E-96

INTELLIGENT KEYBOARD

MIDI implementation

Roland

■ MIDI implementation (Arranger)   Model E-96   Version 1.00 '95.5

The E-96 has additional functions and parameters which were not found on previous GS format sound sources. These functions and parameters are marked as [96]. If MIDI messages marked [96] are transmitted to a different GS format sound source, it is possible that these messages may not be received.

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=velocity	: 00H - 7FH (0 - 127)

* Not received when Rx.NOTE MESSAGE = OFF (Initial value is ON) or when note number is outside limits.
* 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=velocity	: 01H - 7FH (1 - 127)

* Not received when Rx.NOTE MESSAGE = OFF (Initial value is ON) or when note number is outside limits.
* 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=value	: 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 - 7FH	Initial value = 00H

* Not received when Rx.BANK SELECT = OFF
* When "GM System On" is received, Rx.BANK SELECT will be set OFF, and Bank Select will not be received.
* When "GS Reset" is received, Rx.BANK SELECT will be set ON.
* When Rx.BANK SELECT LSB = OFF, Bank number LSB will be handled as 00H regardless of the received value.
* 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.
* Some other GS devices do not recognize the Bank Select LSB (Controller number 32).

○ 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.

○ 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)

* Volume messages are used to adjust the volume balance of each Part.
* This message is not received when Rx.VOLUME = OFF. (Initial value is ON)

○ 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.
* This message is 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)

* 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.
* This message is 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) 0-63=OFF 64-127=ON

*This message is not received when Rx.HOLD1 = OFF. (Initial value is ON)

○ Portamento   (Controller number 65)

Status	2nd byte	3rd byte
BnH	41H	vvH

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

* This message is 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

* This message is 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

* This message is 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
B0 54 3C	Portamento Control from C4	no change (C4 voice still sounding)
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
B0 54 3C	Portamento Control from C4	no change
90 40 40	Note on E4	E4 on with glide from C4
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=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 98,99)

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

* When "GM System On" is received, Rx.NRPN will be set OFF, and NRPN will not be received. When "GS Reset" or Rx.NRPN = ON is received, NRPN can be received.
* 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, 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.

To use these messages, you must first send NRPN MSB and NRPN LSB messages to specify the parameter to be controlled, and then send 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.

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 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 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)	
4FH 10H	mmH	Part 4 On / Off (Upper 1) mm: 00H - 7FH (00-3FH =Off - 40-7FH= On)	[96]
4FH 11H	mmH	Part 11 On / Off (Lower) mm: 00H - 7FH (00-3FH =Off - 40-7FH= On)	[96]
4FH 12H	mmH	Part 12 On / Off (Man Bass) mm: 00H - 7FH (00-3FH =Off - 40-7FH= On)	[96]
4FH 13H	mmH	Part 6 On / Off (Upper 2) mm: 00H - 7FH (00-3FH =Off - 40-7FH= On)	[96]
4FH 14H	mmH	Part 16 On / Off (Man Drums) mm: 00H - 7FH (00-3FH =Off - 40-7FH= On)	[96]

4FH 15H	mmH	Part 13 On / Off (Rx Only 1)	[96]
		mm: 00H - 7FH (00-3FH =Off - 40-7FH= On)	
4FH 16H	mmH	Part 14 On / Off (Rx Only 2)	[96]
		mm: 00H - 7FH (00-3FH =Off - 40-7FH= On)	
4FH 17H	mmH	Part 15 On / Off (Rx Only 3)	[96]
		mm: 00H - 7FH (00-3FH =Off - 40-7FH= On)	
4FH 18H	mmH	Part 8 On / Off (Acc 5)	[96]
		mm: 00H - 7FH (00-3FH =Off - 40-7FH= On)	
4FH 19H	mmH	Part 9 On / Off (Acc 6)	[96]
		mm: 00H - 7FH (00-3FH =Off - 40-7FH= On)	
4FH 1AH	mmH	Part 10 On / Off (Acc Drums)	[96]
		mm: 00H - 7FH (00-3FH =Off - 40-7FH= On)	
4FH 1BH	mmH	Part 2 On / Off (Acc Bass)	[96]
		mm: 00H - 7FH (00-3FH =Off - 40-7FH= On)	
4FH 1CH	mmH	Part 1 On / Off (Acc 1)	[96]
		mm: 00H - 7FH (00-3FH =Off - 40-7FH= On)	
4FH 1DH	mmH	Part 3 On / Off (Acc2)	[96]
		mm: 00H - 7FH (00-3FH =Off - 40-7FH= On)	
4FH 1EH	mmH	Part 5 On / Off (Acc3)	[96]
		mm: 00H - 7FH (00-3FH =Off - 40-7FH= On)	
4FH 1FH	mmH	Part 7 On / Off (Acc 4)	[96]
		mm: 00H - 7FH (00-3FH =Off - 40-7FH= On)	
4FH 20H	mmH	Master Accompaniment On / Off	[96]
		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 . 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 100,101)

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

* This message is not received when Rx.RPN = OFF.
* 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) message allows an extended range of control changes to be used, letting you use additional control functions which are part of the MIDI Specification. To use these messages, you must first use RPN MSB and RPN LSB messages to specify the parameter to be controlled, and then use Data Entry messages 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.

On the E-96, 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)
		Refer to 5. Supplementary material, "About tuning".
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)

* This message is 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 messages will not be received on bank numbers 129 - 16384 (the value of Control Number 0 is other than 0(00H)).

● **Channel Pressure**

Status	2nd byte
DnH	vvH

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

* This message is 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)

* This message is 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.

■ **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

● **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 untill 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)

* Omni Off is only recognize as "All Notes Off". Mode does not change.

● **OMNI ON**　　　　　　　(Controller number 125)

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

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

* Omni Onis only recognize as "All Notes Off". Mode does not change.

● MONO   (Controller number 126)
Status   2nd byte   3rd byte
BnH   7EH   mmH

n=MIDIchannel 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 Messages

○ 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 according to the following table.

○ Sequencer Stop
Status
FCH

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

○ Timing Clock   [96]
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.

Style 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.
Auto 1	As long the E-96 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 1	As long the E-96 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" buttons to start song Playback. Once received a "Sequencer Start" (FA), if also "Timing clock" (F8) follows this message, the Recorder (Play) starts with the external timing, otherwise it start following its internal tempo.
MIDI 1	As long the E-96 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 2	As long the E-96 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" buttons to start song Playback. Once received a "Sequencer Start" (FA), if also "Timing clock" (F8) follows this message, the Recorder (Play) starts with the external timing, otherwise it will wait for external "Timing Clock" (F8) .
REMOTE 1	As long the E-96 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), also if "Timing clock" (F8) follows this message, the Arranger / Recorder (Rec) start always with the internal timing.
REMOTE 2	As long the E-96 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" buttons to start song Playback. Once received a "Sequencer Start" (FA), also if "Timing clock" (F8) follows this message, the Recorder (Play) starts always with the internal timing.

■ 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 received by the E-96 are; messages related to Mode Setting, 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, a "GS Reset" message at the beginning of a GS music data, and a "System Mode Set" message at the beginning of data especially for the E-96. 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.)

"System Mode Set" and "GS Reset" use Roland system exclusive format "Data Set 1 (DT1)". "Turn General MIDI System On" use Universal Non-realtime Message format.

○ Turn General MIDI System On
"General MIDI System On" is a command message that resets the internal settings of the unit to the General MIDI initial state (General MIDI System - Level 1). A General MIDI device that receives this message 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 E-96 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	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 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 E-96 default mode. (Arranger 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
F0H	7FH, 7FH, 04H, 01H, llH, 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)
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 E-96 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. (The E-96 allows you to change the Device ID setting.)

○ 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 (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)
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

■ 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 - 7FH

* Not transmitted when "Program Change" TX Filter is On.
* Some other GS devices do not recognize the Bank Select LSB (Controller number 32).

○ 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 transmitted when "Modulation" TX Filter is On.

○ 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)

* Not transmitted when "Volume" TX Filter is On.
* 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)

* Not transmitted when "Volume" TX Filter is On.
* 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)

* Not transmitted when "Expression" TX Filter is On.
* 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

* Not transmitted when "Hold" TX Filter is On.

○ Portamento   (Controller number 65)
Status	2nd byte	3rd byte
BnH	41H	vvH

n=MIDI channel number   : 0H - FH (ch.1 - ch.16)
vv=Control value   : 00H - 7FH (0 - 127) 0-63=OFF 64-127=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 transmitted when "Sostenuto" TX Filter 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 transmitted when "Soft" TX Filter 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)

○ 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.
* Not transmitted when "Reverb" TX Filter is On.

○ 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.
* Not transmitted when "Chorus" TX Filter is On.

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

* Not transmitted when NRPN TX Filter is On.

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	
MSB	LSB	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 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)

4FH 10H mmH   Part 4 On / Off (Upper 1)   [96]
         mm: 00H - 7FH (00-3FH =Off - 40-7FH= On)

4FH 11H mmH   Part 11 On / Off (Lower)   [96]
         mm: 00H - 7FH (00-3FH =Off - 40-7FH= On)

4FH 12H mmH   Part 12 On / Off (Man Bass)   [96]
         mm: 00H - 7FH (00-3FH =Off - 40-7FH= On)

4FH 13H mmH   Part 6 On / Off (Upper 2)   [96]
         mm: 00H - 7FH (00-3FH =Off - 40-7FH= On)

4FH 14H mmH   Part 16 On / Off (Man Drums)   [96]
         mm: 00H - 7FH (00-3FH =Off - 40-7FH= On)

4FH 15H mmH   Part 13 On / Off (Rx Only 1)   [96]
         mm: 00H - 7FH (00-3FH =Off - 40-7FH= On)

4FH 16H mmH   Part 14 On / Off (Rx Only 2)   [96]
         mm: 00H - 7FH (00-3FH =Off - 40-7FH= On)

4FH 17H mmH   Part 15 On / Off (Rx Only 3)   [96]
         mm: 00H - 7FH (00-3FH =Off - 40-7FH= On)

4FH 18H mmH   Part 8 On / Off (Acc 5)   [96]
         mm: 00H - 7FH (00-3FH =Off - 40-7FH= On)

4FH 19H mmH   Part 9 On / Off (Acc 6)   [96]
         mm: 00H - 7FH (00-3FH =Off - 40-7FH= On)

4FH 1AH mmH   Part 10 On / Off (Acc Drums)   [96]
         mm: 00H - 7FH (00-3FH =Off - 40-7FH= On)

4FH 1BH mmH   Part 2 On / Off (Acc Bass)   [96]
         mm: 00H - 7FH (00-3FH =Off - 40-7FH= On)

4FH 1CH mmH   Part 1 On / Off (Acc 1)   [96]
         mm: 00H - 7FH (00-3FH =Off - 40-7FH= On)

4FH 1DH mmH   Part 3 On / Off (Acc2)   [96]
         mm: 00H - 7FH (00-3FH =Off - 40-7FH= On)

4FH 1EH mmH   Part 5 On / Off (Acc3)   [96]
         mm: 00H - 7FH (00-3FH =Off - 40-7FH= On)

4FH 1FH mmH   Part 7 On / Off (Acc 4)   [96]
         mm: 00H - 7FH (00-3FH =Off - 40-7FH= On)

4FH 20H mmH   Master Accompaniment On / Off   [96]
         mm: 00H - 7FH (00-3FH =Off - 40-7FH= On)

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* Data entry LSB (llH) is not Transmitted.
* 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 100,101)

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 transmitted when RPN TX Filter is On.

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 E-96, RPN can be used to modify the following parameters.

RPN		Data entry		
MSB	LSB	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)
                     Refer to 5. Supplementary material, "About tuning".

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)

* Not transmitted when Program Change TX Filter is On.

● **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 transmitted when Pitch Bender TX Filter is On.

■ 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 transmitted, 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

● MONO   (Controller number 126)

Status	2nd byte	3rd byte
BnH	7EH	mmH

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

* The corresponding channel will be set to Mode 4 (M=1).

● POLY   (Controller number 127)

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

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

* The corresponding channel will be set to Mode 3.

■ System Realtime Messages

○ Active Sensing

Status
FEH

Transmitted about every 250ms.

○ Sequencer Start   [96]

Status
FAH

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

○ Sequencer Stop   [96]

Status
FCH

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

○ Timing Clock   [96]

Status
F8H

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

Style Sync TX	Meaning
Start/Stop	If you select this option, the E-96 arranger sends "Sequencer Start, Stop messages.
Clock	This option means that the E-96 arranger sends Timing clock messages.

■ 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 E-96 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 E-96 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), 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.
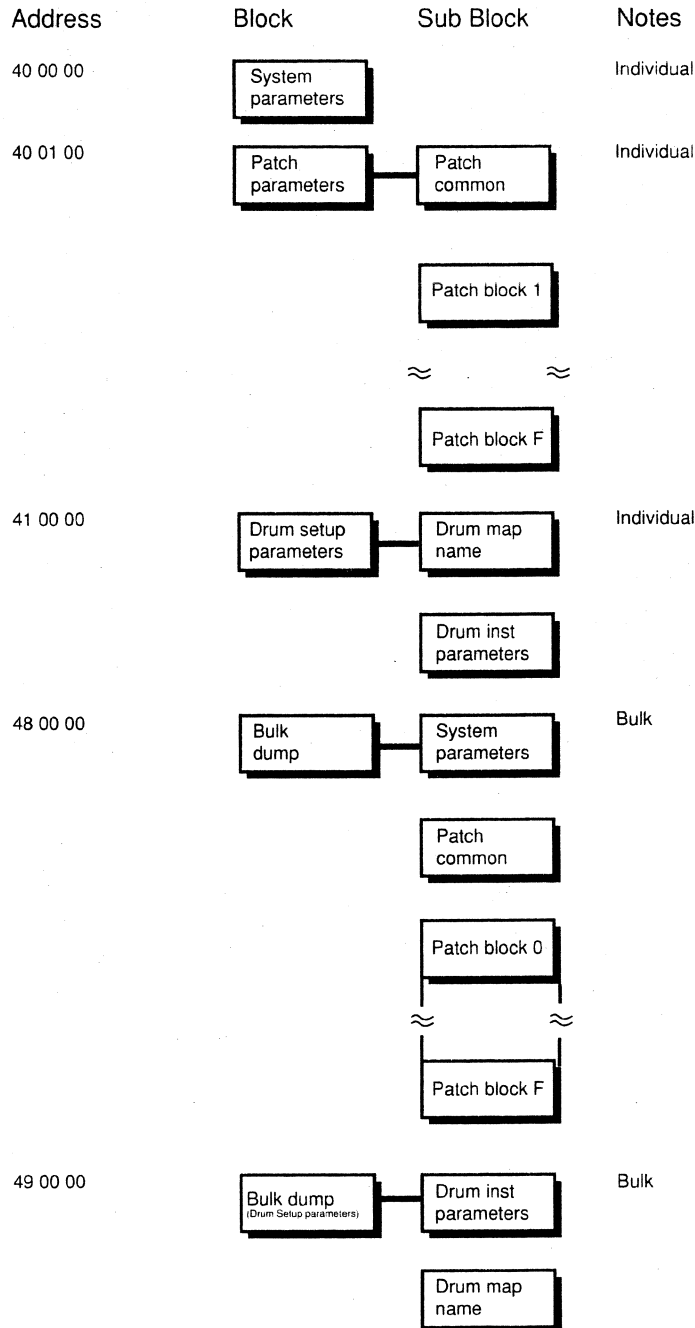* Regarding the checksum please refer to section 4 .

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**

An outlined address map of the Exclusive Communication is shown below:

Address	Block	Sub Block	Notes
40 00 00	System parameters		Individual
40 01 00	Patch parameters	Patch common	Individual
		Patch block 1	
		≈ ≈	
		Patch block F	
41 00 00	Drum setup parameters	Drum map name	Individual
		Drum inst parameters	
48 00 00	Bulk dump	System parameters	Bulk
		Patch common	
		Patch block 0	
		≈ ≈	
		Patch block F	
49 00 00	Bulk dump (Drum Setup parameters)	Drum inst parameters	Bulk
		Drum map name	

● 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".

Address(H)	Size(H)	Data(H)	Parameter	Description	Default Value (H)	Description
40 00 04	00 00 01	00 - 7F	MASTER VOLUME (= F0 7F 7F 04 01 00 vv F7)	0 - 127	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 (Rx. only)	00 = GS Reset		

* Refer to "System exclusive messages related to Mode settings".

Address(H)	Size(H)	Data(H)	Parameter	Description	Default Value (H)	Description
40 01 00	00 00 10	20 - 7F	PATCH NAME	16 ASCII Characters		
40 01 :#						
40 01 0F#						

Address(H)	Size(H)	Data(H)	Parameter	Description		Default Value (H)
40 01 10	00 00 10	00 - 18	VOICE RESERVE	PART 10 (Drum Part)	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 :#				:		
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. The number of the maximum polyphony of E-86 is 28. For the compatibility to other GS models, it is recommended to be equal or less than 24.

Address(H)	Size(H)	Data(H)	Parameter	Description	Default Value (H)	Description
40 01 30	00 00 01	0 - 07	REVERB MACRO	00: Room 1	04	Hall 2
				01: Room 2		
				02: Room 3		
				03: Hall 1		
				04: Hall 2		
				05: Plate		
				06: Delay		
				07: Panning Delay		
40 01 31	00 00 01	00 - 07	REVERB CHARACTER	0 - 7	04	04
40 01 32	00 00 01	00 - 07	REVERB PRE-LPF	0 - 7	00	00
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	00
40 01 36	00 00 01	00 - 7F	REVERB SEND LEVEL TO CHORUS	0 - 127	00	00

* 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.

Address(H)	Size(H)	Data(H)	Parameter	Description	Default Value (H)	Description
40 01 38	00 00 01	00 - 07	CHORUS MACRO	00: Chorus 1	02	Chorus 3
				01: Chorus 2		
				02: Chorus 3		
				03: Chorus 4		
				04: Feedback Chorus		
				05: Flanger		
				06: Short Delay		
				07: Short Delay(FB)		
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 E-96 has 16 Parts. Parameters that can be set individually for each Part are called Patch Part parameters.

If you use exclusive messages to set Patch Part parameters, specify the address by Block number rather than Part Number (normally the same number as the MIDI channel). The Block number can be specified as one of 16 blocks, from 0(H) to F(H).

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.

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 (Bank number MSB)	00	0
40 1x 01#		00 - 7F		P.C. VALUE 1 - 128 (Program unmber)	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(CAf)	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(PAf)	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.

Address(H)	Size(H)	Data(H)	Parameter	Description	Default Value (H)	Description
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	

* 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.

Address(H)	Size(H)	Data(H)	Parameter	Description	Default Value (H)	Description
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 Par) MAP1 (Drum Part)

* This parameter sets the Drum Map of the Part used as the Drum Part. The E-96 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)).

Address(H)	Size(H)	Data(H)	Parameter	Description	Default Value (H)	Description
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.		
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	KEY RANGE LOW	(C-1) - (G9)	00	C-1
40 1x 1E	00 00 01	00 - 7F	KEY 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 30	00 00 01	0E - 72	TONE MODIFY1 Vibrato Rate	-64 - +63 (=NRPN# 8)	40	0
40 1x 31	00 00 01	0E - 72	TONE MODIFY2 Vibrato Depth	-64 - +63 (=NRPN# 9)	40	0
40 1x 32	00 00 01	0E - 72	TONE MODIFY3 TVF Cutoff Freq.	-64 - +63 (=NRPN# 32)	40	0
40 1x 33	00 00 01	0E - 72	TONE MODIFY4 TVF Resonance	-64 - +63 (=NRPN# 33)	40	0
40 1x 34	00 00 01	0E - 72	TONE MODIFY5 TVF&TVA Env.attack	-64 - +63 (=NRPN# 99)	40	0
40 1x 35	00 00 01	0E - 72	TONE MODIFY6 TVF&TVA Env.decay	-64 - +63 (=NRPN# 100)	40	0
40 1x 36	00 00 01	0E - 72	TONE MODIFY7 TVF&TVA Env.release	-64 - +63 (=NRPN# 102)	40	0
40 1x 37	00 00 01	0E - 72	TONE MODIFY8 Vibrato Delay	-64 - +63 (=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 .

Address(H)	Size(H)	Data(H)	Parameter	Description	Default Value (H)	Description
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	47 [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 [%]

● DRUM SETUP PARAMETERS

*m:Map number (0 = MAP1, 1 = MAP2)
*rr:drum part note number (00H - 7FH)

Address(H)	SIZE(H)	Data(H)	ParameterDescription	
41 m0 00 : # 41 m0 0B#	00 00 0C	20 - 7F	DRUM MAP NAME	ASCII Character
41 m1 rr	00 00 01	00 - 7F	PLAY NOTE NUMBER	Pitch coarse
41 m2 rr	00 00 01	00 - 7F	LEVEL	TVA level (=Bn 63 1A 62 rr 06 vv)
41 m3 rr	00 00 01	00 - 7F	ASSIGN GROUP NUMBER	Non, 1 - 127
41 m4 rr	00 00 01	00 - 7F	PANPOT	Random, -63(LEFT) - +63(RIGHT) (=Bn 63 1C 62 rr 06 vv)
41 m5 rr	00 00 01	00 - 7F	REVERB SEND LEVEL	0.0 - 1.0 Multiplicand of the part reverb depth (=Bn 63 1D 62 rr 06 vv)
41 m6 rr	00 00 01	00 - 7F	CHORUS SEND LEVEL	0.0 - 1.0 Multiplicand of the part chorus depth (=Bn 63 1E 62 rr 06 vv)
41 m7 rr	00 00 01	00 - 01	Rx.NOTE OFF	OFF / ON
41 m8 rr	00 00 01	00 - 01	Rx.NOTE ON	OFF / ON

When you change Drum Sets, all values of the DRUM SETUP PARAMETERS will be initialized.

Section 4. BULK DUMP

Bulk Dump
You can send or request bulk data which contains a large amount of parameter data by using Bulk Dump communication.
It is used for storing bulk data in a sequencer or a computer. To send or request bulk data, use the Address and Size indicated in the following map.
You cannot use any address having "#" for the top address in a System Exclusive message except the following case.
Messages which include large data (more than 128 bytes) are sent out in separate packets, then, the top address of the following messages may be the address marked "#".
To send several packets of large DT1 messages at a time, insert intervals of at least 40ms in between those packets.

All Parameters (System Parameters and all Patch Parameters)

Address(H)	SIZE(H)	Description	Number of packets
48 00 00 : # 48 1D 0F#	00 1D 10	ALL	30 packets

System Parameters

Address(H)	SIZE(H)	Description	Number of packets
48 00 00 : # 48 00 0F#	00 00 10	SYSTEM PARAMETERS	1 packet

Patch Parameters

Address(H)	SIZE(H)	Description	Number of packets
48 00 10 : # 48 01 0F#	00 01 00	PATCH COMMON 1 packet	
48 01 10 : # 48 02 6F#	00 01 60	BLOCK 0	2 packets
48 02 70 : # 48 04 4F#	00 01 60	BLOCK 1	2 packets
48 04 50 : # 48 06 2F#	00 01 60	BLOCK 2	2 packets
48 06 30 : # 48 08 0F#	00 01 60	BLOCK 3	2 packets
48 08 10 : # 48 09 6F#	00 01 60	BLOCK 4	2 packets
48 09 70 : # 48 0B 4F#	00 01 60	BLOCK 5	2 packets
48 0B 50 : # 48 0D 2F#	00 01 60	BLOCK 6	2 packets
48 0D 30 : # 48 0F 0F#	00 01 60	BLOCK 7	2 packets
48 0F 10 : # 48 10 6F#	00 01 60	BLOCK 8	2 packets
48 10 70 : # 48 12 4F#	00 01 60	BLOCK 9	2 packets
48 12 50 : # 48 14 2F#	00 01 60	BLOCK A	2 packets
48 14 30 : # 48 16 0F#	00 01 60	BLOCK B	2 packets
48 16 10 : # 48 17 6F#	00 01 60	BLOCK C	2 packets
48 17 70 : # 48 19 4F#	00 01 60	BLOCK D	2 packets
48 19 50 : # 48 1B 2F#	00 01 60	BLOCK E	2 packets
48 1B 30 : # 48 1D 0F#	00 01 60	BLOCK F	2 packets

DRUM SETUP PARAMETERS
*m: map number (0 = MAP1, 1 = MAP2)

Address(H)	SIZE(H)	Description	Number of packets
49 m0 00 : 49 m1 7F	00 02 00	PLAY NOTE NUMBER	2 packets
49 m2 00 : 49 m3 7F	00 02 00	LEVEL	2 packets
49 m4 00 : 49 m5 7F	00 02 00	ASSIGN GROUP NUMBER	2 packets
49 m6 00 : 49 m7 7F	00 02 00	PANPOT	2 packets
49 m8 00 : 49 m9 7F	00 02 00	REVERB SEND LEVEL	2 packets
49 mA 00 : 49 mB 7F	00 02 00	CHORUS SEND LEVEL	2 packets
49 mC 00 : 49 mD 7F	00 02 00	Rx. NOTE ON/OFF 2 packets	
49 mE 00 : 49 mE 17	00 00 18	DRUM MAP NAME 1 packet	

Section 5. Supplementary material

● **Decimal and Hexadecimal table**

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 $\pm$ sign, 00H = -64, 40H = $\pm$ 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 = $\pm$ 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 "nibbled" 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.

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

<Example 2> What is the decimal expression of the value 12 34H given as hexadecimal for each 7 bits?
From the preceeding 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 preceeding table, since 0AH = 10, 03H = 3, 09H = 9, 0DH = 13
((10 x 16 + 3) x 16 + 9) x 16 + 13 = 41885

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

```
16) 1258
16)   78 ... 10
16)    4 ... 14
       0 ... 4
```

Since from the preceeding 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 128 + 0 = 8192) is 0, so this Pitch Bend Value is
28 00H - 40 00H = 40 x 128 + 0 - (64 x 128 + 0) = 5120 - 8192 = -3072

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

<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 value	: 0CH
(B3)	26 00	(MIDI ch.4) lower byte of 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 $\pm$ 2 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 occuring in the same (or consecutive) clock may be transmitted in an order different than the order in which they were received. For this reason it is a good idea to slightly skew the time of each event (about 1 tick for TPQN=96, and about 5 ticks for TPQN=480).

* TPQN : Ticks Per Quarter Note

● **Example of an Exclusive message and calculating a Checksum**

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

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

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

Here's an example of how the checksum is calculated. We will assume that in the exclusive message we are transmitting, the address is 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 1> Set the tuning of MIDI channel 3 to A4 = 442.0Hz
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 value                  :45H
(B2)  26 03    (MIDI ch.3) lower byte of value                  :03H
(B2)  64 7F    (MIDI ch.3) upper byte of RPN parameter number   :7FH
(B2)  65 7F    (MIDI ch.3) lower byte of RPN parameter number   :7FH
```

<Example 2> Set the tuning of the entire device to +23.4 cent
From the "Parameter Address Map", the MASTER TUNE Address is 40 00 00H.
The value is expressed nibbled in steps of 0.1 cent with 00 04 00 00H (= 1024) as ± 0, so +23.4 cent would be 234 + 1024 = 1258, and when this is nibbled it would be 00 04 0E 0AH.

```
F0    41    10    42    12    40 00 00   00 04 0E 0A    ??      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 + 00H + 00H + 00H + 04H + 0EH + 0AH = 64 + 0 + 0 + 0 + 4 + 14 + 10 = 92(sum)
92(sum) ÷ 128 = 0(quotient) ... 92(remainder)
checksum = 128 - 92(remainder) = 36 = 24H

This means that F0 41 10 42 12 40 00 00 00 04 0E 0A 24 F7 is the message we transmit.

MIDI IMPLEMENTATION CHART

[Intelligent Synthesizer] (Arranger)

Model: E-96

Date: 2 May 1995

Version: 1.00

	Function...	Transmitted	Recognized	Remarks
Basic Channel	Default Changed	1~12, 14, 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/St! PG, 11= Lower, 12= Man Bass, 13=Rx1/Basic MIDI Ch., 14= Rx2 / NTA1, 15= Rx 3 / NTA2, 16= M Drum.
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 *1 *****	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 *1 O *1	
Pitch Bend		O *1	O *1	
Control Change	0,32 1 5 6, 38 7 10 11 64 65 66 67 84 91 93 98, 99 100, 101 120 121	O *1 O *1 O O O *1 O *1 O *1 O *1 O X *1 X *1 O O *1 O *1 O *1 O *1 X X	O *1 O *1 O *1 O *1 O *1 O *1 O *1 O *1 O *1 O *1 O *1 O *1 O (Reverb) *1 O (Chorus) *1 O *1 O *1 O 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 All Sound Off Reset All Controllers
Program Change	True #	O *1 *****	O *1 0~127	Program Number 1~128
System Exclusive		O	O	
System Common	Song Pos Song Sel Tune	X X X	X X X	
System Real Time	Clock Commands	O *1 O *1	O *1 O *1	MIDI File Record/Play
Aux Messages	Local On/Off All Notes Off Active Sense Reset	O *1 X O X	O O (123-125) O X	
Notes		*1 O X is selectable *2 Recognized as M=1 even if M≠1		

Mode 1: OMNI ON, POLY   Mode 2: OMNI ON, MONO   O: Yes
Mode 3: OMNI OFF, POLY   Mode 4: OMNI OFF. MONO   X: No

■ MIDI implementation

(Sound Module, Keyboard Section, SMF Player)

Model E-96   Version 1.00 '95.5

The E-96 has additional functions and parameters which were not found on previous GS format sound sources. These functions and parameters are marked as [96]. If MIDI messages marked as [96] are transmitted to a different GS format sound source, it is possible that these messages may not be received.

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=velocity   : 00H - 7FH (0 - 127)

* Not received when Rx.NOTE MESSAGE = OFF (Initial value is ON)
  or when note number is outside limits.
* 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=velocity   : 01H - 7FH (1 - 127)

* Not received when Rx.NOTE MESSAGE = OFF (Initial value is ON)
  or when note number is outside limits.
* 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=value   : 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 - 7FH
                                              Initial value = 00H

* Not received when Rx.BANK SELECT = OFF
* When "GM System On" is received, Rx.BANK SELECT will be set OFF, and Bank Select will not be received.
* When "GS Reset" is received, Rx.BANK SELECT will be set ON.
* When Rx.BANK SELECT LSB = OFF, Bank number LSB will be handled as 00H regardless of the received value.
* 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.
* Some other GS devices do not recognize the Bank Select LSB (Controller number 32).

◌ 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.

◌ 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)

* Volume messages are used to adjust the volume balance of each Part.
* This message is not received when Rx.VOLUME = OFF. (Initial value is ON)

◌ 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.
* This message is 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)

* 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.
* This message is 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) 0-63=OFF 64-127=ON

*This message is not received when Rx.HOLD1 = OFF. (Initial value is ON)

◌ Portamento   (Controller number 65)

Status	2nd byte	3rd byte
BnH	41H	vvH

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

* This message is 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

* This message is 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

* This message is 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
B0 54 3C	Portamento Control from C4	no change (C4 voice still sounding)
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
B0 54 3C	Portamento Control from C4	no change
90 40 40	Note on E4	E4 on with glide from C4
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=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 98,99)

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

* When "GM System On" is received, Rx.NRPN will be set OFF, and NRPN will not be received. When "GS Reset" or Rx.NRPN = ON is received, NRPN can be received.
* 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, 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.

To use these messages, you must first send NRPN MSB and NRPN LSB messages to specify the parameter to be controlled, and then send 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.

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 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 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)	
4FH 10H	mmH	Part 4 On / Off (Upper 1) mm: 00H - 7FH (00-3FH =Off - 40-7FH= On)	[96]
4FH 11H	mmH	Part 11 On / Off (Lower) mm: 00H - 7FH (00-3FH =Off - 40-7FH= On)	[96]
4FH 12H	mmH	Part 12 On / Off (Man Bass) mm: 00H - 7FH (00-3FH =Off - 40-7FH= On)	[96]
4FH 13H	mmH	Part 6 On / Off (Upper 2) mm: 00H - 7FH (00-3FH =Off - 40-7FH= On)	[96]
4FH 14H	mmH	Part 16 On / Off (Man Drums) mm: 00H - 7FH (00-3FH =Off - 40-7FH= On)	[96]

* 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 100,101)

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

* This message is not received when Rx.RPN = OFF.
* 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) message allows an extended range of control changes to be used, letting you use additional control functions which are part of the MIDI Specification. To use these messages, you must first use RPN MSB and RPN LSB messages to specify the parameter to be controlled, and then use Data Entry messages 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.

On the E-96, 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) Refer to 5. Supplementary material, "About tuning".
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)

* This message is 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 messages will not be received on bank numbers 129 - 16384 (the value of Control Number 0 is other than 0(00H)).

● **Channel Pressure**

Status	2nd byte
DnH	vvH

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

* This message is 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)

* This message is 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.

■ **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

● **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 untill 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)

* Omni Off is only recognize as "All Notes Off". Mode does not change.

● **OMNI ON**   (Controller number 125)

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

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

* Omni On is only recognize as "All Notes Off". Mode does not change.

● **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 Messages

⊃ 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 according to the following table.

⊃ Sequencer Continue
Status
FBH

* When "Sequencer Continue " is received, the internal Recorder continue to play from the current position.

⊃ Sequencer Stop
Status
FCH

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

⊃ Timing Clock [96]
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.

Style 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.
Auto 1	As long the E-96 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 1	As long the E-96 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" buttons to start song Playback. Once received a "Sequencer Start" (FA), if also "Timing clock" (F8) follows this message, the Recorder (Play) starts with the external timing, otherwise it start following its internal tempo.
MIDI 1	As long the E-96 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 2	As long the E-96 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" buttons to start song Playback.
Once received a "Sequencer Start" (FA), if also "Timing clock" (F8) follows this message, the Recorder (Play) starts with the external timing, otherwise it will wait for external "Timing Clock" (F8) .

REMOTE 1	As long the E-96 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), also if "Timing clock" (F8) follows this message, the Arranger / Recorder (Rec) start always with the internal timing.
REMOTE 2	As long the E-96 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" buttons to start song Playback. Once received a "Sequencer Start" (FA). also if "Timing clock" (F8) follows this message, the Recorder (Play) starts always with the internal timing.

⊃ Song Position Pointer [96]
Status | 2nd byte | 3rd byte
F2H | XXH | YYH

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

⊃ Song Select [96]
Status | 2nd byte
F3H | XXH

XX = Song Number

■ 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 received by the E-96 are; messages related to Mode Setting, 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, a "GS Reset" message at the beginning of a GS music data, and a "System Mode Set" message at the beginning of data especially for the E-96. 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.)
"System Mode Set" and "GS Reset" use Roland system exclusive format "Data Set 1 (DT1)". "Turn General MIDI System On" use Universal Non-realtime Message format.

⊃ Turn General MIDI System On
"General MIDI System On" is a command message that resets the internal settings of the unit to the General MIDI initial state (General MIDI System - Level 1). A General MIDI device that receives this message 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 E-96 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	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 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 E-96 default mode. (Arranger 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
F0H	7FH, 7FH, 04H, 01H, llH, 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)
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 E-96 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. (The E-96 allows you to change the Device ID setting.)

⊃ 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)
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

■ 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 - 7FH

* Not transmitted when "Program Change" TX Filter is On.
* Some other GS devices do not recognize the Bank Select LSB (Controller number 32).

○ 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 transmitted when "Modulation" TX Filter is On.

○ 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)

* Not transmitted when "Volume" TX Filter is On.
* 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)

* Not transmitted when "Volume" TX Filter is On.
* 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)

* Not transmitted when "Expression" TX Filter is On.
* 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

* Not transmitted when "Hold" TX Filter is On.

○ Portamento   (Controller number 65)

Status	2nd byte	3rd byte
BnH	41H	vvH

n=MIDI channel number   : 0H - FH (ch.1 - ch.16)
vv=Control value   : 00H - 7FH (0 - 127) 0-63=OFF 64-127=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 transmitted when "Sostenuto" TX Filter 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 transmitted when "Soft" TX Filter 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)

○ 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.
* Not transmitted when "Reverb" TX Filter is On.

○ 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.
* Not transmitted when "Chorus" TX Filter is On.

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

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

* Not transmitted when NRPN TX Filter is On.

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	
MSB LSB	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 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)

4FH 10H	mmH	Part 4 On / Off (Upper 1)		[96]
		mm: 00H - 7FH (00-3FH =Off - 40-7FH= On)		
4FH 11H	mmH	Part 11 On / Off (Lower)		[96]
		mm: 00H - 7FH (00-3FH =Off - 40-7FH= On)		
4FH 12H	mmH	Part 12 On / Off (Man Bass)		[96]
		mm: 00H - 7FH (00-3FH =Off - 40-7FH= On)		
4FH 13H	mmH	Part 6 On / Off (Upper 2)		[96]
		mm: 00H - 7FH (00-3FH =Off - 40-7FH= On)		
4FH 14H	mmH	Part 16 On / Off (Man Drums)		[96]
		mm: 00H - 7FH (00-3FH =Off - 40-7FH= On)		
4FH 15H	mmH	Part 13 On / Off (Rx Only 1)		[96]
		mm: 00H - 7FH (00-3FH =Off - 40-7FH= On)		

* Data entry LSB (llH) is not Transmitted.
* 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 100,101)**

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 transmitted when RPN TX Filter is On.

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 E-96, RPN can be used to modify the following parameters.

RPN		Data entry		
MSB LSB		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)
				Refer to 5. Supplementary material, "About tuning".
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)

* Not transmitted when Program Change TX Filter is On.

● **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 transmitted when Pitch Bender TX Filter is On.

■ 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 transmitted, 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

● 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 corresponding channel will be set to Mode 4 (M=1).

● POLY   (Controller number 127)

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

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

* The corresponding channel will be set to Mode 3.

■ System Realtime Messages

○ Active Sensing

Status
FEH

Transmitted about every 250ms.

○ Sequencer Start   [96]

Status
FAH

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

○ Sequencer Stop   [96]

Status
FCH

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

○ Timing Clock   [96]

Status
F8H

There are several options for sending MIDI realtime messages whenever you playback a song using the internal E-96 Recorder/Player

Options	Meaning
Start/Stop/Continue	If you select this option, the E-96 Recorder/ Player sends only "Sequencer Start, Stop and Continue" messages.
Clock	This option means that the E-96 Recorder/Player sends "Sequencer Start, Stop and Continue" and "Timing clock" messages.
Song Position Pointer	In this case the E-96 sends all the above mentioned messages, as well as "Song Position Pointer" messages.
Song Select	In this case the E-96 sends all the above mentioned messages, as well as "Song select" messages.

○ Song Position Pointer   [96]

Status	2nd byte	3rd byte
F2H	XXH	YYH

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

○ Song Select   [96]

Status	2nd byte
F3H	XXH

XX = Song Number

■ 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 E-96 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 E-96 can use Exclusive messages to transmit internal settings to other devices. There are three types of Exclusive data transmission: Lyrics Transmission (Section 3.1), Individual Parameter Transmission (section 3.2) 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.

The exclusive message used to transmit "Lyrics Data" has a model ID of 41H.

◯ 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), 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 3.1 Lyrics Data Transmission

(Model ID=41H)

When a "TUNE1000" song with lyrics is played, the E-96 sends on its MIDI Out the following "Lyrics Sys Exe":

Address(H) Description	Size(H) Default(H)	Data(H) Description	Parameter
7F 00 00	00 00 7F	00 - 0F [96]	LYRICS 1st Line Display
7F 01 00	00 00 7F	00 - 0F [96]	LYRICS 2nd Line Display
7F 02 00	00 00 7F	00 - 0F [96]	LYRICS 3rd Line Display
7F 08 00	00 00 7F	00 - 0F [96]	LYRICS 1st Line syllable Highlight
7F 09 00	00 00 7F	00 - 0F [96]	LYRICS 2nd Line syllable Highlight
7F 0A 00	00 00 7F	00 - 0F [96]	LYRICS 3rd Line syllable Highlight

Lyrics data are sent in nibbles format:
Bit 7 = 0
Bit 6 = 0
Bit 5 = 0
Bit 4 = 0
Bit 3 =
Bit 2 =
Bit 1 =
Bit 0 =

Less significant nibble is sent first.

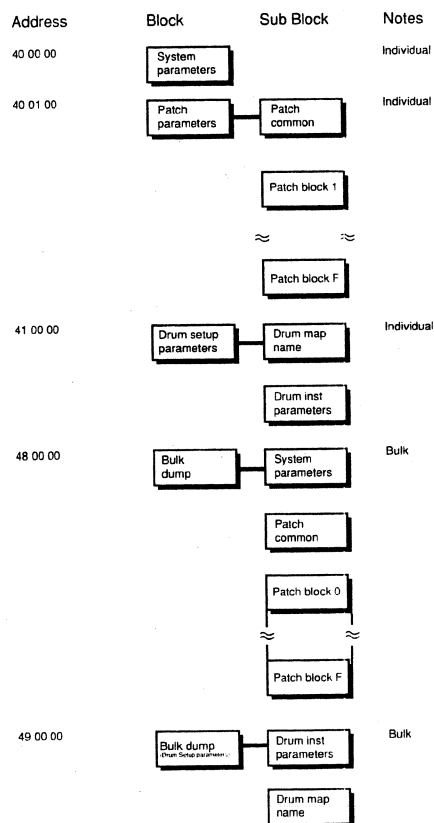## Section 3.2 Individual Parameter Transmission

(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

An outlined address map of the Exclusive Communication is shown below:

Address	Block	Sub Block	Notes
40 00 00	System parameters		Individual
40 01 00	Patch parameters	Patch common	Individual
		Patch block 1	
		≈ ≈	
		Patch block F	
41 00 00	Drum setup parameters	Drum map name	Individual
		Drum inst parameters	
48 00 00	Bulk dump	System parameters	Bulk
		Patch common	
		Patch block 0	
		≈ ≈	
		Patch block F	
49 00 00	Bulk dump (Drum Setup parameters)	Drum inst parameters	Bulk
		Drum map name	

● Patch parameters
○ Patch Common parameters

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

* Refer to section 5. Supplementary material, "About tuning".

40 00 04	00 00 01	00 - 7F	MASTER VOLUME (= F0 7F 7F 04 01 00 vv F7)	0 - 127	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 (Rx. only)	00 = GS Reset		

* Refer to "System exclusive messages related to Mode settings" .

40 01 00 4 0 01 40 01 0F#	00 00 10	20 - 7F	PATCH NAME	16 ASCII Characters		:#

40 01 10 40 01 11# 40 01 12# 40 01 13# 40 01 14# 40 01 15# 40 01 16# 40 01 17# 40 01 18# 40 01 19# 40 01 1A# 40 01 :# 40 01 1F#	00 00 10	00 - 18	VOICE RESERVE	PART 10 (Drum Part) 02 PART 1 06 PART 2 02 PART 3 02 PART 4 02 PART 5 02 PART 6 02 PART 7 02 PART 8 02 PART 9 02 PART 11 00 : 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. The number of the maximum polyphony of E-86 is 28. For the compatibility to other GS models, it is recommended to be equal or less than 24.

○ Patch part parameters
The E-96 has 16 Parts. Parameters that can be set individually for each Part are called Patch Part parameters.
If you use exclusive messages to set Patch Part parameters, specify the address by Block number rather than Part Number (normally the same number as the MIDI channel).
The Block number can be specified as one of 16 blocks, from 0(H) to F(H).

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.

40 01 30	00 00 01	0 - 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	04
40 01 32	00 00 01	00 - 07	REVERB PRE-LPF	0 - 7	00	00
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	00
40 01 36	00 00 01	00 - 7F	REVERB SEND LEVEL TO CHORUS	0 - 127	00	00

* 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 E-96 has 16 Parts. Parameters that can be set individually for each Part are called Patch Part parameters.

If you use exclusive messages to set Patch Part parameters, specify the address by Block number rather than Part Number (normally the same number as the MIDI channel). The Block number can be specified as one of 16 blocks, from 0(H) to F(H).

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.

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 (Bank number MSB)		00	0
40 1x 01#		00 - 7F		P.C. VALUE 1 - 128 (Program unmber)		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(CAf)	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(PAf)	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.

Address(H)	Size(H)	Data(H)	Parameter	Description		Default Value (H)	Description
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	

* 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.

Address(H)	Size(H)	Data(H)	Parameter	Description		Default Value (H)	Description
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 Par) MAP1 (Drum Part)

* This parameter sets the Drum Map of the Part used as the Drum Part. The E-96 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)).

Address(H)	Size(H)	Data(H)	Parameter	Description		Default Value (H)	Description
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.			
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	KEY RANGE LOW	(C-1) - (G9)		00	C-1
40 1x 1E	00 00 01	00 - 7F	KEY 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 30	00 00 01	0E - 72	TONE MODIFY1 Vibrato Rate	-64 - +63 (=NRPN# 8)		40	0
40 1x 31	00 00 01	0E - 72	TONE MODIFY2 Vibrato Depth	-64 - +63 (=NRPN# 9)		40	0
40 1x 32	00 00 01	0E - 72	TONE MODIFY3 TVF Cutoff Freq.	-64 - +63 (=NRPN# 32)		40	0
40 1x 33	00 00 01	0E - 72	TONE MODIFY4 TVF Resonance	-64 - +63 (=NRPN# 33)		40	0
40 1x 34	00 00 01	0E - 72	TONE MODIFY5 TVF&TVA Env.attack	-64 - +63 (=NRPN# 99)		40	0
40 1x 35	00 00 01	0E - 72	TONE MODIFY6 TVF&TVA Env.decay	-64 - +63 (=NRPN# 100)		40	0
40 1x 36	00 00 01	0E - 72	TONE MODIFY7 TVF&TVA Env.release	-64 - +63 (=NRPN# 102)		40	0
40 1x 37	00 00 01	0E - 72	TONE MODIFY8 Vibrato Delay	-64 - +63 (=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 .

Address(H)	Size(H)	Data(H)	Parameter	Description	Default Value (H)	Description
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	47 [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 [%]

● DRUM SETUP PARAMETERS

*m:Map number (0 = MAP1, 1 = MAP2)
*rr:drum part note number (00H - 7FH)

Address(H)	SIZE(H)	Data(H)	Parameter	Description
41 m0 00 : # 41 m0 0B#	00 00 0C	20 - 7F	DRUM MAP NAME	ASCII Character
41 m1 rr	00 00 01	00 - 7F	PLAY NOTE NUMBER	Pitch coarse
41 m2 rr	00 00 01	00 - 7F	LEVEL	TVA level (=Bn 63 1A 62 rr 06 vv)
41 m3 rr	00 00 01	00 - 7F	ASSIGN GROUP NUMBER	Non. 1 - 127
41 m4 rr	00 00 01	00 - 7F	PANPOT	Random. -63(LEFT) - +63(RIGHT) (=Bn 63 1C 62 rr 06 vv)
41 m5 rr	00 00 01	00 - 7F	REVERB SEND LEVEL	0.0 - 1.0 Multiplicand of the part reverb depth (=Bn 63 1D 62 rr 06 vv)
41 m6 rr	00 00 01	00 - 7F	CHORUS SEND LEVEL	0.0 - 1.0 Multiplicand of the part chorus depth (=Bn 63 1E 62 rr 06 vv)
41 m7 rr	00 00 01	00 - 01	Rx. NOTE OFF	OFF : ON
41 m8 rr	00 00 01	00 - 01	Rx. NOTE ON	OFF : ON

When you change Drum Sets, all values of the DRUM SETUP PARAMETERS will be initialized.

Section 4. BULK DUMP

Bulk Dump
You can send or request bulk data which contains a large amount of parameter data by using Bulk Dump communication.
It is used for storing bulk data in a sequencer or a computer. To send or request bulk data, use the Address and Size indicated in the following map.
You cannot use any address having "#" for the top address in a System Exclusive message except the following case.
Messages which include large data (more than 128 bytes) are sent out in separate packets, then, the top address of the following messages may be the address marked "#".
To send several packets of large DT1 messages at a time, insert intervals of at least 40ms in between those packets.

All Parameters (System Parameters and all Patch Parameters)

Address(H)	SIZE(H)	Description	Number of packets
48 00 00 : # 48 1D 0F#	30 1D 10	ALL	30 packets

System Parameters

Address(H)	SIZE(H)	Description	Number of packets
48 00 00 : # 48 00 0F#	00 00 10	SYSTEM PARAMETERS	1 packet

Patch Parameters

Address(H)	SIZE(H)	Description	Number of packets
48 00 00 : # 48 01 0F#	00 01 00	PATCH COMMON 1 packet	
48 01 10 : # 48 02 6F#	00 01 60	BLOCK 0	2 packets
48 02 70 : # 48 04 4F#	00 01 60	BLOCK 1	2 packets
48 04 50 : # 48 06 2F#	00 01 60	BLOCK 2	2 packets
48 06 30 : # 48 08 0F#	00 01 60	BLOCK 3	2 packets
48 08 10 : # 48 09 6F#	00 01 60	BLOCK 4	2 packets
48 09 70 : # 48 0B 4F#	00 01 60	BLOCK 5	2 packets
48 0B 50 : # 48 0D 2F#	00 01 60	BLOCK 6	2 packets
48 0D 30 : # 48 0F 0F#	00 01 60	BLOCK 7	2 packets
48 0F 10 : # 48 10 6F#	00 01 60	BLOCK 8	2 packets
48 10 70 : # 48 12 4F#	00 01 60	BLOCK 9	2 packets
48 12 50 : # 48 14 2F#	00 01 60	BLOCK A	2 packets
48 14 30 : # 48 16 0F#	00 01 60	BLOCK B	2 packets
48 16 10 : # 48 17 6F#	00 01 60	BLOCK C	2 packets
48 17 70 : # 48 19 4F#	00 01 60	BLOCK D	2 packets
48 19 50 : # 48 1B 2F#	00 01 60	BLOCK E	2 packets
48 1B 30 : # 48 1D 0F#	00 01 60	BLOCK F	2 packets

DRUM SETUP PARAMETERS
*m: map number (0 = MAP1, 1 = MAP2)

Address(H)	SIZE(H)	Description	Number of packets
49 m0 00 : 49 m1 7F	00 02 00	PLAY NOTE NUMBER	2 packets
49 m2 00 : 49 m3 7F	00 02 00	LEVEL	2 packets
49 m4 00 : 49 m5 7F	00 02 00	ASSIGN GROUP NUMBER	2 packets
49 m6 00 : 49 m7 7F	00 02 00	PANPOT	2 packets
49 m8 00 : 49 m9 7F	00 02 00	REVERB SEND LEVEL	2 packets
49 mA 00 : 49 mB 7F	00 02 00	CHORUS SEND LEVEL	2 packets
49 mC 00 : 49 mD 7F	00 02 00	Rx. NOTE ON/OFF 2 packets	
49 mE 00 : 49 mE 17	00 00 18	DRUM MAP NAME 1 packet	

Section 5. Supplementary material

● **Decimal and Hexadecimal table**

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		69	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 "nibbled" 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.

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

<Example 2> What is the decimal expression of the value 12 34H given as hexadecimal for each 7 bits?
From the preceeding 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 preceeding table, since 0AH = 10, 03H = 3, 09H = 9, 0DH = 13
((10 x 16 + 3) x 16 + 9) x 16 + 13 = 41885

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

```
16) 1258
16)   78 ... 10
16)    4 ... 14
       0 ... 4
```

Since from the preceeding 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 128 + 0 = 8192) is 0, so this Pitch Bend Value is
28 00H - 40 00H = 40 x 128 + 0 - (64 x 128 + 0) = 5120 - 8192 = -3072

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

<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 value	: 0CH
(B3)	26 00	(MIDI ch.4) lower byte of 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 ‡ 2 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 occuring in the same (or consecutive) clock may be transmitted in an order different than the order in which they were received. For this reason it is a good idea to slightly skew the time of each event (about 1 tick for TPQN=96, and about 5 ticks for TPQN=480).

* TPQN : Ticks Per Quarter Note

● **Example of an Exclusive message and calculating a Checksum**

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

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

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

Here's an example of how the checksum is calculated. We will assume that in the exclusive message we are transmitting, the address is 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	22	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	22	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 1> Set the tuning of MIDI channel 3 to A4 = 442.0Hz

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

<Example 2> Set the tuning of the entire device to +23.4 cent

From the "Parameter Address Map", the MASTER TUNE Address is 40 00 00H.
The value is expressed nibbled in steps of 0.1 cent with 00 04 00 00H (= 1024) as ± 0, so +23.4 cent would be 234 + 1024 = 1258, and when this is nibbled it would be 00 04 0E 0AH.

F0	41	10	42	12	40 00 00	00 04 0E 0A	22	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 + 00H + 00H + 00H + 04H + 0EH + 0AH = 64 + 0 + 0 + 0 + 4 + 14 + 10 = 92(sum)
92(sum) ÷ 128 = 0(quotient) ... 92(remainder)
checksum = 128 - 92(remainder) = 36 = 24H

This means that F0 41 10 42 12 40 00 00 00 04 0E 0A 24 F7 is the message we transmit.

MIDI IMPLEMENTATION CHART

[Intelligent Synthesizer] (Sound Module, Keyboard Section, SMF Player)

Model: E-96

Date: 2 May 1995

Version: 1.00

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

Mode 1: OMNI ON, POLY   Mode 2: OMNI ON, MONO   O: Yes

Mode 3: OMNI OFF, POLY   Mode 4: OMNI OFF, MONO   X: No

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