

# CTK-6000/WK-6500/CTK-7000/WK-7500/AT-3/AT-5

## MIDI Implementation

CASIO COMPUTER CO., LTD.

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## Part I

# MIDI Message Overview

## 1 Product Configuration as a MIDI Device

As a MIDI device, this Instrument consists of the System Section, Sound Generator Section, and Performance Controller Section described below. Each of these sections can send and receive specific MIDI Messages in accordance with its function.

### 1.1 System Section

The System Section manages the Instrument status and user data. A communication method known as a “bulk dump” can be used for two-way transfer of user data between the Instrument and a computer.

### 1.2 Performance Controller Section

The Performance Controller Section performs keyboard play and controller operations, and generates performance messages in accordance with auto play, etc. Basically, generated performance messages are sent to external destinations while also being transmitted to the Sound Generator Section. The channel number of the sent channel message is in accordance with the Instrument’s instrument part number.

**MIDI Output Performance Information** The following describes the performance information that is output and is not output as MIDI signals.

- Output performance
  - Keyboard play and controller operations by the musician
  - Auto accompaniment
  - Recorded song playback
- Non-output performance
  - Demo Songs
  - Card song playback

### 1.3 Sound Generator Section

The Sound Generator Section mainly performs receive of performance information and sound source setting information. It consists of a common part that does not depend on the channel and a musical instrument part that is independent of each channel.

#### 1.3.1 Sound Generator Common Block

The common block consists of system effects, master control, etc. These can be controlled by Instrument mixer function and/or general universal system exclusive messages, and the Instrument’s system exclusive messages.

### 1.3.2 Instrument Part Block

The instrument part section consists of a total of 32 instrument parts, divided into two groups, named Group A and Group B of 16 instruments each. Each part can perform operations and setting changes using the Instrument mixer function, and/or channel messages and Instrument's system exclusive messages. Only Group B can be controlled by external channel messages.

As shown in the following table, there is a fixed relationship between channel message receive channel numbers and instrument parts.

Number	Name	MIDI Receive Ch	MIDI Send Ch	Assigned Function
00	A01	-	01-16(Note1)	Keyboard UPPER 1
01	A02	-	02	Keyboard UPPER 2
02	A03	-	03	Keyboard LOWER
03	A04	-	04	Auto Harmonize
04	A05	-	05	Song Sequencer system track UPPER 1
05	A06	-	06	Song Sequencer system track UPPER 2
06	A07	-	07	Song Sequencer system track LOWER
07	A08	-	-	Metronome
08	A09	-	09	Auto Accompaniment (Percussion)
09	A10	-	10	Auto Accompaniment (Drum)
10	A11	-	11	Auto Accompaniment (Bass)
11	A12	-	12	Accompaniment (Chord 1)
12	A13	-	13	Accompaniment (Chord 2)
13	A14	-	14	Accompaniment (Chord 3)
14	A15	-	15	Accompaniment (Chord 4)
15	A16	-	16	Accompaniment (Chord 5)
16	B01	01	01	MIDI/Auto Performance Functions
17	B02	02	02	MIDI/Auto Performance Functions
18	B03	03	03	MIDI/Auto Performance Functions
19	B04	04	04	MIDI/Auto Performance Functions
20	B05	05	05	MIDI/Auto Performance Functions
21	B06	06	06	MIDI/Auto Performance Functions
22	B07	07	07	MIDI/Auto Performance Functions
23	B08	08	08	MIDI/Auto Performance Functions
24	B09	09	09	MIDI/Auto Performance Functions
25	B10	10	10	MIDI/Auto Performance Functions(Note2)
26	B11	11	11	MIDI/Auto Performance Functions
27	B12	12	12	MIDI/Auto Performance Functions
28	B13	13	13	MIDI/Auto Performance Functions
29	B14	14	14	MIDI/Auto Performance Functions
30	B15	15	15	MIDI/Auto Performance Functions
31	B16	16	16	MIDI/Auto Performance Functions

Note1 : Can be changed by the Keyboard Channel setting.

Note2 : This instrument part is basically a drum-only part. To specify a sound with a MIDI message, specify a drum sound whose setting is supported by the Instrument mixer.



## **2 Timbre Type Specific Operation**

The sound source operation performed for a sound generator instrument receive message may depend on the value of the Timbre Type (see “About the Timbre Type” in “12 Program Change”) of each part’s operation mode. For details, see the explanation for each message.

## **3 Controlling Send/Receive of MIDI Messages in Each Instrument Part**

Send/receive of MIDI messages in each instrument part can be enabled/disabled by the Instrument’s mixer, the NRPN message explained under “10.19.1 Part Enable”, and the Part Enable Parameter explained under “25.7 Part Parameter”.

## **4 Conditions that Disable Message Send and Receive**

All MIDI message send and receive is temporarily disabled while “Please Wait ...” is displayed.

## Part II

# Channel Message

## 5 Receive Channel

The channel number of the channel message received by each part is shown in the table under “1.3.2 Instrument Part Block”.

## 6 Send Channel

Basically, the MIDI channel of the channel message sent when the Instrument is played coincides with the MIDI channel of the part being played. Note, however, that the MIDI channel of the performance information that corresponds to the keyboard main part depends on the Keyboard Channel setting value.

## 7 Note Off

Message Format: 8nH kkH vvH  
9nH kkH 00H(receive only)

---

n: MIDI Channel Number  
kk: Key Number  
vv: Velocity(Send:40H, Receive:Ignored)

**Send** Sent when the keyboard is played, when play is performed using Auto Accompaniment, and when recorded song data is played back. The key number changes in accordance with on the Transpose function and Octave Shift function.

**Receive** Receipt stops a note being sounded by a note on message.

## 8 Note On

Message Format: 9nH kkH vvH

---

n: MIDI Channel Number  
kk: Key Number  
vv: Velocity

**Send** Sent when the keyboard is played, when play is performed using Auto Accompaniment, and when recorded song data is played back. The key number changes in accordance with on the Transpose function and Octave Shift function.

**Receive** Receipt sounds a note of the corresponding instrument part.

## 9 Polyphonic Key Pressure

Message Format: AnH kkH vvH

---

n: MIDI Channel Number  
kk: Key Number  
vv: Pressure Value

**Send** This message is not sent by this Instrument.

**Receive** This message is not received by this Instrument.

## 10 Control Change

Message Format: BnH ccH vvH

---

n: MIDI Channel Number  
cc: Control Number  
vv: Value

**Send** Sent when the Instrument's pedal is operated or when Instrument settings are changed.

**Receive** Receipt changes the pedal and other performance conditions, and Instrument settings.

### 10.1 Bank Select (00H,20H)

Message Format: BnH 00H mmH (MSB)  
BnH 20H 11H (LSB)

---

n: MIDI Channel Number  
mm: MSB Value(Note1)  
11: LSB Value(Send:00H, Receive:Ignored)

Note1 : For details about the relationship between the MSB value and the tone, see the Tone List that comes with the Instrument.

**Send** Sent when a tone is selected.

**Receive** Receipt causes a change in the tone bank number stored in Instrument memory, but the tone is not actually changed until a Program Change message is received. For details, see "12 Program Change".

### 10.2 Modulation (01H)

Message Format: BnH 01H vvH

---

n: MIDI Channel Number  
vv: Value

**Send** Sent when the modulation button is operated (CTK-7000, WK-7500, AT-3, AT-5 only).

**Receive** Receipt adds, to the tone being sounded, modulation of a depth specified by the value. In the case of a tone that already has modulation applied, receipt of this message increases the modulation depth. The modulation effect differs according to the tone being used.

### 10.3 Data Entry (06H,26H)

Message Format: BnH 06H mmH (MSB)  
BnH 26H 11H (LSB)

---

n: MIDI Channel Number  
mm: MSB Value  
11: LSB Value

**Send** Sent when there is a change to the parameter assigned to RPN, NRPN.

**Receive** Receipt changes the parameter assigned to RPN, NRPN.

### 10.4 Volume (07H)

Message Format: BnH 07H vvH

---

n: MIDI Channel Number  
vv: Value

**Send** Sent when the volume of any part is changed.

**Receive** Receipt changes the volume of the corresponding part.

### 10.5 Pan (0AH)

Message Format: BnH 0AH vvH

---

n: MIDI Channel Number  
vv: Value(Note1)

Note1 : For information about the relationship between setting values and send/receive values, see “36.4 Pan Setting Value Table” in “VIII Setting Values and Send/Receive Values”.

**Send** Sent when the pan of any part is changed.

**Receive** Receipt changes the pan of the corresponding part.

### 10.6 Expression (0BH)

Message Format: BnH 0BH vvH

---

n: MIDI Channel Number  
vv: Value

**Send** Sent when Auto Accompaniment is used and during recorded song playback.

**Receive** Receipt changes the Expression value.

## 10.7 General Use Controllers 1 through 8 (10H through 13H, 50H through 53H)

On this Instrument, these messages are used to control DSP operation.

Message Format:	BnH 10H vvH	DSP Parameter7 [1]
	BnH 11H vvH	DSP Parameter7 [2]
	BnH 12H vvH	DSP Parameter7 [3]
	BnH 13H vvH	DSP Parameter7 [4]
	BnH 50H vvH	DSP Parameter7 [5]
	BnH 51H vvH	DSP Parameter7 [6]
	BnH 52H vvH	DSP Parameter7 [7]
	BnH 53H vvH	DSP Parameter7 [8]

---

n: MIDI Channel Number  
vv: Value

**Send** Sent when the DSP parameter setting is configured.

**Receive** Receipt changes the value of DSP Parameter 7 [1 to 8] (7-bit parameter) assigned to the part specified by the MIDI Channel Number. Any message received that corresponds to the parameter of a number not being used by the currently selected DSP is ignored. For details about Parameter 7 of each DSP, see the explanations under “VII DSP Parameter List”.

**Received values and parameter setting values** The range of the value of each DSP Parameter 7 array element depends on the selected DSP or array number. Unlike manipulation of a DSP parameter using a System Exclusive Message, a value received by this control change message is always in the range of 0 to 127, but the range is changed in accordance with the setting range of the applicable parameter setting. Because of this, it is impossible for a value to be outside of the range. Conversion to the parameter setting value from the value received with the message can be represented in general terms by the expression shown below.

$$\text{Parameter Setting Value} = \text{Parameter Minimum Value} + (\text{Parameter Maximum Value} - \text{Parameter Minimum Value}) * \left( \frac{\text{Received Value}}{127} \right)$$

## 10.8 Hold1 (40H)

Message Format: BnH 40H vvH

---

n: MIDI Channel Number  
vv: Value (Note1)

Note1 : For information about the relationship between setting values and send/receive values, see the “36.1 Off/On Setting Value Table” in “VIII Setting Values and Send/Receive Values” of this document.

**Send** Sent when a pedal that has a sustain (damper) function is operated.

**Receive** Receipt performs an operation equivalent to a sustain pedal operation.

**Timbre Type Specific Operation** This operation differs in accordance with the Timbre Type (see “About the Timbre Type” in “12 Program Change”) setting.

- Timbre Type: Melody or Drawbar  
Sustain off/on control is performed in accordance with the value of the received message.
- Timbre Type: Piano  
Continuous control of the piano tone is performed in accordance with the value of the received message.
- Timbre Type: Drum  
The received message does not affect sound source operation.

## 10.9 Sostenuto (42H)

Message Format: BnH 42H vvH

---

n: MIDI Channel Number  
vv: Value (Note1)

Note1 : For information about the relationship between setting values and send/receive values, see the “36.1 Off/On Setting Value Table” in “VIII Setting Values and Send/Receive Values” of this document.

**Send** Sent when a pedal that has a sostenuto function is operated.

**Receive** Receipt performs an operation equivalent to a sostenuto pedal operation.

## 10.10 Soft (43H)

Message Format: BnH 43H vvH

---

n: MIDI Channel Number  
vv: Value (Note1)

Note1 : For information about the relationship between setting values and send/receive values, see the “36.1 Off/On Setting Value Table” in “VIII Setting Values and Send/Receive Values” of this document.

**Send** Sent when a pedal that has a soft function is operated.

**Receive** Receipt performs an operation equivalent to a soft pedal operation.

## 10.11 Release Time (48H)

Message Format: BnH 48H vvH

---

n: MIDI Channel Number  
vv: Value (Note1)

Note1 : For information about the relationship between setting values and send/receive values, see the “36.2 -64 - 0 - +63 Setting Value Table” in “VIII Setting Values and Send/Receive Values” of this document.

**Send** Sent when the release time setting is configured.

**Receive** Receipt makes a relative change in the time it takes for a note to decay to zero after a key is released.

## 10.12 Attack Time (49H)

Message Format: BnH 49H vvH

---

n: MIDI Channel Number

vv: Value (Note1)

Note1 : For information about the relationship between setting values and send/receive values, see the “36.2 –64 - 0 - +63 Setting Value Table” in “VIII Setting Values and Send/Receive Values” of this document.

**Send** Sent when the attack time setting is configured.

**Receive** Receipt makes a relative change in the time it takes for a note to rise to its maximum level.

## 10.13 Filter Cut Off (4AH)

Message Format: BnH 4AH vvH

---

n: MIDI Channel Number

vv: Value (Note1)

Note1 : For information about the relationship between setting values and send/receive values, see the “36.2 –64 - 0 - +63 Setting Value Table” in “VIII Setting Values and Send/Receive Values” of this document.

**Send** Sent when the filter cut off setting is configured.

**Receive** Receipt changes how the cut-off filter is applied.

## 10.14 Vibrato Rate (4CH)

Message Format: BnH 4CH vvH

---

n: MIDI Channel Number

vv: Value (Note1)

Note1 : For information about the relationship between setting values and send/receive values, see the “36.2 –64 - 0 - +63 Setting Value Table” in “VIII Setting Values and Send/Receive Values” of this document.

**Send** Sent when the vibrato rate setting is configured.

**Receive** Receipt changes the note vibrato rate.

## 10.15 Vibrato Depth (4DH)

Message Format: BnH 4DH vvH

---

n: MIDI Channel Number

vv: Value (Note1)

Note1 : For information about the relationship between setting values and send/receive values, see the “36.2 –64 - 0 - +63 Setting Value Table” in “VIII Setting Values and Send/Receive Values” of this document.

**Send** Sent when the vibrato depth setting is configured.

**Receive** Receipt changes the degree of pitch modulation.

## 10.16 Vibrato Delay (4EH)

Message Format: BnH 4EH vvH

---

n: MIDI Channel Number

vv: Value (Note1)

Note1 : For information about the relationship between setting values and send/receive values, see the “36.2 –64 - 0 - +63 Setting Value Table” in “VIII Setting Values and Send/Receive Values” of this document.

**Send** Sent when the vibrato delay setting is configured.

**Receive** Receipt changes the time it takes until note vibrato starts.

## 10.17 Reverb Send (5BH)

Message Format: BnH 5BH vvH

---

n: MIDI Channel Number

vv: Value

**Send** Sent when the reverb send of any part is changed.

**Receive** Receipt changes the reverb send of the corresponding part.

## 10.18 Chorus Send (5DH)

Message Format: BnH 5DH vvH

---

n: MIDI Channel Number

vv: Value

**Send** Sent when the chorus send of any part is changed.

**Receive** Receipt changes the chorus send of the corresponding part.



## 10.19 NRPN (62H,63H)

Message Format: BnH 62H 11H (LSB)  
BnH 63H mmH (MSB)

---

n: MIDI Channel Number  
ll: LSB Value  
mm: MSB Value

### 10.19.1 Part Enable

Message Format: BnH 62H 00H  
BnH 63H 02H  
BnH 06H mmH  
BnH 26H 11H

---

n: MIDI Channel Number  
mm: Value (Note1)  
ll: (Send:00H, Receive:Ignored)

Note1 : For information about the relationship between setting values and send/receive values, see the “36.1 Off/On Setting Value Table” in “VIII Setting Values and Send/Receive Values” of this document.

**Send** Sent when each part’s Part On/Off operation is performed.

**Receive** Receipt changes the part on/off setting of the corresponding part.

### 10.19.2 DSP Enable

Message Format: BnH 62H 01H  
BnH 63H 02H  
BnH 06H mmH  
BnH 26H 11H

---

n: MIDI Channel Number  
mm: Value (Note1)  
ll: (Send:00H, Receive:Ignored)

Note1 : For information about the relationship between setting values and send/receive values, see the “36.1 Off/On Setting Value Table” in “VIII Setting Values and Send/Receive Values” of this document.

**Send** Sent when each part’s DSP Line On/Off operation is performed.

**Receive** Receipt changes the DSP on/off setting of the corresponding part.

### 10.19.3 Mixer Scale Tune Enable

Message Format: BnH 62H 00H  
                  BnH 63H 03H  
                  BnH 06H mmH  
                  BnH 26H 11H

---

n: MIDI Channel Number  
mm: Value (Note1)  
ll: (Send:00H, Receive:Ignored)

Note1 : For information about the relationship between setting values and send/receive values, see the “36.1 Off/On Setting Value Table” in “VIII Setting Values and Send/Receive Values” of this document.

**Send** Sent when each part’s Scale On/Off operation is performed.

**Receive** Receipt changes the scale on/off setting of the corresponding part.

### 10.19.4 Drawbar Position

Message Format: BnH 62H ffH  
                  BnH 63H 40H  
                  BnH 06H mmH  
                  BnH 26H 11H

---

n: MIDI Channel Number  
ff: Drawbar Foot(Feet) (Note1)  
mm: Value (Note2)  
ll: (Send:00H, Receive:Ignored)

Note1 : The following shows the relationship between the Drawbar Foot value and the actual foot bar.

ff	Foot Bar
00	Ft16’
01	Ft5 1/3’
02	Ft8’
03	Ft4’
04	Ft2 2/3’
05	Ft2’
06	Ft1 3/5’
07	Ft1 1/3’
08	Ft1’

Note2 : For information about the relationship between setting values and send/receive values, see the “36.10 Drawbar Position Setting Value Table” in “VIII Setting Values and Send/Receive Values” of this document.

**Send** Sent when a drawbar is operated (CTK-7000, WK-7500 only).

**Receive** Receipt changes the drawbar position in accordance with the message contents (CTK-7000, WK-7500 only).

### 10.19.5 Drawbar Organ Click

Message Format: BnH 62H 09H  
BnH 63H 40H  
BnH 06H mmH  
BnH 26H 11H

---

n: MIDI Channel Number  
mm: Value (Note1)  
ll: (Not sent, Receive:Ignored)

Note1 : For information about the relationship between setting values and send/receive values, see the “36.1 Off/On Setting Value Table” in “VIII Setting Values and Send/Receive Values” of this document.

**Send** This message is not sent by this Instrument.

**Receive** Receipt changes the drawbar parameter click (CTK-7000, WK-7500 only).

### 10.19.6 Drawbar Organ 2nd Percussion

Message Format: BnH 62H 0AH  
BnH 63H 40H  
BnH 06H mmH  
BnH 26H 11H

---

n: MIDI Channel Number  
mm: Value (Note1)  
ll: (Send:00H, Receive:Ignored)

Note1 : For information about the relationship between setting values and send/receive values, see the “36.1 Off/On Setting Value Table” in “VIII Setting Values and Send/Receive Values” of this document.

**Send** Sent when the 2nd percussion button is operated (CTK-7000, WK-7500 only).

**Receive** Receipt changes the drawbar parameter 2nd percussion (CTK-7000, WK-7500 only).

### 10.19.7 Drawbar Organ 3rd Percussion

Message Format: BnH 62H 0BH  
BnH 63H 40H  
BnH 06H mmH  
BnH 26H 11H

---

n: MIDI Channel Number  
mm: Value (Note1)  
ll: (Send:00H, Receive:Ignored)

Note1 : For information about the relationship between setting values and send/receive values, see the “36.1 Off/On Setting Value Table” in “VIII Setting Values and Send/Receive Values” of this document.

**Send** Sent when the 3rd percussion button is operated (CTK-7000, WK-7500 only).

**Receive** Receipt changes the drawbar parameter 3rd percussion (CTK-7000, WK-7500 only).

### 10.19.8 Percussion Decay Time

Message Format: BnH 62H 0CH  
                  BnH 63H 40H  
                  BnH 06H mmH  
                  BnH 26H 11H

---

n: MIDI Channel Number  
mm: Value  
ll: (Not sent, Receive:Ignored)

**Send** This message is not sent by this Instrument.

**Receive** Receipt changes the percussion decay time (CTK-7000, WK-7500 only).

### 10.19.9 Drawbar Organ Type

Message Format: BnH 62H 0DH  
                  BnH 63H 40H  
                  BnH 06H mmH  
                  BnH 26H 11H

---

n: MIDI Channel Number  
mm: Value (Note1)  
ll: (Not sent, Receive:Ignored)

Note1 : For information about the relationship between setting values and send/receive values, see the “36.11 Normal/Vintage Setting Value Table” in “VIII Setting Values and Send/Receive Values” of this document.

**Send** This message is not sent by this Instrument.

**Receive** Receipt changes the drawbar parameter type (CTK-7000, WK-7500 only).

## 10.20 RPN (64H,65H)

Message Format: BnH 64H 11H (LSB)  
                  BnH 65H mmH (MSB)

---

n: MIDI Channel Number  
ll: LSB Value  
mm: MSB Value

### 10.20.1 Pitch Bend Sensitivity

Message Format: BnH 64H 00H  
                  BnH 65H 00H  
                  BnH 06H mmH  
                  BnH 26H 11H

---

n: MIDI Channel Number  
mm: MSB Value(00H - 18H)  
ll: LSB Value(Send:00H, Receive:Ignored)

**Send** Sent when Bend Range of any part is changed.

**Receive** Receipt changes Bend Range of the corresponding part.

### 10.20.2 Fine Tune

Message Format: BnH 64H 01H  
                  BnH 65H 00H  
                  BnH 06H mmH  
                  BnH 26H 11H

---

n: MIDI Channel Number  
mm: MSB Value  
ll: LSB Value

**Send** Sent when the fine tune of any part is changed.

**Receive** Receipt changes the fine tune of the corresponding part.

### 10.20.3 Coarse Tune

Message Format: BnH 64H 02H  
                  BnH 65H 00H  
                  BnH 06H mmH  
                  BnH 26H 11H

---

n: MIDI Channel Number  
mm: MSB Value(28H - 58H)  
ll: LSB Value(Not sent, Receive:Ignored)

**Send** Sent when the coarse tune of any part is changed.

**Receive** Receipt changes the coarse tune of the corresponding part. Does not affect sound source operation when the Timbre Type (see “About the Timbre Type” in “12 Program Change”) is Drum.

### 10.20.4 Null

Message Format: BnH 64H 7FH  
                  BnH 65H 7FH

---

n: MIDI Channel Number

**Send** Sent when an RPN, NRPN message send operation is performed.

**Receive** Receipt de-selects RPN, NRPN.

## 11 Mode Message

### 11.1 All Sound Off (78H)

Message Format: BnH 78H 00H

---

n: MIDI Channel Number

**Send** Sent when the local control is set to OFF on the Instrument.

**Receive** Receipt stops all voices that are sounding.

### 11.2 Reset All Controllers (79H)

Message Format: BnH 79H 00H

---

n: MIDI Channel Number

**Send** Sent when MIDI send related settings are changed.

**Receive** Receipt initializes each performance controller.

### 11.3 All Notes Off (7BH)

Message Format: BnH 7BH 00H

---

n: MIDI Channel Number

**Send** Sent when MIDI send related settings are changed.

**Receive** Receipt releases (key release) all voices that are sounding.

### 11.4 Omni Off (7CH)

Message Format: BnH 7CH 00H

---

n: MIDI Channel Number

**Send** This message is not sent by this Instrument.

**Receive** Receipt performs the same operation as when All Notes Off is received.

### 11.5 Omni On (7DH)

Message Format: BnH 7DH 00H

---

n: MIDI Channel Number

**Send** This message is not sent by this Instrument.

**Receive** Receipt performs the same operation as when All Notes Off is received.

## 11.6 Mono (7EH)

Message Format: BnH 7EH 00H

---

n: MIDI Channel Number

**Send** This message is not sent by this Instrument.

**Receive** Receipt performs the same operation as when All Notes Off is received.

## 11.7 Poly (7FH)

Message Format: BnH 7FH 00H

---

n: MIDI Channel Number

**Send** This message is not sent by this Instrument.

**Receive** Receipt performs the same operation as when All Notes Off is received.

## 12 Program Change

Message Format: CnH ppH

---

n: MIDI Channel Number

pp: Program Number (Note1)

Note1 : For details about the relationship between the program number and the tone, see the Tone List that comes with the Instrument.

**Send** Sent when a tone is selected.

**Receive** Receipt changes the ton of the corresponding part. The selected tone is determined by the program value of this message and the Bank Select message value received prior to this message. Also note that receipt of this message also may change the Timbre Type that corresponds to the selected tone. For more information, see “About the Timbre Type” below.

**About the Timbre Type** Tones that are selected by each Instrument part have an attribute that depends on the sound source operation type. This attribute is called the “timbre type,” which is one of the types described below.

- Melody

This timbre type optimizes for normal melody tones. The damper pedal performs on/off operations.

- Piano

This setting optimizes for piano tones. The damper pedal performs on/off operations, but the decay speed of sounding voices changes in accordance with the Hold1 message value(CTK-7000, WK-7500, AT-3, AT-5 only).

- Drum

This setting optimizes for drum sounds. The damper pedal does not function. The Hold1, Channel Coarse Tune, and Master Coarse Tune messages are ignored if they are received.

- Drawbar

This setting optimizes for drawbar tones. The damper pedal performs on/off operations.

## 13 Channel After Touch

Message Format: DnH vvH

---

n: MIDI Channel Number  
vv: Value

**Send** This message is not sent by this Instrument.

**Receive** Receipt adds, to the tone being sounded, modulation of a depth specified by the value. In the case of a tone that already has modulation applied, receipt of this message increases the modulation depth. The modulation effect differs according to the tone being used.

## 14 Pitch Bend

Message Format: EnH llH mmH

---

n: MIDI Channel Number  
ll: Value LSB  
mm: Value MSB

**Send** Sent when the bender is operated.

**Receive** Receipt changes the pitch of the currently sounding note. The range of the pitch change depends on the Bend Range value setting.



## Part III

# System Message

## 15 Timing Clock

Message Format: F8H

**Send** Sent when auto accompaniment is used.

**Receive** This message is not received by this Instrument.

## 16 Start

Message Format: FAH

**Send** Sent when auto accompaniment is used.

**Receive** This message is not received by this Instrument.

## 17 Stop

Message Format: FCH

**Send** Sent when auto accompaniment is used.

**Receive** This message is not received by this Instrument.

## 18 Active Sensing

Message Format: FEH

**Send** This message is not sent by this Instrument.

**Receive** Once this message is received, the Active Sensing mode is entered. If no MIDI message is received for a specified amount of time, voices being sounded by this Instrument's sound source are released, the controller is reset, and the Active Sensing mode is exited.

## 19 System Exclusive Message

Message Format: F0H...F7H

The Instrument sends and receives standard universal system exclusive messages, and system exclusive messages that have Instrument-specific formats.

## 19.1 Universal Real Time System Exclusive Message

Message Format: F0H 7FH...F7H

### 19.1.1 Master Volume

Message Format: F0H 7FH 7FH 04H 01H 11H mmH F7H

---

11: LSB Value(Send:00H, Receive:Ignored)

mm: MSB Value

**Send** Sent when the Master Volume is changed.

**Receive** Receipt changes the Master Volume.

### 19.1.2 Master Pan

Message Format: F0H 7FH 7FH 04H 02H 11H mmH F7H

---

11: LSB Value(Send:00H, Receive:Ignored)

mm: MSB Value(Note1)

Note1 : For information about the relationship between setting values and send/receive values, see “36.4 Pan Setting Value Table” in “VIII Setting Values and Send/Receive Values” of this document.

**Send** Sent when the Master Pan is changed.

**Receive** Receipt changes the Master Pan.

### 19.1.3 Master Fine Tuning

Message Format: F0H 7FH 7FH 04H 03H 11H mmH F7H

---

11: LSB Value(Note1)

mm: MSB Value(Note1)

Note1 : For information about the relationship between setting values and send/receive values, see “36.5 Fine Tuning Setting Value Table” in “VIII Setting Values and Send/Receive Values” of this document.

**Send** This message is sent when the tuning setting is changed.

**Receive** Receipt changes the tuning setting.

### 19.1.4 Master Coarse Tuning

Message Format: F0H 7FH 7FH 04H 04H 11H mmH F7H

---

11: LSB Value(Not sent, Receive:Ignored)

mm: MSB Value

**Send** This message is not sent by this Instrument.

**Receive** Receipt changes the Patch Master Coarse Tune parameter.

### 19.1.5 Reverb Type

Message Format: F0H 7FH 7FH 04H 05H 01H 01H 01H 01H 01H 00H vvH F7H

---

vv: Value(Note1)

Note1 : For information about the relationship between setting values and send/receive values, see “36.7 Reverb Type Setting Value Table” in “VIII Setting Values and Send/Receive Values” of this document.

**Send** Sent when the Reverb Type is changed.

**Receive** Receipt changes the Reverb Type.

### 19.1.6 Reverb Time

Message Format: F0H 7FH 7FH 04H 05H 01H 01H 01H 01H 01H 01H vvH F7H

---

vv: Value(Note1)

Note1 : For information about the relationship between setting values and send/receive values, see “36.8 Reverb Time Setting Value Table” in “VIII Setting Values and Send/Receive Values” of this document.

**Send** This message is not sent by this Instrument.

**Receive** Receipt changes the Reverb duration.

### 19.1.7 Chorus Type

Message Format: F0H 7FH 7FH 04H 05H 01H 01H 01H 01H 02H 00H vvH F7H

---

vv: Value(Note1)

Note1 : For information about the relationship between setting values and send/receive values, see “36.9 Chorus Type Setting Value Table” in “VIII Setting Values and Send/Receive Values” of this document.

**Send** Sent when the Chorus Type is changed.

**Receive** Receipt changes the Chorus Type.

### 19.1.8 Modulation Rate

Message Format: F0H 7FH 7FH 04H 05H 01H 01H 01H 01H 02H 01H vvH F7H

---

vv: Value

**Send** This message is not sent by this Instrument.

**Receive** Receipt changes the Chorus Rate.

### 19.1.9 Scale/Octave 2 Byte Real Time Tuning

Message Format: F0H 7FH 7FH 08H 09H ffH ggH hhH ssH ttH ... F7H

---

ff: Channel Byte 1 (bits 0 to 1 = channel 15 to 16)

gg: Channel Byte 2 (bits 0 to 6 = channel 8 to 14)

hh: Channel Byte 3 (bits 0 to 6 = channel 1 to 7)

ss tt ...: Tuning offset(Note1)

Note1 : For information about the relationship between setting values and send/receive values, see “36.6 Scale Setting Value Table” in “VIII Setting Values and Send/Receive Values” of this document.

**Send** Sent when the scale setting is changed. The value of (ffH, ggH, hhH) is (03H, 7FH, 7FH) only.

**Receive** Receipt is ignored when the value of (ffH, ggH, hhH) is (00H, 00H, 00H), and changes Instrument’s scale setting for other values.

### 19.1.10 GM System On

Message Format: F0H 7EH 7FH 09H 01H F7H

**Send** This message is not sent by this Instrument.

**Receive** Receipt puts the sound source into a GM sound source mode.

### 19.1.11 GM System Off

Message Format: F0H 7EH 7FH 09H 02H F7H

**Send** This message is not sent by this Instrument.

**Receive** Receipt changes the sound source setting to the Instrument presetting.

### 19.1.12 GM2 System On

Message Format: F0H 7EH 7FH 09H 03H F7H

**Send** This message is not sent by this Instrument.

**Receive** Though the Instrument does not support GM2, receipt of the GM2 System On message has the same result as receipt of the GM System On message.

### 19.1.13 GS Message

Message Format: F0H 41H ddH 42H 12H 40H 00H 7FH 00H 41H F7H

---

dd: Device ID(Ignored)

**Send** This message is not sent by this Instrument.

**Receive** Receipt performs the same operation as when the GM System On message is received.

## 19.2 Instrument-Specific System Exclusive Message

Message Format: F0H 44H 16H 02H ... F7H

This message can be used to send the Instrument memory status, for two-way transfer of special operation commands and user data, to perform sound source parameter operations, etc. For more information, see “IV Instrument-Specific System Exclusive Messages”.

## Part IV

# Instrument-Specific System Exclusive Messages

## 20 Format

This section explains the format of the Instrument-specific System Exclusive Messages. See “V Parameter List” and “VI Parameter Set List” for information about how parameter sets actually are transferred.

### 20.1 Message Classifications

Basically, the operation that corresponds to Instrument-specific system exclusive messages is parameter data transfer.

The following operations can be performed from an external device using this parameter transfer message.

- Modification of an individual Instrument parameter
- Batch modification of a particular Instrument parameter set
- Import of an individual Instrument parameter value
- Batch import of a particular Instrument parameter set

In addition to parameters being used as device setting values, some parameters act as commands when received by the Instrument and as device status information when sent from the Instrument.

The following table shows the parameter category for each type of transfer.

Function Section	Parameter Category	Description
System	System	Commands to the Instrument, Instrument stats
	All	All user data
Performance Controller	Scale Memory	User Scale Memory
	Sequence	Song Sequencer
	Registration	Registration
	Rhythm	User Rhythm
Sound Generator	Patch	Sound source common settings (system effects, master settings, etc.) Instrument part settings (tone selection, mixer channel setting, tuning, etc.)
	Tone	Tone Setting, Drawbar Organ Setting, Modulation Setting
	DSP	DSP Parameter Setting

### 20.2 Basic Message Structure

Instrument-specific system exclusive message operation can be broadly divided between two methods: Individual Parameter Transfer (single parameter send/receive) and Bulk Parameter Set Transfer (batch parameter send/receive). Each method includes a number of different messages.

The field in the system exclusive message that specifies the message type is the action (*act*) field. The format of the *body* part of the message depends on the *act* value.

The table below shows the body format for each action of Instrument-specific system exclusive messages. An actual message consists of the items indicated by Y, from left to right.

	<- <i>body</i> (Depends on <i>act</i> ) ->															
	SX	MAN	MOD	<i>dev</i>	<i>act</i>	<i>cat</i>	<i>mem</i>	<i>pset</i>	<i>blk</i>	<i>prm</i>	<i>idx</i>	<i>len</i>	<i>data</i>	<i>img</i>	<i>crc</i>	EOX
IPR	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	-	-	-	Y
IPS	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	-	-	Y
OBR	Y	Y	Y	Y	Y	Y	Y	Y	-	-	-	-	-	-	-	Y
OBS	Y	Y	Y	Y	Y	Y	Y	Y	-	-	-	Y	-	Y	Y	Y
HBR	Y	Y	Y	Y	Y	Y	Y	Y	-	-	-	-	-	-	-	Y
HBS	Y	Y	Y	Y	Y	Y	Y	Y	-	-	-	Y	-	Y	Y	Y
EXI	Y	Y	Y	Y	Y	-	-	-	-	-	-	-	-	-	-	Y
SBS	Y	Y	Y	Y	Y	-	-	-	-	-	-	-	Y	-	-	Y
ACK	Y	Y	Y	Y	Y	Y	Y	Y	-	-	-	-	-	-	-	Y
RJC	Y	Y	Y	Y	Y	Y	Y	Y	-	-	-	-	-	-	-	Y
ESS	Y	Y	Y	Y	Y	Y	Y	Y	-	-	-	-	-	-	-	Y
EBS	Y	Y	Y	Y	Y	Y	Y	Y	-	-	-	-	-	-	-	Y
ERR	Y	Y	Y	Y	Y	-	-	-	-	-	-	-	Y	-	-	Y

## 20.3 Format of Each Field

### 20.3.1 SX : System Exclusive message Status

Format: 11110000B (F0H)

This is the System Exclusive Message status byte established by the MIDI standard.

### 20.3.2 MAN : Manufacturer's ID

Format: 01000100B (CASIO = 44H)

Indicates this Instrument's manufacturer ID.

### 20.3.3 MOD : Model ID

Format: MSB 00010110B (16H)  
 LSB 00000010B (02H)

These two successive bytes (MSB, LSB) indicate the CTK-6000/WK-6500/CTK-7000/WK-7500/AT-3/AT-5 model ID.

### 20.3.4 *dev* : MIDI Device ID 00H - 7FH

Format: 00000000B

The contents of this field in a received message are compared with the Model's MIDI Device ID, and receipt of the incoming message is allowed only when the two IDs match. When a message containing 7FH is received, receipt of the message is always allowed, regardless of the Instrument's ID setting. Note, however, that the Instrument does not have a specific Device ID, so use only 7FH for send and receive.

### 20.3.5 *act* : Action

Format: 0aaaaaaaB

This field indicates the operation of the Instrument-specific System Exclusive Message.

aaaaaaaB	Action	Function
00H	IPR	Individual Parameter Request
01H	IPS	Individual Parameter Send
02H	OBR	One-way Bulk Parameter Set Request
03H	OBS	One-way Bulk Parameter Set Send
04H	HBR	Handshake Bulk Parameter Set Request
05H	HBS	Handshake Bulk Parameter Set Send
08H	SBS	Start of Bulk Dump Session Session
09H	EXI	Extend Interval
0AH	ACK	Acknowledge
0BH	RJC	Reject
0DH	ESS	End of Sub-session
0EH	EBS	End of Bulk Dump Session
0FH	ERR	Error

**IPR:Individual Parameter Request** Indicates an individual parameter value send request message. When the Instrument receives this action, it uses an IPS message to return the specified parameter value.

**IPS:Individual Parameter Send** Indicates an individual parameter value send message. When the Instrument receives this action, it rewrites the value specified by the *data* field with the specified parameter value.

**OBR:One-way Bulk Parameter Set Request** Indicates a send request message using parameter set image one-way mode. When the Instrument receives this action, it uses an OBS message to return the specified parameter set.

**OBS:One-way Bulk Parameter Set Bulk Send** Indicates a parameter set image send message using one-way mode. When the parameter set to be transferred is greater than a preset size, it is divided into multiple packets and transferred at prescribed time intervals. The time interval is set in accordance with the Oneway Current Interval parameter described under “24.2 System Exclusive Protocol Parameter”.

**HBR:Handshake Bulk Parameter Set Request** Indicates a send request message using the parameter set image handshake mode. When the Instrument receives this action, it uses an HBS message to return the specified parameter set.

**HBS:Handshake Bulk Parameter Set Send** Indicates a parameter set image send message using handshake mode. The parameter set to be transferred is divided into multiple packets when it is greater than a prescribed size. The packets are transferred in accordance with handshake mode.

**EXI:Extend Interval** During a dump session, message sent by a devices that should send the next message to tell a device waiting for the next message to extend the message interval. Receipt of this message causes the message wait elapsed time to reset to 0.



**SBS:Start of Bulk Dump Session** This message is sent to both devices to start a session to transfer a series of parameter sets using one-way protocol or handshake protocol. The protocol used during the session and the data transfer direction is determined in accordance with the value of the data field. For details, see the explanation about the data field. When there is a request to start a handshake protocol session, the devices that receive this message return ACK after setting up to enable a session. This message is ignored if the outlook is that a session cannot be enabled.

**ACK:Acknowledge** Indicates a message used by the receiver during parameter set handshake mode transfer to convey to the sender that it is ready for send of the next packet. The *cat*, *mem*, and *pset* fields indicate the value carried by the last received message.

**RJC:Reject** Indicates a message to convey to the other side that an ongoing parameter set one-way mode or handshake mode send or receive session was interrupted. The *cat*, *mem*, and *pset* fields indicate the value carried by the last received message.

**ESS:End of Sub-session** Indicates there is a message to convey to the receiving device that a one-way mode or handshake mode serial packet transfer for sending a sub-session (one parameter set) is complete. The *cat*, *mem*, and *pset* fields indicate the values in the last received message.

**EBS:End of Bulk Dump Session** Indicates there is a message to convey to the receiving device that a one-way mode or handshake mode serial parameter set transfer session send, which was launched by some operation, is complete. The *cat*, *mem*, and *pset* fields indicate the values in the last received message.

**ERR:Error** This message is sent to a device that sent a message during a parameter set transfer session using handshake protocol bulk dump, when the device that received the message encounters some communication problem. The generated error type depends on the value in the data field. For details, see the explanation about the data field.

### 20.3.6 *cat* : Category

Format: 0ccccccB

The category indicates the categories of data handled by the System Exclusive Message. The ID number (ID) of the Category is indicated on the left, while the communication operation (Action) is indicated on the right.

Category		Transfer		
ID (c)	Parameter Set	Individual Parameter	One-way Bulk	Handshake Bulk
00H	System	A	-	-
02H	Patch	A	-	-
03H	Tone	A	A	A
12H	Scale Memory	A(Note1)	A(Note1)	A(Note1)
13H	DSP	A	A	A
1FH	All	F	A	A
21H	Sequence	F	A	A
22H	Registration	F	A	A
24H	Rhythm	F	A	A

- A ... Available (Also including when only some parameters are available.)
- F ... File Information (Not the data itself. Name, size, and other file information only.)
- ... Not Available

Note1 : AT-3/AT-5 only.

### 20.3.7 *mem* : Memory Area ID

Format: 0mmmmmmB

Specifies the memory area that is the object of the parameter transfer. The following are defined for this Instrument.

<i>mem</i>	Data Type	Meaning
0	User area	Read/write enabled
1	Preset area	Read/write disabled
2	Store area	Read/write enabled

### 20.3.8 *pset* : Parameter Set Number

Format:   LSB   0nnnnnnnB  
           MSB   0mmmmmmB

This field is a 2-byte (LSB, MSB) value indicating the number of the parameter set (mmmmmmnnnnnnB, Binary) being transferred.

### 20.3.9 *blk* Block Number

The block number is a supplementary number that specifies which block parameter is to be accessed when there are multiple blocks (instrument parts, etc.) that include parameters with the same ID within a single parameter set. The array structure of a block can be expressed up to 4 dimensions, and the size of a 1-dimensional array is expressed as 14 bits.

Format:   index3 LSB   0iiiiiiiB  
           index3 MSB   0jjjjjjjB  
           index2 LSB   0kkkkkkkB  
           index2 MSB   0lllllllB  
           index1 LSB   0mmmmmmB  
           index1 MSB   0nnnnnnB  
           index0 LSB   0ooooooB  
           index0 MSB   0ppppppB

Note : Arranged in high dimension sequence.

#### 1-dimension array block [index0]

Value	Meaning
00jjjjjjjjiiiiiiiB	0000H
00llllllllkkkkkkkB	0000H
00nnnnnnnnmmmmmmB	0000H
00ppppppppooooooB	index0

### 2-dimension array block [index1][index0]

Value	Meaning
00jjjjjjjiiiiiiiB	0000H
001111111kkkkkkkB	0000H
00nnnnnnnmmmmmmB	index1
00pppppppoooooooB	index0

### 3-dimension array block [index2][index1][index0]

Value	Meaning
00jjjjjjjiiiiiiiB	0000H
001111111kkkkkkkB	index2
00nnnnnnnmmmmmmB	index1
00pppppppoooooooB	index0

### 4-dimension array block [index3][index2][index1][index0]

Value	Meaning
00jjjjjjjiiiiiiiB	index3
001111111kkkkkkkB	index2
00nnnnnnnmmmmmmB	index1
00pppppppoooooooB	index0

#### 20.3.10 *prm* : Parameter ID

Format:   LSB   0pppppppB  
          MSB   0qqqqqqqB

The Parameter ID indicates the parameter type. When transferring parameters (see “V Parameter List” below) individually (as opposed to bulk transfer), this field is used to identify the parameter being transferred by its parameter ID.

#### 20.3.11 *idx* : Data Index Number

Format:   LSB   0iiiiiiiB  
          MSB   0jjjjjjjB

The data index number indicates the first array number of the array from which transfer starts.

#### 20.3.12 *len* : Data Length

Format:   LSB   01111111B  
          MSB   0mmmmmmB

As shown below, the meaning of this field differs depending on whether an individual transfer or a bulk parameter set transfer is being performed.

**Individual Parameter Transfer** The value of this field specifies the size of the parameter value stored in the data field. Data length indicates the length of the array being transferred minus 1 when the parameter contains a character string or other similar array structure.

**Bulk Parameter Set Transfer** The value of this field specifies the size of the parameter set memory image stored in the `img` field. Data length indicates the number of bytes of data included within a packet. When this value is zero, it means the data itself does not exist.

### 20.3.13 *data* : Parameter Data

#### Individual Parameter Transfer

```
Format:  index0 0dddddddB (0eeeeeeeB) (0fffffffB) (0gggggggB) (0hhhhhhhB)
         index1 0dddddddB (0eeeeeeeB) (0fffffffB) (0gggggggB) (0hhhhhhhB)
         index2 0dddddddB (0eeeeeeeB) (0fffffffB) (0gggggggB) (0hhhhhhhB)
         :      :
         indexN 0dddddddB (0eeeeeeeB) (0fffffffB) (0gggggggB) (0hhhhhhhB)
```

Parameter data indicates the parameter value. Data is repeatedly placed in an array of the size equivalent to `len+1`. For the structure of one data item, the length depends on the data bit width (Parameter List Size), as shown below.

Size	Number of Data
1 - 7	1
8 - 14	2
15 - 21	3
22 - 28	4
29 - 32	5

Each block of data is packed from the lowest order byte first. In the case of multiple-byte data, the lowest weighted bit is the least significant digit of the first data byte, and the highest weighted bit is the most significant digit of the final data byte. The following shows an example of how data would be divided for transfer in the case of 32-bit data.

	7	6	5	4	3	2	1	0
data0:	0	[bit06]	[bit05]	[bit04]	[bit03]	[bit02]	[bit01]	[bit00]
data1:	0	[bit13]	[bit12]	[bit11]	[bit10]	[bit09]	[bit08]	[bit07]
data2:	0	[bit20]	[bit19]	[bit18]	[bit17]	[bit16]	[bit15]	[bit14]
data3:	0	[bit27]	[bit26]	[bit25]	[bit24]	[bit23]	[bit22]	[bit21]
data4:	0	0	0	0	[bit31]	[bit30]	[bit29]	[bit28]

#### SBS (Start of Bulk Dump Session)

Format: 0bbbbbbbB

The relationship between the data value and error 0bbbbbbbB is defined as shown below.

- Data = 0 : Start OBR Session  
Start session to request data using one-way protocol.
- Data = 1 : Start OBS Session  
Start session to send data using one-way protocol.
- Data = 2 : Start HBR Session  
Start session to request data using handshake protocol. If a device that receives this message accepts the session, it needs to return ACK.

- Data = 3 : Start HBS Session

Start session to send data using handshake protocol. If a device that receives this message accepts the session, it needs to return ACK.

## ERR (Error)

Format: 00000000B

The relationship between the data value and error 00000000B is defined as shown below.

- Data = 0 : Time Out Error

This error message is generated when a preset amount of time elapses without a receiving device receiving an expected message. This error is also generated when an unexpected message is received instead of the expected message. The preset time is set in accordance with the Handshake Max Interval parameter described under “24.2 System Exclusive Protocol Parameter”.

- Data = 1 : Format Error

This error message is issued in the case of an invalid format in an Instrument System Exclusive message received by a receiving device.

- Data = 2 : CRC Error

This error message is issued in the case of an invalid CRC value in an HBS message received by the data receiving device.

**Single Parameter Data Size Limit** Under initial default settings for the Instrument’s System Exclusive message format, the size of a single message cannot exceed 256 bytes in the case of bulk dump using handshake protocol, and cannot exceed 48 bytes in all other cases. The data size and the array size, however, can cause a packet to exceed 48 bytes when transferring a single parameter array. In this case, the IPS and IPR message data length and data index number values can be modified to enable division of a single parameter value into multiple messages so it can be sent that way. These message sizes can be changed with the system parameter.

### 20.3.14 *img* : Parameter Set Memory Image

```
Format:  Data0  0aaaaaaaaB
          Data1  0bbbbbbbaB
          Data2  0ccccccbB
          Data3  0dddcccB
          :      :
```

During data transfer, the memory image data of the parameter set to be sent is read sequentially in 1-byte units starting from the first address. That value is transformed starting from the lower bit to a 7-bit wide data string.

**Example: 33-byte data transfer** In the case of memory image transfer of the 33 bytes such as Table 1, for example, the transfer image is transformed to 38 bytes as shown in Table 2.

Table 1

	7	6	5	4	3	2	1	0
Memory data 00:	[00.7]	[00.6]	[00.5]	[00.4]	[00.3]	[00.2]	[00.1]	[00.0]
Memory data 01:	[01.7]	[01.6]	[01.5]	[01.4]	[01.3]	[01.2]	[01.1]	[01.0]
Memory data 02:	[02.7]	[02.6]	[02.5]	[02.4]	[02.3]	[02.2]	[02.1]	[02.0]
:								
Memory data 32:	[32.7]	[32.6]	[32.5]	[32.4]	[32.3]	[32.2]	[32.1]	[32.0]

(Bit M of the NNth byte is indicated at [NN.M].)

Table 2

	7	6	5	4	3	2	1	0
Send data 00:	0	[00.6]	[00.5]	[00.4]	[00.3]	[00.2]	[00.1]	[00.0]
Send data 01:	0	[01.5]	[01.4]	[01.3]	[01.2]	[01.1]	[01.0]	[00.7]
Send data 02:	0	[02.4]	[02.3]	[02.2]	[02.1]	[02.0]	[01.7]	[01.6]
:								
Send data 37:	0	0	0	[32.7]	[32.6]	[32.5]	[32.4]	[32.3]

Though transferred data always sequentially uses from bit 0 through bit 7, unused upper bit fields in the final transfer data are filled in with 0.

**Parameter Set Packet Splitting** When a parameter set is transferred, a single parameter set memory image can be split so it can fit into the preset transfer message size, and transferred as multiple packets. Even when a packet is split, the memory image must be transferred from the beginning in the sequence it is arranged without interruption. When sending a parameter set to the Instrument, the size of a System Exclusive message for a single packet must fit within a preset size. The parameter set memory image to be transferred can be split into 1-byte units, and it does not matter whether the length of each packet is different. When a packet receive error is generated, the sending device needs to resend, but the size of the packet sent does not necessarily need to be the same size as the packet sent when the error was generated. Even the sizes of parameter sets are small, using a single packet to send multiple parameter sets is not supported. With this Instrument, the data size, transfer time interval, and other communication parameters for split packets can be adjusted using the parameters described under “24.2 System Exclusive Protocol Parameter”. For details, see “24.2 System Exclusive Protocol Parameter.”

### 20.3.15 *crc* : Cyclic Redundancy Check

```
Format:  LSB  0aaaaaaaaB
          0bbbbbbbaB
          0ccccbbB
          0dddcccB
          MSB  0000dddB
```

CRC32 (in accordance with ISO 8802-3 or IEEE803.2 regulations) 32-bit value (dddddddccccccc-cbbbbbbbaaaaaaaB) calculated for the byte string from “MAN: Manufacturer’s ID” to the last byte of “img: Parameter Set Memory Image” is stored in this “*crc*: Cyclic Redundancy Check”. The receiving unit checks the value, and if it is not correct sends an error as a re-request.

### 20.3.16 EOX : End of System Exclusive Message

Format: 11110111B (F7H)

This is the End of System Exclusive Message status byte established by the MIDI standard.

## 21 Individual Parameter Operations

There are two parameter unit operations: Individual Parameter Transfer and Individual Parameter Request. For one session, in response to an IPR (Individual Parameter Request) from an external device, this Instrument returns an IPS (Individual Parameter Send) or the session is concluded when the external device or this Instrument spontaneously sends an IPS. If this Instrument received an IPS, the value of the applicable parameter is changed. Depending on the function of a parameter, Individual Parameter Send may be used to issue a command to the Instrument and Individual Parameter Request may be used to check Instrument status information.

Data Receiver	Data Sender	Operation
IPR		Send Request(Optional)
	IPS	Data Transfer

## 22 Parameter Set Transfer

### 22.1 Communication Modes

#### 22.1.1 One-way and Handshake

In order to ensure maximum speed for bulk dumping of Parameter Sets, the data format is different from the data format used for Individual Parameter Send. Data is transferred as-is, using the Model's memory image. Parameter Sets can be transferred by bulk dump using the message exchange types described below.

- One-way mode Parameter Set send/receive
- One-way mode Parameter Set send request send/receive
- Handshake mode Parameter Set send/receive
- Handshake mode Parameter Set send request, receive rejected, error notification send/receive

With the one-way mode, the sending device sends data and ends the session without regard to the response of the receiving device. This mode is best for one-way transfers from a sequencer or similar device.

With the handshake mode, the sending device sends the data and then waits for a response from the receiving device before advancing to the next session. This is a high-speed mode in which there is no time wasted waiting.

See "VI Parameter Set List" for details about Instrument parameter sets.

#### 22.1.2 Session and Subsession

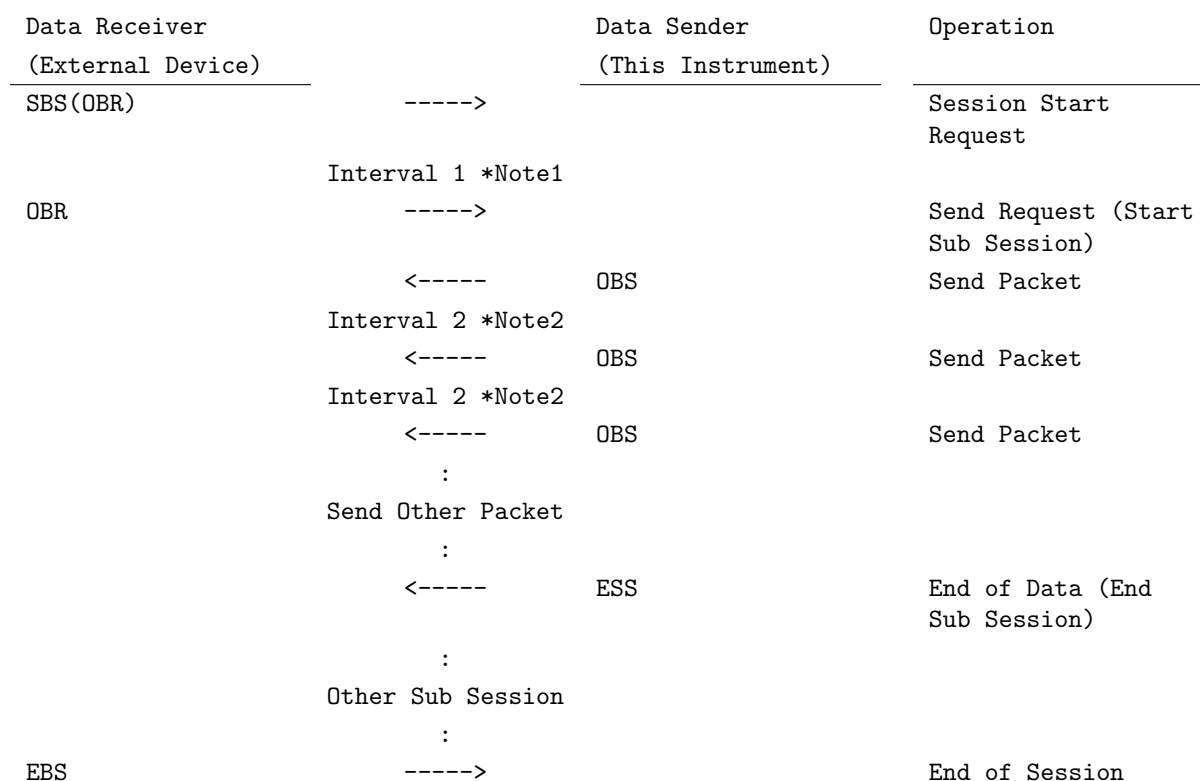
**Subsession** "One subsession" refers to transfer of one parameter set. A subsession transfers one parameter set or a parameter set that has been divided into multiple packets for transfer, with ESS (End of Sub-session) at the end to terminate the send. Division of a parameter set into multiple packets is used when the size of the parameter set is greater than a prescribed size. The packet number in the packet index field indicates the sequential position of a packet relative to the other packets. A single packet cannot be used to transfer multiple small parameter sets. A parameter set delimiter always must be transferred as a packet delimiter.

**Session** “One session” refers to a series of processes that occur for one user operation. One subsession or multiple subsessions make up a session. The sender sends EBS (End of Bulk Dump Session) to end a session. Regardless of whether there is a single parameter set or multiple parameter sets being transferred, a bulk dump always takes the form of a session, never a subsession only.

## 22.2 One-way Mode Communication Flow

A single session starts when an external device, which wants to start communication for data send/receive using one-way protocol, sends an SBS (Start of Bulk Dump Session) message to this Instrument, which is its communication partner. The external device starts a request send using OBR or a data send using OBS. The sub session ends when one parameter set that needs to be transferred by the data send device is complete. After the send of all the parameter sets is complete, the external device that started the communication sends an EBS to inform the Instrument that the session is ended. The transfer messages of a single parameter set cannot exceed a preset size. To do this, messages are split into multiple packets that are less than the preset size, and transfer is performed according to a preset interval. The preset size and preset time are determined in accordance with the parameters described under “24.2 System Exclusive Protocol Parameter”.

### 22.2.1 Example: Sending Data from the Instrument to an External Device in Response to a Request from the External Device

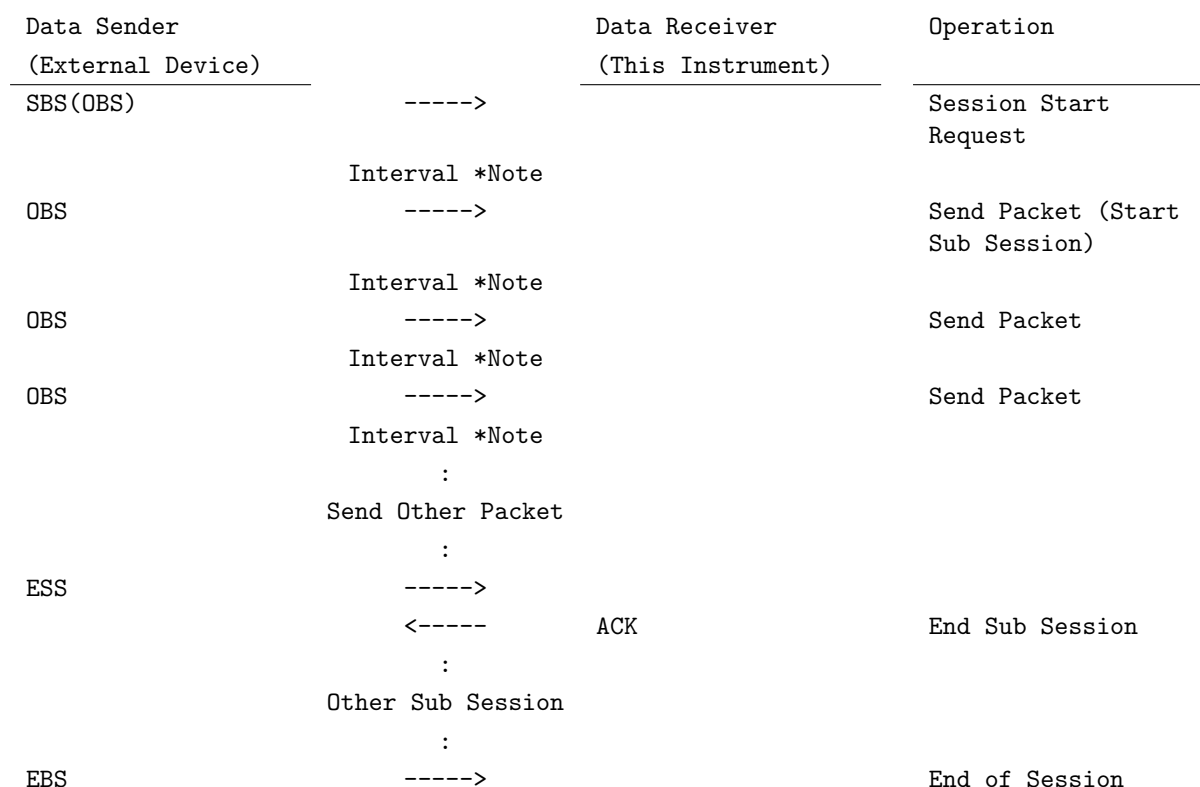


Note1 : Interval 1 is no less than Oneway Min Interval and no more than Oneway Max Interval, which are explained under “24.2 System Exclusive Protocol Parameter”. If the interval exceeds these values, the partner device will issue a timeout error.

Note2 : Interval 1 is a Oneway Current Interval, which is explained under “24.2 System Exclusive Protocol Parameter”.



## 22.2.2 Example: Data send to Instrument from external device



Note : The interval is no less than Oneway Min Interval and less than Oneway Max Interval, which are explained under “24.2 System Exclusive Protocol Parameter”. If the interval exceeds these values, the partner device will issue a timeout error.

## 22.3 Handshake Mode Communication Flow

### 22.3.1 Session Start

A single session starts when an external device, which wants to start communication for sending or receiving data using handshake protocol, sends an SBS (Start of Bulk Dump Session) message to this Instrument, which is its communication partner. The external device cannot send an HBS or HBR until this Instrument receives ACK.

### 22.3.2 Message Timeout Processing

Failure of the next message expected for receipt to arrive within a preset amount of time is viewed as a timeout error, and ERR (Data = Time Out Error) is sent to the partner device, which then returns to the message standby state. The device that received the ERR sends the message it believes the partner device that is in the message receive standby state. If the desired message does not arrive after a preset number of retries, RJC is sent and the session is terminated. The standby time and number of retries are determined in accordance with the parameters described under “24.2 System Exclusive Protocol Parameter”.

### 22.3.3 Message Format Error Processing

The message receive device returns ERR (Format Error) if it discovers an illegal format in the received message. When the message sending device receives ERR (Format Error) from the receiving device,

it resends the last data sent. If the correct message does not arrive after a preset number of retries, RJC is sent and the session is terminated. The number of retries is determined in accordance with the parameters described under “24.2 System Exclusive Protocol Parameter”.

#### **22.3.4 Message CRC Error Processing**

The message receive device returns ERR (CRC Error) if it discovers an illegal format in the received message. When the sending device receives ERR (CRC Error) from the receiving device, it resends the last data sent. If the correct CRC message does not arrive after a preset number of retries, RJC is sent and the session is terminated. The number of retries is determined in accordance with the parameters described under “24.2 System Exclusive Protocol Parameter”.

#### **22.3.5 Processing when Multiple Errors are Generated**

While communication retry is in progress following generation of a timeout error, format error, or CRC error, the retry count is not reset even if another error is generated. Also the error code of the last send error message is determined by the cause of the last error generated.

#### **22.3.6 Session End**

When the data send device is an external device, the session is concluded when the external device sends ESS and EBS in response to an ACK by this Instrument after the external device finishes sending all of the Parameter Sets that need to be transferred. When the data send device is an this Instrument, the session is concluded when the external device sends EBS after this Instrument finishes sending all of the Parameter Sets that need to be transferred. The maximum interval until one device sends a message following receipt of a message from another device is no greater than the Handshake Max Interval explained under “24.2 System Exclusive Protocol Parameter”. If the interval exceeds these values, the partner device will issue a timeout error.

#### **22.3.7 Example: Sending Data from the Instrument to an External Device in Response to a Request from the External Device**

Data Receiver (External Device)		Data Sender (This Instrument)	Operation
SBS(HBR)	----->		Session Start Request
	<-----	ACK	Acknowledge
HBR	----->		Send Request (Start Sub Session)
	<-----	HBS	Send Packet
ACK	----->		Acknowledge
	<-----	HBS	Send Packet
ACK	----->		Acknowledge
	<-----	HBS	Send Packet
ACK	----->		Acknowledge
	:		
	Send Other Packet		
	:		
ACK	----->		Acknowledge
	<-----	ESS	End Data (End Sub Session)
	:		
	Other Sub Session		
	:		
EBS	----->		End of Session

### 22.3.8 Example: Data send to Instrument from external device

Data Sender (External Device)		Data Receiver (This Instrument)	Operation
SBS(HBS)	----->		Session Start Request
	<-----	ACK	Acknowledge
HBS	----->		Send Packet
	<-----	ACK	Acknowledge
HBS	----->		Send Packet
	<-----	ACK	Acknowledge
HBS	----->		Send Packet
	<-----	ACK	Acknowledge
	:		
	Send Other Packet		
	:		
ESS	----->		End of Data
	:		
	Other Sub Session		
	:		
EBS	----->		End of Session

### 22.3.9 Example: Session Generating a Timeout Error

Data Receiver (External Device)		Data Sender (This Instrument)	Operation
SBS(HBR)	----->		Session Start Request
	Interval *Note1		
ERR(Time Out Error)	----->		Timeout Error
	<-----	ACK	Acknowledge
HBR	----->		Send Request (Optional)
	<-----	HBS	Send Packet
ACK	----->		Acknowledge
	Interval *Note1		
ERR(Time Out Error)	----->		Timeout Error
	Interval *Note1		
ERR(Time Out Error)	----->		2 consecutive timeout errors (Note2)
	<-----	HBS	Acknowledge
	Interval *Note1		
	<-----	ERR(Time Out Error)	Timeout Error
ACK	----->		Acknowledge
	<-----	HBS	Send Packet
	:		

Note1 : Interval that exceeds the time stipulated by Handshake Max Interval explained under “24.2 System Exclusive Protocol Parameter”.

Note2 : Number of retries that exceeds the retries stipulated by Handshake Max Retry explained under “24.2 System Exclusive Protocol Parameter”.

### 22.3.10 Example: Session Generating a Format Error

Data Receiver (External Device)		Data Sender (This Instrument)	Operation
SBS(HBR)	----->		Session Start Request
	<-----	ACK	Acknowledge
HBR	----->		Send Request (Optional)
	<-----	HBS	Send Packet
ACK	----->		Acknowledge
	<-???-	HBS	Send Packet (Note1)
ERR(Format Error)	----->		Format Error
	<-----	HBS	Resend Packet
ACK	-???->		Acknowledge
	<-----	ERR(Format Error)	Format Error
ACK	-???->		Acknowledge
	<-----	ERR(Format Error)	2 consecutive format errors(*Note2)
ACK	----->		Acknowledge
	<-----	HBS	Send Packet
		:	

Note1 : "<-???->" or "-???->" indicates transfer failed.

Note2 : Number of retries that exceeds the retries stipulated by Handshake Max Retry explained under "24.2 System Exclusive Protocol Parameter".

### 22.3.11 Example: Session Generating a CRC Error

Data Receiver (External Device)		Data Sender (This Instrument)	Operation
SBS(HBR)	----->		Session Start Request
	<-----	ACK	Acknowledge
HBR	----->		Send Request (Optional)
	<-----	HBS	Send Packet
ACK	----->		Acknowledge
	<-???-	HBS	Send Packet
ERR(CRC Error)	----->		CRC error
	<-???-	HBS	Resend Packet
ERR(CRC Error)	----->		2 consecutive CRC errors(*Note)
	<-----	HBS	Resend Packet
ACK	----->		Acknowledge
	<-----	HBS	Send Packet
		:	

Note : Number of retries that exceeds the retries stipulated by Handshake Max Retry explained under “24.2 System Exclusive Protocol Parameter”.

### 22.3.12 Example: Session Termination by Error Generation

Data Receiver		Data Sender	Operation
SBS(HBR)	----->		Session Start Request
	<-----	ACK	Acknowledge
HBR	----->		Send Request (Optional)
	<-----	HBS	Send Packet
ACK	----->		Acknowledge
	<-???-	HBS	Send Packet
	<-???-	HBS	Send Packet
ERR(CRC Error)	----->		Error
	<-???-	HBS	Resend Packet
ERR(Format Error)	----->		2 consecutive errors
	<-???-	HBS	Resend Packet
ERR(Time Out Error)	----->		3 consecutive errors
	:		
	<-???-	HBS	Resend Packet
ERR(CRC Error)	----->		N consecutive errors(*Note)
	<-???-	HBS	Resend Packet
RJC	----->		Abandon Session

Note : Number of retries that exceeds the retries stipulated by Handshake Max Retry explained under “24.2 System Exclusive Protocol Parameter”. Also, the maximum number of retries is the same, even if multiple instances of the same error are generated or if multiple different errors are generated.

### 22.3.13 Example: Intentional Session Termination by an External Device

Data Receiver (External Device)		Data Sender (This Instrument)	Operation
SBS(HBR)	----->		Session Start Request
	<-----	ACK	Acknowledge
HBR	----->		Send Request
	<-----	HBS	Send Packet
ACK	----->		Acknowledge
	<-----	HBS	Send Packet
ACK	----->		Acknowledge
	<-----	HBS	Send Packet
RJC	----->		Terminate Session

### 22.3.14 Example: Intentional Session Termination by This Instrument

Data Sender (External Device)		Data Receiver (This Instrument)	Operation
SBS(HBS)	----->		Session Start Request
	<-----	ACK	Acknowledge
HBS	----->		Send Packet
	<-----	ACK	Acknowledge
HBS	----->		Send Packet
	<-----	ACK	Acknowledge
HBS	----->		Send Packet
	<-----	RJC	Terminate Session

### 22.3.15 Example: Session Pause

Session flow when the session is temporarily paused for some reason and then restarted is shown below. A session can be paused by sending an EXI message from an external device or this Instrument to the other device.

Data Receiver (External Device)		Data Sender (This Instrument)	Operation
SBS(HBR)	----->		Session Start Request
	<-----	ACK	Acknowledge
HBR	----->		Send Request
	<-----	HBS	Send Packet
ACK	----->		Acknowledge
	<-----	HBS	Send Packet
	Interval *Note1		
EXI	----->		Extend Interval (Pause Session)
	Interval *Note1		
EXI	----->		Extend Interval
	:		
EXI	----->		Extend Interval
	Interval *Note1		
ACK	----->		Acknowledge (Restart Session)*Note2
	<-----	HBS	Send Packet
ESS	----->		End of Data
	:		
	Other Sub Session		
	:		
EBS	----->		End of Session

Note1 : Interval less than the time stipulated by Handshake Max Interval explained under "24.2 System Exclusive Protocol Parameter". There is no limit on the number of extensions using EXI.

Note2 : The sessions can be paused by sending RJC here.



## Part V

# Parameter List

This section explains the parameters that actually can be transferred by the Instrument.

## 23 Using the Parameter List

- Parameter field  
Shows the parameter name.
- ID field  
Shows the parameter ID as a hexadecimal number.
- R/W field  
Shows “R” to indicate that an IPR (Individual Parameter Request) read operation (Read) is possible or “W” to indicate that an IPS (Individual Parameter Send) write operation is possible.
- Block field  
Shows the bit field allocation of the block number. The bit field position is shown as a decimal format number.
- Size field  
Shows the parameter bit width as a decimal format value.
- Array field  
Shows the parameter array size as a hexadecimal value.
- Min-Def-Max field  
Shows the minimum value, default value, and maximum value for parameter acquisition as a hexadecimal value.
- Description field  
Explains the meaning of parameter values. Unless otherwise specified, setting values are all indicated in decimal format.

## 24 System Parameters

These parameters make it possible for an external device to check the status of the Instrument and for an external device to command some operation of the Instrument.

### 24.1 System Information Parameter

This parameter is a container for system information.

Parameter	ID	R/W	Block	Size	Array	Min-Def-Max	Description
Model Name	0000	R	00000000	7	08	00-20-7F	Ascii Character CTK-6000... "CTK-6000" CTK-7000... "CTK-7000" WK-6500... "WK-6500 " WK-7500... "WK-7500 " AT-3..... "AT-3 " AT-5..... "AT-5 "
General Register	000D	R/W		8	01	00-00-FF	General-purpose register for communication test

## 24.2 System Exclusive Protocol Parameter

These parameters are related to the System Exclusive message protocol.

Parameter	ID	R/W	Block	Size	Array	Min-Def-Max	Description
Oneway Min Interval	000E	R	00000000	14	01	0000-0014-3FFF	Minimum time interval time value (msec) between packets during One-way Bulk Dump receive by Instrument
Oneway Max Interval	000F	R/W		14	01	0000-0800-3FFF	Maximum allowable message wait time (msec) during One-way Bulk Dump receive by Instrument
Oneway Current Interval	0010	R/W		14	01	0000-0014-3FFF	Current time interval value between packets during One-way Bulk Dump send by Instrument
Oneway Max Data Length	0011	R		14	01	0000-0080-3FFF	Maximum memory size value (bytes) of transfer data included in one packet during One-way Bulk Dump send/receive by Instrument
Oneway Curent Data Length	0012	R/W		14	01	0000-0080-3FFF	Current memory size value (bytes) of transfer data included in one packet during One-way Bulk Dump send by Instrument
Handshake Max Interval	0013	R/W		14	01	0000-0800-3FFF	Maximum allowable message wait time (msec) during Handshake Bulk Dump receive by Instrument
Handshake Max Data Length	0014	R		14	01	0000-0080-3FFF	Maximum memory size value (bytes) of transfer data included in one packet during Handshake Bulk Dump send/receive by Instrument
Handshake Currnet Data Length	0015	R/W		14	01	0000-0080-3FFF	Maximum memory size value (bytes) of transfer data included in one packet during Handshake Bulk Dump send by Instrument
Handshake Retry Number	0016	R/W		7	01	00-03-7F	Number of retries after error generation during Handshake Bulk Dump send

## 24.3 Data Management Parameter

These are information acquisition and operation command parameters for this Instrument's Data Manager PC application.

Parameter	ID	R/W	Block	Size	Array	Min-Def-Max	Description
Ps Category	0019	W	00000000	7	01	00-00-7F	Specifies the category ID of the parameter set that corresponds to an operation.
Ps Memory	001A	W		7	01	00-00-7F	Specifies the memory ID of the parameter set that corresponds to an operation.
Ps Number	001B	W		14	01	0000-0001-3FFF	Specifies the number of the parameter set that corresponds to an operation.
Ps Data Type	001C	R		8	01	00-00-FF	This the data type of the parameter set in the specified category. Compatibility is provided between models with the same type.
Current Ps Existence	001D	R		1	01	00-00-01	Whether a parameter set exists in the specified category. 0...No 1...Yes
Current Ps Protect	001E	R		1	01	00-00-01	Protect status of a parameter set data in the specified category. 0...Off 1...On
Current Ps Size	001F	R		32	01	00000000-00000000-FFFFFFFF	Size of a parameter set in the specified category/number (bytes).
Current Sub Ps Size	0020	R		32	01	00000000-00000000-FFFFFFFF	00000000-00000000-FFFFFFFF Total size of a parameter sets under the specified category (bytes).
Current Ps Name	0021	R		8	10	00-20-7F	Name of a parameter set in the specified category (ASCII characters).
Max Ps Size	0022	R		32	01	00000000-00000000-FFFFFFFF	Maximum size of parameter sets in the specified category (bytes).
Max Ps Number	0023	R		14	01	0000-0000-FFFF	Maximum number parameter sets in the specified category (bytes).
Area Size	0024	R		32	01	00000000-00000000-FFFFFFFF	Maximum size (bytes) of parameter sets in specified category
Available Size	0025	R		32	01	00000000-00000000-FFFFFFFF	Maximum size (bytes) writable to parameter sets in specified category/number
Free Size	0026	R		32	01	00000000-00000000-FFFFFFFF	Current size (bytes) of parameter set free space in specified category
Delete Ps	0027	W		1	01	00-00-01	Deletes parameter sets in the specified category. Values are ignored.

## 25 Patch Parameter

The main function of patch parameters is to configure the settings of the sound source of a device.

### 25.1 Analog Input Tune Parameter

These parameters are for analog input tuning. They correspond to the MIC part of the Instrument's mixer function (CTK-6000, WK-6500) or to the EXT part (CTK-7000, WK-7500, AT-3, AT-5).

Parameter	ID	R/W	Block	Size	Array	Min-Def-Max	Description
Part Enable	0074	R/W	00000000	1	01	00-01-01	0...Off 1...On
Line Select	0075	R/W		1	01	00-00-01	0...System Chorus 1...DSP
Level	0076	R/W		7	01	00-64-7F	0 - 127
Pan	0077	R/W		7	01	00-40-7F	0 - 127
Rev Send	0078	R/W		7	01	00-00-7F	0 - 127
Cho Dsp Send	0079	R/W		7	01	00-00-7F	0 - 127
Noise Gate Threshold	007A	R/W		7	01	00-14-7F	(CTK-7000, WK-7500, AT-3, AT-5 only) 0 - 127
Noise Gate Release	007B	R/W		7	01	00-40-7F	(CTK-7000, WK-7500, AT-3, AT-5 only) 0 - 127
Auto Level Control	007C	R/W		2	01	00-00-03	(CTK-7000, WK-7500, AT-3, AT-5 only) 0..Off 1..1 2..2 3..3

### 25.2 Card Audio Parameter

These parameters configure card audio output settings (CTK-7000, WK-7500, AT-3, AT-5 only).

Parameter	ID	R/W	Block	Size	Array	Min-Def-Max	Description
Level	0081	R/W	00000000	7	01	00-7F-7F	0 - 127

### 25.3 DSP Output Parameter

These parameters configure DSP output settings.

Parameter	ID	R/W	Block	Size	Array	Min-Def-Max	Description
Part Enable	007D	R/W	00000000	1	01	00-01-01	0...Off 1...On
Level	007E	R/W		7	01	00-64-7F	0 - 127
Pan	007F	R/W		7	01	00-40-7F	0 - 127
Rev Send	0080	R/W		7	01	00-20-7F	0 - 127

### 25.4 DSP Setup Parameter

These parameters configure DSP enable/disable and type settings.

Parameter	ID	R/W	Block	Size	Array	Min-Def-Max	Description
Disable	0082	R/W	00000000	1	01	00-00-01	0...enable DSP operation 1...disable DSP operation
Number	0083	R/W	00000000	8	01	00-00-C8	0.....Tone Dsp 1-100.....Preset Dsp 101-200...User Dsp

## 25.5 Master Tune Parameter

These parameters configure the Master Tuning settings.

Parameter	ID	R/W	Block	Size	Array	Min-Def-Max	Description
Master Fine Tune	0000	R/W	00000000	10	01	0000-0200-03FF	-100/512 - 0 - 100/512(cent)
Master Coarse Tune	0001	R/W		7	01	28-40-58	-24 - 0 - +24(semicolon)

## 25.6 Master Mixer Parameter

These parameters configure the Master settings of the mixer.

Parameter	ID	R/W	Block	Size	Array	Min-Def-Max	Description
Master Volume	0002	R/W	00000000	7	01	00-7F-7F	0 - 127
Master Pan	0003	R/W		7	01	00-40-7F	-64 - 0 - +63
Master Line Select	0004	R/W		1	01	00-00-01	0...System Chorus 1...DSP

## 25.7 Part Parameter

Part parameters configure the settings of each musical instrument part.

Parameter	ID	R/W	Block	Size	Array	Min-Def-Max	Description
Part Enable	0068	R/W	4-0:Part #	1	01	00-01-01	0...Off 1...On
Scalitone Enable	0069	R/W		1	01	00-01-01	0...Disable 1...Enable
Tone Num	006A	R/W		14	01	0000-0000-3FFF	0 - 16383
Fine Tune	006B	R/W		10	01	0000-0200-03FF	-100/512 - 0 - 100/512(cent)
Coarse Tune	006C	R/W		7	01	28-40-58	-24 - 0 - +24(semicolon)
Volume	006D	R/W		7	01	00-64-7F	0 - 127
Acmp Volume	006E	R/W		7	01	00-7F-7F	0 - 127
Pan	006F	R/W		7	01	00-40-7F	-64 - 00 - +63
Cho Send	0070	R/W		7	01	00-00-7F	0 - 127
Rev Send	0071	R/W		7	01	00-28-7F	0 - 127
Bend Range	0072	R/W		7	01	00-02-18	0 - 24
Line Select	0073	R/W		1	01	00-00-01	0...System Chorus 1...DSP

## 26 Tone Parameter

These parameters configure tone settings.

### 26.1 Drawbar Parameter

These parameters configure drawbar organ settings (CTK-7000, WK-7500 only).

Parameter	ID	R/W	Block	Size	Array	Min-Def-Max	Description
Position	001E	R/W	3-0:Select Bar	2	01	00-00-03	0-3
Percussion	001F	R/W	00000000	2	01	00-00-03	0...off 1...2nd 2...3rd 3...2nd+3rd
Percussion Decay Time	0020	R/W		7	01	00-00-7F	0-127
Click	0021	R/W		1	01	00-00-01	0...off 1...on
Type	0022	R/W		1	01	00-00-01	0...Normal 1...Vintage

## 26.2 Tone Parameter

These parameters configure settings of tone basic settings.

Parameter	ID	R/W	Block	Size	Array	Min-Def-Max	Description
Attack Time	0008	R/W	00000000	7	01	00-40-7F	-64 - 0 - 63
Release Time	0009	R/W		7	01	00-40-7F	-64 - 0 - 63
Cutoff Freq	000A	R/W		7	01	00-40-7F	-64 - 0 - 63
Vibrato Type	000B	R/W		7	01	00-00-03	0...Sine 1...Triangle 2...Saw 3...Square
Vibrato Depth	000C	R/W		7	01	00-40-7F	-64 - 0 - 63
Vibrato Speed	000D	R/W		7	01	00-40-7F	-64 - 0 - 63
Vibrato Delay	000E	R/W		7	01	00-40-7F	-64 - 0 - +63
Octave Shift	000F	R/W		7	01	3E-40-42	-2 - 0 - +2
Volume	0010	R/W		7	01	00-7F-7F	0-127
Touch Sense	0011	R/W		7	01	00-7F-7F	-64 - 0 - 63
Reverb Send	0012	R/W		7	01	00-28-7F	0-127
Chorus Send	0013	R/W		7	01	00-00-7F	0-127

## 26.3 Modulation Setting Parameter

These parameters configure modulation button settings (CTK-7000, WK-7500, AT-3, AT-5 only).

Parameter	ID	R/W	Block	Size	Array	Min-Def-Max	Description
Type	001C	R/W	00000000	1	01	00-00-01	0...Modulation 1...DSP
Depth	001D	R/W		7	01	00-40-7F	0-127

## 27 Scale Memory Parameter

### 27.1 Scale Memory Octave

Scale memory parameters store scale memory data (AT-3, AT-5 only).

Parameter	ID	R/W	Block	Size	Array	Min-Def-Max	Description
Tune	0000	R/W	3-0: Note #	16	01	7E00-8000-81FF	-100/512 - 0 - 100/512(cent) Block: Note # 0...C 1...C# 2...D 3...D# 4...E 5...F 6...F# 7...G 8...G# 9...A 10...A# 11...B
Onoff	0001	R/W		1	01	00-00-01	Scale Button 0...Off 1...On

## 28 DSP Parameter

### 28.1 DSP Basic

These parameters store DSP data.

Parameter	ID	R/W	Block	Size	Array	Min-Def-Max	Description
Name	0000	R/W	00000000	7	10	00-20-7F	Ascii Character
Rev Send	0001	R/W		7	01	00-28-7F	0 - 127
Algorithm	0002	R/W		14	01	0000-000A-3FFF	ID (Note1)
Parameter7	0003	R/W		7	08	00-40-7F	0 - 127
Rotary Sw Onoff	0004	R/W		1	01	00-00-01	0...0ff 1...0n
Parameter Index	0005	R/W	0:Button Selection	4	01	00-00-08	0....No Assign 1-8...Parameter 1-8 Block: Button Selection 0...Modulation Button(CTK-7000, WK-7500, AT-3, AT-5 only) 1...Rotary Slow/Fast Button(CTK-7000, WK-7500 only)
On Value	0006	R/W		7	01	00-00-7F	0 - 127
Off Value	0007	R/W		7	01	00-00-7F	0 - 127

Note1 : For details about the relationship between the Algorithm ID and the DSP Type Number, see "34 DSP Type List".

## 29 All Data Parameter

### 29.1 All Directory Info

The All data parameter stores all data directory information.

Parameter	ID	R/W	Block	Size	Array	Min-Def-Max	Description
Size	0001	R	000000	32	01	00000000-00000000-00FFFFFF	0 - 0xFFFFFFFF

## 30 Sequence Parameter

### 30.1 Sequence Directory Info

The sequence parameter stores recorder song directory information.

Parameter	ID	R/W	Block	Size	Array	Min-Def-Max	Description
Size	0001	R	000000	32	01	00000000-00000000-00FFFFFF	0 - 0xFFFFFFFF

## 31 Registration Parameter

### 31.1 Registration Directory Info

The registration parameter stores registration data directory information.

Parameter	ID	R/W	Block	Size	Array	Min-Def-Max	Description
Size	0001	R	000000	32	01	00000000-00000000-00FFFFFF	0 - 0xFFFFFFFF

## 32 Rhythm Parameter

### 32.1 Rhythm Directory Info

The rhythm parameter stores rhythm directory information.

Parameter	ID	R/W	Block	Size	Array	Min-Def-Max	Description
Name	0000	R	00000000	7	10	20-20-7F	Ascii Character
Size	0002	R		32	01	00000000-00000000-00FFFFFF	0 - 0xFFFFFFFF

## Part VI

# Parameter Set List

This section explains actually how parameter sets can be transferred by the Instrument with bulk dump.

## 33 Parameter Set Table

### Field Contents

- *cat* field  
Shows the category value.(Note1)
- *mem* field  
Shows the memory area ID value.(Note1)
- *pset* field  
Shows the parameter set number value. Applicable parameter set numbers are those in the user area where the top number is zero, and are not the same numbers as those displayed by the Instrument.  
(Note1)

Note1 : Operation is not guaranteed for values other than those noted here.

### 33.1 CTK-6000/WK-6500

Parameter Set Category	<i>cat</i>	<i>mem</i>	<i>pset</i>	description
Tone	03H	02H	0000H - 0009H	(User Tone 1 - 10)
DSP	13H	02H	0000H - 0063H	(User DSP 101 - 200)
All	1FH	02H	0000H - 000AH	(All Data)
Sequence	21H	02H	0000H - 0004H	(Song Sequencer 1 - 5)
Registration	22H	02H	0000H	(Registration)
Rhythm	24H	02H	0000H - 0009H	(User Rhythm 1 - 10)
Music Preset	25H	02H	0000H - 0031H	(User Preset 1 - 50)

### 33.2 CTK-7000/WK-7500

Parameter Set Category	<i>cat</i>	<i>mem</i>	<i>pset</i>	description
Tone	03H	02H	0000H - 0063H	(User Tone 1 - 100)
		02H	0064H - 0095H	(User Drawbar 1 - 50)
DSP	13H	02H	0000H - 0063H	(User DSP 101 - 200)
All	1FH	02H	0000H - 0037H	(All Data)
Sequence	21H	02H	0000H - 0004H	(Song Sequencer 1 - 5)
Registration	22H	02H	0000H	(Registration)
Rhythm	24H	02H	0000H - 0063H	(User Rhythm 1 - 100)
Music Preset	25H	02H	0000H - 0063H	(User Preset 1 - 100)



### 33.3 AT-3/AT-5

Parameter Set Category	<i>cat</i>	<i>mem</i>	<i>pset</i>	description
Tone	03H	02H	0000H - 0063H	(User Tone 1 - 100)
Scale Memory	12H	02H	0000H	(User Scale Memory)
DSP	13H	02H	0000H - 0063H	(User DSP 101 - 200)
All	1FH	02H	0000H - 0037H	(All Data)
Sequence	21H	02H	0000H - 0004H	(Song Sequencer 1 - 5)
Registration	22H	02H	0000H	(Registration)
Rhythm	24H	02H	0000H - 0063H	(User Rhythm 1 - 100)
Music Preset	25H	02H	0000H - 0063H	(User Preset 1 - 100)

## Part VII

# DSP Parameter List

## 34 DSP Type List

This is a list of DSP types built into the Instrument.

### 34.1 Single DSP

Number	ID	Type
01	01H	Wah
02	02H	Compressor
03	03H	Distortion
04	04H	Enhancer
05	05H	Pan
06	06H	Tremolo
07	07H	Phaser
08	08H	Flanger
09	09H	Chorus
10	0AH	Delay
11	0BH	Reflection
12	0CH	Rotary
13	0DH	RingModulator
14	0EH	LoFi

## 34.2 Dual DSP

Number	ID	Type
15	41H	Wah-Comp
16	42H	Wah-Dist
17	43H	Wah-Cho
18	44H	Wah-Flan
19	45H	Wah-Ref
20	46H	Wah-Trem
21	47H	Wah-Pan
22	48H	Comp-Wah
23	49H	Comp-Dist
24	4AH	Comp-Cho
25	4BH	Comp-Flan
26	4CH	Comp-Ref
27	4DH	Comp-Trem
28	4EH	Comp-Pan
29	50H	Dist-Wah
20	51H	Dist-Comp
31	53H	Dist-Cho
32	54H	Dist-Flan
33	55H	Dist-Ref
34	56H	Dist-Trem
35	57H	Dist-Pan
36	5DH	Cho-Ref
37	5FH	Cho-Pan
38	65H	Flan-Ref
39	67H	Flan-Pan
30	6AH	Ref-Dist
41	6BH	Ref-Cho
42	6FH	Ref-Pan
43	72H	Trem-Dist
44	73H	Trem-Cho
45	74H	Trem-Flan
46	75H	Trem-Ref

## 35 DSP Parameter Set Type

### 35.1 Wah

Parameter Number	Parameter Name	Value	Notes
Parameter7[1]	Resonance	00 - 7F	
Parameter7[2]	Manual	00 - 7F	
Parameter7[3]	LFO Rate	00 - 7F	
Parameter7[4]	LFO Depth	00 - 7F	
Parameter7[5]	LFOvform	00 - 7F	Note1

Note1 : For information about the relationship between setting values and send/receive values, see “36.17 LFO Wave Form1 Setting Value Table” in “VIII Setting Values and Send/Receive Values” of this document.

## 35.2 Compressor

Parameter Number	Parameter Name	Value	Notes
Parameter7[1]	Attack	00 - 7F	
Parameter7[2]	Release	00 - 7F	
Parameter7[3]	Level	00 - 7F	
Parameter7[4]	Threshold	00 - 7F	

## 35.3 Distortion

Parameter Number	Parameter Name	Value	Notes
Parameter7[1]	Gain	00 - 7F	
Parameter7[2]	Level	00 - 7F	

## 35.4 Enhancer

Parameter Number	Parameter Name	Value	Notes
Parameter7[1]	Low Freq	00 - 7F	
Parameter7[2]	Low Phase	00 - 7F	
Parameter7[3]	High Freq	00 - 7F	
Parameter7[4]	HighPhase	00 - 7F	

## 35.5 Pan

Parameter Number	Parameter Name	Value	Notes
Parameter7[1]	LFO Rate	00 - 7F	
Parameter7[2]	LFO Depth	00 - 7F	
Parameter7[3]	LFOVvform	00 - 7F	Note1

Note1 : For information about the relationship between setting values and send/receive values, see “36.19 LFO Wave Form3 Setting Value Table” in “VIII Setting Values and Send/Receive Values” of this document.

## 35.6 Tremolo

Parameter Number	Parameter Name	Value	Notes
Parameter7[1]	LFO Rate	00 - 7F	
Parameter7[2]	LFO Depth	00 - 7F	
Parameter7[3]	LFOVvform	00 - 7F	Note1

Note1 : For information about the relationship between setting values and send/receive values, see “36.19 LFO Wave Form3 Setting Value Table” in “VIII Setting Values and Send/Receive Values” of this document.

## 35.7 Phaser

Parameter Number	Parameter Name	Value	Notes
Parameter7[1]	Resonance	00 - 7F	
Parameter7[2]	LFO Rate	00 - 7F	
Parameter7[3]	LFO Depth	00 - 7F	
Parameter7[4]	LFOVvform	00 - 7F	Note1

Note1 : For information about the relationship between setting values and send/receive values, see “36.18 LFO Wave Form2 Setting Value Table” in “VIII Setting Values and Send/Receive Values” of this document.

## 35.8 Flanger

Parameter Number	Parameter Name	Value	Notes
Parameter7[1]	LFO Rate	00 - 7F	
Parameter7[2]	LFO Depth	00 - 7F	
Parameter7[3]	LFOVvform	00 - 7F	Note1
Parameter7[4]	Feedback	00 - 7F	

Note1 : For information about the relationship between setting values and send/receive values, see “36.18 LFO Wave Form2 Setting Value Table” in “VIII Setting Values and Send/Receive Values” of this document.

## 35.9 Chorus

Parameter Number	Parameter Name	Value	Notes
Parameter7[1]	LFO Rate	00 - 7F	
Parameter7[2]	LFO Depth	00 - 7F	
Parameter7[3]	LFOVvform	00 - 7F	Note1
Parameter7[4]	Feedback	00 - 7F	
Parameter7[5]	Type	00 - 7F	Note2

Note1 : For information about the relationship between setting values and send/receive values, see “36.19 LFO Wave Form3 Setting Value Table” in “VIII Setting Values and Send/Receive Values” of this document.

Note2 : For information about the relationship between setting values and send/receive values, see “36.14 Chorus Mode Setting Value Table” in “VIII Setting Values and Send/Receive Values” of this document.

## 35.10 Delay

Parameter Number	Parameter Name	Value	Notes
Parameter7[1]	DelayTime	00 - 7F	
Parameter7[2]	Feedback	00 - 7F	
Parameter7[3]	Ratio Lch	00 - 7F	
Parameter7[4]	Ratio Rch	00 - 7F	
Parameter7[5]	Wet Level	00 - 7F	Note1
Parameter7[6]	Type	00 - 7F	Note2

Note1 : For information about the relationship between setting values and send/receive values, see “36.15 Delay Level Setting Value Table” in “VIII Setting Values and Send/Receive Values” of this document.

Note2 : For information about the relationship between setting values and send/receive values, see “36.16 Delay Type Setting Value Table” in “VIII Setting Values and Send/Receive Values” of this document.

## 35.11 Reflection

Parameter Number	Parameter Name	Value	Notes
Parameter7[1]	Type	00 - 7F	Note1
Parameter7[2]	Feedback	00 - 7F	

Note1 : For information about the relationship between setting values and send/receive values, see “36.21 Reflection Setting Value Table” in “VIII Setting Values and Send/Receive Values” of this document.

## 35.12 Rotary

Parameter Number	Parameter Name	Value	Notes
Parameter7[1]	Od Gain	00 - 7F	Note1
Parameter7[2]	Od Level	00 - 7F	
Parameter7[3]	Speed	00 - 7F	Note2
Parameter7[4]	Brake	00 - 7F	Note3
Parameter7[5]	FallAccel	00 - 7F	
Parameter7[6]	RiseAccel	00 - 7F	
Parameter7[7]	Slow Rate	00 - 7F	
Parameter7[8]	Fast Rate	00 - 7F	

Note1 : For information about the relationship between setting values and send/receive values, see “36.12 0-3 Setting Value Table” in “VIII Setting Values and Send/Receive Values” of this document.

Note2 : For information about the relationship between setting values and send/receive values, see “36.24 Slow/Fast Setting Value Table” in “VIII Setting Values and Send/Receive Values” of this document.

Note3 : For information about the relationship between setting values and send/receive values, see “36.23 Rotate/Brake Setting Value Table” in “VIII Setting Values and Send/Receive Values” of this document.

## 35.13 Ring Modulator

Parameter Number	Parameter Name	Value	Notes
Parameter7[1]	OSC Freq	00 - 7F	
Parameter7[2]	LFO Rate	00 - 7F	
Parameter7[3]	LFO Depth	00 - 7F	
Parameter7[4]	Type	00 - 7F	Note1

Note1 : For information about the relationship between setting values and send/receive values, see “36.22 Ring Type Setting Value Table” in “VIII Setting Values and Send/Receive Values” of this document.

## 35.14 LoFi

Parameter Number	Parameter Name	Value	Notes
Parameter7[1]	WF Rate	00 - 7F	
Parameter7[2]	WF Depth	00 - 7F	
Parameter7[3]	Nz1 Level	00 - 7F	Note1
Parameter7[4]	Nz2 Level	00 - 7F	Note2
Parameter7[5]	Density	00 - 7F	Note3
Parameter7[6]	Bit	00 - 7F	Note4

Note1 : For information about the relationship between setting values and send/receive values, see “36.20 LoFi Noise Level Setting Value Table” in “VIII Setting Values and Send/Receive Values” of this document.

Note2 : For information about the relationship between setting values and send/receive values, see “36.20 LoFi Noise Level Setting Value Table” in “VIII Setting Values and Send/Receive Values” of this document.

Note3 : For information about the relationship between setting values and send/receive values, see “36.13 0-5 Setting Value Table” in “VIII Setting Values and Send/Receive Values” of this document.

Note4 : For information about the relationship between setting values and send/receive values, see “36.12 0-3 Setting Value Table” in “VIII Setting Values and Send/Receive Values” of this document.

### 35.15 Wah Compressor

Parameter Number	Parameter Name	Value	Notes
Parameter7[1]	WahWvform	00 - 7F	Note1
Parameter7[2]	Wah Rate	00 - 7F	
Parameter7[3]	Wah Depth	00 - 7F	
Parameter7[4]	CmpThresh	00 - 7F	
Parameter7[5]	Cmp Level	00 - 7F	

Note1 : For information about the relationship between setting values and send/receive values, see “36.17 LFO Wave Form1 Setting Value Table” in “VIII Setting Values and Send/Receive Values” of this document.

### 35.16 Wah Distortion

Parameter Number	Parameter Name	Value	Notes
Parameter7[1]	WahWvform	00 - 7F	Note1
Parameter7[2]	Wah Rate	00 - 7F	
Parameter7[3]	Wah Depth	00 - 7F	
Parameter7[4]	Dst Gain	00 - 7F	
Parameter7[5]	Dst Level	00 - 7F	

Note1 : For information about the relationship between setting values and send/receive values, see “36.17 LFO Wave Form1 Setting Value Table” in “VIII Setting Values and Send/Receive Values” of this document.

### 35.17 Wah Chorus

Parameter Number	Parameter Name	Value	Notes
Parameter7[1]	WahWvform	00 - 7F	Note1
Parameter7[2]	Wah Rate	00 - 7F	
Parameter7[3]	Wah Depth	00 - 7F	
Parameter7[4]	ChoWvform	00 - 7F	Note2
Parameter7[5]	Cho Rate	00 - 7F	
Parameter7[6]	Cho Depth	00 - 7F	

Note1 : For information about the relationship between setting values and send/receive values, see “36.17 LFO Wave Form1 Setting Value Table” in “VIII Setting Values and Send/Receive Values” of this document.

Note2 : For information about the relationship between setting values and send/receive values, see “36.19 LFO Wave Form3 Setting Value Table” in “VIII Setting Values and Send/Receive Values” of this document.

### 35.18 Wah Flanger

Parameter Number	Parameter Name	Value	Notes
Parameter7[1]	WahWvform	00 - 7F	Note1
Parameter7[2]	Wah Rate	00 - 7F	
Parameter7[3]	Wah Depth	00 - 7F	
Parameter7[4]	FlnWvform	00 - 7F	Note2
Parameter7[5]	Fln Rate	00 - 7F	
Parameter7[6]	Fln Depth	00 - 7F	

Note1 : For information about the relationship between setting values and send/receive values, see “36.17 LFO Wave Form1 Setting Value Table” in “VIII Setting Values and Send/Receive Values” of this document.

Note2 : For information about the relationship between setting values and send/receive values, see “36.18 LFO Wave Form2 Setting Value Table” in “VIII Setting Values and Send/Receive Values” of this document.

### 35.19 Wah Reflection

Parameter Number	Parameter Name	Value	Notes
Parameter7[1]	WahWvform	00 - 7F	Note1
Parameter7[2]	Wah Rate	00 - 7F	
Parameter7[3]	Wah Depth	00 - 7F	
Parameter7[4]	Ref Fbk	00 - 7F	

Note1 : For information about the relationship between setting values and send/receive values, see “36.17 LFO Wave Form1 Setting Value Table” in “VIII Setting Values and Send/Receive Values” of this document.

### 35.20 Wah Tremolo

Parameter Number	Parameter Name	Value	Notes
Parameter7[1]	WahWvform	00 - 7F	Note1
Parameter7[2]	Wah Rate	00 - 7F	
Parameter7[3]	Wah Depth	00 - 7F	
Parameter7[4]	TrmWvform	00 - 7F	Note2
Parameter7[5]	Trm Rate	00 - 7F	
Parameter7[6]	Trm Depth	00 - 7F	

Note1 : For information about the relationship between setting values and send/receive values, see “36.17 LFO Wave Form1 Setting Value Table” in “VIII Setting Values and Send/Receive Values” of this document.

Note2 : For information about the relationship between setting values and send/receive values, see “36.19 LFO Wave Form3 Setting Value Table” in “VIII Setting Values and Send/Receive Values” of this document.

### 35.21 Wah Pan

Parameter Number	Parameter Name	Value	Notes
Parameter7[1]	WahWvform	00 - 7F	Note1
Parameter7[2]	Wah Rate	00 - 7F	
Parameter7[3]	Wah Depth	00 - 7F	
Parameter7[4]	PanWvform	00 - 7F	Note2
Parameter7[5]	Pan Rate	00 - 7F	
Parameter7[6]	Pan Depth	00 - 7F	

Note1 : For information about the relationship between setting values and send/receive values, see “36.17 LFO Wave Form1 Setting Value Table” in “VIII Setting Values and Send/Receive Values” of this document.

Note2 : For information about the relationship between setting values and send/receive values, see “36.19 LFO Wave Form3 Setting Value Table” in “VIII Setting Values and Send/Receive Values” of this document.

## 35.22 Compressor Wah

Parameter Number	Parameter Name	Value	Notes
Parameter7[1]	CmpThresh	00 - 7F	
Parameter7[2]	Cmp Level	00 - 7F	
Parameter7[3]	WahWvform	00 - 7F	Note1
Parameter7[4]	Wah Rate	00 - 7F	
Parameter7[5]	Wah Depth	00 - 7F	

Note1 : For information about the relationship between setting values and send/receive values, see “36.17 LFO Wave Form1 Setting Value Table” in “VIII Setting Values and Send/Receive Values” of this document.

## 35.23 Compressor Distortion

Parameter Number	Parameter Name	Value	Notes
Parameter7[1]	CmpThresh	00 - 7F	
Parameter7[2]	Cmp Level	00 - 7F	
Parameter7[3]	Dst Gain	00 - 7F	
Parameter7[4]	Dst Level	00 - 7F	

## 35.24 Compressor Chorus

Parameter Number	Parameter Name	Value	Notes
Parameter7[1]	CmpThresh	00 - 7F	
Parameter7[2]	Cmp Level	00 - 7F	
Parameter7[3]	ChoWvform	00 - 7F	Note1
Parameter7[4]	Cho Rate	00 - 7F	
Parameter7[5]	Cho Depth	00 - 7F	

Note1 : For information about the relationship between setting values and send/receive values, see “36.19 LFO Wave Form3 Setting Value Table” in “VIII Setting Values and Send/Receive Values” of this document.

## 35.25 Compressor Flanger

Parameter Number	Parameter Name	Value	Notes
Parameter7[1]	CmpThresh	00 - 7F	
Parameter7[2]	Cmp Level	00 - 7F	
Parameter7[3]	FlnWvform	00 - 7F	Note1
Parameter7[4]	Fln Rate	00 - 7F	
Parameter7[5]	Fln Depth	00 - 7F	

Note1 : For information about the relationship between setting values and send/receive values, see “36.18 LFO Wave Form2 Setting Value Table” in “VIII Setting Values and Send/Receive Values” of this document.

## 35.26 Compressor Reflection

Parameter Number	Parameter Name	Value	Notes
Parameter7[1]	CmpThresh	00 - 7F	
Parameter7[2]	Cmp Level	00 - 7F	
Parameter7[3]	Ref Fbk	00 - 7F	



## 35.27 Compressor Tremolo

Parameter Number	Parameter Name	Value	Notes
Parameter7[1]	CmpThresh	00 - 7F	
Parameter7[2]	Cmp Level	00 - 7F	
Parameter7[3]	TrmWvform	00 - 7F	Note1
Parameter7[4]	Trm Rate	00 - 7F	
Parameter7[5]	Trm Depth	00 - 7F	

Note1 : For information about the relationship between setting values and send/receive values, see “36.19 LFO Wave Form3 Setting Value Table” in “VIII Setting Values and Send/Receive Values” of this document.

## 35.28 Compressor Pan

Parameter Number	Parameter Name	Value	Notes
Parameter7[1]	CmpThresh	00 - 7F	
Parameter7[2]	Cmp Level	00 - 7F	
Parameter7[3]	PanWvform	00 - 7F	Note1
Parameter7[4]	Pan Rate	00 - 7F	
Parameter7[5]	Pan Depth	00 - 7F	

Note1 : For information about the relationship between setting values and send/receive values, see “36.19 LFO Wave Form3 Setting Value Table” in “VIII Setting Values and Send/Receive Values” of this document.

## 35.29 Distortion Wah

Parameter Number	Parameter Name	Value	Notes
Parameter7[1]	Dst Gain	00 - 7F	
Parameter7[2]	Dst Level	00 - 7F	
Parameter7[3]	WahWvform	00 - 7F	Note1
Parameter7[4]	Wah Rate	00 - 7F	
Parameter7[5]	Wah Depth	00 - 7F	

Note1 : For information about the relationship between setting values and send/receive values, see “36.17 LFO Wave Form1 Setting Value Table” in “VIII Setting Values and Send/Receive Values” of this document.

## 35.30 Distortion Compressor

Parameter Number	Parameter Name	Value	Notes
Parameter7[1]	Dst Gain	00 - 7F	
Parameter7[2]	Dst Level	00 - 7F	
Parameter7[3]	CmpThresh	00 - 7F	
Parameter7[4]	Cmp Level	00 - 7F	

## 35.31 Distortion Chorus

Parameter Number	Parameter Name	Value	Notes
Parameter7[1]	Dst Gain	00 - 7F	
Parameter7[2]	Dst Level	00 - 7F	
Parameter7[3]	ChoWvform	00 - 7F	Note1
Parameter7[4]	Cho Rate	00 - 7F	
Parameter7[5]	Cho Depth	00 - 7F	

Note1 : For information about the relationship between setting values and send/receive values, see “36.19 LFO Wave Form3 Setting Value Table” in “VIII Setting Values and Send/Receive Values” of this document.

### 35.32 Distortion Flanger

Parameter Number	Parameter Name	Value	Notes
Parameter7[1]	Dst Gain	00 - 7F	
Parameter7[2]	Dst Level	00 - 7F	
Parameter7[3]	FlnWvform	00 - 7F	Note1
Parameter7[4]	Fln Rate	00 - 7F	
Parameter7[5]	Fln Depth	00 - 7F	

Note1 : For information about the relationship between setting values and send/receive values, see “36.18 LFO Wave Form2 Setting Value Table” in “VIII Setting Values and Send/Receive Values” of this document.

### 35.33 Distortion Reflection

Parameter Number	Parameter Name	Value	Notes
Parameter7[1]	Dst Gain	00 - 7F	
Parameter7[2]	Dst Level	00 - 7F	
Parameter7[3]	Ref Fbk	00 - 7F	

### 35.34 Distortion Tremolo

Parameter Number	Parameter Name	Value	Notes
Parameter7[1]	Dst Gain	00 - 7F	
Parameter7[2]	Dst Level	00 - 7F	
Parameter7[3]	TrmWvform	00 - 7F	Note1
Parameter7[4]	Trm Rate	00 - 7F	
Parameter7[5]	Trm Depth	00 - 7F	

Note1 : For information about the relationship between setting values and send/receive values, see “36.19 LFO Wave Form3 Setting Value Table” in “VIII Setting Values and Send/Receive Values” of this document.

### 35.35 Distortion Pan

Parameter Number	Parameter Name	Value	Notes
Parameter7[1]	Dst Gain	00 - 7F	
Parameter7[2]	Dst Level	00 - 7F	
Parameter7[3]	PanWvform	00 - 7F	Note1
Parameter7[4]	Pan Rate	00 - 7F	
Parameter7[5]	Pan Depth	00 - 7F	

Note1 : For information about the relationship between setting values and send/receive values, see “36.19 LFO Wave Form3 Setting Value Table” in “VIII Setting Values and Send/Receive Values” of this document.

### 35.36 Chorus Reflection

Parameter Number	Parameter Name	Value	Notes
Parameter7[1]	ChoWvform	00 - 7F	Note1
Parameter7[2]	Cho Rate	00 - 7F	
Parameter7[3]	Cho Depth	00 - 7F	
Parameter7[4]	Ref Fbk	00 - 7F	

Note1 : For information about the relationship between setting values and send/receive values, see “36.19 LFO Wave Form3 Setting Value Table” in “VIII Setting Values and Send/Receive Values” of this document.

### 35.37 Chorus Pan

Parameter Number	Parameter Name	Value	Notes
Parameter7[1]	ChoWvform	00 - 7F	Note1
Parameter7[2]	Cho Rate	00 - 7F	
Parameter7[3]	Cho Depth	00 - 7F	
Parameter7[4]	PanWvform	00 - 7F	Note2
Parameter7[5]	Pan Rate	00 - 7F	
Parameter7[6]	Pan Depth	00 - 7F	

Note1 : For information about the relationship between setting values and send/receive values, see “36.19 LFO Wave Form3 Setting Value Table” in “VIII Setting Values and Send/Receive Values” of this document.

Note2 : For information about the relationship between setting values and send/receive values, see “36.19 LFO Wave Form3 Setting Value Table” in “VIII Setting Values and Send/Receive Values” of this document.

### 35.38 Flanger Reflection

Parameter Number	Parameter Name	Value	Notes
Parameter7[1]	FlnWvform	00 - 7F	Note1
Parameter7[2]	Fln Rate	00 - 7F	
Parameter7[3]	Fln Depth	00 - 7F	
Parameter7[4]	Ref Fbk	00 - 7F	

Note1 : For information about the relationship between setting values and send/receive values, see “36.18 LFO Wave Form2 Setting Value Table” in “VIII Setting Values and Send/Receive Values” of this document.

### 35.39 Flanger Pan

Parameter Number	Parameter Name	Value	Notes
Parameter7[1]	FlnWvform	00 - 7F	Note1
Parameter7[2]	Fln Rate	00 - 7F	
Parameter7[3]	Fln Depth	00 - 7F	
Parameter7[4]	PanWvform	00 - 7F	Note2
Parameter7[5]	Pan Rate	00 - 7F	
Parameter7[6]	Pan Depth	00 - 7F	

Note1 : For information about the relationship between setting values and send/receive values, see “36.18 LFO Wave Form2 Setting Value Table” in “VIII Setting Values and Send/Receive Values” of this document.

Note2 : For information about the relationship between setting values and send/receive values, see “36.19 LFO Wave Form3 Setting Value Table” in “VIII Setting Values and Send/Receive Values” of this document.

### 35.40 Reflection Distortion

Parameter Number	Parameter Name	Value	Notes
Parameter7[1]	Ref Fbk	00 - 7F	
Parameter7[2]	Dst Gain	00 - 7F	
Parameter7[3]	Dst Level	00 - 7F	

### 35.41 Reflection Chorus

Parameter Number	Parameter Name	Value	Notes
Parameter7[1]	Ref Fbk	00 - 7F	
Parameter7[2]	ChoWvform	00 - 7F	Note1
Parameter7[3]	Cho Rate	00 - 7F	
Parameter7[4]	Cho Depth	00 - 7F	

Note1 : For information about the relationship between setting values and send/receive values, see “36.19 LFO Wave Form3 Setting Value Table” in “VIII Setting Values and Send/Receive Values” of this document.

### 35.42 Reflection Pan

Parameter Number	Parameter Name	Value	Notes
Parameter7[1]	Ref Fbk	00 - 7F	
Parameter7[2]	PanWvform	00 - 7F	Note1
Parameter7[3]	Pan Rate	00 - 7F	
Parameter7[4]	Pan Depth	00 - 7F	

Note1 : For information about the relationship between setting values and send/receive values, see “36.19 LFO Wave Form3 Setting Value Table” in “VIII Setting Values and Send/Receive Values” of this document.

### 35.43 Tremolo Distortion

Parameter Number	Parameter Name	Value	Notes
Parameter7[1]	TrmWvform	00 - 7F	Note1
Parameter7[2]	Trm Rate	00 - 7F	
Parameter7[3]	Trm Depth	00 - 7F	
Parameter7[4]	Dst Gain	00 - 7F	
Parameter7[5]	Dst Level	00 - 7F	

Note1 : For information about the relationship between setting values and send/receive values, see “36.19 LFO Wave Form3 Setting Value Table” in “VIII Setting Values and Send/Receive Values” of this document.

### 35.44 Tremolo Chorus

Parameter Number	Parameter Name	Value	Notes
Parameter7[1]	TrmWvform	00 - 7F	Note1
Parameter7[2]	Trm Rate	00 - 7F	
Parameter7[3]	Trm Depth	00 - 7F	
Parameter7[4]	ChoWvform	00 - 7F	Note2
Parameter7[5]	Cho Rate	00 - 7F	
Parameter7[6]	Cho Depth	00 - 7F	

Note1 : For information about the relationship between setting values and send/receive values, see “36.19 LFO Wave Form3 Setting Value Table” in “VIII Setting Values and Send/Receive Values” of this document.

Note2 : For information about the relationship between setting values and send/receive values, see “36.19 LFO Wave Form3 Setting Value Table” in “VIII Setting Values and Send/Receive Values” of this document.

## 35.45 Tremolo Flanger

Parameter Number	Parameter Name	Value	Notes
Parameter7[1]	TrmWvform	00 - 7F	Note1
Parameter7[2]	Trm Rate	00 - 7F	
Parameter7[3]	Trm Depth	00 - 7F	
Parameter7[4]	FlnWvform	00 - 7F	Note2
Parameter7[5]	Fln Rate	00 - 7F	
Parameter7[6]	Fln Depth	00 - 7F	

Note1 : For information about the relationship between setting values and send/receive values, see “36.19 LFO Wave Form3 Setting Value Table” in “VIII Setting Values and Send/Receive Values” of this document.

Note2 : For information about the relationship between setting values and send/receive values, see “36.18 LFO Wave Form2 Setting Value Table” in “VIII Setting Values and Send/Receive Values” of this document.

## 35.46 Tremolo Reflection

Parameter Number	Parameter Name	Value	Notes
Parameter7[1]	TrmWvform	00 - 7F	Note1
Parameter7[2]	Trm Rate	00 - 7F	
Parameter7[3]	Trm Depth	00 - 7F	
Parameter7[4]	Ref Fbk	00 - 7F	

Note1 : For information about the relationship between setting values and send/receive values, see “36.19 LFO Wave Form3 Setting Value Table” in “VIII Setting Values and Send/Receive Values” of this document.

## Part VIII

# Setting Values and Send/ Receive Values

## 36 Setting Value Tables

### 36.1 Off/On Setting Value Table

Transmit Value	Receive Value	Parameter
00H	00H - 3FH	Off
7FH	40H - 7FH	On

### 36.2 -64 - 0 - +63 Setting Value Table

Transmit Value	Receive Value	Parameter
00H	00H	-64
:	:	:
40H	40H	0
:	:	:
7FH	7FH	+63

### 36.3 -/+ Setting Value Table

Transmit Value	Receive Value	Parameter
00H	00H - 3FH	-
7FH	40H - 7FH	+

### 36.4 Pan Setting Value Table

Transmit Value	Receive Value	Parameter
00H	00H	Left
:	:	:
40H	40H	Center
:	:	:
7FH	7FH	Right

### 36.5 Fine Tune Setting Value Table

Transmit Value	Receive Value	Parameter
(LSB, MSB)		
(43H, 00H)	(00H, 00H) - (5FH, 00H)	415.5 Hz
(65H, 00H)	(60H, 00H) - (7FH, 00H)	415.6 Hz
(07H, 01H)	(00H, 01H) - (1FH, 01H)	415.7 Hz
(29H, 01H)	(20H, 01H) - (3FH, 01H)	415.8 Hz
:	:	:
(40H, 3FH)	(30H, 3FH) - (4FH, 3FH)	439.8 Hz
(60H, 3FH)	(50H, 3FH) - (6FH, 3FH)	439.9 Hz
(00H, 40H)	(70H, 3FH) - (1FH, 40H)	440.0 Hz
(20H, 40H)	(20H, 40H) - (3FH, 40H)	440.1 Hz
(40H, 40H)	(40H, 40H) - (5FH, 40H)	440.2 Hz
:	:	:
(54H, 7EH)	(50H, 7EH) - (6FH, 7EH)	465.6 Hz
(73H, 7EH)	(70H, 7EH) - (0FH, 7FH)	465.7 Hz
(11H, 7FH)	(10H, 7FH) - (2FH, 7FH)	465.8 Hz
(30H, 7FH)	(30H, 7FH) - (7FH, 7FH)	465.9 Hz

### 36.6 Scale Setting Value Table

Transmit Value	Receive Value	Parameter
(ssH, ttH)		
(00H, 50H)	(00H, 00H) - (00H, 7FH)	-99 cent
(01H, 20H)	(01H, 00H) - (01H, 4FH)	-98
(01H, 70H)	(01H, 50H) - (02H, 1FH)	-97
(02H, 40H)	(02H, 20H) - (02H, 7FH)	-96
:	:	:
(40H, 00H)	(3FH, 60H) - (40H, 2FH)	0
:	:	:
(7EH, 50H)	(7EH, 40H) - (7FH, 0FH)	+98
(7FH, 20H)	(7FH, 10H) - (7FH, 7FH)	+99

Note : An actual note is changed by 100/512 cent.

### 36.7 Reverb Type Setting Value Table

Transmit Value	Receive Value	Parameter
01H	01H	Room 1
02H	02H	Room 2
03H	03H	Room 3
04H	04H	Room 4
05H	05H	Hall 1
06H	06H	Hall 2
07H	07H	Hall 3
08H	08H	Hall 4
09H	09H	Stadium 1
0AH	0AH	Stadium 2

### 36.8 Reverb Time Setting Value Table

Transmit Value	Receive Value	Parameter
-	00H - 07H	0(shortest)
-	08H - 0FH	1
-	10H - 17H	2
-	18H - 1FH	3
-	20H - 27H	4
-	28H - 2FH	5
-	30H - 37H	6
-	38H - 3FH	7
-	40H - 47H	8
-	48H - 4FH	9
-	50H - 57H	10
-	58H - 5FH	11
-	60H - 67H	12
-	68H - 6FH	13
-	70H - 77H	14
-	78H - 7FH	15(longest)

### 36.9 Chorus Type Setting Value Table

Transmit Value	Receive Value	Parameter
01H	01H	Chorus 1
02H	02H	Chorus 2
03H	03H	Chorus 3
04H	04H	Chorus 4
05H	05H	Chorus 5

### 36.10 Drawbar Position Setting Value Table

Transmit Value	Receive Value	Parameter
00H	00H - 1FH	0
20H	20H - 3FH	1
40H	40H - 5FH	2
60H	60H - 7FH	3

### 36.11 Normal/Vintage Setting Value Table

Transmit Value	Receive Value	Parameter
00H	00H - 3FH	Normal
7FH	40H - 7FH	Vintage

### 36.12 0-3 Setting Value Table

Transmit Value	Receive Value	Parameter
00H	00H - 1FH	0
2AH	20H - 3FH	1
55H	40H - 5FH	2
7FH	60H - 7FH	3



### 36.13 0-5 Setting Value Table

Transmit Value	Receive Value	Parameter
00H	00H - 14H	0
19H	15H - 29H	1
33H	2AH - 3FH	2
4CH	40H - 54H	3
66H	55H - 69H	4
7FH	6AH - 7FH	5

### 36.14 Chorus Mode Setting Value Table

Transmit Value	Receive Value	Parameter
00H	00H - 29H	mono
40H	2AH - 54H	stereo
7FH	55H - 7FH	tri

### 36.15 Delay Level Setting Value Table

Transmit Value	Receive Value	Parameter
00H	00H - 14H	0
19H	15H - 29H	1
33H	2AH - 3FH	2
4CH	40H - 54H	3
66H	55H - 69H	4
7FH	6AH - 7FH	5

### 36.16 Delay Type Setting Value Table

Transmit Value	Receive Value	Parameter
00H	00H - 3FH	determined by Delay Time
7FH	40H - 7FH	determined by Delay Time and Ratio L/R

### 36.17 LFO Wave Form1 Setting Value Table

Transmit Value	Receive Value	Parameter
00H	00H - 1FH	off
2AH	20H - 3FH	sin
55H	40H - 5FH	tri
7FH	60H - 7FH	random

### 36.18 LFO Wave Form2 Setting Value Table

Transmit Value	Receive Value	Parameter
00H	00H - 29H	sin
40H	2AH - 54H	tri
7FH	55H - 7FH	random

### 36.19 LFO Wave Form3 Setting Value Table

Transmit Value	Receive Value	Parameter
00H	00H - 3FH	sin
7FH	40H - 7FH	tri

### 36.20 LoFi Noise Level Setting Value Table

Transmit Value	Receive Value	Parameter
00H	00H - 14H	0
19H	15H - 29H	1
33H	2AH - 3FH	2
4CH	40H - 54H	3
66H	55H - 69H	4
7FH	6AH - 7FH	5

### 36.21 Reflection Setting Value Table

Transmit Value	Receive Value	Parameter
00H	00H - 0FH	1
12H	10H - 1FH	2
24H	20H - 2FH	3
36H	30H - 3FH	4
49H	40H - 4FH	5
5BH	50H - 5FH	6
6DH	60H - 6FH	7
7FH	70H - 7FH	8

### 36.22 Ring Type Setting Value Table

Transmit Value	Receive Value	Parameter
00H	00H - 29H	ring modulated signal only
40H	2AH - 54H	ring modulated signal and input signal
7FH	55H - 7FH	ring modulated signal and input signal, applied chorus effect

### 36.23 Rotate/Brake Setting Value Table

Transmit Value	Receive Value	Parameter
00H	00H - 3FH	rotate
7FH	40H - 7FH	stop

### 36.24 Slow/Fast Setting Value Table

Transmit Value	Receive Value	Parameter
00H	00H - 3FH	slow
7FH	40H - 7FH	fast

## Part IX

# MIDI Implementation Notation

## 37 Value Notation

### 37.1 Hexadecimal Notation

MIDI implementation sometimes requires that data be expressed in hexadecimal format. Hexadecimal values are indicated by the letter “H” after the value. The hexadecimal equivalents of decimal values 10 through 15 are expressed as the letters A through F.

The table below shows the hexadecimal equivalents for decimal values 0 through 127, which are often used in MIDI messages.

Decimal	Hexadecimal	Decimal	Hexadecimal	Decimal	Hexadecimal	Decimal	Hexadecimal
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

### 37.2 Binary Notation

When a MIDI implementation data value is expressed in binary, the letter “B” (for “binary”) is affixed at the end of the value. The table below shows the binary equivalents for the decimal values 0 through 127, which are often used for settings.

Decimal	Hexadecimal	Binary
0	00H	00000000B
1	01H	00000001B
2	02H	00000010B
3	03H	00000011B
4	04H	00000100B
5	05H	00000101B
6	06H	00000110B
7	07H	00000111B
8	08H	00001000B
9	09H	00001001B
10	0AH	00001010B
11	0BH	00001011B
12	0CH	00001100B
13	0DH	00001101B
14	0EH	00001110B
15	0FH	00001111B
16	10H	00010000B
:	:	
125	7DH	01111101B
126	7EH	01111110B
127	7FH	01111111B

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