

EM-50/30/20/10

.....
CREATIVE KEYBOARDS

MIDI Implementation

MIDI implementation

(Arranger)

Section 1. Receive data

Channel Voice Messages

Note off

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

n = MIDI channel number : 0H-FH (ch.1-ch.16)
kk = note number : 00H-7FH (0-127)
vv = note off velocity : 00H-7FH (0-127)

- * Not received when Rx.NOTE MESSAGE = OFF (Initial value is ON) or when note number is outside limits.
- * For Drum Parts, these messages are received when Rx.NOTE OFF = ON for each Instrument.
- * The velocity values of Note Off messages are ignored.

Note on

Status	2nd byte	3rd byte
9nH	kkH	vvH

n = MIDI channel number : 0H-FH (ch.1-ch.16)
kk = note number : 00H-7FH (0-127)
vv = note on velocity : 01H-7FH (1-127)

- * Not received when Rx.NOTE MESSAGE = OFF. (Initial value is ON)
- * For Drum Parts, not received when Rx.NOTE ON = OFF for each Instrument.

Polyphonic Key Pressure

Status	2nd byte	3rd byte
AnH	kkH	vvH

n = MIDI channel number : 0H-FH (ch.1-ch.16)
kk = note number : 00H-7FH (0-127)
vv = key pressure : 00H-7FH (0-127)

- * Not received when Rx.POLY PRESSURE (PAF) = OFF. (Initial value is ON)
- * The resulting effect is determined by System Exclusive messages. With the initial settings, there will be no effect.

Control Change

- * When Rx.CONTROL CHANGE = OFF, all control change messages except for Channel Mode messages will be ignored.
- * The value specified by a Control Change message will not be reset even by a Program Change, etc.

Bank Select (Controller number 0, 32)

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

n = MIDI channel number : 0H-FH (ch.1-ch.16)
mm = Bank number MSB : 00H-7FH (GS Variation number 0 - 127), Initial Value = 00H
ll = Bank number LSB : 00H - 03H (MAP), Initial Value = 00H

- * Not received when Rx.BANK SELECT = OFF. "Rx.BANK SELECT" is set to OFF by "Turn General MIDI System On," and set to ON by "GS RESET." (Power-on default value is ON)
- * When Rx.BANK SELECT LSB = OFF, Bank number LSB will be handled as 00H regardless of the received value. However, when sending Bank Select messages, you have to send both the MSB (mmH) and LSB (llH, the value should be 00H) together.
- * Bank Select processing will be suspended until a Program Change message is received.
- * The GS format "Variation number" is the value of the Bank Select MSB (Controller number 0) expressed in decimal.

Modulation (Controller number 1)

Status	2nd byte	3rd byte
BnH	01H	vvH

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

- * Not received when Rx.MODULATION = OFF. (Initial value is ON)
- * The resulting effect is determined by System Exclusive messages. With the initial settings, this is Pitch Modulation Depth.
- * Ignored when "Modulation Midi Rx Parameter = OFF". [EM-50/30]

Portamento Time (Controller number 5)

Status	2nd byte	3rd byte
BnH	05H	vvH

n = MIDI channel number : 0H-FH (ch.1-ch.16)
vv = Portamento Time : 00H-7FH (0-127), Initial value = 00H (0)

- * This adjusts the rate of pitch change when Portamento is ON or when using the Portamento Control. A value of 0 results in the fastest change.

Model EM-50/30/20/10

Version 1.00 '99.03

Data Entry (Controller number 6, 38)

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

n = MIDI channel number : 0H-FH (ch.1-ch.16)
mm, ll = the value of the parameter specified by RPN/NRPN
mm = MSB, ll = LSB

Volume (Controller number 7)

Status	2nd byte	3rd byte
BnH	07H	vvH

n = MIDI channel number : 0H-FH (ch.1-ch.16)
vv = Volume : 00H-7FH (0-127), Initial Value = 64H (100)

- * Volume messages are used to adjust the volume balance of each Part.
- * Not received when Rx.VOLUME = OFF. (Initial value is ON)
- * Ignored when "Volume Midi Rx Parameter = OFF". [EM-50/30]

Pan (Controller number 10)

Status	2nd byte	3rd byte
BnH	0AH	vvH

n = MIDI channel number : 0H-FH (ch.1-ch.16)
vv = pan : 00H-40H-7FH (Left-Center-Right), Initial Value = 40H (Center)

- * The stereo position can be adjusted over 127 steps.
- * For Rhythm Parts, this is a relative adjustment of each Instrument's pan setting.
- * Not received when Rx.PANPOT = OFF. (Initial value is ON)

Expression (Controller number 11)

Status	2nd byte	3rd byte
BnH	0BH	vvH

n = MIDI channel number : 0H-FH (ch.1-ch.16)
vv = Expression : 00H-7FH (0-127), Initial Value = 7FH (127)

- * This adjusts the volume of a Part. It can be used independently from Volume messages. Expression messages are used for musical expression within a performance; e.g., expression pedal movements, crescendo and decrescendo.
- * Not received when Rx.EXPRESSION = OFF. (Initial value is ON)

Hold 1 (Controller number 64)

Status	2nd byte	3rd byte
BnH	40H	vvH

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

- * Not received when Rx.HOLD1 = OFF. (Initial value is ON)
- * Ignored when "Sustain Midi Rx Parameter = OFF". [EM-50/30]

Portamento (Controller number 65)

Status	2nd byte	3rd byte
BnH	41H	vvH

n = MIDI channel number : 0H-FH (ch.1-ch.16)
vv = Control value : 00H-7FH (0-127) 0-63 = OFF, 64-127 = ON

- * Not received when Rx.PORTAMENTO = OFF. (Initial value is ON)

Sostenuto (Controller number 66)

Status	2nd byte	3rd byte
BnH	42H	vvH

n = MIDI channel number : 0H-FH (ch.1-ch.16)
vv = Control value : 00H-7FH (0-127) 0-63 = OFF, 64-127 = ON

- * Not received when Rx.SOSTENUTO = OFF. (Initial value is ON)

Soft (Controller number 67)

Status	2nd byte	3rd byte
BnH	43H	vvH

n = MIDI channel number : 0H-FH (ch.1-ch.16)
vv = Control value : 00H-7FH (0-127) 0-63 = OFF, 64-127 = ON

- * Not received when Rx.SOFT = OFF. (Initial value is ON)

Portamento control (Controller number 84)

Status	2nd byte	3rd byte
BnH	54H	kkH

n = MIDI channel number : 0H-FH (ch.1-ch.16)
kk = source note number : 00H-7FH (0-127)

- * A Note-on received immediately after a Portamento Control message will change continuously in pitch, starting from the pitch of the Source Note Number.
- * If a voice is already sounding for a note number identical to the Source Note Number, this voice will continue sounding (i.e., legato) and will, when the next Note-on is received, smoothly change to the pitch of that Note-on.

* The rate of the pitch change caused by Portamento Control is determined by the Portamento Time value.

Example 1.

On MIDI	Description	Result
90 3C 40	Note on C4	C4 on
80 54 3C	Portamento Control from C4	no change
90 40 40	Note on E4	glide from C4 to E4
80 3C 40	Note off C4	no change
80 40 40	Note off E4	E4 off

Example 2.

On MIDI	Description	Result
80 54 3C	Portamento Control from C4	no change
90 40 40	Note on E4	E4 is played with glide from C4 to E4
80 40 40	Note off E4	E4 off

○ Effect 1 (Reverb Send Level) (Controller number 91)

Status 2nd byte 3rd byte
BnH 5BH vH

n = MIDI channel number : 0H-FH (ch.1-ch.16)
vw = Reverb Send Level : 00H-7FH (0-127), Initial Value = 28H (40)

* This message adjusts the Reverb Send Level of each Part.

○ Effect 3 (Chorus Send Level) (Controller number 93)

Status 2nd byte 3rd byte
BnH 5DH vH

n = MIDI channel number : 0H-FH (ch.1-ch.16)
vw = Chorus Send Level : 00H-7FH (0-127), Initial Value = 00H (0)

* This message adjusts the Chorus Send Level of each Part.

○ NRPN MSB/LSB (Controller number 99, 98)

Status 2nd byte 3rd byte
BnH 63H mmH
BnH 62H llH

n = MIDI channel number : 0H-FH (ch.1-ch.16)
mm = upper byte of the parameter number specified by NRPN
ll = lower byte of the parameter number specified by NRPN

* NRPN can be received when Rx.NRPN = ON. "Rx.NRPN" is set to OFF by power-on reset or by receiving "Turn General MIDI System On," and it is set to ON by "GS RESET."

* The value set by NRPN will not be reset even if Program Change or Reset All Controllers is received.

NRPN

The NRPN (Non Registered Parameter Number) message allows an extended range of control changes to be used. On this unit, NRPN messages can be used to modify sound parameters etc.

To use these messages, you must first use NRPN messages (Controller number 98 and 99, their order does not matter) to specify the parameter to be controlled, and then use Data Entry messages to specify the value of the specified parameter. Once an NRPN parameter has been specified, all Data Entry messages received on that channel will modify the value of that parameter. To prevent accidents, it is recommended that you set RPN Null (RPN Number = 7FH/7FH) when you have finished setting the value of the desired parameter. Refer to Section 5. Supplementary material "Examples of actual MIDI messages" <Example 4> (page 14). On this unit, Data entry LSB (Controller number 38) of NRPN is ignored, so it is no problem to send Data entry MSB (Controller number 6) only (without Data entry LSB).

On the EM-50/30/20/10, NRPN can be used to modify the following parameters.

NRPN MSB	Data entry MSB	Function and range
01H 08H	mmH	Vibrato Rate (relative change) mm: 00H - 40H - 7FH (-64 - 0 - +63)
01H 09H	mmH	Vibrato Depth (relative change) mm: 00H - 40H - 7FH (-64 - 0 - +63)
01H 0AH	mmH	Vibrato Delay (relative change) mm: 00H - 40H - 7FH (-64 - 0 - +63)
01H 20H	mmH	TVF Cutoff Frequency (relative change) mm: 00H - 40H - 7FH (-64 - 0 - +63)
01H 21H	mmH	TVF Resonance (relative change) mm: 00H - 40H - 7FH (-64 - 0 - +63)
01H 63H	mmH	TVF&TVA Envelope Attack Time (relative change) mm: 00H - 40H - 7FH (-64 - 0 - +63)
01H 64H	mmH	TVF&TVA Envelope Decay Time (relative change) mm: 00H - 40H - 7FH (-64 - 0 - +63)
01H 66H	mmH	TVF&TVA Envelope Release Time (relative change) mm: 00H - 40H - 7FH (-64 - 0 - +63)
18H rH	mmH	Drum Instrument Pitch Coarse (relative change) rr: Drum Instrument note number mm: 00H - 40H - 7FH (-64 - 0 - +63 semitone)
1AH rH	mmH	Drum Instrument TVA Level (absolute change) rr: Drum Instrument note number mm: 00H - 7FH (0 - max)

1CH rH	mmH	Drum Instrument Panpot (absolute change) rr: Drum Instrument note number mm: 00H, 01H - 40H - 7FH (random, left-center-right)
1DH rH	mmH	Drum Instrument Reverb Send Level (absolute change) rr: Drum Instrument note number mm: 00H - 7FH (0 - max)
1EH rH	mmH	Drum Instrument Chorus Send Level (absolute change) rr: Drum Instrument note number mm: 00H - 7FH (0 - max)
4FH 10H	mmH	Part 4 On / Off (Upper 1) [EM-50/30/20] mm: 00H - 7FH (00-3FH=Off - 40-7FH= On)
4FH 11H	mmH	Part 11 On / Off (Lower) [EM-50/30/20] mm: 00H - 7FH (00-3FH=Off - 40-7FH= On)
4FH 12H	mmH	Part 12 On / Off (Man Bass) [EM-50/30/20] mm: 00H - 7FH (00-3FH=Off - 40-7FH= On)
4FH 13H	mmH	Part 6 On / Off (Upper 2) [EM-50/30/20] mm: 00H - 7FH (00-3FH=Off - 40-7FH= On)
4FH 14H	mmH	Part 16 On / Off (Man Drums) [EM-50/30/20] mm: 00H - 7FH (00-3FH=Off - 40-7FH= On)
4FH 1AH	mmH	Part 10 On / Off (Acc Drums) [EM-50/30/20] mm: 00H - 7FH (00-3FH=Off - 40-7FH= On)
4FH 1BH	mmH	Part 2 On / Off (Acc Bass) [EM-50/30/20] mm: 00H - 7FH (00-3FH=Off - 40-7FH= On)
4FH 1CH	mmH	Part 1 On / Off (Acc 1) [EM-50/30/20] mm: 00H - 7FH (00-3FH=Off - 40-7FH= On)
4FH 1DH	mmH	Part 3 On / Off (Acc2) [EM-50/30/20] mm: 00H - 7FH (00-3FH=Off - 40-7FH= On)
4FH 1EH	mmH	Part 5 On / Off (Acc3) [EM-50/30/20] mm: 00H - 7FH (00-3FH=Off - 40-7FH= On)
4FH 1FH	mmH	Part 7 On / Off (Acc 4) [EM-50/30/20] mm: 00H - 7FH (00-3FH=Off - 40-7FH= On)
4FH 18H	mmH	Part 8 On / Off (Acc 5) [EM-50/30/20] mm: 00H - 7FH (00-3FH=Off - 40-7FH= On)
4FH 19H	mmH	Part 9 On / Off (Acc 6) [EM-50/30/20] mm: 00H - 7FH (00-3FH=Off - 40-7FH= On)
4FH 20H	mmH	Master Accompaniment On / Off [EM-50/30/20] mm: 00H - 7FH (00-3FH=Off - 40-7FH= On)
4FH 21H	mmH	Master Upper On / Off [EM-50/30/20] mm: 00H - 7FH (00-3FH=Off - 40-7FH= On)
4FH 23H	mmH	Master Bass On / Off [EM-50/30/20] mm: 00H - 7FH (00-3FH=Off - 40-7FH= On)
4FH 24H	mmH	Master Drum On / Off [EM-50/30/20] mm: 00H - 7FH (00-3FH=Off - 40-7FH= On)

* Data entry LSB (llH) is ignored.

* Parameters marked "relative change" will change relative to the preset value(40H). Even among different GS devices, "relative change" parameters may sometimes differ in the way the sound changes or in the range of change.

* Parameters marked "absolute change" will be set to the absolute value of the parameter, regardless of the preset value.

* Ignored when "NRPN Midi Rx Parameter = OFF". [EM-50/30]

○ RPN MSB/LSB (Controller number 101, 100)

Status 2nd byte 3rd byte
BnH 65H mmH
BnH 64H llH

n = MIDI channel number : 0H-FH (ch.1-ch.16)
mm = upper byte of parameter number specified by RPN
ll = lower byte of parameter number specified by RPN

* Not received when Rx.RPN = OFF. (Initial value is ON)

* The value specified by RPN will not be reset even by messages such as Program Change or Reset All Controller.

RPN

The RPN (Registered Parameter Number) messages are expanded control changes, and each function of an RPN is described by the MIDI Standard. To use these messages, you must first use RPN (Controller number 100 and 110, their order does not matter) to specify the parameter to be controlled, and then use Data Entry messages (Controller number 6, 38) to specify the value of the specified parameter. Once an RPN parameter has been specified, all Data Entry messages received on that channel will modify the value of that parameter. To prevent accidents, it is recommended that you set RPN Null (RPN Number = 7FH/7FH) when you have finished setting the value of the desired parameter. Refer to Section 5. "Examples of actual MIDI messages" <Example 4> (page 14).

On the EM-50/30/20/10, RPN can be used to modify the following parameters.

RPN	Data entry	Explanation
MSB LSB	MSB LSB	
00H 00H	mmH ---	Pitch Bend Sensitivity mm: 00H-18H (0-24 semitones), Initial Value = 02H (2 semitones) ll: Ignored (processed as 00H) specify up to 2 octaves in semitone steps
00H 01H	mmH llH	Master Fine Tuning mm, ll: 00 00H - 40 00H - 7F 7FH (-100 - 0 - +99.99 cents), Initial Value = 40 00H (± 0 cent) Refer to 5. Supplementary material, "About tuning" (page 15).
00H 02H	mmH ---	Master Coarse Tuning mm: 28H-40H-58H (-24 - 0 - +24 semitones), Initial Value = 40H (±0 semitone) ll: Ignored (processed as 00H)
7FH 7FH	--- ---	RPN null Set condition where RPN and NRPN are unspecified. The data entry messages after set RPN null will be ignored. (No Data entry messages are required after RPN null). Settings already made will not change. mm, ll: Ignored

● Program Change

Status	2nd byte
CnH	ppH

n = MIDI channel number : 0H-FH (ch.1-ch.16)
pp = Program number : 00H-7FH (prog.1-prog.128)

- * Not received when Rx.PROGRAM CHANGE = OFF. (Initial value is ON)
- * After a Program Change message is received, the sound will change beginning with the next Note-on. Voices already sounding when the Program Change message was received will not be affected.
- * For Drum Parts, Program Change message will not be received on lower byte of the bank numbers (the value of Control Number 0 is other than 0 (00H)).
- * Ignored when "Program Change Midi Rx Parameter = OFF". [EM-50/30]

● Channel Pressure

Status	2nd byte
DnH	vvH

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

- * Not received when Rx.CH PRESSURE (CAf) = OFF. (Initial value is ON)
- * The resulting effect is determined by System Exclusive messages. With the initial settings there will be no effect.

● Pitch Bend Change

Status	2nd byte	3rd byte
EnH	llH	mmH

n = MIDI channel number : 0H-FH (ch.1-ch.16)
mm, ll = Pitch Bend value : 00 00H - 40 00H - 7F 7FH (-8192 - 0 - +8191)

- * Not received when Rx.PITCH BEND = OFF. (Initial value is ON)
- * The resulting effect is determined by System Exclusive messages. With the initial settings the effect is Pitch Bend.
- * Ignored when "Pitch Bender Midi Rx Parameter = OFF". [EM-50/30]

■ Channel Mode Messages

● All Sounds Off (Controller number 120)

Status	2nd byte	3rd byte
BnH	78H	00H

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

- * When this message is received, all currently-sounding notes on the corresponding channel will be turned off immediately.

● Reset All Controllers (Controller number 121)

Status	2nd byte	3rd byte
BnH	79H	00H

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

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

Controller	Reset value
Pitch Bend Change	±0 (center)
Polyphonic Key Pressure	0 (off)
Channel Pressure	0 (off)
Modulation	0 (off)
Expression	127 (max)
Hold 1	0 (off)
Portamento	0 (off)
Sostenuto	0 (off)
Soft	0 (off)
RPN	unset; previously set data will not change
NRPN	unset; previously set data will not change

● Local On/Off (Controller number 122)

Status	2nd byte	3rd byte
BnH	7AH	00H (Local Off)
BnH	7AH	7FH (Local On - Default Value)

n = MIDI channel number : 0H-FH (ch.1-ch.16)
This parameter affect all the parts

When Local Off message is received, the generation board is disconnected from the keyboard but the messages received via Midi are still recognized and played.

* Regardless of the set channel, this message is sent to all parts.

● All Notes Off (Controller number 123)

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

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

- * When All Notes Off is received, all notes on the corresponding channel will be turned off. However if Hold 1 or Sostenuto is ON, the sound will be continued until these are turned off.

● OMNI OFF (Controller number 124)

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

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

- * The same processing will be carried out as when All Notes Off is received.

● OMNI ON (Controller number 125)

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

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

- * The same processing will be carried out as when All Note Off is received. OMNI ON will not be turned on.

● MONO (Controller number 126)

Status	2nd byte	3rd byte
BnH	7EH	mmH

n = MIDI channel number : 0H-FH (ch.1-ch.16)
mm = mono number : 00H-10H (0-16)

- * The same processing will be carried out as when All Sounds Off and All Notes Off is received, and the corresponding channel will be set to Mode 4 (M = 1) regardless of the value of "mono number."

● POLY (Controller number 127)

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

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

- * The same processing will be carried out as when All Sounds Off and All Notes Off is received, and the corresponding channel will be set to Mode 3.

■ System Realtime Message

● Active Sensing

Status
FEH

- * When Active Sensing is received, the unit will begin monitoring the intervals of all further messages. While monitoring, if the interval between messages exceeds 420 ms, the same processing will be carried out as when All Sounds Off, All Notes Off and Reset All Controllers are received, and message interval monitoring will be halted.

○ Sequencer Start

Status
FAH

- * When "Sequencer Start" is received, the internal Recorder and/or the internal Arranger start.

○ Sequencer Stop

Status
FCH

- * When "Sequencer Stop" is received, the internal Recorder and/or the internal arranger stop.

○ Timing Clock

Status
F8H

- * When "Timing Clock" is received the internal recorder or the internal arranger is synchronized to an external clock according to the following table.

Sync RX	Response
Internal	The Style will neither start/stop nor follow the tempo of the external Timing Clock (F8) and "Sequencer Start/Stop" (FA / FC) messages. [EM-50/30]
Auto A	As long the EM-50/30/20/10 does not receive "Sequencer Start/Stop" (FA/FC) and "Timing Clock" (F8) messages it will follow its own tempo and Start/Stop whenever you press the "START/STOP" button to start Style Playback and Recorder (Rec). Once received a "Sequencer Start" (FA), if also "Timing Clock" (F8) follows this message, the Arranger / Recorder (Rec) start with the external timing, otherwise it start following its internal tempo.
Auto S	As long the EM-50/30/20/10 does not receive "Sequencer Start/Stop" (FA/FC) and "Timing Clock" (F8) messages it will follow its own tempo and Recorder Play/Stop whenever you press the "PLAY/STOP" button to start Song Playback and Recorder (Rec). Once received a "Sequencer Start" (FA), if also "Timing Clock" (F8) follows this message, the Recorder (Play) / Recorder (Rec) start with the external timing, otherwise it start following its internal tempo.
MIDI A	As long the EM-50/30 does not receive "Sequencer Start/Stop" (FA/FC) and "Timing Clock" (F8) messages it will follow its own tempo and Start/Stop whenever you press the "START/STOP" button to start Style Playback and Recorder (Rec). Once received a "Sequencer Start" (FA), if also "Timing Clock" (F8) follows this message, the Arranger / Recorder (Rec) start with the external timing, otherwise it will wait for external "Timing Clock" (F8).
MIDI S	As long the EM-50/30 does not receive "Sequencer Start/Stop" (FA/FC) and "Timing Clock" (F8) messages it will follow its own tempo and Recorder Play/Stop whenever you press the "PLAY/STOP" button to start Song Playback and Recorder (Rec). Once received a "Sequencer Start" (FA), if also "Timing Clock" (F8) follows this message, the Recorder (Play) / Recorder (Rec) start with the external timing, otherwise it will wait for external "Timing Clock" (F8).
Remote A	As long the EM-50/30 does not receive "Sequencer Start/Stop" (FA/FC) and "Timing Clock" (F8) messages it will follow its own tempo and Start/Stop whenever you press the "START/STOP" button to start Style Playback and Recorder (Rec). Once received a "Sequencer Start" (FA), if also "Timing Clock" (F8) follows this message, the Arranger / Recorder (Rec) start always with the internal timing.
Remote S	As long the EM-50/30 does not receive "Sequencer Start/Stop" (FA/FC) and "Timing Clock" (F8) messages it will follow its own tempo and Recorder Play/Stop whenever you press the "PLAY/STOP" button to start Song Playback and Recorder (Rec). Once received a "Sequencer Start" (FA), if also "Timing Clock" (F8) follows this message, the Recorder (Play) / Recorder (Rec) start always with the internal timing.

■ System Exclusive Message

Status	Data byte	Status
F0H	iiiH, ddH,eeH	F7H
F0H		: System Exclusive Message status
ii = ID number		: an ID number (manufacturer ID) to indicate the manufacturer whose Exclusive message this is. Roland's manufacturer ID is 41H. ID numbers 7EH and 7FH are extensions of the MIDI standard; Universal Non-realtime Messages (7EH) and Universal Realtime Messages (7FH).
dd.....ee = data		: 00H-7FH (0-127)
F7H		: EOX (End Of Exclusive)

The System Exclusive Messages received by this unit are: messages related to mode settings, Universal Realtime System Exclusive messages, Data Requests (RQ1), and Data Set (DT1).

● System exclusive messages related to mode settings

These messages are used to initialize a device to GS or General MIDI mode, or change the operating mode. When creating performance data, a "Turn General MIDI System On" message should be inserted at the beginning of a General MIDI score, and a "GS Reset" message at the beginning of a GS music data. In the case of data for the EM-50/30/20/10 and for this unit, we recommend that "System Mode Set" be placed at the beginning of the song data. Each song should contain only one mode message as appropriate for the type of data. (Do not insert two or more mode setting messages in a single song.)
"Turn General MIDI System On" use Universal Non-realtime Message format. "System Mode Set" and "GS Reset" use Roland system exclusive format "Data Set 1 (DT1)."

○ Turn General MIDI System On

This is a command message that resets the internal settings of the unit to the General MIDI initial state (General MIDI System-Level 1). After receiving this message this unit, will automatically be set to the proper condition for correctly playing a General MIDI score.

Status	Data byte	Status
F0H	7EH, 7FH, 09H, 01H	F7H
Byte	Explanation	
F0H	Exclusive status	
7EH	ID number (Universal Non-realtime Message)	
7FH	Device ID (Broadcast)	
09H	Sub ID#1 (General MIDI Message)	
01H	Sub ID#2 (General MIDI On)	
F7H	EOX (End Of Exclusive)	

- * When this message is received, Rx.BANK SELECT will be OFF and Rx.NRPN will be OFF.
- * There must be an interval of at least 50 ms between this message and the next message.

○ Turn General MIDI System Off

"General MIDI System Off" is a command message that resets the internal settings of the unit to the Arranger Mode I initial state .

Status	Data byte	Status
F0H	7EH, 7FH, 09H, 02H	F7H
Byte	Explanation	
F0H	Exclusive status	
7EH	ID number (Universal Non-realtime Message)	
7FH	Device ID (Broadcast)	
09H	Sub ID#1 (General MIDI Message)	
02H	Sub ID#2 (General MIDI Off)	
F7H	EOX (End Of Exclusive)	

- * When this message is received, the unit change from "General MIDI" mode to EM-50/30/20/10 default mode. (Arranger mode)
- * There must be an interval of at least 100 ms between this message and the next message.

○ GS Reset

GS Reset is a command message that resets the internal settings of a device to the GS initial state. This message appears at the beginning of GS music data, and a GS device that receives this message will automatically be set to the proper state to correctly playback GS music data.

Status	Data byte	Status
F0H	41H, dev, 42H, 12H, 40H, 00H, 7FH, 00H, 41H	F7H
Byte	Explanation	
F0H	Exclusive status	
41H	ID number (Roland)	
dev	Device ID (dev: 00H - 1FH (1 - 32) Initial value is 10H(17))	
42H	Model ID (GS)	
12H	Command ID (DT1)	
40H	Address MSB	
00H	Address	
7FH	Address LSB	
00H	Data (GS reset)	
41H	Checksum	
F7H	EOX (End Of Exclusive)	

- * When this message is received, Rx.NRPN will be ON.
- * There must be an interval of at least 50 ms between this message and the next message.

○ Exit GS Mode

"Exit GS Mode" is a command message that resets the internal settings of the unit to the Arranger Mode I initial state .

Status	Data byte	Status
F0H	41H, dev, 42H, 12H, 40H, 00H, 7FH, 7FH, 42H	F7H
Byte	Explanation	
F0H	Exclusive status	
41H	ID number (Roland)	
dev	Device ID (dev: 00H - 1FH (1 - 32) Initial value is 10H(17))	
42H	Model ID (GS)	
12H	Command ID (DT1)	
40H	Address MSB	
00H	Address	

7FH	AddressLSB	
7FH	Data	(Exit GS Mode)
42H	Checksum	
F7H	EOX	(End Of Exclusive)

* When this message is received, the unit change from "General MIDI" mode to EM-50/30/20/10 default mode. (Style mode)
 * There must be an interval of at least 100 ms between this message and the next message.

bbH	Address	: middle byte of the starting address of the transmitted data
ccH	Address LSB	: lower byte of the starting address of the transmitted data
ddH	Data	: the actual data to be transmitted. Multiple bytes of data are transmitted starting from the address.

eeH	Data	
sum	Checksum	
F7H	EOX	(End Of Exclusive)

* The amount of data that can be transmitted at one time depends on the type of data, and data can be received only from the specified starting address and size. Refer to the Address and Size given in Section 3.
 * Data larger than 128 bytes must be divided into packets of 128 bytes or less. If "Data Set 1" is transmitted successively, there must be an interval of at least 40 ms between packets.
 * Regarding the checksum please refer to section 4.

● Universal Realtime System Exclusive Messages

○ Master volume

Status	Data byte	Status
F0H	7FH, 7FH, 04H, 01H, 01H, mmH	F7H

Byte	Explanation
F0H	Exclusive status
7FH	ID number (universal realtime message)
7FH	Device ID (Broadcast)
04H	Sub ID#1 (Device Control messages)
01H	Sub ID#2 (Master Volume)
01H	Master volume lower byte
mmH	Master volume upper byte
F7H	EOX (End Of Exclusive)

* The lower byte (01H) of Master Volume will be handled as 00H.

● Data transmission

The EM-50/30/20/10 can use Exclusive messages to transmit internal settings to other devices. There are two types of Exclusive data transmission; Individual Parameter Transmission (section 3) in which single parameters are transmitted one by one, and Bulk Dump Transmission (section 4) in which a large amount of data is transmitted at once.

The exclusive message used when transmitting GS format data has a model ID of 42H and a device ID of 10H.

○ Data request 1 RQ1 (11H)

This message requests the other device to send data. The Address and Size determine the type and amount of data to be sent. There are two types of request; Individual Parameter Request which requests data for an individual parameter, and Bulk Dump Request which requests a large amount of data at once. In either case, the "Data Request 1 (RQ1)" message format is used, and the Address and Size included in the message determine the type and amount of data that is desired.

For Individual Parameter Request, refer to "3. Individual Parameter Transmission".

For Bulk Dump Request, refer to "4. Bulk Dump".

When a Data Request message is received, if the device is ready to transmit data and if the address and size are appropriate, the requested data will be transmitted as a "Data Set 1 (DT1)" message. If not, nothing will be transmitted.

Status	Data byte	Status
F0H	41H, dev, 42H, 11H, aaH, bbH, ccH, ssH, ttH, uuH, sum	F7H

Byte	Explanation
F0H	Exclusive status
41H	ID number (Roland)
dev	Device ID (dev: 00H - 1FH Initial value is 10H)
42H	Model ID (GS)
11H	Command ID (RQ1)
aaH	Address MSB : upper byte of the starting address of the requested data
bbH	Address : middle byte of the starting address of the requested data
ccH	Address LSB : lower byte of the starting address of the requested data
ssH	Size MSB
ttH	Size
uuH	Size LSB
sum	Checksum
F7H	EOX (End Of Exclusive)

* The amount of data that can be transmitted at once time will depend on the type of data, and data must be requested using a specific starting address and size. Refer to the Address and Size listed in Section 3.
 * Regarding the checksum please refer to Section 4.

○ Data set 1 DT1 (12H)

This is the message that actually performs data transmission, and is used when you wish to transmit the data.

Status	Data byte	Status
F0H	41H, dev, 42H, 12H, aaH, bbH, ccH, ddH, ... eeH, sum	F7H

Byte	Explanation
F0H	Exclusive status
41H	ID number (Roland)
dev	Device ID (dev: 00H - 1FH Initial value is 10H)
42H	Model ID (GS), 45H
12H	Command ID (DT1)
aaH	Address MSB : upper byte of the starting address of the transmitted data

Section 2. Transmit data (Style Section)

■ Channel voice messages

● Note off

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

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

● Note on

Status 2nd byte 3rd byte
9nH kkH vvH

n=MIDI channel number : 0H - FH (ch.1 - ch.16)
kk=note number : 00H - 7FH (0 - 127)
vv=velocity : 01H - 7FH (1 - 127)

● Control Change

○ Bank Select (Controller number 0,32)

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

n=MIDI channel number : 0H - FH (ch.1 - ch.16)
mm=Bank number MSB : 00H - 7FH (GS Variation number 0 - 127)

ll=Bank number LSB : 00H - 02H (MAP)

* Some other GS devices do not recognize the Bank Select LSB (Controller number 32).

○ Modulation (Controller number 1) [EM-50/30/20]

Status 2nd byte 3rd byte
BnH 01H vvH

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

* Ignored when "Modulation Midi Tx Parameter" = OFF. [EM-50/30]

○ Portamento Time (Controller number 5)

Status 2nd byte 3rd byte
BnH 05H vvH

n=MIDI channel number : 0H - FH (ch.1 - ch.16)
vv=Portamento Time : 00H - 7FH (0 - 127) Initial value = 00H (0)

* This adjusts the rate of pitch change when Portamento is on or when using the Portamento Control. A value of 0 results in the fastest change.

○ Data Entry (Controller number 6,38)

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

n=MIDI channel number : 0H - FH (ch.1 - ch.16)
mm, ll= the value of the parameter specified by RPN/NRPN

○ Volume (Controller number 7)

Status 2nd byte 3rd byte
BnH 07H vvH

n=MIDI channel number : 0H - FH (ch.1 - ch.16)
vv=Volume : 00H - 7FH (0 - 127) Initial value = 64H (100)

* Ignored when "Volume Midi Tx Parameter" = OFF. [EM-50/30]

* Volume messages are used to adjust the volume balance of each Part.

○ Pan (Controller number 10)

Status 2nd byte 3rd byte
BnH 0AH vvH

n=MIDI channel number : 0H - FH (ch.1 - ch.16)
vv=pan : 00H - 40H - 7FH
(Left - Center - Right) Initial value = 40H (Center)

* The stereo position can be adjusted over 127 steps.

○ Expression (Controller number 11)

Status 2nd byte 3rd byte
BnH 0BH vvH

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

* It can be used independently from Volume messages. Expression messages are used for musical expression within a performance; e.g., expression pedal movements, crescendo and decrescendo.

○ Hold 1

(Controller number 64)

Status 2nd byte 3rd byte
BnH 40H vvH

n=MIDI channel number : 0H - FH (ch.1 - ch.16)
vv=Control value : 00H - 7FH (0 - 127) 0-63=OFF 64-127=ON

* Ignored when "Hold Midi Tx Parameter" = OFF. [EM-50/30]

○ Portamento control (Controller number 84)

Status 2nd byte 3rd byte
BnH 54H kkH

n=MIDI channel number : 0H - FH (ch.1 - ch.16)
kk=source note number : 00H - 7FH (0 - 127)

○ Effect 1 (Reverb Send Level) (Controller number 91)

Status 2nd byte 3rd byte
BnH 5BH vvH

n=MIDI channel number : 0H - FH (ch.1 - ch.16)
vv=Control value : 00H - 7FH (0 - 127) Initial value = 28H (40)

* This message adjusts the Reverb Send Level of each Part.

○ Effect 3 (Chorus Send Level) (Controller number 93)

Status 2nd byte 3rd byte
BnH 5DH vvH

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

* This message adjusts the Chorus Send Level of each Part.

○ NRPN MSB/LSB (Controller number 99,98)

Status 2nd byte 3rd byte
BnH 63H mmH
BnH 62H llH

n=MIDI channel number : 0H - FH (ch.1 - ch.16)
mm=upper byte of the parameter number specified by NRPN
ll=lower byte of the parameter number specified by NRPN

* Ignored when "NRPN Midi Tx Parameter" = OFF. [EM-50/30]
NRPN

The NRPN (Non Registered Parameter Number) message allows an extended range of control changes to be used, letting you use control functions which are not defined in the MIDI Specification.

NRPNs provide a great deal of freedom, and can be used with any manufacturer's devices. As a result, any particular parameter number can easily mean one thing when used for a certain device, and mean something completely different on another device.

Note that RPNs and NRPNs require that a multiple number of messages be processed in the correct order. However, a majority of the sequences currently on the market cannot always be relied on to consistently send messages in the proper order if the messages are located at almost exactly the same point in time.

On the GS Instruments, NRPN can be used to modify the following parameters. The range of values for relative change parameters will be different with certain models. Please see the explanation that follows the chart.

NRPN MSB	Data entry MSB	Function and range	
01H 20H	mmH	TVF Cutoff Frequency (relative change) mm: 00H - 40H - 7FH (-64 - 0 - +63)	[EM-50/30/20]
01H 21H	mmH	TVF Resonance (relative change) mm: 00H - 40H - 7FH (-64 - 0 - +63)	[EM-50/30/20]
4FH 10H	mmH	Part 4 On / Off (Upper 1) mm: 00H - 7FH (00-3FH =Off - 40-7FH= On)	[EM-50/30/20]
4FH 11H	mmH	Part 11 On / Off (Lower) mm: 00H - 7FH (00-3FH =Off - 40-7FH= On)	[EM-50/30/20]
4FH 12H	mmH	Part 12 On / Off (Man. Bass) mm: 00H - 7FH (00-3FH =Off - 40-7FH= On)	[EM-50/30/20]
4FH 13H	mmH	Part 6 On / Off (Upper 2) mm: 00H - 7FH (00-3FH =Off - 40-7FH= On)	[EM-50/30/20]
4FH 1AH	mmH	Part 10 On / Off (Acc Drums) mm: 00H - 7FH (00-3FH =Off - 40-7FH= On)	[EM-50/30/20]
4FH 1BH	mmH	Part 2 On / Off (Acc Bass) mm: 00H - 7FH (00-3FH =Off - 40-7FH= On)	[EM-50/30/20]
4FH 20H	mmH	Master Accompaniment On / Off mm: 00H - 7FH (00-3FH =Off - 40-7FH= On)	[EM-50/30/20]

* Data entry LSB (llH) is ignored.
* Parameters marked "relative change" will change relative to the preset value. Even among different GS devices, "relative change" parameters may sometimes differ in the way the sound changes or in the range of change.
* Parameters marked "absolute change" will be set to the absolute value of the parameter, regardless of the preset value.
* It is not possible to simultaneously use both Chorus Send Level and Delay Sendlevel on a single Drum Instrument.

● Program Change

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

* Ignored when "Program Change Midi Tx Parameter" = OFF. [EM-50/30]

● **Pitch Bend Change** [EM-50/30/20]

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

* Ignored when "Pitch Bend Midi Tx Parameter" = OFF. [EM-50/30]

■ **System Realtime Messages**

○ **Active Sensing**

Status
 FEH

Transmitted about every 250ms.

○ **Sequencer Start**

Status
 FAH

* This message is transmitted when the internal sequencer is started.

○ **Sequencer Stop**

Status
 FCH

* This message is transmitted when the internal sequencer is stopped.

○ **Timing Clock**

Status
 F8H

There are two options for sending MIDI realtime messages whenever you play-back a style.

Sync TX

Start/Stop If you select this option, the EM-50/30/20/10 arranger sends Start, Stop messages (FA - FC).

* Ignored when "Start/Stop Midi Tx Parameter" = OFF. [EM-50/30]

Clock This option means that the EM-50/30/20/10 arranger sends Timing clock messages (F8).

* Ignored when "Clock Tx Midi Tx Parameter" = OFF. [EM-50/30]

■ **System Exclusive Messages**

Status Data byte **Status**
 F0H iiH, ddH, ..., eeH F7H

F0H : System Exclusive Message status
 ii = ID number : an ID number (manufacturer ID) to indicate the manufacturer whose Exclusive message this is. Roland's manufacturer ID is 41H.
 ID numbers 7EH and 7FH are extensions of the MIDI standard. Universal Non-realtime Messages (7EH) and Universal Realtime Messages (7FH).
 dd, ..., ee = data : 00H - 7FH (0 - 127)
 F7H : EOX (End Of Exclusive)

The System Exclusive Messages Transmitted and received by the EM-50/30 are: messages related to Mode Setting, Universal Realtime System Exclusive messages, Data Requests (RQ1), and Data Set (DT1).

● **Universal Realtime System Exclusive Messages**

● **Data transmission**

The EM-50/30/20/10 can use Exclusive messages to transmit internal settings to other devices. There are two types of Exclusive data transmission: Individual Parameter Transmission (section 3) in which single parameters are transmitted one by one, and Bulk Dump Transmission (section 4) in which a large amount of data is transmitted at once.

The exclusive message used when transmitting GS format data has a model ID of 42H and a device ID of 10H.

○ **Data request 1 RQ1 (11H)**

This message requests the other device to send data. The Address and Size determine the type and amount of data to be sent. There are two types of request: Individual Parameter Request which requests data for an individual parameter, and Bulk Dump Request which requests a large amount of data at once. In either case, the "Data Request 1 (RQ1)" message format is used, and the Address and Size included in the message determine the type and amount of data that is desired.

For Individual Parameter Request, refer to "3. Individual Parameter Transmission".

For Bulk Dump Request, refer to "4. Bulk Dump".

When a Data Request message is received, if the device is ready to transmit data and if the address and size are appropriate, the requested data will be transmitted as a "Data Set 1 (DT1)" message. If not, nothing will be transmitted.

Status Data byte **Status**
 F0H 41H, dev, 42H, 11H, aaH, bbH, ccH, ssH, ttH, uuH, sum F7H

Byte **Explanation**
 F0H Exclusive status
 41H ID number (Roland)
 dev Device ID (dev: 00H - 1FH Initial value is 10H)
 42H Model ID (GS)
 11H Command ID (RQ1)
 aaH Address MSB : upper byte of the starting address of the requested data
 bbH Address : middle byte of the starting address of the requested data
 ccH Address LSB : lower byte of the starting address of the requested data
 ssH Size MSB
 ttH Size
 uuH Size LSB
 sum Checksum
 F7H EOX (End Of Exclusive)

* The amount of data that can be transmitted at once time will depend on the type of data, and data must be requested using a specific starting address and size. Refer to the Address and Size listed in Section 3.

* Regarding the checksum please refer to Section 4.

○ **Data set 1 DT1 (12H)**

This is the message that actually performs data transmission, and is used when you wish to transmit the data.

Status Data byte **Status**
 F0H 41H, dev, 42H, 12H, aaH, bbH, ccH, ddH, ..., eeH, sum F7H

Byte **Explanation**
 F0H Exclusive status
 41H ID number (Roland)
 dev Device ID (dev: 00H - 1FH Initial value is 10H)
 42H Model ID (GS), 45H, 41H
 12H Command ID (DT1)
 aaH Address MSB : upper byte of the starting address of the transmitted data
 bbH Address : middle byte of the starting address of the transmitted data
 ccH Address LSB : lower byte of the starting address of the transmitted data
 ddH Data : the actual data to be transmitted. Multiple bytes of data are transmitted starting from the address.
 :
 :
 eeH Data
 sum Checksum
 F7H EOX (End Of Exclusive)

* The amount of data that can be transmitted at one time depends on the type of data, and data can be received only from the specified starting address and size. Refer to the Address and Size given in Section 3.

* Data larger than 128 bytes must be divided into packets of 128 bytes or less. If "Data Set 1" is transmitted successively, there must be an interval of at least 40 ms between packets.

* Regarding the checksum please refer to section 4.

Section 3 Individual Parameter Transmission

(Model ID= 42H)

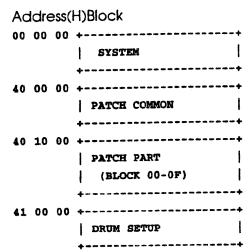
Individual Parameter Transmission transmits data (or requests data) for one parameter as one exclusive message (one packet of 'F0 F7').

In Individual Parameter Transmission, you must use the Address and Size listed in the following "Parameter Address Map". Addresses marked at '#' cannot be used as starting addresses.

■ Address Block Map

The address map for Individual Parameter Transmission is as follows.

<Model ID = 42H>



● **System Parameters**

Parameters affecting the entire unit, such as how the two MIDI IN connectors will function, are called System Parameters. System parameters will not be reset even if "GS Reset" or "General MIDI System On" are received.

<MODEL ID = 42H>

● **Patch parameters**

○ **Patch common parameters**

Address(H)	Size(H)	Data(H)	Parameter	Description	Default Value (H)	Description
40 00 00	00 00 04	0018 - 07E8	MASTER TUNE	-100.0 - +100.0 (cent)	00 04 00 00	0 (cent)
40 00 01#				Use nibblized data.		
40 00 02#						
40 00 03#						

* Refer to section 5. Supplementary material, "About tuning" (page 15).

40 00 04	00 00 01	00 - 7F	MASTER VOLUME	0 - 127 (= F0 7F 7F 04 01 00 vv F7)	7F	127
40 00 05	00 00 01	28 - 58	MASTER KEY-SHIFT	-24 - +24 (semitones)	40	0(semitones)
40 00 06	00 00 01	01 - 7F	MASTER PAN	-63 (LEFT) - +63 (RIGHT)	40	0 (CENTER)
40 00 7F	00 00 01	00	MODE SET	00 = GS Reset (Rx. only)		

* Refer to "System exclusive messages related to Mode settings" (page 6).

40 01 00	00 00 10	20 - 7F	PATCH NAME	16 ASCII Characters		
40 01 : #						
40 01 0F#						
40 01 10	00 00 10	00 - 18	VOICE RESERVE	Part 0	00	
40 01 11#				Part 1	00	
40 01 12#				Part 2	02	
40 01 13#				Part 3	02	
40 01 14#				Part 4	06	
40 01 15#				Part 5	04	
40 01 16#				Part 6	03	
40 01 17#				Part 7	02	
40 01 18#				Part 8	02	
40 01 19#				Part 9	02	
40 01 1A#				Part 11	00	
40 01 1B#				Part 12	00	
40 01 1C#				Part 13	00	
40 01 1D#				Part 14	00	
40 01 1E#				Part 15	00	
40 01 1F#				Part 16	01	

The sum total of voices in the voice reserve function must be equal or less than the number of the maximum poliphony. (24)

40 01 30	00 00 01	00 - 07	REVERB MACRO	00: Room 1 01: Room 2 02: Room 3 03: Hall 1 04: Hall 2 05: Plate 06: Delay 07: Panning Delay	04	Hall 2
40 01 31	00 00 01	00 - 07	REVERB CHARACTER	0 - 7	04	4
40 01 32	00 00 01	00 - 07	REVERB PRE-LPF	0 - 7	00	0
40 01 33	00 00 01	00 - 7F	REVERB LEVEL	0 - 127	40	64
40 01 34	00 00 01	00 - 7F	REVERB TIME	0 - 127	40	64
40 01 35	00 00 01	00 - 7F	REVERB DELAY FEEDBACK	0 - 127	00	0
40 01 36	00 00 01	00 - 7F	REVERB SEND LEVEL TO CHORUS	0 - 127	00	0

* REVERB MACRO is a macro parameter that allows global setting of reverb parameters. When you select the reverb type with REVERB MACRO, each reverb parameter will be set to the most suitable value.

* REVERB CHARACTER is a parameter that changes the reverb algorithm. The value of REVERB CHARACTER corresponds to the REVERB MACRO of the same number.

40 01 38	00 00 01	00 - 07	CHORUS MACRO	00: Chorus 1 01: Chorus 2 02: Chorus 3 03: Chorus 4 04: Feedback Chorus 05: Flanger 06: Short Delay 07: Short Delay(FB)	02	Chorus 3
40 01 39	00 00 01	00 - 07	CHORUS PRE-LPF	0-7	00	0
40 01 3A	00 00 01	00 - 7F	CHORUS LEVEL	0-127	40	64
40 01 3B	00 00 01	00 - 7F	CHORUS FEEDBACK	0-127	08	8
40 01 3C	00 00 01	00 - 7F	CHORUS DELAY	0-127	50	80
40 01 3D	00 00 01	00 - 7F	CHORUS RATE	0-127	03	3
40 01 3E	00 00 01	00 - 7F	CHORUS DEPTH	0-127	13	19
40 01 3F	00 00 01	00 - 7F	CHORUS SEND LEVEL TO REVERB	0-127	00	0

* CHORUS MACRO is a macro parameter that allows global setting of chorus parameters. When you use CHORUS MACRO to select the chorus type, each chorus parameter will be set to the most suitable value.

○ **Patch Part parameters**

The relation between Part number and Block number is as follows.

x...BLOCK NUMBER (0 - F),	Part 1	(default MIDIch = 1)	x=1
	Part 2	(default MIDIch = 2)	x=2
	.	.	.
	Part 9	(default MIDIch = 9)	x=9
	Part10	(default MIDIch = 10)	x=0
	Part11	(default MIDIch = 11)	x=A

Part12 (default MIDich =12) x=B
 :
 Part16 (default MIDich =16) x=F

n... MIDI channel number (0 - F) of the BLOCK.

In the following map, the control numbers of the control changes are indicated as CC#.

Address(H)	Size(H)	Data(H)	Parameter	Description	Default Value (H)	Description
40 1x 00	00 00 02	00 - 7F	TONE NUMBER	CC#00 VALUE 0 - 127	00	0
40 1x 01#		00 - 7F		P.C. VALUE 1 - 128	00	1
40 1x 02	00 00 01	00 - 10	Rx. CHANNEL	1 - 16, OFF		Same as the Part Number
40 1x 03	00 00 01	00 - 01	Rx. PITCH BEND	OFF / ON	01	ON
40 1x 04	00 00 01	00 - 01	Rx. CH PRESSURE(CA#)	OFF / ON	01	ON
40 1x 05	00 00 01	00 - 01	Rx. PROGRAM CHANGE	OFF / ON	01	ON
40 1x 06	00 00 01	00 - 01	Rx. CONTROL CHANGE	OFF / ON	01	ON
40 1x 07	00 00 01	00 - 01	Rx. POLY PRESSURE(PA#)	OFF / ON	01	ON
40 1x 08	00 00 01	00 - 01	Rx. NOTE MESSAGE	OFF / ON	01	ON
40 1x 09	00 00 01	00 - 01	Rx. RPN	OFF / ON	01	ON
40 1x 0A	00 00 01	00 - 01	Rx. NRPN	OFF / ON	00(01*)	OFF(ON*)

* When "General MIDI System On" is received, Rx. NRPN will be set OFF. When "GS Reset" is received, it will be set ON.

40 1x 0B	00 00 01	00 - 01	Rx. MODULATION	OFF / ON	01	ON
40 1x 0C	00 00 01	00 - 01	Rx. VOLUME	OFF / ON	01	ON
40 1x 0D	00 00 01	00 - 01	Rx. PANPOT	OFF / ON	01	ON
40 1x 0E	00 00 01	00 - 01	Rx. EXPRESSION	OFF / ON	01	ON
40 1x 0F	00 00 01	00 - 01	Rx. HOLD1	OFF / ON	01	ON
40 1x 10	00 00 01	00 - 01	Rx. PORTAMENTO	OFF / ON	01	ON
40 1x 11	00 00 01	00 - 01	Rx. SOSTENUTO	OFF / ON	01	ON
40 1x 12	00 00 01	00 - 01	Rx. SOFT	OFF / ON	01	ON

40 1x 13	00 00 01	00 - 01.	MONO/POLY MODE	Mono / Poly (=CC# 126 01 / CC# 127 00)	01	Poly
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40 1x 14	00 00 01	00 - 02	ASSIGN MODE	0 = SINGLE 1 = LIMITED-MULTI 2 = FULL-MULTI	00 at x=0 01 at x=0	SINGLE (Drum Part) LIMITED-MULTI (Normal Part)
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* ASSIGN MODE is the parameter that determines how voice assignment will be handled when sounds overlap on identical note numbers in the same channel (i.e. repeatedly struck notes). This is initialized to a mode suitable for each Part, so for general purposes there is no need to change this.

40 1x 15	00 00 01	00 - 02	USE FOR RHYTHM PART	0 = OFF 1 = MAP1 2 = MAP2	00 at x=0 01 at x=0	OFF (Normal Part) MAP1 (Drum Part)
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* This parameter sets the Drum Map of the Part used as the Drum Part. This unit can simultaneously (in different Parts) use up to two Drum Maps (MAP1, MAP2). With the initial settings, Part10 (MIDI CH=10, x=0) is set to MAP1 (1), and other Parts are set to normal instrumental Parts (OFF(0)).

40 1x 16	00 00 01	28 - 58	PITCH KEY SHIFT	-24 - +24 (semitones)	40	0 (semitones)
40 1x 17	00 00 02	08 - F8	PITCH OFFSET FINE	-12.0 - +12.0 (Hz)	08 00	0 (Hz)
40 1x 18#				Use nibblized data.		

* PITCH OFFSET FINE allows you to alter, by a specified frequency amount, the pitch at which notes will sound. This parameter differs from the conventional Fine Tuning (RPN #1) parameter in that the amount of frequency alteration (in Hertz) will be identical no matter which note is played. When a multiple number of Parts, each of which has been given a different setting for PITCH OFFSET FINE, are sounded by means of an identical note number, you can obtain a Celeste effect.

40 1x 19	00 00 01	00 - 7F	PART LEVEL	0 - 127 (=CC# 7)	64	100
40 1x 1A	00 00 01	00 - 7F	VELOCITY SENSE DEPTH	0 - 127	40	64
40 1x 1B	00 00 01	00 - 7F	VELOCITY SENSE OFFSET	0 - 127	40	64
40 1x 1C	00 00 01	00 - 7F	PART PANPOT	-64(RANDOM), -63(LEFT) - +63(RIGHT) (=CC# 10, except RANDOM)	40	0 (CENTER)
40 1x 1D	00 00 01	00 - 7F	KEYBOARD RANGE LOW	(C-1) - (G9)	00	C-1
40 1x 1E	00 00 01	00 - 7F	KEYBOARD RANGE HIGH	(C-1) - (G9)	7F	G 9
40 1x 1F	00 00 01	00 - 5F	CC1 CONTROLLER NUMBER	0 - 95	10	16
40 1x 20	00 00 01	00 - 5F	CC2 CONTROLLER NUMBER	0 - 95	11	17
40 1x 21	00 00 01	00 - 7F	CHORUS SEND LEVEL	0 - 127 (=CC# 93)	00	0
40 1x 22	00 00 01	00 - 7F	REVERB SEND LEVEL	0 - 127 (=CC# 91)	28	40

40 1x 23	00 00 01	00 - 01	Rx.BANK SELECT	OFF / ON	01(00*)	ON(OFF*)
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* When "General MIDI System On" is received, Rx.BANK SELECT will be set OFF. When "GS Reset" or "System Mode Set" is received, it will be set ON.

40 1x 24	00 00 01	00 - 01	RX BANK SELECT LSB	OFF / ON	01	ON
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* When RX BANK SELECT LSB = OFF, Bank Select LSB (Bn 20 11) will be treated as 00H regardless of its value.

40 1x 2A	00 00 02	00 00 - 40 00 - 7F 7F	PITCH FINE TUNE	-100 - 0 - +100 (cent) (= RPN#1)	40 00	0
40 1x 2B#						
40 1x 30	00 00 01	0E - 72	TONE MODIFY1 Vibrato Rate	-50 - +50 (=NRPN# 8)	40	0
40 1x 31	00 00 01	0E - 72	TONE MODIFY2 Vibrato Depth	-50 - +50 (=NRPN# 9)	40	0
40 1x 32	00 00 01	0E - 72	TONE MODIFY3 TVF Cutoff Freq.	-50 - +50 (=NRPN# 32)	40	0
40 1x 33	00 00 01	0E - 72	TONE MODIFY4 TVF Resonance	-50 - +50 (=NRPN# 33)	40	0
40 1x 34	00 00 01	0E - 72	TONE MODIFY5 TVF&TVA Env.attack	-50 - +50 (=NRPN# 99)	40	0
40 1x 35	00 00 01	0E - 72	TONE MODIFY6 TVF&TVA Env.decay	-50 - +50 (=NRPN# 100)	40	0

40 1x 36	00 00 01	0E - 72	TONE MODIFY7 TVF&TVA Env.release	-50 - +50 (=NRPN# 102)	40	0
40 1x 37	00 00 01	0E - 72	TONE MODIFY8 Vibrato Delay	-50 - +50 (=NRPN# 10)	40	0

Address(H)	Size(H)	Data(H)	Parameter	Description	Default Value (H)	Description
40 1x 40	00 00 0C	00 - 7F	SCALE TUNING C	-64 - +63 (cent)	40	0 (cent)
40 1x 41#		00 - 7F	SCALE TUNING C#	-64 - +63 (cent)	40	0 (cent)
40 1x 42#		00 - 7F	SCALE TUNING D	-64 - +63 (cent)	40	0 (cent)
40 1x 43#		00 - 7F	SCALE TUNING D#	-64 - +63 (cent)	40	0 (cent)
40 1x 44#		00 - 7F	SCALE TUNING E	-64 - +63 (cent)	40	0 (cent)
40 1x 45#		00 - 7F	SCALE TUNING F	-64 - +63 (cent)	40	0 (cent)
40 1x 46#		00 - 7F	SCALE TUNING F#	-64 - +63 (cent)	40	0 (cent)
40 1x 47#		00 - 7F	SCALE TUNING G	-64 - +63 (cent)	40	0 (cent)
40 1x 48#		00 - 7F	SCALE TUNING G#	-64 - +63 (cent)	40	0 (cent)
40 1x 49#		00 - 7F	SCALE TUNING A	-64 - +63 (cent)	40	0 (cent)
40 1x 4A#		00 - 7F	SCALE TUNING A#	-64 - +63 (cent)	40	0 (cent)
40 1x 4B#		00 - 7F	SCALE TUNING B	-64 - +63 (cent)	40	0 (cent)

* SCALE TUNING is a function that allows fine adjustment to the pitch of each note in the octave. The pitch of each identically-named note in all octaves will change simultaneously. A setting of ± 0 cent (40H) is equal temperament (page 15).

40 2x 00	00 00 01	28 - 58	MOD PITCH CONTROL	-24 - +24 (semitones)	40	0 (semitones)
40 2x 01	00 00 01	00 - 7F	MOD TVF CUTOFF CONTROL	-9600 - +9600 (cent)	40	0 (cent)
40 2x 02	00 00 01	00 - 7F	MOD AMPLITUDE CONTROL	-100.0 - +100.0 (%)	40	0 (%)
40 2x 03	00 00 01	00 - 7F	MOD LFO1 RATE CONTROL	-10.0 - +10.0 (Hz)	40	0 (Hz)
40 2x 04	00 00 01	00 - 7F	MOD LFO1 PITCH DEPTH	0 - 600 (cent)	0A	10 (cent)
40 2x 05	00 00 01	00 - 7F	MOD LFO1 TVF DEPTH	0 - 2400 (cent)	00	0 (cent)
40 2x 06	00 00 01	00 - 7F	MOD LFO1 TVA DEPTH	0 - 100.0 (%)	00	0 (%)
40 2x 07	00 00 01	00 - 7F	MOD LFO2 RATE CONTROL	-10.0 - +10.0 (Hz)	40	0 (Hz)
40 2x 08	00 00 01	00 - 7F	MOD LFO2 PITCH DEPTH	0 - 600 (cent)	00	0 (cent)
40 2x 09	00 00 01	00 - 7F	MOD LFO2 TVF DEPTH	0 - 2400 (cent)	00	0 (cent)
40 2x 0A	00 00 01	00 - 7F	MOD LFO2 TVA DEPTH	0 - 100.0 (%)	00	0 (%)
40 2x 10	00 00 01	40 - 58	BEND PITCH CONTROL	0 - 24 (semitones)	42	2 (semitones)
40 2x 11	00 00 01	00 - 7F	BEND TVF CUTOFF CONTROL	-9600 - +9600 (cent)	40	0 (cent)
40 2x 12	00 00 01	00 - 7F	BEND AMPLITUDE CONTROL	-100.0 - +100.0 (%)	40	0 (%)
40 2x 13	00 00 01	00 - 7F	BEND LFO1 RATE CONTROL	-10.0 - +10.0 (Hz)	40	0 (Hz)
40 2x 14	00 00 01	00 - 7F	BEND LFO1 PITCH DEPTH	0 - 600 (cent)	00	0 (cent)
40 2x 15	00 00 01	00 - 7F	BEND LFO1 TVF DEPTH	0 - 2400 (cent)	00	0 (cent)
40 2x 16	00 00 01	00 - 7F	BEND LFO1 TVA DEPTH	0 - 100.0 (%)	00	0 (%)
40 2x 17	00 00 01	00 - 7F	BEND LFO2 RATE CONTROL	-10.0 - +10.0 (Hz)	40	0 (Hz)
40 2x 18	00 00 01	00 - 7F	BEND LFO2 PITCH DEPTH	0 - 600 (cent)	00	0 (cent)
40 2x 19	00 00 01	00 - 7F	BEND LFO2 TVF DEPTH	0 - 2400 (cent)	00	0 (cent)
40 2x 1A	00 00 01	00 - 7F	BEND LFO2 TVA DEPTH	0 - 100.0 (%)	00	0 (%)
40 2x 20	00 00 01	28 - 58	CAf PITCH CONTROL	-24 - +24 (semitones)	40	0 (semitones)
40 2x 21	00 00 01	00 - 7F	CAf TVF CUTOFF CONTROL	-9600 - +9600 (cent)	40	0 (cent)
40 2x 22	00 00 01	00 - 7F	CAf AMPLITUDE CONTROL	-100.0 - +100.0 (%)	40	0 (%)
40 2x 23	00 00 01	00 - 7F	CAf LFO1 RATE CONTROL	-10.0 - +10.0 (Hz)	40	0 (Hz)
40 2x 24	00 00 01	00 - 7F	CAf LFO1 PITCH DEPTH	0 - 600 (cent)	00	0 (cent)
40 2x 25	00 00 01	00 - 7F	CAf LFO1 TVF DEPTH	0 - 2400 (cent)	00	0 (cent)
40 2x 26	00 00 01	00 - 7F	CAf LFO1 TVA DEPTH	0 - 100.0 (%)	00	0 (%)
40 2x 27	00 00 01	00 - 7F	CAf LFO2 RATE CONTROL	-10.0 - +10.0 (Hz)	40	0 (Hz)
40 2x 28	00 00 01	00 - 7F	CAf LFO2 PITCH DEPTH	0 - 600 (cent)	00	0 (cent)
40 2x 29	00 00 01	00 - 7F	CAf LFO2 TVF DEPTH	0 - 2400 (cent)	00	0 (cent)
40 2x 2A	00 00 01	00 - 7F	CAf LFO2 TVA DEPTH	0 - 100.0 (%)	00	0 (%)
40 2x 30	00 00 01	28 - 58	PAf PITCH CONTROL	-24 - +24 (semitones)	40	0 (semitones)
40 2x 31	00 00 01	00 - 7F	PAf TVF CUTOFF CONTROL	-9600 - +9600 (cent)	40	0 (cent)
40 2x 32	00 00 01	00 - 7F	PAf AMPLITUDE CONTROL	-100.0 - +100.0 (%)	40	0 (%)
40 2x 33	00 00 01	00 - 7F	PAf LFO1 RATE CONTROL	-10.0 - +10.0 (Hz)	40	0 (Hz)
40 2x 34	00 00 01	00 - 7F	PAf LFO1 PITCH DEPTH	0 - 600 (cent)	00	0 (cent)
40 2x 35	00 00 01	00 - 7F	PAf LFO1 TVF DEPTH	0 - 2400 (cent)	00	0 (cent)
40 2x 36	00 00 01	00 - 7F	PAf LFO1 TVA DEPTH	0 - 100.0 (%)	00	0 (%)
40 2x 37	00 00 01	00 - 7F	PAf LFO2 RATE CONTROL	-10.0 - +10.0 (Hz)	40	0 (Hz)
40 2x 38	00 00 01	00 - 7F	PAf LFO2 PITCH DEPTH	0 - 600 (cent)	00	0 (cent)
40 2x 39	00 00 01	00 - 7F	PAf LFO2 TVF DEPTH	0 - 2400 (cent)	00	0 (cent)
40 2x 3A	00 00 01	00 - 7F	PAf LFO2 TVA DEPTH	0 - 100.0 (%)	00	0 (%)
40 2x 40	00 00 01	28 - 58	CC1 PITCH CONTROL	-24 - +24 (semitones)	40	0 (semitones)
40 2x 41	00 00 01	00 - 7F	CC1 TVF CUTOFF CONTROL	-9600 - +9600 (cent)	40	0 (cent)
40 2x 42	00 00 01	00 - 7F	CC1 AMPLITUDE CONTROL	-100.0 - +100.0 (%)	40	0 (%)
40 2x 43	00 00 01	00 - 7F	CC1 LFO1 RATE CONTROL	-10.0 - +10.0 (Hz)	40	0 (Hz)
40 2x 44	00 00 01	00 - 7F	CC1 LFO1 PITCH DEPTH	0 - 600 (cent)	00	0 (cent)
40 2x 45	00 00 01	00 - 7F	CC1 LFO1 TVF DEPTH	0 - 2400 (cent)	00	0 (cent)
40 2x 46	00 00 01	00 - 7F	CC1 LFO1 TVA DEPTH	0 - 100.0 (%)	00	0 (%)
40 2x 47	00 00 01	00 - 7F	CC1 LFO2 RATE CONTROL	-10.0 - +10.0 (Hz)	40	0 (Hz)
40 2x 48	00 00 01	00 - 7F	CC1 LFO2 PITCH DEPTH	0 - 600 (cent)	00	0 (cent)
40 2x 49	00 00 01	00 - 7F	CC1 LFO2 TVF DEPTH	0 - 2400 (cent)	00	0 (cent)
40 2x 4A	00 00 01	00 - 7F	CC1 LFO2 TVA DEPTH	0 - 100.0 (%)	00	0 (%)
40 2x 50	00 00 01	28 - 58	CC2 PITCH CONTROL	-24 - +24 (semitones)	40	0 (semitones)
40 2x 51	00 00 01	00 - 7F	CC2 TVF CUTOFF CONTROL	-9600 - +9600 (cent)	40	0 (cent)
40 2x 52	00 00 01	00 - 7F	CC2 AMPLITUDE CONTROL	-100.0 - +100.0 (%)	40	0 (%)
40 2x 53	00 00 01	00 - 7F	CC2 LFO1 RATE CONTROL	-10.0 - +10.0 (Hz)	40	0 (Hz)
40 2x 54	00 00 01	00 - 7F	CC2 LFO1 PITCH DEPTH	0 - 600 (cent)	00	0 (cent)
40 2x 55	00 00 01	00 - 7F	CC2 LFO1 TVF DEPTH	0 - 2400 (cent)	00	0 (cent)
40 2x 56	00 00 01	00 - 7F	CC2 LFO1 TVA DEPTH	0 - 100.0 (%)	00	0 (%)
40 2x 57	00 00 01	00 - 7F	CC2 LFO2 RATE CONTROL	-10.0 - +10.0 (Hz)	40	0 (Hz)
40 2x 58	00 00 01	00 - 7F	CC2 LFO2 PITCH DEPTH	0 - 600 (cent)	00	0 (cent)
40 2x 59	00 00 01	00 - 7F	CC2 LFO2 TVF DEPTH	0 - 2400 (cent)	00	0 (cent)
40 2x 5A	00 00 01	00 - 7F	CC2 LFO2 TVA DEPTH	0 - 100.0 (%)	00	0 (%)

Section 4. Bulk Dump

Bulk Dump allows you to transmit a large amount of data at once, and is convenient for storing settings for the entire unit on a computer or sequencer.

Model ID: 00 19

User Program Dump [EM-50/30]

FO 41 10 00 19 12 05 08 00 00 CHK F7 (23 System Ex.)

Song Dump [EM-50/30]

FO 41 10 00 19 12 05 08 28 00 CHK F7 (563 System Ex.)

Custom Style [EM-50/30]

FO 41 10 00 19 12 00 60 00 00 CHK F7 (586 System Ex.)
 FO 41 10 00 19 12 00 68 00 00 CHK F7 (586 System Ex.)
 FO 41 10 00 19 12 00 70 00 00 CHK F7 (586 System Ex.)
 FO 41 10 00 19 12 00 78 00 00 CHK F7 (586 System Ex.)

Program [EM-50/30]

FO 41 10 00 19 12 00 01 00 00 CHK F7 (37 System Ex.)
 FO 41 10 00 19 12 00 01 40 00 CHK F7 (37 System Ex.)
 FO 41 10 00 19 12 00 42 00 00 CHK F7 (439 System Ex.)
 FO 41 10 00 19 12 00 48 00 00 CHK F7 (586 System Ex.)
 FO 41 10 00 19 12 00 50 00 00 CHK F7 (586 System Ex.)
 FO 41 10 00 19 12 00 58 00 00 CHK F7 (586 System Ex.)

<Example 1> What is the decimal expression of 5AH ?

From the preceding table, 5AH = 90

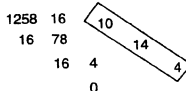
<Example 2> What is the decimal expression of the value 12 34H given as hexadecimal for each 7 bits?

From the preceding table, since 12H = 18 and 34H = 52
 $18 \times 128 + 52 = 2356$

<Example 3> What is the decimal expression of the nibbled value 0A 03 09 0D ?

From the preceding table, since 0AH = 10, 03H = 3, 09H = 9, 0DH = 13
 $((10 \times 16 + 3) \times 16 + 9) \times 16 + 13 = 41885$

<Example 4> What is the nibbled expression of the decimal value 1258?



Since from the preceding table, 0 = 00H, 4 = 04H, 14 = 0EH, 10 = 0AH, the answer is 00 04 0E 0AH.

Examples of actual MIDI messages

<Example 1> 92 3E 5F

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

<Example 2> CE 49

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

<Example 3> EA 00 28

EnH is the Pitch Bend Change status, and n is the MIDI channel number. The 2nd byte (00H = 0) is the LSB and the 3rd byte (28H = 40) is the MSB, but Pitch Bend Value is a signed number in which 40 00H (= $64 \times 12 + 80 = 8192$) is 0, so this Pitch Bend Value is
 $28\ 00H - 40\ 00H = 40 \times 12 + 80 - (64 \times 12 + 80) = 5120 - 8192 = -3072$

If the Pitch Bend Sensitivity is set to 2 semitones, -8192 (00 00H) will cause the pitch to change -200 cents, so in this case $-200 \times (-3072) \div (-8192) = -75$ cents of Pitch Bend is being applied to MIDI channel 11.

<Example 4> B3 64 00 65 00 06 0C 26 00 64 7F 65 7F

BnH is the Control Change status, and n is the MIDI channel number. For Control Changes, the 2nd byte is the control number, and the 3rd byte is the value. In a case in which two or more messages consecutive messages have the same status, MIDI has a provision called "running status" which allows the status byte of the second and following messages to be omitted. Thus, the above messages have the following meaning.

B3	64 00	MIDI ch.4, lower byte of RPN parameter number	: 00H
(B3)	65 00	(MIDI ch.4) upper byte of RPN parameter number	: 00H
(B3)	06 0C	(MIDI ch.4) upper byte of parameter value	: 0CH
(B3)	26 00	(MIDI ch.4) lower byte of parameter value	: 00H
(B3)	64 7F	(MIDI ch.4) lower byte of RPN parameter number	: 7FH
(B3)	65 7F	(MIDI ch.4) upper byte of RPN parameter number	: 7FH

In other words, the above messages specify a value of 0C 00H for RPN parameter number 00 00H on MIDI channel 4, and then set the RPN parameter number to 7F 7FH.

RPN parameter number 00 00H is Pitch Bend Sensitivity, and the MSB of the value indicates semitone units, so a value of 0CH = 12 sets the maximum pitch bend range to ± 12 semitones (1 octave). (On GS sound sources the LSB of Pitch Bend Sensitivity is ignored, but the LSB should be transmitted anyway (with a value of 0) so that operation will be correct on any device.)

Once the parameter number has been specified for RPN or NRPN, all Data Entry messages transmitted on that same channel will be valid, so after the desired value has been transmitted, it is a good idea to set the parameter number to 7F 7FH to prevent accidents. This is the reason for the (B3) 64 7F (B3) 65 7F at the end.

It is not desirable for performance data (such as Standard MIDI File data) to contain many events with running status as given in <Example 4>. This is because if playback is halted during the song and then rewound or fast-forwarded, the sequencer may not be able to transmit the correct status, and the sound source will then misinterpret the data. Take care to give each event its own status.

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

* TPQN: Ticks Per Quarter Note

Example of an Exclusive message and calculating a Checksum

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

Section 5. Supplementary material

Decimal and Hexadecimal table

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

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

The following table shows how these correspond to decimal numbers.

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

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

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

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

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

◆ **How to calculate the checksum (hexadecimal numbers are indicated by 'H')**
 The checksum is a value derived by adding the address, size and checksum itself and inverting the lower 7 bits.
 Here's an example of how the checksum is calculated. We will assume that in the exclusive message we are transmitting, the address is aa bb ccH and the data or size is dd ee ffH.

aa+bb+cc+dd+ee+ff = sum
 sum \ 128 = quotient ... remainder
 128 - remainder = checksum

<Example 1> Setting REVERB MACRO to ROOM 3
 According to the "Parameter Address Map," the REVERB MACRO Address is 40 01 30H, and ROOM 3 is a value of 02H. Thus,

F0	41	10	42	12	40 01 30	02	??	F7
(1)	(2)	(3)	(4)	(5)	address	data	checksum	(6)

(1) Exclusive Status, (2) ID (Roland), (3) Device ID (17),
 (4) Model ID (GS), (5) Command ID (DT1), (6) End of Exclusive

Next we calculate the checksum.

40H+01H+30H+02H = 64+1+48+2 = 115 (sum)
 115 (sum) \ 128 = 0 (quotient) ... 115 (remainder)
 checksum = 128 - 115 (remainder) = 13 = 0DH

This means that F0 41 10 42 12 40 01 30 02 0D F7 is the message we transmit.

<Example 2> Requesting transmission of the LEVEL for DRUM MAP 1 NOTE NUMBER 75 (D#5; Claves)

NOTE NUMBER 75 (D#5) is 4BH in hexadecimal.
 According to the "Parameter Address Map," LEVEL of NOTE NUMBER 75 (D#5; Claves) in DRUM MAP 1 has an Address of 41 02 4BH and a Size of 00 00 01H. Thus,

F0	41	10	42	11	41 02 4B	00 00 01	??	F7
(1)	(2)	(3)	(4)	(5)	address	size	checksum	(6)

(1) Exclusive Status, (2) ID (Roland), (3) Device ID (17),
 (4) Model ID (GS), (5) Command ID (RQ1), (6) End of Exclusive

Next we calculate the checksum.

41H+02H+4BH+00H+00H+01H = 65+2+75+0+0+1 = 143 (sum)
 143 (sum) \ 128 = 1 (quotient) ... 15 (remainder)
 checksum = 128 - 15 (remainder) = 113 = 71H

This means that F0 41 10 42 11 41 02 4B 00 00 01 71 F7 is the message we transmit.

● **About tuning**

In MIDI, individual Parts are tuned by sending RPN #1 (Master Fine Tuning) to the appropriate MIDI channel.

In MIDI, an entire device is tuned by either sending RPN #1 to all MIDI channels being used, or by sending a System Exclusive MASTER TUNE (address 40 00 00H).

RPN #1 allows tuning to be specified in steps of approximately 0.012 cents (to be precise, 100/8192 cent), and System Exclusive MASTER TUNE allows tuning in steps of 0.1 cent. One cent is 1/100th of a semitone.

The values of RPN #1 (Master Fine Tuning) and System Exclusive MASTER TUNE are added together to determine the actual pitch sounded by each Part.

Frequently used tuning values are given in the following table for your reference. Values are in hexadecimal (decimal in parentheses).

Hz at A4	cent	RPN #1	Sys. Ex. 40 00 00
445.0	+19.56	4C 43 (+1603)	00 04 0C 04 (+196)
444.0	+15.67	4A 03 (+1283)	00 04 09 0D (+157)
443.0	+11.76	47 44 (+ 964)	00 04 07 05 (+118)
442.0	+ 7.85	45 03 (+ 643)	00 04 04 0F (+ 79)
441.0	+ 3.93	42 42 (+ 322)	00 04 02 07 (+ 39)
440.0	0	40 00 (0)	00 04 00 00 (0)
439.0	- 3.94	3D 3D (- 323)	00 03 0D 09 (- 39)
438.0	- 7.89	3A 7A (- 646)	00 03 0B 01 (- 79)

<Example> Set the tuning of MIDI channel 3 to A4 = 442.0 Hz
 Send RPN#1 to MIDI channel 3. From the above table, the value is 45 03H.

B2	64 00	MIDI ch.3, lower byte of RPN parameter number	: 00H
(B2)	65 01	(MIDI ch.3) upper byte of RPN parameter number	: 01H
(B2)	06 45	(MIDI ch.3) upper byte of parameter value	: 45H
(B2)	26 03	(MIDI ch.3) lower byte of parameter value	: 03H
(B2)	64 7F	(MIDI ch.3) lower byte of RPN parameter number	: 7FH
(B2)	65 7F	(MIDI ch.3) upper byte of RPN parameter number	: 7FH

● **The Scale Tune Feature (address: 40 1x 40)**

The scale Tune feature allows you to finely adjust the individual pitch of the notes from C through B. Though the settings are made while working with one octave, the fine adjustments will affect all octaves. By making the appropriate Scale Tune settings, you can obtain a complete variety of tuning methods other than equal temperament. As examples, three possible types of scale setting are explained below.

○ **Equal Temperament**

This method of tuning divides the octave into 12 equal parts. It is currently the most widely used form of tuning, especially in occidental music. On this unit, the default settings for the Scale Tune feature produce equal temperament.

○ **Just Temperament (Keytone C)**

The three main chords resound much more beautifully than with equal temperament, but this benefit can only be obtained in one key. If transposed, the chords tend to become ambiguous. The example given involves settings for a key in which C is the keynote.

○ **Arabian Scale**

By altering the setting for Scale Tune, you can obtain a variety of other tunings suited for ethnic music. For example, the settings introduced below will set the unit to use the Arabian Scale.

Example Settings

Note name	Equal Temperament	Just Temperament (Keytone C)	Arabian Scale
C	0	0	-6
C#	0	-8	+45
D	0	+4	-2
D#	0	+16	-12
E	0	-14	-51
F	0	-2	-8
F#	0	-10	+43
G	0	+2	-4
G#	0	+14	+47
A	0	-16	0
A#	0	+14	-10
B	0	-12	-49

The values in the table are given in cents. Refer to the explanation of Scale Tuning on page 15 to convert these values to hexadecimal, and transmit them as exclusive data.

For example, to set the tune (C-B) of the Part1 Arabian Scale, send the data as follows:

F0 41 10 42 12 40 11 40 3A 6D 3E 34 0D 38 6B 3C 6F 40 36 0F 76 F7

MIDI Implementation Charts

Function	Transmitted	Recognized	Remarks
Basic Default Channel Changed	1-16 1-16, Off	1-16 1-16, Off	1= ACC1, 2=A.BASS, 3=ACC2, 4=Upper1, 5=ACC3, 6=Upper2 7=ACC4, 8=ACC5, 9=ACC6, 10=A Drums/Stl PG, 11=Lower, 12=M.Bass, 13=Basic Ch/RX1 14=NTA1/RX2, 15=NTA2/RX3, 16=M.Drums
Mode Default Message Altered	Mode 3 Mode 3, 4(M=1) *****	Mode 3 Mode 3, 4(M=1) *2	
Note Number True Voice	0-127 *****	0-127 *1 0-127	
Velocity Note ON Note OFF	○ *1 ×	○ *1 ×	
After Touch Key's Ch's	× ×	○ ○	
Pitch Bend	○ *1	○ *1	
Control Change	0, 32 ○ 1 ○ *1 5 ○ 6, 38 ○ 7 ○ *1 10 ○ 11 ○ 64 ○ *1 65 × 66 × 67 × 84 ○ 91 ○ 93 ○ 98, 99 ○ *1 100, 101 ○	○ ○ *1 ○ ○ ○ *1 ○ ○ ○ ○ ○ ○ (Reverb) ○ (Chorus) ○ *1 ○	Bank Select Modulation Portamento Time Data Entry Volume *1 Panpot Expression Hold 1 *1 Portamento Sostenuto Soft Portamento Control Effect 1 Depth Effect 3 Depth NRPN LSB,MSB *1 RPN LSB,MSB
Program Change True #	○ *1 *****	○ *1 0-127	Program Number: 1-128
System Exclusive	○	○	
System Common Song Pos Song Sel Tune	× × ×	× × ×	
System Real Time Clock Commands	○ *1 ○ *1	○ *1 ○ *1	MIDI File Record/Play
Aux Messages All Sounds Off Reset All Controllers Local On/Off All Notes Off Active Sense Reset	× × × × ○ ×	○ (120,126,127) ○ (121) ○ ○ (123-125) ○ ×	
Notes	*1 ○ × is selectable. *2 Recognize as M=1 even if M ≠ 1		

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

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

○ : Yes
× : No

MIDI Implementation Charts

Function	Transmitted	Recognized	Remarks
Basic Default Channel Changed	1-16 X	1-16 X	1= ACC1, 2=A.BASS, 3=ACC2, 4=Upper1, 5=ACC3, 6=Upper2 7=ACC4, 8=ACC5, 9=ACC6, 10=A Drums/Stl PG, 11=Lower, 12=M.Bass, 13=Basic Ch 14=NTA1, 15=NTA2, 16=M.Drums
Mode Default Message Altered	Mode 3 Mode 3, 4(M=1) *****	Mode 3 Mode 3, 4(M=1) *2	
Note Number True Voice	0-127 *****	0-127 *1 0-127	
Velocity Note ON Note OFF	○ *1 X	○ *1 X	
After Touch Key's Ch's	X X	○ ○	
Pitch Bend	○ *1	○ *1	
Control Change	0, 32 ○ 1 ○ *1 5 ○ 6, 38 ○ 7 ○ *1 10 ○ 11 ○ 64 ○ *1 65 X 66 X 67 X 84 ○ 91 ○ 93 ○ 98, 99 ○ *1 100,101 ○	○ *1 ○ *1 ○ ○ ○ *1 ○ ○ ○ ○ ○ ○ (Reverb) ○ (Chorus) ○ *1 ○	Bank Select Modulation Portamento Time Data Entry Volume Panpot Expression Hold 1 Portamento Sostenuto Soft Portamento Control Effect 1 Depth Effect 3 Depth NRPN LSB,MSB RPN LSB,MSB
Program Change True #	○ *1 *****	○ *1 0-127	Program Number: 1-128
System Exclusive	○	○	
System Common Song Pos Song Sel Tune	X X X	X X X	
System Real Time Clock Commands	○ *1 ○ *1	○ *1 ○ *1	MIDI File Record/Play
Aux Messages All Sounds Off Reset All Controllers Local On/Off All Notes Off Active Sense Reset	X X X X ○ X	○ (120,126,127) ○ (121) ○ ○ (123-125) ○ X	
Notes	*1 ○ X is selectable. *2 Recognize as M=1 even if M ≠ 1		

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

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

○ : Yes
X : No

MIDI Implementation Charts

Function	Transmitted	Recognized	Remarks
Basic Default Channel Changed	1-16 X	1-16 X	1= ACC1, 2=A.BASS, 3=ACC2, 4=Upper, 5=ACC3, 7=ACC4, 8=ACC5, 9=ACC6, 10=A Drums/Stl PG, 11=Lower, 13=Basic Ch, 14=NTA1, 15=NTA2, 16=M.Drums
Mode Default Message Altered	Mode 3 Mode 3, 4(M=1) *****	Mode 3 Mode 3, 4(M=1) *2	
Note Number True Voice	0-127 *****	0-127 *1 0-127	
Velocity Note ON Note OFF	○ *1 X	○ *1 X	
After Touch Key's Ch's	X X	○ ○	
Pitch Bend	X *1	○ *1	
Control Change	0, 32 ○ 1 X *1 5 ○ 6, 38 ○ 7 ○ *1 10 ○ 11 ○ 64 ○ *1 65 X 66 X 67 X 84 ○ 91 ○ 93 ○ 98, 99 ○ *1 100, 101 ○	○ *1 ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ (Reverb) ○ (Chorus) ○ *1 ○	Bank Select Modulation Portamento Time Data Entry Volume Panpot Expression Hold 1 Portamento Sostenuto Soft Portamento Control Effect 1 Depth Effect 3 Depth NRPN LSB,MSB RPN LSB,MSB
Program Change True #	○ *1 *****	○ *1 0-127	Program Number: 1-128
System Exclusive	○	○	
System Common Song Pos Song Sel Tune	X X X	X X X	
System Real Time Clock Commands	○ *1 ○ *1	○ *1 ○ *1	MIDI File Record/Play
Aux Messages All Sounds Off Reset All Controllers Local On/Off All Notes Off Active Sense Reset	X X X X ○ X	○ (120,126,127) ○ (121) ○ ○ (123-125) ○ X	
Notes	*1 ○ X is selectable. *2 Recognize as M=1 even if M ≠ 1		

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

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

○ : Yes
X : No

■ MIDI implementation

(Sound Module, Keyboard Section, SMF Player)

Model EM-50/30/20/10

Version 1.00 '99.03

Section 1. Receive data

■ Channel Voice Messages

● Note off

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

n = MIDI channel number : 0H-FH (ch.1-ch.16)
 kk = note number : 00H-7FH (0-127)
 vv = note off velocity : 00H-7FH (0-127)

- * Not received when Rx.NOTE MESSAGE = OFF (Initial value is ON) or when note number is outside limits.
- * For Drum Parts, these messages are received when Rx.NOTE OFF = ON for each Instrument.
- * The velocity values of Note Off messages are ignored.

● Note on

Status	2nd byte	3rd byte
9nH	kkH	vvH

n = MIDI channel number : 0H-FH (ch.1-ch.16)
 kk = note number : 00H-7FH (0-127)
 vv = note on velocity : 01H-7FH (1-127)

- * Not received when Rx.NOTE MESSAGE = OFF. (Initial value is ON)
- * For Drum Parts, not received when Rx.NOTE ON = OFF for each Instrument.

● Polyphonic Key Pressure

Status	2nd byte	3rd byte
AnH	kkH	vvH

n = MIDI channel number : 0H-FH (ch.1-ch.16)
 kk = note number : 00H-7FH (0-127)
 vv = key pressure : 00H-7FH (0-127)

- * Not received when Rx.POLY PRESSURE (PA) = OFF. (Initial value is ON)
- * The resulting effect is determined by System Exclusive messages. With the initial settings, there will be no effect.

● Control Change

- * When Rx.CONTROL CHANGE = OFF, all control change messages except for Channel Mode messages will be ignored.
- * The value specified by a Control Change message will not be reset even by a Program Change, etc.

○ Bank Select (Controller number 0, 32)

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

n = MIDI channel number : 0H-FH (ch.1-ch.16)
 mm = Bank number MSB : 00H-7FH (GS Variation number 0 - 127), Initial Value = 00H
 ll = Bank number LSB : 00H - 03H (MAP), Initial Value = 00H

- * Not received when Rx.BANK SELECT = OFF. "Rx.BANK SELECT" is set to OFF by "Turn General MIDI System On," and set to ON by "GS RESET." (Power-on default value is ON.)
- * When Rx.BANK SELECT LSB = OFF, Bank number LSB will be handled as 00H regardless of the received value. However, when sending Bank Select messages, you have to send both the MSB (mmH) and LSB (llH, the value should be 00H) together.
- * Bank Select processing will be suspended until a Program Change message is received.
- * The GS format "Variation number" is the value of the Bank Select MSB (Controller number 0) expressed in decimal.

○ Modulation (Controller number 1)

Status	2nd byte	3rd byte
BnH	01H	vvH

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

- * Not received when Rx.MODULATION = OFF. (Initial value is ON)
- * The resulting effect is determined by System Exclusive messages. With the initial settings, this is Pitch Modulation Depth.
- * Ignored when "Modulation Midi Rx Parameter = OFF". [EM-50/30]

○ Portamento Time (Controller number 5)

Status	2nd byte	3rd byte
BnH	05H	vvH

n = MIDI channel number : 0H-FH (ch.1-ch.16)
 vv = Portamento Time : 00H-7FH (0-127), Initial value = 00H (0)

- * This adjusts the rate of pitch change when Portamento is ON or when using the Portamento Control. A value of 0 results in the fastest change.

○ Data Entry (Controller number 6, 38)

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

n = MIDI channel number : 0H-FH (ch.1-ch.16)
 mm, ll = the value of the parameter specified by RPN/NRPN
 mm = MSB, ll = LSB

○ Volume (Controller number 7)

Status	2nd byte	3rd byte
BnH	07H	vvH

n = MIDI channel number : 0H-FH (ch.1-ch.16)
 vv = Volume : 00H-7FH (0-127), Initial Value = 64H (100)

- * Volume messages are used to adjust the volume balance of each Part.
- * Not received when Rx.VOLUME = OFF. (Initial value is ON)
- * Ignored when "Volume Midi Rx Parameter = OFF". [EM-50/30]

○ Pan (Controller number 10)

Status	2nd byte	3rd byte
BnH	0AH	vvH

n = MIDI channel number : 0H-FH (ch.1-ch.16)
 vv = pan : 00H-40H-7FH (Left-Center-Right), Initial Value = 40H (Center)

- * The stereo position can be adjusted over 127 steps.
- * For Rhythm Parts, this is a relative adjustment of each Instrument's pan setting.
- * Not received when Rx.PANPOT = OFF. (Initial value is ON)

○ Expression (Controller number 11)

Status	2nd byte	3rd byte
BnH	0BH	vvH

n = MIDI channel number : 0H-FH (ch.1-ch.16)
 vv = Expression : 00H-7FH (0-127), Initial Value = 7FH (127)

- * This adjusts the volume of a Part. It can be used independently from Volume messages. Expression messages are used for musical expression within a performance; e.g., expression pedal movements, crescendo and decrescendo.
- * Not received when Rx.EXPRESSION = OFF. (Initial value is ON)

○ Hold 1 (Controller number 64)

Status	2nd byte	3rd byte
BnH	40H	vvH

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

- * Not received when Rx.HOLD1 = OFF. (Initial value is ON)
- * Ignored when "Sustain Midi Rx Parameter = OFF". [EM-50/30]

○ Portamento (Controller number 65)

Status	2nd byte	3rd byte
BnH	41H	vvH

n = MIDI channel number : 0H-FH (ch.1-ch.16)
 vv = Control value : 00H-7FH (0-127) 0-63 = OFF, 64-127 = ON

- * Not received when Rx.PORTAMENTO = OFF. (Initial value is ON)

○ Sostenuato (Controller number 66)

Status	2nd byte	3rd byte
BnH	42H	vvH

n = MIDI channel number : 0H-FH (ch.1-ch.16)
 vv = Control value : 00H-7FH (0-127) 0-63 = OFF, 64-127 = ON

- * Not received when Rx.SOSTENUTO = OFF. (Initial value is ON)

○ Soft (Controller number 67)

Status	2nd byte	3rd byte
BnH	43H	vvH

n = MIDI channel number : 0H-FH (ch.1-ch.16)
 vv = Control value : 00H-7FH (0-127) 0-63 = OFF, 64-127 = ON

- * Not received when Rx.SOFT = OFF. (Initial value is ON)

○ Portamento control (Controller number 84)

Status	2nd byte	3rd byte
BnH	54H	kkH

n = MIDI channel number : 0H-FH (ch.1-ch.16)
 kk = source note number : 00H-7FH (0-127)

- * A Note-on received immediately after a Portamento Control message will change continuously in pitch, starting from the pitch of the Source Note Number.
- * If a voice is already sounding for a note number identical to the Source Note Number, this voice will continue sounding (i.e., legato) and will, when the next Note-on is received, smoothly change to the pitch of that Note-on.

* The rate of the pitch change caused by Portamento Control is determined by the Portamento Time value.

Example 1.

On MIDI	Description	Result
90 3C 40	Note on C4	C4 on
80 54 3C	Portamento Control from C4	no change
90 40 40	Note on E4	glide from C4 to E4
80 3C 40	Note off C4	no change
80 40 40	Note off E4	E4 off

Example 2.

On MIDI	Description	Result
80 54 3C	Portamento Control from C4	no change
90 40 40	Note on E4	E4 is played with glide from C4 to E4
80 40 40	Note off E4	E4 off

○ Effect 1 (Reverb Send Level) (Controller number 91)

Status	2nd byte	3rd byte
BnH	5BH	vvH

n = MIDI channel number : 0H-FH (ch.1-ch.16)
 vv = Reverb Send Level : 00H-7FH (0-127). Initial Value = 28H (40)

* This message adjusts the Reverb Send Level of each Part.

○ Effect 3 (Chorus Send Level) (Controller number 93)

Status	2nd byte	3rd byte
BnH	5DH	vvH

n = MIDI channel number : 0H-FH (ch.1-ch.16)
 vv = Chorus Send Level : 00H-7FH (0-127). Initial Value = 00H (0)

* This message adjusts the Chorus Send Level of each Part.

○ NRPN MSB/LSB (Controller number 99, 98)

Status	2nd byte	3rd byte
BnH	63H	mmH
BnH	62H	llH

n = MIDI channel number : 0H-FH (ch.1-ch.16)
 mm = upper byte of the parameter number specified by NRPN
 ll = lower byte of the parameter number specified by NRPN

* NRPN can be received when Rx.NRPN = ON. "Rx.NRPN" is set to OFF by power-on reset or by receiving "Turn General MIDI System On," and it is set to ON by "GS RESET."

* The value set by NRPN will not be reset even if Program Change or Reset All Controllers is received.

NRPN

The NRPN (Non Registered Parameter Number) message allows an extended range of control changes to be used. On this unit, NRPN messages can be used to modify sound parameters etc.

To use these messages, you must first use NRPN messages (Controller number 98 and 99, their order does not matter) to specify the parameter to be controlled, and then use Data Entry messages to specify the value of the specified parameter. Once an NRPN parameter has been specified, all Data Entry messages received on that channel will modify the value of that parameter. To prevent accidents, it is recommended that you set RPN Null (RPN Number = 7FH/7FH) when you have finished setting the value of the desired parameter. Refer to Section 5. Supplementary material "Examples of actual MIDI messages" <Example 4> (page 29). On this unit, Data entry LSB (Controller number 38) of NRPN is ignored, so it is no problem to send Data entry MSB (Controller number 6) only (without Data entry LSB).

On the EM-50/30/20/10, NRPN can be used to modify the following parameters.

NRPN MSB LSB	Data entry MSB	Function and range
01H 08H	mmH	Vibrato Rate (relative change) mm: 00H - 40H - 7FH (-64 - 0 - +63)
01H 09H	mmH	Vibrato Depth (relative change) mm: 00H - 40H - 7FH (-64 - 0 - +63)
01H 0AH	mmH	Vibrato Delay (relative change) mm: 00H - 40H - 7FH (-64 - 0 - +63)
01H 20H	mmH	TVF Cutoff Frequency (relative change) mm: 00H - 40H - 7FH (-64 - 0 - +63)
01H 21H	mmH	TVF Resonance (relative change) mm: 00H - 40H - 7FH (-64 - 0 - +63)
01H 63H	mmH	TVF&TVA Envelope Attack Time (relative change) mm: 00H - 40H - 7FH (-64 - 0 - +63)
01H 64H	mmH	TVF&TVA Envelope Decay Time (relative change) mm: 00H - 40H - 7FH (-64 - 0 - +63)
01H 66H	mmH	TVF&TVA Envelope Release Time (relative change) mm: 00H - 40H - 7FH (-64 - 0 - +63)
18H nH	mmH	Drum Instrument Pitch Coarse (relative change) rr: Drum Instrument note number mm: 00H - 40H - 7FH (-64 - 0 - +63 semitone)

1AH rH	mmH	Drum Instrument TVA Level (absolute change) rr: Drum Instrument note number mm: 00H - 7FH (0 - max)
1CH rH	mmH	Drum Instrument Panpot (absolute change) rr: Drum Instrument note number mm: 00H, 01H - 40H - 7FH (random, left-center-right)
1DH rH	mmH	Drum Instrument Reverb Send Level (absolute change) rr: Drum Instrument note number mm: 00H - 7FH (0 - max)
1EH rH	mmH	Drum Instrument Chorus Send Level (absolute change) rr: Drum Instrument note number mm: 00H - 7FH (0 - max)

* Data entry LSB (llH) is ignored.

* Parameters marked "relative change" will change relative to the preset value(40H). Even among different GS devices, "relative change" parameters may sometimes differ in the way the sound changes or in the range of change.

* Parameters marked "absolute change" will be set to the absolute value of the parameter, regardless of the preset value.

* Ignored when "NRPN Midi Rx Parameter = OFF". [EM-50/30]

○ RPN MSB/LSB (Controller number 101, 100)

Status	2nd byte	3rd byte
BnH	65H	mmH
BnH	64H	llH

n = MIDI channel number : 0H-FH (ch.1-ch.16)
 mm = upper byte of parameter number specified by RPN
 ll = lower byte of parameter number specified by RPN

* Not received when Rx.RPN = OFF. (Initial value is ON)

* The value specified by RPN will not be reset even by messages such as Program Change or Reset All Controller.

RPN

The RPN (Registered Parameter Number) messages are expanded control changes, and each function of an RPN is described by the MIDI Standard.

To use these messages, you must first use RPN (Controller number 100 and 110, their order does not matter) to specify the parameter to be controlled, and then use Data Entry messages (Controller number 6, 38) to specify the value of the specified parameter. Once an RPN parameter has been specified, all Data Entry messages received on that channel will modify the value of that parameter. To prevent accidents, it is recommended that you set RPN Null (RPN Number = 7FH/7FH) when you have finished setting the value of the desired parameter. Refer to Section 5. "Examples of actual MIDI messages" <Example 4> (page 29).

On the EM-50/30/20/10, RPN can be used to modify the following parameters.

RPN MSB LSB	Data entry MSB LSB	Explanation
00H 00H	mmH ---	Pitch Bend Sensitivity mm: 00H-18H (0-24 semitones), Initial Value = 02H (2 semitones) ll: ignored (processed as 00H) specify up to 2 octaves in semitone steps
00H 01H	mmH llH	Master Fine Tuning mm, ll: 00 00H - 40 00H - 7F 7FH (-100 - 0 - +99.99 cents), Initial Value = 40 00H (± 0 cent) Refer to 5. Supplementary material, "About tuning" (page 30).
00H 02H	mmH ---	Master Coarse Tuning mm: 28H-40H-58H (-24 - 0 - +24 semitones), Initial Value = 40H (±0 semitone) ll: ignored (processed as 00H)
7FH 7FH	--- ---	RPN null Set condition where RPN and NRPN are unspecified. The data entry messages after set RPN null will be ignored. (No Data entry messages are required after RPN null). Settings already made will not change. mm, ll: ignored

● Program Change

Status	2nd byte
CnH	ppH

n = MIDI channel number : 0H-FH (ch.1-ch.16)
 pp = Program number : 00H-7FH (prog.1-prog.128)

* Not received when Rx.PROGRAM CHANGE = OFF. (Initial value is ON)

* After a Program Change message is received, the sound will change beginning with the next Note-on. Voices already sounding when the Program Change message was received will not be affected.

* For Drum Parts, Program Change message will not be received on lower byte of the bank numbers (the value of Control Number 0 is other than 0 (00H)).

* Ignored when "Program Change Midi Rx Parameter = OFF". [EM-50/30]

● Channel Pressure

Status	2nd byte
DnH	vvH

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

* Not received when Rx.CH PRESSURE (CA) = OFF. (Initial value is ON)

* The resulting effect is determined by System Exclusive messages. With the initial settings there will be no effect.

● **Pitch Bend Change**

Status 2nd byte 3rd byte
 EnH 11H mmH

n = MIDI channel number : 0H-FH (ch.1-ch.16)
 mm, ll = Pitch Bend value : 00 00H - 40 00H - 7F 7FH (-8192 - 0 - +8191)

- * Not received when Rx.PITCH BEND = OFF. (Initial value is ON)
- * The resulting effect is determined by System Exclusive messages. With the initial settings the effect is Pitch Bend.
- * Ignored when "Pitch Bender Midi Rx Parameter = OFF". [EM-50/30]

■ **Channel Mode Messages**

● **All Sounds Off (Controller number 120)**

Status 2nd byte 3rd byte
 BnH 78H 00H

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

- * When this message is received, all currently-sounding notes on the corresponding channel will be turned off immediately.

● **Reset All Controllers (Controller number 121)**

Status 2nd byte 3rd byte
 BnH 79H 00H

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

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

Controller	Reset value
Pitch Bend Change	±0 (center)
Polyphonic Key Pressure	0 (off)
Channel Pressure	0 (off)
Modulation	0 (off)
Expression	127 (max)
Hold 1	0 (off)
Portamento	0 (off)
Sostenuto	0 (off)
Soft	0 (off)
RPN	unset; previously set data will not change
NRPN	unset; previously set data will not change

● **Local On/Off (Controller number 122)**

Status 2nd byte 3rd byte
 BnH 7AH 00H (Local Off)
 BnH 7AH 7FH (Local On - Default Value)

n = MIDI channel number : 0H-FH (ch.1-ch.16)
 This parameter affect all the parts

When Local Off message is received, the generation board is disconnected from the keyboard but the messages received via Midi are still recognized and played.

- *Regardless of the set channel, this message is sent to all parts.

● **All Notes Off (Controller number 123)**

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

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

- * When All Notes Off is received, all notes on the corresponding channel will be turned off. However if Hold 1 or Sostenuto is ON, the sound will be continued until these are turned off.

● **OMNI OFF (Controller number 124)**

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

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

- * The same processing will be carried out as when All Notes Off is received.

● **OMNI ON (Controller number 125)**

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

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

- * The same processing will be carried out as when All Note Off is received.OMNI ON will not be turned on.

● **MONO (Controller number 126)**

Status 2nd byte 3rd byte
 BnH 7EH mmH

n = MIDI channel number : 0H-FH (ch.1-ch.16)
 mm = mono number : 00H-10H (0-16)

- * The same processing will be carried out as when All Sounds Off and All Notes Off is received, and the corresponding channel will be set to Mode 4 (M = 1) regardless of the value of "mono number."

● **POLY (Controller number 127)**

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

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

- * The same processing will be carried out as when All Sounds Off and All Notes Off is received, and the corresponding channel will be set to Mode 3.

■ **System Realtime Message**

● **Active Sensing**

Status
 FEH

- * When Active Sensing is received, the unit will begin monitoring the intervals of all further messages. While monitoring, if the interval between messages exceeds 420 ms, the same processing will be carried out as when All Sounds Off, All Notes Off and Reset All Controllers are received, and message interval monitoring will be halted.

○ **Sequencer Start**

Status
 FAH

- * When "Sequencer Start" is received, the internal Recorder and/or the internal Player start.

○ **Sequencer Continue**

Status
 FBH

- * When "Sequencer Continue" is received, the internal Player continue to play from the current position.
- * Ignored in Recorder Mode.

○ **Sequencer Stop**

Status
 FCH

- * When "Sequencer Stop" is received, the internal Recorder and/or the internal Player stop.

○ **Song Position Pointer**

Status 2nd byte 3rd byte
 F2H XXH YYH

XX = Song Position (Bar) LSB
 YY = Song Position (Bar) MSB

○ **Timing Clock**

Status
 F8H

- * When "Timing Clock" is received the internal recorder or the internal Player is synchronized to an external clock according to the following table.

Sync RX	Response
Internal	The Style will neither start/stop nor follow the tempo of the external Timing Clock (F8) and "Sequencer Start /Stop" (FA / FC) messages. [EM-50/30]
Auto A	As long the EM-50/30/20/10 does not receive "Sequencer Start/Stop" (FA/FC) and "Timing Clock" (F8) messages it will follow its own tempo and Start/Stop whenever you press the "START/STOP" button to start Style Playback and Recorder (Rec). Once received a "Sequencer Start" (FA), if also "Timing Clock" (F8) follows this message, the Arranger / Recorder (Rec) start with the external timing, otherwise it start following its internal tempo.
Auto S	As long the EM-50/30/20/10 does not receive "Sequencer Start/Stop" (FA/FC) and "Timing Clock" (F8) messages it will follow its own tempo and Recorder Play/Stop whenever you press the "PLAY/STOP" button to start Song Playback and Recorder (Rec). Once received a "Sequencer Start" (FA), if also "Timing Clock" (F8) follows this message, the Recorder (Play) / Recorder (Rec) start with the external timing, otherwise it start following its internal tempo.
MIDI A	As long the EM-50/30 does not receive "Sequencer Start/Stop" (FA/FC) and "Timing Clock" (F8) messages it will follow its own tempo and Start/Stop whenever you press the "START/STOP" button to start Style Playback and Recorder (Rec). Once received a "Sequencer Start" (FA), if also "Timing Clock" (F8) follows this message, the Arranger / Recorder (Rec) start with the external timing, otherwise it will wait for external "Timing Clock" (F8).

MIDI S As long the EM-50/30 does not receive "Sequencer Start/Stop" (FA/FC) and "Timing Clock" (F8) messages it will follow its own tempo and Recorder Play/Stop whenever you press the "PLAY/STOP" button to start Song Playback and Recorder (Rec).
Once received a "Sequencer Start" (FA), if also "Timing Clock" (F8) follows this message, the Recorder (Play) / Recorder (Rec) start with the external timing, otherwise it will wait for external "Timing Clock" (F8).

Remote A As long the EM-50/30 does not receive "Sequencer Start/Stop" (FA/FC) and "Timing Clock" (F8) messages it will follow its own tempo and Start/Stop whenever you press the "START/STOP" button to start Style Playback and Recorder (Rec).
Once received a "Sequencer Start" (FA), if also "Timing Clock" (F8) follows this message, the Arranger / Recorder (Rec) start always with the internal timing.

Remote S As long the EM-50/30 does not receive "Sequencer Start/Stop" (FA/FC) and "Timing Clock" (F8) messages it will follow its own tempo and Recorder Play/Stop whenever you press the "PLAY/STOP" button to start Song Playback and Recorder (Rec).
Once received a "Sequencer Start" (FA), if also "Timing Clock" (F8) follows this message, the Recorder (Play) / Recorder (Rec) start always with the internal timing.

■ System Exclusive Message

Status	Data byte	Status
FOH	iiH, ddH,eeH	F7H
FOH		: System Exclusive Message status
ii = ID number		: an ID number (manufacturer ID) to indicate the manufacturer whose Exclusive message this is. Roland's manufacturer ID is 41H. ID numbers 7EH and 7FH are extensions of the MIDI standard; Universal Non-realtime Messages (7EH) and Universal Realtime Messages (7FH).
dd.....ee = data		: 00H-7FH (0-127)
F7H		: EOX (End Of Exclusive)

The System Exclusive Messages received by this unit are; messages related to mode settings, Universal Realtime System Exclusive messages, Data Requests (RQ1), and Data Set (DT1).

● System exclusive messages related to mode settings

These messages are used to initialize a device to GS or General MIDI mode, or change the operating mode. When creating performance data, a "Turn General MIDI System On" message should be inserted at the beginning of a General MIDI score, and a "GS Reset" message at the beginning of a GS music data. In the case of data for the EM-50/30/20/10 and for this unit, we recommend that "System Mode Set" be placed at the beginning of the song data. Each song should contain only one mode message as appropriate for the type of data. (Do not insert two or more mode setting messages in a single song.)
"Turn General MIDI System On" use Universal Non-realtime Message format. "System Mode Set" and "GS Reset" use Roland system exclusive format "Data Set 1 (DT1)."

○ Turn General MIDI System On

This is a command message that resets the internal settings of the unit to the General MIDI initial state (General MIDI System-Level 1). After receiving this message this unit, will automatically be set to the proper condition for correctly playing a General MIDI score.

Status	Data byte	Status
FOH	7EH, 7FH, 09H, 01H	F7H
Byte	Explanation	
FOH	Exclusive status	
7EH	ID number (Universal Non-realtime Message)	
7FH	Device ID (Broadcast)	
09H	Sub ID#1 (General MIDI Message)	
01H	Sub ID#2 (General MIDI On)	
F7H	EOX (End Of Exclusive)	

* When this message is received, Rx.BANK SELECT will be OFF and Rx.NRPN will be OFF.
* There must be an interval of at least 50 ms between this message and the next message.

○ Turn General MIDI System Off

"General MIDI System Off" is a command message that resets the internal settings of the unit to the Arranger Mode 1 initial state.

Status	Data byte	Status
FOH	7EH, 7FH, 09H, 02H	F7H

Byte	Explanation
FOH	Exclusive status
7EH	ID number (Universal Non-realtime Message)
7FH	Device ID (Broadcast)
09H	Sub ID#1 (General MIDI Message)
02H	Sub ID#2 (General MIDI Off)
F7H	EOX (End Of Exclusive)

* When this message is received, the unit change from "General MIDI" mode to EM-50/30/20/10 default mode. (Arranger mode)
* There must be an interval of at least 100 ms between this message and the next message.

○ GS Reset

GS Reset is a command message that resets the internal settings of a device to the GS initial state. This message appears at the beginning of GS music data, and a GS device that receives this message will automatically be set to the proper state to correctly playback GS music data.

Status	Data byte	Status
FOH	41H, dev, 42H, 12H, 40H, 00H, 7FH, 00H, 41H	F7H

Byte	Explanation
FOH	Exclusive status
41H	ID number (Roland)
dev	Device ID (dev: 00H - 1FH (1 - 32) Initial value is 10H(17))
42H	Model ID (GS)
12H	Command ID (DT1)
40H	Address MSB
00H	Address
7FH	AddressLSB
00H	Data (GS reset)
41H	Checksum
F7H	EOX (End Of Exclusive)

* When this message is received, Rx.NRPN will be ON.
* There must be an interval of at least 50 ms between this message and the next message.

○ Exit GS Mode

"Exit GS Mode" is a command message that resets the internal settings of the unit to the Arranger Mode 1 initial state.

Status	Data byte	Status
FOH	41H, dev, 42H, 12H, 40H, 00H, 7FH, 7FH, 42H	F7H

Byte	Explanation
FOH	Exclusive status
41H	ID number (Roland)
dev	Device ID (dev: 00H - 1FH (1 - 32) Initial value is 10H(17))
42H	Model ID (GS)
12H	Command ID (DT1)
40H	Address MSB
00H	Address
7FH	AddressLSB
7FH	Data (Exit GS Mode)
42H	Checksum
F7H	EOX (End Of Exclusive)

* When this message is received, the unit change from "General MIDI" mode to EM-50/30/20/10 default mode. (Style mode)
* There must be an interval of at least 100 ms between this message and the next message.

● Universal Realtime System Exclusive Messages

○ Master volume

Status	Data byte	Status
FOH	7FH, 7FH, 04H, 01H, llH, mmH	F7H

Byte	Explanation
FOH	Exclusive status
7FH	ID number (universal realtime message)
7FH	Device ID (Broadcast)
04H	Sub ID#1 (Device Control messages)
01H	Sub ID#2 (Master Volume)
llH	Master volume lower byte
mmH	Master volume upper byte
F7H	EOX (End Of Exclusive)

* The lower byte (llH) of Master Volume will be handled as 00H.

● Data transmission

The EM-50/30/20/10 can use Exclusive messages to transmit internal settings to other devices. There are two types of Exclusive data transmission: Individual Parameter Transmission (section 3) in which single parameters are transmitted one by one, and Bulk Dump Transmission (section 4) in which a large amount of data is transmitted at once.

The exclusive message used when transmitting GS format data has a model ID of 42H and a device ID of 10H.

○ **Data request 1 RQ1 (11H)**

This message requests the other device to send data. The Address and Size determine the type and amount of data to be sent. There are two types of request: Individual Parameter Request which requests data for an individual parameter, and Bulk Dump Request which requests a large amount of data at once. In either case, the "Data Request 1 (RQ1)" message format is used, and the Address and Size included in the message determine the type and amount of data that is desired.

For Individual Parameter Request, refer to "3. Individual Parameter Transmission".

For Bulk Dump Request, refer to "4. Bulk Dump".

When a Data Request message is received, if the device is ready to transmit data and if the address and size are appropriate, the requested data will be transmitted as a "Data Set 1 (DT1)" message. If not, nothing will be transmitted.

Status	Data byte	Status
F0H	41H, dev, 42H, 11H, aaH, bbH, ccH, ssH, tH, uuH, sum	F7H

Byte	Explanation
F0H	Exclusive status
41H	ID number (Roland)
dev	Device ID (dev: 00H - 1FH Initial value is 10H)
42H	Model ID (GS)
11H	Command ID (RQ1)
aaH	Address MSB : upper byte of the starting address of the requested data
bbH	Address : middle byte of the starting address of the requested data
ccH	Address LSB : lower byte of the starting address of the requested data
ssH	Size MSB
tH	Size
uuH	Size LSB
sum	Checksum
F7H	EOX (End Of Exclusive)

* The amount of data that can be transmitted at once time will depend on the type of data, and data must be requested using a specific starting address and size. Refer to the Address and Size listed in Section 3.

* Regarding the checksum please refer to Section 4.

○ **Data set 1 DT1 (12H)**

This is the message that actually performs data transmission, and is used when you wish to transmit the data.

Status	Data byte	Status
F0H	41H, dev, 42H, 12H, aaH, bbH, ccH, ddH, ... eeH, sum	F7H

Byte	Explanation
F0H	Exclusive status
41H	ID number (Roland)
dev	Device ID (dev: 00H - 1FH Initial value is 10H)
42H	Model ID (GS), 45H
12H	Command ID (DT1)
aaH	Address MSB : upper byte of the starting address of the transmitted data
bbH	Address : middle byte of the starting address of the transmitted data
ccH	Address LSB : lower byte of the starting address of the transmitted data
ddH	Data : the actual data to be transmitted. Multiple bytes of data are transmitted starting from the address.

:
eeH Data
sum Checksum
F7H EOX (End Of Exclusive)

* The amount of data that can be transmitted at one time depends on the type of data, and data can be received only from the specified starting address and size. Refer to the Address and Size given in Section 3.

* Data larger than 128 bytes must be divided into packets of 128 bytes or less. If "Data Set 1" is transmitted successively, there must be an interval of at least 40 ms between packets.

* Regarding the checksum please refer to section 4.

Section 2. Transmit data (Sound Module, Keyboard Section, SMF Player)

■ Channel voice messages

● Note off

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

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

● Note on

Status	2nd byte	3rd byte
9nH	kkH	vvH

n=MIDI channel number : 0H - FH (ch.1 - ch.16)
kk=note number : 00H - 7FH (0 - 127)
vv=velocity : 01H - 7FH (1 - 127)

● Polyphonic Key Pressure

Status	2nd byte	3rd byte
AnH	kkH	vvH

n = MIDI channel number : 0H-FH (ch.1-ch.16)
kk = note number : 00H-7FH (0-127)
vv = key pressure : 00H-7FH (0-127)

● Control Change

○ Bank Select (Controller number 0,32)

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

n=MIDI channel number : 0H - FH (ch.1 - ch.16)
mm=Bank number MSB : 00H - 7FH (GS Variation number 0 - 127)

ll=Bank number LSB : 00H - 02H (MAP)

* Some other GS devices do not recognize the Bank Select LSB (Controller number 32).

○ Modulation (Controller number 1) [EM-50/30/20]

Status	2nd byte	3rd byte
BnH	01H	vvH

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

* Ignored when "Modulation Midi Tx Parameter" = OFF. [EM-50/30]

○ Portamento Time (Controller number 5)

Status	2nd byte	3rd byte
BnH	05H	vvH

n=MIDI channel number : 0H - FH (ch.1 - ch.16)
vv=Portamento Time : 00H - 7FH (0 - 127) Initial value = 00H (0)

* This adjusts the rate of pitch change when Portamento is on or when using the Portamento Control. A value of 0 results in the fastest change.

○ Data Entry (Controller number 6,38)

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

n=MIDI channel number : 0H - FH (ch.1 - ch.16)
mm,ll= the value of the parameter specified by RPN/NRPN

○ Volume (Controller number 7)

Status	2nd byte	3rd byte
BnH	07H	vvH

n=MIDI channel number : 0H - FH (ch.1 - ch.16)
vv=Volume : 00H - 7FH (0 - 127) Initial value = 64H (100)

* Ignored when "Volume Midi Tx Parameter" = OFF. [EM-50/30]

* Volume messages are used to adjust the volume balance of each Part.

○ Pan (Controller number 10)

Status	2nd byte	3rd byte
BnH	0AH	vvH

n=MIDI channel number : 0H - FH (ch.1 - ch.16)
vv=pan : 00H - 40H - 7FH
(Left - Center - Right) Initial value = 40H (Center)

* The stereo position can be adjusted over 127 steps.

○ Expression (Controller number 11)

Status 2nd byte 3rd byte
BnH 0BH vH

n=MIDI channel number : 0H - FH (ch.1 - ch.16)
v=Expression : 00H - 7FH (0 - 127) Initial value = 7FH (127)

* It can be used independently from Volume messages. Expression messages are used for musical expression within a performance; e.g., expression pedal movements, crescendo and decrescendo.

○ Hold 1 (Controller number 64)

Status 2nd byte 3rd byte
BnH 40H vH

n=MIDI channel number : 0H - FH (ch.1 - ch.16)
v=Control value : 00H - 7FH (0 - 127) 0-63=OFF 64-127=ON

* Ignored when "Hold Midi Tx Parameter" = OFF. [EM-50/30]

○ Portamento (Controller number 65)

Status 2nd byte 3rd byte
BnH 41H vH

n=MIDI channel number : 0H - FH (ch.1 - ch.16)
v=Control value : 00H - 7FH (0 - 127) 0-63=OFF 64-127=ON

○ Sostenuto (Controller number 66)

Status 2nd byte 3rd byte
BnH 42H vH

n=MIDI channel number : 0H - FH (ch.1 - ch.16)
v=Control value : 00H - 7FH (0 - 127) 0-63=OFF 64-127=ON

○ Soft (Controller number 67)

Status 2nd byte 3rd byte
BnH 43H vH

n=MIDI channel number : 0H - FH (ch.1 - ch.16)
v=Control value : 00H - 7FH (0 - 127) 0-63=OFF 64-127=ON

○ Portamento control (Controller number 84)

Status 2nd byte 3rd byte
BnH 54H kkH

n=MIDI channel number : 0H - FH (ch.1 - ch.16)
kk=source note number : 00H - 7FH (0 - 127)

○ Effect 1 (Reverb Send Level) (Controller number 91)

Status 2nd byte 3rd byte
BnH 5BH vH

n=MIDI channel number : 0H - FH (ch.1 - ch.16)
w=Control value : 00H - 7FH (0 - 127) Initial value = 28H (40)

* This message adjusts the Reverb Send Level of each Part.

○ Effect 3 (Chorus Send Level) (Controller number 93)

Status 2nd byte 3rd byte
BnH 5DH vH

n=MIDI channel number : 0H - FH (ch.1 - ch.16)
v=Control value : 00H - 7FH (0 - 127) Initial value = 00H (0)

* This message adjusts the Chorus Send Level of each Part.

○ NRPN MSB/LSB (Controller number 99,98)

Status 2nd byte 3rd byte
BnH 63H mmH
BnH 62H llH

n=MIDI channel number : 0H - FH (ch.1 - ch.16)
mm=upper byte of the parameter number specified by NRPN
ll=lower byte of the parameter number specified by NRPN

* Ignored when "NRPN Midi Tx Parameter" = OFF.

NRPN

The NRPN (Non Registered Parameter Number) message allows an extended range of control changes to be used, letting you use control functions which are not defined in the MIDI Specification.

NRPNs provide a great deal of freedom, and can be used with any manufacturer's devices. As a result, any particular parameter number can easily mean one thing when used for a certain device, and mean something completely different on another device.

Note that RPNs and NRPNs require that a multiple number of messages be processed in the correct order. However, a majority of the sequencers currently on the market cannot always be relied on to consistently send messages in the proper order if the messages are located at almost exactly the same point in time.

On the GS instruments, NRPN can be used to modify the following parameters. The range of values for relative change parameters will be different with certain models. Please see the explanation that follows the chart.

NRPN	Data entry	Function and range
MSB LSB	MSB	
01H 08H	mmH	Vibrato Rate (relative change) mm: 00H - 40H - 7FH (-64 - 0 - +63)

01H 09H mmH Vibrato Depth (relative change)
mm: 00H - 40H - 7FH (-64 - 0 - +63)

01H 0AH mmH Vibrato Delay (relative change)
mm: 00H - 40H - 7FH (-64 - 0 - +63)

01H 20H mmH TVF Cutoff Frequency (relative change)
mm: 00H - 40H - 7FH (-64 - 0 - +63)

01H 21H mmH TVF Resonance (relative change)
mm: 00H - 40H - 7FH (-64 - 0 - +63)

01H 63H mmH TVF&TVA Envelope Attack Time (relative change)
mm: 00H - 40H - 7FH (-64 - 0 - +63)

01H 64H mmH TVF&TVA Envelope Decay Time (relative change)
mm: 00H - 40H - 7FH (-64 - 0 - +63)

01H 66H mmH TVF&TVA Envelope Release Time (relative change)
mm: 00H - 40H - 7FH (-64 - 0 - +63)

18H rrH mmH Drum Instrument Pitch Coarse (relative change)
rr: Drum Instrument note number
mm: 00H - 40H - 7FH (-64 - 0 - +63 semitone)

1AH rrH mmH Drum Instrument TVA Level (absolute change)
rr: Drum Instrument note number
mm: 00H - 7FH (0 - max)

1CH rrH mmH Drum Instrument Panpot (absolute change)
rr: Drum Instrument note number
mm: 00H, 01H - 40H - 7FH (random, left-center-right)

1DH rrH mmH Drum Instrument Reverb Send Level (absolute change)
rr: Drum Instrument note number
mm: 00H - 7FH (0 - max)

1EH rrH mmH Drum Instrument Chorus Send Level (absolute change)
rr: Drum Instrument note number
mm: 00H - 7FH (0 - max)

* Data entry LSB (llH) is ignored.

* Parameters marked "relative change" will change relative to the preset value. Even among different GS devices, "relative change" parameters may sometimes differ in the way the sound changes or in the range of change.

* Parameters marked "absolute change" will be set to the absolute value of the parameter, regardless of the preset value.

○ RPN MSB/LSB (Controller number 101,100)

Status 2nd byte 3rd byte
BnH 65H mmH
BnH 64H llH

n=MIDI channel number : 0H - FH (ch.1 - ch.16)
mm=upper byte of parameter number specified by RPN
ll=lower byte of parameter number specified by RPN

RPN

The RPN (Registered Parameter Number) message allows an extended range of control changes to be used, letting you use additional control functions which are part of the MIDI Specification.

On the EM-50/30/20/10, RPN can be used to modify the following parameters.

RPN	Data entry	Explanation
MSB LSB	MSB LSB	
00H 00H	mmH ---	Pitch Bend Sensitivity mm: 00H - 18H (0 - 24 semitones) Initial value = 02H (2 semitones) ll: ignored (processed as 00H) specify up to 2 octaves in semitone steps
00H 01H	mmH llH	Master Fine Tuning mm,ll: 00 00H - 40 00H - 7F 7FH (-100.0-+99.99 cents) Refer to 5. Supplementary material, "About tuning" (page 28)
00H 02H	mmH ---	Master Coarse Tuning mm: 28H - 40H - 58H (-24 - 0 - +24 semitones) ll: ignored (processed as 00H)
7FH 7FH	--- ---	RPN null set condition where RPN and NRPN are unspecified Settings already made will not change. mm,ll: ignored

● Program Change

Status 2nd byte
CnH ppH

n=MIDI channel number : 0H - FH (ch.1 - ch.16)
pp=Program number : 00H - 7FH (prog.1 - prog.128)

* Ignored when "Program Change Midi Tx Parameter" = OFF. [EM-50/30]

● **Pitch Bend Change** [EM-50/30/20]
 Status 2nd byte 3rd byte
 EnH llH mmH

n=MIDI channel number : 0H - FH (ch.1 - ch.16)
 mm,ll=Pitch Bend value : 00 00H - 40 00H - 7F 7FH (-8192 - 0 - +8191)

* Ignored when "Pitch Bend Midi Tx Parameter" = OFF. [EM-50/30]

■ **System Realtime Messages**

○ **Active Sensing**

Status
 FEH

Transmitted about every 250ms.

○ **Sequencer Start**

Status
 FAH

* This message is transmitted when the internal sequencer is started.

○ **Sequencer Stop**

Status
 FCH

* This message is transmitted when the internal sequencer is stopped.

○ **Song Position Pointer** [EM-50/30]

Status 2nd byte 3rd byte
 F2H XXH YYH

XX = Song Position (Bar) LSB
 YY = Song Position (Bar) MSB

○ **Timing Clock**

Status
 F8H

There are two options for sending MIDI realtime messages whenever you playback a style.

Sync TX

Start/Stop If you select this option, the EM-50/30/20/10 player sends Start, Stop messages (FA - FC).
 * Ignored when "Start/Stop Midi Tx Parameter" = OFF. [EM-50/30]

Clock This option means that the EM-50/30/20/10 arranger sends Timing clock messages (F8).
 * Ignored when "Clock Tx Midi Tx Parameter" = OFF. [EM-50/30]

■ **System Exclusive Messages**

Status Data byte Status
 F0H llH, ddH,eeH F7H

F0H : System Exclusive Message status
 ll = ID number : an ID number (manufacturer ID) to indicate the manufacturer whose Exclusive message this is. Roland's manufacturer ID is 41H. ID numbers 7EH and 7FH are extensions of the MIDI standard; Universal Non-realtime Messages (7EH) and Universal Realtime Messages (7FH).
 dd,.....ee = data : 00H - 7FH (0 - 127)
 F7H : EOX (End Of Exclusive)

The System Exclusive Messages Transmitted and received by the EM-50/30/20/10 are: messages related to Mode Setting, Universal Realtime System Exclusive messages, Data Requests (RQ1), and Data Set (DT1).

● **Universal Realtime System Exclusive Messages**

● **Data transmission**

The EM-50/30/20/10 can use Exclusive messages to transmit internal settings to other devices. There are two types of Exclusive data transmission; Individual Parameter Transmission (section 3) in which single parameters are transmitted one by one, and Bulk Dump Transmission (section 4) in which a large amount of data is transmitted at once.

The exclusive message used when transmitting GS format data has a model ID of 42H and a device ID of 10H.

○ **Data request 1 RQ1 (11H)**

This message requests the other device to send data. The Address and Size determine the type and amount of data to be sent. There are two types of request; Individual Parameter Request which requests data for an individual parameter, and Bulk Dump Request which requests a large amount of data at once. In either case, the "Data Request 1 (RQ1)" message format is used, and the Address and Size included in the message determine the type and amount of data that is desired.

For Individual Parameter Request, refer to "3. Individual Parameter Transmission".

For Bulk Dump Request, refer to "4. Bulk Dump".

When a Data Request message is received, if the device is ready to transmit data and if the address and size are appropriate, the requested data will be transmitted as a "Data Set 1 (DT1)" message. If not, nothing will be transmitted.

Status Data byte Status
 F0H 41H, dev, 42H, 11H, aaH, bbH, ccH, ssH, ttH, uuH, sum F7H

Byte	Explanation
F0H	Exclusive status
41H	ID number (Roland)
dev	Device ID (dev: 00H - 1FH Initial value is 10H)
42H	Model ID (GS)
11H	Command ID (RQ1)
aaH	Address MSB : upper byte of the starting address of the requested data
bbH	Address : middle byte of the starting address of the requested data
ccH	Address LSB : lower byte of the starting address of the requested data
ssH	Size MSB
ttH	Size
uuH	Size LSB
sum	Checksum
F7H	EOX (End Of Exclusive)

* The amount of data that can be transmitted at once time will depend on the type of data, and data must be requested using a specific starting address and size. Refer to the Address and Size listed in Section 3.

* Regarding the checksum please refer to Section 4.

○ **Data set 1 DT1 (12H)**

This is the message that actually performs data transmission, and is used when you wish to transmit the data.

Status Data byte Status
 F0H 41H, dev, 42H, 12H, aaH, bbH, ccH, ddH, ... eeH, sum F7H

Byte	Explanation
F0H	Exclusive status
41H	ID number (Roland)
dev	Device ID (dev: 00H - 1FH Initial value is 10H)
42H	Model ID (GS), 45H, 41H
12H	Command ID (DT1)
aaH	Address MSB : upper byte of the starting address of the transmitted data
bbH	Address : middle byte of the starting address of the transmitted data
ccH	Address LSB : lower byte of the starting address of the transmitted data
ddH	Data : the actual data to be transmitted. Multiple bytes of data are transmitted starting from the address.
:	:
eeH	Data
sum	Checksum
F7H	EOX (End Of Exclusive)

* The amount of data that can be transmitted at one time depends on the type of data, and data can be received only from the specified starting address and size. Refer to the Address and Size given in Section 3.

* Data larger than 128 bytes must be divided into packets of 128 bytes or less. If "Data Set 1" is transmitted successively, there must be an interval of at least 40 ms between packets.

* Regarding the checksum please refer to section 4.

● **System Parameters**

Parameters affecting the entire unit, such as how the two MIDI IN connectors will function, are called System Parameters. System parameters will not be reset even if "GS Reset" or "General MIDI System On" are received.

<MODEL ID = 42H>

● **Patch parameters**

○ **Patch common parameters**

Address(H)	Size(H)	Data(H)	Parameter	Description	Default Value (H)	Description
40 00 00	00 00 04	0018 - 07E8	MASTER TUNE	-100.0 - +100.0 (cent) Use nibblized data.	00 04 00 00	0 (cent)
40 00 01#						
40 00 02#						
40 00 03#						

* Refer to section 5. Supplementary material, "About tuning" (page 30).

40 00 04	00 00 01	00 - 7F	MASTER VOLUME	0 - 127 (= F0 7F 7F 04 01 00 vv F7)	7F	127
40 00 05	00 00 01	28 - 58	MASTER KEY-SHIFT	-24 - +24 (semitones)	40	0(semitones)
40 00 06	00 00 01	01 - 7F	MASTER PAN	-63 (LEFT) - +63 (RIGHT)	40	0 (CENTER)
40 00 7F	00 00 01	00	MODE SET	00 = GS Reset (Rx. only)		

* Refer to "System exclusive messages related to Mode settings" (page 22).

40 01 00	00 00 10	20 - 7F	PATCH NAME	16 ASCII Characters		
40 01 : #						
40 01 0F#						
40 01 10	00 00 10	00 - 18	VOICE RESERVE	Part 0	02	
40 01 11#				Part 1	06	
40 01 12#				Part 2	02	
40 01 13#				Part 3	02	
40 01 14#				Part 4	02	
40 01 15#				Part 5	02	
40 01 16#				Part 6	02	
40 01 17#				Part 7	02	
40 01 18#				Part 8	02	
40 01 19#				Part 9	02	
40 01 1A#				Part 11	00	
40 01 1B#				Part 12	00	
40 01 1C#				Part 13	00	
40 01 1D#				Part 14	00	
40 01 1E#				Part 15	00	
40 01 1F#				Part 16	00	

The sum total of voices in the voice reserve function must be equal or less than the number of the maximum polyphony. (24)

40 01 30	00 00 01	00 - 07	REVERB MACRO	00: Room 1 01: Room 2 02: Room 3 03: Hall 1 04: Hall 2 05: Plate 06: Delay 07: Panning Delay	04	Hall 2
40 01 31	00 00 01	00 - 07	REVERB CHARACTER	0 - 7	04	4
40 01 32	00 00 01	00 - 07	REVERB PRE-LPF	0 - 7	00	0
40 01 33	00 00 01	00 - 7F	REVERB LEVEL	0 - 127	40	64
40 01 34	00 00 01	00 - 7F	REVERB TIME	0 - 127	40	64
40 01 35	00 00 01	00 - 7F	REVERB DELAY FEEDBACK	0 - 127	00	0
40 01 36	00 00 01	00 - 7F	REVERB SEND LEVEL TO CHORUS	0 - 127	00	0

* REVERB MACRO is a macro parameter that allows global setting of reverb parameters. When you select the reverb type with REVERB MACRO, each reverb parameter will be set to the most suitable value.

* REVERB CHARACTER is a parameter that changes the reverb algorithm. The value of REVERB CHARACTER corresponds to the REVERB MACRO of the same number.

40 01 38	00 00 01	00 - 07	CHORUS MACRO	00: Chorus 1 01: Chorus 2 02: Chorus 3 03: Chorus 4 04: Feedback Chorus 05: Flanger 06: Short Delay 07: Short Delay(FB)	02	Chorus 3
40 01 39	00 00 01	00 - 07	CHORUS PRE-LPF	0-7	00	0
40 01 3A	00 00 01	00 - 7F	CHORUS LEVEL	0-127	40	64
40 01 3B	00 00 01	00 - 7F	CHORUS FEEDBACK	0-127	08	8
40 01 3C	00 00 01	00 - 7F	CHORUS DELAY	0-127	50	80
40 01 3D	00 00 01	00 - 7F	CHORUS RATE	0-127	03	3
40 01 3E	00 00 01	00 - 7F	CHORUS DEPTH	0-127	13	19
40 01 3F	00 00 01	00 - 7F	CHORUS SEND LEVEL TO REVERB	0-127	00	0

* CHORUS MACRO is a macro parameter that allows global setting of chorus parameters. When you use CHORUS MACRO to select the chorus type, each chorus parameter will be set to the most suitable value.

○ **Patch Part parameters**

The relation between Part number and Block number is as follows.

x...BLOCK NUMBER (0 - F),	Part 1	(default MIDlch = 1)	x=1
	Part 2	(default MIDlch = 2)	x=2
	:	:	:
	Part 9	(default MIDlch = 9)	x=9
	Part10	(default MIDlch =10)	x=0

Part11 (default MIDIch =11) x=A
 Part12 (default MIDIch =12) x=B
 :
 :
 Part16 (default MIDIch =16) x=F

n... MIDI channel number (0 - F) of the BLOCK.

In the following map, the control numbers of the control changes are indicated as CC#.

Address(H)	Size(H)	Data(H)	Parameter	Description	Default Value (H)	Description
40 1x 00	00 00 02	00 - 7F	TONE NUMBER	CC#00 VALUE 0 - 127	00	0
40 1x 01#		00 - 7F		P.C. VALUE 1 - 128	00	1
40 1x 02	00 00 01	00 - 10	Rx. CHANNEL	1 - 16, OFF		Same as the Part Number
40 1x 03	00 00 01	00 - 01	Rx. PITCH BEND	OFF / ON	01	ON
40 1x 04	00 00 01	00 - 01	Rx. CH PRESSURE(CA#)	OFF / ON	01	ON
40 1x 05	00 00 01	00 - 01	Rx. PROGRAM CHANGE	OFF / ON	01	ON
40 1x 06	00 00 01	00 - 01	Rx. CONTROL CHANGE	OFF / ON	01	ON
40 1x 07	00 00 01	00 - 01	Rx. POLY PRESSURE(PA#)	OFF / ON	01	ON
40 1x 08	00 00 01	00 - 01	Rx. NOTE MESSAGE	OFF / ON	01	ON
40 1x 09	00 00 01	00 - 01	Rx. RPN	OFF / ON	01	ON
40 1x 0A	00 00 01	00 - 01	Rx. NRPN	OFF / ON	00(01*)	OFF(ON*)

* When "General MIDI System On" is received, Rx. NRPN will be set OFF. When "GS Reset" is received, it will be set ON.

40 1x 0B	00 00 01	00 - 01	Rx. MODULATION	OFF / ON	01	ON
40 1x 0C	00 00 01	00 - 01	Rx. VOLUME	OFF / ON	01	ON
40 1x 0D	00 00 01	00 - 01	Rx. PANPOT	OFF / ON	01	ON
40 1x 0E	00 00 01	00 - 01	Rx. EXPRESSION	OFF / ON	01	ON
40 1x 0F	00 00 01	00 - 01	Rx. HOLD1	OFF / ON	01	ON
40 1x 10	00 00 01	00 - 01	Rx. PORTAMENTO	OFF / ON	01	ON
40 1x 11	00 00 01	00 - 01	Rx. SOSTENUTO	OFF / ON	01	ON
40 1x 12	00 00 01	00 - 01	Rx. SOFT	OFF / ON	01	ON
40 1x 13	00 00 01	00 - 01	MONO/POLY MODE	Mono / Poly (=CC# 126 01 / CC# 127 00)	01	Poly
40 1x 14	00 00 01	00 - 02	ASSIGN MODE	0 = SINGLE 1 = LIMITED-MULTI 2 = FULL-MULTI	00 at x=0 01 at x=0	SINGLE (Drum Part) LIMITED-MULTI (Normal Part)

* ASSIGN MODE is the parameter that determines how voice assignment will be handled when sounds overlap on identical note numbers in the same channel (i.e., repeatedly struck notes). This is initialized to a mode suitable for each Part, so for general purposes there is no need to change this.

40 1x 15	00 00 01	00 - 02	USE FOR RHYTHM PART	0 = OFF 1 = MAP1 2 = MAP2	00 at x=0 01 at x=0	OFF (Normal Part) MAP1 (Drum Part)
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* This parameter sets the Drum Map of the Part used as the Drum Part. This unit can simultaneously (in different Parts) use up to two Drum Maps (MAP1, MAP2). With the initial settings, Part10 (MIDI CH=10, x=0) is set to MAP1 (1), and other Parts are set to normal Instrumental Parts (OFF(0)).

40 1x 16	00 00 01	28 - 58	PITCH KEY SHIFT	-24 - +24 (semitones)	40	0 (semitones)
40 1x 17	00 00 02	08 - F8	PITCH OFFSET FINE	-12.0 - +12.0 (Hz) Use nibblized data.	08 00	0 (Hz)
40 1x 18#						

* PITCH OFFSET FINE allows you to alter, by a specified frequency amount, the pitch at which notes will sound. This parameter differs from the conventional Fine Tuning (RPN #1) parameter in that the amount of frequency alteration (in Hertz) will be identical no matter which note is played. When a multiple number of Parts, each of which has been given a different setting for PITCH OFFSET FINE, are sounded by means of an identical note number, you can obtain a Celeste effect.

40 1x 19	00 00 01	00 - 7F	PART LEVEL	0 - 127 (=CC# 7)	64	100
40 1x 1A	00 00 01	00 - 7F	VELOCITY SENSE DEPTH	0 - 127	40	64
40 1x 1B	00 00 01	00 - 7F	VELOCITY SENSE OFFSET	0 - 127	40	64
40 1x 1C	00 00 01	00 - 7F	PART PANPOT	-64(RANDOM), -63(LEFT) - +63(RIGHT) (=CC# 10, except RANDOM)	40	0 (CENTER)
40 1x 1D	00 00 01	00 - 7F	KEYBOARD RANGE LOW	(C-1) - (G9)	00	C-1
40 1x 1E	00 00 01	00 - 7F	KEYBOARD RANGE HIGH	(C-1) - (G9)	7F	G 9
40 1x 1F	00 00 01	00 - 5F	CC1 CONTROLLER NUMBER	0 - 95	10	16
40 1x 20	00 00 01	00 - 5F	CC2 CONTROLLER NUMBER	0 - 95	11	17
40 1x 21	00 00 01	00 - 7F	CHORUS SEND LEVEL	0 - 127 (=CC# 93)	00	0
40 1x 22	00 00 01	00 - 7F	REVERB SEND LEVEL	0 - 127 (=CC# 91)	28	40
40 1x 23	00 00 01	00 - 01	Rx.BANK SELECT	OFF / ON	01(00*)	ON(OFF*)

* When "General MIDI System On" is received, Rx.BANK SELECT will be set OFF. When "GS Reset" or "System Mode Set" is received, it will be set ON.

40 1x 24	00 00 01	00 - 01	RX BANK SELECT LSB	OFF / ON	01	ON
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* When RX BANK SELECT LSB = OFF, Bank Select LSB (Bn 20 11) will be treated as 00H regardless of its value.

40 1x 2A	00 00 02	00 00 - 40 00 - 7F 7F	PITCH FINE TUNE	-100 - 0 - +100 (cent) (= RPN#1)	40 00	0
40 1x 2B#						
40 1x 30	00 00 01	0E - 72	TONE MODIFY1 Vibrato Rate	-50 - +50 (=NRPN# 8)	40	0
40 1x 31	00 00 01	0E - 72	TONE MODIFY2 Vibrato Depth	-50 - +50 (=NRPN# 9)	40	0
40 1x 32	00 00 01	0E - 72	TONE MODIFY3 TVF Cutoff Freq.	-50 - +50 (=NRPN# 32)	40	0
40 1x 33	00 00 01	0E - 72	TONE MODIFY4 TVF Resonance	-50 - +50 (=NRPN# 33)	40	0
40 1x 34	00 00 01	0E - 72	TONE MODIFY5 TVF&TVA Env.attack	-50 - +50 (=NRPN# 99)	40	0

40 1x 35	00 00 01	0E - 72	TONE MODIFY6 TVF&TVA Env.decay	-50 - +50 (=NRPN# 100)	40	0
40 1x 36	00 00 01	0E - 72	TONE MODIFY7 TVF&TVA Env.release	-50 - +50 (=NRPN# 102)	40	0
40 1x 37	00 00 01	0E - 72	TONE MODIFY8 Vibrato Delay	-50 - +50 (=NRPN# 10)	40	0

Address(H)	Size(H)	Data(H)	Parameter	Description	Default Value (H)	Description
40 1x 40	00 00 0C	00 - 7F	SCALE TUNING C	-64 - +63 (cent)	40	0 (cent)
40 1x 41#		00 - 7F	SCALE TUNING C#	-64 - +63 (cent)	40	0 (cent)
40 1x 42#		00 - 7F	SCALE TUNING D	-64 - +63 (cent)	40	0 (cent)
40 1x 43#		00 - 7F	SCALE TUNING D#	-64 - +63 (cent)	40	0 (cent)
40 1x 44#		00 - 7F	SCALE TUNING E	-64 - +63 (cent)	40	0 (cent)
40 1x 45#		00 - 7F	SCALE TUNING F	-64 - +63 (cent)	40	0 (cent)
40 1x 46#		00 - 7F	SCALE TUNING F#	-64 - +63 (cent)	40	0 (cent)
40 1x 47#		00 - 7F	SCALE TUNING G	-64 - +63 (cent)	40	0 (cent)
40 1x 48#		00 - 7F	SCALE TUNING G#	-64 - +63 (cent)	40	0 (cent)
40 1x 49#		00 - 7F	SCALE TUNING A	-64 - +63 (cent)	40	0 (cent)
40 1x 4A#		00 - 7F	SCALE TUNING A#	-64 - +63 (cent)	40	0 (cent)
40 1x 4B#		00 - 7F	SCALE TUNING B	-64 - +63 (cent)	40	0 (cent)

* SCALE TUNING is a function that allows fine adjustment to the pitch of each note in the octave. The pitch of each identically-named note in all octaves will change simultaneously. A setting of ± 0 cent (40H) is equal temperament (page 29).

40 2x 00	00 00 01	28 - 58	MOD PITCH CONTROL	-24 - +24 (semitones)	40	0 (semitones)
40 2x 01	00 00 01	00 - 7F	MOD TVF CUTOFF CONTROL	-9600 - +9600 (cent)	40	0 (cent)
40 2x 02	00 00 01	00 - 7F	MOD AMPLITUDE CONTROL	-100.0 - +100.0 (%)	40	0 (%)
40 2x 03	00 00 01	00 - 7F	MOD LFO1 RATE CONTROL	-10.0 - +10.0 (Hz)	40	0 (Hz)
40 2x 04	00 00 01	00 - 7F	MOD LFO1 PITCH DEPTH	0 - 600 (cent)	0A	10 (cent)
40 2x 05	00 00 01	00 - 7F	MOD LFO1 TVF DEPTH	0 - 2400 (cent)	00	0 (cent)
40 2x 06	00 00 01	00 - 7F	MOD LFO1 TVA DEPTH	0 - 100.0 (%)	00	0 (%)
40 2x 07	00 00 01	00 - 7F	MOD LFO2 RATE CONTROL	-10.0 - +10.0 (Hz)	40	0 (Hz)
40 2x 08	00 00 01	00 - 7F	MOD LFO2 PITCH DEPTH	0 - 600 (cent)	00	0 (cent)
40 2x 09	00 00 01	00 - 7F	MOD LFO2 TVF DEPTH	0 - 2400 (cent)	00	0 (cent)
40 2x 0A	00 00 01	00 - 7F	MOD LFO2 TVA DEPTH	0 - 100.0 (%)	00	0 (%)
40 2x 10	00 00 01	40 - 58	BEND PITCH CONTROL	0 - 24 (semitones)	42	2 (semitones)
40 2x 11	00 00 01	00 - 7F	BEND TVF CUTOFF CONTROL	-9600 - +9600 (cent)	40	0 (cent)
40 2x 12	00 00 01	00 - 7F	BEND AMPLITUDE CONTROL	-100.0 - +100.0 (%)	40	0 (%)
40 2x 13	00 00 01	00 - 7F	BEND LFO1 RATE CONTROL	-10.0 - +10.0 (Hz)	40	0 (Hz)
40 2x 14	00 00 01	00 - 7F	BEND LFO1 PITCH DEPTH	0 - 600 (cent)	00	0 (cent)
40 2x 15	00 00 01	00 - 7F	BEND LFO1 TVF DEPTH	0 - 2400 (cent)	00	0 (cent)
40 2x 16	00 00 01	00 - 7F	BEND LFO1 TVA DEPTH	0 - 100.0 (%)	00	0 (%)
40 2x 17	00 00 01	00 - 7F	BEND LFO2 RATE CONTROL	-10.0 - +10.0 (Hz)	40	0 (Hz)
40 2x 18	00 00 01	00 - 7F	BEND LFO2 PITCH DEPTH	0 - 600 (cent)	00	0 (cent)
40 2x 19	00 00 01	00 - 7F	BEND LFO2 TVF DEPTH	0 - 2400 (cent)	00	0 (cent)
40 2x 1A	00 00 01	00 - 7F	BEND LFO2 TVA DEPTH	0 - 100.0 (%)	00	0 (%)
40 2x 20	00 00 01	28 - 58	CAf PITCH CONTROL	-24 - +24 (semitones)	40	0 (semitones)
40 2x 21	00 00 01	00 - 7F	CAf TVF CUTOFF CONTROL	-9600 - +9600 (cent)	40	0 (cent)
40 2x 22	00 00 01	00 - 7F	CAf AMPLITUDE CONTROL	-100.0 - +100.0 (%)	40	0 (%)
40 2x 23	00 00 01	00 - 7F	CAf LFO1 RATE CONTROL	-10.0 - +10.0 (Hz)	40	0 (Hz)
40 2x 24	00 00 01	00 - 7F	CAf LFO1 PITCH DEPTH	0 - 600 (cent)	00	0 (cent)
40 2x 25	00 00 01	00 - 7F	CAf LFO1 TVF DEPTH	0 - 2400 (cent)	00	0 (cent)
40 2x 26	00 00 01	00 - 7F	CAf LFO1 TVA DEPTH	0 - 100.0 (%)	00	0 (%)
40 2x 27	00 00 01	00 - 7F	CAf LFO2 RATE CONTROL	-10.0 - +10.0 (Hz)	40	0 (Hz)
40 2x 28	00 00 01	00 - 7F	CAf LFO2 PITCH DEPTH	0 - 600 (cent)	00	0 (cent)
40 2x 29	00 00 01	00 - 7F	CAf LFO2 TVF DEPTH	0 - 2400 (cent)	00	0 (cent)
40 2x 2A	00 00 01	00 - 7F	CAf LFO2 TVA DEPTH	0 - 100.0 (%)	00	0 (%)
40 2x 30	00 00 01	28 - 58	PAf PITCH CONTROL	-24 - +24 (semitones)	40	0 (semitones)
40 2x 31	00 00 01	00 - 7F	PAf TVF CUTOFF CONTROL	-9600 - +9600 (cent)	40	0 (cent)
40 2x 32	00 00 01	00 - 7F	PAf AMPLITUDE CONTROL	-100.0 - +100.0 (%)	40	0 (%)
40 2x 33	00 00 01	00 - 7F	PAf LFO1 RATE CONTROL	-10.0 - +10.0 (Hz)	40	0 (Hz)
40 2x 34	00 00 01	00 - 7F	PAf LFO1 PITCH DEPTH	0 - 600 (cent)	00	0 (cent)
40 2x 35	00 00 01	00 - 7F	PAf LFO1 TVF DEPTH	0 - 2400 (cent)	00	0 (cent)
40 2x 36	00 00 01	00 - 7F	PAf LFO1 TVA DEPTH	0 - 100.0 (%)	00	0 (%)
40 2x 37	00 00 01	00 - 7F	PAf LFO2 RATE CONTROL	-10.0 - +10.0 (Hz)	40	0 (Hz)
40 2x 38	00 00 01	00 - 7F	PAf LFO2 PITCH DEPTH	0 - 600 (cent)	00	0 (cent)
40 2x 39	00 00 01	00 - 7F	PAf LFO2 TVF DEPTH	0 - 2400 (cent)	00	0 (cent)
40 2x 3A	00 00 01	00 - 7F	PAf LFO2 TVA DEPTH	0 - 100.0 (%)	00	0 (%)
40 2x 40	00 00 01	28 - 58	CC1 PITCH CONTROL	-24 - +24 (semitones)	40	0 (semitones)
40 2x 41	00 00 01	00 - 7F	CC1 TVF CUTOFF CONTROL	-9600 - +9600 (cent)	40	0 (cent)
40 2x 42	00 00 01	00 - 7F	CC1 AMPLITUDE CONTROL	-100.0 - +100.0 (%)	40	0 (%)
40 2x 43	00 00 01	00 - 7F	CC1 LFO1 RATE CONTROL	-10.0 - +10.0 (Hz)	40	0 (Hz)
40 2x 44	00 00 01	00 - 7F	CC1 LFO1 PITCH DEPTH	0 - 600 (cent)	00	0 (cent)
40 2x 45	00 00 01	00 - 7F	CC1 LFO1 TVF DEPTH	0 - 2400 (cent)	00	0 (cent)
40 2x 46	00 00 01	00 - 7F	CC1 LFO1 TVA DEPTH	0 - 100.0 (%)	00	0 (%)
40 2x 47	00 00 01	00 - 7F	CC1 LFO2 RATE CONTROL	-10.0 - +10.0 (Hz)	40	0 (Hz)
40 2x 48	00 00 01	00 - 7F	CC1 LFO2 PITCH DEPTH	0 - 600 (cent)	00	0 (cent)
40 2x 49	00 00 01	00 - 7F	CC1 LFO2 TVF DEPTH	0 - 2400 (cent)	00	0 (cent)
40 2x 4A	00 00 01	00 - 7F	CC1 LFO2 TVA DEPTH	0 - 100.0 (%)	00	0 (%)
40 2x 50	00 00 01	28 - 58	CC2 PITCH CONTROL	-24 - +24 (semitones)	40	0 (semitones)
40 2x 51	00 00 01	00 - 7F	CC2 TVF CUTOFF CONTROL	-9600 - +9600 (cent)	40	0 (cent)
40 2x 52	00 00 01	00 - 7F	CC2 AMPLITUDE CONTROL	-100.0 - +100.0 (%)	40	0 (%)
40 2x 53	00 00 01	00 - 7F	CC2 LFO1 RATE CONTROL	-10.0 - +10.0 (Hz)	40	0 (Hz)
40 2x 54	00 00 01	00 - 7F	CC2 LFO1 PITCH DEPTH	0 - 600 (cent)	00	0 (cent)
40 2x 55	00 00 01	00 - 7F	CC2 LFO1 TVF DEPTH	0 - 2400 (cent)	00	0 (cent)
40 2x 56	00 00 01	00 - 7F	CC2 LFO1 TVA DEPTH	0 - 100.0 (%)	00	0 (%)
40 2x 57	00 00 01	00 - 7F	CC2 LFO2 RATE CONTROL	-10.0 - +10.0 (Hz)	40	0 (Hz)
40 2x 58	00 00 01	00 - 7F	CC2 LFO2 PITCH DEPTH	0 - 600 (cent)	00	0 (cent)
40 2x 59	00 00 01	00 - 7F	CC2 LFO2 TVF DEPTH	0 - 2400 (cent)	00	0 (cent)
40 2x 5A	00 00 01	00 - 7F	CC2 LFO2 TVA DEPTH	0 - 100.0 (%)	00	0 (%)

Section 4. Bulk Dump

Bulk Dump allows you to transmit a large amount of data at once, and is convenient for storing settings for the entire unit on a computer or sequencer.

Model ID: 00 19

User Program Dump [EM-50/30]

F0 41 10 00 19 12 05 08 00 00 CHK F7 (23 System Ex.)

Song Dump [EM-50/30]

F0 41 10 00 19 12 05 08 28 00 CHK F7 (563 System Ex.)

Custom Style [EM-50/30]

F0 41 10 00 19 12 00 60 00 00 CHK F7 (586 System Ex.)

F0 41 10 00 19 12 00 68 00 00 CHK F7 (586 System Ex.)

F0 41 10 00 19 12 00 70 00 00 CHK F7 (586 System Ex.)

F0 41 10 00 19 12 00 78 00 00 CHK F7 (586 System Ex.)

Program [EM-50/30]

F0 41 10 00 19 12 00 01 00 00 CHK F7 (37 System Ex.)

F0 41 10 00 19 12 00 01 40 00 CHK F7 (37 System Ex.)

F0 41 10 00 19 12 00 42 00 00 CHK F7 (439 System Ex.)

F0 41 10 00 19 12 00 48 00 00 CHK F7 (586 System Ex.)

F0 41 10 00 19 12 00 50 00 00 CHK F7 (586 System Ex.)

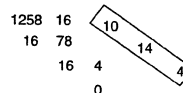
F0 41 10 00 19 12 00 58 00 00 CHK F7 (586 System Ex.)

<Example 1> What is the decimal expression of 5AH?
From the preceding table, 5AH = 90

<Example 2> What is the decimal expression of the value 12 34H given as hexadecimal for each 7 bits?
From the preceding table, since 12H = 18 and 34H = 52
18 x 128 + 52 = 2356

<Example 3> What is the decimal expression of the nibbled value 0A 03 09 0D?
From the preceding table, since 0AH = 10, 03H = 3, 09H = 9, 0DH = 13
(10 x 16 + 3) x 16 + 9 + 13 = 41885

<Example 4> What is the nibbled expression of the decimal value 1258?



Since from the preceding table, 0 = 00H, 4 = 04H, 14 = 0EH, 10 = 0AH, the answer is 00 04 0E 0AH.

● Examples of actual MIDI messages

<Example 1> 92 3E 5F

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

<Example 2> CE 49

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

<Example 3> EA 00 28

EnH is the Pitch Bend Change status, and n is the MIDI channel number. The 2nd byte (00H = 0) is the LSB and the 3rd byte (28H = 40) is the MSB, but Pitch Bend Value is a signed number in which 40 00H (= 64 x 12 + 80 = 8192) is 0, so this Pitch Bend Value is
28 00H - 40 00H = 40 x 12 + 80 - (64 x 12 + 80) = 5120 - 8192 = -3072

If the Pitch Bend Sensitivity is set to 2 semitones, -8192 (00 00H) will cause the pitch to change -200 cents, so in this case -200 x (-3072) | (-8192) = -75 cents of Pitch Bend is being applied to MIDI channel 11.

<Example 4> B3 64 00 65 00 06 0C 26 00 64 7F 65 7F

BnH is the Control Change status, and n is the MIDI channel number. For Control Changes, the 2nd byte is the control number, and the 3rd byte is the value. In a case in which two or more messages consecutive messages have the same status, MIDI has a provision called 'running status' which allows the status byte of the second and following messages to be omitted. Thus, the above messages have the following meaning.

B3	64 00	MIDI ch.4, lower byte of RPN parameter number	: 00H
(B3)	65 00	(MIDI ch.4) upper byte of RPN parameter number	: 00H
(B3)	06 0C	(MIDI ch.4) upper byte of parameter value	: 0CH
(B3)	26 00	(MIDI ch.4) lower byte of parameter value	: 00H
(B3)	64 7F	(MIDI ch.4) lower byte of RPN parameter number	: 7FH
(B3)	65 7F	(MIDI ch.4) upper byte of RPN parameter number	: 7FH

In other words, the above messages specify a value of 0C 00H for RPN parameter number 00 00H on MIDI channel 4, and then set the RPN parameter number to 7F 7FH.

RPN parameter number 00 00H is Pitch Bend Sensitivity, and the MSB of the value indicates semitone units, so a value of 0CH = 12 sets the maximum pitch bend range to ±12 semitones (1 octave). (On GS sound sources the LSB of Pitch Bend Sensitivity is ignored, but the LSB should be transmitted anyway (with a value of 0) so that operation will be correct on any device.)

Once the parameter number has been specified for RPN or NRPN, all Data Entry messages transmitted on that same channel will be valid, so after the desired value has been transmitted, it is a good idea to set the parameter number to 7F 7FH to prevent accidents. This is the reason for the (B3) 64 7F (B3) 65 7F at the end.

It is not desirable for performance data (such as Standard MIDI File data) to contain many events with running status as given in <Example 4>. This is because if playback is halted during the song and then rewind or fast-forwarded, the sequencer may not be able to transmit the correct status, and the sound source will then misinterpret the data. Take care to give each event its own status.

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

* TPQN: Ticks Per Quarter Note

● Example of an Exclusive message and calculating a Checksum

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

Section 5. Supplementary material

● Decimal and Hexadecimal table

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

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

The following table shows how these correspond to decimal numbers.

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

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

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

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

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

◊ How to calculate the checksum (hexadecimal numbers are indicated by 'H')

The checksum is a value derived by adding the address, size and checksum itself and inverting the lower 7 bits. Here's an example of how the checksum is calculated. We will assume that in the exclusive message we are transmitting, the address is aa bb cch and the data or size is dd ee ffh.

aa+bb+cc+dd+ee+ff = sum
sum \ 128 = quotient ... remainder
128 - remainder = checksum

<Example 1> Setting REVERB MACRO to ROOM 3
According to the "Parameter Address Map," the REVERB MACRO Address is 40 01 30H, and ROOM 3 is a value of 02H. Thus,

F0	41	10	42	12	40 01 30	02	??	F7
(1)	(2)	(3)	(4)	(5)	address	data	checksum	(6)

(1) Exclusive Status, (2) ID (Roland), (3) Device ID (17),
(4) Model ID (GS), (5) Command ID (DT1), (6) End of Exclusive

Next we calculate the checksum.

40H+01H+30H+02H = 64+1+48+2 = 115 (sum)
115 (sum) \ 128 = 0 (quotient) ... 115 (remainder)
checksum = 128 - 115 (remainder) = 13 = 0DH

This means that F0 41 10 42 12 40 01 30 02 0D F7 is the message we transmit.

<Example 2> Requesting transmission of the LEVEL for DRUM MAP 1 NOTE NUMBER 75 (D#5; Claves)
NOTE NUMBER 75 (D#5) is 4BH in hexadecimal.
According to the "Parameter Address Map," LEVEL of NOTE NUMBER 75 (D#5; Claves) in DRUM MAP 1 has an Address of 41 02 4BH and a Size of 00 00 01H. Thus,

F0	41	10	42	11	41 02 4B	00 00 01	??	F7
(1)	(2)	(3)	(4)	(5)	address	size	checksum	(6)

(1) Exclusive Status, (2) ID (Roland), (3) Device ID (17),
(4) Model ID (GS), (5) Command ID (RQ1), (6) End of Exclusive

Next we calculate the checksum.

41H+02H+4BH+00H+00H+01H = 65+2+75+0+0+1 = 143 (sum)
143 (sum) \ 128 = 1 (quotient) ... 15 (remainder)
checksum = 128 - 15 (remainder) = 113 = 71H

This means that F0 41 10 42 11 41 02 4B 00 00 01 71 F7 is the message we transmit.

● About tuning

In MIDI, individual Parts are tuned by sending RPN #1 (Master Fine Tuning) to the appropriate MIDI channel.
In MIDI, an entire device is tuned by either sending RPN #1 to all MIDI channels being used, or by sending a System Exclusive MASTER TUNE (address 40 00 00H).
RPN #1 allows tuning to be specified in steps of approximately 0.012 cents (to be precise, 100/8192 cent), and System Exclusive MASTER TUNE allows tuning in steps of 0.1 cent. One cent is 1/100th of a semitone.
The values of RPN #1 (Master Fine Tuning) and System Exclusive MASTER TUNE are added together to determine the actual pitch sounded by each Part.

Frequently used tuning values are given in the following table for your reference. Values are in hexadecimal (decimal in parentheses).

Hz at A4	cent	RPN #1	Sys. Ex. 40 00 00
445.0	+19.56	4C 43 (+1603)	00 04 0C 04 (+196)
444.0	+15.67	4A 03 (+1283)	00 04 09 0D (+157)
443.0	+11.76	47 44 (+ 964)	00 04 07 06 (+118)
442.0	+ 7.85	45 03 (+ 643)	00 04 04 0F (+ 79)
441.0	+ 3.93	42 42 (+ 322)	00 04 02 07 (+ 39)
440.0	0	40 00 (0)	00 04 00 00 (0)
439.0	- 3.94	3D 3D (- 323)	00 03 0D 09 (- 39)
438.0	- 7.89	3A 7A (- 646)	00 03 0B 01 (- 79)

<Example> Set the tuning of MIDI channel 3 to A4 = 442.0 Hz
Send RPN#1 to MIDI channel 3. From the above table, the value is 45 03H.

B2	64 00	MIDI ch.3, lower byte of RPN parameter number	: 00H
(B2)	65 01	(MIDI ch.3) upper byte of RPN parameter number	: 01H
(B2)	06 45	(MIDI ch.3) upper byte of parameter value	: 45H
(B2)	26 03	(MIDI ch.3) lower byte of parameter value	: 03H
(B2)	64 7F	(MIDI ch.3) lower byte of RPN parameter number	: 7FH
(B2)	65 7F	(MIDI ch.3) upper byte of RPN parameter number	: 7FH

● The Scale Tune Feature (address: 40 1x 40)

The scale Tune feature allows you to finely adjust the individual pitch of the notes from C through B. Though the settings are made while working with one octave, the fine adjustments will affect all octaves. By making the appropriate Scale Tune settings, you can obtain a complete variety of tuning methods other than equal temperament. As examples, three possible types of scale setting are explained below.

○ Equal Temperament

This method of tuning divides the octave into 12 equal parts. It is currently the most widely used form of tuning, especially in occidental music. On this unit, the default settings for the Scale Tune feature produce equal temperament.

○ Just Temperament (Keytone C)

The three main chords resound much more beautifully than with equal temperament, but this benefit can only be obtained in one key. If transposed, the chords tend to become ambiguous. The example given involves settings for a key in which C is the keynote.

○ Arabian Scale

By altering the setting for Scale Tune, you can obtain a variety of other tunings suited for ethnic music. For example, the settings introduced below will set the unit to use the Arabian Scale.

Example Settings

Note name	Equal Temperament	Just Temperament (Keytone C)	Arabian Scale
C	0	0	-6
C#	0	-8	+45
D	0	+4	-2
D#	0	+16	-12
E	0	-14	-51
F	0	-2	-8
F#	0	-10	+43
G	0	+2	-4
G#	0	+14	+47
A	0	-16	0
A#	0	+14	-10
B	0	-12	-49

The values in the table are given in cents. Refer to the explanation of Scale Tuning on page 30 to convert these values to hexadecimal, and transmit them as exclusive data.

For example, to set the tune (C-B) of the Part1 Arabian Scale, send the data as follows:

F0 41 10 42 12 40 3A 6D 3E 34 0D 38 6B 3C 6F 40 36 0F 76 F7

MIDI Implementation Charts

Function	Transmitted	Recognized	Remarks
Basic Default Channel Changed	1-16 1-16, Off	1-16 1-16, Off	4=Upper1, 6=Upper2 10=ManDrum 11=Lower,
Mode Default Message Altered	Mode 3 Mode 3, 4(M=1) *****	Mode 3 Mode 3, 4(M=1) *2	
Note Number True Voice	0-127 *****	0-127 *1 0-127	
Velocity Note ON Note OFF	○ *1 X	○ *1 X	
After Touch Key's Ch's	X X	○ ○	
Pitch Bend	○ *1	○ *1	
Control Change	0, 32 ○ 1 ○ *1 5 ○ 6, 38 ○ 7 ○ *1 10 ○ 11 ○ 64 ○ *1 65 ○ 66 ○ 67 ○ 84 ○ 91 ○ 93 ○ 98, 99 ○ *1 100, 101 ○	○ ○ *1 ○ ○ ○ *1 ○ ○ ○ *1 ○ ○ ○ ○ ○ ○ ○ ○ (Reverb) ○ (Chorus) ○ *1 ○	Bank Select Modulation Portamento Time Data Entry Volume Panpot Expression Hold 1 Portamento Sostenuto Soft Portamento Control Effect 1 Depth Effect 3 Depth NRPN LSB,MSB RPN LSB,MSB
Program Change True #	○ *1 *****	○ *1 0-127	Program Number: 1-128
System Exclusive	○	○	
System Common Song Pos Song Sel Tune	○ *1 X X	○ *1 X X	
System Real Time Clock Commands	○ *1 ○ *1	○ *1 ○ *1	MIDI File Record/Play
Aux Messages All Sounds Off Reset All Controllers Local On/Off All Notes Off Active Sense Reset	○ ○ X ○ ○ X	○ (120,126,127) ○ (121) ○ ○ (123-125) ○ X	
Notes	*1 ○ X is selectable. *2 Recognize as M=1 even if M ≠ 1		

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

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

○ : Yes
X : No

MIDI Implementation Charts

Function		Transmitted		Recognized		Remarks
Basic	Default	1-16		1-16		4=Upper1, 6=Upper2
Channel	Changed	X		X		10=ManDrum 11=Lower,
Mode	Default Message Altered	Mode 3 Mode 3, 4(M=1) *****		Mode 3 Mode 3, 4(M=1) *2		
Note Number	True Voice	0-127 *****		0-127 *1 0-127		
Velocity	Note ON Note OFF	O *1 X		O *1 X		
After Touch	Key's Ch's	X X		O O		
Pitch Bend		O *1		O *1		
Control Change		0, 32 O 1 O *1 5 O 6, 38 O 7 O *1 10 O 11 O 64 O *1 65 O 66 O 67 O 84 O 91 O 93 O 98, 99 O *1 100, 101 O		O O *1 O O O *1 O O O O O O O (Reverb) O (Chorus) O *1 O		Bank Select Modulation Portamento Time Data Entry Volume Panpot Expression Hold 1 Portamento Sostenuto Soft Portamento Control Effect 1 Depth Effect 3 Depth NRPN LSB,MSB RPN LSB,MSB
Program Change	True #	O *1 *****		O *1 0-127		Program Number: 1-128
System Exclusive		O		O		
System Common	Song Pos Song Sel Tune	O *1 X X		O *1 X X		
System Real Time	Clock Commands	O *1 O *1		O *1 O *1		MIDI File Record/Play
Aux Messages	All Sounds Off Reset All Controllers Local On/Off All Notes Off Active Sense Reset	O O X O O X		O (120,126,127) O (121) O O (123-125) O X		
Notes	*1 O X is selectable. *2 Recognize as M=1 even if M ≠ 1					

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

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

O : Yes
X : No

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