MIDI Implementation for the CTK-900, WK-3200, and WK-3700

Important!
• All mentions of "this Model" in this document refer to the CASIO CTK-900, WK-3200, and WK-3700.

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Part I
MIDI Message Overview

1 Product Configuration as a MIDI Device

This Model consists of a controller block and a sound source block as described below.

- Controller Block
  - Keyboard
  - Pedals, wheels, and other real-time controllers
  - Auto accompaniment
  - Song Memory
  - SMF Player
  - Parameter editing tools
- Sound Source Block
  - Common Sub-blocks
    - Sound source common sub-block (Drawbar Organ Waveform Synthesis)
    - Effector sub-block (DSP, Reverb, Chorus, EQ)
    - Mixer common sub-block
  - Channel Independent Sub-blocks (1 to 16)
    - Instrument part sub-block
    - Mixer independent sub-block

1.1 Controller Block

The Controller Block issues messages for the following: keyboard, real-time controllers (WK-3200/WK-3700 bender wheel, WK-3200 modulation switch, WK-3700 modulation wheel, etc.), song memory, auto-accompaniment, panel operations, etc.
An operation causes the corresponding message to be sent to the sound source and from MIDI OUT.
Though the Controller Block is mainly a send function, turning on MIDI IN Chord Judge configures it to perform chord judgment on received data and send the matching auto-accompaniment play data.
The channel number of the sent data is in accordance with the settings configured for each of this Model's parts. Channel messages are not sent from any part that is turned off.
Accompaniment part send messages are sent when this Model's Accomp MIDI Out setting is turned on.

1.2 Sound Source Block

The Sound Source Block consists of effectors and other common sub-blocks, and independent instruments for each channel. It operates in accordance with receive MIDI messages. Setting data may also be sent, depending on external requests.

1.3 Sound Source Common Sub-blocks

The Sound Source Common Sub-blocks include sound source settings that are not dependent on sound source parts; namely effectors, a mixer, and a drawbar organ waveform synthesizer.
Basically, common sub-block parameters can be controlled using System Exclusive messages, but a number of parameters can be controlled using Channel messages.

DSP Sub-block The effector DSP sub-block can be used to change DSP settings in accordance with the Channel messages associated with the channel number specified by the MIDI Global Channel (see "MIDI Channel Number" in section 10.7).

Drawbar Organ Waveform Synthesis Sub-block The drawbar organ waveform synthesis sub-block can be used to change settings in accordance with the Channel messages associated with one of the channel numbers when drawbar organ is selected.

1.4 Sound Source Instrument Part Sub-block

The parts of the sound source can be operated and their settings can be changed with System Exclusive messages and Channel messages. The following table shows the fixed relationships between the part numbers and Channel numbers of Channel messages.

Part	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Channel	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16

1.5 MIDI Send by Auto-accompaniment, Song Memory, and the SMF Player

This document provides information about which operations are sent by each message. Note however, that when an auto-accompaniment, Song Memory, or SMF Player operation is performed, MIDI messages may be sent as part of playback data. Such data is not covered here.

Also note that auto-accompaniment and Song Memory play data is sent only when the Transpose/Function menu's Accomp/Song MIDI Out item is turned on.

SMF player play data is sent only when SMF player settings are configured with MIDI as the output destination.

2 Conditions that Disable Message Send and Receive

All MIDI message send and receive is temporarily disabled while any one of the following processes is in progress.

- System Initialization
- FDD formatting (WK-3700 only)
- SmartMedia formatting (WK-3200/WK-3700 only)

3 Conditions that Disable Bulk Dump Session Send and Receive

Bulk dump message send and receive is disabled while any one of the following processes is in progress. See "19 Parameter Set Transfer Protocols" for information about bulk dump.

- SMF data playback on the FDD (WK-3700 only)
- Parameter data loading from the FDD (WK-3700 only)
- Parameter data writing to the FDD (WK-3700 only)

4 Different Operations Depending on Part Mode

Each Part Mode (see 12.1 "About the Part Mode"), which is the sound source operational mode, has different messages for performing operations upon receipt. Each message is explained in the applicable message sections of this document.

Part II
Channel Message

5 Receive Channel

The channel number of Channel messages received by each part is in accordance with each part's receive channel setting, which is configured on this Model. Turning off the setting disabled Channel message receipt for that part.

The MIDI Channel of messages that can change DSP settings is determined by the Global Channel, which is described under "10.7 MIDI Channel Number".

6 Send Channel

Basically, the MIDI Channel of the Channel message that is sent when play data or parameter setting is changed is the value that corresponds to the part that is playing or the parameter that was changed. When the performance part or part for which the parameter setting is changed is Part 1, however, the value depends on the Transpose/ Function Keyboard Channel value.

The MIDI Channel of the message that is sent when the DSP setting is changed depends on the Global Channel, which is described under "10.7 MIDI Channel Number".

7 Note Off

Format

Message Format:	9nH kkH 00H 8nH kkH **H (Receive only)
n:	MIDI Channel Number
kk: **:	Key Number Ignored

Send

Sent when something is played on the keyboard.

Receive

Received over MIDI Channels that correspond to each part. Any part whose mixer channel is turned off is not received.
The velocity value is ignored.

8 Note On

Format

Message Format:	9nH kkH vvH
n:	MIDI Channel Number
kk:	Key Number
vv:	Velocity

Send
Sent when something is played on the keyboard.

Receive
Received over MIDI Channels that correspond to each part. Any part whose mixer channel is turned off is not received.

9 Polyphonic Key Pressure

Format

Message Format:	AnH kkH vvH
n:	MIDI Channel Number
kk:	Key Number
vv:	Pressure Value

Send Operation
This message is not sent.

Receive Operation
This message is not received.

10 Control Change

Format

Message Format:	BnH ccH vvH
n:	MIDI Channel Number
cc:	Control Number
vv:	Value

Send
Sent when this Model's modulation button (WK-3200 only), modulation wheel (WK-3700 only), or pedal is operated, and when a parameter is changed with a control panel operation.

Receive
Receipt changes this Model's performance control status or the corresponding parameter.

Drawbar Organ Operation
Independent drawbar organ settings cannot be configured for each part, but multiple parts can use the same drawbar organ settings. At this time, the drawbar organ related Control Change Message (NRPN) is recognized by the MIDI Channels of all parts that are using the drawbar organ tone.

When Drawbar Organ is selected by Part 1 and Part 2, for example, the same parameters are applied to MIDI Channels 1 and 2.

10.1 Bank Select (00H)

Format

Message Format:	BnH 00H vvH (MSB) BnH 20H **H (LSB)
n:	MIDI Channel Number
vv: **:	Value Ignored

Send

Sent when a tone is selected. See the "Tone List" of this Model's User's Guide for details.

Receive

Receipt causes a change in the tone bank number stored in this Model's memory, but the tone is not actually changed until Program Change is received. For details, see "12 Program Change" in this document, and the "Tone List" in this Model's User's Guide.

10.2 Modulation (01H)

Format

Message Format:	BnH 01H vvH
n:	MIDI Channel Number
vv:	Value

Send

Sent when WK-3200 modulation button or WK-3700 modulation wheel, which is assigned to the vibrato function, is operated. A fixed value of 85 is always sent when the WK-3200 modulation button is operated.

Receive

Receipt adds vibrato of a depth specified by the value to the tone being sounded. In the case of a tone that already has vibrato applied, receipt of this message increases the vibrato depth.

10.3 Data Entry (06H,26H)

Format

Message Format:	BnH 06H vvH (MSB) BnH 26H vvH (LSB)
n:	MIDI Channel Number
vv:	Value

Send

Sent when there is a change in the parameters assigned to NRPN and RPN.

Receive

Receipt changes the parameters assigned to NRPN and RPN.

10.4 Volume (07H)

Format

Message Format:	BnH 07H vvH
n:	MIDI Channel Number
vv:	Value (Note 1)

Note 1:
The setting value matches the value that is sent and received.

Send
Sent when the volume of Mixer Part 1 through 16 is changed.

Receive
Receipt changes the Mixer Part Volume.

10.5 Pan (0AH)

Format

Message Format:	BnH 0AH vvH
n:	MIDI Channel Number
vv:	Value (Note 1)

Note 1:
For information about the relationship between setting values and send/receive values, see "42.6 Pan Setting Value Table" in "Part VIII Setting Values and Send/Receive Values".

Send
Sent when the pan setting of mixer parts 1 through 16 is changed.

Receive
Receipt changes the Mixer part pan setting.

10.6 Expression (0BH)

Format

Message Format:	BnH 0BH vvH
n:	MIDI Channel Number
vv:	Value (Note 1)

Note 1:
The setting value matches the value that is sent and received.

Send
Sent when there is a change in the Expression value by an accompaniment function.

Receive
Receipt changes the Expression value.

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

Format

Message Format:	BnH 10H vvH	DSP Parameter 0
	BnH 11H vvH	DSP Parameter 1
	BnH 12H vvH	DSP Parameter 2
	BnH 13H vvH	DSP Parameter 3
	BnH 50H vvH	DSP Parameter 4
	BnH 51H vvH	DSP Parameter 5
	BnH 52H vvH	DSP Parameter 6
	BnH 53H vvH	DSP Parameter 7
	n:MIDI Channel Number (Note 1)	
	vv:Value (Note 2)	

Note 1: MIDI Channel Number

The MIDI Channel for manipulating DSP parameters with control change messages is called the "Global Channel". The initial factory default Global Channel is Channel 1.
The Global Channel cannot be changed with a control panel operation. You need to use a System Exclusive Message to change the Global Channel. For details about messages, "Global Channel" under "21.1 Patch Common Parameter List".

Note 2: Value

The range for a value that can be sent by any of the parameters is 0 to 127. Note, however, that the parameter values that can actually be set and the corresponding send value depend on the parameter.

Send

Sent when the WK-3200 modulation button or WK-3700 modulation wheel assigned to a DSP Parameter is operated, and when this Model's DSP edit function is used to change the DSP Parameter value.

Receive

Receipt changes the DSP Parameter value. Any message received that corresponds to a parameter whose number exceeds the number of parameters for the currently selected DSP is ignored.

10.8 Hold1 (40H)

Format

Message Format:	BnH 40H vvH
n:	MIDI Channel Number
vv:	Value (Note 1)

Note 1:

For information about the relationship between setting values and send/receive values, see the "42.1 Off/On Setting Value Table" in "Part VIII Setting Values and Send/Receive Values."

Send

Sent when the assignable jack is configured for sustain and the connected pedal is operated.

Receive

Receipt performs an operation equivalent to a sustain pedal operation.

10.9 Sostenuto (42H)

Format

Message Format:	BnH 42H vvH
n:	MIDI Channel Number
vv:	Value (Note 1)

Note 1:
For information about the relationship between setting values and send/receive values, see the "42.1 Off/On Setting Value Table" in "Part VIII Setting Values and Send/Receive Values."

Send
Sent when the assignable jack is configured for sostenuto and the connected pedal is operated.

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

10.10 Soft (43H)

Format

Message Format:	BnH 43H vvH
n:	MIDI Channel Number
vv:	Value (Note 1)

Note 1:
For information about the relationship between setting values and send/receive values, see the "42.1 Off/On Setting Value Table" in "Part VIII Setting Values and Send/Receive Values."

Send
Sent when the assignable jack is configured for soft and the connected pedal is operated.

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

10.11 Envelope Release Time (48H)

Format

Message Format:	BnH 48H vvH
n:	MIDI Channel Number
vv:	Value (Note 1)

Note 1:
For information about the relationship between setting values and send/receive values, see "42.5 -64 to 0 to 63 Setting Value Table" in "Part VIII Setting Values and Send/Receive Values".

Send
Sent when Release Time is changed.

Receive
Receipt changes Release Time.

10.12 Envelope Attack Time (49H)

Format

Message Format:	BnH 49H vvH
n:	MIDI Channel Number
vv:	Value (Note 1)

Note 1:
For information about the relationship between setting values and send/receive values, see "42.5 -64 to 0 to 63 Setting Value Table" in "Part VIII Setting Values and Send/Receive Values".

Send
Sent when Attack Time is changed with the synthesizer function.

Receive
Receipt changes Attack Time.

10.13 Filter Cutoff (4AH)

Format

Message Format:	BnH 4AH vvH
n:	MIDI Channel Number
vv:	Value (Note 1)

Note 1:
For information about the relationship between setting values and send/receive values, see "42.5 -64 to 0 to 63 Setting Value Table" in "Part VIII Setting Values and Send/Receive Values".

Send
Sent when Filter Cutoff is changed with the synthesizer function.

Receive
Receipt changes Filter Cutoff.

10.14 Filter Resonance (47H)

Format

Message Format:	BnH 47H vvH
n:	MIDI Channel Number
vv:	Value (Note 1)

Note 1:
For information about the relationship between setting values and send/receive values, see "42.5 -64 to 0 to 63 Setting Value Table" in "Part VIII Setting Values and Send/Receive Values".

Send
Sent when Filter Resonance is changed with the synthesizer function.

Receive
Receipt changes Filter Resonance.

10.15 Vibrato Rate (4CH)

Format

Message Format:	BnH 4CH vvH
n:	MIDI Channel Number
vv:	Value (Note 1)

Note 1:
For information about the relationship between setting values and send/receive values, see "42.5 -64 to 0 to 63 Setting Value Table" in "Part VIII Setting Values and Send/Receive Values".

Send
Sent when Vibrato Rate is changed with the synthesizer function.

Receive
Receipt changes Vibrato Rate of Tone Parameter.

10.16 Vibrato Depth (4DH)

Format

Message Format:	BnH 4DH vvH
n:	MIDI Channel Number
vv:	Value (Note 1)

Note 1:
For information about the relationship between setting values and send/receive values, see "42.5 -64 to 0 to 63 Setting Value Table" in "Part VIII Setting Values and Send/Receive Values".

Send
Sent when Vibrato Depth is changed with the synthesizer function.

Receive
Receipt changes Vibrato Depth of Tone Parameter.

10.17 Vibrato Delay (4EH)

Format

Message Format:	BnH 4EH vvH
n:	MIDI Channel Number
vv:	Value (Note 1)

Note 1:
For information about the relationship between setting values and send/receive values, see "42.5 -64 to 0 to 63 Setting Value Table" in "Part VIII Setting Values and Send/Receive Values".

Send
Sent when Vibrato Delay is changed with the synthesizer function.

Receive
Receipt changes Vibrato Delay of Tone Parameter.

10.18 Reverb Send (5BH)

Format

Message Format:	BnH 5BH vvH
n:	MIDI Channel Number
vv:	Value (Note 1)

Note 1:
The setting value matches the value that is sent and received.

Send
Sent when Reverb Send of Mixer Part 1 through 16 is changed.

Receive
Receipt changes Reverb Send of Mixer Part 1 through 16.

10.19 Chorus Send (5DH)

Format

Message Format:	BnH 5DH vvH
n:	MIDI Channel Number
vv:	Value (Note 1)

Note 1:
The setting value matches the value that is sent and received.

Send
Sent when Chorus Send of Mixer Part 1 through 16 is changed.

Receive
Receipt changes Chorus Send of Mixer Part 1 through 16.

10.20 NRPN (62H,63H)

Format

Message Format:	BnH 62H vvH (LSB) BnH 63H vvH (MSB)
n:	MIDI Channel Number
vv:	Value

10.20.1 Filter Cutoff

Format

Message Format:	BnH 62H 20H 63H 01H 06H mmH 26H **H
n:	MIDI Channel Number
mm:	Value (Note 1)
**:	Ignored

Note 1:
For information about the relationship between setting values and send/receive values, see "42.5 -64 to 0 to 63 Setting Value Table" in "Part VIII Setting Values and Send/Receive Values".

Send
This message is never sent.

Receive
Receipt changes Filter Cutoff of Tone Parameter.

10.20.2 Filter Resonance

Format

Message Format:	BnH 62H 21H 63H 01H 06H mmH 26H **H
n:	MIDI Channel Number
mm: **:	Value (Note 1) Ignored

Note 1:
For information about the relationship between setting values and send/receive values, see "42.5 -64 to 0 to 63 Setting Value Table" in "Part VIII Setting Values and Send/Receive Values".

Send
This message is never sent.

Receive
Receipt changes Filter Resonance of Tone Parameter.

10.20.3 Drawbar Position

Format

Message Format:	BnH 62H ffH 63H 40H 06H mmH 26H **H
n:	MIDI Channel Number
ff:	Drawbar Foot(Feet) (Note 1)
mm: **:	Value (Note 2) Ignored

Note 1:
The table below shows the relationship between the Drawbar Foot value and the position of the foot bar.

ff	Foot Bar
0	Ft16'
1	Ft5 1/3'
2	Ft8'
3	Ft4'
4	Ft2 1/3'
5	Ft2'
6	Ft1 3/5'
7	Ft1 1/3'
8	Ft1'

Note 2:
For information about the relationship between setting values and send/receive values, see "42.17 Drawbar Position Setting Value Table" in "Part VIII Setting Values and Send/Receive Values".

Send
Sent when Drawbar Organ Parameter is changed on this Model.

Receive
Receipt changes the drawbar position in accordance with the message contents.

10.20.4 Drawbar Organ Click

Format

Message Format:	BnH 62H 09H 63H 40H 06H mmH 26H **H
n:	MIDI Channel Number
mm: **:	Value (Note 1) Ignored

Note 1:
For information about the relationship between setting values and send/receive values, see the "42.1 Off/On Setting Value Table" in "Part VIII Setting Values and Send/Receive Values."

Send
Sent when Click of Drawbar Organ Parameter is edited.

Receive
Receipt changes Click of Drawbar Organ Parameter.

10.20.5 Drawbar Organ 2nd Percussion

Format

Message Format:	BnH 62H 0AH 63H 40H 06H mmH 26H **H
n:	MIDI Channel Number
mm: **:	Value (Note 1) Ignored

Note 1:
For information about the relationship between setting values and send/receive values, see the "42.1 Off/On Setting Value Table" in "Part VIII Setting Values and Send/Receive Values."

Send
Sent when 2nd Percussion of Drawbar Organ Parameter is changed on this Model.

Receive
Receipt changes 2nd Percussion of Drawbar Organ Parameter.

10.20.6 Drawbar Organ 3rd Percussion

Format

Message Format:	BnH 62H 0BH 63H 40H 06H mmH 26H **H
n:	MIDI Channel Number
mm: **:	Value (Note 1) Ignored

Note 1:
For information about the relationship between setting values and send/receive values, see the "42.1 Off/On Setting Value Table" in "Part VIII Setting Values and Send/Receive Values."

Send
Sent when 3rd Percussion of Drawbar Parameter is changed on this Model.

Receive
Receipt changes 3rd Percussion the Drawbar Organ Parameter.

10.20.7 Percussion Decay Time

Format

Message Format:	BnH 62H 0CH 63H 40H 06H mmH 26H **H
n:	MIDI Channel Number
mm: **:	Value (Note 1) Ignored

Note 1:
The setting value matches the value that is sent and received.

Send
Sent when Percussion Decay Time of Drawbar Parameter is changed on this Model.

Receive
Receipt changes Decay Time of Drawbar Parameter.

10.21 RPN (64H,65H)

Format

Message Format:	BnH 64H vvH (LSB) BnH 65H vvH (MSB)
n:	MIDI Channel Number
vv:	Value

10.21.1 Pitch Bend Sensitivity

Format

Message Format:	BnH 64H 00H 65H 00H 06H mmH 26H **H
n:	MIDI Channel Number
mm: **:	Value 0-24(Note 1) Ignored

Note 1:
The setting value matches the value that is sent and received.

Send
Same value sent over channels 1 through 5 when the Bend Range parameter of Transpose/Function is changed.

Receive
Receipt changes Pitch Bend Sensitivity.

10.21.2 Fine Tune

Format

Message Format:	BnH 64H 01H 65H 00H 06H mmH 26H llH
n:	MIDI Channel Number
mm:	Value MSB (Note 1)
ll:	Value LSB (Note 1)

Note 1:
For information about the relationship between setting values and send/receive values, see "42.7 -99 to 0 to 99 Setting Value Table" in "Part VIII Setting Values and Send/Receive Values".

Send
Sent when Fine Tune of Mixer Part 1 through 16 is by operation of this Model.

Receive
Receipt changes Fine Tune of Mixer Part 1 through 16.

10.21.3 Coarse Tune

Format

Message Format:	BnH 64H 02H 65H 00H 06H mmH 26H 00H
n:	MIDI Channel Number
mm:	Value (Note 1)

Note 1:
For information about the relationship between setting values and send/receive values, see "42.4 -24 to 0 to 24 Setting Value Table" in "Part VIII Setting Values and Send/Receive Values".

Send
Sent when Coarse Tune of Mixer Part 1 through 16 is changed by operation of this Model.

Receive
Receipt changes Coarse Tune of Mixer Part 1 through 16.

10.21.4 Modulation Depth

Format

Message Format:	BnH 64H 05H 65H 00H 06H mmH 26H 00H
n:	MIDI Channel Number
mm:	Value (Note 1)

Note 1:
The setting value matches the value that is sent and received.

Send
This message is never sent.

Receive
Receipt changes Vibrato depth.

10.21.5 Null

Format

Message Format:	BnH 64H 7FH 65H 7F
n:	MIDIChannelNumber

Send
This message is never sent.

Receive
Receipt deselects RPN.

10.22 All Sound Off (78H)

Format

Message Format:	BnH 78H 00H
n:	MIDIChannelNumber

Send
This message is never sent.

Receive
Receipt stops all voices that are sounding.

10.23 Reset All Controllers (79H)

Format

Message Format:	BnH 79H 00H
n:	MIDIChannelNumber

Send
Sent when the song function is used.

Receive
Receipt initializes controller values as shown below.

Message	Number	Controller	Value
Control Change	01H	Modulation	00H
	02H	Breath Controller	00H
	04H	Foot Controller	00H
	0BH	Expression	7FH
	40H	Hold1	00H
	42H	Sostenuto	00H
	43H	Soft	00H
	65H/64H	RPN MSB/LSB	7FH/7FH
	63H/62H	NRPN MSB/LSB	7FH/7FH
Channel Pressure			00H
Pitch Bend Change			40H/00H

11 Mode Message

11.1 All Notes Off (7BH)

Format

Message Format:	BnH 7BH 00H
n:	MIDIChannelNumber

11.2 Omni Off (7CH)

Format

Message Format:	BnH 7CH 00H
n:	MIDIChannelNumber

11.3 Omni On (7DH)

Format

Message Format:	BnH 7DH 00H
n:	MIDIChannelNumber

11.4 Mono (7EH)

Format

Message Format:	BnH 7EH 00H
n:	MIDIChannelNumber

11.5 Poly (7FH)

Format

Message Format:	BnH 7FH 00H
n:	MIDIChannelNumber

Send
These messages are never sent.

Receive
Receipt of any of these messages releases (same as releasing the keyboard key) the currently sounding voice.

12 Program Change

Format

Message Format:	CnH ppH
n:	MIDIChannelNumber
pp:	Program Number

Send

Sent when a tone is selected. See the "Tone List" of this Model's User's Guide for details about program numbers.

Receive

Receipt changes the tone of the part corresponding to the MIDI Channel.
The selected tone is determined by the program value of this message and the Bank Select message value received prior to this message. See the "Tone List" in this Model's User's Guide for information about actually selecting tones, etc.
Also note that receipt of this message may also change the Part Mode parameter at the same time. For more information, see "12.1 About the Part Mode" below.

12.1 About the Part Mode

Each of this Model's parts has a parameter called "Part Mode," which can be set to Normal Mode, Drum Mode, or Drawbar Organ Mode. Melody tones are set to Melody Mode, rhythm tones that use the drum map are set to the Drum Mode, and drawbar organ tones are set the to Drawbar Organ Mode.

13 Channel Aftertouch

Format

Message Format:	DnH vvH
n:	MIDIChannelNumber
vv:	Value

Send

These messages are never sent.

Receive

Receipt of this message adds vibrato to the voice that is sounding. Details of the effect differ according to the tone setting.

14 Pitch Bend

Format

Message Format:	EnH llH mmH
n:	MIDIChannelNumber
ll:	Value LSB
mm:	Value MSB

Send

Sent when the bender wheel is operated (WK-3200/WK-3700 only).
Also sent when play data or auto-accompaniment data that includes bender wheel data is played back.

Receive

Receipt changes the pitch of the currently sounding note. The width of the change depends on the setting of the Transpose/Function's Bend Range parameter and the Pitch Bend Sensitivity, whose setting is configured by RPN.

Part III
System Message

15 Active Sensing

Format

Message Format:	FEH

Send
This message is never sent.

Receive
When this message is received once, the Active Sensing mode is entered. If no MIDI Message is received for a particular amount of time, voices being sounded by this Model's sound source are released, controller is reset, and Active Sensing mode is exited.

16 System Exclusive Message

Format

Message Format:	F0H....F7H

This Model can send and receive Universal System Exclusive Messages, as well as System Exclusive Messages that have a format that is unique to this Model.

16.1 Universal Realtime System Exclusive Message

Format

Message Format:	F0H 7FH....F7H

16.1.1 Master Volume

Format

Message Format:	F0H 7FH 7FH 04H 01H llH mmH F7H
ll:	Value LSB (Note 1)
mm:	Value MSB (Note 1)

Note 1:
The setting value matches the value that is sent and received.

Send
This message is never sent.

Receive
Receipt changes the Master Volume parameter. Note that the Master Volume parameter cannot be changed with an operation of this Model.

16.1.2 Master Balance

Format

Message Format:	F0H 7FH 7FH 04H 02H llH mmH F7H
ll:	Value LSB (Note 1)
mm:	Value MSB (Note 1)

Note 1:
For information about the relationship between setting values and send/receive values, see "42.6 Pan Setting Value Table" in "Part VIII Setting Values and Send/Receive Values".

Send
This message is never sent.

Receive
Receipt changes the Master Pan parameter. Note that the Master Pan parameter cannot be changed with an operation of this Model.

16.1.3 Master Fine Tuning

Format

Message Format:	F0H 7FH 7FH 04H 03H 00H mmH F7H
mm:	Value MSB(Note 1)

Note 1:
For information about the relationship between setting values and send/receive values, see "42.7 -99 to 0 to 99 Setting Value Table" in "Part VIII Setting Values and Send/Receive Values".

Send
Sent when the Fine Tune parameter of Transpose/Function is changed.

Receive
Receipt changes the Fine Tune parameter.

16.1.4 Master Coarse Tuning

Format

Message Format:	F0H 7FH 7FH 04H 04H llH mmH F7H
ll:	Value LSB (Note 1)
mm:	Value MSB (Note 1)

Note 1:
For information about the relationship between setting values and send/receive values, see "42.4 -24 to 0 to 24 Setting Value Table" in "Part VIII Setting Values and Send/Receive Values".

Send
Sent when the Transpose parameter of Transpose/Function is changed.

Receive
Receipt changes the Transpose parameter.

16.1.5 Reverb Parameter

Format

Message Format:	F0H 7FH 7FH 04H 05H 01H 01H 01H 01H 01H ppH vvH F7H
pp:	Parameter
vv:	Value

Type Format

Message Format:	F0H 7FH 7FH 04H 05H 01H 01H 01H 01H 01H 00H vvH F7H
vv:	Value (Note 1)

Note 1:
For information about the relationship between setting values and send/receive values, see "42.10 Reverb Type Setting Value Table" in "Part VIII Setting Values and Send/Receive Values."

Send
Sent when the Reverb Type parameter of System Reverb is changed.

Receive
Receipt changes the Reverb Type parameter.

Time Format

Message Format:	F0H 7FH 7FH 04H 05H 01H 01H 01H 01H 01H 01H vvH F7H
vv:	Value (Note 1)

Note 1:
The setting value matches the value that is sent and received.

Send
Sent when the Reverb Time parameter of System Reverb is changed.

Receive
Receipt changes the Reverb Time parameter.

16.1.6 Chorus Parameter

Format

Message Format:	F0H 7FH 7FH 04H 05H 01H 01H 01H 01H 02H ppH vvH F7H
pp:	Parameter
vv:	Value

Type Format

Message Format:	F0H 7FH 7FH 04H 05H 01H 01H 01H 01H 02H 00H vvH F7H
vv:	Value (Note 1)

Note 1:
For information about the relationship between setting values and send/receive values, see "42.11 Chorus Type Setting Value Table" in "Part VIII Setting Values and Send/Receive Values."

Send
Sent when the Chorus Type parameter of System Chorus is changed.

Receive
Receipt changes the System Chorus Type parameter.

Rate Format

Message Format:	F0H 7FH 7FH 04H 05H 01H 01H 01H 01H 02H 01H vvH F7H
vv:	Value (Note 1)

Note 1:
The setting value matches the value that is sent and received.

Send
Sent when the Chorus Rate parameter of System Chorus is changed.

Receive
Receipt changes the Chorus Rate parameter of System Chorus.

Depth Format

Message Format:	F0H 7FH 7FH 04H 05H 01H 01H 01H 01H 02H 02H vvH F7H
vv:	Value (Note 1)

Note 1:
The setting value matches the value that is sent and received.

Send
Sent when the Chorus Depth parameter of System Chorus is changed.

Receive
Receipt changes the Chorus Depth parameter of System Chorus.

Feedback Format

Message Format:	F0H 7FH 7FH 04H 05H 01H 01H 01H 01H 02H 03H vvH F7H
vv:	Value (Note 1)

Note 1:
The setting value is the same as the value that is sent.

Send
This message is never sent.

Receive
Receipt changes the Chorus Feedback parameter. The Chorus Feedback parameter cannot be changed with an operation of this Model.

Send To Reverb Format

Message Format:	F0H 7FH 7FH 04H 05H 01H 01H 01H 01H 02H 04H vvH F7H
vv:	Value (Note 1)

Note 1:
The setting value is the same as the value that is sent.

Send
This message is never sent.

Receive
Receipt changes the Chorus Send To Reverb parameter. The Chorus Send to Reverb parameter cannot be changed with an operation of this Model.

16.1.7 GM System Message

GM System On Format

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

Send
This message is never sent.

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

GM System Off Format

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

Send
This message is never sent.

Receive
Receipt returns the sound source to its normal mode.

GM2 System On Format

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

Send
This message is never sent.

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

16.1.8 GS Message

Message Format:	F0H 41H 10H 42H 12H 40H 00H 7FH 00H 41H F7H

Send
This message is never sent.

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

16.2 CTK-900/WK-3200/WK-3700 System Exclusive Message

Format

Message Format:	F0H 44H 11H 02H....F7H

These messages can control most of the this Model's parameters, as well as user data send/receive with Flash memory and come commands.

For more information, see "Part IV This Model's System Exclusive Messages".

Part IV
This Model's System Exclusive Messages

17 Format

17.1 Message Classifications

This Model's SysEx operations are classified as Parameter type for send and receive of an individual Parameter, and Parameter Set type for Bulk send and receive of a set of parameters. These SysEx types can be further broken down into parameter categories according to the item being transferred.

<table>
<tr><td colspan="4">CTK-900/WK-3200/WK-3700 System Exclusive Messages</td></tr>
<tr><td rowspan="7">Individual Parameter Transfer</td><td>Command</td><td colspan="2">Status and Commands</td></tr>
<tr><td rowspan="2">Patch</td><td>Common</td><td>MIDI
Tune/Mix
Sys Chorus
Sys Reverb
Master EQ
DSP</td></tr>
<tr><td>Part</td><td>Basic
Tune/Mix
Tone
Drawbar
Vibrato</td></tr>
<tr><td colspan="3">Wave Data Information</td></tr>
<tr><td colspan="3">Song Data Information</td></tr>
<tr><td colspan="3">Rhythm Data Information</td></tr>
<tr><td colspan="3">SMF Data Information</td></tr>
<tr><td rowspan="14">Parameter Set Bulk Transfer</td><td colspan="3">User Tone</td></tr>
<tr><td colspan="3">User Timbre</td></tr>
<tr><td colspan="3">User Drum</td></tr>
<tr><td colspan="3">User Instrument</td></tr>
<tr><td colspan="3">User Wave Parameter</td></tr>
<tr><td colspan="3">User Wave Data</td></tr>
<tr><td colspan="3">User DSP</td></tr>
<tr><td colspan="3">Song</td></tr>
<tr><td colspan="3">User Rhythm Pattern</td></tr>
<tr><td colspan="3">Registration</td></tr>
<tr><td colspan="3">User Drawbar</td></tr>
<tr><td colspan="3">SMF</td></tr>
</table>

The operation classification of a message is determined in accordance with the value of the "Action" field of this Model's SysEx message. The basic format for all operation type messages is described in "17.2 Message Structure", below.

17.2 Message Structures

This Model's System Exclusive Messages is formed of the 13 fields shown below. Whether or not a particular field is included in a message and the length of each field depends on the message.
The minimum unit for the length of each field is bytes. If two values are contained within the same byte, they are separated by a slash (/).

1	2	3	4	5	6	7	8	9	10	11	12	13
SYSEX	MAN	MOD	*dev*	*act*	*cat*	*prm*	*ilen/dlen*	*ps*	*index*	*data*	*sum*	EOX

The "*act*" field describes the action that the message performs. The meanings of the "*index*" and "*data*" fields differ according to the content of the act field. The following describes each of the fields in detail.

17.2.1 1...SYSEX : System Exclusive message Status

Format:	11110000B

System Exclusive message Status = F0H

17.2.2 2...MAN : Manufacturer's ID

Format:	01000100B

CASIO Manufacturer's ID = 44H

17.2.3 3...MOD : Model ID

Format:	00010001B (MSB)	00000010B (LSB)

The Model ID of this Model is shown by two consecutive bytes (MSB, LSB).
(CTK-900/WK-3200/WK-3700 Model ID MSB = 11H, LSB = 02H)

17.2.4 4...*dev* : MIDI Device ID 00H through 1FH,7FH

Format:	0ddddddd B

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. The default value for this field is 10H. When a message containing 7FH is received, receipt of the message is always allowed, regardless of MIDI Device ID setting.
MIDI Device ID is a Patch Parameter, and it can be changed with a System Exclusive Message. When changing this setting, make the System Exclusive Message device ID 7FH.

17.2.5 5...*act* : Action

Format:	00000aaa B

aaaB = Action (3bit)
This field indicates the operation of the System Exclusive Message.

aaaB	Message Type
00H	IPC Individual Parameter Change
01H	IPR Individual Parameter Request
02H	BDR Oneway Parameter Set Bulk Send
03H	BDR Oneway Parameter Set Bulk Request
04H	HDS Handshake Parameter Set Bulk Send
05H	HDR Handshake Parameter Set Bulk Request
06H	Reserved
07H	Communication Control for Handshake(EOD,HDA,HDJ,HDE,BSY,EOS,NOP)

17.2.6 6...*cat* : Category

Format:	0000ccccB

0ccccccB = Category (7bit)
The category indicates the type 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		Action(*act*))						
ID(c)	Parameter Set	IPC	IPR	BDS	BDR	HDS	HDR	Control
00H	Command	A	R	-	-	-	-	-
01H	Patch	A	R	-	-	-	-	-
02H	Tone	A	R	-	-	A	R	A
03H	Timbre	-	-	-	-	A	R	A
04H	Drum	-	-	-	-	A	R	A
05H	Voice	-	-	-	-	A	R	A
06H	Instrument	-	-	-	-	A	R	A
07H	Wave Parameter	-	-	-	-	A	R	A
08H	Wave Data	T	-	-	-	A	R	A
09H	DSP	A	R	-	-	A	R	A
0AH	Song Data	A	-	-	-	A	R	A
0BH	Rhythm Pattern	T	-	-	-	A	R	A
0CH	Registration	-	-	-	-	A	R	A
0DH	Drawbar	- (Note 1)		-	-	A	A	A
0EH	Reserved	-	-	-	-	-	-	-
0FH	Reserved	-	-	-	-	-	-	-
10H	SMF	T	-	-	-	A	R	A
11H	Flash Memory Image	-	-	-	-	A	R	A
12H	Reserved	-	-	-	-	-	-	-

A...Available (Includes cases here parameters are only partially available.)
R...Receive Only
T...Transmit Only
-...Not Available
Note 1...The drawbar parameter involved with the current sound production operation is provided inside Patch Parameter. To manipulate this parameter individually, manipulate Drawbar Parameter within Patch Parameter.

17.2.7 7...*prm* : Parameter ID

Format:	0ppppppB

The Parameter ID field indicates the parameter type. When transferring parameters (see "Part V Parameter List" below) individually (as opposed to bulk transfer), this field is used to identify the parameter being transferred by its parameter ID. Any other time, this field is filled with the value 00H.

17.2.8 8...*ilen/dlen* : index length / data length

Format:	0iiddddB

This field indicates the size of the "11...*index*" field and the "12...*data*" field.

iiB (Binary) = index length

"index length (iiB)" indicates the *index* field length, which is always the following, regardless of the "*act*" (Action) value.

iiB.....*index* byte size - 1

"*act*" Value	Message Type	iiB
00, 01	IPC, IPR	index byte size - 1 (Example: When 4 bytes = 3
02, 04	BDS, HDS	2 = 10B (Packet Number = 3 bytes)
03, 05	BDR, HDR	0 = 00B (This field is empty, but its length is indicated as 0.)
07	Control	0 = 00B (The length of this filed is 1 byte.)

dddddB (Binary) = data length

"data length (dddddB)" indicates the size of each data unit (parameter) in the "data" field.
The data length differs according to Message Type, as shown below.

"*act*" Value	Message Type	dddddB
00	IPC	data bit size - 1 (If 1 bit = 00000B; if 32 bits = 11111B)
02, 04	BDS, HDS	data bit size - 1 = 01111B (Since transfer is in 16-bit data, this data length is always used.)
01, 03, 05, 07	IPR, BDR, HDR or Control	0

17.2.9 9....*ps* : Parameter Set Number

Format:	0nnnnnnnB (LSB)	0mmmmmmmB (MSB)

This field is a 2-byte (LSB, MSB) value indicating the number of the parameter set (00mmmmmmmnnnnnnnB (Binary)) being transferred.

17.2.10 10...*index* Parameter Index Number

When *act* = 00(IPC) or 01(IPR)

Format:	0iiiiiiiB	(0jjjjjjjB)	(0kkkkkkkB)	(0lllllllB)

This field contains a supplementary number that points to data when parameters are arrayed. This means that each parameter has a different number, and the length of the number is anywhere from one to four bytes.

Even when parameters have the same IDs, for example, the parameters also have preset numbers, part numbers, and key numbers, and so the parameters can be distinguished by specifying these values with an "*index*".

When *act* = 02(BDS) or 04(HDS)

Format:	0nnnnnnnB	0NNNNNNNB	0LLLLLLLB

In this case, "*index*" is a 3-byte fixed field. When transferring one parameter set, it indicates the divided packet serial number (starting with 00) and the size of the "*data*" field that immediately follows this field.

```
i[0]...0nnnnnnnB Packet Number LSB (NNNNNNNnnnnnnnnB = Packet Number)
i[1]...0NNNNNNNB Packet Number MSB
```

As detailed in the "data" field explanation, up to 128 bytes of data can be send in one packet. When sending data in excess of 128 bytes, it is divided into 128-byte packets (final packet can be less than 128 bytes), and received data is stored at the address equivalent to:

ParameterSet Start Address + PacketNumber × 128

```
i[2]...0LLLLLLLB data length / 3
```

The data length is the data length indicated here, multiplied by 3. This means that the data length is always a multiple of 3.

When *act* = 03(BDR) or 05(HDR)

Format:	-

This field is always empty.

When *act* = 7 (EOD, HDA, HDJ, HDE, BSY, EOS, NOP)

Format:	0000ccccB

In this case, the "*index*" field length is fixed at 1 byte, and it indicates the control messages used for handshaking as shown below. See "19 Parameter Set Transfer Protocols" for more information.

ccccB	Control Message
0000B	EOD Oneway/Handshake Bulk Dump End of Data (Parameter set transfer complete)
0001B	HDA Handshake Bulk Dump Acknowledge (Handshake receive successful)
0010B	HDJ Handshake Bulk Dump Reject (Handshake rejected/stopped)
0011B	HDE Handshake Bulk Dump Error (Handshake Error)
0100B	BSY Handshake Bulk Dump Busy (Handshake Busy)
0101B	EOS Oneway/Handshake Bulk Dump End of Package (Parameter set package complete)
:	
1111B	NOP No Operation (No operation)

17.2.11 11...*data* Parameter Data

When *act* = 1(IPR), 03(BDR), 05(HDR) or 7 (EOD, HDA, HDJ, HDE, BSY, EOS, NOP)

Format:	-

This field is always empty.

When *act* = 00(IPC)

Format:	0ddddddB	(0eeeeeeeB)	(0ffffffB)	(0gggggggB)	(0hhhhhhhB)

Indicates the value of the parameter itself. The length varies in accordance with the data size indicated by the "*dlen*" field, as shown below. This field is not included for a parameter request.

dddddB + 1	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 least significant bit is the LSB of the first "*data*" block, and the most significant bit is the MSB of the final "*data*" block.

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]

When *act* = 02(BDS) or 04(HDS)

Format:	0ddddddd B	0cccccccB	000000abB

For a bulk data transfer operation, the Parameter Set data to be transferred is read sequentially in 16-bit data starting from the top address. Read values are divided into 3-byte segments as shown below, and then sent in sequence.

The following is the conversion format, which is the same as the individual parameter 16-bit transfer detailed above.

16-bit Memory Image

```
  MSB:    abccccccB
  LSB:    cddddddd B
          ↓
 data0:   0ddddddd B
 data1:   0cccccccB
 data2:   000000abB
```

Note, however, that a parameter set of 128 bytes or less can be sent using a single packet, and anything greater than 128 bytes is divided among multiple packets.

This means that the maximum length "*data*" field is 128/2 × 3 = 192 bytes.

Only one parameter set can be transferred per session, and data from different parameter sets cannot be mixed within a single packet, even when sending multiple parameter sets. Different parameter sets are always divided into separate packets.

17.2.12 12...*sum* Check Sum

When *act* = 00(IPC), 01(IPR), 03(BDR), 05(HDR) or 7(EOD, HDA, HDJ, HDE, BSY, EOS, NOP)

Format:	-

This field is always empty.

When *act* = 02(BDS) or 04(HDS)

Format:	0ssssssB

In this case, the "sum" field contains a value, which, when added to the total value of the "*data*" field, makes the lower seven bits 0. The receiving side checks if this is true, and performs error handling (re-request, etc.) if it is not.

17.2.13 14...EOX : End of System Exclusive Message

Format:	11110111B

(End of System Exclusive message Status = F7H)

18 Parameter Operations

There are two parameter operations: Individual Parameter Transfer and Individual Parameter Request.

A single session is concluded when this Model sends an IPC (Individual Parameter Change) in response to an IPR (Individual Parameter Request) from an external device, or when an IPC is sent by an external device or this Model on its own (not in response to an IPR). Receipt of an IPC by this Model causes the corresponding parameter to be changed.

An Individual Parameter Change can also be used to issue some command to this Model, and the Individual Parameter Request can be used to check this Model's status information.

Data Receiver		Data Sender	Operation
IPR	→		Send Request (Optional)
	←	IPC	Data Transfer

See "Part V Parameter List" for information about what kinds of parameters are actually sent.

19 Parameter Set Transfer Protocols

19.1 Communication Protocols

19.1.1 One-way and Handshake

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.

Important!
Though the one-way mode format is defined, there is no Parameter Set category that corresponds to this Model. This is because the time required to write to flash memory is indefinite, which makes it necessary to maintain a very long interval between packets and makes communication impossible for all practical purposes.

See “VI Parameter Set List” for information about how Parameter Sets are actually allocated. 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 Change. Data is transferred as-is, using the Model’s memory image.

19.1.2 Session and Subsession

Subsession

One Parameter Set can be transferred per subsession. Subsession transfers one Parameter Set or data that is broken down into multiple packets for transfer, with EOD (End of data) sent at the end to terminate the send.
Data is broken down into multiple packets when a single Parameter Set is larger than a certain size. The Packet Number in the packet's index field is used to indicate the sequential position of a packet relative to the other packets. Even if Parameter Sets are small, they cannot be grouped together and sent as a single packet. A Parameter Set delimiter is always treated as a packet delimiter for transfer.

Session

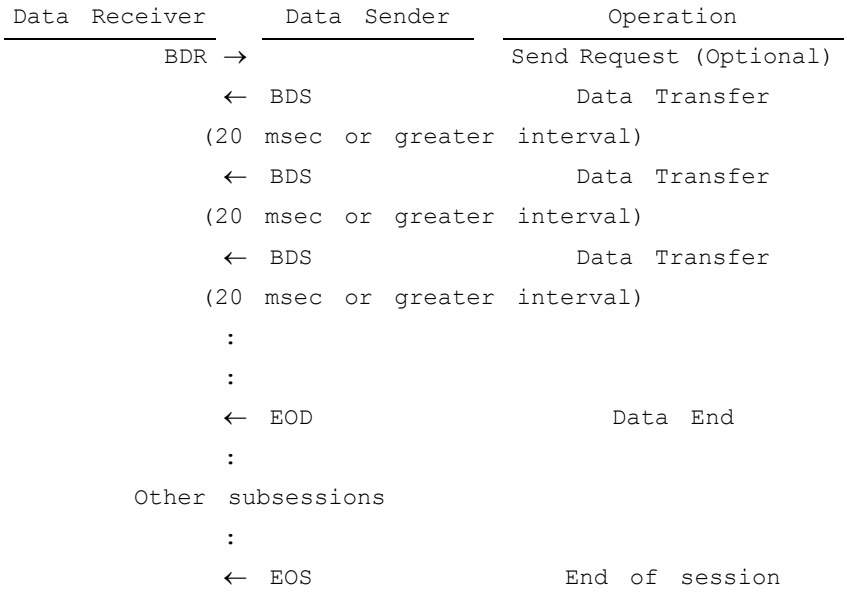
One Parameter Set or multiple Parameter Sets can be transferred by one session. A session can consist of one subsession or multiple subsessions, with EOS (End of session) sent at the end to terminate the send. Regardless of whether there is a single Parameter Set or multiple Parameter sets, an actual bulk dump always takes the form of a session, never a subsession only.

19.2 One-way Protocol Communication Flow

A session starts with the receiving device sending a request using a BDR, or with the sending device sending BDS data. The session ends after transfer of all the data in the parameter set being transferred by the sending device is complete.

Data is divided into multiple packets of 256 bytes or less each, and transfers them at fixed intervals (20 msec).

A final EOD informs the receiving device when the session is ended.



19.3 Handshake Protocol Communication Flow

A session starts with the receiving device sending a request using an HDR or with the sending device sending HDS data.
The sending device does not send the next packet until it receives an ACK from the receiving device. The maximum wait time of at least 2000 msec is reserved. Failure of a response to arrive within the wait time (at least 2000 msec) is treated as a timeout error, and data communication is terminated.
The sending device resends the last data if the receiving device returns an HDE (error) due to checksum mismatch, incompatible data structure, or some other reason. If an error repeats a number of times (undefined), either the sending device or the receiving device sends an HDJ to terminate the session.
A session ends after the sending device sends all the parameter sets, and sends a final EOD in response to an HAD (ACK) from the sending device.

Data Receiver		Data Sender	Operation
HDR	→		Send Request (Optional)
	←	HDS	Data Send
HDA	→		Acknowledge
	←	HDS	Data Send
HDA	→		Acknowledge
	:		
	:		
HDA	→		Acknowledge
	←	EOD	Data End
	:		
Other subsessions			
	:		
	←	EOS	End of session

The same packet is resent when a checksum mismatch or incompatible data structure error is detected.

Data Receiver		Data Sender	Operation
HDR	→		Send Request (Optional)
	←	HDS	Data Send
HDA	→		Acknowledge
	←	HDS	Data Send
HDE	→		Error
	←	HDS	Data Resend
	:		
	:		
HDE	→		Error
	←	EOD	Data End
	:		
Other subsessions			
	:		
	←	EOS	End of session

Data send is canceled when no acknowledgement (ACK) is received.

Data Receiver		Data Sender	Operation
HDR	→		Send Request (Optional)
	←	HDS	Data Send
HDA	→		Acknowledge
	←	HDS	Data Send
HDJ	→		Rejection
		(Send Canceled)	

The session can be canceled for any reason by sending an HDJ. The HDJ can be sent by the sending device or the receiving device. The bulk dump session is terminated immediately upon receipt of an HDJ.

Data Receiver		Data Sender	Operation
HDR	→		Send Request (Optional)
	←	HDS	Data Send
HDA	→		Acknowledge
	←	HDS	Data Send
	:		
	:		
HDJ	→		Data Receive Rejected
		(Send Canceled)	

Data Receiver		Data Sender	Operation
HDR	→		Send Request (Optional)
HDA	→		Acknowledge
	←	HDS	Data Send
HDA	→		Acknowledge
	←	HDS	Data Send
	:		
	:		
	←	HDJ	Data Send Rejected
		(Send Canceled)	

In the case of the WK-3700, for example, when a communication request is received from an external source while floppy disk control is being performed, BSY is returned to an external device that sends BDS, BDR, HDS, HDR.
When the BSY is received, the receiver must wait until this Model enters a session-enabled mode, or use a Prepare for Data Management parameter (see "20.2 Data Management Command List") to change to a communication-enabled mode.

Data Receiver		Data Sender	Operation
BDR	→		Send Request
	←	BSY	Busy
		(Send Canceled)	

Data Receiver		Data Sender	Operation
BDS	→		Data Send
	←	BSY	Busy
		(Send Canceled)	

Data Receiver		Data Sender	Operation
HDR	→		Send Request
	←	BSY	Busy
		(Send Canceled)	

Data Receiver		Data Sender	Operation
HDS	→		Data Send
	←	BSY	Busy
		(Send Canceled)	

The same packet is resent when a checksum mismatch or incompatible data structure error is detected.

Part V
Parameter Lists

These lists show the parameters that can be transferred individually using System Exclusive Messages.

- Note 1: Any parameter that has "r" to the right of its Parameter ID number is a read-only parameter that can be used for obtaining status information only. A parameter with "w" next to its Parameter ID is a write-only parameter, which is used for commands, etc.
- Note 2: All values in the System Exclusive Format table are hexadecimal. Except for the "Setting Value" column, all values in the Parameter Lists are hexadecimal, unless specifically noted otherwise.
- Note 3: Receipt of a value outside a specified range causes the value marked "Default" to be used instead.

20 Command Parameters

The parameters defined here mainly execute commands and indicate statuses. Values indicate the pointer to a command or a status.

20.1 System Parameter List

System Exclusive Format

Field		Value
01	SYSEX	F0
02	MAN	44
03	MOD	11,02
04	*dev*	Either 00 to 1F, or 7F
05	*act*	00(IPC), 01(IPR)
06	*cat*	Command = 0
07	*prm*	00-7F
08	*ilen/dlen*	0 / bit size - 1
09	*ps*	LSB,MSB = 00, 00
10	*index*	00
11	*data*	See the Parameter List
12	*sum*	None
13	EOX	F7

System Parameter List

ParamID	Parameter	ps	index	bit	Value	Default	Setting Value (Decimal)
00r	Model Version ID (Note 1)	0000	00	0E	05	0	nn00 = reserved nn01 = CTK-691 nn02 = WK-3000 nn03 = WK-3500 nn04 = reserved nn05 = CTK-900 nn06 = WK-3200 nn07 = WK-3700 n=version (00 to 3F)
03	DSP Bypass (Note 2)	0000	00	10	0-FFFF	0	Bit0...Part1 Bit1....Part2 : Bit15...Part16 0...Nop 1...DSP cancel

Note 1:
This is the version number of models with the same System Exclusive Model ID = 11-02. This value is used to specify the model for a parameter send request from an external source.

Note 2:
This is a request to look up and cancel the tone status of parts whose bits are set. It does this by canceling the DSP Line selection of the parts whose corresponding bit is 1.

20.2 Data Management Command Parameter List

System Exclusive Format

Field		Value
01	SYSEX	F0
02	MAN	44
03	MOD	11,02
04	*dev*	Either 00 to 1F, or 7F
05	*act*	00(IPC), 01(IPR)
06	*cat*	Command = 0
07	*prm*	00-7F
08	*ilen/dlen*	0 / bit size - 1
09	*ps*	0
10	*index*	0
11	*data*	(See the Parameter List)
12	*sum*	None
13	EOX	F7

Data Management Command List

ParamID	Parameter	ps	index	bit	Value	Default	Setting Value (Decimal)
20w	Prepare for Data Management (Note 1)	0	00	07	0-127	0	0...Prepare
21r	Free Size of Song (Note 2)	0	00	20	0-FFFFFFFF	0	Free size (bytes)
22r	Free Size of SMF/ Wave/Rhythm (Note 3)	0	00	20	0-FFFFFFFF	0	Free size (bytes)
23w	Delete Song	0	0	10	0-FFFF	0	Song Number
24w	Delete Rhythm	0	0	10	0-FFFF	0	Rhythm Number
25w	DeleteTone/Wave	0	0	10	0-FFFF	0	Tone Number
26w	DeleteDrum/Wave	0	0	10	0-FFFF	0	Drum Number
27w	Delete SMF	0	0	14	0-FFFF	0	SMF Number
28w	Store	0	0	32	0-FFFFFFFF	-	Part/Category/Number (Note 4)
29w	Initialize	0	00	07	00-7F	-	0...Mixer(Note 5) 1...Parameters(Note 6) 2...System(Note 7)
2Aw	Console Command	0	0	10	0-FFFF	-	0000...Update DSP LED

Note 1:
Receipt of this parameter causes this Model to terminate all music and note play, and enter a mode that is optimized for bulk dump.

Note 2:
This parameter stores a value, in bytes, that indicates the remaining free Song area memory.

Note 3:
This parameter stores a value, in bytes, that indicates the remaining free SMF/Wave/Rhythm area memory.

Note 4:
The 32-bit value of this message indicates the part number (Tone and Drawbar parameter set categories only), parameter set category, and the parameter set being written to, as shown in the table below.

Bit Field	Content
24-31	Part (Tone, Drawbar)
16-23	Parameter Set Category
0-15	Destination Parameter Set Number

See "39 About Parameter Set (PS) Numbers" for details about user parameter set numbers.

Note 5:
The initialization target is all parameters that can be modified by the Mixer edit mode.

Note 6:
The initialization target is the temporary area being influenced by operation of the current device, but does not include previously stored user parameter sets or song data. This means that all Mixer parameters are included. The LCD contrast setting is not affected.

Note 7:
The initialization target is the entire Flash memory, which is returned to its initial factory default state.

20.3 Command Parameter List

System Exclusive Format

Field		Value
01	SYSEX	F0
02	MAN	44
03	MOD	11,02
04	*dev*	Either 00 to 1F, or 7F
05	*act*	00(IPC), 01(IPR)
06	*cat*	Command = 0
07	*prm*	00-7F
08	*ilen/dlen*	0 / bit size - 1
09	*ps*	LSB,MSB = 00,00
10	*index*	Part
11	*data*	See the Parameter List
12	*sum*	None
13	EOX	F7

Setup Parameter List

ParamID	Parameter	ps	index	bit	Value	Default	Setting Value (Decimal)
30	Touch Response	0000	00	02	0-3	1	0...Off 1...Type1 2...Type2 3...Type3
31	Transpose	0000	00	07	28 to 40 to 58	40	-24 to 0 to +24
32	Jack Mode	0000	00	02	0-3	0	0...Sustain 1...Sostenuto 2...Soft 3...Rhythm
33	LCD Contrast	0000	00	04	0-12	6	0 to 6 to 12
34	Mixer Hold	0000	00	01	0-1	0	0...Off 1...On
35	AuotHarmonize	0000	00	04	0-9	0	0-9 Type

MIDI Parameter List

ParamID	Parameter	ps	index	bit	Value	Default	Setting Value (Decimal)
36	Keyboard MIDI Channel	0000	00	04	00-0F	0	1-16Channel
37	MIDI Chord judge	0000	00	01	0-1	0	0...Off 1...On
38	Accomp MIDI Out	0000	00	01	0-1	0	0...Off 1...On
39	Local Control	0000	00	01	0-1	0	0...Off 1...On

21 Patch Parameter

The patch parameter is a temporary area that controls the sound source operation mode. Mixer settings, synthesizer function, DSP function and other editable parameters are also included in these areas.
The content of this area is rewritten whenever preset data or user data is selected and manipulated. The parameters in this area are written into the user area whenever data is written into any user data area.

21.1 Patch Common Parameter List

This list shows setting parameters that are common for each part.

System Exclusive Format

Field		Value
01	SYSEX	F0
02	MAN	44
03	MOD	11,02
04	*dev*	Either 00 to 1F, or 7F
05	*act*	00(IPC), 01(IPR)
06	*cat*	Patch = 01
07	*prm*	00-7F
08	*ilen/dlen*	0 / bit size - 1
09	*ps*	LSB,MSB = 00, 00
10	*index*	Indicates Bar Number in the case of Drawbar Bar Position. 0 in any other case.
11	*data*	See the Parameter List
12	*sum*	None
13	EOX	F7

MIDI Parameter List

ParamID	Parameter	bit	Value	Default	SettingValue(Decimal)
00	MIDI Device ID (Note 1)	07	00-1F	10	0-31
01	MIDI Global Channel	04	00-0F	00	1-16

Note 1:
This parameter sets the SysEx Device ID.

Tune / Mix Parameter

ParamID	Parameter	bit	Value	Default	SettingValue(Decimal)
04	Master Fine Tune (Note 1)	08	00-FF	80	-100 to 0 to 99cent
05	Master Coarse Tune (Note 2)	07	28-58	40	-24 to 0 to 24semi
08	Master Volume	07	00-7F	7F	0-127
09	Master Pan (Note 3)	07	00-7F	40	-64 to 0 to +63
0A	Chorus Send To Reverb (Note 4)	07	00-7F	00	0-127
0B	DSP Line Bypass (Note 5)	01	0-1	0	0...Effect 1...DSP Bypass

Note 1:
See "42.7 -99 to 0 to 99 Setting Value Table".

Note 2:
See "42.4 -24 to 0 to 24 Setting Value Table".

Note 3:
See "42.6 Pan Setting Value Table".

Note 4:
This specifies the volume of data sent from System Chorus to System Reverb.

Note 5:
When "DSP Bypass" is specified for "DSP Line Bypass," the DSP Line Select settings of all parts are cancelled, and all DSP lines are treated as if they are turned off. This means that notes that are currently sounding are not affected.

Drawbar Parameter

ParamID	Parameter	index	bit	Value	Default	Setting Value (Decimal)
0C	Bar Position	Bar Num (Note 1)	02	0-3	0	0-3
0D	Percussion	0	02	00-03 (Note 2)	00	off,2nd,3rd,2nd+3rd
0E	Percussion Decay Time	0	07	00-7F	28	0-12.7sec
0F	Click	0	01	0-1	00	0...Off 1...On

Note 1:
See "10.20.3 Drawbar Position" for information about index numbers.

Note 2:
See "42.18 Drawbar Percussion Setting Table" for information about percussion setting values.

System Chorus

ParamID	Parameter	bit	Value	Default	SettingValue(Decimal)
10	Chorus Macro Num (Note 1)	05	00-0F	02	0-15
11	Chorus Level	07	00-7F	40	0-127
12	Chorus Rate	07	00-7F	03	0-127
13	Chorus Depth	07	00-7F	13	0-127
14	Chorus Feedback (Note 2)	07	00-7F	00	0-127
15	Chorus Tone (Note 3)	07	00-7F	7F	0-127

Note 1:
Selects the System Chorus preset type. Receipt of GM/GS Reset selects Chorus3. The other System Chorus parameters are changed to preset values in accordance with this type value. See "42.11 Chorus Type Setting Value Table."

Note 2:
Sets the System Chorus feedback volume.

Note 3:
Adjusts the System Chorus timbre.

System Reverb

ParamID	Parameter	bit	Value	Default	SettingValue(Decimal)
18	Reverb Macro Num (Note 1)	05	00-0F	04	0-15
19	Reverb Level	07	00-7F	40	0-127
1A	Reverb Time/Del Feedback	07	00-7F	40	0-127
1B	Reverb ER Level	07	00-7F	40	0-127
1C	Reverb Hi Damp	07	00-7F	40	0-127
1D	Reverb Tone	07	00-7F	7F	0-127

Note 1:
Selects the System Reverb preset type. Receipt of GM/GS Reset selects Hall2. The other System Reverb parameters are changed to preset values in accordance with this type value. See "42.10 Reverb Type Setting Value Table."

Master Equalizer

ParamID	Parameter	bit	Value	Default	SettingValue(Decimal)
20	Master EQ Macro Num (Note 1)	05	00-09	00	0-9
21	MasEq Lo Freq (Note 2)	07	00-7F	40	0-2
22	MasEq Lo Gain (Note 3)	07	00 to 40 to 7F	40	-12 to 0 to +12
23	MasEqMid-LoFreq (Note 4)	07	00-7F	40	0-7
24	MasEqMid-LoGain (Note 5)	07	00 to 40 to 7F	40	-12 to 0 to +12
25	MasEqMid-HiFreq (Note 6)	07	00-7F	40	0-7
26	MasEqMid-HiGain (Note 7)	07	00 to 40 to 7F	40	-12 to 0 to +12
27	MasEq Hi Freq (Note 8)	07	00-7F	40	0-9
28	MasEq Hi Gain (Note 9)	07	00 to 40 to 7F	40	-12 to 0 to +12

Note 1:
Selects the Master EQ preset type. Receipt of GM/GS Reset selects Standard. The other Master Equalizer parameters are changed to preset values in accordance with this type value. See "42.9 Master EQ Type Setting Value Table".

Note 2:
Selects the Master EQ low-range cutoff frequency. See "42.12 Equalizer Low Frequency Setting Value Table".

Note 3:
Selects the Master EQ low-range gain. See "42.15 Equalizer Gain Setting Value Table".

Note 4:
Selects the Master EQ mid-low frequency. See "42.13 Equalizer Mid Frequency Setting Value Table".

Note 5:
Selects the Master EQ mid-low-range gain. See "42.15 Equalizer Gain Setting Value Table".

Note 6:
Selects the Master EQ mid-high frequency type. See "42.13 Equalizer Mid Frequency Setting Value Table".

Note 7:
Selects the Master EQ mid-high range gain. See "42.15 Equalizer Gain Setting Value Table".

Note 8:
Selects the Master EQ high-range cutoff frequency. See "42.14 Equalizer High Frequency Setting Value Table".

Note 9:
Selects the Master EQ high-range gain. See "42.15 Equalizer Gain Setting Value Table".

DSP Patch Parameter

The values of this parameter do not change when DSP Type and Tone Values are changed.

ParamID	Parameter	bit	Value	Default	SettingValue(Decimal)
2C	DSP Type Number (Note 1)	08	00-C8	0E	0- 99 Preset 100-199 User 200 DSP of Tone
2D	DSP Hold	01	0-1	0	0...Off 1...On
2E	DSP Level	07	00-7F	64	0-127
2F	DSP Pan (Note 2)	07	00-7F	40	-64 to 0 to +63

Note 1:
Selects the DSP Type. Receipt of GM/GS Reset selects 014 Delay. 200 is stored when a tone-associated DSP is read into the DSP area.

Note 2:
See "42.6 Pan Setting Value Table".

DSP Type parameter

The value of this block's parameter is rewritten whenever the DSP type or tone is changed.

ParamID	Parameter	bit	Value	Default	SettingValue(Decimal)
30	DSP Name A (Note 1)	20	0-FFFFFFFF	556e7469	MSB is leading character.
31	DSP Name B (Note 1)	20	0-FFFFFFFF	746c6564	MSB is leading character.
32r	DSP Algorithm ID (Note 2)	07	00-3F	00	0-63
33	DSP Chorus Send	07	00-7F	40	0-127
34	DSP Reverb Send	07	00-7F	40	0-127

Note 1:
These parameters change the DSP name. One character is indicated by each byte.

Note 2:
This value is the DSP algorithm ID, which cannot be changed directly. Changing the DSP type or tone number causes the algorithm ID of the original DSP to be copied automatically to this parameter. See "42.16 DSP Algorithm ID Table".

DSP Type Independent Parameters

The first eight parameters listed below are DSP User Parameters whose settings can be configured from this Model's control panel. The next 16 parameters are Internal Parameters that cannot be changed on this Model's control panel. The range of these parameter values is 0 to 127, regardless of the DSP algorithm. However, the number of parameter types depends on the DSP algorithm, which means that not all User Parameters and Internal Parameters are necessarily available as a particular DSP's parameters. See the "Part VII DSP Parameter List" for details about parameter types and contents.

ParamID	Parameter	bit	Value	Default	SettingValue(Decimal)
38	DSP User Parameter0	07	00-7F	-	0-127
39	DSP User Parameter1	07	00-7F	-	0-127
3A	DSP User Parameter2	07	00-7F	-	0-127
3B	DSP User Parameter3	07	00-7F	-	0-127
3C	DSP User Parameter4	07	00-7F	-	0-127
3D	DSP User Parameter5	07	00-7F	-	0-127
3E	DSP User Parameter6	07	00-7F	-	0-127
3F	DSP User Parameter7	07	00-7F	-	0-127
40	DSP Internal Param00	07	00-7F	-	0-127
41	DSP Internal Param01	07	00-7F	-	0-127
42	DSP Internal Param02	07	00-7F	-	0-127
43	DSP Internal Param03	07	00-7F	-	0-127
44	DSP Internal Param04	07	00-7F	-	0-127
45	DSP Internal Param05	07	00-7F	-	0-127
46	DSP Internal Param06	07	00-7F	-	0-127
47	DSP Internal Param07	07	00-7F	-	0-127
48	DSP Internal Param08	07	00-7F	-	0-127
49	DSP Internal Param09	07	00-7F	-	0-127
4A	DSP Internal Param10	07	00-7F	-	0-127
4B	DSP Internal Param11	07	00-7F	-	0-127
4C	DSP Internal Param12	07	00-7F	-	0-127
4D	DSP Internal Param13	07	00-7F	-	0-127
4E	DSP Internal Param14	07	00-7F	-	0-127
4F	DSP Internal Param15	07	00-7F	-	0-127

21.2 Patch Part Parameter List

This list shows setting parameters that are specific for each part.

System Exclusive Format

Field		Value
01	SYSEX	F0
02	MAN	44
03	MOD	11,02
04	*dev*	Either 00 to 1F, or 7F
05	*act*	00(IPC), 01(IPR)
06	*cat*	Patch = 01
07	*prm*	00-7F
08	*ilen/dlen*	0 / bit size - 1
09	*ps*	LSB,MSB = 00, 00
10	*index*	Part Number - 1 (00-1F)
11	*data*	See the Parameter List
12	*sum*	None
13	EOX	F7

Basic Parameter List

ParamID	Parameter	bit	Value	Default	SettingValue(Decimal)
50	Tone Number (Note 1)	0E		000	000-FFF
51	Part Octave Shift	03	2-6	4	-2 to 0 to +2 Oct
52	Part Enable	01	0-1	1	0...Disable (Off) 1...Enable (On)
53	Part Mode (Note 2)	04	0-4	0	0...Normal 1...Rhythm 2...Drawbar

Note 1:
Number of the tone allocated to this part.

Note 2:
Sets the Normal, Drum and Drawbar Organ modes of the part play operation. For detailed operations, see "12.1 About the Part Mode".

Tune / Mix parameter

ParamID	Parameter	bit	Value	Default	SettingValue(Decimal)
54	Pitch Fine Tune	08	00-FF	80	-99 to 0 to +99cent
55	Pitch Coarse Tune	07	28-58	40	-24 to 0 to +24 semi
56	Volume	07	00-7F	7F	0-127
57	Accomp Volume	07	00-FF	7F	0-127
58	Bend Range	07	00-18	02	0-+24
59	Pan	07	00-7F	40	-64 to 0 to +63

Tone parameter

ParamID	Parameter	bit	Value	Default	SettingValue(Decimal)
60	Tone Name A (Note 1)	20	0-FFFFFFFF	556e7469	MSB is leading character.
61	Tone Name B (Note 1)	20	0-FFFFFFFF	746c6564	MSB is leading character.
64	Line Select	01	0-1	0	0...Thru 1...DSP
65	Tone Octave Shit	03	2-6	4	-2 to 0 to +2 Oct
66	Tone Attack Time	07	00-7F	40	-64 to 0 to +63
67	Tone Release Time	07	00-7F	40	-64 to 0 to +63
68	Tone DCF Cutoff	07	00-7F	40	-64 to 0 to +63
69	Tone DCF Resonance	07	00-7F	40	-64 to 0 to +63
6A	Chorus Send	07	00-7F	00	0-127
6B	Reverb Send	07	00-7F	32	0-127
6C	Tone Level	07	00-7F	7F	0-127
6D	Tone Touch Sens	07	00-7F	7F	-64 to 0 to +63

Note 1:
Change the tone name. One character is indicated by each byte.

Assignable Controller Parameter

ParamID	Parameter	bit	Value	Default	SettingValue(Decimal)
70	Modulation Assign	04	0-9	0	Function 0....Off 1....Modulation 2....DSP Parameter0 3....DSP Parameter1 4....DSP Parameter2 5....DSP Parameter3 6....DSP Parameter4 7....DSP Parameter5 8....DSP Parameter6 9....DSP Parameter7
71-73	Reserved				
74	Modulation Depth (Note 1)	07	00-7F	127	0-127
75-77	Reserved				

Note 1:
When Vibrato is selected for Modulation Assign, this parameter specifies the depth of the vibrato effect to be applied relative to the modulation button, modulation wheel, and received Modulation message value. This parameter does not affect the value sent by the Modulation message when the modulation button or modulation wheel is operated.

When Modulation Assign is any setting from DSP Parameter0 to DSP Parameter7, the DSP Parameter0 to DSP Parameter7 value and MIDI send value when the modulation button is operated is in accordance with the setting of this parameter. This setting does not affect modulation wheel operation. When the Modulation message is received, vibrato depth is in accordance with Vibrato Modulation Sens, which is explained below.

Vibrato Parameter

ParamID	Parameter	bit	Value	Default	Setting Value (Decimal)
7A	Vibrato Type	04	0-3	0	Vibrato Waveform 0....Triangle 1....Saw Up 2....Pulse 3....Sin
7B	Vibrato Delay	07	00-7F	40	-64 to 0 to +63
7C	Vibrato Rate	07	00-7F	40	-64 to 0 to +63
7D	Vibrato Pitch Depth	07	00-7F	40	-64 to 0 to +63
7E	Vibrato Modulation Sens (Note 1)	07	00-7F	00	0-127
7F	Vibrato Aftertouch Sens (Note 2)	07	00-7F	00	0-127

Note 1:
When Modulation Assign is any setting other than Vibrato, Vibrato depth is adjusted when a Modulation message (MIDI Control Change) is received.

Note 2:
This parameter adjusts the depth of the Vibrato effect when MIDI Channel Aftertouch is received.

22 Wave Data Parameters

Wave Data Parameters contain address and size information about expanded waveform data.

22.1 Wave Data Information

System Exclusive Format

Field		Value
01	SYSEX	F0
02	MAN	44
03	MOD	11,02
04	*dev*	Either 00 to 1F, or 7F
05	*act*	00(IPC), 01(IPR)
06	*cat*	Wave Data = 08
07	*prm*	00-7F
08	*ilen/dlen*	0 / bit size - 1
09	*ps*	LSB,MSB = wave number For details, see "39 About Parameter Set (PS) numbers".
10	*index*	0
11	*data*	See the Parameter List
12	*sum*	None
13	EOX	F7

Parameter List

ParamID	Parameter	bit	Value	Default	Setting Value (Hexadecimal)
00	Data Existence	01	0-1	0	0...No Data 1...Exists
01	Data Address Hi	0F	0-7FFF	00	
02	Data Address Lo	10	0-FFFF	0000	
03	Data Size	20	0-FFFFFFFF	00000000	

23 Song Data Parameter

Song Data Parameters contain address, size, and name information about song sequencer data.

23.1 Song Data Information

System Exclusive Format

Field		Value
01	SYSEX	F0
02	MAN	44
03	MOD	11,02
04	*dev*	Either 00 to 1F, or 7F
05	*act*	00(IPC), 01(IPR)
06	*cat*	Song = 0A
07	*prm*	00-7F
08	*ilen/dlen*	0 / bit size - 1
09	*ps*	LSB,MSB = Song number For details, see "39 About Parameter Set (PS) numbers".
10	*index*	0
11	*data*	See the Parameter List
12	*sum*	None
13	EOX	F7

Parameter List

ParamID	Parameter	bit	Value	Default	Setting Value (Hexadecimal)
00	Data Existence	01	0-1	0	0...No data 1...Data present
01	Data Address Hi	0F	00-7FFF	00	
02	Data Address Lo	10	0-FFFF	0000	
03	Data Size	20	0-FFFFFFFF	00000000	
04	Name A	20	0-FFFFFFFF	556e7469	MSB is leading character.
05	Name B	20	0-FFFFFFFF	746c6564	MSB is leading character.

24 Rhythm Data Parameters

Rhythm Data Parameters contain address, size, and name information about expanded rhythm data.

24.1 Rhythm Data Information

System Exclusive Format

Field		Value
01	SYSEX	F0
02	MAN	44
03	MOD	11,02
04	*dev*	Either 00 to 1F, or 7F
05	*act*	00(IPC), 01(IPR)
06	*cat*	Rhythm = 0B
07	*prm*	00-7F
08	*ilen/dlen*	0 / bit size - 1
09	*ps*	LSB,MSB = SMF Data number For details, see "39 About Parameter Set (PS) numbers".
10	*index*	0
11	*data*	See the Parameter List
12	*sum*	None
13	EOX	F7

Parameter List

ParamID	Parameter	bit	Value	Default	Setting Value (Hexadecimal)
00	Data Existence	01	0-1	0	0...No data 1...Data present
01	Data Address Hi	0F	00-7FFF	00	
02	Data Address Lo	10	0-FFFF	0000	
03	Data Size	20	0-FFFFFFFF	00000000	
04	Name A	20	0-FFFFFFFF	556e7469	MSB is leading character.
05	Name B	20	0-FFFFFFFF	746c6564	MSB is leading character.

25 SMF Data Parameters

SMF Data Parameters contain address, size, and name information about SMF data.

25.1 SMF Data Information

System Exclusive Format

Field		Value
01	SYSEX	F0
02	MAN	44
03	MOD	11,02
04	*dev*	Either 00 to 1F, or 7F
05	*act*	00(IPC), 01(IPR)
06	*cat*	SMF = 10
07	*prm*	00-7F
08	*ilen/dlen*	0 / bit size - 1
09	*ps*	LSB,MSB = SMF Data number For details, see "39 About Parameter Set (PS) numbers".
10	*index*	0
11	*data*	See the Parameter List
12	*sum*	None
13	EOX	F7

Parameter List

ParamID	Parameter	bit	Value	Default	Setting Value (Hexadecimal)
00	Data Existence	01	0-1	0	0... No data 1... Data present
01	Data Address Hi	0F	00-7FFF	00	
02	Data Address Lo	10	0-FFFF	0000	
03	Data Size	20	0-FFFFFFFF	00000000	
04	Name A	20	0-FFFFFFFF	556e7469	MSB is leading character.
05	Name B	20	0-FFFFFFFF	746c6564	MSB is leading character.

Part VI
Parameter Set List

This list shows the parameter sets that can be transferred using System Exclusive Message Bulk Dump.

26 User Tone Parameter Set

System Exclusive Format

Field		Value
01	SYSEX	F0
02	MAN	44
03	MOD	11,02
04	*dev*	Either 00 to 1F, or 7F
05	*act*	04(HDS), 05(HDR), 07(Control)
06	*cat*	Tone = 02
07	*prm*	00-7F
08	*ilen/dlen*	See "IV This Model's System Exclusive Messages".
09	*ps*	Indicates the tone number being transferred. For details, see "39 About Parameter Set (PS) numbers".
10	*index*	See "IV This Model's System Exclusive Messages".
11	*data*	See "IV This Model's System Exclusive Messages".
12	*sum*	See "IV This Model's System Exclusive Messages".
13	EOX	F7

27 User Timbre Parameter Set

This is the parameter set that is associated with and sent with Tone.

System Exclusive Format

Field		Value
01	SYSEX	F0
02	MAN	44
03	MOD	11,02
04	*dev*	Either 00 to 1F, or 7F
05	*act*	04(HDS), 05(HDR), 07(Control)
06	*cat*	Timbre = 03
07	*prm*	00-7F
08	*ilen/dlen*	See "IV This Model's System Exclusive Messages".
09	*ps*	Indicates the timbre number being transferred. For details, see "39 About Parameter Set (PS) numbers".
10	*index*	See "IV This Model's System Exclusive Messages".
11	*data*	See "IV This Model's System Exclusive Messages".
12	*sum*	See "IV This Model's System Exclusive Messages".
13	EOX	F7

28 User Drum Parameter Set

This is the drum set parameter set.

System Exclusive Format

Field		Value
01	SYSEX	F0
02	MAN	44
03	MOD	11,02
04	*dev*	Either 00 to 1F, or 7F
05	*act*	04(HDS), 05(HDR), 07(Control)
06	*cat*	Drum = 04
07	*prm*	00-7F
08	*ilen/dlen*	See "IV This Model's System Exclusive Messages".
09	*ps*	Indicates the drum number being transferred. For details, see "39 About Parameter Set (PS) numbers".
10	*index*	See "IV This Model's System Exclusive Messages".
11	*data*	See "IV This Model's System Exclusive Messages".
12	*sum*	See "IV This Model's System Exclusive Messages".
13	EOX	F7

29 User Voice Parameter Set

This is the parameter set that is associated with and sent with Timbre. Four voices are associated with one timbre.

System Exclusive Format

Field		Value
01	SYSEX	F0
02	MAN	44
03	MOD	11,02
04	*dev*	Either 00 to 1F, or 7F
05	*act*	04(HDS), 05(HDR), 07(Control)
06	*cat*	Voice = 05
07	*prm*	00-7F
08	*ilen/dlen*	See "IV This Model's System Exclusive Messages".
09	*ps*	Indicates the voice number being transferred. For details, see "39 About Parameter Set (PS) numbers".
10	*index*	See "IV This Model's System Exclusive Messages".
11	*data*	See "IV This Model's System Exclusive Messages".
12	*sum*	See "IV This Model's System Exclusive Messages".
13	EOX	F7

30 User Instrument Parameter Set

This is the parameter set that is associated with and sent with Drum.
All key numbers are supported, so one drum set is associated with 128 instruments.

System Exclusive Format

Field		Value
01	SYSEX	F0
02	MAN	44
03	MOD	11,02
04	*dev*	Either 00 to 1F, or 7F
05	*act*	04(HDS), 05(HDR), 07(Control)
06	*cat*	Instrument = 06
07	*prm*	00-7F
08	*ilen/dlen*	See "IV This Model's System Exclusive Messages".
09	*ps*	Indicates this Model's number being transferred. For details, see "39 About Parameter Set (PS) numbers".
10	*index*	See "IV This Model's System Exclusive Messages".
11	*data*	See "IV This Model's System Exclusive Messages".
12	*sum*	See "IV This Model's System Exclusive Messages".
13	EOX	F7

31 User Wave Parameter Set

This is the parameter set that is associated with and sent with Voice or Instrument.
16 waves are associated with Voice, and one wave with Instrument.

System Exclusive Format

Field		Value
01	SYSEX	F0
02	MAN	44
03	MOD	11,02
04	*dev*	Either 00 to 1F, or 7F
05	*act*	04(HDS), 05(HDR), 07(Control)
06	*cat*	Wave = 08
07	*prm*	00-7F
08	*ilen/dlen*	See "IV This Model's System Exclusive Messages".
09	*ps*	Indicates the wave number being transferred. For details, see "39 About Parameter Set (PS) numbers".
10	*index*	See "IV This Model's System Exclusive Messages".
11	*data*	See "IV This Model's System Exclusive Messages".
12	*sum*	See "IV This Model's System Exclusive Messages".
13	EOX	F7

32 User DSP Parameter Set

System Exclusive Format

Field		Value
01	SYSEX	F0
02	MAN	44
03	MOD	11,02
04	*dev*	Either 00 to 1F, or 7F
05	*act*	04(HDS), 05(HDR), 07(Control)
06	*cat*	DSP = 09
07	*prm*	00-7F
08	*ilen/dlen*	See "IV This Model's System Exclusive Messages".
09	*ps*	Indicates the DSP number being transferred. For details, see "39 About Parameter Set (PS) numbers" and "DSP Type Number" in "21.1 Patch Common Parameter List".
10	*index*	See "IV This Model's System Exclusive Messages".
11	*data*	See "IV This Model's System Exclusive Messages".
12	*sum*	See "IV This Model's System Exclusive Messages".
13	EOX	F7

33 Song Data

System Exclusive Format

Field		Value
01	SYSEX	F0
02	MAN	44
03	MOD	11,02
04	*dev*	Either 00 to 1F, or 7F
05	*act*	04(HDS), 05(HDR), 07(Control)
06	*cat*	Song = 0A
07	*prm*	00
08	*ilen/dlen*	See "IV This Model's System Exclusive Messages".
09	*ps*	Indicates the song number being transferred. For details, see "39 About Parameter Set (PS) numbers".
10	*index*	See "IV This Model's System Exclusive Messages".
11	*data*	See "IV This Model's System Exclusive Messages".
12	*sum*	See "IV This Model's System Exclusive Messages".
13	EOX	F7

34 User Rhythm Pattern

System Exclusive Format

Field		Value
01	SYSEX	F0
02	MAN	44
03	MOD	11,02
04	*dev*	Either 00 to 1F, or 7F
05	*act*	04(HDS), 05(HDR), 07(Control)
06	*cat*	User Rhythm = 0B
07	*prm*	00
08	*ilen/dlen*	See "IV This Model's System Exclusive Messages".
09	*ps*	Indicates the rhythm number being transferred. For details, see "39 About Parameter Set (PS) numbers".
10	*index*	See "IV This Model's System Exclusive Messages".
11	*data*	See "IV This Model's System Exclusive Messages".
12	*sum*	See "IV This Model's System Exclusive Messages".
13	EOX	F7

35 Registration Data

System Exclusive Format

Field		Value
01	SYSEX	F0
02	MAN	44
03	MOD	11,02
04	*dev*	Either 00 to 1F, or 7F
05	*act*	04(HDS), 05(HDR), 07(Control)
06	*cat*	Registration = 0C
07	*prm*	00
08	*ilen/dlen*	See "IV This Model's System Exclusive Messages".
09	*ps*	Indicates the registration number being transferred. Note 1
10	*index*	See "IV This Model's System Exclusive Messages".
11	*data*	See "IV This Model's System Exclusive Messages".
12	*sum*	See "IV This Model's System Exclusive Messages".
13	EOX	F7

Note 1:
The relationship between the "Bank", "Number" and "ps (parameter set)" are as shown below.

Bank	Number	ps	Bank	Number	ps
1	1	0020H	5	1	0030H
1	2	0021H	5	2	0031H
1	3	0022H	5	3	0032H
1	4	0023H	5	4	0033H
2	1	0024H	6	1	0034H
2	2	0025H	6	2	0035H
2	3	0026H	6	3	0036H
2	4	0027H	6	4	0037H
3	1	0028H	7	1	0038H
3	2	0029H	7	2	0039H
3	3	002AH	7	3	003AH
3	4	002BH	7	4	003BH
4	1	002CH	8	1	003CH
4	2	002DH	8	2	003DH
4	3	002EH	8	3	003EH
4	4	002FH	8	4	003FH

36 User Drawbar Parameter Set

System Exclusive Format

Field		Value
01	SYSEX	F0
02	MAN	44
03	MOD	11,02
04	*dev*	Either 00 to 1F, or 7F
05	*act*	04(HDS), 05(HDR), 07(Control)
06	*cat*	Drawbar = 0D
07	*prm*	00
08	*ilen/dlen*	See "IV This Model's System Exclusive Messages".
09	*ps*	Indicates the drawbar number being transferred. For details, see "39 About Parameter Set (PS) numbers".
10	*index*	See "IV This Model's System Exclusive Messages".
11	*data*	See "IV This Model's System Exclusive Messages".
12	*sum*	See "IV This Model's System Exclusive Messages".
13	EOX	F7

37 SMF Parameter Set

System Exclusive Format

Field		Value
01	SYSEX	F0
02	MAN	44
03	MOD	11,02
04	*dev*	Either 00 to 1F, or 7F
05	*act*	04(HDS), 05(HDR), 07(Control)
06	*cat*	SMF = 10
07	*prm*	00-7F
08	*ilen/dlen*	See "IV This Model's System Exclusive Messages".
09	*ps*	Indicates the SMF number being transferred. For details, see "39 About Parameter Set (PS) numbers".
10	*index*	See "IV This Model's System Exclusive Messages".
11	*data*	See "IV This Model's System Exclusive Messages".
12	*sum*	See "IV This Model's System Exclusive Messages".
13	EOX	F7

Data Format

Bulk dumping SMF data transfers the data with a 128-byte header appended as shown below. The header data starts with an 8-byte file name, which is displayed by this Model after receipt.

Header 128Bytes	Name 8Bytes
	Reserved 120Bytes
SMF Data	

38 Flash Memory Image Parameter Set

This Parameter Set is used for dumping flash memory contents. One Parameter Set corresponds to an image block of 2 Mbytes of flash memory. The 4 Mbytes of flash memory of this Model is made up of two blocks, so two Parameter Sets are used.

System Exclusive Format

Field		Value
01	SYSEX	F0
02	MAN	44
03	MOD	11,02
04	*dev*	00 to 1F, or 7F
05	*act*	04(HDS), 05(HDR), 07(Control)
06	*cat*	Flash Memory Image = 11
07	*prm*	00
08	*ilen/dlen*	See "IV This Model's System Exclusive Message".
09	*ps*	Indicates the Flash Image Block Number being transferred. For details, see "39 About Parameter Set (PS) numbers".
10	*index*	See "IV This Model's System Exclusive Message".
11	*data*	See "IV This Model's System Exclusive Message".
12	*sum*	See "IV This Model's System Exclusive Message".
13	EOX	F7

39 About Parameter Set (PS) numbers

When using a system exclusive message to transfer a user Parameter Sets or user Parameter Set parameters, the specified Parameter Set number do not necessarily need to start from zero when the Parameter Set numbers are located after the preset Parameter Set. Refer to the table below for user area Parameter Set number for each category.

PS Category	User PS Header (Decimal)	Number of User PS (Decimal)
Tone	830	100
Tone with wave	930	20
Timbre	560	20
Drum	20	4
Voice	1024	80
Instrument	320	512
Wave	1024	1792
Rhythm	160	16
Song	0	5
SMF	0	200
DrawbarOrgan	100	100
Registration	Registration 32 (See "35 Registration Data".)	32
FlashMemoryImage	0	2

Part VII
DSP Parameter List

This list shows the parameters for each of the DSP algorithms.
U0 to U7 indicate User Parameters 0 to 7, while I00 to I15 indicate Internal Parameters 00 to 15.
Parameters for which no setting range is indicated, receipt of a value from 0 to 127 is assigned as-is to the parameter.

40 DSP Algorithm List (Single Effect)

These are effects that are configured of a single module.

40.1 Algorithm 00 (00H) : Auto Pan

Number	Parameter	Notes
U0	Rate	-
U1	Depth	-

40.2 Algorithm 01 (01H) : Tremolo

Number	Parameter	Notes
U0	Rate	-
U1	Depth	-

40.3 Algorithm 02 (02H) : 2BandEQ

Number	Parameter	Notes
U0	Low Frequency	Note 1
U1	Low Gain	Note 2
U2	Hi Frequency	Note 3
U3	Hi Gain	Note 2

Note 1: See "42.12 Equalizer Low Frequency Setting Value Table".

Note 2: See "42.15 Equalizer Gain Setting Value Table".

Note 3: See "42.14 Equalizer High Frequency Setting Value Table".

40.4 Algorithm 03 (03H) : 3BandEQ

Number	Parameter	Notes
U0	Low Frequency	Note 1
U1	Low Gain	Note 2
U2	Mid Frequency	Note 3
U3	Mid Gain	Note 4
U4	High Frequency	Note 5
U5	High Gain	Note 6

Note 1: See "42.12 Equalizer Low Frequency Setting Value Table".

Note 2: See "42.15 Equalizer Gain Setting Value Table".

Note 3: See "42.13 Equalizer Mid Frequency Setting Value Table".

Note 4: See "42.15 Equalizer Gain Setting Value Table".

Note 5: See "42.14 Equalizer High Frequency Setting Value Table".

Note 6: See "42.15 Equalizer Gain Setting Value Table".

40.5 Algorithm 04 (04H) : LFO Wah

Number	Parameter	Notes
U0	Input Level	-
U1	Resonance	-
U2	Manual	-
U3	LFO Rate	-
U4	LFO Depth	-

40.6 Algorithm 05 (05H) : Auto Wah

Number	Parameter	Notes
U0	Input Level	-
U1	Resonance	-
U2	Manual	-
U3	Depth	Note 1
I00	Sensitivity	-

Note 1: See the "42.5 -64 to 0 to 63 Setting Value Table."

40.7 Algorithm 06 (06H) : Compressor

Number	Parameter	Notes
U0	Depth	-
U1	Attack	-
U2	Release	-
U3	Level	-
I00	Threshold	Note 1

Note 1: This algorithm adjusts the level at which the compressor effect starts.

40.8 Algorithm 07 (07H) : Limiter

Number	Parameter	Notes
U0	Limit	-
U1	Attack	-
U2	Release	-
U3	Level	-

40.9 Algorithm 08 (08H) : Distortion

Number	Parameter	Notes
U0	Gain	-
U1	Low	-
U2	High	-
U3	Level	-

40.10 Algorithm 09 (09H) : Stereo Phaser

Number	Parameter	Notes
U0	Resonance	-
U1	Manual Note 1	-
U2	Rate	-
U3	Depth	-
U4	Wet Level	-

Note 1: See the "42.5 -64 to 0 to 63 Setting Value Table."

40.11 Algorithm 10 (0AH) : Phaser

Number	Parameter	Notes
U0	Resonance	-
U1	Manual	Note 1
U2	Rate	-
U3	Depth	-
U4	Wet Level	-

Note 1: See the "42.5 -64 to 0 to 63 Setting Value Table."

40.12 Algorithm 11 (0BH) : Rotary

Number	Parameter	Notes
U0	Speed	-
U1	Break	Note 1
U2	Fall Accel	-
U3	Rise Accel	-
U4	Slow Rate	-
U5	Fast Rate	-

Note 1: See "42.3 Rotate/Break Setting Value Table".

40.13 Algorithm 12 (0CH) : Overdrive Rotary

Number	Parameter	Notes
U0	Overdrive Gain	-
U1	Overdrive Level	-
U2	Speed	Note 1
U3	Break	Note 2
U4	Fall Accel	-
U5	Rise Accel	-
U6	Slow Rate	-
U7	Fast Rate	-

Note 1: See "42.2 Slow/Fast Setting Value Table".

Note 2: See "42.3 Rotate/Break Setting Value Table".

40.14 Algorithm 13 (0DH) : Enhancer

Number	Parameter	Notes
U0	Low Frequency	-
U1	Low Gain	-
U2	High Frequency	-
U3	High Gain	-

40.15 Algorithm 14 (0EH) : Ring Modulator

Number	Parameter	Notes
U0	OSC Frequency	-
U1	LFO Rate	-
U2	LFO Depth	-
U3	Wet Level	-
U4	Dry Level	-

40.16 Algorithm 15 (0FH) : LoFi

Number	Parameter	Notes
U0	Noise Level 1	-
U1	Noise Density 1	-
U2	Noise Level 2	-
U3	Noise Density 2	-
U4	Tone	-
U5	Resonance	-
U6	Bass	Note 1
U7	Level	-

Note 1: See the "42.5 -64 to 0 to 63 Setting Value Table."

40.17 Algorithm 16 (10H) : 1-Phase Chorus

Number	Parameter	Notes
U0	LFO Rate	-
U1	LFO Depth	-
U2	Feedback	Note 1
U3	Wet Level	-

Note 1: See the "42.5 -64 to 0 to 63 Setting Value Table."

40.18 Algorithm 17 (11H) : Sin 2-Phase Chorus

Number	Parameter	Notes
U0	LFO Rate	-
U1	LFO Depth	-
U2	Feedback	Note 1
U3	Wet Level	-

Note 1: See the "42.5 -64 to 0 to 63 Setting Value Table."

40.19 Algorithm 18 (12H) : 3-Phase Chorus

Number	Parameter	Notes
U0	Rate1	-
U1	Depth1	-
U2	Rate2	-
U3	Depth2	-
U4	Wet Level	-

40.20 Algorithm 19 (13H) : Tri 2-Phase Chorus

Number	Parameter	Notes
U0	LFO Rate	-
U1	LFO Depth	-
U2	Feedback	Note 1
U3	Wet Level	-

Note 1: See the "42.5 -64 to 0 to 63 Setting Value Table."

40.21 Algorithm 20 (14H) : Stereo Delay 1

Number	Parameter	Notes
U0	Delay Time	-
U1	Wet Level	-
U2	Feedback	-
U3	High Damp	-
U4	Ratio L	-
U5	Ratio R	-

40.22 Algorithm 21 (15H) : Stereo Delay 2

Number	Parameter	Notes
U0	Delay Time	-
U1	Wet Level	-
U2	Feedback	-
U3	High Damp	-
U4	Ratio L	-
U5	Ratio R	-

40.23 Algorithm 22 (16H) : 3-Tap Delay

Number	Parameter	Notes
U0	Delay Time	-
U1	Wet Level	-
U2	Feedback	-
U3	High Damp	-
U4	Ratio L	-
U5	Ratio C	-
U6	Ratio R	-

40.24 Algorithm 23 (17H) : Gate Reverb

Number	Parameter	Notes
U0	LPF	-
U1	HPF	-
U2	Feedback	-
U3	High-Damp	-
U4	Diffusion	-
U5	Wet Level	-
U6	Dry Level	-

40.25 Algorithm 24 (18H) : Reverse Gate Reverb

Number	Parameter	Notes
U0	LPF	-
U1	HPF	-
U2	Feedback	-
U3	High-Damp	-
U4	Diffusion	-
U5	Wet Level	-
U6	Dry Level	-

40.26 Algorithm 25 (19H) : Reflection

Number	Parameter	Notes
U0	Type	Note 1
U1	Wet Level	-
U2	Feedback	-
U3	Tone	-

Note 1: See "42.8 Type0 to Type7 Setting Value Table".

40.27 Algorithm 26 (1AH) : Flanger

Number	Parameter	Notes
U0	LFO Rate	-
U1	LFO Depth	-
U2	Feedback	Note 1
U3	Wet Level	-

Note 1: See the "42.5 -64 to 0 to 63 Setting Value Table."

40.28 Algorithm 27 (1BH) : Reverb

Number	Parameter	Notes
U0	Tone	-
U1	Time	-
U2	High-Damp	-
U3	ER Level	-
U4	Wet Level	-

40.29 Algorithm 28 (1CH) : 2-Tap Delay

Number	Parameter	Notes
U0	Delay Time	-
U1	Wet Level	-
U2	Feedback	-
U3	High Damp	-
U4	Ratio L	-
U5	Ratio R	-

41 DSP Algorithm List (Multi Effect)

The multi-algorithms (M00 to M31) listed below are combinations of the algorithms described above. Parameter operations and other details are the same as the previous algorithms, so there is no separate explanation provided here.

41.1 Algorithm M00 (20H) : Multi00

Number	Parameter	Notes
U0	Chorus Rate	-
U1	Chorus Depth	-
U2	Chorus Feedback	-
U3	Chorus Wet Level	-
U4	Delay Delay Time	-
U5	Delay Wet Level	-
U6	Delay Feedback	-
U7	Delay High-Damp	-

41.2 Algorithm M01 (21H) : Multi01

Number	Parameter	Notes
U0	Chorus Fast Rate	-
U1	Chorus Fast Depth	-
U2	Chorus Slow Rate	-
U3	Chorus Slow Depth	-
U4	Chorus Wet Level	-
U5	Delay Time	-
U6	Delay Wet Level	-
U7	Delay Feedback	-
I03	Delay High-Damp	-
I04	Delay Ratio L	-
I05	Delay Ratio C	-
I06	Delay Ratio R	-

41.3 Algorithm M02 (22H) : Multi02

Number	Parameter	Notes
U0	Phaser Resonance	-
U1	Phaser Manual	-
U2	Phaser Rate	-
U3	Phaser Depth	-
U4	Chorus Rate 1	-
U5	Chorus Depth 1	-
U6	Chorus Rate 2	-
U7	Chorus Depth 2	-
I03	Phaser Wet Level	-

41.4 Algorithm M03 (23H) : Multi03

Number	Parameter	Notes
U0	Flanger LFO Rate	-
U1	Flanger LFO Depth	-
U2	Flanger Feedback	-
U3	Flanger Wet Level	-
U4	Delay Time	-
U5	Delay Wet Level	-
U6	Delay Feedback	-
U7	Delay High-Damp	-
I06	Delay Ratio L	-
I07	Delay Ratio R	-

41.5 Algorithm M04 (24H) : Multi04

Number	Parameter	Notes
U0	Phaser Resonance	-
U1	Phaser Manual	-
U2	Phaser Rate	-
U3	Phaser Depth	-
U4	Phaser Wet Level	-
U5	Delay Time	-
U6	Delay Wet Level	-
U7	Delay Feedback	-
I05	Delay High-Damp	-
I06	Delay Ratio L	-
I07	Delay Ratio R	-

41.6 Algorithm M05 (25H) : Multi05

Number	Parameter	Notes
U0	Enhancer Low Frequency	-
U1	Enhancer Low Gain	-
U2	Enhancer High Frequency	-
U3	Enhancer High Gain	-
U4	Chorus LFO Rate	-
U5	Chorus LFO Depth	-
U6	Chorus Feedback	-
U7	Chorus Wet Level	-

41.7 Algorithm M06 (26H) : Multi06

Number	Parameter	Notes
U0	Enhancer Low Frequency	-
U1	Enhancer Low Gain	-
U2	Enhancer High Frequency	-
U3	Enhancer High Gain	-
U4	Delay Time	-
U5	Delay Wet Level	-
U6	Delay Feedback	-
U7	Delay High-Damp	-

41.8 Algorithm M07 (27H) : Multi07

Number	Parameter	Notes
U0	Enhancer Low Frequency	-
U1	Enhancer Low Gain	-
U2	Enhancer High Frequency	-
U3	Enhancer High Gain	_
U4	Flanger LFO Rate	-
U5	Flanger LFO Depth	-
U6	Flanger Feedback	_
U7	Flanger Wet Level	-
I06	Flanger Delay Time L	-
I07	Flanger Delay Time R	_

41.9 Algorithm M08 (28H) : Multi08

Number	Parameter	Notes
U0	Chorus LFO Rate	-
U1	Chorus LFO Depth	-
U2	Chorus Feedback	-
U3	Chorus Wet Level	-
U4	Flanger LFO Rate	-
U5	Flanger LFO Depth	-
U6	Flanger Feedback	-
U7	Flanger Wet Level	-

41.10 Algorithm M09 (29H) : Multi09

Number	Parameter	Notes
U0	Chorus LFO Rate	-
U1	Chorus LFO Depth	-
U2	Chorus Feedback	-
U3	Chorus Wet Level	-
U4	Tremolo Rate	-
U5	Tremolo Depth	-

41.11 Algorithm M10 (2AH) : Multi10

Number	Parameter	Notes
U0	Phaser Resonance	-
U1	Phaser Manual	-
U2	Phaser Rate	-
U3	Phaser Depth	-
U4	Phaser Wet Level	-
U5	Auto Pan Rate	-
U6	Auto Pan Depth	-

41.12 Algorithm M11 (2BH) : Multi11

Number	Parameter	Notes
U0	Compressor Depth	-
U1	Compressor Attack	-
U2	Compressor Level	-
U3	Lo-Fi Noise 1	-
U4	Lo-Fi Noise 2	-
U5	Lo-Fi Tone	-
U6	Lo-Fi Resonance	-
U7	Lo-Fi Bass	-
I01	Compressor Release	-
I02	Lo-Fi Noi1 Density	-
I03	Lo-Fi Noi2 Density	-
I04	Lo-Fi Level	-

41.13 Algorithm M12 (2CH) : Multi12

Number	Parameter	Notes
U0	Ring OSC Frequency	-
U1	Ring LFO Rate	-
U2	Ring LFO Depth	-
U3	Ring Wet Level	-
U4	Ring Dry Level	-
U5	Chorus LFO Depth	-
U6	Delay Time	-
U7	Delay Wet Level	-
I00	Chorus LFO Rate	-
I01	Chorus Feedback	-
I02	Chorus Wet Level	-
I09	Delay Feedback	-
I10	Delay High-Damp	-
I11	Delay Ratio L	-
I12	Delay Ratio R	-

41.14 Algorithm M13 (2DH) : Multi13

Number	Parameter	Notes
U0	Ring OSC Frequency	-
U1	Ring LFO Rate	-
U2	Ring LFO Depth	-
U3	Ring Wet Level	-
U4	Ring Dry Level	-
U5	Distortion Gain	-
U6	Distortion Tone	-
U7	Distortion Level	-

41.15 Algorithm M14 (2EH) : Multi14

Number	Parameter	Notes
U0	Lo-Fi Noise 1	-
U1	Lo-Fi Noise 2	-
U2	Lo-Fi Tone	-
U3	Lo-Fi Resonance	-
U4	Reflection Type	-
U5	Reflection Wet Level	-
U6	Reflection Feedback	-
U7	Reflection Tone	-
I00	Lo-Fi Noi1 Dens	-
I01	Lo-Fi Noi2 Dens	-
I02	Lo-Fi Bass	-
I03	Lo-Fi Level	-

41.16 Algorithm M15 (2FH) : Multi15

Number	Parameter	Notes
U0	Distortion Gain	-
U1	Distortion Low	-
U2	Distortion Tone	-
U3	Distortion Level	-
U4	Lo-Fi Noise1	-
U5	Lo-Fi Noise2	-
U6	Lo-Fi Tone	-
U7	Lo-Fi Resonance	-
I12	Lo-Fi Noi1 Dens	-
I13	Lo-Fi Noi2 Dens	-
I14	Lo-Fi Bass	-
I15	Lo-Fi Level	-

41.17 Algorithm M16 (30H) : Multi16

Number	Parameter	Notes
U0	Od Gain	-
U1	Od Level	-
U2	Rot Speed	-
U3	Rot Slow Rate	-
U4	Rot Fast Rate	-
U5	Reflection Wet Level	-
U6	Reflection Feedback	-
U7	Reflection Tone	-
I09	Rot Fall Accel	-
I10	Rot Rise Accel	-
I11	Rot Break	-
I12	Reflection Type	-

41.18 Algorithm M17 (31H) : Multi17

Number	Parameter	Notes
U0	Rot Speed	-
U1	Rot Break	-
U2	Rot Slow Rate	-
U3	Rot Fast Rate	-
U4	Reflection Wet Level	-
U5	Reflection Feedback	-
U6	Reflection Tone	-
I10	Rot Fall Accel	-
I11	Rot Rise Accel	-
I12	Reflection Type	-

41.19 Algorithm M18 (32H) : Multi18

Number	Parameter	Notes
U0	Compressor Depth	-
U1	Compressor Attack	-
U2	Compressor Level	-
U3	Enhancer Low Gain	-
U4	Enhancer High Gain	-
U5	Delay Delay Time	-
U6	Delay Wet Level	-
U7	Delay Feedback	-
I06	Enhancer Low Frequency	-
I07	Enhancer High Frequency	-
I10	Delay High-Damp	-
I11	Delay Ratio L	-
I12	Delay Ratio R	-

41.20 Algorithm M19 (33H) : Multi19

Number	Parameter	Notes
U0	Compressor Depth	-
U1	Compressor Attack	-
U2	Compressor Release	-
U3	Compressor Level	-
U4	Delay Delay Time	-
U5	Delay Wet Level	-
U6	Delay Feedback	-
U7	Delay High-Damp	-
I03	Delay Ratio L	-
I04	Delay Ratio R	-

41.21 Algorithm M20 (34H) : Multi20

Number	Parameter	Notes
U0	Phaser Resonance	-
U1	Phaser Manual	-
U2	Phaser Rate	-
U3	Phaser Depth	-
U4	Chorus LFO Rate	-
U5	Chorus LFO Depth	-
U6	Auto Pan Rate	-
U7	Auto Pan Depth	-

41.22 Algorithm M21 (35H) : Multi21

Number	Parameter	Notes
U0	Wah Resonance	-
U1	Wah Manual	-
U2	Wah Depth	-
U3	Chorus LFO Rate	-
U4	Chorus LFO Depth	-
U5	Delay Delay Time	-
U6	Delay Wet Level	-
U7	Delay Feedback	-
I10	Delay High-Damp	-
I11	Delay Ratio L	-
I12	Delay Ratio R	-

41.23 Algorithm M22 (36H) : Multi22

Number	Parameter	Notes
U0	Wah Resonance	-
U1	Wah Manual	-
U2	Wah LFO Rate	-
U3	Wah LFO Depth	-
U4	Chorus LFO Depth	-
U5	Delay Time	-
U6	Delay Wet Level	-
U7	Delay Feedback	-
I09	Delay High-Damp	-
I10	Delay Ratio L	-
I11	Delay Ratio R	-

41.24 Algorithm M23 (37H) : Multi23

Number	Parameter	Notes
U0	Compressor Depth	-
U1	Compressor Attack	-
U2	Compressor Level	-
U3	Chorus LFO Rate	-
U4	Chorus LFO Depth	-
U5	Reflection Wet Level	-
U6	Reflection Feedback	-
U7	Reflection Tone	-

41.25 Algorithm M24 (38H) : Multi24

Number	Parameter	Notes
U0	Distortion Gain	-
U1	Distortion Low	-
U2	Distortion Hi	-
U3	Distortion Level	-
U4	Chorus LFO Depth	-
U5	Delay Delay Time	-
U6	Delay Wet Level	_
U7	Delay Feedback	-
I09	Delay High-Damp	-
I10	Delay Ratio L	-
I11	Delay Ratio R	-

41.26 Algorithm M25 (39H) : Multi25

Number	Parameter	Notes
U0	Compressor Depth	-
U1	Distortion Gain	-
U2	Distortion Low	-
U3	Distortion Hi	-
U4	Distortion Level	-
U5	Delay Delay Time	-
U6	Delay Wet Level	-
U7	Delay Feedback	-
I01	Compressor Attack	-
I02	Compressor Release	-
I03	Compressor Level	-
I07	Delay High-Damp	-
I08	Delay Ratio L	-
I09	Delay Ratio R	-

41.27 Algorithm M26 (3AH) : Multi26

Number	Parameter	Notes
U0	Wah Manual	-
U1	Wah Depth	-
U2	Distortion Gain	-
U3	Distortion Tone	-
U4	Distortion Level	-
U5	Delay Delay Time	-
U6	Delay Wet Level	-
U7	Delay Feedback	-
I04	Wah Resonance	-
I09	Delay High-Damp	-
I10	Delay Ratio L	-
I11	Delay Ratio R	-

41.28 Algorithm M27 (3BH) : Multi27

Number	Parameter	Notes
U0	Wah Manual	-
U1	Wah LFO Rate	-
U2	Wah LFO Depth	-
U3	Distortion Gain	-
U4	Distortion Level	-
U5	Delay Delay Time	-
U6	Delay Wet Level	-
U7	Delay Feedback	-
I02	Wah Resonance	-
I08	Delay High-Damp	-
I09	Delay Ratio L	-
I10	Delay Ratio R	-

41.29 Algorithm M28 (3CH) : Multi28

Number	Parameter	Notes
U0	Distortion Gain	-
U1	Distortion Low	-
U2	Distortion Tone	-
U3	Distortion Level	-
U4	Delay Time	-
U5	Delay Wet Level	-
U6	Delay Feedback	-
U7	Delay High-Damp	-
I12	Delay Ratio L	-
I13	Delay Ratio C	-
I14	Delay Ratio R	-

41.30 Algorithm M29 (3DH) : Multi29

Number	Parameter	Notes
U0	Distortion Gain	-
U1	Distortion Low	-
U2	Distortion Tone	-
U3	Distortion Level	-
U4	Phaser Resonance	-
U5	Phaser Manual	-
U6	Phaser Rate	-
U7	Phaser Depth	-
I12	Phaser Input Level	-
I15	Phaser Wet Level	-

41.31 Algorithm M30 (3EH) : Multi30

Number	Parameter	Notes
U0	Distortion Gain	-
U1	Distortion Low	-
U2	Distortion Tone	-
U3	Distortion Level	-
U4	Chorus LFO Rate	-
U5	Chorus LFO Depth	-
U6	Chorus Feedback	-
U7	Chorus Wet Level	-

41.32 Algorithm M31 (3FH) : Multi31

Number	Parameter	Notes
U0	Distortion Gain	-
U1	Distortion Low	-
U2	Distortion Tone	-
U3	Distortion Level	-
U4	Flanger LFO Rate	-
U5	Flanger LFO Depth	-
U6	Flanger Feedback	-
U7	Flanger Wet Level	-

Part VIII
Setting Values and Send/Receive Values

42 Setting Value Table

42.1 Off/On Setting Value Table

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

42.2 Slow/Fast Setting Value Table

Value	Transmit	Receive
Slow	00H	00H-3FH
Fast	7FH	40H-7FH

42.3 Rotate/Break Setting Value Table

Value	Transmit	Receive
Rotate	00H	00H-3FH
Break	7FH	40H-7FH

42.4 -24 to 0 to 24 Setting Value Table

Value	Transmit/Receive
-24	28H
:	:
0	40H
:	:
24	58H

42.5 -64 to 0 to 63 Setting Value Table

Value	Transmit/Receive
-64	00H
-63	01H
:	:
0	40H
:	:
62	7EH
63	7FH

42.6 Pan Setting Value Table

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

42.7 -99 to 0 to 99 Setting Value Table

Value	Transmit/Receive
	(MSB-LSB)
-99	00H-40H
:	:
0	40H-00H
:	:
99	7FH-00H

42.8 Type 0 to Type 7 Setting Value Table

Value	Transmit	Receive
Type0	00H	00H-0FH
Type1	10H	10H-1FH
Type2	20H	20H-2FH
Type3	30H	30H-3FH
Type4	40H	40H-4FH
Type5	50H	50H-5FH
Type6	60H	60H-6FH
Type7	70H	70H-7FH

42.9 Master EQ Type Setting Value Table

Value	Transmit/Receive
Standard	00H
Bass +	01H
Treble +	02H
Loudness	03H
Mellow	04H
Bright	05H
Rock	06H
Dance	07H
Jazz	08H
Classic	09H

42.10 Reverb Type Setting Value Table

Value	Transmit/Receive
Room1	00H
Room2	01H
Room3	02H
Hall1	03H
Hall2	04H
Plate1	05H
Delay	06H
Panning Delay	07H
Plate2	08H
Plate3	09H
Large Room1	0AH
Large Room2	0BH
Stadium1	0CH
Stadium2	0DH
Long Delay	0EH
Long Panning Delay	0FH

42.11 Chorus Type Setting Value Table

Value	Transmit/Receive
Chorus1	00H
Chorus2	01H
Chorus3	02H
Chorus4	03H
Feedback Chorus	04H
Flanger1	05H
Short Delay	06H
Short Delay FB	07H
Soft Chorus	08H
Bright Chorus	09H
Deep Chorus	0AH
Flanger2	0BH
Flanger3	0CH
Flanger4	0DH
Short Delay Modulation	0EH
Short Delay Modulation FB	0FH

42.12 Equalizer Low Frequency Setting Value Table

Value	Transmit	Receive
0(200Hz)	00H	00H-2AH
1(400Hz)	40H	2BH-55H
2(800Hz)	7FH	56H-7FH

42.13 Equalizer Mid Frequency Setting Value Table

Value	Transmit	Rceive
0(1.0KHz)	00H	00H-0FH
1(1.3KHz)	10H	10H-1FH
2(1.6KHz)	20H	20H-2FH
3(2.0KHz)	30H	30H-3FH
4(3.0KHz)	40H	40H-4FH
5(4.0KHz)	50H	50H-5FH
6(6.0KHz)	60H	60H-6FH
7(8.0KHz)	70H	70H-7FH

42.14 Equalizer High Frequency Setting Value Table

Value	Transmit	Receive
0(6.0KHz)	00H	00H-2AH
1(8.0KHz)	40H	2BH-55H
2(10.0KHz)	7FH	56H-7FH

42.15 Equalizer Gain Setting Value Table

Value	Transmit	Receive
-12	00H	00H-04H
-11	05H	05H-09H
-10	0AH	0AH-0EH
-9	0FH	0FH-13H
-8	14H	14H-18H
-7	19H	19H-1DH
-6	1EH	1EH-22H
-5	23H	23H-27H
-4	28H	28H-2CH
-3	2DH	2DH-31H
-2	32H	32H-36H
-1	37H	37H-3BH
0	3CH	3CH-43H
+1	44H	44H-48H
+2	49H	49H-4DH
+3	4EH	4EH-52H
+4	53H	53H-57H
+5	58H	58H-5CH
+6	5DH	5DH-61H
+7	62H	62H-66H
+8	67H	67H-6BH
+9	6CH	6CH-70H
+10	71H	71H-75H
+11	76H	76H-7AH
+12	7BH	7BH-7FH

The parameter value is not equivalent to dB (decibels).

42.16 DSP Algorithm ID Table

Algorithm	ID
00	00H
01	01H
02	02H
03	03H
:	:
28	1CH
M00	20H
M01	21H
M02	22H
M03	23H
:	:
M31	3FH

42.17 Drawbar Position Setting Value Table

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

42.18 Drawbar Percussion Setting Table

Value	Setting
0	0 All off
1	2nd only on
2	3rd only on
3	2nd and 3rd both on

Part IX
MIDI Implementation Notation

42.19 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 following table shows the hexadecimal equivalents for the most commonly used values (0 to 127).

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

42.20 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 following table shows the binary equivalents for some of the values in the most commonly used range (0 to 127).

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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