

MZ-2000 MIDI Implementation

CASIO Computer Electronic Musical Instrument Division

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1 MIDI Message Format Overview

1.1 Configuration

The MZ-2000 is made up of a Performance Block and a Sound Source Block as shown below. The Performance Block includes the keyboard, wheels, and other real-time controllers, as well as auto accompaniment, the sequencer, the control panel, etc.

The Sound Source Block consists of a Common Sub-block that includes tone generator settings, effector, and mixer, and a Parts Sub-block that includes a 32-tone tone generator.

- * Performance Block
 - o Keyboard
 - o Wheels and other real-time controllers
 - o Auto accompaniment
 - o Sequencer
- * Sound Source Block
 - o Common Sub-block
 - + Tone generator settings
 - + Effector
 - + Mixer
 - o Parts Sub-block
 - + Parts that cannot be received by the tone generator (Parts 1 to 16)
 - + Parts that can be received by the tone generator (Parts 17 to 32)

1.2 messages and Channels

1.2.1 Performance Block

The Performance Block generates messages for keyboard, wheel, pedal and other real-time controller operations, and for the sequencer, auto accompaniment, the control panel, etc. messages for each type of operation are sent both to the sound source and to the MIDI OUT terminal. Though the Performance Block has only send functions, it also performs chord recognitions when note data is received.

Send message channel numbers are in accordance with the MZ-2000 send (Tx) channel settings.

Accompaniment part send messages are sent when the MZ-2000 Accomp MIDI Out parameter is turned on.

1.2.2 Sound Source Common Sub-block

The Common Sub-block consists of a tone generator for tones that do not depend on in the sound source, an effector, a mixer, etc. The settings of these items can be changed by system exclusive messages or by channel messages with channel numbers set by the MIDI Global Channel.

1.2.3 Parts Sub-block

Operation and setting changes of the Parts Sub-block of the Sound Source Block can be controlled using system exclusive messages and channel messages. Channel messages used for such control are limited to those with channel numbers set by the MIDI channel assigned to the applicable part.

Also note that Parts 17 through 32 only can receive channel messages.

2 Channel messages

The channel numbers of the channel messages received by each part are in accordance with the MZ-2000 receive (Rx) channel setting for each part. Channel messages are not received for any part whose receive channel setting is off.

When the MZ-2000 MIDI In Chord Judge option is turned on, MZ-2000 auto accompaniment chords can be specified using note messages within the chord judge keyboard range specified by the MZ-2000 by sending the note messages over the channel that is specified as the receive channel for Part 1.

2.1 Note messages

2.1.1 Note Off

2.1.1.1 Receive

Format

Byte 1 Byte 2 Byte 3
8nH kkH vvH
9nH kkH 00H

n : Voice Channel Number = 0H to FH (Ch1 to Ch16)
kk : Note Number = 00H to 7FH
vv : Note Off Velocity = 00H to 7FH

Operation

The Note Off Velocity value is ignored.
For drum parts, Note Off is not received by each instrument when Rx.Note Off = ON.

2.1.1.2 Send

Format

Byte 1 Byte 2 Byte 3
8nH kkH vvH

n : Voice Channel Number = 0H to FH (Ch1 to Ch16)
kk : Note Number = 18H to 6CH
vv : Note Off Velocity = 40H

Operation

Normally, the range of the Note Number is 24H to 60H. Changing the Pattern Sequencer's Octave Shift value (-1 to 1) causes the value of kk to change within the range shown below.

Octave	Note Number Range (kk)
-1	18H to 54H
0	24H to 60H
+1	30H to 6CH

2.1.2 Note On

2.1.2.1 Receive

Format

Byte 1 Byte 2 Byte 3
9nH kkH vvH

n : Voice Channel Number = 0H to FH (Ch1 to Ch16)
kk : Note Number = 00H to 7FH
vv : Note On Velocity = 00H to 7FH

Operation

Note On is not received when Rx.Note message is turned off.
For drum parts, Note On is when Rx.Note On = OFF for each instrument.

2.1.2.2 Send

Format

Byte 1 Byte 2 Byte 3
9nH kkH vvH

n : Voice Channel Number = 0H to FH (Ch1 to Ch16)
kk : Note Number = 18H to 6CH
vv : Note On Velocity = 01 to 7FH

Operation

Normally, the range of the Note Number is 24H to 60H.
Changing the Pattern Sequencer's Octave Shift value (-1 to 1) causes the value of kk to change within the range shown below.

Octave	Note Number Range (kk)
-1	18H to 54H
0	24H to 60H
+1	30H to 6CH

2.2 Polyphonic Key Pressure

Format

Byte 1 Byte 2 Byte 3
AnH kkH vvH

n : Voice Channel Number = 0H to FH (Ch1 to Ch16)
kk : Note Number = 00H to 7FH
vv : Pressure Value = 00H to 7FH

Receive

Polyphonic Key Pressure is not received when Rx.Poly Pressure = OFF.

Send

Polyphonic Key Pressure cannot be sent.

2.3 Control Change

When Rx.Control Change = OFF, all Control change messages for that part are not received.

2.3.1 Bank Select

Format

Byte 1 Byte 2 Byte 3
BnH 00H mmH (Bank SelectMSB)
BnH 20H llH (Bank SelectLSB)

n : Voice Channel Number = 0H to FH (Ch1 to Ch16)
mm : Bank NumberMSB = 00H to 7FH
ll : Bank NumberLSB = 00H to 7FH

Receive

The ll value is used for tone map switching, but since 00H is the only value currently stored in the tone map, any setting other than 00H is ignored.
Program change messages received with a bank number value other than 00H are ignored.

Bank Select is not received when Rx.Bank Select = Off.
The Bank Number LSB is always treated as 00H when Rx.Bank Select LSB = Off.

Send

The Bank Select message is sent whenever the tone selection is changed.

2.3.2 Modulation Wheel

Format

Byte 1 Byte 2 Byte 3
BnH 01H mmH

n : Voice Channel Number = 0H to FH (Ch1 to Ch16)
vv : Modulation Depth = 00H to 7FH

Receive

The Modulation Wheel message is not received when Rx.Modulation = OFF.
The modulation type can be specified using a system exclusive message.

Send

Modulation Wheel messages are sent when you operate the modulation wheel when Tone Preset is selected for the modulation wheel or the assignable switch when Tone Preset (Mod.) is selected for the assignable switch.

2.3.3 Portamento Time

Format

Byte 1 Byte 2 Byte 3
BnH 05H mmH

n : Voice Channel Number = 0H to FH (Ch1 to Ch16)
vv : Modulation Depth = 00H to 7FH

Receive

This message is received when Rx.Control Change = ON and its channel matches the part MIDI channel.

Send

Modulation Wheel messages are sent when you operate the modulation wheel when Portamento Time is selected for the modulation wheel or the assignable switch when Portamento On/Off is selected for the assignable switch.

2.3.4 Data Entry

Format

Byte 1 Byte 2 Byte 3
BnH 06H mmH (Data Entry MSB)
BnH 26H llH (Data Entry LSB)

n : Voice Channel Number = 0H to FH (Ch1 to Ch16)
mm : MSB of parameter specified by RPN, NRPN
ll : LSB of parameter specified by RPN, NRPN

2.3.5 Channel Volume

Format

Byte 1 Byte 2 Byte 3
BnH 07H vvH

n : Voice Channel Number = 0H to FH (Ch1 to Ch16)
vv : Volume = 00H to 7FH

Receive

The Channel Volume message is no received when Rx.Volume = OFF.

Send

The Channel Volume message is sent whenever a change is made in mixer volume, accomp volume, disk volume, or U1/U2 balance settings.

2.3.6 Pan

Format

Byte 1 Byte 2 Byte 3
BnH 0AH vvH

n : Voice Channel Number = 0H to FH (Ch1 to Ch16)
vv : Pan = 00H (Left) to 40H (Center) to 7FH (Right)

Receive

The Pan message is not received when Rx.Panpot = OFF.
For drum parts, the pan settings are changed relative to the pan setting of each drum part note number.

Send

The Pan message is sent whenever the mixer's pan setting is changed.

2.3.7 Expression Controller

Format

Byte 1 Byte 2 Byte 3
BnH 0BH vvH

n : Voice Channel Number = 0H to FH (Ch1 to Ch16)
vv : Expression = 00H to 7FH

Receive

The Expression Controller message is not received when Rx.Expression = OFF.

Send

The Expression Controller message is sent whenever an expression pedal operation is performed.

2.3.8 General Controller 1 to 8

General Controller messages are assigned to the effect parameters in the Common Sub-block.

Format

Byte 1 Byte 2 Byte 3
BnH kkH vvH

n : Voice Channel Number = 0H to FH (Ch1 to Ch16)
kk : cc Number = 4cH to 53H
vv : Effect Value = 00H to 7FH

The following shows the relationship between cc numbers and effect parameters.

cc Parameter)
4CH DSP1 Parameter 1
4DH DSP1 Parameter 2
4EH DSP2 Parameter 1
4FH DSP2 Parameter 2
50H DSP3 Parameter 1
51H DSP3 Parameter 2
52H DSP4 Parameter 1
53H DSP4 Parameter 2

Receive

This message is received when its channel matches the MIDI Global channel.

For details about the receive operation General Controller messages, see "4.11.5 Control Using the Val Control Change Message."

Send

A General Controller message is sent whenever an effect parameter is changed.

2.3.9 Hold 1 (Damper Pedal)

Format

Byte 1 Byte 2 Byte 3
BnH 40H vvH

Receive

n : Voice Channel Number = 0H to FH (Ch1 to Ch16)
 vv : Hold 1 = 00H to 7FH

The Hold 1 message is not received when Rx.Hold1 = OFF.

Send

n : Voice Channel Number = 0H to FH (Ch1 to Ch16)
 vv : Hold 1 = 00H, 7FH (00H:OFF, 7FH:ON)

The Hold 1 message is sent whenever the MZ-2000 sustain pedal is operated while the sustain effect is assigned to the pedal, or when the sustain switch of the MZ-2000 is operated.

2.3.10 Portamento

Format

Byte 1 Byte 2 Byte 3
 BnH 41H vvH

Receive

n : Voice Channel Number = 0H to FH (Ch1 to Ch16)
 vv : Portamento = 00H to 7FH (00H to 3FH:OFF, 40H to 7FH:ON)

The Portamento message is not received when Rx.Portamento = OFF.

Send

n : Voice Channel Number = 0H to FH (Ch1 to Ch16)
 vv : Portamento = 00H, 7FH (00H:OFF, 7FH:ON)

The Portamento message is sent whenever the assignable button of the MZ-2000 is operated when the portamento effect is assigned to the button.

2.3.11 Sostenuto

Format

Byte 1 Byte 2 Byte 3
 BnH 42H vvH

Receive

n : Voice Channel Number = 0H to FH (Ch1 to Ch16)
 vv : Sostenuto = 00H to 7FH (00H to 3FH:OFF, 40H to 7FH:ON)

Sostenuto is not received when Rx.Sostenuto = OFF.

Send

n : Voice Channel Number = 0H to FH (Ch1 to Ch16)
 vv : Sostenuto = 00H,7FH(00H:OFF,7FH:ON)

The Sostenuto message is sent whenever the MZ-2000 sustain pedal is operated when the sostenuto effect is assigned to the pedal.

2.3.12 Soft

Format

Byte 1 Byte 2 Byte 3
 BnH 43H vvH

Receive

n : Voice Channel Number = 0H to FH (Ch1 to Ch16)
 vv : Soft = 00H to 7FH (00H to 3FH:OFF, 40H to 7FH:ON)

The Soft message is not received when Rx.Soft = OFF.

Send

n : Voice Channel Number = 0H to FH (Ch1 to Ch16)
 vv : Soft = 00H, 7FH(00H:OFF, 7FH:ON)

The Soft message is sent whenever the MZ-2000 sustain pedal is operated when the soft effect is assigned to the pedal.

2.3.13 Sound Controller 2 (Resonance)

Format

Byte 1 Byte 2 Byte 3
 BnH 47H vvH

n : Voice Channel Number = 0H to FH (Ch1 to Ch16)
 vv : TVF Resonance = 00H to 7FH

Receive

This message is received when Rx.Control Change = ON and its channel matches the part MIDI channel.

Send

The Sound Controller 2 message cannot be sent.

2.3.14 Sound Controller 3 (Release Time)

Format

Byte 1 Byte 2 Byte 3
 BnH 48H vvH

n : Voice Channel Number = 0H to FH (Ch1 to Ch16)
 vv : TVA Release Time = 00H to 7FH

Receive

This message is received when Rx.Control Change = ON and its channel matches the part MIDI channel.

Send

The Sound Controller 3 message cannot be sent.

2.3.15 Sound Controller 4 (Attack Time)

Format

Byte 1 Byte 2 Byte 3
 BnH 49H vvH

n : Voice Channel Number = 0H to FH (Ch1 to Ch16)
 vv : TVA Attack Time = 00H to 7FH

Receive

This message is received when Rx.Control Change = ON and its channel matches the part MIDI channel.

Send

The Sound Controller 4 message cannot be sent.

2.3.16 Sound Controller 5 (Brightness)

Format

Byte 1 Byte 2 Byte 3
BnH 4AH vvH

n : Voice Channel Number = 0H to FH (Ch1 to Ch16)
vv : TVF Cutoff Frequency = 00H to 7FH

Receive

This message is received when Rx.Control Change = ON and its channel matches the part MIDI channel.

Send

The Sound Controller 5 message cannot be sent.

2.3.17 Portamento Control

Format

Byte 1 Byte 2 Byte 3
BnH 54H kkH

n : Voice Channel Number = 0H to FH (Ch1 to Ch16)
kk : Source Note Number = 00H to 7FH

Receive

This message is received when Rx.Control Change = ON and its channel matches the part MIDI channel.

Send

The Portamento Control message cannot be sent.

2.3.18 Effect 1 (Reverb Send Level)

Format

Byte 1 Byte 2 Byte 3
BnH 5BH vvH

n : Voice Channel Number = 0H to FH (Ch1 to Ch16)
vv : Reverb Send Level = 00H to 7FH

Receive

This message is received when Rx.Control Change = ON and its channel matches the part MIDI channel.

Send

The Effect 1 message is sent whenever a mixer reverb depth, accomp reverb depth, or melody reverb depth operation is performed.

2.3.19 Effect 3 (Chorus Send Level)

Format

Byte 1 Byte 2 Byte 3
BnH 5DH vvH

n : Voice Channel Number = 0H to FH (Ch1 to Ch16)
vv : Chorus Send Level = 00H to 7FH

Receive

This message is received when Rx.Control Change = ON and its channel matches the part MIDI channel.

Send

The Effect 1 message is sent whenever a mixer chorus depth, accomp chorus depth, or melody chorus depth operation is performed.

2.3.20 NRPN

Format

Byte 1 Byte 2 Byte 3
BnH 63H pmH (MSB)
BnH 62H plH (LSB)

n : Voice Channel Number = 0H to FH (Ch1 to Ch16)
pm : NRPN MSB
pl : NRPN LSB

Receive

NRPN are not received when Rx.Nrpn = OFF. Though undefined NRPN can be received and stored, subsequent data entry values following undefined NRPN messages are ignored. Applicable parameters are set following receipt of the NRPN MSB and LSB, the data entry MSB is received and the value is set in accordance with the data entry MSB. The data entry LSB is ignored.

Send

An NRPN and data entry are sent whenever the parameter assigned to the NRPN is changed.

2.3.20.1 Vibrato Rate

NRPN MSB = 01H
NRPN LSB = 08H
Data Entry MSB = mmH

mm : Vibrato Rate = 00H to 40H to 7FH (-64 to 0 to +63)

Receive

When the MZ-2000 receives the Vibrato Rate message, the reset vibrato rate value for the tone is changed accordingly. There is no change when the value of the data entry MSB is 40H (0).

Send

The Vibrato Rate message is sent whenever a vibrato rate operation is performed.

2.3.20.2 Vibrato Depth

NRPN MSB = 01H
NRPN LSB = 09H
Data Entry MSB = mmH

mm : Vibrato Depth = 00H to 40H to 7FH (-64 to 0 to +63)

Receive

When the MZ-2000 receives the Vibrato Depth message, the reset vibrato depth value for the tone is changed accordingly. There is no change when the value of the data entry MSB is 40H (0).

Send

The Vibrato Depth message is sent whenever a vibrato depth operation is performed.

2.3.20.3 Vibrato Delay

NRPN MSB = 01H
NRPN LSB = 0AH
Data Entry MSB = mmH

mm : Vibrato Delay = 00H to 40H to 7FH (-64 to 0 to +63)

Receive

When the MZ-2000 receives the Vibrato Delay message, the reset vibrato delay value for the tone is changed accordingly. There is no change when the value of the data entry MSB is 40H (0).

Send

The Vibrato Delay message cannot be sent.

2.3.20.4 TVF Cutoff Frequency

NRPN MSB = 01H
NRPN LSB = 20H
Data Entry MSB = mmH

mm : Cutoff Frequency = 00H to 40H to 7FH (-64 to 0 to +63)

Receive

When the MZ-2000 receives the TVF Cutoff Frequency message, the reset TVF cutoff frequency value for the tone is changed accordingly. There is no change when the value of the data entry MSB is 40H (0).

Send

The TVF Cutoff Frequency message is sent whenever a cutoff frequency operation is performed using the initial screen in the Synthesizer Mode.

2.3.20.5 TVF Resonance

NRPN MSB = 01H
NRPN LSB = 21H
Data Entry MSB = mmH

mm : TVF Resonance = 00H to 40H to 7FH (-64 to 0 to +63)

Receive

When the MZ-2000 receives the TVF Resonance message, the reset TVF resonance value for the tone is changed accordingly. There is no change when the value of the data entry MSB is 40H (0).

Send

The TVF Cutoff Frequency message is sent whenever a resonance operation is performed using the initial screen in the Synthesizer Mode.

2.3.20.6 TVF/TVA Envelope Attack Time

NRPN MSB = 01H
NRPN LSB = 63H
Data Entry MSB = mmH

mm : TVF/TVA Envelope Attack Time = 00H to 40H to 7FH (-64 to 0 to +63)

Receive

When the MZ-2000 receives the TVF/TVA Envelope Attack Time message, the reset TVF/TVA envelope attack time value for the tone is changed accordingly. There is no change when the value of the data entry MSB is 40H (0).

Send

The TVF/TVA Envelope Attack Time message is sent whenever an attack time operation is performed using the initial screen in the Synthesizer Mode.

2.3.20.7 TVF/TVA Envelope Decay Time

NRPN MSB = 01H
NRPN LSB = 64H
Data Entry MSB = mmH

mm : TVF/TVA Envelope Decay Time = 00H to 40H to 7FH (-64 to 0 to +63)

Receive

When the MZ-2000 receives the TVF/TVA Envelope Decay Time message, the reset TVF/TVA envelope decay time value for the tone is changed accordingly. There is no change when the value of the data entry MSB is 40H (0).

Send

The TVF/TVA Envelope Decay Time message cannot be sent.

2.3.20.8 TVF/TVA Envelope Release Time

NRPN MSB = 01H
NRPN LSB = 66H
Data Entry MSB = mmH

mm : TVF/TVA Envelope Release Time = 00H to 40H to 7FH (-64 to 0 to +63)

Receive

When the MZ-2000 receives the TVF/TVA Envelope Release Time message, the reset TVF/TVA envelope release time value for the tone is changed accordingly. There is no change when the value of the data entry MSB is 40H (0).

Send

The TVF/TVA Envelope Release Time message is sent whenever a release time operation is performed using the initial screen in the Synthesizer Mode.

2.3.20.9 Drawbar Control

NRPN MSB = 40H
NRPN LSB = 00H to 08H (16' to 1')
Data Entry MSB = mmH

mm : Bar Position = 00H to 7FH (0 to 8)

The following shows the relationship between the NRPN and the drawbar numbers.

MSB	LSB	Drawbar Number
40H	00H	16'
40H	01H	5 1/3'
40H	02H	8'
40H	03H	4'
40H	04H	2 1/3'
40H	05H	2'
40H	06H	1 3/5'
40H	07H	1 1/3'
40H	08H	1'

The following shows the drawbar position for each mm value.

mm	Bar Position
00H to 0EH	0
0FH to 1CH	1
1DH to 2AH	2
2BH to 38H	3
39H to 47H	4
48H to 55H	5
56H to 63H	6
64H to 71H	7
72H to 7FH	8

Receive

While a Preset Drawbar Organ tone (Bank Number 60H) or User Drawbar Organ (Bank Number 61H) is selected on the MZ-2000, you can use Drawbar Control messages for external adjustment of harmonic component levels.

Send

The Drawbar Control message is sent whenever a drawbar operation is performed.

2.3.21 RPN

Format

Byte 1 Byte 2 Byte 3
 BnH 65H qmH (MSB)
 BnH 64H qlH (LSB)

n : Voice Channel Number = 0H to FH (Ch1 to Ch16)

qm : RPN MSB

ql : RPN LSB

Receive

An RPN cannot be received when Rx.Rpn = OFF.

Though undefined RPN can be received and stored, subsequent data entry values following undefined RPN messages are ignored.

Applicable parameters are set following receipt of the RPN MSB and LSB, the data entry MSB is received and the value is set in accordance with the data entry MSB. The data entry LSB is ignored.

Send

An RPN and data entry are sent whenever the parameter assigned to the RPN is changed.

2.3.21.1 Pitch Bend Sensitivity

RPN MSB = 00H
 RPN LSB = 00H
 Data Entry MSB = mmH

mm : Pitch Bend Sensitivity = 00H to 18H (0 to 24 $^{\circ}$ är)

Receive

The data entry LSB is always ignored.

Send

The Pitch Bend Sensitivity message is sent when accompaniment starts.

2.3.21.2 Master Fine Tuning

RPN MSB = 00H
 RPN LSB = 01H
 Data Entry MSB = mmH
 Data Entry LSB = llH

mm : ll Master Fine Tuning = 00 00H to 40H, 00H to 7FH 7FH (-100 to 0 to +99.99 cents)

Receive

The Master Fine Tuning message is always received when the MIDI Global Channel and RPN match.

Send

The Master Fine Tuning message sent whenever a mixer fine tuning operation is performed.

2.3.21.3 Master Coarse Tuning

RPN MSB = 00H
 RPN LSB = 02H
 Data Entry MSB = mmH

mm : Master Coarse Tuning = 28H to 40H to 58H (-24 to 0 to +24 semitones)

Receive

The data entry LSB is always ignored.

Send

The Master Coarse Tuning message sent whenever a mixer coarse tuning operation is performed.

2.3.21.4 RPN Null

RPN MSB = 7FH
 RPN LSB = 7FH

Receive

Receipt of an RPN null causes all received RPN and NRPN data entry MSBs and LSBs to be ignored until another non-null RPN message is received.

Send

A Null RPN message is sent whenever a drawbar operation performed or when an operation is performed using the initial screen in the Synthesizer Mode.

2.4 Program Change

Format

Byte 1 Byte 2
 CnH ppH

pp : Program Number = 00H to 7FH

Receive

The Program Change message is not received when Rx.Program Change = OFF.

The Bank Select MSB is always 00H for a drum part program change, regardless of the MSB value received in the Program Change message.

Send

The Program Change message is sent whenever a tone selection operation is performed.

2.5 Channel Pressure

Format

Byte 1 Byte 2
 DnH vvH

vv : Pressure Value = 00H to 7FH

Receive

The Channel Pressure message is not received when Rx.Pressure Change = OFF.

The Bank Select MSB is always 00H for drum part channel pressure, regardless of the MSB value received in the Channel Pressure Change message.

Send

The Channel Pressure Change message is sent whenever a tone preset operation is performed.

2.6 Pitch Bend Change

Format

Byte 1 Byte 2 Byte 3
 EnH llH mmH

n : Voice Channel Number = 0H to FH (Ch1 to Ch16)

ll : Pitch Bend Change LSB = 00H to 7FH

mm : Pitch Bend Change MSB = 00H to 7FH

Receive

The value llH mmH is 00H 00H at the lowest pitch, 00H 40H at mid-pitch, and 7FH 7FH at the highest pitch.

The Pitch Bend Change message is not received when Rx.Pitch Change = OFF.
The LSB and MSB must be sent together to form a 14-bit value in order to be a valid Pitch Bend Change setting.

Send

The Pitch Bend Wheel message is sent whenever a ptone preset operation is performed.

2.7 Channel Mode messages

2.7.1 All Sound Off

Format

Byte 1 Byte 2 Byte 3
BnH 78H 00H

n : Voice Channel Number = 0H to FH (Ch1 to Ch16)

Receive

Receipt of the All Sound Off message immediately mutes all notes being received over the MIDI channels.

Send

The All Sound Off message is sent whenever the Fade Out function is used.

2.7.2 Reset All Controller

Format

Byte 1 Byte 2 Byte 3
BnH 79H 00H

n : Voice Channel Number = 0H to FH (Ch1 to Ch16)

Receive

Receipt of the All Controller message causes the following controllers to be reset.

Controller Name	Reset Value
Polyphonic Key Pressure	vvH = 00H
Modulation Wheel	vvH = 00H
Expression Controller	vvH = 7FH
Hold 1	vvH = 00H
Portamento	vvH = 00H
Sostenuto	vvH = 00H
Soft	vvH = 00H
NRPN	msb = 7FH, lsb = 7FH
RPN	msb = 7FH, lsb = 7FH
Channel Pressure	vvH = 00H
Pitch Bend Change	llH mmH = 00H 40H

Send

The Reset All Controller message is sent whenever you change modes on the MZ-2000.

2.7.3 All Note Off

Format

Byte 1 Byte 2 Byte 3
BnH 7BH 00H

n : Voice Channel Number = 0H to FH (Ch1 to Ch16)

Receive

Receipt of the All Note Off message mutes all notes being received over the MIDI channels. If Hold 1 or Sostenuto is turned all when the All Note Off message is received, notes are sustained.

Send

The All Note Off message cannot be sent.

2.7.4 Omni Mode Off

Format

Byte 1 Byte 2 Byte 3
BnH 7CH 00H

n : Voice Channel Number = 0H to FH (Ch1 to Ch16)

Receive

Receipt of the Omni Mode Off message does not enter the MZ-2000 Omni Mode. Instead, it is treated as receipt of an All Note Off message.

Send

The Omni Mode Off message cannot be sent.

2.7.5 Omni Mode On

Format

Byte 1 Byte 2 Byte 3
BnH 7DH 00H

n : Voice Channel Number = 0H to FH (Ch1 to Ch16)

Receive

Receipt of the Omni Mode On message does not enter the MZ-2000 Omni Mode. Instead, it is treated as receipt of an All Note Off message.

Send

The Omni Mode On message cannot be sent.

2.7.6 Mono Mode On

Format

Byte 1 Byte 2 Byte 3
BNH 7EH vvH

n : Voice Channel Number = 0H to FH (Ch1 to Ch16)

vv : Number of Mono Mode Channels = 00H to 10H

Receive

Receipt of the Mono Mode On message does not enter the MZ-2000 Mono Mode. Instead, it functions as the All Sound Off message and All Note Off message.

Send

The Mono Mode On message cannot be sent.

2.7.7 Poly Mode On

Format

Byte 1 Byte 2 Byte 3
BNH 7FH vvH

n : Voice Channel Number = 0H to FH (Ch1 to Ch16)
vv : Number of Mono Mode Channels = 00H to 10H

Receive

Receipt of the Poly Mode On message changes the Channel n setting to Mode 3.
The Poly Mode On message functions as the All Sound Off message and All Note Off message.

Send

The Poly Mode On message cannot be sent.

3 System Messages

3.1 System Real-Time Messages

3.1.1 Active Sensing

Format

Byte 1
FEH

Receive

After the Active Sensing message is received, the MZ-2000 stands by for 400 msec waiting for another message to be sent. If nothing is received within 400 msec, the MZ-2000 performs the All Sound Off, All Note Off, and Reset All Controller procedures.

Send

The Active Sensing message cannot be sent.

3.1.2 Timing Clock

Format

Byte 1
F8H

Receive

The Timing Clock message cannot be received.

Send

The Timing Clock message is sent whenever an accompaniment or a song playback is performed while the MZ-2000's Realtime Message Out feature is turned on.

3.1.3 Start

Format

Byte 1
FAH

Receive

The Start message cannot be received.

Send

The Timing Clock message is sent whenever an accompaniment or a song playback is performed while the MZ-2000's Realtime Message Out feature is turned on.

3.1.4 Stop

Format

Byte 1
FCH

Receive

The Stop message cannot be received.

Send

The Timing Clock message is sent whenever an accompaniment or a song playback is performed while the MZ-2000's Realtime Message Out feature is turned on.

3.2 System Common Messages

The MS-2000 does not support sending or receiving of system common messages.

3.3 System Exclusive Messages

3.3.1 Universal System Exclusive Messages

3.3.1.1 GM System On

Format

F0H 7EH 7FH 09H 01H F7H

Receive

The GM System On message is not received when Rx.Gm On = OFF.

Send

The GM System On message cannot be sent.

3.3.1.2 Master Volume

Format

F0H 7FH 7FH 04H 01H llH mmH F7H

ll : Master VolumeLSB
mm : Master VolumeMSB

Receive

The Master Volume message is always received.

Send

The Master Volume message is whenever a Fade In/Out operation is performed.

3.3.2 MZ-2000 Sound Source System Exclusive Overview

System exclusive messages received by the MZ-2000 sound source start with the following data.

Format

F0H 44H 7EH 02H 00H 7FH

Though the purpose of system exclusive messages is mainly to assign parameters, the MZ-2000 also sends system exclusive messages whenever an operation that changes the setting of a parameter is performed.

A system exclusive message also includes a Device ID value, which corresponds to the channel number of a channel message. A Device ID is used when a system exclusive message is sent.

You can change the Device ID value on the MZ-2000.

See "4 MZ-2000 Sound Source System Exclusive Messages" for full details on MZ-2000 sound source system exclusive messages.

4 MZ-2000 Sound Source System Exclusive Messages

4.1 MZ-2000 Sound Source Common System Exclusive Format

4.1.1 General

The MZ-2000 sound source consists of audio signal processor sections for the tone generator, effects, mixer, etc.

The MZ-2000 sound source sends and receives sound source-related system information, parameters, and parameter sets, using the format described later in this chapter.

The format consists of a header block and data block. The same header block is always used within the MZ-2000, but the format of the data block is determined by the data being communicated.

The data content, in turn, depends on the MS-2000 function. The following sections of this chapter provide detailed information about the data content for each function.

Header Block (Hexadecimal)

```

00 F0 [System Exclusive Status]
01 44 [Manufacturer's ID] CASIO ID = 44H
02 7E [Model ID MSB] MZ-2000 Sound Source Model-ID MSB
03 02 [Model ID LSB] MZ-2000 Sound Source Model-ID LSB
04 00 [Message Version]
05 ** [SysEx Dev ID] SysEx Device ID 00H to 1FH,7FH (Default: 16)
    Even with system exclusive messages, channel numbers can be specified within the
    range of 00H to 1FH for use as a Device ID number.
    Messages are ignored if their ID Device ID number does not match that of the MZ-
    2000.
    A Universal Device ID of 7FH is provided, which means that the MZ-2000 always
    recognizes any SysEx message with a Device ID of 7FH.
```

Data Block (Format depends on content.)

```

06 ** [Message Type] (Category / Action)
07 ** [Data] (Not required when a Handshak Bulk Dump Reject value is present.)
08 ** [Data]
nn-1 ** [Checksum] (Option) Required for Bulk Dump only.
```

nn F7 [EOX]

(nn < 256) Indicates there are 256 data bytes or less from F0H to F7H.

4.1.2 MZ-2000 Sound Source Common System Exclusive Data Blocks

The MZ-2000 sound source system exclusive data block always starts with the message type, which indicates the type of communication is being performed. Messages can be broadly classified into the types listed below.

- * Individual Parameter Send/Receive
- * Individual Parameter Send Request Send/Receive
- * One-Way Parameter Set Bulk Send/Receive
- * One-Way Parameter Set Bulk Send Request Send/Receive
- * Handshake Parameter Set Bulk Send/Receive
- * Handshake Parameter Set Bulk Send Request/Receive Rejection/ Error Report Send/Receive

With one-way communication, the sender sends the data and immediately ends the session without any response from the receiver. This type of communication is best for one-way data transfer from a sequencer, etc.

With handshake protocol, the sender sends the data but does not advance to the next session until it receives a response from the receiver. This type of communication helps to reduce time wasted waiting for the receiver to become ready.

About Message Types

0ccccaaa

aaaa Action(Binary)

0000...IPC Individual Parameter Change (Individual Parameter Send)

0001...IPR Individual Parameter Request (Individual Parameter Send Request)

0010...BDS One Way Bulk Dump Send (One Way Data Send)

0011...BDR One Way Bulk Dump Request (One Way Data Send Request)

0100...HDS Handshake Bulk Dump Send (Handshake Data Send)

0101...HDR Handshake Bulk Dump Request (Handshake Data Send Request)

0110...HDA Handshake Bulk Dump Acknowledge (Handshake Data Send Request)

0111...HDJ Handshake Bulk Dump Reject (Handshake Data Rejection)

1000...HDE Handshake Bulk Dump Error (Handshake Data Error)

1111...NOP No operation (No Operation)

ccc Category

100...MZ-2000 Instrument Section (Sound Source)

4.1.3 Parameter Configuration

A parameter is a variable for making sound source operational settings, while a parameter set is a group of multiple parameters.

When using the MZ-2000 sound source system exclusive messages to access parameters and parameter sets, you must specify the location of data you are trying to access. The following shows the location of each type of data.

- * Category (4 bits)Parameter set category
- * Type ID (7 bits - 7 bits).....ID number inside parameter set category
- * Mdev ID (7 bits - 7 bits) ID number of memory where parameter set is stored
- * Section Number (14 bits) Section number indicating where a parameter set is stored in memory
- * PS (Parameter Set) Number (14 bits)....Number indicating where inside a section a parameter set is stored
- * Parameter ID (For parameter specification only)(16 bits)ID number of a parameter inside a parameter set
- * Parameter Block Number (For parameter specification only) (7 bits* 1 to 16)
 -Block number to which a parameter is attached inside a parameter set

In a structure where parameters with the same parameter ID are assigned to multiple blocks within the same parameter set, the block numbers must be specified specified using at least one as as many as 16 array data items.

The parameter blocks of the sound source parts and key numbers are a typical example of this. When there are parameters with the same ID for the key numbers in each part, a single parameter can be specified to substitute the part number and key number for at least one of the Block Number arrays.

Exactly how many of these values there are is covered within the explanations for each parameter.

There are two parameter formats, depending on the parameter ID: single data and array data. Array data is sent by specifying the starting element and the number of elements to be sent.

4.1.4 Individual Parameter Operations

This section describes parameter operation formats.

IPR Communication Flow

A session consists of an IPC being sent in reply to an IPR request, or an IPC being sent and the session being terminated with without a request.

When the MZ-2000 receives an IPR, it returns the corresponding parameter IPR.

When the MZ-2000 receives an IPC, it changes the value of the corresponding parameter.

Data Receiver	Data Sender
IPR ->	Send Request (Optional)
<- IPC	Data Transfer

For information about how parameters are actually assigned, see sections 4.2 through 4.11.

IPC/IPR

tt	0100aaaa	aaaa = IPC/IPR
d0[0]	00100000	Parameter Modify Message ID = 20H
d0[1]	0000cccc	cccc = Cat (Parameter Set Category)
d0[2]	0tttttt	0TTTTTTT0ttttt = Type ID
d0[3]	0TTTTTTT	
d0[4]	0mmmmmmm	0MMMMMM0mmmmmm = Mdev ID
d0[5]	0MMMMMMM	
d0[6]	0sssssss	0SSSSSS0ssssss = Section Number
d0[7]	0SSSSSSS	
d0[8]	0nnnnnnn	0NNNNNN0nnnnnn = PS Number
d0[9]	0NNNNNNN	
d0[10]	0ppppppp	qqPPPPPPpppppp = Parameter ID
d0[11]	0PPPPPPP	
d0[12]	0rbbbbqq	bbbb = number of parameter block - 1

One less than the number nested parameter block levels in the parameter configuration

bbbb=0 is interpreted as one-level parameter block nesting.

This means that at least one parameter must be associated with a parameter block.

r = array flag

0...single data

1...array data

Flag indicating whether the data immediately following it is single data or array data

☆ Parameter block number specification (number of bytes required for parameter blocks)

d1[0] 0iiiiiii 0iiiiiii = block-0 number of parameter

:

d1[bbbb] 0IIIIIII 0IIIIIII = block-bbbb number of parameter

Data indicating the block number of the parameter when parameters are nested in a parameter set

☆ Section indicating the number of data in a data array and the number of data array numbers (This data string is not necessary in the case of non-array data.)

d2[0] 0ooooooo

d2[1] 0ppppppp ooooooppoooo = top index number of array to send
(Number of array where transfer starts)

d2[2] 0qqqqqqq qqqqqqq = number of array members to send
(Number of send members in current packet)

In the case of an array that does not fit inside one packet, multiple packets are sent for the length specified by the top index number.

☆ One data size (number of bits) minus 1

d3[0] 000zzzzz
zzzzz = number of bits - 1

When zzzz + 1 is: The number of data bytes is:

1 to 7	1
8 to 14	2
15 to 21	3
22 to 28	4
29 to 32	5

☆ Following is actual data transfer format, which is added only in the case of IPC

Single Data

When the data size is 29 bits to 32 bits

d4[0] 0xxxxxxx yyyyXXXXXXXX....xxxxxxx = Data

:

d4[3] 0XXXXXXXX

d4[4] 0000yyyy

When the data size is 22 bits to 28 bits

d4[0] 0xxxxxxx yyyyyyXXXXXXXX....xxxxxxx = Data

:

d4[2] 0XXXXXXXX

d4[3] 0yyyyyyy

When the data size is 15 bits to 21 bits

d4[0] 0xxxxxxx yyyyyyXXXXXXXXxxxxxxx = Data

d4[1] 0XXXXXXXX

d4[2] 0yyyyyyy

When the data size is 8 bits to 14 bits

d4[0] 0xxxxxxx XXXXXXXXxxxxxxx = Data

d4[1] 0XXXXXXXX

When the data size is 7 bits or less

d4[0] 0xxxxxxx xxxxxxxx = Data

Array Data

When an entire array is transferred, the format is the same as that for single data.

d4[0][0] 0xxxxxxx yyyyyyy....xxxxxxx = Data

:

d4[0][X] 0yyyyyyy

d4[1][0] 0xxxxxxx yyyyyyy....xxxxxxx = Data

:

d4[1][X] 0yyyyyyy

:

d4[N][0] 0xxxxxxx yyyyyyy....xxxxxxx = Data

:

d4[N][X] 0yyyyyyy

Notes: N = ooooooppoooo - 1

X = depends on data size - 1

When zzzz + 1 is: The number of data bytes is:

1 to 7	0
8 to 14	1
14 to 21	2
22 to 28	3
29 to 32	4

4.1.5 Parameter Set Bulk Dump

This section describes the bulk format for parameter set transfers.

How parameter sets are actually allocated depends on the MZ-2000 sound source specifications. See sections 4.2 through 4.11 for more information.

Unlike the data format for individual parameter changes, a memory image is sent in order to increase the speed of the parameter set bulk dump. Pre- and post-processing required for each parameter is performed after bulk dump of all the data is complete.

You can transfer multiple parameter sets during a session. When a single parameter set is very large, it can be divided and transferred as multiple packets. In such a case, an address offset is included as part of the data.

Transferring multiple small-size parameter sets using a single packet is not allowed. Each parameter set must always be transferred as a separate packet.

One-Way Communication Flow

A session starts with a BDR request by the data receiver or a BDS data send by the data sender. The session ends after the data sender transfers the required amount of data for the number of parameter sets.

When the MZ-2000 receives a BDR, it uses a BDS to return the corresponding parameter set. When the MZ-2000 receives a BDS, it modifies the setting of the applicable parameter set.

Data is divided into packets of 256 bytes or less and transferred at fixed intervals (20 msec).

Data Receiver	Data Sender
BDR ->	Send Request (Optional)
<- BDS	Data Transfer
Interval: 20 msec minimum	
<- BDS	Data Transfer
Interval: 20 msec minimum	
<- BDS	Data Transfer
Interval: 20 msec minimum	
:	
:	

Hand Shake Protocol

A session starts with the data receiving sending an HDR request or an HDS data send from the data sender.

The data sender does not send the next packet until it receives an acknowledgement (ACK) from the data receiver. Be sure to reserve at least 100msec as the maximum wait time. If no response is received within the prescribed time, a time out error occurs and communication is terminated.

If the data receiver returns an HDE (error) due to a checksum error, illegal data format, or any other reason, the data sender resends the data. Resend the data at least one time.

The session ends after the data sender transfers the correct amount of data for the number of parameter sets, and is terminated when an ACK is returned.

Data Receiver	Data Sender
HDR ->	Send Request(Optional)
<- HDS	Data Send
HDA ->	Acknowledge
<- HDS	Data Send
HDA ->	Acknowledge
:	
:	

Resend is performed after an error due to checksum error or data format error.

Data Receiver	Data Sender
HDR ->	Send Request (Optional)
<- HDS	Data Send
HDA ->	Acknowledge
<- HDS	Data Send
HDE ->	Acknowledge
<- HDS	Data Resend
:	
:	

Send is terminated if there is no acknowledgement (ACK).

Data Receiver	Data Sender
HDR ->	Send Request (Optional)
<- HDS	Data Send
HDA ->	Acknowledge
<- HDS	Data Send
	(Send Terminated)

HDJ is sent whenever the session is terminated for any reason. HDJ can be sent from either the sender or receiver. Receipt of HDJ immediately terminates a bulk dump.

Data Receiver	Data Sender
HDR ->	Send Request (Optional)
<- HDS	Data Send
HDA ->	Acknowledge
<- HDS	Data Send
:	
HDJ ->	Data Receive Rejection
	(Send Terminated)

Data Receiver	Data Sender
HDR ->	Send Request (Optional)
HDA ->	Acknowledge
<- HDS	Data Send
HDA ->	Acknowledge
<- HDS	Data Send
:	
<- HDJ	Data Send Rejection

Parameter Set HDJ/HDA/HDE

```
tt 0100aaaa      aaaa = HDJ/HDA/HDE

      No data in the case of Rejection, Acknowledge, or Error
```

Parameter Set BDS/HDS

```
tt 0100aaaa      aaaa = BDS/HDS

d0[0] 0000cccc   cccc = Parameter Set Category
                   ooo = option (Definition for each category)

d0[1] 0ttttttt   0TTTTTTT0tttttt = Type ID
d0[2] 0TTTTTTT
d0[3] 0mmmmmmmm  0MMMMMMM0mmmmmmm = Mdev ID
d0[4] 0MMMMMMM
d0[5] 0sssssss   0SSSSSSSsssssss = Section Number
d0[6] 0SSSSSSS
d0[7] 0nnnnnnn   0NNNNNNNnnnnnnn = PS Number
d0[8] 0NNNNNNN
```


☆ Data offset (16-bit Address Offset)

d0[9] 0jjjjjj 000jjjjjjkkkkkkkklllllll
 d0[10] 0kkkkkkk = Data address offset (16 bits x data)
 d0[11] 0lllllll

Offset from PS header address specified by the PS number in the packet data
 Note that this is a 16-bit address, and not a byte address.

A session that is divided among multiple packets starts from 0 and this value is incremented by the length of each packet.

☆ Number of data items inside a packet (16-bit data is counted as 1.)

d0[12] 0mmmmmmmm 0mmmmmmmm = Data number of this packet (16bit x data)

☆ Data

d1[0][0] 0nnnnnnn ppoooooonnnnnnnn = Data (16 bits)
 d1[0][1] 0ooooooo
 d1[0][2] 000000pp
 :
 d1[N][0] 0nnnnnnn ppoooooonnnnnnnn = Data (16 bits)
 d1[N][1] 0ooooooo
 d1[N][2] 000000pp
 N = mmmmm-1

Three bytes are expressed by 16 bits, and packets can be transferred with up to 64 x 16 bits per packet.

The basic bulk dump of the MZ-2000 sound source is in 64 x 16 bit units.

ss 0sssssss checksum (value that produces 0 when added to d0[0] to ss)

Parameter Set BDR/HDR

tt 0100aaaa aaaa = BDR/HDR
 d0[0] 0ooocccc cccc = Parameter Set Category (same as BDS/HDS)
 ooo = option (same as BDS/HDS)
 d0[1] 0tttttt 0TTTTTTT0tttttt = Type ID
 d0[2] 0TTTTTTT
 d0[3] 0mmmmmmmm 0MMMMMMM0mmmmmmmm = Mdev ID
 d0[4] 0MMMMMMM
 d0[5] 0sssssss 00SSSSSSSSSSSSSS = Section Number
 d0[6] 0SSSSSS
 d0[7] 0nnnnnnn 00NNNNNNNnnnnnnn = PS Number (header PS number)
 d0[8] 0ffffff

☆ Number of requested parameter sets

d0[9] 0nnnnnnn 00mmmmmmmmnnnnnnn
 d0[10] 0mmmmmmmm
 Number of parameter sets requested by entire session.

4.2 MZ-2000 System Control

4.2.1 General

MZ-2000 system control messages enable system common functions by changing system parameters.

4.2.2 MZ-2000 System Control Message Format

The MZ-2000 System Control block is a system exclusive implementation. Only IPR and IPC are recognized, and messages are provided to send system data, for initialization, etc.

System Information Request (except avail type) IPR/IPC

tt 0000aaaa aaaa = IPC..."SYSEX_ACT_IPC" = 00H
 IPR..."SYSEX_ACT_IPR" = 01H
 d0[0] 00000000 System Parameter Access Message ID = 00H
 d1[0] 0pppppppp ppppppp = System Parameter ID
 = Parameter ID of operation
 d2[0] 0xxxxxxx Data block
 (Depends on the parameter. See the following section for details.)
 :

4.2.3 IDs and Operations of Each Control Parameter

A list of the control parameters is shown below. A parameter recognizes an IPR or IPC, depending on the parameter.

Param ID / IPR/ IPC/ Function

- 20H - * Save/Resume MidiSetup (DevID, Global Channel)
- 21H - * Tone Gen / Mixer / EffectAll Initialize
- 22H - * DSP Effect Initialize

(*...Recognizes, -...Ignores)

MIDI Setup Save/Resume

This message saves or restores the DevID and the Global Channel.

d2[0] 0aaaaaaa aaaaaa = 0...Save MIDI Setup
 1...Resume MIDI Setup

The expected operation may not be performed during MIDI playback of song data or other data when the Global Channel used for the Device ID and effector control is not fixed. The Resume MIDI Setup message can be used as described below to avoid this problem.

* When the song data starts, the Save MIDI Setup message can be sent to the MZ-2000 to save the Device ID and Global Channel and initialize these parameters to the default values shown below.

- o Device ID.....16 (10H)
- o Global Channel...Channel 1

* Receipt of the Resume MIDI Setup message after the song data is finished restores the saved Device ID and Global Channel data.

Tone Generator/Effect/Mixer Initialize

Receipt of this message initializes the sound source of the parts that can be played by MIDI, the mixer, all effector settings, and all effector insertion settings.

This function is executed when:

d2[0] 0aaaaaaa aaaaaa = 1111111 = 127

DSP Initialize

Receipt of this message initializes the mixer insertion setting and effector insertion setting.

This function is executed when:

d2[0] 0aaaaaaa aaaaaa = 1111111 = 127

4.2.3.1 Setting Examples

Example 1: Sending the Save MIDI Setup message using Universal DevID

Header Block(Hexadecimal)

```
00 F0 [System Exclusive Status]
01 44 [Manufacturer's ID] 44H = CASIO ID
02 7E [Model ID MSB] MZ-2000 Sound System Model-ID MSB
03 02 [Model ID LSB] MZ-2000 Sound System Model-ID LSB
04 00 [Message Version]
05 7F SysEx Device Id (Universal)
```

Data Block

```
06 00 tt :Message Type
07 00 d0[0] :Message Id
08 20 d1[0] :System Parameter ID
09 00 d2[0] :Data (Save = 0)
```

EOX

```
10 F7 [EOX]
```

Example 2: DSP Initialize

Header Block(Hexadecimal)

```
00 F0 [System Exclusive Status]
01 44 [Manufacturer's ID] 44H = CASIO ID
02 7E [Model ID MSB] MZ-2000 Sound System Model-ID MSB
03 02 [Model ID LSB] MZ-2000 Sound System Model-ID LSB
04 00 [Message Version]
05 10 SysEx Device Id
```

Data Block

```
06 00 tt :Message Type
07 00 d0[0] :Message Id
08 22 d1[0] :System Parameter ID
09 7F d2[0] :Data
```

EOX

```
10 F7 [EOX]
```

4.3 Patch MIDI Overview

4.3.1 MIDI Messages Received by Patch

4.3.1.1 Patch Parameter Configuration

The patch parameters can be broadly divided into the following blocks.

1. Tone Generator: Sound source setting block
2. Effect Module Select: Effect select block
3. Actual Effect: Actual effect image
4. Actual Mixer: Actual mixer image
5. Effect Macro Select: Effect macro select block

In the case of the Actual Effect and Actual Mixer, effect and mixer settings can be saved and restored by a bulk dump, which means these settings are integral parts of the patch parameter and they cannot be edited as patch parameter data. Because of this, these two blocks are not covered here.

For details on the remaining blocks, see each patch parameter block MIDI implementation as indicated below.

1. Patch Tone Generator (4.4)
2. Patch Effect Module Select (4.5)
3. Patch Effect Macro Select (4.6)

4.3.1.2 Patch Parameter Set Bulk Dump

The patch Parameter Set can be sent and received using bulk dump. There are two protocols, One-Way and Handshake, which are the same as those described under "4.1 MZ-2000 Sound Source Common System Exclusive Format."

The following shows the section that applies to effects only.

```
tt 0100aaaa aaaa = BDS..."SYSEX_ACT_BDS" = 02H
BDR..."SYSEX_ACT_BDR" = 03H
HDS..."SYSEX_ACT_HDS" = 04H
HDR..."SYSEX_ACT_HDR" = 05H
HDA..."SYSEX_ACT_HDA" = 06H
HDJ..."SYSEX_ACT_HDJ" = 07H
HDE..."SYSEX_ACT_HDE" = 08H

d0[0] 0ooooccc cccc = Parameter Set Category = Patch = 01H
ooo = 00H

d0[1] 0ttttttt 0TTTTTTT0tttttt = Type ID = 0000 Fixd
d0[2] 0TTTTTTTT
d0[3] 0mmmmmmm 0MMMMMMM0mmmmmmm = Mdev ID = Internal RAM = 2F00 Fixd
d0[4] 0MMMMMMM
d0[5] 0sssssss 0SSSSSSSsssssss = Section Number = 0000 Fixd
d0[6] 0SSSSSSS
d0[7] 0nnnnnnn 0NNNNNNNnnnnnnn = PS Number = 0000 Fixd
d0[8] 0NNNNNNN
```

The volume of data that follows the above is very large, so it is not included here. This data can be looked up by sending HDR and BDR.

4.4 Patch Tone Generator

4.4.1 General

This sound source control parameter is the tone generator block within the patch parameter.

4.4.2 Patch Tone Generator Parameter Control Message Format

```
tt 0100aaaa aaaa = IPC..."SYSEX_ACT_IPC" = 00H
IPR..."SYSEX_ACT_IPR" = 01H

d0[0] 00100000 Parameter Modify Message-ID = 20H
d0[1] 0000cccc cccc = Category = CAT_PATCH = 01H
d0[2] 0ttttttt 0TTTTTTT0tttttt = Type ID
= Tg Type ID for operation = 00H

d0[3] 0TTTTTTTT
d0[4] 0mmmmmmm 0MMMMMMM0mmmmmmm = MDEV ID = 2F00H
d0[5] 0MMMMMMM
d0[6] 0sssssss 0SSSSSSS0sssssss = Section Number = 0000Hã=fiE
d0[7] 0SSSSSSS
d0[8] 0nnnnnnn 0NNNNNNNnnnnnnn = PS Number = 00H
d0[9] 0NNNNNNN

d0[10] 0ppppppp qqPPPPPPpppppppp = Parameter ID
d0[11] 0PPPPPPP (See the following section for details.)

d0[12] 0rbbbbqq bbbb = number of parameter block - 1 = 02H
Target operation Tg Type ID => Operation Tg Type ID
(See next section.) => (See next section.)
For Scale Tune only, r = 1 => For Scale Tune only: r = 1
Other parameters are not arrays, and so r = 0.

d1[0] 0iiiiiii 0iiiiiii = I:Main Block = 00H
d1[1] 0jjjjjjj 0jjjjjjj = J:TgPatch = 00H
d1[2] 0kkkkkkk 0kkkkkkk = K:TgCommon = 00H
d1[2] 0kkkkkkk 0kkkkkkk = K:Part = 00H - 1FH(0--31) Part Index
These values are used when Part Index is specified.
```

When r = 1 only (d2[0] to d2[2])

```
d2[0] 0ooooooo
d2[1] 0ppppppp ooooooppoooo = top index number of array to send
(transfer start array number)

d2[2] 0qqqqqqq qqqqqqq = number of array member to send
(Members sent inside this packet)
```

☆ One data size (number of bits) minus 1

d3[0] 000zzzzz

zzzzz = number of bits - 1

When zzzz + 1 is: The number of data bytes is:

- 1 to 7 1
- 8 to 14 2
- 15 to 21 3
- 22 to 28 4
- 29 to 35 5

☆ Parameter Values

7 bits or less

d4[0] 0xxxxxxx xxxxxxxx = Data

8 to 14 bits

d4[0] 0xxxxxxx XXXXXXXXxxxxxxx = Data

d4[1] 0XXXXXXXX

15 to 21 bits

d4[0] 0xxxxxxx yyyyyyXXXXXXXXxxxxxxx = Data

d4[1] 0XXXXXXXX

d4[2] 0yyyyyyy

4.4.3 Patch Common Parameters

4.4.3.1 System Reverb

Para ID	Parameter	Bit	Default	Value
0000	RevMacro Reverb Macro	8	00H - 0DH	04H
	Batch resets system reverb parameters to their preset values.			
			value | macro	
			-----+-----	
			00H | Room1	
			01H | Room2	
			02H | Room3	
			03H | Hall1	
			04H | Hall2	
			05H | Plat1	
			06H | Delay	
			07H | PanDly	
			08H | Room4	
			09H | Plate2	
			0AH | Small Hall	
			0BH | Medium Hall	
			0CH | Large Hall	
			0DH | Bright Hall	
0001	RevChara Reverb Character	8	00H - 07H	04H
	Selects the system reverb program type.			
			value | character	
			-----+-----	
			00H | Room1	
			01H | Room2	
			02H | Room3	
			03H | Hall1	
			04H | Hall2	
			05H | Plat1	
			06H | Delay	
			07H | PanDI	

0002	RevPreLpf Reverb Pre Low Pass Filter	8	00H - 07H	00H
	Sets the cut off frequency value of the low pass filter (-6dB/oct), which filters the high frequency components of the sound input into system reverb.			
			value | cutoff freq.	
			-----+-----	
			00H | bypass	
			01H | 20000 (Hz)	
			02H | 8500 (Hz)	
			03H | 5500 (Hz)	
			04H | 3500 (Hz)	
			05H | 2500 (Hz)	
			06H | 1500 (Hz)	
			07H | 500 (Hz)	
0003	RevLevel Reverb Level	8	00H - 7FH	40H
	Sets the return (output) level of the reverb sound.			
			value | level	
			-----+-----	
			00H | 0 (%)	
			40H | 100 (%)	
			7FH | 200 (%)	
0004	RevTime Reverb Time	8	00H - 7FH	40H
	Sets the reverb time of the reverb sound.			
0005	RevDelayFeedback Reverb Delay Feedback	8	00H - 7FH	00H
	Sets the delay feedback level.			
	This parameter is valid only when RevChara is 6 or 7, and when RevMacro is 6 or 7. A setting of 60H or greater clips 75%.			
			value | level	
			-----+-----	
			00H | 0 (%)	
			60H | 75 (%)	
			7FH | 75 (%)	
0006	RevPreDelayTime Reverb Pre-Delay Time	8	00H - 7FH	00H
	Sets the delay time until reverb is output.			
			value | level	
			-----+-----	
			00H | 0 (ms)	
			7FH | 127 (ms)	

4.4.3.2 System Chorus

ParaID	Parameter	Bit	Default	Value
0007	ChoMacro Chorus Macro Batch sets system chorus parameters to preset values.	8	00H - 13H	02H
		value	macro	
		00H	Cho1	
		01H	Cho2	
		02H	Cho3	
		03H	Cho4	
		04H	FbCho	
		05H	FInG1	
		06H	SDly	
		07H	FbSD1	
		08H	Cho5	
		09H	Cho6	
		0AH	Cho7	
		0BH	Ens1	
		0CH	Ens2	
		0DH	Ens3	
		0EH	FInG2	
		0FH	FInG3	
		10H	FInG4	
		11H	Org1	
		12H	Org2	
		13H	Org3	
0008	ChoPreLpf Chorus Pre-low Pass Filter Sets the cut off frequency value of the low pass filter (-6dB/oct), which filters the high frequency components of the sound input into system chorus.	8	00H - 07H	00H
		value	cutoff freq.	
		00H	bypass	
		01H	20000 (Hz)	
		02H	8500 (Hz)	
		03H	5500 (Hz)	
		04H	3500 (Hz)	
		05H	2500 (Hz)	
		06H	1500 (Hz)	
		07H	500 (Hz)	
0009	ChoLevel Chorus Level Sets the return (output) level of the chorus.	8	00H - 7FH	40H
		value	level	
		00H	0 (%)	
		40H	100 (%)	
		7FH	200 (%)	
0010	ChoFeedback Chorus Feedback Sets the feedback level of the chorus sound.	8	00H - 7FH	08H
		value	level	
		00H	0 (%)	
		7FH	96.9 (%)	
0011	ChoDelay Chorus Delay Sets the delay time of the chorus sound. The delay time is calculated using the following formula. (ChoDelay / 7FH) * 23.8[msec]	8	00H - 7FH	50H

0012	ChoRate Chorus Rate Sets the LFO frequency of the chorus sound. The frequency is calculated using the following formula. (ChoRate * 15.5 / 7FH) [Hz]	8	00H - 7FH	03H
0013	ChoDepth Chorus Depth Sets the LFO modulation depth of the chorus tone. (ChoDepth + 1) / 3200 [sec]	8	00H - 7FH	13H
0014	ChoSendLevelToRev Chorus Send Level To Reverb Sets the mix level of the system chorus output sound to system reverb input.	8	00H - 7FH	00H
		value	level	
		00H	0 (%)	
		7FH	100 (%)	

4.4.3.3 Master

ParaID	Parameter	Bit	Default	Value
0016	MasterTune Master Tune Sets overall tuning. The center value is 0400H.	16	0018H - 07E8H	0400H
			0018H:	-100.0 [cent]
			0400H:	0.0 [cent]
			07E8H:	+100.0 [cent]
0017	Master Key Shift Master Key Shift Sets the overall key shift (transpose) level. The center value is 40H.	8	28H - 58H	40H
			28H:	-24 [semitones]
			40H:	0 [semitones]
			58H:	+24 [semitones]
0018	MasterVolume Master Volume Sets the overall volume level.	8	00H - 7FH	7FH
0019	MasterPan Master Pan Sets the overall pan position. The center value is 40H.	8	01H - 7FH	40H
			01H:	-63 (left)
			40H:	0 (center)
			7FH:	+64 (right)
0020	ModeSet Mode Set Performs a GS reset.	8	00H - 00H	00H
				00H Rx.only (00=GsReset)

4.4.4 Patch Part Parameter

4.4.4.1 Receive Filter Parameter

ParaID	Parameter	Bit	Default	Value
0024	Rx.Chan Receive Channel Sets the receive channel or channel message receive = OFF.	5	00H - 10H	Note
			00H - 0FH	: Receive Channel
			10H	: channel messageReceiveOFF
				AllBit: bit 0 - 4 : Receive Channel, OFF=0

0027	Rx.Bender Receive Bender Turns pitch bend change on and off.	1	0H - 1H	1H
	0H : OFF 1H : ON AllBit: bit8 : Rx.Bender			
0028	Rx.Caf Receive Channel After Touch Turns channel after touch receive on and off.	1	0H - 1H	1H
	0H : OFF 1H : ON AllBit: bit9 : Rx.Channel After			
0029	Rx.Program Turns program change receive on and off.	1	0H - 1H	1H
	0H : OFF 1H : ON AllBit: bit10 : Rx.Program Change			
0030	Rx.Control Turns control change receive on and off.	1	0H - 1H	1H
	0H : OFF 1H : ON AllBit: bit11 : Rx.Control Change			
0031	Rx.Paf Turns polyphonic after touch receive on and off.	1	0H - 1H	1H
	0H : OFF 1H : ON AllBit: bit12 : Rx.Poly After			
0032	Rx.NoteMsg Turns note message receive on and off.	1	0H - 1H	1H
	0H : OFF 1H : ON AllBit: bit13 : Rx.Note message			
0033	Rx.Rpn Turns RPN receive on and off.	1	0H - 1H	1H
	0H : OFF 1H : ON AllBit: bit14 : Rx.RPN			
0034	Rx.Nrpn Turns NRPN receive on and off. 0:OFF turns on the GM system receive, while 1:ON enables GS reset receive.	1	0H - 1H	1H
	0H : OFF 1H : ON AllBit: bit15 : Rx.NRPN			
0035	Rx.Modulation Turns modulation depth receive on and off.	1	0H - 1H	1H
	0H : OFF 1H : ON AllBit: bit16 : Rx.Modulation			
0036	Rx.Volume Turns volume receive on and off.	1	0H - 1H	1H
	0H : OFF 1H : ON AllBit: bit17 : Rx.Volume			
0037	Rx.Panpot Turns pan receive on and off.	1	0H - 1H	1H
	0H : OFF 1H : ON AllBit: bit18 : Rx.Panpot			

0038	Rx.Expression Turns expression receive on and off.	1	0H - 1H	1H
	0H : OFF 1H : ON AllBit: bit19 : Rx.Expression			
0039	Rx.Damper Turns damper (Hold 1) receive on and off.	1	0H - 1H	1H
	0H : OFF 1H : ON AllBit: bit20 : Rx.Damper			
0040	Rx.Portament Turns portamento receive on and off.	1	0H - 1H	1H
	0H : OFF 1H : ON AllBit: bit21 : Rx.Portament			
0041	Rx.Sost Turns sostenuto receive on and off.	1	0H - 1H	1H
	0H : OFF 1H : ON AllBit: bit22 : Rx.Sost			
0042	Rx.Soft Turns soft pedal receive on and off.	1	0H - 1H	1H
	0H : OFF 1H : ON AllBit: bit 23 : Rx.Soft			
0043	Rx.BankSelect Turns bank select receive on and off.	1	0H - 1H	1H
	0H : OFF 1H : ON AllBit: bit 24 : Rx.Bank Select (MSB)			
0044	Rx.BankLsb Turns bank select LSB receive on and off.	1	0H - 1H	1H
	0H : OFF 1H : ON AllBit: bit 25 : Rx.Bank LSB			

4.4.4.2 Modulation Effects

ParaID	Parameter	Bit	Default	Value
0047	ModPitch Modulation-induced pitch change	8	28H - 58H	40H 28H : -24 (semitones) 40H : 0 (semitones) 58H : +24 (semitones)
0048	ModTvfCutoff Modulation-induced TvfCutoff change	8	00H - 7FH	40H 00H : -9600 (cents) 40H : 0 (cents) 7FH : +9600 (cents)
0049	ModAmp Modulation-induced amp change	8	00H - 7FH	40H 00H : -100.0 (%) 40H : 0.0 (%) 7FH : +100.0 (%)
0050	ModLfo1Rate Modulation-induced Lfo1 frequency change	8	00H - 7FH	40H 00H : -10.0 (Hz) 40H : 0.0 (Hz) 7FH : +10.0 (Hz)

0051	ModLfo1PitchDepth	8	00H - 7FH	0AH
	Modulation-induced Lfo1 pitch modulation depth			
			00H : 0 (cents)	
			7FH : 600 (cents)	
0052	ModLfo1TvfDepth	8	00H - 7FH	0H
	Modulation-induced Lfo1 Tvf cutoff modulation depth			
			00H : 0 (cents)	
			7FH : 2400 (cents)	
0053	ModLfo1TvaDepth	8	00H - 7FH	0H
	Modulation-induced Lfo1 Tva amplitude modulation depth			
			00H : 0 (%)	
			7FH : 100 (%)	
0054	ModLfo2Rate	8	00H - 7FH	40H
	Modulation-induced Lfo2 frequency change			
			00H : -10.0 (Hz)	
			40H : 0.0 (Hz)	
			7FH : +10.0 (Hz)	
0055	ModLfo2PitchDepth	8	00H - 7FH	40H
	Modulation-induced Lfo2 pitch modulation depth			
			00H : 0 (cents)	
			7FH : 600 (cents)	
0056	ModLfo2TvfDepth	8	00H - 7FH	40H
	Modulation-induced Lfo2 Tvf cutoff modulation depth			
			00H : 0 (cents)	
			7FH : 2400 (cents)	
0057	ModLfo2TvaDepth	8	00H - 7FH	40H
	Modulation-induced Lfo2 Tva amplitude modulation depth			
			00H : 0 (%)	
			7FH : 100 (%)	

4.4.4.3 Bender Effects

ParaID	Parameter	Bit	Default	Value
0059	BendPitch	8	28H - 58H	42H
	Bender-induced pitch change			
			28H : -24 (semitones)	
			40H : 0 (semitones)	
			58H : +24 (semitones)	
0060	BendTvfCutoff	8	00H - 7FH	40H
	Bender-induced TvfCutoff change			
			00H : -9600 (cents)	
			40H : 0 (cents)	
			7FH : +9600 (cents)	
0061	BendAmp	8	00H - 7FH	40H
	Bender-induced amp change			
			00H : -100.0 (%)	
			40H : 0.0 (%)	
			7FH : +100.0 (%)	
0062	BendLfo1Rate	8	00H - 7FH	40H
	Bender-induced Lfo1 frequency change			
			00H : -10.0 (Hz)	
			40H : 0.0 (Hz)	
			7FH : +10.0 (Hz)	
0063	BendLfo1PitchDepth	8	00H - 7FH	0H
	Bender-induced Lfo1 pitch modulation depth			
			00H : 0 (cents)	
			7FH : 600 (cents)	

0064	BendLfo1TvfDepth	8	00H - 7FH	0H
	Bender-induced Lfo1 Tvf cutoff modulation depth			
			00H : 0 (cents)	
			7FH : 2400 (cents)	
0065	BendLfo1TvaDepth	8	00H - 7FH	0H
	Bender-induced Lfo1 Tva amplitude modulation depth			
			00H : 0 (%)	
			7FH : 100 (%)	
0066	BendLfo2Rate	8	00H - 7FH	40H
	Bender-induced Lfo2 frequency change			
			00H : -10.0 (Hz)	
			40H : 0.0 (Hz)	
			7FH : +10.0 (Hz)	
0067	BendLfo2PitchDepth	8	00H - 7FH	40H
	Bender-induced Lfo2 pitch modulation depth			
			00H : 0 (cents)	
			7FH : 600 (cents)	
0068	BendLfo2TvfDepth	8	00H - 7FH	40H
	Bender-induced Lfo2 Tvf cutoff modulation depth			
			00H : 0 (cents)	
			7FH : 2400 (cents)	
0069	BendLfo2TvaDepth	8	00H - 7FH	40H
	Bender-induced Lfo2 Tva amplitude modulation depth			
			00H : 0 (%)	
			7FH : 100 (%)	

4.4.4.4 Channel After Touch

ParaID	Parameter	Bit	Default	Value
0071	CAfPitch	8	28H - 58H	40H
	Channel after touch-induced pitch change			
			28H : -24 (semitones)	
			40H : 0 (semitones)	
			58H : +24 (semitones)	
0072	CAfTvfCutoff	8	00H - 7FH	40H
	Channel after touch-induced TvfCutoff change			
			00H : -9600 (cents)	
			40H : 0 (cents)	
			7FH : +9600 (cents)	
0073	CAfAmp	8	00H - 7FH	40H
	Channel after touch-induced amp change			
			00H : -100.0 (%)	
			40H : 0.0 (%)	
			7FH : +100.0 (%)	
0074	CAfLfo1Rate	8	00H - 7FH	40H
	Channel after touch-induced Lfo1 frequency change			
			00H : -10.0 (Hz)	
			40H : 0.0 (Hz)	
			7FH : +10.0 (Hz)	
0075	CAfLfo1PitchDepth	8	00H - 7FH	0H
	Channel after touch-induced Lfo1 pitch modulation depth			
			00H : 0 (cents)	
			7FH : 600 (cents)	
0076	CAfLfo1TvfDepth	8	00H - 7FH	0H
	Channel after touch-induced Lfo1 Tvf cutoff modulation depth			
			00H : 0 (cents)	
			7FH : 2400 (cents)	

0077	CAfLfo1TvaDepth	8	00H - 7FH	0H
	Channel after touch-induced Lfo1 Tva amplitude modulation depth			
			00H : 0 (%)	
			7FH : 100 (%)	
0078	CAfLfo2Rate	8	00H - 7FH	40H
	Channel after touch-induced Lfo2 frequency change			
			00H : -10.0 (Hz)	
			40H : 0.0 (Hz)	
			7FH : +10.0 (Hz)	
0079	CAfLfo2PitchDepth	8	00H - 7FH	40H
	Channel after touch-induced Lfo2 pitch modulation depth			
			00H : 0 (cents)	
			7FH : 600 (cents)	
0080	CAfLfo2TvfDepth	8	00H - 7FH	40H
	Channel after touch-induced Lfo2 Tvf cutoff modulation depth			
			00H : 0 (cents)	
			7FH : 2400 (cents)	
0081	CAfLfo2TvaDepth	8	00H - 7FH	40H
	Channel after touch-induced Lfo2 Tva amplitude modulation depth			
			00H : 0 (%)	
			7FH : 100 (%)	

4.4.4.5 Polyphonic After Touch Effects

ParaID	Parameter	Bit	Default	Value
0083	PAfPitch	8	28H - 58H	40H
	Polyphonic after touch-induced pitch change			
			28H : -24 (semitones)	
			40H : 0 (semitones)	
			58H : +24 (semitones)	
0084	PAfTvfCutoff	8	00H - 7FH	40H
	Polyphonic after touch-induced TvfCutoff change			
			00H : -9600 (cents)	
			40H : 0 (cents)	
			7FH : +9600 (cents)	
0085	PAfAmp	8	00H - 7FH	40H
	Polyphonic after touch-induced amp change			
			00H : -100.0 (%)	
			40H : 0.0 (%)	
			7FH : +100.0 (%)	
0086	PAfLfo1Rate	8	00H - 7FH	40H
	Polyphonic after touch-induced Lfo1 frequency change			
			00H : -10.0 (Hz)	
			40H : 0.0 (Hz)	
			7FH : +10.0 (Hz)	
0087	PAfLfo1PitchDepth	8	00H - 7FH	0H
	Polyphonic after touch-induced Lfo1 pitch modulation depth			
			00H : 0 (cents)	
			7FH : 600 (cents)	
0088	PAfLfo1TvfDepth	8	00H - 7FH	0H
	Polyphonic after touch-induced Lfo1 Tvf cutoff modulation depth			
			00H : 0 (cents)	
			7FH : 2400 (cents)	
0089	PAfLfo1TvaDepth	8	00H - 7FH	0H
	Polyphonic after touch-induced Lfo1 Tva amplitude modulation depth			
			00H : 0 (%)	
			7FH : 100 (%)	

0090	PAfLfo2Rate	8	00H - 7FH	40H
	Polyphonic after touch-induced Lfo2 frequency change			
			00H : -10.0 (Hz)	
			40H : 0.0 (Hz)	
			7FH : +10.0 (Hz)	
0091	PAfLfo2PitchDepth	8	00H - 7FH	40H
	Polyphonic after touch-induced Lfo2 pitch modulation depth			
			00H : 0 (cents)	
			7FH : 600 (cents)	
0092	PAfLfo2TvfDepth	8	00H - 7FH	40H
	Polyphonic after touch-induced Lfo2 Tvf cutoff modulation depth			
			00H : 0 (cents)	
			7FH : 2400 (cents)	
0093	PAfLfo2TvaDepth	8	00H - 7FH	40H
	Polyphonic after touch-induced Lfo2 Tva amplitude modulation depth			
			00H : 0 (%)	
			7FH : 100 (%)	

4.4.4.6 Continuous Controller 1 Effects

ParaID	Parameter	Bit	Default	Value
0095	CC1Pitch	8	28H - 58H	40H
	Continuous Controller 1-induced pitch change			
			28H : -24 (semitones)	
			40H : 0 (semitones)	
			58H : +24 (semitones)	
0096	CC1TvfCutoff	8	00H - 7FH	40H
	Continuous Controller 1-induced TvfCutoff change			
			00H : -9600 (cents)	
			40H : 0 (cents)	
			7FH : +9600 (cents)	
0097	CC1Amp	8	00H - 7FH	40H
	Continuous Controller 1-induced amp change			
			00H : -100.0 (%)	
			40H : 0.0 (%)	
			7FH : +100.0 (%)	
0098	CC1Lfo1Rate	8	00H - 7FH	40H
	Continuous Controller-induced Lfo1 frequency change			
			00H : -10.0 (Hz)	
			40H : 0.0 (Hz)	
			7FH : +10.0 (Hz)	
0099	CC1Lfo1PitchDepth	8	00H - 7FH	0H
	Continuous Controller 1-induced Lfo1 pitch modulation depth			
			00H : 0 (cents)	
			7FH : 600 (cents)	
0100	CC1Lfo1TvfDepth	8	00H - 7FH	0H
	Continuous Controller 1-induced Lfo1 Tvf cutoff modulation depth			
			00H : 0 (cents)	
			7FH : 2400 (cents)	
0101	CC1Lfo1TvaDepth	8	00H - 7FH	0H
	Continuous Controller 1-induced Lfo1 Tva amplitude modulation depth			
			00H : 0 (%)	
			7FH : 100 (%)	
0102	CC1Lfo2Rate	8	00H - 7FH	40H
	Continuous Controller 1-induced Lfo2 frequency change			
			00H : -10.0 (Hz)	
			40H : 0.0 (Hz)	
			7FH : +10.0 (Hz)	

0103	CC1Lfo2PitchDepth	8	00H - 7FH	40H
	Continuous Controller 1-induced Lfo2 pitch modulation depth			
	00H :	0 (cents)		
	7FH :	600 (cents)		
0104	CC1Lfo2TvfDepth	8	00H - 7FH	40H
	Continuous Controller 1-induced Lfo2 Tvf cutoff modulation depth			
	00H :	0 (cents)		
	7FH :	2400 (cents)		
0105	CC1Lfo2TvaDepth	8	00H - 7FH	40H
	Continuous Controller 1-induced Lfo2 Tva amplitude modulation depth			
	00H :	0 (%)		
	7FH :	100 (%)		

4.4.4.7 Continuous Controller 2

ParaID	Parameter	Bit	Default	Value
0107	CC2Pitch Continuous Controller 2-induced pitch change	8	28H - 58H	40H
	28H :	-24 (semitones)		
	40H :	0 (semitones)		
	58H :	+24 (semitones)		
0108	CC2TvfCutoff Continuous Controller 2-induced TvfCutoff change	8	00H - 7FH	40H
	00H :	-9600 (cents)		
	40H :	0 (cents)		
	7FH :	+9600 (cents)		
0109	CC2Amp Continuous Controller 2-induced amp change	8	00H - 7FH	40H
	00H :	-100.0 (%)		
	40H :	0.0 (%)		
	7FH :	+100.0 (%)		
0110	CC2Lfo1Rate Continuous Controller-induced Lfo2 frequency change	8	00H - 7FH	40H
	00H :	-10.0 (Hz)		
	40H :	0.0 (Hz)		
	7FH :	+10.0 (Hz)		
0111	CC2Lfo1PitchDepth Continuous Controller 2-induced Lfo1 pitch modulation depth	8	00H - 7FH	0H
	00H :	0 (cents)		
	7FH :	600 (cents)		
0112	CC2Lfo1TvfDepth Continuous Controller 2-induced Lfo1 Tvf cutoff modulation depth	8	00H - 7FH	0H
	00H :	0 (cents)		
	7FH :	2400 (cents)		
0113	CC2Lfo1TvaDepth Continuous Controller 2-induced Lfo1 Tva amplitude modulation depth	8	00H - 7FH	0H
	00H :	0 (%)		
	00H :	0 (%)		
	7FH :	100 (%)		
0114	CC2Lfo2Rate Continuous Controller 2-induced Lfo2 frequency change	8	00H - 7FH	40H
	00H :	-10.0 (Hz)		
	40H :	0.0 (Hz)		
	7FH :	+10.0 (Hz)		
0115	CC2Lfo2PitchDepth Continuous Controller 2-induced Lfo2 pitch modulation depth	8	00H - 7FH	40H
	00H :	0 (cents)		
	7FH :	600 (cents)		

0116	CC2Lfo2TvfDepth	8	00H - 7FH	40H
	Continuous Controller 2-induced Lfo2 Tvf cutoff modulation depth			
	00H :	0 (cents)		
	7FH :	2400 (cents)		
0117	CC2Lfo2TvaDepth	8	00H - 7FH	40H
	Continuous Controller 2-induced Lfo2 Tva amplitude modulation depth			
	00H :	0 (%)		
	7FH :	100 (%)		

4.4.4.8 Scale Tuning

ParaID	Parameter	Bit	Default	Value	Array
--------	-----------	-----	---------	-------	-------

0119	ScaleTune[ScaleNum]	8	00H - 7FH	40H	1																										
	Scale Tuning																														
	This function fine tunes the 12 notes of a scale. It can be used to specify a temperament, such as equal temperament, just intonation, etc.																														
	<table border="0"> <tr> <td>key</td> <td> C</td> <td> C#</td> <td> D</td> <td> D#</td> <td> E</td> <td> F</td> <td> F#</td> <td> G</td> <td> G#</td> <td> A</td> <td> Bb</td> <td> B</td> </tr> <tr> <td>ScaleNum</td> <td> 0</td> <td> 1</td> <td> 2</td> <td> 3</td> <td> 4</td> <td> 5</td> <td> 6</td> <td> 7</td> <td> 8</td> <td> 9</td> <td> 10</td> <td> 11</td> </tr> </table>					key	C	C#	D	D#	E	F	F#	G	G#	A	Bb	B	ScaleNum	0	1	2	3	4	5	6	7	8	9	10	11
key	C	C#	D	D#	E	F	F#	G	G#	A	Bb	B																			
ScaleNum	0	1	2	3	4	5	6	7	8	9	10	11																			
	ScaleNum sets the tuning within the range of 0 through 11. The center value is 40H.																														
				00H :	-64 (cents)																										
				40H :	0 (cents)																										
				7FH :	+63 (cents)																										

Note
With the MZ-2000, the scale number and length settings can be used to specify a single location or a one-time setting of consecutive multiple scales.

4.4.4.9 Other Parameters

ParaID	Parameter	Bit	Default	Value
--------	-----------	-----	---------	-------

0121	PitchFineTune Pitch Fine Tune Pitch fine tuning. The center value is 2000H	16	0000H - 3FFFH	2000H
				0000H : -100 (cents)
				2000H : 0 (cents)
				3FFFH : +100 (cents)
0122	KeyShift Key Shift (Transpose) Key shift level. The center value is 40H.	8	28H - 58H	40H
				28H : -24 (semitones)
				40H : 0 (semitones)
				58H : +24 (semitones)
0123	KeyRangeHi Key Range High Maximum receivable note number	8	00H - 7FH	7FH
0124	KeyRangeLo Key Range Low Minimum receivable note number	8	00H - 7FH	00H
0125	Level Level Tone volume level. The center value is 64H.	8	00H - 7FH	64H
0126	Pan Pan position. The center value is 40H. A value of 00H specifies a random pan position for each note on message.	8	00H - 7FH	40H
				00H : -- (random)
				01H : -63 (left)
				40H : 0 (center)
				7FH : +63 (right)
0127	ChoSend Chorus Send Send level to system chorus	8	00H - 7FH	00H

0128	RevSend Reverb Send Send level to system reverb	8	00H - 7FH	28H	
0129	VeloSenseDepth Velocity Sense Depth Extent to which the velocity effect changes a note. The larger the value, the greater the change.	8	00H - 7FH	40H	
0130	VeloSenseOffset Velocity Sense Offset This indicates with how much force the note should be played Specifies the note force offset for the velocity value. The greater the value, the more forcibly a note is played for the same velocity value. The center value is 40H.	8	00H - 7FH	40H	
0131	CC1Number Continuous Controller 1 Number Specifies the Continuous Controller 1 number.	8	00H - 5FH	10H	
0132	CC2Number Continuous Controller 2 Number Specifies the Continuous Controller 2 number.	8	00H - 5FH	11H	
0133	VibratoRate Vibrato Rate Specifies the vibrato rate. (=NRPN:8) The greater the value, the faster the rate. The center value is 40H.	8	00H - 7FH	40H	00H : -64 40H : 0 7FH : +63
0134	VibratoDepth Vibrato Depth Specifies the vibrato depth. (=NRPN:9) The greater the value, the deeper the depth. The center value is 40H.	8	00H - 7FH	40H	00H : -64 40H : 0 7FH : +63
0135	TvfCutoffFreq TVF Cutoff Frequency Specifies the TVF cutoff frequency. (=NRPN:32) The greater the value, the brighter the tone. The center value is 40H.	8	00H - 7FH	40H	00H : -64 40H : 0 7FH : +63
0136	TvfResonance TVF Resonance Specifies the TVF Resonance. (=NRPN:33) The greater the value, the more distinctive the tone. The center value is 40H.	8	00H - 7FH	40H	00H : -64 40H : 0 7FH : +63
0137	TvfTvaEnvAttack TVF-TVA Envelope Attack Specifies the TVF and TVA envelope attack rate. (=NRPN:99) The greater the value, the sharper faster the attack and the sharper the tone. The center value is 40H.	8	00H - 7FH	40H	00H : -64 40H : 0 7FH : +63
0138	TvfTvaEnvDecay TVF/TVA Envelope Decay Specifies the TVF and TVA envelope decay rate. (=NRPN:100) The greater the value, the faster the decay of the tone while keyboard keys are depressed. The center value is 40H.	8	00H - 7FH	40H	00H : -64 40H : 0 7FH : +63
0139	TvfTvaEnvRelease TVF/TVA Envelop Release Specifies the TVF and TVA envelope release rate. (=NRPN:102) The greater the value, the faster the decay of the tone when keyboard keys are released. The center value is 40H.	8	00H - 7FH	40H	00H : -64 40H : 0 7FH : +63
0140	VibrateDelay Vibrato Delay Specifies the vibrato delay length. (=NRPN:10) The greater the value, the longer the delay length. The center value is 40H.	8	00H - 7FH	40H	00H : -64 40H : 0 7FH : +63
0141	BankNumberMSB Bank Number Tone bank number.	8	00H - 7FH	00H	
0142	ProgNum Program Number Tone program number.	8	00H - 7FH	00H	
0143	ToneMapNum Tone Map Number Tone map number. 00h:[88](=CC 0:Selected, 1:PresetMap)	8	00H - 01H	00H	
0144	ToneMap0Num Tone Map 0 Number 01H: PresetMap	8	01H - 01H	01H	
0145	MonoPoly Mono/Poly Mode Single notes only can be played in the Mono mode. Chords and other multiple notes can be played in the Poly mode. 0H : Mono Mode 1H : Poly Mode	1	0H - 1H	1H	
0146	AssignMode Assign Mode Specifies the operation when note on for the same note is received. When Single is specified, the currently sounding note is turned off. When Multi is specified, the currently sounding note continues to sound along with the new note.	2	0H - 1H	1H	0H : Single 1H : Multi
0147	UseDrumPart Use Drum Part 0H : OFF(Normal Part) 1H : Map1(Drum Part) 2H : Map2(Drum Part) 3H : Map3(Drum Part) 4H : Map4(Drum Part)	3	0H - 4H	0H	
0148	EqLowFreq EQ Low Frequency Cutoff frequency of the low shelving equalizer.	2	0H - 3H	0H	0H : 200 (Hz) 1H : 400 (Hz) 2H : 800 (Hz) 3H : 1600 (Hz)
0149	EqLowGain EQ Low Gain Gain of the low shelving equalizer	4	00H - 0CH	06H	0H : -6 (dB) 6H : 0 (dB) cH : +6 (dB)

0150 EqHighFreq 2 0H - 3H 0H
 EQ High Frequency
 Specifies cutoff frequency of the high shelving equalizer.
 0H : 2 (KHz)
 1H : 4 (KHz)
 2H : 8 (KHz)
 3H : 16 (KHz)

0151 EqHighGain 4 00H - 0CH 06H
 EQ High Gain
 Gain of the high shelving equalizer
 0H : -6 (dB)
 6H : 0 (dB)
 CH : +6 (dB)

4.4.4.10 Example Settings

Example 1: To the Patch Common Master Key Shift setting to 3

Header Block (Hexadecimal)

```
00 F0 [System Exclusive Status]
01 44 [Manufacturer's ID] 44H = CASIO ID
02 7E [Model ID MSB] MZ-2000 Sound System Model-ID MSB
03 02 [Model ID LSB] MZ-2000 Sound System Model-ID LSB
04 00 [Message Version]
05 10 SysEx Device Id
Data Block
06 40 tt :Message Type
07 20 d0[0] :Message Id
08 01 d0[1] :CAT PATCH
09 00 d0[2] :Type Id LSB : **00H
10 00 d0[3] :Type Id MSB : 00**H
11 00 d0[4] :MdevId LSB :
12 2F d0[5] :MdevId MSB :
13 00 d0[6] :Section Number LSB
14 00 d0[7] :Section Number MSB
15 00 d0[8] :Parameter Set Number LSB
16 00 d0[9] :Parameter Set Number MSB
17 11 d0[10] :Parameter ID LSB
18 00 d0[11] :Parameter ID :
19 08 d0[12] :Parameter ID MSB & Block Number & Array Flag

20 00 d1[0] :Main Block
21 00 d1[1] :Tg Block
22 00 d1[2] :Common Block

23 07 d3[0] :Number of Data Bit - 1
24 03 d4[0] :Data LSB
25 00 d4[1] :Data MSB
EOX
26 F7 [EOX]
```

Example 2: To set the Part 2 Receive Channe to 05H (Channel 6)

Header Block (Hexadecimal)

```
00 F0 [System Exclusive Status]
01 44 [Manufacturer's ID] 44H = CASIO ID
02 7E [Model ID MSB] MZ-2000 Sound System Model-ID MSB
03 02 [Model ID LSB] MZ-2000 Sound System Model-ID LSB
04 00 [Message Version]
05 10 SysEx Device Id
Data Block
06 40 tt :Message Type
07 20 d0[0] :Message Id
08 01 d0[1] :CAT PATCH
09 00 d0[2] :Type Id LSB : **00H
10 00 d0[3] :Type Id MSB : 00**H
11 00 d0[4] :MdevId LSB :
12 2F d0[5] :MdevId MSB :
13 00 d0[6] :Section Number LSB
14 00 d0[7] :Section Number MSB
15 00 d0[8] :Parameter Set Number LSB
```

```
16 00 d0[9] :Parameter Set Number MSB
17 18 d0[10] :Parameter ID LSB
18 00 d0[11] :Parameter ID :
19 08 d0[12] :Parameter ID MSB & Block Number & Array Flag

20 00 d1[0] :I:Main Block
21 00 d1[1] :J:Tg Block
22 02 d1[2] :K:Patch Block( Part 2 )
23 04 d3[0] :Number of Data Bit - 1
24 05 d4[0] :Data LSB
EOX
25 F7 [EOX]
```

Example: To Part 7 Scale Tune D#,E,F,F# to 1,2,3,4¢ respectively. This is an example of setting the Array Flag.

Header Block (Hexadecimal)

```
00 F0 [System Exclusive Status]
01 44 [Manufacturer's ID] 44H = CASIO ID
02 7E [Model ID MSB] MZ-2000 Sound System Model-ID MSB
03 02 [Model ID LSB] MZ-2000 Sound System Model-ID LSB
04 00 [Message Version]
05 10 SysEx Device Id
Data Block
06 40 tt :Message Type
07 20 d0[0] :Message Id
08 01 d0[1] :CAT PATCH
09 00 d0[2] :Type Id LSB : **00H
10 00 d0[3] :Type Id MSB : 00**H
11 00 d0[4] :MdevId LSB :
12 2F d0[5] :MdevId MSB :
13 00 d0[6] :Section Number LSB
14 00 d0[7] :Section Number MSB
15 00 d0[8] :Parameter Set Number LSB
16 00 d0[9] :Parameter Set Number MSB
17 77 d0[10] :Parameter ID LSB
18 00 d0[11] :Parameter ID :
19 48 d0[12] :Parameter ID MSB & Block Number & Array Flag

20 00 d1[0] :I:Main Block
21 00 d1[1] :J:Tg Block
22 07 d1[2] :K:Patch Block( Part 7 )
23 00 d2[0] :o:top index number of array to send (MSB)
24 03 d2[1] :p:top index number of array to send (LSB)
25 04 d2[2] :q:number of array member to send
26 07 d3[0] :Number of Data Bit - 1
27 01 d4[0] :Data LSB : D# 1¢
28 00 d4[1] :Data MSB : D# 1¢
29 02 d4[0] :Data LSB : E 2¢
30 00 d4[1] :Data MSB : E 2¢
31 03 d4[0] :Data LSB : F 3¢
32 00 d4[1] :Data MSB : F 3¢
33 04 d4[0] :Data LSB : F# 4¢
34 00 d4[1] :Data MSB : F# 4¢
EOX
35 F7 [EOX]
```

4.5 Selecting Patch Effects

4.5.1 General

These parameters are used to select individual effect modules. When selecting an effect, you can specify effect preset data by sending the following three parameters.

- * Memory Device ID = 2F00H (Fixed value)
- * TypeID =Assigned effect type (See "4.8 Effects.")
- * Number = Assigned effect number (See "4.8 Effects.")

4.5.2 Common Format for Patch Effect Selection Parameter Control

```

tt      0100aaaa      aaaa = IPC..."SYSEX_ACT_IPC" = 00H
                    IPR..."SYSEX_ACT_IPR" = 01H

d0[0]  00100000      20H Parmeter Modify Message ID
d0[1]  0000cccc      cccc = Category = CAT_PAT = 01H
d0[2]  0ttttttt      0TTTTTTT0tttttt = Type ID = _PatchId00 = 0000H
d0[3]  0TTTTTTTTT
d0[4]  0mmmmmmmm      0MMMMMMM0mmmmmmmm = MDEV ID = 2F00H (RAM)
d0[5]  0MMMMMMMMM
d0[6]  0sssssss      0SSSSSS0sssssss = Section = 0000H Fixed
d0[7]  0SSSSSSS
d0[8]  0nnnnnnn      0NNNNNNNnnnnnnn = PS Number = 0000H Fixed
d0[9]  0NNNNNNN
d0[10] 0ppppppp      qqPPPPPPppppppp = Parameter ID
d0[11] 0PPPPPPP      = Parameter ID of operation target
                    (See following section.)

d0[12] 0rbbbqq bbbb = number of parameter block - 1 = 04H
                    r = array flag
                    FX (Effect) Select is not an array parameter, so its value is fixed at 00H.

d1[0]  0iiiiiii 0iiiiiii = block-0 number of parameter = 00H
d1[1]  0jjjjjjj 0jjjjjjj = block-1 number of parameter = 00H
d1[2]  0kkkkkkk 0kkkkkkk = block-2 number of parameter = Effect Part Number
                    This is the part number that selects the effect (Fx). The part number is defined as
                    shown below.
    
```

Line/Segment	Part#

DSP1 / Segment 0	0000H
Segment 1	0001H
Segment 2	0002H
Segment 3	0003H
DSP2 / Segment 0	0004H
Segment 1	0005H
Segment 2	0006H
Segment 3	0007H
DSP3 / Segment 0	0008H
Segment 1	0009H
Segment 2 ...	000AH
Segment 3	000BH
DSP4 / Segment 0	000CH
Segment 1 ...	000DH
Segment 2	000EH
Segment 3	000FH
Master	0010H
System Chorus	0011H
System Reverb	0012H
System Noise Gate	0013H

```

d1[3]  0lllllll 0lllllll = block-3 number of parameter = 00H
d1[4]  0mmmmmmm 0mmmmmmm = block-4 number of parameter = 00H
    
```

☆ One data size (number of bits) minus 1
(Depends on the parameter. See the following section for details.)

```

d3[0]  000zzzzz
                    zzzzz = number of bits - 1
    
```

When zzzz + 1 is: The number of data bytes is:

- 1 to 7 1
- 8 to 14 2
- 15 to 21 3
- 22 to 28 4
- 29 to 35 5

Fx (Effect) Select Mdev Parameter, for example, is 16-bit data with the following values:

```

zzzzz = 15
Data bytes = 3
    
```

☆ Parameter Value

(Depends on the parameter. See 4.5.3 for details.)

```

16 bits
d4[0] 0xxxxxxx yyXXXXXXXXxxxxxxx = Data
d4[1] 0XXXXXXXX
d4[2] 000000yy
    
```

4.5.3 Parameter Ids and Bit Sizes

The following three parameters can be used to specify the effect parameter set for the source you want to call up.

ParaID	Parameter	Bit*Len	Value

0098H	MdevID	16	Fx (Effect) Parameter Set MdevID = BankROM = 1F00H
0099H	TypeID	16	Fx (Effect) Parameter Set TypeID *Note 1
009AH	Num	16	Serial number 0000H - Maximum number (depends on the effect) inside memory device with same ID indicated by Mdev-Type

*Note 1
See "MIDI Implementation" for information about TypeID.

4.5.4 Patch Parameter Effect Select Bulk Dump

This effect select block is also sent when performing a patch parameter bulk dump, but the effect select block cannot be sent as a bulk dump alone.

4.6 Patch Effect Macro Select

4.6.1 Patch Parameter Effect Macro Select

The following parameter values can be sent in order to actually specify effect macro preset data.

* Num = Number of macro to be assigned (See the "MZ-2000 Effect Module Preset List.")
The array number at this time is indicated by the DSP part.

4.6.2 Effect Macro Select Parameter Control Message Format

When performing an operation or reference of the patch parameter's effect select parameter, create and send a message like the one below that specifies the appropriate effect part and parameter ID.

```

tt      0100aaaa      aaaa = IPC..."SYSEX_ACT_IPC" = 00H
                    IPR..."SYSEX_ACT_IPR" = 01H

d0[0]  00100000      Parmeter Modify Message ID = 20H
d0[1]  0000cccc      cccc = Category = CAT_PAT = 01H
d0[2]  0ttttttt      0TTTTTTT0tttttt = Type ID = _PatchId00 = 0000H
d0[3]  0TTTTTTTTT
d0[4]  0mmmmmmmm      0MMMMMMM0mmmmmmmm = MDEV ID = 2F00H (RAM)
d0[5]  0MMMMMMMMM
d0[6]  0sssssss      0SSSSSS0sssssss = Section = 0000H Fixed
d0[7]  0SSSSSSS
d0[8]  0nnnnnnn      0NNNNNNNnnnnnnn = PS Number = 0000H Fixed
d0[9]  0NNNNNNN

d0[10] 0ppppppp      qqPPPPPPppppppp = Parameter ID
d0[11] 0PPPPPPP      = Applicable Parameter ID
                    (See the next section.)
    
```

```

d0[12] 0rbbbqq bbbb = number of parameter block - 1 = 04H
                    r = array flag
                    Fx (Effect) Select is an array parameter, so its value is fixed at 01H.
    
```

```

d1[0]  0iiiiiii 0iiiiiii = block-0 number of parameter = 00H
d1[1]  0jjjjjjj 0jjjjjjj = block-1 number of parameter = 00H
d1[2]  0kkkkkkk 0kkkkkkk = block-2 number of parameter = 00H
d1[3]  0lllllll 0lllllll = block-3 number of parameter = 00H
d1[4]  0mmmmmmm 0mmmmmmm = block-4 number of parameter = 00H
    
```

☆ Data array number

d2[0] 0ooooooo
 d2[1] 0ppppppp ooooooppoooo = top index number of array to send
 (Send start array number)
 The length of Fx (Effect) Macro is 4, so this value is 0000H to 0003H.

d2[2] 0qqqqqqq qqqqqqq = number of array members to send
 (Number of send members in current packet)
 The length of Fx (Effect) Macro is 4, so this value is 0000H to 0003H.

☆ One data size (number of bits) minus 1
 (Depends on the parameter. See the following section for details.)

d3[0] 000zzzzz
 zzzzz = number of bits - 1

When zzzz + 1 is: The number of data bytes is:

- 1 to 7 1
- 8 to 14 2
- 15 to 21 3
- 22 to 28 4
- 29 to 35 5

Fx (Effect) Select Mdev Parameter, for example, is 16-bit data with the following values:
 Data bytes = 3

☆ Parameter Values

(Depends on the parameter. See 4.5.3 for details.)

16 bits
 d4[0] 0xxxxxxx yyXXXXXXXXxxxxxxx = Data
 d4[1] 0XXXXXXXX
 d4[2] 000000yy

4.6.3 Parameter IDs and Bit Sizes

The following parameter can be used to specify the effect parameter set for the source you want to call up.

ParaID	Parameter	Bit*Len	Index #	Value
009DH	Num	16*4	DSP	Fx (Effect) Macro Parameter Set #
			0...DSP1	0000H - 7F7FH
			1...DSP2	
			2...DSP3	
			3...DSP4	

4.6.4 Patch Parameter Effect Macro Select Block Bulk Dump

This effect macro select block is also sent when performing a patch parameter bulk dump, but the effect macro select block cannot be sent as a bulk dump alone.

4.7 Drawbar Tone Generator

4.7.1 Drawbar TG Parameter Settings

This section provides information on the following two items.

- * MIDI messages received by UserDorg(Tg)
- * MIDI messages receive by parts received by the part receiving a drawbar Program Change message

4.7.2 Parameter Operations

tt 0100aaaa aaaa = IPC..."SYSEX_ACT_IPC" (00H)
 IPR..."SYSEX_ACT_IPR" (01H)
 d0[0] 00100000 20H Parmeter Modify Message ID
 d0[1] 0000cccc cccc = Category = CAT_TG (02H)
 d0[2] 0tttttt 0TTTTTTT0ttttt = Type ID
 = Operation target Tg Type ID = 02H
 d0[3] 0TTTTTTT
 d0[4] 0mmmmmmm 0MMMMMM0mmmmmm = MDEV ID = 2F00H
 d0[5] 0MMMMMMM
 d0[6] 0sssssss 0SSSSSS0ssssss = Section Number = 0000H:UserDorg
 0001H:TempDorg
 d0[7] 0SSSSSSS

The section number is closely related to the PS number indicated by d0[8]. The PS Number is recorded in the d0[8]PS Number item.

Section UserDorg

Edited parameters are stored in this section when saved.
 When this section is edited, the edited parameters are not reflected in the tone until the applicable user drawbar tones are assigned to Part by a program change message, etc.

Note

Even if the applicable user drawbar tone is already assigned to Part, edits are not reflected until the tone is assigned again.
 See Section TempDorg, below.

Section TempDorg

This section (parameter area) is reserved for note playing purposes.
 When a drawbar tone is selected by BankMSB/ProgramChange, the preset tone and user tone parameters are copied to this section.

When a part has a Drawbar tone assigned to it and d0[8], d0[9] of a received MIDI message specifies the corresponding Parameter Set, the Fctt setting change is reflected immediately, while all other parameter changes are reflected the next time the part is played.

Note

Since this is a temporary area, the original PresetDrawbar/UserDrawbar settings are restored whenever the program number is called up again by Part.

d0[8] 0nnnnnnn 00NNNNNNnnnnnnn = PS Number = Usertone number 0 to 39, or
 d0[9] 0NNNNNNN Oscillation Temporary Tone Number

User Tone Numbers: 0 to 39

These parameter set numbers correspond to user drawbar tone numbers.
 To edit user tones by directly specifying a user drawbar tone, specify UserDorg for section d0[7].

Oscillation Temporary Tone Numbers: 0 to 59

These parameter set numbers correspond to oscillation temporary area numbers.
 Use these numbers when you want to reflect a drawbar tone in a previously selected part immediately.

The following shows the relationship between the specified parameter set number, and then preset tone numbers and user tone numbers.

- 0 to 19 : Preset drawbar tone numbers 0 to 19
- 20 to 59 : User Drawbar tone numbers 0 to 39

d0[10] 0ppppppp qqPPPPPPppppppp = Parameter ID
 d0[11] 0PPPPPPP
 d0[12] 0rbbbbqq bbbb = Number of parameter block - 1 = 02H
 r = array flag
 In the case of TgTypeDorg, the char Feet[_MaxDrawbar]; preset member is r = 1.
 In other cases, r = 0.

d1[0] 0iiiiiii 0iiiiiii = I:Main Block = 0

d1[1] 0jjjjjjj 0jjjjjjj = J:TgCommon = 0

d1[1] 0jjjjjjj 0jjjjjjj = J:Preset = 0

d1[2] 0kkkkkkk 0kkkkkkk = K:PresetWave = 0

hen r = 1 only (d2[0] to d2[2])

d2[0] 0ooooooo

d2[1] 0ppppppp oooooopprrrrrr = top index number of array to send
(Send start array number)

d2[2] 0qqqqqqq qqqqqqq = number of array member to send
(Send members in current packet)

☆ One data size (number of bits) minus 1

d3[0] 000zzzzz

zzzzz = number of bits - 1

When zzzz + 1 is: The number of data bytes is:

1 to 7 1

8 to 14 2

15 to 21 3

22 to 28 4

29 to 34 5

☆ Parameter Bits

7 bits

d4[0] 0xxxxxxx xxxxxxx = Data

8 to 14 bits

d4[0] 0xxxxxxx XXXXXXxxxxxxx = Data

d4[1] 0XXXXXXX

15 to 21 bits

d4[0] 0xxxxxxx yyyyyyyXXXXXXXXxxxxxxx = Data

d4[1] 0XXXXXXX

d4[2] 0yyyyyyy

4.7.3 Parameter IDs and Value Ranges

4.7.3.1 Drawbar TG Common Parameter

ParaID	Bit	Parameter	min	max	def
0	8	Volume	00H	FFH	80H
Volume balance between tones (0 -- 128 -- 255)					
0.0 -- 1.0 -- 1.99					

4.7.3.2 Setting Parameters

ParaID	Bit	Parameter	min	max	def
8	8	Feet	00H	7FH	--
Note: r = array flag = 1 Array Size = 9 Insert required data into the d2[] field. This parameter does not reflect foot changes in real time.					
Use the MIDI Control Change (NRPN) message when you want to change the foot balance while playing. The user drawbar parameter area is mainly used for editing.					
9	7	Attack Time	00H	7FH	40H
default: 64 Sustained tone This is the exclusive drawbar tone sustained tone Attack Time Modify. The initial value depends on the preset tone. As with Tone Modify, the value is offset by 64.					
10	1	SusOn	00H	01H	00H
Sustained Tone Release Time Modify default:0:(off), 1:(on) Sustain On/Off Specifies whether Sustain Time should be reflected.					

11	7	SustainTime	00H	7FH	40H;
This is the exclusive drawbar tone steady tone Release Time Modify. This setting is used exclusively for modifying the attack time of the drawbar tone steady tone. The initial value depends on the preset tone. As with Tone Modify, the value is offset by 64.					
14	1	Click	00H	01H	01H Default: 1(on), 0(off)
15	1	OffClick	00H	01H	01H Default:1(on), 0(off)
16	2	Percussion	00H	03H	00H
Off: 0, Second: 1, Third: 2, 2nd&3rd: 3 Note: The structure of HAMMOND B-3 makes it impossible to select 2nd&3rd.					
17	2	SlowFast	00H	02H	00H
Percussive Decay Time 0 (off): Default 1 (Slow): Slow Time 2 (Fast): Fast Time					
18	7	PercOnNormalLevel	00H	7FH	40H
Sustained Tone Level for PercussiveOn					
19	1	Soft	00H	01H	00H
Default: 0:(off), 1(on)					
20	4	PercSoftLevel	00H	0FH	06H
Percussive Level for SoftOn, 6 initial default value					
21	4	PercDefaultLevel	00H	0FH	0AH
Percussive Level for SoftOff, 10 initial default value					
22	7	FastTime	00H	7FH	40H
Percussion Decay Time Modify Value The initial value depends on the preset tone. Decay Time Modify (Value:0 to 127) As with Tone Modify, the value is offset by 64. Operation is the same as Tone Decay Time Modify.					
24	7	SlowTime	00H	7FH	40H
Percussion Decay Time Modify Value The initial value depends on the preset tone. Decay Time Modify (Value:0 to 127) As with Tone Modify, the value is offset by 64. Operation is the same as Tone Decay Time Modify.					
32	16	WaveNumber	0000H	0001H	----
0 = Sin Wave 1 = Vintage Selects the original waveform for waveform combination. Vintage is a waveform that includes Vintage is a waveform that includes high harmonics.					

4.7.4 Sample Message

4.7.4.1 Enabling On Click

Header Block (Hexadecimal)

No.	Data
00	F0 [System Exclusive Status]
01	44 [Manufacturer's ID] 44H = CASIO ID
02	7E [Model ID MSB] MZ-2000 Sound System Model-ID MSB
03	02 [Model ID LSB] MZ-2000 Sound System Model-ID LSB
04	00 [Message Version]
05	10 SysEx Device Id

Data Block

No.	Data
06	40 Message Type
07	20 Message Id
08	02 CAT_TG
09	02 Type Id LSB : **02H
10	00 Type Id MSB : 00**H
11	00 MdevId LSB : **00H
12	2F MdevId MSB : 2F**H
13	01 Section Number LSB : **01H Temporary Area
14	00 Section Number MSB : 00**H Temporary Area
15	00 Parameter Set Number LSB : **00H Drawbar Preset 0
16	00 Parameter Set Number MSB : 00**H Drawbar Preset 0
17	0E Parameter ID LSB
18	00 Parameter ID :
19	08 Parameter ID MSB & Block Number & Array Flag
20	00 Main Block
21	00 Common Block or Drawbar Setting Block
22	00 Wave Select Block
23	00 Number of Data Bit - 1 : 1bit - 1
24	01 Data (Set OnClick)

EOX

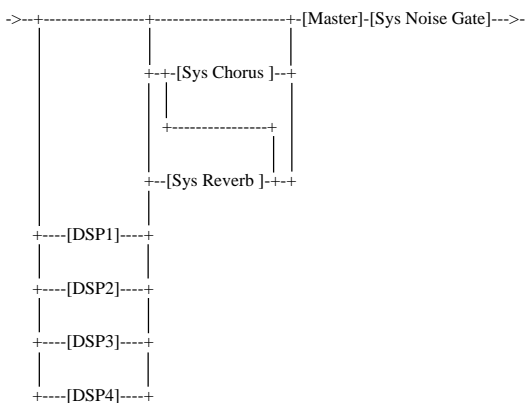
No.	Data
25	F7 [EOX]

4.8 Effects

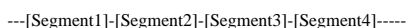
4.8.1 Organization of Effects

There are approximately 30 types of effects, with one or more effect presets, indicated by Num, for each.

The mixer has the effect parts shown below. On the MZ-2000, effect insertion is called "DSP."



Each of the four DSPs also contains four parallel effector frames. This means that there is a total of 20 effector frames.



4.8.2 Effect Select Operation

To use a desired effect, you must first load its preset effect data.

Preset effects are selected by the patch parameter operation that specifies the sound source system configuration.

The following describes the actual operation.

- * The patch parameter effect select block MdevID,TypeID, and Num operations are used to call the desired effect from among the presets.
- * The patch parameter effect macro select block Num operation is used to call the effect macro (DSP) from among the presets.
- * The effect macro parameter effect type and effect num operations are used to call the desired effect from among the presets. 4.8.2 is performed at the same time.

More concretely, effect preset data is allocated to all of the 20 effect frames. Though there are a number of effect preset data for each effect type, the actual number depends on the selected Type. Refer to the MZ-2000 Effect Preset List when making selections.

The effect select and recall operation is performed using a patch parameter change, so this section does not include information about messages. See the explanation about patch parameter effect selection for information about effect selection.

4.8.3 Effect Load Precautions

4.8.3.1 Parts

Effect parts can be classified according to the five groups shown below. Only the effects of the types listed below each part are valid for each part.

- * DSP
 1. Thru
 2. Stereo Thru
 3. Noise Gate
 4. Compressor/Limiter
 5. Stereo Compressor/Limiter
 6. Slow Attack
 7. 3 Band EQ
 8. Stereo 3 Band EQ
 9. Enhancer
 10. Stereo Enhancer
 11. Wah
 12. Auto Wah
 13. Distortion
 14. Gt.Amp Simmurator
 15. Rotary Speaker
 16. Phaser
 17. Stereo Phaser
 18. Chorus
 19. Stereo Chorus
 20. Flanger
 21. Delay
 22. Stereo Delay
 23. Stereo Tap Delay
 24. Gate Reverb
 25. Ring Modulator
 26. Tremolo
 27. Auto Pan
 28. Lo-Fi
 29. Stereo Lo-Fi
- * System Chorus
 1. System Chorus
- * System Reverb
 1. System Reverb
- * Master
 1. Stereo Thru
 2. Stereo Comp/Lim
 3. Stereo 3Band EQ
 4. Stereo Enhancer
 5. Surround
 6. Stereo Lo-Fi

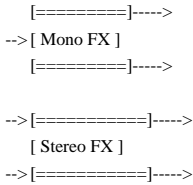
- * System Noise Gate
- 1. System Noise Gate

4.8.3.2 Effect Connections

Monaural/Stereo

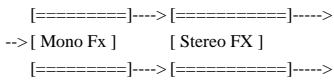
Effects include monaural and stereo types, so signal flow must be considered when making connections.

There is one monaural type input terminal and two stereo type input terminals, and two terminals each for monaural and stereo outputs. This means that the monaural/stereo type of the effect is determined by the input type. In the case of a monaural effect, the same signal is output from both of the output terminals.



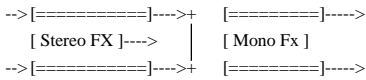
Monaural Effect and Stereo Effect Connection

Connecting a stereo effect after a monaural effect outputs two monaural effects, each of which is connected to the two stereo effect inputs.



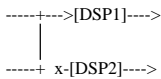
Stereo Effect and Monaural Effect Connection

Connecting a monaural effect after a stereo effect causes a signal that mixes the two stereo effect outputs to be sent to the monaural effect.



Assignment of a Stereo Effect to a DSP

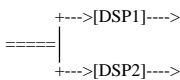
Assigning a stereo effect to DSP1 connects two input lines to DSP1, without any signal being sent to DSP2.



Conversely, no signal is sent to DSP1 when a stereo effect is assigned to DSP2. The above also holds true for DSP3 and DSP4.

Parallel Use of Two Monaural Effects

Selecting A + B as the input line when monaural effects are assigned to DSP1 and DSP2 causes Part L output to be sent to DSP1, and Part R output to be sent to DSP2. Selecting the same effect for both outputs in this configuration produces a stereo effect.



4.8.3.3 Resource Problem

The DSP resource problem is the point that requires most attention when loading effects.

MZ-2000 effects are produced using Digital Signal Processors (DSP), but the DSPs do not possess sufficient resources to allow discretionary assignment of effects to all effect parts at the same time. Simultaneous assignment of a number of effects makes use of further effects impossible. Because of this, a dynamic resource allocation system for DSP effects is employed in order to ensure efficient use of DSP resources.

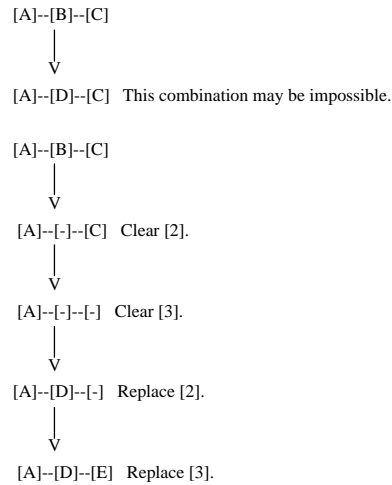
More concretely, the same resources are used by DSP1 and B, and by DSP3 and D, so when DSP1 uses up all the available resources, Insertion B is unable to use effects. This does not, however, effect DSP3 or D, System Chorus, Reverb, Master, or other effects.

Modification or addition of effect assignments by DSP1 causes DSP1 signal flow to be temporarily muted. Due to the resource sharing relationship, the DSP signal is also temporarily muted. The same relationship applies to DSP3 and D. Though the actual mute time depends of the makeup of the effect, it can be anywhere in the range of 20 to 100 milliseconds. Be sure to keep all of this in mind when changing effect assignments while playing.

If resources are insufficient for sequential assignment of effects to each DSP segment, further assignment of effects becomes impossible. The extremely complex decision making process required to determine what combination of resources leads to a shortage is beyond the scope of this document. Probably the easiest and most practical way to determine whether a particular combination can be used is to try it out on the MZ-2000 and see what happens. If a shortage of resources occurs after receipt of an effect assignment instruction, you can determine whether an effect has not been loaded by re-setting the DSP line effect to Thru on the MZ-2000.

In addition, when switching effects of DSP multiple segments, all of the segments must be cleared.

Let us say, for example that effects A, B, and C are assigned respectively to DSP 1, 2, and 3, and you want to change the assignments of DSP 2 and 3 to effects D and E. The new effects could be assigned in the sequence 2, 3 or 3, 2, but the number of resources consumed by effect A assigned to DSP 1 can cause a shortage of resources when you try to assign effects D or E to DSP 2 or 3. Because of this, you must clear DSP 2 and 3 first.



The clear operation is achieved by changing the patch parameter effect select block parameter of the applicable part to execute a NOFX (No Effect) effect select instruction.

```

MdevID=2F00H
TypeID=0000H
Number=0000H
    
```

For details about send messages, see "4.5 Selecting Patch Effects."

4.8.3.4 Distortion

Distortion can be caused by changing the parameters of the effectors so signal level related settings cause the amplification factor to be greater than the sound source, and then using those effects in combination. Since this is basically unavoidable, you need check your settings and avoid setups that cause distortion to be generated.

4.8.4 Effect Parameter Change Operation

Any modification of an effect parameter is immediately reflected in keyboard operation. Changing the values of parameters, however, causes a momentary interruption in the sound or a slight clicking noise. These conditions do not indicate malfunction.

When effects are of the same type but have different numbers, the same operation results cannot be guaranteed, even if all the parameter values are the same.

Operation for effects of the same types is basically the same, but when compressor/limiter, and other numbers are different, it indicates that there are also differences in operational characteristics.

4.8.5 Effect Parameter Control Message Common Format

This section describes only the data block that indicates the common system exclusive message format for the MZ-2000 sound source.

When performing an operation or reference of an effect parameter, create and send a message like the one below that specifies the appropriate parameter set position, type ID and parameter ID.

```

tt      0100aaaa      aaaa = IPC..."SYSEX_ACT_IPC" = 00H
                          IPR..."SYSEX_ACT_IPR" = 01H
d0[0]  00100000      Parameter Modify Message ID = 20H
d0[1]  0000cccc      cccc = Category = "CAT_FX" = 03H
d0[2]  0ttttttt      0TTTTTTT0ttttt = Type ID = Target operation effect Type ID
d0[3]  0TTTTTTTTT    The followings action provides details about each effect.
d0[4]  0mmmmmmmm      0MMMMMMM0mmmmmmmm = MDEV ID = Internal RAM = 2F00H
d0[5]  0MMMMMMMMM
d0[6]  0sssssss      0SSSSSS0sssssss = Section Number
d0[7]  0SSSSSSS
    
```

The mixer part/segment numbers that select effects are valid here. (See the mixer diagram.)

Part/Segment	Section

DSP1 / Segment 0	.... 0000H
Segment 1	.... 0001H
Segment 2	.... 0002H
Segment 3	.... 0003H
DSP2 / Segment 0	.... 0004H
Segment 1	.... 0005H
Segment 2	.... 0006H
Segment 3	.... 0007H
DSP3 / Segment 0	.... 0008H
Segment 1	.... 0009H
Segment 2	.... 000AH
Segment 3	.... 000BH
DSP4 / Segment 0	.... 000CH
Segment 1	.... 000DH
Segment 2	.... 000EH
Segment 3	.... 000FH
Master	..... 0010H
System Chorus	..... 0011H
System Reverb	..... 0012H
System Noise Gate	..... 0013H

```

d0[8]  0nnnnnnn 00NNNNNNNnnnnnnn = PS Number = 0000H Fixed
d0[9]  0NNNNNNNN

d0[10] 0ppppppp qqPPPPPPppppppp = Parameter ID
d0[11] 0PPPPPPP          = Target operation effect parameter ID
                          (See following section.)
d0[12] 0rbbbbbq bbbb = number of parameter block - 1 = 00H
        r = array flag
        The PS Name for each effector is array type data, so r = 1.
        Other parameters are non-array type data, so r = 0.

d1[0]  0iiiiiii 0iiiiiii = block-0 number of parameters = 00H Fixed
        (Because effector parameters do not have a nested parameter structure.)
    
```

☆ Fx Name(array) only number of data and data array number

When r = 1 only (d2[0] to d2[2])

```

d2[0]  0ooooooo
d2[1]  0pppppppp oooooooppppppp = top index number of array to send
                          (Send start array number)
        Fx Name length is 16, so this value is 0000H to 000FH.

d2[2]  0qqqqqqq qqqqqqq = number of array members to send
                          (Number of send members in current packet)
        Fx Name length is 16, so this value is 0000H to 0010H.
    
```

☆ One data size (number of bits) minus 1

```

d3[0]  000zzzzz
        zzzzz = number of bits - 1
    
```

For example, Fx Name is 7-bit data, so zzzzz = 6.

When zzzz + 1 is: The number of data bytes is:

- 1 to 7 1
- 8 to 14 2
- 15 to 21 3
- 22 to 28 4
- 29 to 32 5

☆ Parameter Values

Other than Effects Name, 7 bits or less

```
d4[0]  0xxxxxxx xxxxxxx = Data
```

Other than Effects Name, 8 to 14bits

```

d4[0]  0xxxxxxx XXXXXXXXxxxxxxx = Data
d4[1]  0XXXXXXXX
    
```

Effects Name

```

d4[0]  0xxxxxxx xxxxxxx = Character String 0
d4[1]  0xxxxxxx xxxxxxx = Character String 1
:
d4[15] 0xxxxxxx xxxxxxx = Character String 15
    
```

4.8.6 Effector Types

This section provides specifications for each effector. Each effector is described according to the following items.

TypeID Effect Type ID (Used by SysEx.)

I/O Input/Output terminals

There are always two output terminals, but 2 is noted for two-channel effects only.

Available Part Compatible Part (DSP, System Cho, System Rev, Master, or SystemNoise Gate)

Also, the parameter list includes descriptions of the following items, which show effect and parameter operations.

```

ParameterID ..... Parameter ID number
Parameter ..... Parameter name
Bit ..... Parameter value bit width
Len ..... Parameter value arrays (skipped when1)
Value-Range ..... Parameter value range
Value-Meaning ..... Parameter value meaning
    
```

4.8.6.1 Thru

Specifications

```

TypeID          FXID_THRU = 0001H
I/O             1/1
Available Part  DSP
    
```


Parameter List

ParaID	Parameter	Bit*Len	Value-Range	Value-Meaning
0000	Fx Name	7*16	20H - 7EH	-

Operation

This module outputs the input tone without modification. It is used as the initial default condition.

Preset List

No Preset Name
00 Thru

4.8.6.2 Stereo Thru

Specifications

TypeID	FXID_STTHRU = 0002H
I/O	2/2
Available Part	DSP, Master

Parameter List

ParaID	Parameter	Bit*Len	Value-Range	Value-Meaning
0000	Fx Name	7*16	20H - 7EH	-

Operation

This module outputs the input tone without modification. It is used as the initial default condition.

Preset List

No Preset Name
00 Stereo Thru

4.8.6.3 Noise Gate

Specifications

TypeID	FXID_NOI = 0010H
I/O	1/1
Available Part	DSP

Parameter List

ParaID	Parameter	Bit*Len	Value-Range	Value-Meaning
0000	Fx Name	7*16	20H - 7EH	-
0001	Bypass	1	0 - 1	0...Bypass 1...Effect
0002	Threshold	7	0 - 127	0 - 127
0003	Release	7	0 - 127	0 - 127

Operation

This module is for noise cancellation when there is no signal.

The input signal is output as-is, but whenever the input signal level drops below a certain value for a specific time the gate closes and output is muted.

1. Bypass
Effector function enable/disable. Selecting bypass causes the input signal to be output as-is.
2. Threshold
Noise gate operation threshold level. Output is muted when the input signal is at or below the level specified here.
3. Release
Time the noise gate is closed when muting is performed.

Preset List

No Preset Name
00 Stereo Thru

4.8.6.4 System Noise Gate

Specifications

TypeID	FXID_SYNOI = 0012H
I/O	2/2
Available Part	System Noise Gate

Operation

The system-wide master noise gate always performs correct operation automatically, so there is never any need to even be away of its existence.

Preset List

No Preset Name
00 Stereo Thru

4.8.6.5 Compressor/Limiter

Specifications

TypeID	FXID_COMP = 0100H
I/O	1/1
Available Part	DSP

Parameter List

ParaID	Parameter	Bit*Len	Value-Range	Value-Meaning
0000	Fx Name	7*16	20H - 7EH	-
0001	Bypass	1	0 - 1	0...Bypass 1...Effect
0002	Attack	7	0 - 127	0 - 127
0003	Release	7	0 - 127	0 - 127
0004	Threshold	7	0 - 127	0 - 127
0005	Depth	7	0 - 127	0 - 127
0006	Level	7	0 - 127	0 - 127

Operation

This effector lowers the volume when the input signal is at or above a specified level. This function can be employed to achieve either of the two objectives described below.

Compressor

Volume is raised when the input signal is small and lowered when the input signal is large. This suppresses wide variations in volume levels, which makes it possible to sustain decay type instrument tones longer.

Limiter

Since the operation start level is set comparatively higher than that of the compressor, when the input signal is at or below a certain level, it is output as-is. When the input signal is at or above a certain level, the input the output amplification factor is reduced, which suppresses the output signal peak.

1. Bypass
Effector function enable/disable. Selecting bypass causes the input signal to be output as-is.
2. Attack
Level of attack for the signal rise. Theoretically, it controls the time it takes from the point the input signal rises to a preset level until the compressor/limiter effect is applied. A late attack keeps the signal attack part from being compressed, which makes it possible to maintain the attack only.
3. Release
Time from the point when the input signal drops below the threshold level until the compressor/limiter function stops

4. Threshold

Threshold input level for the compressor/limiter effect. Though the compressor and limiter use the same algorithm, the items in the effect Preset List named Limiter are optimized for the limiter by setting the actual level for the threshold value at a high level.

5. Depth

Compressor/limiter compression factor. A large value results in a low signal level while the compressor/limiter function is working, so correction is required depending on the Level setting.

6. Level

Output level

Preset List

- No Preset Name
- 00 Comp1 Light
- 01 Comp2 Light Mid
- 02 Comp3 Mid
- 03 Comp4 Deep Mid
- 04 Comp5 Deep
- 05 Comp6 Deep2
- 06 Comp7 Heavy
- 07 Comp8 LongSustain
- 08 Attack Gate1
- 09 Attack Gate2
- 10 Attack Gate3
- 11 Limiter1
- 12 Limiter2
- 13 Comp9 Thin

4.8.6.6 Stereo Compressor/Limiter

Specifications

TypeID FXID_STCOMP = 0101H
 Available Part DSP, Master
 I/O 2/2

Parameter List

ParaID	Parameter	Bit*Len	Value-Range	Value-Meaning
0000	Fx Name	7*16	20H - 7EH	-
0001	Bypass	1	0 - 1	0...Bypass 1...Effect
0002	Attack	7	0 - 127	0 - 127
0003	Release	7	0 - 127	0 - 127
0004	Threshold	7	0 - 127	0 - 127
0005	Depth	7	0 - 127	0 - 127
0006	Level	7	0 - 127	0 - 127

Operation

Though the Compressor/Limiter is a two-channel, left-right input effector, input signal level detect is performed after the left and right signals are mixed. Operational principles and parameter operations are identical to those for Compressor/Limiter. Parameter operations are identical for the left and right channels.

Preset List

- No Preset Name
- 00 Compressor1
- 01 Compressor2
- 02 Compressor3
- 03 Compressor4
- 04 Compressor5
- 05 Compressor6
- 06 Compressor7
- 07 Compressor8
- 08 AttackComp1
- 09 AttackComp2
- 10 AttackComp3
- 11 Limiter1
- 12 Limiter2

4.8.6.7 Slow Attack

Specifications

TypeID FXID_SLOW = 0104H
 Available Part DSP
 I/O 1/1

Parameter List

ParaID	Parameter	Bit*Len	Value-Range	Value-Meaning
0000	Fx Name	7*16	20H - 7EH	-
0001	Bypass	1	0 - 1	0...Bypass 1...Effect
0002	Threshold	7	0 - 127	0 - 127
0003	Attack	7	0 - 127	0 - 127
0004	Release	7	0 - 127	0 - 127

Operation

This effector change the input signal of the attach part to a slow attack. It is used for guitar tones and solo synthesizer violin play.

Whenever the input signal drops below a preset level, the gate closes and the output signal is muted. With the next input signal, the gate opens slowly, so the attack is eliminated. To delay the attack, temporarily mute the input signal.

1. Bypass

Effector function enable/disable. Selecting bypass causes the input signal to be output as-is.

2. Threshold

Slow attach threshold input level. The output signal is muted when the input level is below this setting. Setting a value that is too high causes the tone to be cut too quickly. Setting a value that is too low causes incomplete muting and makes it impossible to obtain the slow attack effect, and makes it difficult to play with little interval between notes. When setting a value, you need to take such factors as the attenuation characteristics of the inputtone and phrasing into consideration.ÅB

3. Attack

Signal rise attack time. The larger the value, the slower the rise.

4. Release

Time from the point the input signal drops below the Threshold level until the signal is muted.

Preset List

- No Preset Name
- 00 Slow1
- 02 Slow2
- 03 Slow3

4.8.6.8 3-Band EQ

Specifications

TypeID FXID_3BEQ = 0200H
 Available Part DSP
 I/O 1/1

Parameter List

ParaID	Parameter	Bit*Len	Value-Range	Value-Meaning
0000	Fx Name	7*16	20H - 7EH	-
0001	Bypass	1	0 - 1	0...Bypass 1...Effect
0002	Lo Freq	7	8 - 40	50 - 2.0K(Hz) *Note1
0003	Lo Gain	7	52 - 64 - 76	-12dB - 0dB - +12dB
0004	Mid Freq	7	14 - 54	100 - 10K(Hz) *Note1
0005	Mid Gain	7	46 - 64 - 82	-18dB - 0dB - +18dB
0006	Mid Peak	7	10 - 120	1.0 - 12.0 (Q)
0007	Hi Freq	7	28 - 58	500 - 16.0K(Hz) *Note1
0008	Hi Gain	7	52 - 64 - 76	-12dB - 0dB - +12dB
0009	Level	7	0 - 127	0 - 127

Operation

This effector controls tone quality. Settings can be made for three individual bands, and the mid-range parametric equalizer provides great latitude for sound creation.

1. Bypass
Effector function enable/disable. Selecting bypass causes the input signal to be output as-is.
2. Lo Freq
Low-range equalizer trigger frequency
3. Lo Gain
Low-range level
4. Mid Freq
Mid-range equalizer center trigger frequency
5. Mid Gain
Mid-range level
6. Mid Peak
Mid-range equalizer frequency range. A larger value defines a narrower range.
7. Hi Freq
High-range equalizer trigger frequency
8. Hi Gain
High-range level
9. Level
Output level

Equalizer Frequencies

The following shows the relationships between equalizer frequency parameter values and actual frequencies.

Freq: Frequency
Value: Parameter Value
cc

value	Freq	value	Freq	value	Freq	value	Freq	value	Freq	value	Freq
0	20	10	63	20	200	30	630	40	2.0K	50	6.3K
1	22	11	70	21	225	31	700	41	2.3K	51	7.0K
2	25	12	80	22	250	32	800	42	2.5K	52	8.0K
3	28	13	90	23	280	33	900	43	2.8K	53	9.0K
4	32	14	100	24	315	34	1.0K	44	3.2K	54	10.0K
5	36	15	110	25	355	35	1.1K	45	3.6K	55	11.0K
6	40	16	125	26	400	36	1.2K	46	4.0K	56	12.0K
7	45	17	140	27	455	37	1.4K	47	4.5K	57	14.0K
8	50	18	160	28	500	38	1.6K	48	5.0K	58	16.0K
9	56	19	180	29	560	39	1.8K	49	5.6K	59	18.0K
										60	20.0K

Preset List

- No 3Band EQ
- 00 Low Boost
- 01 High Boost
- 02 High-Low
- 03 HiCut-MidBoost
- 04 HiCut-MidBoost2
- 05 Loudness1
- 06 LoudLo1
- 07 LoudHi1
- 08 Loudness2
- 09 LoudLo2
- 10 LoudHi2
- 11 Loud3
- 12 Loud3 Lo+
- 13 Loud3 Hi+
- 14 AntiFeedback
- 15 Flat
- 16 LoCut1
- 17 LoCut2

4.8.6.9 Stereo 3-Band EQ

Specifications

TypeID FXID_ST3BEQ = 0201H
Available Part DSP, Master
I/O 2/2

Parameter List

ParaID	Parameter	Bit*Len	Value-Range	Value-Meaning
0000	Fx Name	7*16	20H - 7EH	-
0001	Bypass	1	0 - 1	0..Bypass 1..Effect
0002	Lo Freq	7	8 - 40	50 - 2.0K(Hz) *Note1
0003	Lo Gain	7	52 - 64 - 76	-12dB - 0dB - +12dB
0004	Mid Freq	7	14 - 54	100 - 10K(Hz) *Note1
0005	Mid Gain	7	46 - 64 - 82	-18dB - 0dB - +18dB
0006	Mid Peak	7	10 - 120	1.0 - 12.0 (Q)
0007	Hi Freq	7	28 - 58	500 - 16.0K(Hz) *Note1
0008	Hi Gain	7	52 - 64 - 76	-12dB - 0dB - +12dB
0009	Level	7	0 - 127	0 - 127

Operation

This effector is a 2-channel, left/right input version of 3-band EQ. Its operations and parameters are identical to those of 3-Band EQ. Parameter operations are identical for the left and right channels.

Preset List

- No Preset Name
- 00 Lo+
- 01 Hi+
- 02 LoHi+Mid-
- 03 Mid+
- 04 Mid-
- 05 Hi-
- 06 Lo-
- 07 LoHi-Mid+
- 08 Loud1
- 09 Loud1 Lo+
- 10 Loud1 Hi+
- 11 Loud2
- 12 Loud2 Lo+
- 13 Loud2 Hi+
- 14 Loud3
- 15 Loud3 Lo+
- 16 Loud3 Hi+
- 17 Flat

4.8.6.10 Enhancer

Specifications

TypeID FXID_ENH = 0204H
Available Part DSP
I/O 1/1

ParaID	Parameter	Bit*Len	Value-Range	Value-Meaning
0000	Fx Name	7*16	20H - 7EH	-
0001	Bypass	1	0 - 1	0..Bypass 1..Effect
0002	Lo	7	0 - 64 - 127	-64 - 0 - +63
0003	Hi	7	0 - 64 - 127	-64 - 0 - +63
0004	Level	7	0 - 127	0 - 127

Operation

This effector enhances the quality of the input signal to produce a richer tone. It can be used to control the levels of two bands.

1. Bypass
Effector function enable/disable. Selecting bypass causes the input signal to be output as-is.
2. Lo Gain
Low-range level
3. Hi Gain
High-range level
4. Level
Output level

Preset List

No Preset Name

- 00 HiEnh1
- 01 HiEnh2
- 02 Loud1
- 03 Loud2
- 04 LoEnh

4.8.6.11 Stereo Enhancer

Specifications

TypeID FXID_STENH = 0205H
 Available Part DSP, Master
 I/O 2/2

Parameter List

ParaID	Parameter	Bit*Len	Value-Range	Value-Meaning
0000	Fx Name	7*16	20H - 7EH	-
0001	Bypass	1	0 - 1	0...Bypass 1...Effect
0002	Lo	7	0 - 64 -127	-64 - 0 - +63
0003	Hi	7	0 - 64 -127	-64 - 0 - +63
0004	Level	7	0 - 127	0 - 127

Operation

This effector is a two-channel left-right input version of Enhancer. Its operations and parameters are identical to those of Enhancer. Parameter operations are identical for the left and right channels.

Preset List

No Preset Name

- 00 HiEnh1
- 01 HiEnh2
- 02 LoEnh1
- 03 LoEnh2
- 04 Loudness1
- 05 Loudness2
- 06 +Lo-Hi
- 07 -Lo+Hi

4.8.6.12 Wah

Specifications

TypeID FXID_WAH = 0240H
 Available Part DSP
 I/O 1/1

Parameter List

ParaID	Parameter	Bit*Len	Value-Range	Value-Meaning
0000	Fx Name	7*16	20H - 7EH	-
0001	Bypass	1	0 - 1	0...Bypass 1...Effect
0002	FilterType	1	0 - 1	0...BPF 1...LPF
0003	Freq	7	0 - 127	0 - 127
0004	Resonance	7	0 - 127	0 - 127
0005	Depth	7	0 - 127	0 - 127
0006	Rate	7	0 - 127	0 - 127
0007	Waveform	3	0 - 4	0...Sin 1...Tri 2...SawUp 3...SawDw 4...Squ
0008	Step	7	0 - 127	0 - 127

Operation

This effector produces a distinctive wah-wah effect by using a filter to enhance a particular frequency band of the input signal, and by shifting the frequency in accordance with the changes in the cutoff parameter caused by pedal, wheel, or other controller operation.

This effector also has a built-in LFO, which can be used to modulate the high range of the filter frequency based on the Cutoff setting.

1. Bypass
Effector function enable/disable. Selecting bypass causes the input signal to be output as-is.
2. FilterType
Either BPF (Band Pass Filter) or LPF (Low Pass Filter) can be selected as the filter type. Using BPF outputs only narrow band signals, so the change in the tone is great.
3. Freq
When BPF is selected, this parameter controls the mid-range equalizer center trigger frequency. When LPF is selected, this parameter controls the mid-range equalizer trigger frequency.
4. Resonance
Wah effect resonance
5. Depth
Width of frequency band shifted by an LFO. Setting 0 disables LFO operation.
6. Rate
LFO speed.
7. Waveform
LFO waveform.
 - o Sin.....Sine wave
 - o SawUp....Sawtooth wave (rising)
 - o SawDw....Sawtooth wave (falling)
 - o Squ.....Square wave
8. Step
LFO continuity. A value of 0 specifies smooth change, while a larger value specifies coarser change.

Preset List

No Preset Name

- 00 Low Fix
- 01 Mid Fix
- 02 Hi Fix
- 03 LFO-1
- 04 LFO-2
- 05 LFO-Up
- 06 LFO-Down
- 07 LFO-Squ
- 08 LFO-Step1
- 09 LFO-Step2
- 10 LFO-3

4.8.6.13 Auto Wah

Specifications

TypeID FXID_AWAH = 0241H
 Available Part DSP
 I/O 1/1

Parameter List

ParaID	Parameter	Bit*Len	Value-Range	Value-Meaning
0000	Fx Name	7*16	20H - 7EH	-
0001	Bypass	1	0 - 1	0...Bypass 1...Effect
0002	FilterTye	1	0 - 1	0...BPF 1...LPF
0003	Freq	7	0 - 127	0 - 127
0004	Resonance	7	0 - 127	0 - 127
0005	Sens	7	0 - 127	0 - 127

Operation

The effector has the same basic built-in filter as Wah. The filter frequency shift element is the input signal level envelope, so the wah effect is applied automatically in accordance with keyboard play.

Both high-speed and low-speed response to the input signal are provided, and these cannot be adjusted.

1. Bypass
Effector function enable/disable. Selecting bypass causes the input signal to be output as-is.
2. FilterType
Either BPF (Band Pass Filter) or LPF (Low Pass Filter) can be selected as the filter type. Using BPF outputs only narrow band signals, so the change in the tone is great.
3. Freq
When BPF is selected, this parameter controls the mid-range equalizer center trigger frequency. When LPF is selected, this parameter controls the mid-range equalizer trigger frequency.
4. Resonance
Resonance of the wah effect.
5. Sens
Input signal sensitivity. The greater the value, the greater the change.

Preset List

- No Preset Name
- 00 Narrow LPF
- 01 Mid Narrow
- 02 Quick Follow Wide
- 03 Dull Follow Wide
- 04 Dull Wide LPF
- 05 Mild LPF

4.8.6.14 Distortion

Specifications

TypeID FXID_DIST = 0300H
 Available Part DSP
 I/O 1/1

Parameter List

ParaID	Parameter	Bit*Len	Value-Range	Value-Meaning
0000	Fx Name	7*16	20H - 7EH	-
0001	Bypass	1	0 - 1	0...Bypass 1...Effect
0002	Type	4	0 - 4	0...Crnch 1...OD 2...Dist 3...Metal 4...Fuzz
0003	Drive	7	0 - 127	0 - 127
0004	Tone	7	0 - 127	0 - 127
0005	NG.Thresh	7	0 - 127	0 - 127
0006	NG.Release	7	0 - 127	0 - 127
0007	Level	7	0 - 127	0 - 127

Operation

This effector amplifies the input signal and limits the wave height to produce distortion. In addition to electric guitar tones, this effect can also be applied to bass, electric piano, organ, reed synth, drum, vocal, and other tones.

This effector also has a number of built-in algorithms for different characteristics, which can be selected with the parameters.

This effector also has an internal noise gate. When an externally input signal is passed through this effector, it may be desirable to perform a noise gate operation earlier than the externally input noise gate. This can be accomplished by changing the settings of the distortion effector's independent noise gate.

1. Bypass
Effector function enable/disable. Selecting bypass causes the input signal to be output as-is.
2. Type
Distortion type
 - o Crnch (Crunch)
Light distortion
 - o OD (Overdrive)
Warm distortion
 - o Dist (Distortion)
Hard and straight distortion
 - o Metal
Metallic distortion with enhanced low and high ranges
 - o Fuzz
Fuzz sound often heard in music from the late 60's and early 70's
3. Drive
Amplification factor. The maximum amplification factor depends on the selected Type. Nothing is sounded when this parameter is 0.
4. Tone
Tone quality. A larger tone results in a brighter tone.
5. NG.Thresh
Threshold level of the internal noise gate. Output is muted whenever the input signal drops below the level specified by this parameter.
6. NG.Release
Internal noise gate gate close time when muting.
7. Level
Output level.

Preset List

- No Preset Name
- 00 Light Crunch
- 01 Mid Crunch
- 02 Blues Crunch
- 03 Mid OverDrive
- 04 Hard OverDrive
- 05 Distortion
- 06 Hard Distortion
- 07 Metal
- 08 Fuzz
- 09 Light OverDrive
- 10 Light Dist
- 11 Mid Dist
- 12 Light Metal
- 13 Mid Metal
- 14 Light Fuzz
- 15 Mid Fuzz

4.8.6.15 Guitar Amp Simulator

Specifications

TypeID FXID_GAS = 0700H
 Available Part DSP
 I/O 1/1

Parameter List

ParaID	Parameter	Bit*Len	Value-Range	Value-Meaning
0000	Fx Name	7*16	20H - 7EH	-
0001	Bypass	1	0 - 1	0...Bypass 1...Effect
0002	AmpType	4	0 - 7	0...MiniP 1...SmalF 2...CombB 3...CombS 4...CombF 5...CombJ 6...StckM 7...SRamp
0003	Color	7	0 - 127	0 - 127
0004	Efx Level	7	0 - 127	0 - 127
0005	Dir Level	7	0 - 127	0 - 127

Operation

This effector simulates the characteristics of a guitar amplifier cabinet and speaker. It is especially effective following distortion to cut out harsher components.

1. Bypass
Effector function enable/disable. Selecting bypass causes the input signal to be output as-is.
2. Type
Type of guitar amp to be simulated.
 - o MiniPg
Simulates a mini amp.
 - o SmalFc
Simulates a small amp.
 - o CombBg
Simulates a combo amp with a distinctive mid range. This option is best used with long-sustained tones that are prone to distortion.
 - o CombSl
Simulates a combo amp with a distinctive high range whose mid range components are very narrow. This option is best used with reed tones that are prone to distortion.
 - o CombFd
Simulates a combination amp with confined characteristics. This option is best used with breath sounds that have little distortion.

- o CombJc
Simulates a solid-state amp, which has relatively brighter characteristics than the combo amps. This option can be used with everything from country sounds to straight hard rock sounds.
- o StckMs
Simulates a large stack amp, which has rich low range characteristics and trebly high range characteristics, resulting in orthodox rock and metal sounds.
- o SRamp
Simulates the characteristics of a non-guitar amp SR (Sound Reinforcement) device, for an unmodified sound as if the device were connected directly to the console of the musical instrument.

3. Color

This parameter alters the characteristics of the tone quality. It actually controls the frequency characteristics of the distinguishing feature of the guitar amp being simulated. The larger the value, the more the band being enhanced is shifted to the high range. The breadth of the parameter operation and the band depends on the selected Type. Certain input waveform frequency components can make modifications made with this parameter difficult to recognize.

4. Efx Level

Output level of the signal simulated by the guitar amp simulator.

5. Dir Level

Input direct signal output. The setting of this parameter is normally 0, but the direct signal and effect signal can be mixed in order to obtain an amp simulator that has less effect on the sound.

Preset List

- No Preset Name
- 00 MiniPig
- 01 Small Box
- 02 Small Fc
- 03 Combo Bg
- 04 Combo Bg Mild
- 05 Combo Bg Blight
- 06 Combo Sld
- 07 Combo Fd
- 08 Combo Jc
- 09 Stack Ms
- 10 SR Amp

4.8.6.16 Rotary Speaker

Specifications

TypeID FXID_ROT = 0740H
 Available Part DSP
 I/O 1/2

Parameter List

ParaID	Parameter	Bit*Len	Value-Range	Value-Meaning
0000	Fx Name	7*16	20H - 7EH	-
0001	Bypass	1	0 - 1	0...Bypass 1...Effect
0002	RateSelect		0 - 1	0...Slow 1...Fast
0003	Break	1	0 - 1	0...Rot 1...Stop
0004	HiSlowRate	7	0 - 127	0 - 127
0005	HiFastRate	7	0 - 127	0 - 127
0006	HiRiseAcel	7	0 - 127	0 - 127
0007	HiFallAcel	7	0 - 127	0 - 127
0008	LoSlowRate	7	0 - 127	0 - 127
0009	LoFastRate	7	0 - 127	0 - 127
000A	LoRiseAcel	7	0 - 127	0 - 127
000B	LoFallAcel	7	0 - 127	0 - 127

Operation

This effector simulates the effect of a rotary speaker, as an independently rotating woofer (Lo) and tweeter (Hi). Parameters are available for presetting two rotation rates or to specify no initial rotation, and acceleration rates can also be specified.

1. Bypass
Effector function enable/disable. Selecting bypass causes the input signal to be output as-is.
2. RateSelect
Speaker rotation rate.
3. Break
This parameter is used to stop speaker rotation. A setting of 0 (=Rot) turns on rotation, while 1 (=Stop) stops rotation.
4. HiSlowRate
Rate of Hi speaker rotation when Slow is selected for Rate Select.
5. HiFastRate
Rate of Hi speaker rotation when Fast is selected for Rate Select.
6. HiRiseAcel
Hi speaker rotation acceleration rate when Rate Select is switched from Slow to Fast, or when Break is switched from Stop to Rotate.
7. HiFallAcel
Hi speaker rotation acceleration rate when Rate Select is switched from Fast to Slow, or when Break is switched from Rotate to Stop.
8. LoSlowRate
Rate of Lo speaker rotation when Slow is selected for Rate Select.
9. LoFastRate
Rate of Lo speaker rotation when Fast is selected for Rate Select.
10. Lo Rise Accel
Lo speaker rotation acceleration rate when Rate Select is switched from Slow to Fast, or when Break is switched from Stop to Rotate.
11. LoFallAccel
Lo speaker rotation acceleration rate when Rate Select is switched from Fast to Slow, or when Break is switched from Rotate to Stop.

Preset List

- No Preset Name
- 00 Standard Fast
- 01 Standard Slow
- 02 Deep Fast
- 03 Deep Slow
- 04 Soft Fast
- 05 Soft Slow

4.8.6.17 Phaser

Specifications

TypeID FXID_PHA = 0800H
 Available Part DSP
 I/O 1/1

Parameter List

ParaID	Parameter	Bit*Len	Value-Range	Value-Meaning
0000	Fx Name	7*16	20H - 7EH	-
0001	Bypass	1	0 - 1	0...Bypass 1...Effect
0002	Depth	7	0 - 127	0 - 127
0003	Rate	7	0 - 127	0 - 127
0004	Resonance	7	0 - 64 -127	-64 - 0 - +63
0005	Waveform	3	0 - 4	0...Sin 1...Tri 2...SawUp 3...SawDw 4...Squ
0006	Step	7	0 - 127	0 - 127
0007	Offset	7	0 - 127	0 - 127

Operation

This effector manipulates the phase of the input signal and directly mixes sound to produce an interference effect. The offset of the phase is modulated by an LFO.

1. Bypass
Effector function enable/disable. Selecting bypass causes the input signal to be output as-is.
2. Depth
Effect depth.
3. Resonance
Resonance. The larger the value, the more of a characteristic tone is produced.
4. Rate
LFO rate
5. Waveform
LFO waveform
 - o Sin.....Sine wave
 - o SawUp....Sawtooth wave (rising)
 - o SawDw....Sawtooth wave (falling)
 - o Squ.....Square wave
6. Step
LFO continuity. A value of 0 specifies smooth change, while a larger value specifies coarser change.
7. Offset
Allows manual setting of the reference phase position.

Preset List

- No Preset Name
- 00 Phaser 1
- 01 Phaser 2
- 02 Phaser 3
- 03 Rotate 1
- 04 Rotate 2
- 05 Step1
- 06 Step2
- 07 Step3
- 08 ThinPhaser 1
- 09 ThinPhaser 2
- 10 ThinPhaser 3
- 11 Phaser 4
- 12 Phaser 5
- 13 Phaser 6
- 14 Phaser 7

4.8.6.18 Stereo Phaser

Specifications

TypeID FXID_STPHA = 0801H
 Available Part DSP
 I/O 2/2

Parameter List

ParaID	Parameter	Bit*Len	Value-Range	Value-Meaning
0000	Fx Name	7*16	20H - 7EH	-
0001	Bypass	1	0 - 1	0...Bypass 1...Effect
0002	Depth	7	0 - 127	0 - 127
0003	Rate	7	0 - 127	0 - 127
0004	Resonance	7	0 - 64 -127	-64 - 0 - +63
0005	Waveform	3	0 - 4	0...Sin 1...Tri 2...SawUp 3...SawDw 4...Squ
0006	Step	7	0 - 127	0 - 127
0007	Offset	7	0 - 127	0 - 127

Operation

This effector is a two-channel left-right input version of Phaser. Its operations and parameters are identical to those of Phaser. Parameter operations are identical for the left and right channels.

Preset List

- No Preset Name
- 00 Phaser 1
- 01 Phaser 2
- 02 Phaser 3
- 03 Phaser 4
- 04 Step1
- 05 Step2

4.8.6.19 Chorus

Specifications

TypeID FXID_CHO = 0900H
 Available Part DSP
 I/O 1/2

Parameter List

ParaID	Parameter	Bit*Len	Value-Range	Value-Meaning
0000	Fx Name	7*16	20H - 7EH	-
0001	Bypass	1	0 - 1	0...Bypass 1...Effect
0002	Delay	7	0 - 127	
0003	Depth	7	0 - 127	
0004	Rate	7	0 - 127	
0005	DelayLevel	7	0 - 127	

Operation

This effector provides depth and breadth by delaying the input signal, modulating the pitch of the input signal by adjusting the delay time with an LFO, and then mixing the signal with the direct tone.

1. Bypass
Effector function enable/disable. Selecting bypass causes the input signal to be output as-is.
2. Delay
Delay time used as a reference.
3. Depth
LFO modulation
4. Rate
LFO rate
5. DelayLevel
Delay signal output level.

Preset List

- No Preset Name
- 00 Chorus 1
- 01 Chorus 2
- 02 Chorus 3
- 03 Chorus 4
- 04 Chorus 5
- 05 Chorus 6
- 06 Fbk Chorus 1
- 07 Fbk Chorus 2
- 08 Mod. Delay 1
- 09 Mod. Delay 2
- 10 Chorus 7
- 11 Chorus 8
- 12 Chorus 9
- 13 Chorus 10
- 14 Chorus 11
- 15 Chorus 12
- 16 Chorus 13

4.8.6.20 Stereo Chorus

Specifications

TypeID FXID_STCHO = 0901H
 Available Part DSP
 I/O 2/2

Parameter List

ParaID	Parameter	Bit*Len	Value-Range	Value-Meaning
0000	Fx Name	7*16	20H - 7EH	-
0001	Bypass	1	0 - 1	0...Bypass 1...Effect
0002	Delay	7	0 - 127	0 - 127
0003	Depth	7	0 - 127	0 - 127
0004	Rate	7	0 - 127	0 - 127
0005	CrossLevel	7	0 - 127	0 - 127
0006	DelayLevel	7	0 - 127	0 - 127

Operation

This effector is basically identical to Chorus, except that it is capable of two-channel stereo delay.

1. Bypass
Effector function enable/disable. Selecting bypass causes the input signal to be output as-is.
2. Delay
Delay time used as a reference.
3. Depth
LFO modulation
4. Rate
LFO rate
5. CrossLevel
Send volume of the left-right delay signal to the opposite output, which has an influence on the nuances of the effect.
6. DelayLevel
Delay signal output level.

Preset List

- No Preset Name
- 00 Stereo Chorus 1
- 01 Stereo Chorus 2
- 02 Stereo Chorus 3
- 03 Stereo Deep Chorus 1
- 04 Stereo Deep Chorus 2
- 05 Stereo Fbk Chorus
- 06 Stereo Flanger 1
- 07 Stereo Flanger 2

4.8.6.21 System Chorus

Specifications

TypeID FXID_SYCHO = 0902H
 Available Part System Chorus
 I/O 1/2

Parameter List

ParaID	Parameter	Bit*Len	Value-Range	Value-Meaning
0000	Fx Name	7*16	20H - 7EH	-
0001	Bypass	1	0 - 1	0...Bypass 1...Effect
0002	Hi-Damp	7	0 - 127	0 - 127
0003	Cho Level	7	0 - 127	0 - 127
0004	Cho FB	7	0 - 127	0 - 127
0005	Delay	7	0 - 127	0 - 127
0006	Rate	7	0 - 127	0 - 127
0007	Depth	7	0 - 127	0 - 127
0008	SendToRev	7	0 - 127	0 - 127

Operation

This effector allows system-wide chorus settings.

1. Bypass
Effector function enable/disable. Selecting bypass causes the input signal to be output as-is.
2. Hi-Damp
High-range damping characteristics
3. Cho Level
Effect tone level
4. Cho FB
Chorus effect feedback level. A more characteristic sound is produced when this value is greater.
5. Delay
Delay time used as a reference.
6. Rate
LFO rate
7. Depth
LFO modulation
8. SendTenumerate
Send level to the System Reverb output for this effector.

Preset List

- No Preset Name
- 00 Chorus 1
 - 01 Chorus 2
 - 02 Chorus 3
 - 03 Chorus 4
 - 04 Fbk Chorus
 - 05 Flanger 1
 - 06 Short Delay
 - 07 FB Short Delay
 - 08 Chorus 5
 - 09 Chorus 6
 - 10 Chorus 7
 - 11 Ensemble 1
 - 12 Ensemble 2
 - 13 Ensemble 3
 - 14 Flanger 2
 - 15 Flanger 3
 - 16 Flanger 4
 - 17 Organ 1
 - 18 Organ 2
 - 19 Organ 3

4.8.6.22 Flanger

Specifications

TypeID FXID_FL = 0910H
 Available Part DSP
 I/O 1/2

Parameter List

ParaID	Parameter	Bit*Len	Value-Range	Value-Meaning
0000	Fx Name	7*16	20H - 7EH	-
0001	Bypass	1	0 - 1	0...Bypass 1...Effect
0002	Manual	7	0 - 127	0 - 127
0003	Feedback	7	0 - 64 -127	-64 - 0 - +63
0004	Depth	7	0 - 127	0 - 127
0005	Rate	7	0 - 127	0 - 127
0006	Waveform	3	0 - 4	0...Sin 1...Tri 2...SawUp 3...SawDw 4...Squ
0007	Step	7	0 - 127	0 - 127
0006	Delay Level	7	0 - 127	0 - 127

Operation

This effector produces a comb filter effect by applying a delay to the input signal and then mixing the signal with the direct tone to produce distortion. The delay time is modulated by an LFO.

1. Bypass
Effector function enable/disable. Selecting bypass causes the input signal to be output as-is.
2. Manual
Allows manual setting of the reference delay time
3. Feedback
Delay feedback volume. The greater this value, the more distinctive the tone.
4. Depth
LFO modulation
5. Rate
LFO rate
6. Waveform
LFO waveform
 - o Sin.....Sine wave
 - o SawUp....Sawtooth wave (rising)
 - o SawDw....Sawtooth wave (falling)
 - o Squ.....Square wave
7. Step
LFO continuity. A value of 0 specifies smooth change, while a larger value specifies coarser change.
8. Delay Level
Delay signal output level

Preset List

- No Preset Name
- 00 Flanger 1
 - 01 Flanger 2
 - 02 Flanger 3
 - 03 Flanger 4
 - 04 Jet Flanger 1
 - 05 Jet Flanger 2
 - 06 Step Flanger 1
 - 07 Step Flanger 2
 - 08 Flanger 5
 - 09 Flanger 6
 - 10 Flanger 7
 - 11 Flanger 8

4.8.6.23 Delay

Specifications

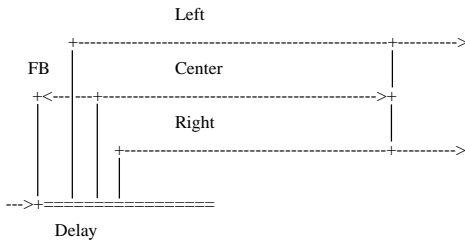
TypeID FXID_DEL = 0B00H
 Available Part DSP
 I/O 1/2

Parameter List

ParaID	Parameter	Bit*Len	Value-Range	Value-Meaning
0000	Fx Name	7*16	20H - 7EH	-
0001	Bypass	1	0 - 1	0...Bypass 1...Effect
0002	DlyPre-LPF	7	0 - 7	0 - 7
0003	DlyTimeCnt	7	0 - 127	0 - 127 (0.1ms - 1.0s)
0004	DlyTimeLft	7	0 - 127	0 - 127 (0.1ms - 1.0s)
0005	DlyTimeRit	7	0 - 127	0 - 127 (0.1ms - 1.0s)
0006	DlyLevelCnt	7	0 - 127	0 - 127
0007	DlyLevelLft	7	0 - 127	0 - 127
0008	DlyLevelRit	7	0 - 127	0 - 127
0009	DlyLevel	7	0 - 127	0 - 127
000A	DlyFeedback	7	0 - 127	0 - 127

Operation

This effector produces an echo effect by delayin the input signal. Three types of delay signals (left, center, right) are extracted from the one-channel delay, and then output.



1. Bypass
Effector function enable/disable. Selecting bypass causes the input signal to be output as-is.
2. DlyPre-LPF
Delay signal pre-LPF (low pass filter) characteristics.
3. DlyTimeCnt
Center delay time
4. DlyTimeLft
Left-channel delay time
5. DlyTimeRit
Right-channel delay time
6. DlyLevelCnt
Center delay signal level
7. DlyLevelLft
Left-channel delay signal level
8. DlyLevelRit
Right-channel delay signal level
9. DlyLevel
Overall delay signal level
10. DlyFeedback
Center delay signal feedback volume

Preset List

- No Preset Name
- 00 Delay On Center
- 01 Doubling
- 02 Short Delay
- 03 Short Delay(Single)
- 04 Short Delay L/R
- 05 Delay(Single)
- 06 Delay L
- 07 Delay R
- 08 Panning Delay
- 09 Long Delay
- 10 Long Delay(Single)
- 11 Sound On Sound
- 12 Cathedral
- 13 Thin Short
- 14 Thin Short Mid
- 15 Thin Short Long
- 16 Twice Long
- 17 Short Long1
- 18 Short Long2
- 19 Short Single1
- 20 Short Single2
- 21 Very Short
- 22 Long Repeat1
- 23 Long Repeat2
- 24 Long Top Repeat
- 25 Ambience1
- 26 Ambience2
- 27 Ambience3
- 28 Short1
- 29 Short2
- 30 -
- 31 -
- 32 Thin Delay Center2

- 33 Doubling2
- 34 Short Delay2
- 35 Short Single2
- 36 Short Delay L/R
- 37 Single Delay2
- 38 Delay L
- 39 Delay R
- 40 Panning Delay
- 41 Long Delay
- 42 Long Delay(Single)
- 43 Sound On Sound

4.8.6.24 Stereo Delay

Specifications

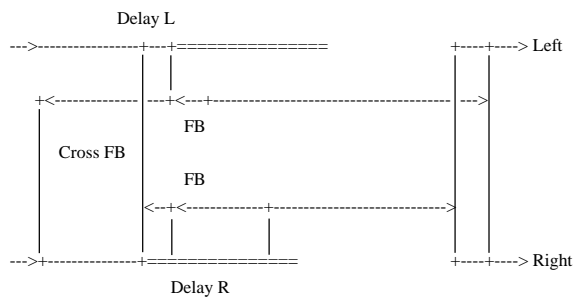
TypeID FXID_STDEL = 0B01H
 Available Part DSP
 I/O 2/2

Parameter List

ParaID	Parameter	Bit*Len	Value-Range	Value-Meaning
0000	Fx Name	7*16	20H - 7EH	-
0001	Bypass	1	0 - 1	0..Bypass 1..Effect
0002	Delay Time L	7	0 - 127	0 - 127
0003	Delay Level L	7	0 - 127	0 - 127
0004	Delay Pan L	7	0 - 127	0 - 127
0005	Freedback L	7	0 - 127	0 - 127
0006	CrossFB LtoR	7	0 - 127	0 - 127
0007	Dir Level L	7	0 - 127	0 - 127
0008	Delay Time R	7	0 - 127	0 - 127
0009	Delay Level R	7	0 - 127	0 - 127
000A	Delay Pan R	7	0 - 127	0 - 127
000B	Freedback R	7	0 - 127	0 - 127
000C	CrossFB RtoL	7	0 - 127	0 - 127
000D	Dir Level R	7	0 - 127	0 - 127

Operation

This effector provides two-channel stereo delay. Cross feedback is available for each line feed-back.



1. Bypass
Effector function enable/disable. Selecting bypass causes the input signal to be output as-is.
2. Delay Time L
Left-channel delay time
3. Delay Level L
Left-channel delay signal level
4. Delay Pan L
Left-channel delay signal output pan
5. Feedback L
Left-channel delay signal feedback volume
6. CrossFB LtoR
Right-channel feedback signal send volume to left input
7. Dir Level L
Left-channel direct signal level

- 8. Delay Time R
Right-channel delay time
- 9. Delay Level R
Right-channel delay signal level
- 10. Delay Pan R
Right-channel delay signal output pan
- 11. Feedback R
Right-channel delay signal feedback volume
- 12. CrossFB RtoL
Right-channel feedback signal send volume to left input
- 13. Dir Level R
Right-channel direct signal level

Preset List

- No Preset Name
- 00 Sterao Delay
- 01 Doubling
- 02 Short Delay
- 03 Cross Short Delay
- 04 Cross Delay
- 05 Pan L To R
- 06 Pan R To L
- 07 Stereo Single Delay
- 08 Sterao Thin Delay

4.8.6.25 Stereo Tap Delay

Specifications

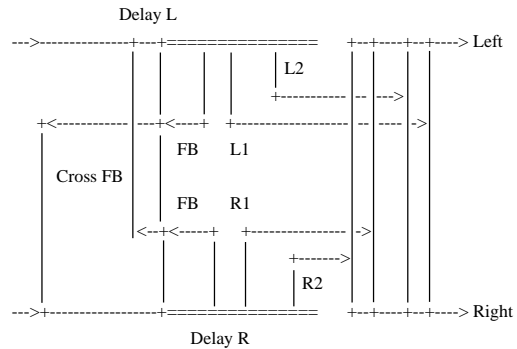
TypeID FXID_STTDEL = 0B02H
 Available Part DSP
 I/O 2/2

Parameter List

ParaID	Parameter	Bit*Len	Value-Range	Value-Meaning
0000	Fx Name	7*16	20H - 7EH	-
0001	Bypass	1	0 - 1	0...Bypass 1...Effect
0002	Delay Time L1	7	0 - 127	0 - 127
0003	Delay Level L1	7	0 - 127	0 - 127
0004	Delay Pan L1	7	0 - 127	0 - 127
0005	Delay Time L2	7	0 - 127	0 - 127
0006	Delay Level L2	7	0 - 127	0 - 127
0007	Delay Pan L2	7	0 - 127	0 - 127
0008	Delay Time FBL	7	0 - 127	0 - 127
0009	Feedback L	7	0 - 127	0 - 127
000A	CrossFB LtoR	7	0 - 127	0 - 127
000B	Dir Level L	7	0 - 127	0 - 127
000C	Delay Time R1	7	0 - 127	0 - 127
000D	Delay Level R1	7	0 - 127	0 - 127
000E	Delay Pan R1	7	0 - 127	0 - 127
000F	Delay Time R2	7	0 - 127	0 - 127
0010	Delay Level R2	7	0 - 127	0 - 127
0011	Delay Pan R2	7	0 - 127	0 - 127
0012	Delay Time FBR	7	0 - 127	0 - 127
0013	Feedback R	7	0 - 127	0 - 127
0014	CrossFB RtoL	7	0 - 127	0 - 127
0015	Dir Level R	7	0 - 127	0 - 127

Operation

This effector provides two-channel stereo delay. There are three taps for each channel, one of which is used exclusively for feedback. Cross feedback is available for each line feedback.



- 1. Bypass
Effector function enable/disable. Selecting bypass causes the input signal to be output as-is.
- 2. Delay Time L1
Left-channel 1 delay time
- 3. Delay Level L1
Left-channel 1 delay signal level
- 4. Delay Pan L1
Left-channel 1 delay signal output pan
- 5. Delay Time L2
Left-channel 2 delay time
- 6. Delay Level L2
Left-channel 2 delay signal level
- 7. Delay Pan L2
Left-channel 2 delay signal output pan
- 8. Delay Time FBL
Left-channel feedback delay time
- 9. Feedback L
Left-channel delay signal feedback volume
- 10. CrossFB LtoR
Left-channel feedback signal send volume to right input
- 11. Dir Level L
Left-channel direct signal level
- 12. Delay Time R1
Right-channel 1 delay time
- 13. Delay Level R1
Right-channel 1 delay signal level
- 14. Delay Pan R1
Right-channel 1 delay signal output pan
- 15. Delay Time R2
Right-channel 2 delay time
- 16. Delay Level R2
Right-channel 2 delay signal level
- 17. Delay Pan R2
Right signal 2 delay signal output pan
- 18. Delay Time FBR
Right-channel feedback delay time
- 19. Feedback R
Right-channel delay signal feedback volume
- 20. CrossFB RotL
Right-channel feedback signal
Right-channel feedback signal send volume to left input
- 21. Dir Level R
Right-channel direct signal level

Preset List

- No Preset Name
- 00 Stereo Tap Delay1
- 01 Stereo Tap Delay2
- 02 Stereo Tap Delay3
- 03 Single Tap Delay
- 04 Ambience1
- 05 Ambience2
- 06 Ambience3

4.8.6.26 System Reverb

Specifications

TypeID FXID_SYREV = 0C00H
 Available Part System Reverb
 I/O 1/2

Parameter List

ParaID	Parameter	Bit*Len	Value-Range	Value-Meaning
0000	Fx Name	7*16	20H - 7EH	-
0001	Bypass	1	0 - 1	0...Bypass 1...Effect
0002	-			
0003	Pre-LPF	3	0 - 127	0 - 127
0004	RevLevel	7	0 - 127	0 - 127
0005	RevTime	7	0 - 127	0 - 127
0006	DelayFb	7	0 - 127	0 - 127
0007	PreDlyTime	7	0 - 127	0 - 127

Operation

This effector simulates concert hall and room acoustics.

1. Bypass
Effector function enable/disable. Selecting bypass causes the input signal to be output as-is.
2. Pre-LPF
Reverb pre-LPF characteristics. A larger value dampens the right range.
3. RevLevel
Reverb level
4. RevLevel
Reverb timem
5. DelayFb (Delay Feedback)
Delay feedback volume when Delay or Panning Delay is selected as for Type.
6. PreDlyTime (Pre-Delay Time)
Time until reverb is generated

Preset List

- No Preset Name
- 00 Room 1
 - 01 Room 2
 - 02 Room 3
 - 03 Hall 1
 - 04 Hall 2
 - 05 Plate 1
 - 06 Delay
 - 07 Pan Delay
 - 08 Room 4
 - 09 Plate 2
 - 10 Small Hall
 - 11 Medium Hall
 - 12 Large Hall
 - 13 Bright Hall
 - 14 Church

4.8.6.27 Gate Reverb

Specifications

TypeID FXID_GTREV = 0C01H
 Available Part DSP
 I/O 1/2

Parameter List

ParaID	Parameter	Bit*Len	Value-Range	Value-Meaning
0000	Fx Name	7*16	20H - 7EH	-
0001	Bypass	1	0 - 1	0...Bypass 1...Effect
0002	Time	4	0 - 9	0 - 9
0003	LPF Freq	7	0 - 127	0 - 127
0004	HPF Freq	7	0 - 127	0 - 127
0005	Color	7	0 - 127	0 - 127
0006	Feedback	7	0 - 127	0 - 127
0007	FbLPF Freq	7	0 - 127	0 - 127
0008	Efx Level	7	0 - 127	0 - 127
0009	Dir Level	7	0 - 127	0 - 127

Operation

This effector creates artificial reverb as if the gate were cut. Parameter settings can be used to produce a reverb rotation effect, and an effect that is somewhere between a broken up and dispersed delay, and reverb.

1. Bypass
Effector function enable/disable. Selecting bypass causes the input signal to be output as-is.
2. Time
Reverb time
3. LPF Freq
Low pass filter trigger frequency
4. HPF Freq
High pass filter trigger frequency
5. Color
Gate reverb effect nuance
6. Feedback
Feedback volume
7. FbLPF Freq (Feedback-LPF Frequency)
Filter fequqncy characteristics apply to feedback signal
8. Efx Level
Effect volume
9. Dir Level
Input direct signal output level

Preset List

- No Preset Name
- 00 Gate Reverb 1
 - 01 Gate Reverb 2
 - 02 Gate Reverb 3
 - 03 Gate Reverb 4
 - 04 Deep Sky
 - 05 Reverse 1
 - 06 Reverse 2
 - 07 Reverse 3
 - 08 Moving Reverse 1
 - 09 Moving Reverse 2

4.8.6.28 Surround

Specifications

TypeID FXID_SRND = 0D00H
 Available Part Master
 I/O 2/2

Parameter List

ParaID	Parameter	Bit*Len	Value-Range	Value-Meaning
0000	Fx Name	7*16	20H - 7EH	-
0001	Bypass	1	0 - 1	0...Bypass 1...Effect
0002	Depth	7	0 - 127	0 - 127

Operation

This effector broadens the spatiality of the sound. This effect is most dramatic when heard from the position of the person playing the keyboard. This effect is applied to all tones because the design of the keyboard makes it difficult to apply this effect to specific tones.

1. Bypass
Effector function enable/disable. Selecting bypass causes the input signal to be output as-is.
2. Depth
Effect depth

Preset List

No Preset Name
00 Surround1
01 Surround2
02 Surround3
03 Surround4

4.8.6.29 Ring Modulator

Specifications

TypeID FXID_RING = 0E10H
Available Part DSP
I/O 1/1

Parameter List

ParaID	Parameter	Bit*Len	Value-Range	Value-Meaning
0000	Fx Name	7*16	20H - 7EH	-
0001	Bypass	1	0 - 1	0...Bypass 1...Effect
0002	OSC Depth	7	0 - 127	0 - 127
0003	OSC Freq	7	0 - 127	0 - 127
0004	Depth	7	0 - 127	0 - 127
0005	Rate	7	0 - 127	0 - 127
0006	Waveform	3	0 - 4	0...Sin 1...Tri 2...SawUp 3...SawDw 4...Squ
0007	Step	7	0 - 127	0 - 127
0008	Efx Level	7	0 - 127	0 - 127
0009	Dir Level	7	0 - 127	0 - 127

Operation

This effector generates a mirror-like sound by applying amplitude modulation (AM) to the input signal using the tone from the effector's internal oscillator. An internal LFO is also included to modulate the frequency of the internal oscillator.

The sound source an effect tones can be freely mixed, which makes it possible to maintain the pitch of the sound source while adding an ring modulator effect.

This effect is useful for both melody and rhythm instruments.

1. Bypass
Effector function enable/disable. Selecting bypass causes the input signal to be output as-is.
2. OSC Depth
Oscillation modulation depth of internal oscillator
3. OSC Freq
Frequency of internal oscillator
4. Depth
LFO rate for frequency modulation of internal oscillator
5. Rate
LFO rate
6. Waveform
LFO waveform
 - o Sin.....Sine wave
 - o SawUp....Sawtooth wave (rising)
 - o SawDw....Sawtooth wave (falling)
 - o Squ.....Square wave

7. Step

LFO continuity. A value of 0 specifies smooth change, while a larger value specifies coarser change.

8. Efx Level
Effect level
9. Dir Level
Input direct signal output level

Preset List

No Preset Name
00 Fix Lo
01 Fix Mid
02 Fix Hi
03 Fix Mix
04 Lfo Tri
05 Lfo Up
06 Lfo Down
07 Step1
08 Step2
09 Frog

4.8.6.30 Tremolo

Specifications

TypeID FXID_TREM = 0E30H
Available Part DSP
I/O 1/1

Parameter List

ParaID	Parameter	Bit*Len	Value-Range	Value-Meaning
0000	Fx Name	7*16	20H - 7EH	-
0001	Bypass	1	0 - 1	0...Bypass 1...Effect
0002	Depth	7	0 - 127	0 - 127
0003	Rate	7	0 - 127	0 - 127
0004	Phase	9	0 - 180 - 360	-180 - 0 - +180
0005	Waveform	3	0 - 4	0...Sin 1...Tri 2...SawUp 3...SawDw 4...Squ

Operation

This effector produces a tremolo effect by using an LFO to apply amplitude modulation to the input signal.

1. Bypass
Effector function enable/disable. Selecting bypass causes the input signal to be output as-is.
2. Depth
LFO effect depth
3. Rate
LFO rate
4. Phase
Left-right modulation phase differential
5. Waveform
LFO waveform
 - o Sin.....Sine wave
 - o SawUp....Sawtooth wave (rising)
 - o SawDw....Sawtooth wave (falling)
 - o Squ.....Square wave

Preset List

- No Preset Name
- 00 Tremolo 1
- 01 Tremolo 2
- 02 Vibes 1
- 03 Vibes 2
- 04 Up1
- 05 Down1
- 06 Slice1
- 07 Slice2
- 08 Vibes 3

4.8.6.31 Auto Pan

Specifications

TypeID FXID_APAN = 0E31H
 Available Part DSP
 I/O 1/2

Parameter List

ParaID	Parameter	Bit*Len	Value-Range	Value-Meaning
0000	Fx Name	7*16	20H - 7EH	-
0001	Bypass	1	0 - 1	0...Bypass 1...Effect
0002	Depth	7	0 - 127	0 - 127
0003	Rate	7	0 - 127	0 - 127
0004	Waveform	3	0 - 4	0...Sin 1...Tri 2...SawUp 3...SawDw 4...Squ

Operation

This effector produces panning movement of the input signal using an LFO.

1. Bypass
Effector function enable/disable. Selecting bypass causes the input signal to be output as-is.
2. Depth
LFO effect depth
3. Rate
LFO rate
4. Waveform
LFO waveform
 - o Sin.....Sine wave
 - o SawUp....Sawtooth wave (rising)
 - o SawDw....Sawtooth wave (falling)
 - o Squ.....Square wave

Preset List

- No Preset Name
- 00 Slow Round
- 01 Mid Round
- 02 Fast Round
- 03 Slow Shuttle
- 04 Mid Shuttle
- 05 Fast Shuttle
- 06 Fast
- 07 Very Fast
- 08 Slow One Way L>R
- 09 Slow One Way L<R
- 10 Mid One Way L>R
- 11 Mid One Way L<R
- 12 Fast One Way L>R
- 13 Fast One Way L<R
- 14 Mid Alternate
- 15 Fast Alternate

4.8.6.32 Lo-Fi

Specifications

TypeID FXID_LOFI = 0E40H
 Available Part DSP
 I/O 1/1

Parameter List

ParaID	Parameter	Bit*Len	Value-Range	Value-Meaning
0000	Fx Name	7*16	20H - 7EH	-
0001	Bypass	1	0 - 1	0...Bypass 1...Effect
0002	LoFiType	4	0 - 8	0 - 8
0003	LoFiMix	7	0 - 127	0 - 127
0004	HumFreq	1	0 - 1	0...50HZ 1...60HZ
0005	HumLevel	7	0 - 127	0 - 127
0006	PeriodSpd	2	0 - 2	0...33rpm 1...45rpm 2...78rpm
0007	PeriodLvl	7	0 - 127	0 - 127
0008	ScratchDen	7	0 - 127	0 - 127
0009	ScratchLvl	7	0 - 127	0 - 127
000A	NoiseMode	1	0 - 1	0...White 1...Pink
000B	NoiseLevel	7	0 - 127	0 - 127
000C	Lo Freq	7	8 - 40	50 - 2.0K(Hz) *Note1
000D	Lo Gain	7	52 - 64 - 76	-12dB - 0dB - +12dB
000E	Hi Freq	7	28 - 58	500 - 16.0K(Hz) *Note1
000F	Hi Gain	7	52 - 64 - 76	-12dB - 0dB - +12dB
0010	Dir Level	7	0 - 127	0 - 127

Operation

This effector produces an artificial Lo-Fi sound. It includes the following functions, which can be enabled simultaneously.

- * Reduction of input signal fidelity
- * Simulation of power supply hum noise simulation
- * Generation of white noise and pink noise generation
- * Generation of nonregular noise, like a damaged phonograph record
- * Generation of cyclical noise, like a damaged phonograph record
- * Equalizer

1. Bypass
Effector function enable/disable. Selecting bypass causes the input signal to be output as-is.
2. LoFiType
Level of fidelity reduction in input signal. A greater value causes a greater reduction in fidelity and deterioration of the tone.
3. LoFiMix
Mix level of signal whose fidelity is reduced
4. HumFreq
Hum noise frequency
5. HumLevel
Hum noise level
6. PeriodSpd
Cycle of cyclical phonograph record noise
7. PeriodLvl
Level of cyclical phonograph record noise
8. ScratchDen
Generation density of nonregular phonograph record noise
9. ScratchLvl
Level of nonregular phonograph record noise
10. NoiseMode
Noise mode: white noise or pink noise
11. NoiseLevel
White noise or pink noise level
12. Lo Freq
Low range filter frequency

- 13. Lo Gain
Low range level
- 14. Hi Freq
High range filter frequency
- 15. Hi Gain
High range level
- 16. Dir Level
Input direct signal output level

Preset List

- No Preset Name
- 00 LoFi 1
- 01 LoFi 2
- 02 LP Scratch
- 03 EP Scratch
- 04 SP Scratch
- 05 50Hz Hum
- 06 60Hz Hum
- 07 7Bit Loss
- 08 5Bit Loss

4.8.6.33 Stereo Lo-Fi

Specifications

TypeID FXID_STLOFI = 0E41H
 Available Part DSP, Master
 I/O 2/2

Parameter List

ParaID	Parameter	Bit*Len	Value-Range	Value-Meaning
0000	Fx Name	7*16	20H - 7EH	-
0001	Bypass	1	0 - 1	0...Bypass 1...Effect
0002	LoFiType	4	0 - 8	0 - 8
0003	LoFiMix	7	0 - 127	0 - 127
0004	NoiseMode	1	0 - 1	0...White 1...Pink
0005	NoiseLevel	7	0 - 127	0 - 127
0006	Lo Freq	7	8 - 40	50 - 2.0K(Hz) *Note1
0007	Lo Gain	7	52 - 64 - 76	-12dB - 0dB - +12dB
0008	Hi Freq	7	28 - 58	500 - 16.0K(Hz) *Note1
0009	Hi Gain	7	52 - 64 - 76	-12dB - 0dB - +12dB
000A	Dir Level	7	0 - 127	0 - 127

Operation

This is a multiple effector stereo version of Lo-Fi that produces artificial Lo-Fi sounds. The phonograph record noise generation function of the monaural Lo-Fi effector is not available in stereo.

Stereo Lo-Fi includes the following functions, which can be enabled simultaneously.

- * Reduction of input signal fidelity
- * Simulation of power supply hum noise simulation
- * Generation of white noise and pink noise generation
- * Equalizer

1. Bypass
Effector function enable/disable. Selecting bypass causes the input signal to be output as-is.
2. LoFiType
Level of fidelity reduction in input signal. A greater value causes a greater reduction in fidelity and deterioration of the tone.
3. LoFiMix
Mix level of signal whose fidelity is reduced
4. HumFreq
Hum noise frequency
5. HumLevel
Hum noise level

6. NoiseMode
Noise mode: white noise or pink noise
7. NoiseLevel
White noise or pink noise level
8. Lo Freq
Low range filter frequency
9. Lo Gain
Low range level
10. Hi Freq
High range filter frequency
11. Hi Gain
High range level
12. Dir Level
Input direct signal output level

Preset List

- No Preset Name
- 00 Bright1
- 01 Bright2
- 02 Bright3
- 03 Dark1
- 04 Dark2
- 05 Dark3
- 06 HiDump
- 07 PinkNoise
- 08 HiNoise
- 09 Narrow
- 10 Lo-Bit1
- 11 Lo-Bit2
- 12 Lo-Bit3
- 13 Lo-Bit WN

Presents from 06 on are initial stage noise generation settings and can be selected by MIDI only.

4.8.7 FX Parameter Set Bulk Dump

The FX Parameter Set can be sent and received using bulk dump. There are two protocols, One-Way and Handshake, which are the same as those described under "4.1 MZ-2000 Sound Source Common System Exclusive Format."

The following shows the section that applies to effects only.

```

tt 0100aaaa aaaa = BDS..."SYSEX_ACT_BDS" = 02H
                                BDR..."SYSEX_ACT_BDR" = 03H
                                HDS..."SYSEX_ACT_HDS" = 04H
                                HDR..."SYSEX_ACT_HDR" = 05H
                                HDA..."SYSEX_ACT_HDA" = 06H
                                HDJ..."SYSEX_ACT_HDJ" = 07H
                                HDE..."SYSEX_ACT_HDE" = 08H

d0[0] 00oocccc cccc = Parameter Set Category = FX = 03H
                                ooo = 00H

d0[1] 0ttttttt 0TTTTTTTTtttttt = Type ID = See the description of each effect
                                (FX) for details about Type IDs.

d0[2] 0TTTTTTTT
d0[3] 0mmmmmmm 0MMMMMMM0mmmmmm = Mdev ID = Internal RAM = 2F00H
d0[4] 0MMMMMMM
d0[5] 0sssssss 00SSSSSSsssssss = Section Number
d0[6] 0SSSSSSS

                                The mixer (MIX) Part/Segment numbers selected by FX go here. This is the same
                                for IPC and IPR.

d0[7] 0nnnnnnn 00NNNNNNnnnnnn = PS Number = 0000H Fixed
d0[8] 0NNNNNNN
    
```

The content and size of the data depend on the FX. Since the volume of data is very large, and it is not included here. This data can be looked up by sending HDR and BDR.

4.9 Mixer

4.9.1 General

This section describes mixer (MIX) parameter operations. There is only one MIX Parameter Set resident in the MZ-2000, so there is no operation for selecting a MIXParameter Set.

4.9.2 Parameter Operations Using MIDI Messages

```

tt 0100aaaa      aaaa = IPC..."SYSEX_ACT_IPC" = 00H
                          IPR..."SYSEX_ACT_IPR" = 01H

d0[0] 00100000    Parameter Modify Message-ID = 20H
d0[1] 0000cccc    cccc = Category = CAT_MIX = 04H
d0[2] 0Tttttt     0TTTTTTT0ttttt = Type ID
                          = Target operation MIX Type ID = 00H

d0[3] 0TTTTTTT
d0[4] 0mmmmmmm    0MMMMMMMM0mmmmmm = MDEV ID = 2F00H
d0[5] 0MMMMMMM
d0[6] 0sssssss    0SSSSSS0sssssss = Section Number = 0000H Fixed
d0[7] 0SSSSSS
d0[8] 0nnnnnnn    0NNNNNNNnnnnnnn = PS Number = 0000H Fixed
d0[9] 0NNNNNNN

d0[10] 0ppppppp  qqPPPPPPppppppp = Parameter ID
d0[11] 0PPPPPPP      = Target operations MIX ParameterID

d0[12] 0rbbbbqq  bbbb = number of parameter block - 1 = 02H
                          r = array flag = 00H (single data, no array data)

d1[0] 0iiiiiii  0iiiiiii = I:Common Block = 0

d1[1] 0jjjjjjj  0jjjjjjj =
      Part Parameter
      J:Part#      = 0--31 TG Part
                          32...Audio Input

      Drum Parameter
      K:Drum Map#  = 0--1

      DSP Parameter
      L:DSP # = 0...DSP1
                          1...DSP2
                          2...DSP3
                          3...DSP4
    
```

```

Drum Inst Parameter
d1[2] 0lllllll  0lllllll = M:Drum Key# = 0--127
    
```

Use these values when the parameter must specify Part#, DrumMap#, or DrumInst#.

d2[*] No data

☆ One data size (number of bits) minus 1

```

d3[0] 000zzzzz
      zzzzz = number of bits - 1
    
```

When zzzz + 1 is: The number of data bytes is:

```

1 to 7  1
8 to 14 2
15 to 21 3
22 to 28 4
29 to 35 5
    
```

For example, since Line Select has three bits of data, zzzzz = 2.

☆ Parameter Values

```

7 bits or less
d4[0] 0xxxxxxx  xxxxxxxx = Data
    
```

```

8 to 14 bits
d4[0] 0xxxxxxx  XXXXXXXXxxxxxxx = Data
d4[1] 0XXXXXXXX
    
```

4.9.2.1 Mixer Parameter IDs and Value Ranges

The availability of I, J, K, and L depends on the parameter.

[Common Parameters]

ParaID	Parameter	Bit*Len	Value	I	J	K	L	M
000D	Master Pan	7	00H - 7FH	00H	00H	00H	00H	00H
000E	Master Level	7	00H - 7FH	00H	00H	00H	00H	00H
000F	Chorus Level	7	00H - 7FH	00H	00H	00H	00H	00H
0010	Cho to Rev Send	7	00H - 7FH	00H	00H	00H	00H	00H
0011	Reverb Level	7	00H - 7FH	00H	00H	00H	00H	00H

[Part Parameters]

The following are parameters that can be set for each part.

ParaID	Parameter	Bit*Len	Value	I	J	K	L	M
001A	Line Select	1	0...Part	00H	Part#	00H	00H	00H
	Enable	1	1...Inst					

When Part is selected for Line Select Enable, the following five part parameters are enabled for all parts. When Inst is selected for Line Select Enable, the five parameters listed under Rhythm Parameters in the following section are enabled for each individual instrument that corresponds to a key number.

0000	Line Select	3	0...Thru 1...A 2...A/B 3...B 4...C 5...C/D 6...D	00H	Part#	00H	00H	00H
0001	Pan	7	00H - 7FH	00H	Part#	00H	00H	00H
0002	Level	7	00H - 7FH	00H	Part#	00H	00H	00H
0003	Cho Send	7	00H - 7FH	00H	Part#	00H	00H	00H
0004	Rev Send	7	00H - 7FH	00H	Part#	00H	00H	00H

[Rhythm Parameters]

Rhythm instrument-specific settings

ParaID	Parameter	Bit*Len	Value	I	J	K	L	M
001b	Line Select	4	0...Thru 1...A 2...A/B 3...B 4...C 5...C/D 6...D	00H	00H	Map#	00H	Key#
0005	Pan	7	00H - 7FH	00H	00H	Map#	00H	Key#
0006	Level	7	00H - 7FH	00H	00H	Map#	00H	Key#
0007	Cho Send	7	00H - 7FH	00H	00H	Map#	00H	Key#
0008	Rev Send	7	00H - 7FH	00H	00H	Map#	00H	Key#

[DSP Parameters]

DSP lin settings

ParaID	Parameter	Bit*Len	Value	I	J	K	L	M
0009	Pan	7	00H - 7FH	00H	00H	00H	Ins#	00H
000A	Level	7	00H - 7FH	00H	00H	00H	Ins#	00H
000B	Cho Send	7	00H - 7FH	00H	00H	00H	Ins#	00H
000C	Rev Send	7	00H - 7FH	00H	00H	00H	Ins#	00H

[Audio In Parameters]

ParaID	Parameter	Bit*Len	Value	I	J	K	L	M
0012	Input Mode	1	0...Stereo 1...Mono	00H	00H	00H	00H	00H
0013	Threshold	8	00H - 7FH	00H	00H	00H	00H	00H

4.9.2.2 Mix Parameter Set Bulk Dump

The Mix Parameter Set can be sent and received using bulk dump. There are two protocols, One-Way and Handshake, which are the same as those described under "4.1 MZ-2000 Sound Source Common System Exclusive Format."

The following shows the section that applies to Mix only.

```

tt 0100aaaa      aaaa = BDS..."SYSEX_ACT_BDS" = 02H
                        BDR..."SYSEX_ACT_BDR" = 03H
                        HDS..."SYSEX_ACT_HDS" = 04H
                        HDR..."SYSEX_ACT_HDR" = 05H
                        HDA..."SYSEX_ACT_HDA" = 06H
                        HDJ..."SYSEX_ACT_HDJ" = 07H
                        HDE..."SYSEX_ACT_HDE" = 08H

d0[0] 00oocccc      cccc = Parameter Set Category = MIX = 04H
                        ooo = 00H

d0[1] 0tttttt      0TTTTTTTT0tttttt = Type ID = 0000 Fixed
d0[2] 0TTTTTTTT
d0[3] 0mmmmmmm      0MMMMMMM0mmmmmmm = Mdev ID = Internal RAM = 2F00 Fixed
d0[4] 0MMMMMMM
d0[5] 0sssssss      0SSSSSS0sssssss = Section Number = 0000 Fixed
d0[6] 0SSSSSS
d0[7] 0nnnnnnn      0NNNNNN0nnnnnnn = PS Number = 0000 Fixed
d0[8] 0NNNNNNN
    
```

The volume of data that follows the above is very large, so it is not included here. This data can be looked up by sending HDR and BDR.

4.10 Drum Setup

4.10.1 Drum Setup Parameter Control Message Format

```

tt 0100aaaa      aaaa = IPC..."SYSEX_ACT_IPC" (00H)
                        IPR..."SYSEX_ACT_IPR" (01H)

d0[0] 00100000      20H : Parmeter Modify Message-ID
d0[1] 0000cccc      cccc = Category = CAT_SUB (05H)
d0[2] 0tttttt      0TTTTTTTT0tttttt = Type ID
                        = Target operation Sub Type ID = 05H

d0[3] 0TTTTTTTT
d0[4] 0mmmmmmm      0MMMMMMM0mmmmmmm = MDEV ID = 2F00H
d0[5] 0MMMMMMM
d0[6] 0sssssss      0SSSSSS0sssssss = Section Number = 0000H Fixed
d0[7] 0SSSSSS
d0[8] 0nnnnnnn      0NNNNNN0nnnnnnn = PS Number = 00H -- 03H
d0[9] 0NNNNNNN

                        The Parameter Set Number specified here is a Map number.
                        0 = Map1, 1 = Map2, 2 = Map3, 3 = Map4

d0[10] 0ppppppp      qqPPPPPPppppppp = Parameter ID = 01H -- 08H
d0[11] 0PPPPPPP

                        For details, see "4.10.1.1 Drum Setup Parameter ID and Value
                        Range."

d0[12] 0rbbbbqq bbbb = number of parameter block - 1 = 01H
                        r = array flag = 0

d1[0] 0iiiiiii 0iiiiiii = I:Main Block = 0

d1[1] 0jjjjjjj 0jjjjjjj = J:Setup Block= 0 to 127
                        Specifies the Drum Part Note Number.
    
```

☆ One data size (number of bits) minus 1

```

d3[0] 000zzzzz
                        zzzzz = number of bits - 1
    
```

When zzzz + 1 is: The number of data bytes is:

- 1 to 7 1
- 8 to 14 2
- 15 to 21 3
- 22 to 28 4
- 29 to 35 5

☆ Parameter Values

```

7 bits or less
d4[0] 0xxxxxxx xxxxxxx = Data
    
```

4.10.1.1 Drum Setup ParameterID and Value Range

ParaID	Parameter	Bit	Value	default	Description
0001	PlayNoteNum	7	00H - 7FH	--	Pitch coarse
0002	Level	7	00H - 7FH	--	Instrument TVA Level
0003	AssignGrp	7	00H - 7FH	--	Group Number(0:Non,1--127)
0004	Pan	7	00H - 7FH	--	-64(RANDOM) -63(LEFT),+63(RIGHT)
0005	RevSendLevel	7	00H - 7FH	--	Reverb Send Level
0006	RxNoteOff	1	00H - 01H	--	0:Off, 1:On
0007	ChoSendLevel	7	00H - 7FH	--	Chorus Send Level
0008	RxNoteOn	1	00H - 01H	--	0:Off, 1:On

4.10.1.2 Setup Example

Example: Drum Setup Map2, KeyNumber=60(C4), Level=127

Header Block (Hexadecimal)

No.	Data
00	F0 [System Exclusive Status]
01	44 [Manufacturer's ID] 44H = CASIO ID
02	7E [Model ID MSB] MZ-2000 Sound System Model-ID MSB
03	02 [Model ID LSB] MZ-2000 Sound System Model-ID LSB
04	00 [Message Version]
05	10 SysEx Device Id

Data Block

No.	Data
06	40 tt :Message Type
07	20 d0[0] :Message Id
08	05 d0[1] :CAT CAT_SUB
09	05 d0[2] :Type Id LSB : **05H
10	00 d0[3] :Type Id MSB : 00**H
11	00 d0[4] :MdevId LSB :
12	2F d0[5] :MdevId MSB :
13	00 d0[6] :Section Number LSB
14	00 d0[7] :Section Number MSB
15	01 d0[8] :Parameter Set Number LSB (Map2 = **01H)
16	00 d0[9] :Parameter Set Number MSB (Map2 = 00**H)
17	02 d0[10] :Parameter ID LSB (Level ParameterID = 2)
18	00 d0[11] :Parameter ID :
19	04 d0[12] :Parameter ID MSB & Block Number & Array Flag
20	00 d1[0] :Main Block
21	3C d1[1] :Setup Block (3CH = KeyNumber 60)
22	06 d3[0] :Number of Data bit - 1 (Data number of bits = 7)
23	7F d4[0] :Data LSB (Level = 127)

EOX

No.	Data
24	F7 [EOX]

4.11 Effect Macro

4.11.1 Effect Macro Overview

Effect macro is a parameter set that can be used to store groups of preset independent effect modules, control change parameter assignments, DSP system effect send level, etc.

Effect macro selection is performed by changing the Num parameter of the patch parameter effect macro select parameter group. See the "4.8 Effects" for details.

4.11.2 Effect Parameter Control Message Format

```

tt      0100aaaa      aaaa = IPC..."SYSEX_ACT_IPC" = 00H
                          IPR..."SYSEX_ACT_IPR" = 01H
d0[0]  00100000      20H Parmeter Modify Message-ID
d0[1]  0000cccc      cccc = Category = CAT_SUB = 05H
d0[2]  0ttttttt      0TTTTTTT0tttttt = Type ID = _SubIdFxMacro = 0CH
d0[3]  0TTTTTTTTT
d0[4]  0mmmmmmmm      0MMMMMMMM0mmmmmmmm = MDEV ID = RAM = 2F00H
d0[5]  0MMMMMMMMM
d0[6]  0sssssss      0SSSSSSS0sssssss = 0000H
d0[7]  0SSSSSSS
d0[8]  0nnnnnnn      0NNNNNNNnnnnnnn = PS Number = Corresponds to Fx Macro
d0[9]  0NNNNNNN      DSP Number

```

```

0...DSP1 Fx Macro
1...DSP2 Fx Macro
2...DSP3 Fx Macro
3...DSP4 Fx Macro

```

```

d0[10] 0ppppppp qqPPPPPPppppppp = Parameter ID
d0[11] 0PPPPPPP      = Target operation FX Macro ParmeterID
                          (See next section.)

```

```

d0[12] 0rbbbbqq bbbb = number of parameter block - 1 = 01H
                          r = array flag
                          The PS Name for each effector is array type data, so r = 1.
                          Other parameters are non-array type data, so r = 0.

```

```

d1[0] 0iiiiiii 0iiiiiii = block-0 = 00H
d1[1] 0jjjjjjj 0jjjjjjj = block-1 = Struct Number
                          Structure number attached to the parameter
                          This meaning depends on the parameter. See the next section for details.

```

☆ Number of data and data array number in the case of Fx Macro Name(array) only

When r = 1 only (d2[0] to d2[2])

```

d2[0] 0ooooooo
d2[1] 0ppppppp ooooooppoooo = top index number of array to send
                          (Send start array number)
                          Fx Name length is 32, so this value is 0000H to 001FH.

```

```

d2[2] 0qqqqqqq qqqqqqq = number of array members to send
                          (Number of send members in current packet)
                          Fx Name length is 32, so this value is 0001H to 0020H.

```

☆ One data size (number of bits) minus 1

```

d3[0] 000zzzzz
                          zzzzz = number of bits - 1

```

When zzzz + 1 is: The number of data bytes is:

```

1 to 7  1
8 to 14 2
15 to 21 3
22 to 28 4
29 to 35 5

```

For example, Fx Macro Name is 7-bit data, so zzzzz = 6.

☆ Parameter Values

Non-Fx Macro Name, 7 bits or less

```
d4[0] 0xxxxxxx xxxxxxx = Data
```

Non-Fx Macro Name, 8 to 14 bits

```
d4[0] 0xxxxxxx XXXXXXXXxxxxxxx = Data
d4[1] 0XXXXXXXX
```

Non-Fx Macro Name, 15 to 21 bits

```
d4[0] 0xxxxxxx yyyyyyyXXXXXXXXxxxxxxx = Data
d4[1] 0XXXXXXXX
d4[2] 0yyyyyyy
```

Fx Macro Name

```

d4[0] 0xxxxxxx xxxxxxx = character string 0
d4[1] 0xxxxxxx xxxxxxx = character string 1
:
d4[31] 0xxxxxxx xxxxxxx = character string 31

```

4.11.3 Parameter Type ID, Size, Index Num, Bit Width, Value Range

☆ Basic Parameter

ParaID	Parameter	Bit*Len	Value
0000	Fx Name	7*32	20H - 7EH
0001	Stereo	1	0...Mono 1...Stereo
0002	Size	1	0...Single 1...Double

☆ Fx Select Parameter

The following parameters specify the Fx to be assigned to Segment.

ParaID	Parameter	Bit*Len	Value
0003	Fx Type	16	0000H - 7F7FH
0004	Fx Num	16	0000H - Maximum for Fx

*Note

In these parameters, d1[1] indicate Segment#. Segment# is the Fx segment number within the DSP assigned by that Fx Macro.

☆ Send Level Parameter

ParaID	Parameter	Bit*Len	Value
0005	Chorus Send	7	0 - 127
0006	Reverb Send	7	0 - 127

☆ Control Parameter

The following parameters specify data related to parameters controlled by CC.

ParaID	Parameter	Bit*Len	Value
0007	Segment	2	0 - 3 Section (Segment) Number Fx Segment Number assigned to the Fx parameter linked to this parameter
0008	ParamId	16	0000H - FFFFH ParameterID Parameter ID (see "4.8 Effects") of the Fx linked to this parameter.
0009	BitSize	7	00H - 7FH BitSize Bit size of this parameter
000A	Val	7	00H - 7FH Current value of this parameter
000B	Min	7	00H - 7FH Minimum value of parameter sent to Fx
000C	Max	7	00H - 7FH Maximum value of parameter sent to Fx

The above three parameters determine the actual value of the parameter sent to the Fx. Change is performed in a linear manner to one of 127 levels between the Min and Max values, in accordance with the current value.

The value actually sent is the value of V, as calculated by the following.

$$V = \text{Min} + (\text{Max} - \text{Min}) * \text{Val}/127$$

When Max = 1 and Min = 0:

If Val < 64, V = 0

If Val >= 64, V = 1

The current value alters the Fx parameter value assigned when the Fx macro is initially imported, so the tone can be changed by specifying the same Fx Num.

The Val value is the actual received control change value, which is changed within the range of 0 to 127. 0 is the Min setting and 127 is the Max setting. Values between these extremes are obtained by linear interpolation, and those values are provided as effector parameter values.

*Note

Even when parameters are sent immediately following the Fx selection operation, the values may not be reflected immediately because it takes some time to perform Fx switching.

All of this means that when sending a Val parameter, an interval of at least 100 msec must be allowed after sending the Num segment Fx selection parameter connected with the Val parameter.

000D	DefaultVal	7	00H - 7FH Default value This value can be set only. It is not used internally by the MZ-2000
------	------------	---	---

*Note

d1[1] is the parameter number, which is the serial number within the parameter Fx macro. Two parameters can be programmed per Fx Macro, so the range is 0 or 1.

4.11.4 Effect Macro Parameter Set Bulk Dump

The Effect Macro Parameter Set can be sent and received using bulk dump. There are two protocols, One-Way and Handshake, which are the same as those described under "4.1 MZ-2000 Sound Source Common System Exclusive Format."

The following shows the section that applies to effects only.

```

tt 0100aaaa      aaaa = BDS..."SYSEX_ACT_BDS" = 02H
                        BDR..."SYSEX_ACT_BDR" = 03H
                        HDS..."SYSEX_ACT_HDS" = 04H
                        HDR..."SYSEX_ACT_HDR" = 05H
                        HDA..."SYSEX_ACT_HDA" = 06H
                        HDJ..."SYSEX_ACT_HDJ" = 07H
                        HDE..."SYSEX_ACT_HDE" = 08H

d0[0] 0000cccc      cccc = Parameter Set Category = Sub = 05H
                        ooo = 00H

d0[1] 0ttttttt      0TTTTTTT0tttttt = Type ID = 000CH Fixed
d0[2] 0TTTTTTTTT
d0[3] 0mmmmmmmm      0MMMMMMM0mmmmmmm = Mdev ID = Internal RAM = 2F00H Fixed
d0[4] 0MMMMMMMMM
d0[5] 0sssssss      00SSSSSSsssssss = Section Number = 0000H Fixed
d0[6] 0SSSSSSS
d0[7] 0nnnnnnn      00NNNNNNnnnnnnn = PS Number = Fx Macro Part
d0[8] 0NNNNNNNN
                        0000H...DSP1 Fx Macro Part
                        0001H...DSP2 Fx Macro Part
                        0002H...DSP3 Fx Macro Part
                        0003H...DSP4 Fx Macro Part
    
```

The volume of data that follows the above is very large, so it is not included here. This data can be looked up by sending HDR and BDR.

4.11.5 Control Using the Val Control Change Message

The Val parameter itself can be changed using a control change message. This makes it possible to perform chained control of the prescribed parameters of the effect linked to this parameter.

Channel

The MIDI channel of this message is compared with the MIDI Global channel, and the operation is performed when the channels matched.

Number

The effect macro parameter can be controlled using the prescribed control change numbers listed below.

```

cc Parameter
76=4CH DSP1 Parameter1
77=4DH DSP1 Parameter2
78=4EH DSP2 Parameter1
79=4FH DSP2 Parameter2
80=50H DSP3 Parameter1
81=51H DSP3 Parameter2
82=52H DSP4 Parameter1
83=53H DSP4 Parameter2
    
```