TD-12 MIDI Implementation

Model: TD-12
Date: Dec. 17, 2004
Version: 1.00

1. Receive data

■Channel Voice Messages

* Following Channel Voice Messages can be received in [SETUP]-[MIDI]-[MIDI CH] Tx/Rx Channel.
* Not received when [SETUP]-[MIDI]-[MIDI CH] Rx/Rx Switch is set to "OFF.

●Note Off

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

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

* Only the channels assigned to the backing part can be received.
* The Velocity Values of Note Off message are ignored.
* When recording, this is recorded in the sequencer data itself.

●Note On

Status	2nd byte	3rd byte
9nH	kkH	vvH

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

* A channel which is assigned to the drum part will receive only the note numbers which are specified by the drum kit. For more on note numbers, refer to "Preset Percussion Set List" (p. 92) in the Owner's Manual.
* When the [KIT]-[FUNC]-[BRUSH] Brush Switch is set to "ON", the note number set by means of [INST]-[CONTROL]-[BR MIDI] Brush Note No. is received on the channel assigned to the drum part (when an instrument campatible when bursh performances is selected for the Snare pad head).
* The note number set by means of [INST]-[CONTROL]-[BR MIDI] XStick Note No. is received on the channel assigned to the drum part (when an instrument compatible with cross-sticking is selected for the Snare pad rim).
* When recording, this is recorded in the sequencer data itself.

●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)

* A channel which is assigned to the drum part will receive only the note numbers which are specified by the drum kit. For more on note numbers, refer to "Preset Percussion Set List" (p. 92) in the Owner's Manual.
* If the value is greater than 40H (64), the decay of the note sounded by the received note number will be shortened. (Used in choking)
* When recording, this is recorded in the sequencer data itself.

●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 (bank.1 - bank.128)
ll = Bank number LSB: processed as 00H

* Only the channels assigned to the backing part can be received. Refer to "Backing Instrument List" (p. 94) in the Owner's Manual.
* Bank select processing will be suspended until a program change message is received.
* Not recorded in the sequencer.

○Modulation (Controller number 1)

Status	2nd byte	3rd byte
BnH	01H	vvH

n = MIDI channel number: 0H - FH (ch.1 - ch.16)
vv = Control value: 00H - 7FH (0 - 127)
                                  Pedal position: open to closed
                                  Head strike position: center to perimeter
                                  Rim strike position: deep to shallow

* Recieved only on channels not assigned to a percussion part.
* In the channel assigned to the drum part, setting [SETUP]-[MIDI]-[CTRL] Pedal CC to MODULATION changes the hi-hat control pedal position.
* In the channel assigned to the drum part, the strike position of the pad corresponding to the note number received changes immediately after [SETUP]-[MIDI]-[CTRL] Snare CC (for the SNARE pad head and rim), Ride CC (for the RIDE pad bow), or Toms CC (for the TOM 1-3 and AUX 1-2 pad rims) is set to MODULATION.
* During recording, the sequencer data is recorded to the TD-12 in accordance with the above settings as "Pedal CC messages," "Snare CC messages," "Ride CC messages," and "Toms CC messages."
* The modulation effect is applied in the channel assigned to the backing part. It is not recorded to the sequencer during recording.

○Breath Controller (Controller number 2)

Status	2nd byte	3rd byte
BnH	02H	vvH

n = MIDI channel number: 0H - FH (ch.1 - 16)
vv = Control value: 00H - 7FH (0 - 127)
                                  Pedal position: open to closed
                                  Head strike position: center to perimeter
                                  Rim strike position: deep to shallow

* Only the channel assigned to the drum part can be received.
* Setting [SETUP]-[MIDI]-[CTRL] Pedal CC to BREATH changes the hi-hat control pedal position.
* The strike position of the pad corresponding to the note number received changes immediately after [SETUP]-[MIDI]-[CTRL] Snare CC (for the SNARE pad head and rim), Ride CC (for the RIDE pad bow), or Toms CC (for the TOM 1-3 and AUX 1-2 pad rims) is set to BREATH.
* During recording, the sequencer data is recorded to the TD-12 in accordance with the above settings as "Pedal CC messages," "Snare CC messages," "Ride CC messages," and "Toms CC messages."

❍Foot Controller (Controller number 4)

Status	2nd byte	3rd byte
BnH	04H	vvH

n = MIDI channel number:	0H - FH (ch.1 - ch.16)
vv = Control value:	00H - 7FH (0 - 127)
	Pedal position: open to closed
	Head strike position: center to perimeter
	Rim strike position: deep to shallow

* Only the channel assigned to the drum part can be received.
* Setting [SETUP]-[MIDI]-[CTRL] Pedal CC to FOOT changes the hi-hat control pedal position.
* The strike position of the pad corresponding to the note number received changes immediately after [SETUP]-[MIDI]-[CTRL] Snare CC (for the SNARE pad head and rim), Ride CC (for the RIDE pad bow), or Toms CC (for the TOM 1-3 and AUX 1-2 pad rims) is set to FOOT.
* During recording, the sequencer data is recorded to the TD-12 in accordance with the above settings as "Pedal CC messages," "Snare CC messages," "Ride CC messages," and "Toms CC messages."

❍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	
mm = MSB, ll = LSB	

* Only the channels assigned to the backing part can be received.
* Refer to the RPN item.
* Not recorded in the sequencer.

❍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)

* Changes the volume for the part. Not indicated in the display.
* Not recorded in the sequencer.

❍Panpot (Controller number 10)

Status	2nd byte	3rd byte
BnH	0AH	vvH

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

* Only the channels assigned to the backing part can be received.
* Changes the pan ([PATTERN]-[PART]-[MIXER]-[PAN]) for the part. Not indicated in the display.
* Not recorded in the sequencer.

❍Expression (Controller number 11)

Status	2nd byte	3rd byte
BnH	0BH	vvH

n = MIDI channel number:	0H - FH (ch.1 - 16)
vv = Control value:	00H - 7FH (0 - 127)
	Pedal position: open to closed
	Head strike position: center to perimeter
	Rim strike position: deep to shallow

* Only the channel assigned to the drum part can be received.
* Setting [SETUP]-[MIDI]-[CTRL] Pedal CC to EXPRESSION changes the hi-hat control pedal position.
* The strike position of the pad corresponding to the note number received changes immediately after [SETUP]-[MIDI]-[CTRL] Snare CC (for the SNARE pad head and rim), Ride CC (for the RIDE pad bow), or Toms CC (for the TOM 1-3 and AUX 1-2 pad rims) is set to EXPRESSION.
* During recording, the sequencer data is recorded to the TD-12 in accordance with the above settings as "Pedal CC messages," "Snare CC messages," "Ride CC messages," and "Toms CC messages."

❍General Purpose Controller 1 (Controller number 16)

Status	2nd byte	3rd byte
BnH	10H	vvH

n = MIDI channel number:	0H - FH (ch.1 - ch.16)
vv = Control value:	00H - 7FH (0 - 127)
	Pedal position: open to closed
	Head strike position: center to perimeter
	Rim strike position: deep to shallow

* Only the channel assigned to the drum part can be received.
* Setting [SETUP]-[MIDI]-[CTRL] Pedal CC to GENERAL1 changes the hi-hat control pedal position.
* The strike position of the pad corresponding to the note number received changes immediately after [SETUP]-[MIDI]-[CTRL] Snare CC (for the SNARE pad head and rim), Ride CC (for the RIDE pad bow), or Toms CC (for the TOM 1-3 and AUX 1-2 pad rims) is set to GENERAL1.
* During recording, the sequencer data is recorded to the TD-12 in accordance with the above settings as "Pedal CC messages," "Snare CC messages," "Ride CC messages," and "Toms CC messages."

❍General Purpose Controller 2 (Controller number 17)

Status	2nd byte	3rd byte
BnH	11H	vvH

n = MIDI channel number:	0H - FH (ch.1 - ch.16)
vv = Control value:	00H - 7FH (0 - 127)
	Pedal position: open to closed
	Head strike position: center to perimeter
	Rim strike position: deep to shallow

* Only the channel assigned to the drum part can be received.
* Setting [SETUP]-[MIDI]-[CTRL] Pedal CC to GENERAL2 changes the hi-hat control pedal position.
* The strike position of the pad corresponding to the note number received changes immediately after [SETUP]-[MIDI]-[CTRL] Snare CC (for the SNARE pad head and rim), Ride CC (for the RIDE pad bow), or Toms CC (for the TOM 1-3 and AUX 1-2 pad rims) is set to GENERAL2.
* During recording, the sequencer data is recorded to the TD-12 in accordance with the above settings as "Pedal CC messages," "Snare CC messages," "Ride CC messages," and "Toms CC messages."

○**General Purpose Controller 3 (Controller number 18)**

Status	2nd byte	3rd byte
BnH	12H	vvH

n = MIDI channel number:	0H - FH (ch.1 - ch.16)
vv = Control value:	00H - 7FH (0 - 127)
	Pedal position: open to closed
	Head strike position: center to perimeter
	Rim strike position: deep to shallow

*   Only the channel assigned to the drum part can be received.
*   Setting [SETUP]-[MIDI]-[CTRL] Pedal CC to GENERAL3 changes the hi-hat control pedal position.
*   The strike position of the pad corresponding to the note number received changes immediately after [SETUP]-[MIDI]-[CTRL] Snare CC (for the SNARE pad head and rim), Ride CC (for the RIDE pad bow), or Toms CC (for the TOM 1-3 and AUX 1-2 pad rims) is set to GENERAL3.
*   During recording, the sequencer data is recorded to the TD-12 in accordance with the above settings as "Pedal CC messages," "Snare CC messages," "Ride CC messages," and "Toms CC messages."

○**General Purpose Controller 4 (Controller number 19)**

Status	2nd byte	3rd byte
BnH	13H	vvH

n = MIDI channel number:	0H - FH (ch.1 - ch.16)
vv = Control value:	00H - 7FH (0 - 127)
	Pedal position: open to closed
	Head strike position: center to perimeter
	Rim strike position: deep to shallow

*   Only the channel assigned to the drum part can be received.
*   Setting [SETUP]-[MIDI]-[CTRL] Pedal CC to GENERAL4 changes the hi-hat control pedal position.
*   The strike position of the pad corresponding to the note number received changes immediately after [SETUP]-[MIDI]-[CTRL] Snare CC (for the SNARE pad head and rim), Ride CC (for the RIDE pad bow), or Toms CC (for the TOM 1-3 and AUX 1-2 pad rims) is set to GENERAL4.
*   During recording, the sequencer data is recorded to the TD-12 in accordance with the above settings as "Pedal CC messages," "Snare CC messages," "Ride CC messages," and "Toms CC messages."

○**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

*   Only the channels assigned to the backing part can be received.
*   When recording, this is recorded in the sequencer data itself.

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

Status	2nd byte	3rd byte
BnH	5BH	vvH

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

*   Only the channels assigned to the backing part can be received.
*   Changes the reverb send level ([PATTERN]-[PART]-[MIXER]-[REV SND]) for the part. Not indicated in the display.
*   Not recorded in the sequencer.

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

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

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

mm = upper byte of parameter number specified by RPN

ll = lower byte of parameter number specified by RPN

<< RPN >>

Control Changes include RPN (Registered Parameter Numbers), which are extended.

When using RPNs, first RPN (Controller numbers 100 and 101; they can be sent in any order) should be sent in order to select the parameter,

then Data Entry (Controller numbers 6 and 38) should be sent to set the value. Once RPN messages are received, Data Entry messages that is received

at the same MIDI channel after that are recognized as changing toward the value of the RPN messages. In order not to make any mistakes,

transmitting RPN Null is recommended after setting parameters you need.

Refer to "Examples of actual MIDI message" <Example 4> (p. 11).

This device receives the following RPNs.

RPN	Data	entry
MSB, LSB	MSB, LSB	Explanation
00H, 00H	mmH, ---	Pitch Bend Sensitivity
		mm: 00H - 18H (0 - 24 semitones)
		ll: ignored (processed as 00H)
		specify up to 2 octaves in semitone steps
7FH, 7FH	---, ---	RPN null
		mm,ll: ignored
		set condition where RPN is unspecified. The Data Entry messages after set RPN null will be ignored.
		(No Data Entry messages are required after RPN null).
		Settings already made will not change.

*   Only the channels assigned to the backing part can be received.
*   Changes the bend range ([PATTERN]-[PART]-[BACKING] Bend Range) for the part. Not indicated in the display.
*   Not recorded in the sequencer.

●**Program Change**

Status	2nd byte
CnH	ppH

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

*   Not Received when [SETUP]-[MIDI]-[PROG] RX Switch is set to "OFF".
*   The sound will change beginning with the next Note-On after the Program Change is received. Voices which were already sounding before the Program Change was received will not be affected.
*   Only the program number set with [SETUP]-[MIDI]-[PROG]-[DRM KIT] is received on the channel assigned to the durm part.
*   Only the program number set with [SETUP]-[MIDI]-[PROG]-[PRC SET] is received on the channel assigned to the percussion part.
*   For more on the channels assigned to backing parts, refer to the "Backing Instrument List" (p. 94) in the Owner's Manual. Specify sounds using a combination of these three messages: the MSB and LSB of the Bank Select, and the Program Change.
*   Not recorded in the sequencer.

●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)

* Only the channels assigned to the backing part can be received.
* When recording, this is recorded in the sequencer data itself.

■Channel Mode Messages

* Following Channel Voice Messages can be received in [SETUP]-[MIDI]-[MIDI CH] Tx/Rx Channel.
* Not received when [SETUP]-[MIDI]-[MIDI CH] Tx/Rx Switch is set to "OFF."

●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 silenced. However, the status of channel messages will not change.
* When recording, this is recorded in the sequencer data itself.

●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)
Modulation	0
Breath Controller	0
Foot Controller	0
Expression	0
General Purpose Controller 1 - 4	0
Hold 1	0 (off)
RPN	unset; previously set data will not change

* When recording, a control message carrying the reset value will be created and recorded.

●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 is ON, the sound will be continued until these are turned off.
* In the recording mode, "Note Off message" will be created for corresponding Note On message, and will be recorded.

●OMNI OFF (Controller number 124)

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

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

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

●OMNI ON (Controller number 125)

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

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

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

●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 Sound Off or All Notes Off is received.

●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 Sound Off or All Notes Off is received.

■System Realtime Message

* Following System Realtime Messages cannot be recorded in recording mode.

●Timing Clock

Status
F8H

* Recognized only when the [TEMPO]-[SYNC] Sync Mode is set at "EXTERNAL" or "AUTO".

●Start

Status
FAH

* Recognized only when the [TEMPO]-[SYNC] Sync Mode is set at "EXTERNAL," "AUTO" or "REMOTE".

●Continue

Status
FBH

* Recognized only when the [TEMPO]-[SYNC] Sync Mode is set at "EXTERNAL," "AUTO" or "REMOTE".

●**Stop**

Status
FCH

* Recognized only when the [TEMPO]-[SYNC] Sync Mode is set at "EXTERNAL," "AUTO" or "REMOTE".

●**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 about 250 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.

■**System Exclusive Message**

* Following System Exclusive Messages cannot be recorded.

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 this device are; Universal Non-realtime System Exclusive Messages and Data Set 1 (DT1).

●**Universal Non-realtime System Exclusive Messages**

○**Identity Request**

Status	Data byte	Status
F0H	7EH, dev, 06H, 01H	F7H

Byte	Explanation
F0H	Exclusive status
7EH	ID number (Universal Non-realtime Message)
dev	Device ID (00H - 1FH (1 - 32), 7FH) Initial value is 10H (17)
06H	Sub ID#1 (General Information)
01H	Sub ID#2 (Identity Request)
F7H	EOX (End Of Exclusive)

* When Identity Request is received, Identity Reply message will be transmitted (p. 9).
* The [SETUP]-[MIDI]-[GLOBAL] Device ID setting is used as the Device ID.

●**Data transmission**

This device can transmit and receive the various parameters using System Exclusive messages.
The Exclusive Message of this device's data has a model ID of 00H 00H 09H and a device ID of 10H (17). Device ID can be changed in this device.

○**Data Set 1DT1**

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, 00H, 00H, 09H, 12H, aaH, bbH, ccH, ddH, eeH,... ffH, sum	F7H

Byte	Explanation
F0H	Exclusive status
41H	ID number (Roland)
dev	Device ID (00H - 1FH (1 - 32), 7FH)) Initial value is 10H (17)
00H	Model ID #1 (TD-12)
00H	Model ID #2 (TD-12)
09H	Model ID #3 (TD-12)
12H	Command ID (DT1)
aaH	Address MSB: upper byte of the starting address of the data to be sent
bbH	Address 2nd: 2nd byte of the starting address of the data to be sent
ccH	Address 3rd: 3rd byte of the starting address of the data to be sent
ddH	Address LSB: lower byte of the starting address of the data to be sent
eeH	Data: the actual data to be sent. Multiple bytes of data are transmitted in order starting from the address.
:	:
ffH	Data
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 listed in 3. Parameter address map (p. 10).
* If "Data Set 1" is transmitted successively, there must be an interval of at least 40 ms.
* The [SETUP]-[MIDI]-[GLOBAL] Device ID setting is used as the Device ID.
* Regarding the checksum please refer to p. 12.

2. Transmit data

* When [SETUP]-[MIDI]-[GLOBAL] Soft Thru is set to "ON", messages received in addition to the following messages are also sent.

■Channel Voice Messages

* The following channel voice messages are transmitted on the channel specified as the [SETUP]-[MIDI]-[MIDI CH] Tx/Rx Channel.
* Not transmitted when [SETUP]-[MIDI]-[MIDI CH] Tx/Rx Switch is set to "OFF."
* When [SETUP]-[MIDI]-[GLOBAL] Local Control is set to anything other than ON(PERC), messages are transmitted over the channel assigned to the drum part when the pad is played. When set to ON(PERC), messages are transmitted over the channel assigned to the percussion part.
* When [INST]-[CONTROL]-[MIDI] Tx Channel is set to anything other than GLOBAL, messages are transmitted over the channels assigned to each pad in the drum kit (when Local Control is set to ON(DRUM)).
* Pressing the Preview switch transmits the same message sent when the corresponding pad is struck.

●Note Off

Status	2nd byte	3rd byte
8nH	kkH	vvH

n = MIDI channel number:	0H - FH (ch.1 - ch.16)
kk = note number:	00H - 7FH (0 - 127)
vv = Note off velocity:	40H (64) fixed

* In the channel assigned to the durm part (or percussion part), after a pad is struck or the hi-hat control pedal is in the foot closed (splash) position, Note Off is transmitted after the interval set in Gate Time([INST]-[CONTROL]-[MIDI] or [INST]-[CONTROL]-[HH MIDI]).
* When a brush sweep is played on the SNARE pad with the [KIT]-[FUNC]-[BRUSH] Brush Switch set to ON, the corresponding note number set by means of [INST]-[CONTROL]-[BR MIDI] Brush Note No. is transmitted over the channel assigned to the drum part.
* When cross sticks are played on the SNARE pad with the [KIT]-[XSTICK] XStick Switch set to ON, the corresponding note number set by means of [INST]-[CONTROL]-[BR MIDI] XStick Note No. is transmitted after the gate time over the channel assigned to the drum part.
* Transmitted only when the device is in play for pattern in which Note Off is recorded.

●Note On

Status	2nd byte	3rd byte
9nH	kkH	vvH

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

* In the channel assigned to the durm part (or percussion part), after a pad is struck or the hi-hat control pedal is in the foot closed (splash) position, the note number set for the drum kit is transmitted.
* When a brush sweep is played on the SNARE pad with the [KIT]-[FUNC]-[BRUSH] Brush Switch set to ON, the corresponding note number set by means of [INST]-[CONTROL]-[BR MIDI] Brush Note No. is transmitted over the channel assigned to the drum part.
* When cross sticks are played on the SNARE pad with the [KIT]-[XSTICK] XStick Switch set to ON, the note number set by means of [INST]-[CONTROL]-[BR MIDI] XStick Note No. is transmitted over the channel assigned to the drum part.
* In the channel assigned to the durm part, the note number transmitted when the hi-hat pad is srtuck (open, closed) switches with the value set with [SETUP]-

[MIDI]-[CTRL] HH Note# Border setting (the Pedal CC Control value) in accordance with the degree to which the hi-hat pedal is pressed.
* Transmitted only when the device is in play for pattern in which Note On is recorded.

●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)

* On the channel assigned to the drum part, 7FH will be transmitted when the rim of the pad is pressed and 00H will be transmitted when the rim is released, for the note number specified for the head and rim. (When using a choking-compatible pad and [TRIGGER]-[BASIC] Trig Type is set to the corresponding pad.)
* Transmitted only when the device is in play for pattern in which Polyphonic Key Pressure is recorded.

●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 (bank.1 - bank.128)
ll = Bank number LSB:	processed as 00H

* Not transmitted when [SETUP]-[MIDI]-[PROG] TX Switch is set to "OFF".
* When a drum kit is selected, the corresponding bank select (00H 00H) is transmitted.
* When a percussion set is selected, the corresponding bank select (00H 00H) is transmitted.
* When instruments are selected for the backing part, bank selects for the respective instruments are sent. Refer to "Backing Instrument List" (p. 94) in the Owner's Manual.
* When a pattern is selected, the corresponding bank select for the instrument in each part is transmitted (except for the drum part).

○Modulation (Controller number 1)

Status	2nd byte	3rd byte
BnH	01H	vvH

n = MIDI channel number:	0H - FH (ch.1 - ch.16)
vv = Control value:	00H - 7FH (0 - 127)
	Pedal position: open to closed
	Head strike position: center to perimeter
	Rim strike position: deep to shallow

* This is transmitted only on the channel which is assigned to the drum part.
* When [SETUP]-[MIDI]-[CTRL] Pedal CC is set to MODULATION, this is transmitted when the hi-hat control pedal is adjusted. When the HI-HAT pad is struck, this is transmitted as a pedal position message before Note On.
* When either [SETUP]-[MIDI]-[CTRL] Snare CC (for the SNARE pad head and rim), Ride CC (for the RIDE pad bow), or Toms CC (for the TOM1-3 and AUX1-2 pad rims) is set to MODULATION, this is transmitted as a striking position message before Note On (when the [INST]-[CONTROL]-[MIDI] Position Ctrl setting is set to ON).
* "Pedal CC message," "Snare CC message," "Ride CC message," "Toms CC message" sequencer data recorded to the TD-12 is transmitted during the performance in accordance with the above settings.

○**Breath Controller (Controller number 2)**

Status	2nd byte	3rd byte
BnH	02H	vvH

n = MIDI channel number:	0H - FH (ch.1 - 16)
vv = Control value:	00H - 7FH (0 - 127)
	Pedal position: open to closed
	Head strike position: center to perimeter
	Rim strike position: deep to shallow

*   This is transmitted only on the channel which is assigned to the drum part.
*   When [SETUP]-[MIDI]-[CTRL] Pedal CC is set to BREATH, this is transmitted when the hi-hat control pedal is adjusted. When the HI-HAT pad is struck, this is transmitted as a pedal position message before Note On.
*   When either [SETUP]-[MIDI]-[CTRL] Snare CC (for the SNARE pad head and rim), Ride CC (for the RIDE pad bow), or Toms CC (for the TOM1-3 and AUX1-2 pad rims) is set to BREATH, this is transmitted as a striking position message before Note On (when the [INST]-[CONTROL]-[MIDI] Position Ctrl setting is set to ON).
*   "Pedal CC message," "Snare CC message," "Ride CC message," "Toms CC message" sequencer data recorded to the TD-12 is transmitted during the performance in accordance with the above settings.

○**Foot Controller (Controller number 4)**

Status	2nd byte	3rd byte
BnH	04H	vvH

n = MIDI channel number:	0H - FH (ch.1 - ch.16)
vv = Control value:	00H - 7FH (0 - 127)
	Pedal position: open to closed
	Head strike position: center to perimeter
	Rim strike position: deep to shallow

*   This is transmitted only on the channel which is assigned to the drum part.
*   When [SETUP]-[MIDI]-[CTRL] Pedal CC is set to FOOT, this is transmitted when the hi-hat control pedal is adjusted. When the HI-HAT pad is struck, this is transmitted as a pedal position message before Note On.
*   When either [SETUP]-[MIDI]-[CTRL] Snare CC (for the SNARE pad head and rim), Ride CC (for the RIDE pad bow), or Toms CC (for the TOM1-3 and AUX1-2 pad rims) is set to FOOT, this is transmitted as a striking position message before Note On (when the [INST]-[CONTROL]-[MIDI] Position Ctrl setting is set to ON).
*   "Pedal CC message," "Snare CC message," "Ride CC message," "Toms CC message" sequencer data recorded to the TD-12 is transmitted during the performance in accordance with the above settings.

○**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 - 16)

mm, ll = the value of the parameter specified by RPN
mm = MSB, ll = LSB

*   This is transmitted only on the channels which are assigned to the backing part.
*   Refer to the RPN item.

○**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)

*   The part volume ([PATTERN]-[PART]-[MIXER]-[VOLUME]) information is transmitted when set.
*   The volume of each part in a pattern is transmitted when the pattern is selected (except for the drum part).

○**Panpot (Controller number 10)**

Status	2nd byte	3rd byte
BnH	0AH	vvH

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

*   This is transmitted only on the channels which are assigned to the backing part.
*   The backing part pan ([PATTERN]-[PART]-[MIXER]-[PAN]) information is transmitted when set.
*   The backing part pan is transmitted when the pattern is selected.

○**Expression (Controller number 11)**

Status	2nd byte	3rd byte
BnH	0BH	vvH

n = MIDI channel number:	0H - FH (ch.1 - 16)
vv = Control value:	00H - 7FH (0 - 127)
	Pedal position: open to closed
	Head strike position: center to perimeter
	Rim strike position: deep to shallow

*   This is transmitted only on the channel which is assigned to the drum part.
*   When [SETUP]-[MIDI]-[CTRL] Pedal CC is set to EXPRESSION, this is transmitted when the hi-hat control pedal is adjusted. When the HI-HAT pad is struck, this is transmitted as a pedal position message before Note On.
*   When either [SETUP]-[MIDI]-[CTRL] Snare CC (for the SNARE pad head and rim), Ride CC (for the RIDE pad bow), or Toms CC (for the TOM1-3 and AUX1-2 pad rims) is set to EXPRESSION, this is transmitted as a striking position message before Note On (when the [INST]-[CONTROL]-[MIDI] Position Ctrl setting is set to ON).
*   "Pedal CC message," "Snare CC message," "Ride CC message," "Toms CC message" sequencer data recorded to the TD-12 is transmitted during the performance in accordance with the above settings.

○**General Purpose Controller 1 (Controller number 16)**

Status	2nd byte	3rd byte
BnH	10H	vvH

n = MIDI channel number:	0H - FH (ch.1 - ch.16)
vv = Control value:	00H - 7FH (0 - 127)
	Pedal position: open to closed
	Head strike position: center to perimeter
	Rim strike position: deep to shallow

*   This is transmitted only on the channel which is assigned to the drum part.
*   When [SETUP]-[MIDI]-[CTRL] Pedal CC is set to GENERAL1, this is transmitted when the hi-hat control pedal is adjusted. When the HI-HAT pad is struck, this is transmitted as a pedal position message before Note On.
*   When either [SETUP]-[MIDI]-[CTRL] Snare CC (for the SNARE pad head and rim), Ride CC (for the RIDE pad bow), or Toms CC (for the TOM1-3 and AUX1-2 pad rims) is set to GENERAL1, this is transmitted as a striking position message before Note On (when the [INST]-[CONTROL]-[MIDI] Position Ctrl setting is set to ON).
*   "Pedal CC message," "Snare CC message," "Ride CC message," "Toms CC message" sequencer data recorded to the TD-12 is transmitted during the performance in accordance with the above settings.

❍General Purpose Controller 2 (Controller number 17)

Status	2nd byte	3rd byte
BnH	11H	vvH

n = MIDI channel number: 0H - FH (ch.1 - ch.16)
vv = Control value: 00H - 7FH (0 - 127)
    Pedal position: open to closed
    Head strike position: center to perimeter
    Rim strike position: deep to shallow

* This is transmitted only on the channel which is assigned to the drum part.
* When [SETUP]-[MIDI]-[CTRL] Pedal CC is set to GENERAL2, this is transmitted when the hi-hat control pedal is adjusted. When the HI-HAT pad is struck, this is transmitted as a pedal position message before Note On.
* When either [SETUP]-[MIDI]-[CTRL] Snare CC (for the SNARE pad head and rim), Ride CC (for the RIDE pad bow), or Toms CC (for the TOM1-3 and AUX1-2 pad rims) is set to GENERAL2, this is transmitted as a striking position message before Note On (when the [INST]-[CONTROL]-[MIDI] Position Ctrl setting is set to ON).
* "Pedal CC message," "Snare CC message," "Ride CC message," "Toms CC message" sequencer data recorded to the TD-12 is transmitted during the performance in accordance with the above settings.

❍General Purpose Controller 3 (Controller number 18)

Status	2nd byte	3rd byte
BnH	12H	vvH

n = MIDI channel number: 0H - FH (ch.1 - ch.16)
vv = Control value: 00H - 7FH (0 - 127)
    Pedal position: open to closed
    Head strike position: center to perimeter
    Rim strike position: deep to shallow

* This is transmitted only on the channel which is assigned to the drum part.
* When [SETUP]-[MIDI]-[CTRL] Pedal CC is set to GENERAL3, this is transmitted when the hi-hat control pedal is adjusted. When the HI-HAT pad is struck, this is transmitted as a pedal position message before Note On.
* When either [SETUP]-[MIDI]-[CTRL] Snare CC (for the SNARE pad head and rim), Ride CC (for the RIDE pad bow), or Toms CC (for the TOM1-3 and AUX1-2 pad rims) is set to GENERAL3, this is transmitted as a striking position message before Note On (when the [INST]-[CONTROL]-[MIDI] Position Ctrl setting is set to ON).
* "Pedal CC message," "Snare CC message," "Ride CC message," "Toms CC message" sequencer data recorded to the TD-12 is transmitted during the performance in accordance with the above settings.

❍General Purpose Controller 4 (Controller number 19)

Status	2nd byte	3rd byte
BnH	13H	vvH

n = MIDI channel number: 0H - FH (ch.1 - ch.16)
vv = Control value: 00H - 7FH (0 - 127)
    Pedal position: open to closed
    Head strike position: center to perimeter
    Rim strike position: deep to shallow

* This is transmitted only on the channel which is assigned to the drum part.
* When [SETUP]-[MIDI]-[CTRL] Pedal CC is set to GENERAL4, this is transmitted when the hi-hat control pedal is adjusted. When the HI-HAT pad is struck, this is transmitted as a pedal position message before Note On.
* When either [SETUP]-[MIDI]-[CTRL] Snare CC (for the SNARE pad head and rim), Ride CC (for the RIDE pad bow), or Toms CC (for the TOM1-3 and AUX1-2 pad rims) is set to GENERAL4, this is transmitted as a striking position message before Note On (when the [INST]-[CONTROL]-[MIDI] Position Ctrl setting is set to ON).
* "Pedal CC message," "Snare CC message," "Ride CC message," "Toms CC message" sequencer data recorded to the TD-12 is transmitted during the performance in accordance with the above settings.

❍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 is transmitted only on the channels which are assigned to the backing part.
* Transmitted only when the device is in play for pattern in which Hold 1 is recorded.

❍Effect 1 Depth(Reverb Send Level) (Controller number 91)

Status	2nd byte	3rd byte
BnH	5BH	vvH

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

* This is transmitted only on the channels which are assigned to the backing part.
* The backing part reverb send level ([PATTERN]-[PART]-[MIXER]-[REV SND]) is transmitted when set.
* The backing part reverb send level is transmitted when the pattern is selected.

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

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

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

This device transmits the following RPNs.

RPN	Data Entry	
MSB, LSB	MSB, LSB	Explanation
00H, 00H	mmH, 00H	Pitch Bend Sensitivity
		mm: 00H - 18H (0 - 24 semitones)
7FH, 7FH	---, ---	RPN null
		mm,ll: ignored
		set condition where RPN is unspecified.

* This is transmitted only on the channels which are assigned to the backing part.
* The backing part bend range ([PATTERN]-[PART]-[BACKING] Bend Range) is transmitted when set.
* The backing part bend range is transmitted when the pattern is selected.

●**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 [SETUP]-[MIDI]-[PROG] TX Switch is set to "OFF".
* When a drum kit is selected, the corresponding program number ([SETUP]-[MIDI]-[PROG]-[DRM KIT]) is transmitted.
* When a percussion set is selected, the corresponding program number ([SETUP]-[MIDI]-[PROG]-[PRC SET]) is transmitted.
* When a backing part instrument is selected, the corresponding program number is transmitted. Refer to the "Backing Instrument List" (p. 94) in the Owner's Manual.
* When a pattern is selected, the program number for the instrument in each part is transmitted (except for the drum part).

●**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 is transmitted only on the channels which are assigned to the backing part.
* Transmitted only when the device is in play for pattern in which Pitch Bend Change is recorded.

■**System Realtime Message**

●**Timing Clock**

Status
F8H

●**Start**

Status
FAH

●**Continue**

Status
FBH

●**Stop**

Status
FCH

●**Active Sensing**

Status
FEH

* This will be transmitted constantly at intervals of approximately 250ms.

■**System exclusive messages**

Identity Reply and Data Set 1 (DT1) are the only System Exclusive messages transmitted by this device.

●**Universal Non-realtime System Exclusive Messages**

○**Identity Reply**

Status	Data byte	Status
F0H	7EH, dev, 06H, 02H, 41H, 09H, 02H, 00H, 00H, 00H, 02H, 00H, 00H	F7H

Byte	Explanation
F0H	Exclusive status
7EH	ID number (Universal Non-realtime Message)
dev	Device ID (00H - 1FH (1 - 32), 7FH) Initial value is 10H (17)
06H	Sub ID#1 (General Information)
02H	Sub ID#2 (Identity Reply)
41H	ID number(Roland)
09H 02H	Device family code
00H 00H	Device family number code
00H 02H 00H 00H	Software revision level
F7H	EOX (End Of Exclusive)

* When Identity Request (p. 5) is received, Identity Reply message will be transmitted.
* The [SETUP]-[MIDI]-[GLOBAL] Device ID setting is used as the Device ID.

●**Data transmission**

○**Data Set 1DT1**

Status	Data byte	Status
F0H	41H, dev, 00H, 00H, 09H, 12H, aaH, bbH, ccH, ddH, eeH,... ffH, sum	F7H

Byte	Explanation
F0H	Exclusive status
41H	ID number (Roland)
dev	Device ID (00H - 1FH (1 - 32), 7FH) Initial value is 10H (17)
00H	Model ID #1 (TD-12)
00H	Model ID #2 (TD-12)
09H	Model ID #3 (TD-12)
12H	Command ID (DT1)
aaH	Address MSB: upper byte of the starting address of the data to be sent
bbH	Address 2nd: 2nd byte of the starting address of the data to be sent
ccH	Address 3rd: 3rd byte of the starting address of the data to be sent
ddH	Address LSB: lower byte of the starting address of the data to be sent
eeH	Data: the actual data to be sent. Multiple bytes of data are transmitted in order starting from the address.
:	:
ffH	Data
sum	Checksum
F7H	EOX (End Of Exclusive)

* When a bulk dump is executed, the corresponding "Data Set (DT1)" message is transmitted.
* 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 listed in 3. Parameter address map (p. 10).
* 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.
* The [SETUP]-[MIDI]-[GLOBAL] Device ID setting is used as the Device ID.
* Regarding the checksum please refer to p. 12.

● V-LINK message

○ V-LINK ON

Transmitted when entering V-LINK mode.

Status	Data byte	Status
F0H	41H, dev, 00H, 51H, 12H,	F7H
	10H, 00H, 00H, 01H,	
	nnH, 10H, 01H, sum	

Byte	Explanation
F0H	Exclusive status
41H	ID number (Roland)
dev	Device ID (00H - 1FH, 7FH (1 - 32, 128)) Initial value is 10H (17)
00H	Model ID #1 (V-LINK)
51H	Model ID #2 (V-LINK)
12H	Command ID (DT1)
10H 00H 00H	Address
01H	V-LINK ON
nnH	Clip Control Rx MIDI Ch. (00H - 0FH (ch.1 - ch.16))
	Initial value is 0FH (ch.16)
10H	Color Control Rx MIDI Ch. (OFF)
01H	Note Message Enabled (ON)
sum	Checksum
F7H	EOX (End of Exclusive)

* Setting [SETUP]-[V-LINK] V-LINK Switch to ON puts the unit in V-LINK mode.
* The [SETUP]-[V-LINK] V-LINK Device ID setting is used as the Device ID.
* The [SETUP]-[V-LINK] V-LINK MIDI Ch setting is used as the Clip Control Rx MIDI Ch.
* Only the Clip Control Rx MIDI Ch address (10H 00H 01H) and data are transmitted when the [SETUP]-[V-LINK] V-LINK MIDI Ch setting is made in V-LINK mode.

○ V-LINK OFF

Transmitted when exiting V-LINK mode.

Status	Data byte	Status
F0H	41H, dev, 00H, 51H, 12H,	F7H
	10H, 00H, 00H, 00H, 70H	

Byte	Explanation
F0H	Exclusive status
41H	ID number (Roland)
dev	Device ID (00H - 1FH, 7FH (1 - 32, 128)) Initial value is 10H (17)
00H	Model ID #1 (V-LINK)
51H	Model ID #2 (V-LINK)
12H	Command ID (DT1)
10H 00H 00H	Address
00H	V-LINK OFF
70H	Checksum
F7H	EOX (End of Exclusive)

* Setting [SETUP]-[V-LINK] V-LINK Switch to OFF causes the unit to exit V-LINK mode.
* The [SETUP]-[V-LINK] V-LINK Device ID setting is used as the Device ID.

3. Parameter address map

This map indicates Address and Parameter which can be transferred using "Data Set 1 (DT1)".
All the numbers of address are indicated in 7-bit Hexadecimal-form.

■ Parameter Address Block

TD-12 (Model ID = 00H 00H 09H)

```
+---------------------------------------------------------------+
| Start                                                         |
|  address     | Description                                    |
+---------------------------------------------------------------+
| 70 00 00 00  | SETUP                          (Bulk)    (*1)  |
+---------------------------------------------------------------+
| 71 00 00 00  | TRIGGER BANK 1                 (Bulk)          |
| 71 01 00 00  | TRIGGER BANK 2                 (Bulk)          |
| 71 02 00 00  | TRIGGER BANK 3                 (Bulk)          |
| 71 03 00 00  | TRIGGER BANK 4                 (Bulk)          |
+---------------------------------------------------------------+
| 72 00 00 00  | DRUM KIT 1                     (Bulk)          |
| 72 01 00 00  | DRUM KIT 2                     (Bulk)          |
|      :       |                                                |
| 72 31 00 00  | DRUM KIT 50                    (Bulk)          |
+---------------------------------------------------------------+
| 73 00 00 00  | PERCUSSION SET 1               (Bulk)          |
| 73 01 00 00  | PERCUSSION SET 2               (Bulk)          |
|      :       |                                                |
| 73 07 00 00  | PERCUSSION SET 8               (Bulk)          |
+---------------------------------------------------------------+
| 74 00 00 00  | PATTERN INFORMATION            (Bulk)    (*2)  |
| 75 00 00 00  | PATTERN DATA                   (Bulk)          |
+---------------------------------------------------------------+
```

*1: Except Device ID and LCD Contrast
*2: User Patterns U151 - U250

4. 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.

* Hexadecimal numbers are indicated by 'H'.

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(1) 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.

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

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

■Examples of actual MIDI message

<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> C9 20

CnH is the Program Change status, and n is the MIDI channel number. Since 9H = 9 and 20H = 32, this is a Program Change message with MIDI CH = 10, program number 33.

<Example 3> E1 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 2.

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

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

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

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

RPN parameter number 00 00H is Pitch Bend Sensitivity, and the MSB of the value indicates semitone units, so a value of 0CH = 12 sets the maximum pitch bend range to ±12 semitones (1 octave). (On this device, 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, 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. 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 generator will then misinterpret the data. Take care to give each event its own status.

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

* TPQN : Ticks Per Quarter Note

<Example 5> 99 2C 7F B9 04 7F 04 40

9n is the Note-on status, and n is the MIDI channel number. BnH is the Control Change status, and n is the MIDI channel number. Thus, the above messages have the following meaning.

99	2C 7F	MIDI ch.10, NOte On message	
B9	04 7F	(MIDI ch.10) foot controller:	7FH
(B9)	04 40	(MIDI ch.10) foot controller:	40H

In other words, with these messages a Note On message with a note number of 44 (G#2) and velocity of 127 is transmitted on MIDI Channel 10, and then the foot controller value is set from 127 to 64.

According to the setting made at the factory, the drum part is assigned to MIDI Channel 10, Note Number 44 is assigned to the pedal hi-hat, and the foot controller is set to Pedal CC; in this case, the TD-12 plays a foot splash when the message is received.

■Calculation of the Checksum of Exclusive Messages

Roland Exclusive messages (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 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, data 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 cc ddH and the data is ee ff gg hhH.

aa + bb + cc + dd + ee + ff + gg + hh = sum

sum ÷ 128 = quotient ... remainder

128 - remainder = checksum

(However, the checksum will be 0 if the remainder is 0.)

PERCUSSION SOUND MODULE (SOUND GENERATOR SECTION)　　　Date : Dec. 17, 2004

Model TD-12　　　**MIDI Implementation Chart**　　　Version : 1.00

Function...		Transmitted	Recognized	Remarks
Basic Channel	Default	1–16, OFF	1–16, OFF	Memorized
	Changed	1–16, OFF	1–16, OFF	
Mode	Default	Mode 3	Mode 3	
	Messages	X	X	
	Altered	**************	**************	
Note Number :		0–127	0–127	
	True Voice	**************	0–127	
Velocity	Note On	O 9nH, v = 1–127	O	
	Note Off	O 8nH, v = 64	O　　　　*4	
After Touch	Key's	O　　　　*3	O　　　　*3	
	Channel's	X	X	
Pitch Bend		X	O　　　　*4	
Control Change	0, 32	O	O　　　　*4	Bank Select
	1	O (Pad, Pedal) *1 *2 *3	O　　*1 *2 *3	Modulation
	2	O (Pad, Pedal) *1 *2 *3	O　　*1 *2 *3	Breath Controller
	4	O (Pad, Pedal) *1 *2 *3	O　　*1 *2 *3	Foot Controller
	6, 38	X	O　　　　*4	Data Entry
	7	X	O	Volume
	10	X	O　　　　*4	Panpot
	11	O (Pad, Pedal) *1 *2 *3	O　　*1 *2 *3	Expression
	16–19	O (Pad, Pedal) *1 *2 *3	O　　*1 *2 *3	General Purpose Controller 1–4
	64	X	O　　　　*4	Hold 1
	91	X	O　　　　*4	Effects 1 (Reverb Send Level)
	100, 101	X	O　　　　*4	RPN LSB, MSB
Program Change		O 0–127　　　*5	O 0–127　　　*5	Program No. 1–128
	: True Number	**************	0–127	
System Exclusive		O	O	
System Common	: Song Position	X	X	
	: Song Select	X	X	
	: Tune Request	X	X	
System Real Time	: Clock	X	O	
	: Commands	X	X	
Aux Messages	: All Sound Off	X	O (120, 126, 127)	
	: Reset All Controllers	X	O	
	: Local On/Off	X	X	
	: All Notes Off	X	O (123–127)	
	: Active Sensing	O	O	
	: System Reset	X	X	
Notes		*1 One is selected as the strike position.　　　　*4 Backing part only.		
		*2 One is selected as the hi-hat control pedal.　　*5 O X is selectable.		
		*3 Drum part only.		

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

PERCUSSION SOUND MODULE (SEQUENCER SECTION)　　　　Date : Dec. 17, 2004

Model TD-12　　**MIDI Implementation Chart**　　Version : 1.00

Function...		Transmitted	Recognized	Remarks
Basic Channel	Default	1–16, OFF	1–16, OFF	Memorized
	Changed	1–16, OFF	1–16, OFF	
Mode	Default	Mode 3	Mode 3	
	Messages	X	X	
	Altered	***************	***************	
Note Number :		0–127	0–127	
	True Voice	***************	0–127	
Velocity	Note On	O 9nH, v = 1–127	O	
	Note Off	O 8nH, v = 64	O	
After Touch	Key's	O　　　　　*3	O　　　　　*3	
	Channel's	X	X	
Pitch Bend		O　　　　　*4	O　　　　　*4	
Control Change	0, 32	O　　　*6 *7	X	Bank Select
	1	O　　　*1 *2 *3	O　　　*1 *2 *3	Modulation
	2	O　　　*1 *2 *3	O　　　*1 *2 *3	Breath Controller
	4	O　　　*1 *2 *3	O　　　*1 *2 *3	Foot Controller
	6, 38	O　　　*4 *6 *7	X	Data Entry
	7	O　　*6 *7 *10	X	Volume
	10	O　　　*4 *6 *7	X	Panpot
	11	O　　　*1 *2 *3	O　　　*1 *2 *3	Expression
	16–19	O　　　*1 *2 *3	O　　　*1 *2 *3	General Purpose Controller 1–4
	64	O　　　*4	O　　　*4	Hold 1
	91	O　　　*4 *6 *7	X	Effects 1 (Reverb Send Level)
	100, 101	O　　　*4 *6 *7	X	RPN LSB, MSB
Program Change	: True Number	O 0–127　*5 *6 *7	X	Program No. 1–128
		***************		
System Exclusive		O	O	Only reception/transmission of Bulk Data.
System Common	: Song Position	X	X	
	: Song Select	X	X	
	: Tune Request	X	X	
System Real Time	: Clock	O	O　　　　　*8	
	: Commands	O	O　　　　　*9	
Aux Messages	: All Sound Off	X	O	
	: Reset All Controllers	X	O	
	: Local On/Off	X	X	
	: All Notes Off	X	O (123–127)	
	: Active Sensing	X	X	
	: System Reset	X	X	
Notes		*1 One is selected as the strike position. *2 One is selected as the hi-hat control pedal. *3 Drum part only. *4 Backing part only. *5 O X is selectable. *6 Transmits when pattern is selected.	*7 Transmits when modified. *8 Receives when Sync Mode setting is "EXTERNAL" or "AUTO." *9 Receives when Sync Mode setting is "EXTERNAL," "AUTO," or "REMOTE." *10 Except drum part.	

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