA) / Stop (FC)
00 01	0aaa aaaa	Input Min (0 - 127)
00 02	0aaa aaaa	Input Max (0 - 127)
00 03	0aaa aaaa	Output Min (0 - 127)
00 04	0aaa aaaa	Output Max (0 - 127)
00 05	0000 000a	Mode (0 - 1)
00 06	0000 aaaa	Latch, Momentary (0 - 11) Curve 1 Linear, 2 Exp L, 3 Exp M1, 4 Exp M2, 5 Exp H, 6 Log L, 7 Log M1, 8 Log M2, 9 Log H, 10 S-Shape, 11 Reverse S, 12 Step
00 07	0aaa aaaa	Function (0 - 98)
00 08	0aaa aaaa	Input Min (0 - 127)
00 09	0aaa aaaa	Input Max (0 - 127)
00 0A	0aaa aaaa	Output Min (0 - 127)
00 0B	0aaa aaaa	Output Max (0 - 127)
00 0C	0000 000a	Mode (0 - 1)
00 0D	0000 aaaa	Curve (0 - 11)
00 0E	0aaa aaaa	Function (0 - 98)
00 0F	0aaa aaaa	Input Min (0 - 127)
00 10	0aaa aaaa	Input Max (0 - 127)
00 11	0aaa aaaa	Output Min (0 - 127)
00 12	0aaa aaaa	Output Max (0 - 127)
00 13	0000 000a	Mode (0 - 1)
00 14	0000 aaaa	Curve (0 - 11)
00 15	0aaa aaaa	Function (0 - 98)
00 16	0aaa aaaa	Input Min (0 - 127)
00 17	0aaa aaaa	Input Max (0 - 127)
00 18	0aaa aaaa	Output Min (0 - 127)
00 19	0aaa aaaa	Output Max (0 - 127)
00 1A	0000 000a	Mode (0 - 1)
00 1B	0000 aaaa	Curve (0 - 11)
00 1C	0aaa aaaa	Function (0 - 98)
00 1D	0aaa aaaa	Input Min (0 - 127)
00 1E	0aaa aaaa	Input Max (0 - 127)
00 1F	0aaa aaaa	Output Min (0 - 127)
00 20	0aaa aaaa	Output Max (0 - 127)
00 21	0000 000a	Mode (0 - 1)
00 22	0000 aaaa	Curve (0 - 11)
00 23	0aaa aaaa	Function (0 - 98)
00 24	0aaa aaaa	Input Min (0 - 127)
00 25	0aaa aaaa	Input Max (0 - 127)
00 26	0aaa aaaa	Output Min (0 - 127)
00 27	0aaa aaaa	Output Max (0 - 127)
00 28	0000 000a	Mode (0 - 1)
00 29	0000 aaaa	Curve (0 - 11)
00 2A	0aaa aaaa	Function (0 - 98)
00 2B	0aaa aaaa	Input Min (0 - 127)
00 2C	0aaa aaaa	Input Max (0 - 127)
00 2D	0aaa aaaa	Output Min (0 - 127)
00 2E	0aaa aaaa	Output Max (0 - 127)
00 2F	0000 000a	Mode (0 - 1)
00 30	0000 aaaa	Curve (0 - 11)
00 31	0aaa aaaa	Function (0 - 98)
00 32	0aaa aaaa	Input Min (0 - 127)
00 33	0aaa aaaa	Input Max (0 - 127)
00 34	0aaa aaaa	Output Min (0 - 127)
00 35	0aaa aaaa	Output Max (0 - 127)
00 36	0000 000a	Mode (0 - 1)
00 37	0000 aaaa	Curve (0 - 11)
00 00 00 38	Total Size	

* [Favorite]

Offset Address	Description	
00 00	0000 000a	Favorite Switch (0 - 1) Off, On
00 01	0aaa aaaa	Tone Bank Select MSB (0 - 127)
00 02	0aaa aaaa	Tone Bank Select LSB (0 - 127)

00 03	0aaa aaaa	Tone Program Change	(0 - 127) 1 - 128
00 00 00 04	Total Size		

* [Tone Common]

Offset Address	Description		
00 00	0aaa aaaa	NAME 1	(32 - 127)
00 01	0aaa aaaa	NAME 2	(32 - 127)
00 02	0aaa aaaa	NAME 3	(32 - 127)
00 03	0aaa aaaa	NAME 4	(32 - 127)
00 04	0aaa aaaa	NAME 5	(32 - 127)
00 05	0aaa aaaa	NAME 6	(32 - 127)
00 06	0aaa aaaa	NAME 7	(32 - 127)
00 07	0aaa aaaa	NAME 8	(32 - 127)
00 08	0aaa aaaa	NAME 9	(32 - 127)
00 09	0aaa aaaa	NAME 10	(32 - 127)
00 0A	0aaa aaaa	NAME 11	(32 - 127)
00 0B	0aaa aaaa	NAME 12	(32 - 127)
00 0C	0aaa aaaa	NAME 13	(32 - 127)
00 0D	0aaa aaaa	NAME 14	(32 - 127)
00 0E	0aaa aaaa	NAME 15	(32 - 127)
00 0F	0aaa aaaa	NAME 16	(32 - 127)
00 12	0000 000a	Harmony/Drone	(0 - 1) Harmony, Drone
00 14	0aaa aaaa	Tone Level	(0 - 127)
00 15	000a aaaa	Effect Type	0 - 17 Off, 1, 2, ... 17
00 16	0aaa aaaa	Effect Level	(0 - 127)
00 17	0aaa aaaa	Tone Transpose	(59 - 70) G (-5), G# (-4), A (-3), Bb (-2), B (-1), C (0), C# (+1), D (+2), Eb (+3), E (+4), F (+5), F# (+6)
00 18	0aaa aaaa	Tone Octave Shift	(61 - 67) -3 - 3
00 1C	0000 aaaa	Intelligent Harmony	(0 - 14) Off, Oct below, 7th below, 6th below, 5th below, 4th below, 3rd below, 2nd below, 2nd above, 3rd above,
00 00 00 1D	Total Size		

* [Tone Part]

Offset Address	Description		
00 05	0aaa aaaa	Part Level (CC#7)	(0 - 127)
00 07	0aaa aaaa	Part Pan (CC#10)	(0 - 127)
00 08	0aaa aaaa	Part Coarse Tune (RPN#2)	(16 - 112)
00 09	0aaa aaaa	Part Fine Tune (RPN#1)	(14 - 114)
00 0C	0000 00aa	Part Portamento Switch (CC#65)	(0 - 2) OFF, ON, TONE
# 00 0D	0000 aaaa		
00 0E	0000 bbbb	Part Portamento Time (CC#5)	(0 - 128)
00 10	0aaa aaaa	Part Cutoff Offset (CC#74)	(0 - 127) -64 - 63
00 11	0aaa aaaa	Part Resonance Offset (CC#71)	(0 - 127) -64 - 63
00 12	0aaa aaaa	Part AttackTime Offset (CC#73)	(0 - 127) -64 - 63
00 13	0aaa aaaa	Part DecayTime Offset (CC#75)	(0 - 127) -64 - 63
00 14	0aaa aaaa	Part ReleaseTime Offset (CC#72)	(0 - 127) -64 - 63
00 15	0aaa aaaa	Part Vibrato Rate (CC#76)	(0 - 127) -64 - 63
00 16	0aaa aaaa	Part Vibrato Depth (CC#77)	(0 - 127) -64 - 63
00 17	0aaa aaaa	Part Vibrato Delay (CC#78)	(0 - 127) -64 - 63
00 22	0aaa aaaa	Part Chorus Send Level (CC#93)	(0 - 127)
00 23	0aaa aaaa	Part Reverb Send Level (CC#91)	(0 - 127)
00 28	0aaa aaaa	Part Delay Send Level (CC#94)	(0 - 127)
00 00 00 29	Total Size		

4. Supplementary Material

■ Decimal and Hexadecimal Table

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

In MIDI documentation, data values and addresses/sizes of Exclusive messages, etc. are expressed as hexadecimal values for each 7 bits. The following table shows how these correspond to decimal numbers.

D	H	D	H	D	H	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.

<Example1> What is the decimal expression of 5AH?

From the preceding table, 5AH = 90

<Example2>

What is the decimal expression of the value 12 34H given as hexadecimal for each 7 bits?

From the preceding table, since 12H = 18 and 34H = 52

18 x 128 + 52 = 2356

<Example3>

What is the decimal expression of the nibbled value 0A 03 09 0D?

From the preceding table, since 0AH = 10, 03H = 3, 09H = 9, 0DH = 13

((10 x 16 + 3) x 16 + 9) x 16 + 13 = 41885

<Example4> What is the nibbled expression of the decimal value 1258?

16) 1258

16) 78 ... 10

16) 4 ... 14

0 ... 4

Since from the preceding table, 0 = 00H, 4 = 04H, 14 = 0EH, 10 = 0AH, the result is:

00 04 0E 0AH

■ Examples of Actual MIDI Messages

<Example1> 92 3E 5F

9n is the Note-on status, and n is the MIDI channel number. Since 2H = 2, 3EH = 62, and 5FH = 95, this is a Note-on message with MIDI CH = 3, note number 62 (note name is D4), and velocity 95.

<Example2> CE 49

CnH is the Program Change status, and n is the MIDI channel number. Since EH = 14 and 49H = 73, this is a Program Change message with MIDI CH = 15, program number 74.

<Example3> EA 00 28

EnH is the Pitch Bend Change status, and n is the MIDI channel number. The 2nd byte (00H = 0) is the LSB and the 3rd byte (28H = 40) is the MSB, but Pitch Bend Value is a signed number in which 40 00H (= 64 x 128 + 0 = 8192) is 0, so this Pitch Bend Value is

28 00H - 40 00H = 40 x 128 + 0 - (64 x 128 + 0) = 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 fastforwarded, the sequencer may not be able to transmit the correct status, and the sound generator will then misinterpret the data. Take care to give each event its own status.

It is also necessary that the RPN or NRPN parameter number setting and the value setting be done in the proper order. On some sequencers, events occurring in the same (or consecutive) clock may be transmitted in an order different than the order in which they were received. For this reason it is a good idea to slightly skew the time of each event (about 1 tick for TPQN = 96, and about 5 ticks for TPQN = 480).

* TPQN: Ticks Per Quarter Note

■ Example of an Exclusive Message and Calculating a Checksum

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

● How to calculate the checksum

(hexadecimal numbers are indicated by "H")

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

Here's an example of how the checksum is calculated. We will assume that in the Exclusive message we are transmitting, the address is aabbccddH and the data or size is eeffH.

aa + bb + cc + dd + ee + ff = sum

sum / 128 = quotient ... remainder

128 - remainder = checksum

<Example> Setting Tone Volume to 74 (DT1).

According to the Parameter Address Map, the start address of Temporary Program is 01 00 00 00H, the offset address of Program common is 00 00 00H, and the address of Program level is 00 18H. Therefore the address is:

```

01 00 00 00H
00 00 00H
+) 00 18H
-----
01 00 00 18H

```

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

F0 41 10 01 06 08 12 01 00 00 18 4A ?? F7
 (1) (2) (3) (4) (5) address data checksum (6)

(1) Exclusive Status (2) ID (Roland) (3) Device ID (17)

(4) Model ID (AE-BRISA) (5) Command ID (DT1) (6) End of Exclusive

Then calculate the checksum.

01H + 00H + 00H + 18H + 4AH = 1 + 0 + 0 + 24 + 74 = 99 (sum)

91 (sum) / 128 = 0 (quotient) ... 99 (remainder)

checksum = 128 - 91 (remainder) = 29 = 1DH

This means that F0 41 10 01 06 08 12 01 00 00 18 4A 1D F7 is the message should be sent.

ASCII Code Table

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

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

D: decimal

H: hexadecimal

* "SP" is space.

Model AE-BRISA

Function		Transmitted	Recognized	Remarks
Basic Channel	Default Changed	1-16 1-16	1 1	
Mode	Default Messages Altered	Mode 3 Mono, Poly *****	Mode 3 Mode 3, 4 (M=1)	
Note Number	:True Voice	0-127 *****	0-127 0-127	
Velocity	Note On Note Off	o o	o o	
After Touch	Key's Channel's	x o	x o	
Pitch Bend		o	o	
Control Change	0, 32 1 2 5 6, 38 7 10 11 64 65 66 68 71 72 73 74 75 76 77 78 91 93 94 1 - 31, 33 - 95 96, 97 98, 99 100, 101	o *1 *2 o x x o	o (Reverb) o (Chorus) o (Delay) o x x o	Bank Select Modulation Breath Type Portamento Time Data Entry Volume Panpot Expression Hold 1 Portamento Sostenuto Legato Foot Switch Resonance Release Time Attack time Cutoff Decay Time Vibrato Rate Vibrato Depth Vibrato Delay General Purpose Effect 1 General Purpose Effect 3 General Purpose Effect 4 General Purpose Controller Increment, Decrement NRPN LSB, MSB RPN LSB, MSB
Program Change	:True Number	o *1 *****	o 0-127	Program No. 1-128
System Exclusive		o *3	o	
System Common	:Song Position :Song Select :Tune Request	x x x	x x x	
System Real Time	:Clock :Commands	x x	x x	
Aux Messages	:All Sound Off :Reset All Controllers :Local On/Off :All Notes Off :Active Sensing :System Reset	x o x x o x	o o x o (120, 123-125) o x	
Notes		*1 ○ × is selectable. *2 Transmitted if MIDI Control Sw is on. *3 Transmitted if Transmit Edit Data is on, or when RQ1 is received.		

o : Yes
x : No