

SMF Authoring Guideline

For MA-3 Authoring Tool

< SMAF edition >

Ver.1.3.0

2003/8/29

YAMAHA Corporation

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Revision History

Version.	Date	Contents	
1.0.0	11/20/2002	Renewal	
1.1.0	4/25/2003	3.	Description of an object MIDI event was corrected.
		3.1.	Note clause was added for SMF which a note event does not exist at all. Note clause about same channel and note number was added.
		3.3	The description about a program change in music is corrected to a Note clause.
		3.4.1	The Note clause about key control status was deleted.
		4.1	The description about restriction of the simultaneous pronunciation number was added.
		4.3	An item name was changed.
		5.	The other notes were moved to before 6. appendix.
		5.4.	The item about note-on of the same timing in monochrome mode-on is added.
		5.5.	The frequency of a PCM voice which can be pronounced is added.
		5.6.	The item about the recommendation Fs setting value of a PCM voice is added.
		5.7.	The item about key control status is added.
1.2.0	5/14/2003		Only version number was updated.
1.2.1	2003/6/13	5.7	The description about the cautions in the case of creating the voice using the PCM user waveform was added.
		5.8	The description about the total length after conversion was added.
1.3.0	2003/8/29	3.6.6	Channel status designation was added.

1. Outline

This document specifies a guideline for authoring SMF (Standard Midi File) that creates the maximum suitable data of MA-3 required authoring the contents for terminal that carried YAMAHA produced a mobile synthesizer “LSI”.

MA-3 Authoring Tool performs a confirmation of playback by reading SMF in accordance with this document and conversion to carrier format. Operations when reading SMF other than the one described in this document are not guaranteed. Although MIDI sequencer application software for authoring SMF in accordance with this document is not designated, the requirements include the capability of entry of events described here.

2. Notes to Authoring SMF

2.1 SMF format

Please use Standard MIDI File Format 0.

2.2 MIDI Channel

MIDI channels from 1 to 16 can be used.

2.3 Synthesizer mode and the number of pronunciation

MA-3 Authoring Tool has two modes; FM 32 tone mode and FM 16 tone mode. In FM 32 tone mode, up to 32 tones (all of them in 2 operator) as FM synthesizer and up to 8 tones as PCM synthesizer can be used [Total 40 tones], and in FM 16 tones mode, up to 16 tons (4 operator / 2 operator, confusion is possible.) as FM synthesizer and up to 8 voices as PCM synthesizer can be used [Total 24 tones].

Although data can be described with Poly-mode in one MIDI channel, at this point, please be careful about that the maximum number of voices generated simultaneously is not exceeded in all MIDI channels. When voices exceeding the maximum number of tones generated simultaneously are inputted, MA-3 Authoring Tool silences the notes of tones that are generated before by giving priority to the ones that arrived later.

The change in the mode is set up by the preference of the Authoring Tool.

For MA-3 Authoring Tool, when FM 16 tone mode is designated, and bank select MSB is designated as 124 or 125, all of default voices of FM prepared is those in 4 operators.

When FM 32 mode is designated, and bank select MSB is designated as 124 and 125, all of default voices of FM prepared are those in 2 operators. For the voice maps, please refer to the “MA-3 Authoring Tool Users Manual”.

2.4 TEMPO

Only the range of 0x5B8D80 (quarter notes of 10) to 0x00EA60 (quarter notes of 1000) becomes valid for Set Tempo value.

In MA-3 Authoring Tool, it corresponds to the tempo change in music. Conversely, a tempo cannot be changed after MA-3 Authoring Tool takes SMF. When there is no tempo specification, MA-3 Authoring Tool is treated as quarter note = 120.

2.5 Time Base

There is no particular regulation. In MA-3 Authoring Tool, it changes into the event which specifies the time per 1 tick from the time base and the tempo information of SMF.

2.6 Channel Attribution.

As the channel attributes, there are a normal channel and a Drum channel. These attributions can be changed by the bank selects. (For more details, please refer to “Voice List” of MA-3 Authoring Tool Users Manual.) When there is no particular specification by the bank selections, channel 10 is treated as a Drum channel and the other channel as a normal channel.

3. A Subject of *MIDI Event*

MA-3 Authoring Tool covers the following MIDI events, and ignores the other events. In addition, please be sure to insert a note event. The initial-setting value described below shows the default value which MA-3 Authoring Tool treats, when there is no specification in SMF.

3.1 Note On

0x9n kk vv

n: channel number (0x0 to 0xF)

kk: note number (0x00 to 0x72) A of 440 Hz=0x45 (69)

vv: key velocity: it is interpreted as NoteOff when it is "00".

In an applicable channel, the pronunciation in the key of a specification note number is started. When applicable channels are Drum / Stream PCM channel, the keys of note numbers 0 to 12 and 92 to 110 (Decimal) means the pronunciation starting of Stream PCM.

[Note]: Conversion to internal data cannot do SMF in which a note event does not exist at all, and a tool may not operate normally. Please be sure to insert a note event.

[Note]: Some temperaments are different by the program change number. About the corresponding program change number, please refer to the "Voice List term" of MA-3 Authoring Tool Users Manual.

[Note]: When two or more notes are pronounced at the same timing in MA-3, the latter output sound pronounced is delay about 115 μ s compared with the former output sound pronounced. Therefore for example, by the pronunciation of the same timing of the same note, the sound may become worse depending on the frequency to play.

[Note]: In MA-3 Authoring Tool, two or more simultaneous pronunciation of the same note numbers in the same channel guarantees, and it does not become precocious. Pronunciation should not overlap by the same note number in the same channel.

3.2 Note Off

0x8n kk vv

n: channel number (0x0 to 0xF)

kk: note number (0x00 to 0x72) A of 440 Hz=0x45 (69)

vv: Key velocity is ignored.

In an applicable channel, a pronunciation is terminated by the key of a specification note number. When applicable channels are a Drum / Stream PCM channel, the key of the note numbers 0 to 12 and 92 to 110 means the ending a pronunciation of Stream PCM.

3.3 Program Change

0xCn pp

n: channel number (0x0 to 0xF)

pp: program number (0x00 to 0x7F)

Initial setting value: 0x00

The voices of a specification channel are set up. When an applicable channel is set up for a normal channel, it selects voices from designated banks by the bank select. When an applicable channel is set up for a Drum channel, the Drum sets is selected.

Please insert a program change after a bank selection. For the default voice of a Drum bank, the PCM voice and FM voice are intermingled. A user voice can be assigned either FM voice or PCM voice by MA-3 Authoring Tool.

[Note]: About the voice which can be set up by program change, please refer to the “Voice List” of MA-3 Authoring Tool Users Manual.

[Note]: When a program change is performed during pronunciation, the sound under pronunciation may be affected. When a program change is performed in music, please be sure to insert a program change in a time points under pronunciation in the channel concerned.

3.4 Control change

3.4.1 Bank select

0xBn	0x00	aa (MSB)
0xBn	0x20	bb (LSB)

n: channel number (0x0 to 0xF)

aa: MSB value of bank number (0x00 to 0x7F)

bb: LSB value of bank number (0x00 to 0x7F)

Initial setting value: 0x00/0x00

The bank of a specification channel is set up. It is recommended using the bank selection MSB and the bank selection LSB as a set.

Table 1 shows the bank select that is handled by MA-3 Authoring Tool.

MSB	Format	Category	LSB ((Decimal).)												
			0	1	2	3	4	5	6	7	8	9	10	11 - 127	
0	GM1	Normal	Voices built in ROM (Drum for channel 10, and normal for others)												
0-121	No applicable format	-----	Replaced MSB / LSB with 0												
124(122)	MA-3 Native	Normal	Default	User Voice							Built in Rom		Replaced LSB with 0		
125(123)	MA-3 Native	Drum/Stream PCM	User Voice(*)	Replaced LSB with 0											
126, 127	No applicable format	-----	Replaced MSB/LSB with 0												

(*) Program #10 is built-in ROM voices. #11 and after are replaced with 00.

Table 1 Bank select applicability table

In each channel, it becomes a drum channel by specifying a program change after the drum bank is designated. In addition, it becomes a normal channel by specifying a program change after a normal bank is designated. Even though the bank select is received, the voices of present Program change are valid until the next Program change is received.

If there are two or more bank selections, it processes by considering the newest message (in time-axis back) as priority.

[Note]: For MA-3 Authoring Tool, when MSB is 122, it is replaced with 124, or when MSB is 123, it is replaced with 125, so that SMF made for MA-2 can be used.

[Note]: It is decided whether the channel accepts the Key control by the setting of BankSelect.

The channel which uses voices of Normal bank accepts Key control.

The channel which uses voices of Drum bank does not accept Key control.

By specifying Bank MSB 125, an applicable channel turns into a Drum / Stream PCM channel. If a Drum set is changed by program change, an instrument of a Drum will exchange to an instrument which is corresponding to the voice map. As for Stream PCM, the relationship between the note number and Stream Wave ID is to be unique as shown in Table 2. In addition, the maximum number of Stream PCM Wave ID which can be registered into SMAF is till 32.

Note #	Definition	Assign
0	Stream PCM	Stream Wave ID :1
1		Stream Wave ID :2
2		Stream Wave ID :3
:		:
12		Stream Wave ID :13
13	Drum Instrument	No Instrument
14		No Instrument
15		No Instrument
:		:
91		No Instrument
92	Stream PCM	Stream Wave ID :14
93		Stream Wave ID :15
94		Stream Wave ID :16
:		:
110		Stream Wave ID :32

Table 2 Correspondence of Note# of Drum/Stream PCM bank

[Note]: About the voice which can be set up by a bank selection and program change, please refer to “Voice List” of MA-3 Authoring Tool Users Manual.

3.4.2 Modulation depth

0xBn 0x01 vv

n: channel number (0x0 to 0xF)

vv: vibrato value (0x00 to 0x7F)

Initial setting value: 0x00

The depth of the vibrato (LFO pitch modulation) of a specification channel is designated. In table 3, it describes the relation between a vibrato value and the depth. The depth of a vibrato here shows the magnification to the vibrato depth which is set up per a voice.

Vibrato value	Depth of vibrato
0x00	OFF
0x01~0x1F	x 1
0x20~0x3F	x 2
0x40~0x5F	x 4
0x60~0x7F	x 8

Table 3 Relationship between vibrato value and depth

When the applicable channels are Drum / Stream PCM channel, it becomes invalid toward to the note numbers 0 to 12 and 92 to 110 (fixed to 0x00).

3.4.3 Channel volume

0xBn 0x07 vv

n: channel number (0x0 to 0xF)

vv: control value (0x00 to 0x7F)

Initial setting value: 0x64

It sets the volume balance between channels for messages that designates volume of applicable channels.

Formula: $\text{Gain[dB]} = 20 * \log((vv)^2 / 127^2)$

When applicable channels are a Drum / Stream PCM channel, it becomes invalid toward to the note numbers 0 to 12 and 92 to 110.

[Note]: Please set up an individual waveform volume assigned into Stream PCM by velocity.

3.4.4 Panpot

0xBn 0x0A vv

n: channel number (0x0 to 0xF)

vv: control value (0x00 to 0x7F)

Initial setting value: 0x40 (center)

The stereo sounds place a position of the specification channel is designated. Between right ends (vv=0x7F) and left end (vv=0x00) is orientated according to the following formula in the stereo sound place. In addition, when applicable channels are Drum / Stream PCM channel, it is effective toward to the note numbers 0 to 12 and 92 to 110 (decimal)

Formulas : Left Channel Gain[dB] = $20 \cdot \log(\cos(\pi / 2 \cdot (vv) / 127))$

Right Channel Gain[dB] = $20 \cdot \log(\sin(\pi / 2 \cdot (vv) / 127))$

3.4.5 Expression

0xBn 0x0B vv

n: channel number (0x0 to 0xF)

vv: control value (0x00 to 0x7F)

Initial setting value: 0x7F

It designates the change of volume that is set with channel volume of applicable channel. When applicable channels are Drum / Stream PCM channel, it becomes invalid toward to the note numbers 0 to 12 and 92 to 110 (decimal).

[Note]: Although both Channel volume and Expression are used to control the volume, their purposes are different.

The Channel volume is used for mix down with volume of overall music that is set before the playback of music data and the fader. Moreover, the expression is used to adjust the setting of the Channel volume.

Formula: Exp[dB] = $20 \cdot \log((vv)^2 / 127^2)$

3.4.6 Hold 1 (damper)

0xBn 0x40 vv

n: channel number (0x0 to 0xF)

vv: control value (0x00 to 0x7F)

Initial setting value: 0x00

On and off of the damper (Sustain pedal) of an applicable channel is specified. The value sets up ON by 0x00 ~ 0x3F, OFF by 0x40 ~ 7F. When applicable channels are a Drum / Stream PCM channel, it becomes invalid toward to the note numbers 0 to 12 and 92 to 110 (Decimal).

[Note]: Note-off is suspended when note-off is received by damper-on. When a damper changes from ON to OFF, delayed note-off is performed and the volume envelope shifts to a release.

3.4.7 Data entry

0xBn 0x06 aa (MSB)

0xBn 0x26 bb (LSB)

n: channel number(0x0 to 0xF)

aa: MSB of data value (0x00 to 0x7F)

bb: LSB of data value (0x00 to 0x7F)

Initial setting value: 0x00/0x00

It is used for the input the PRN value (MSB/LSB). Please refer to a “RPN clause” for more details.

3.4.8 RPN

0xBn 0x64 aa (LSB)

0xBn 0x65 bb (MSB)

n: channel number (0x0 to 0xF)

aa: LSB of parameter number (0x00 to 0x7F)

bb: MSB of parameter number (0x00 to 0x7F)

Initial setting value: 0x7F/0x7F

It is used for specification of the parameter number of RPN.

3.4.8.1 0x00/0x00: Pitch bend sensitivity

0xBn 0x64 0x00 / 0xBn 0x65 0x00 (RPN parameter designation)

0xBn 0x06 aa / 0xBn 0x26 bb (data entry)

- n: channel number (0x0 to 0xF)
aa: MSB of data value (0x00 to 0x18)
bb: LSB of data value (fixed to 0x00)

Initial setting value: 0x02/0x00 2 semitones

A sensitivity set up of pitch bend is performed. MSB of data entry shows the sensitivity in semitone, and LSB of data entry shows the sensitivity in cents unit. For example, it becomes ± 1 semitone (Overall range of change is 2 semitones) at the time of MSB=0x01 and LSB=0x00.

3.4.9 All sound off

0xBn 0x78 0x00

- n: channel number (0x0 to 0xF)

All of the voices which are under the pronunciation are immediately muffled by the applicable channel after the specification of this message. It is effective also to the note numbers 0 to 12 and 92 to 110 (Decimal) in case applicable channels are Drum / Stream PCM channel.

3.4.10 Reset all controller

0xBn 0x79 0x00

n: channel number (0x0 to 0xF)

After specifying this message according to table 4, a controller is re-set to an initial value.

Table 4: Initial value of Reset all controller

Controller	Name	Value
0x01	Modulation	0x00 (OFF)
0x0B	Expression	0x7F(MAX)
0x40	Hold1	0x00(OFF)
0x64	RPN LSB	0x7F (NULL)
0x65	RPN MSB	0x7F (NULL)
-	Pitch Bend	MSB 0x40/LSB 0x00
-	Key Velocity	0x40

Program change, bank selection, channel volume, and a pan are not re-set.

[Note]: Please place the Reset all controller message before the Start Point.

The RPN LSB/MSB may not be reset if the Reset all controller message was used in music.

3.4.11 All NoteOff

0xBn 0x7B 0x00

n: channel number (0x0 to 0xF)

All of the voices which are under the pronunciation are turned off by the applicable channel. It is effective also to the note numbers 0 to12 and 92 to 110 (decimal) in case of the applicable channels are Drum / Stream PCM channel.

3.4.12 Mono mode on

0xBn 0x7E 0x01

n: channel number (0x0 to 0xF)

An applicable channel is changed to mono mode. This message is invalid when applicable channels are Drum / Stream PCM channel. Mode change in music is prohibited. When a channel is in mono mode, notes of poly are subjected to slur (legato) processing. When a note tone of the first tone in the slur processing is silenced by DVA, an attack can be attached (retrigger) to the note of the second tone.

3.4.13 Poly-mode on

0xBn 0x7F 0x00

n: channel number (0x0 to 0xF)

An applicable channel is changed to the poly mode. Mode change in music is prohibited. Drum / Stream PCM channel are not concerned with the existence of this message, but it is always pronounced in the poly mode.

3.5 Pitch bend

0xEn ll mm

n: channel number (0x0 to 0xF)

ll: LSB of bend value (0x00 to 0x7F)

mm: MSB of bend value (0x00 to 0x7F)

Initial setting value: 0x00/0x40 (center)

The pitch of an applicable channel is changed up and down. The initial value of change width (pitch bend sensitivity) is ± 2 semitone. Down pitch bend serves as the maximum by 0x00 / 0x00. Above pitch bend becomes the maximum by 0x7F/0x7F. Pitch bend sensitivity can be set up by 0x00 / 0x00 of RPN. It becomes invalid to the note numbers 0 to 12 and 92 to 110 (Decimal).) In case of an applicable channel is Drum / Stream PCM channel.

3.6 Meta events

3.6.1 Tempo

0xFF 0x51 0x03 aa bb cc

aa bb cc: length of quarter notes (μ sec)

MA-3 Authoring Tool corresponds to a tempo change in music. The tempo change specified to be arbitrary positions is interpreted.

3.6.2 Text

0xFF 0x01 len text

len : no. of bytes of text (variable length presentation)

text: text data

In this meta-event, a music name, a composer, a songwriter, an arrangement person, a player, and a song person can be inputted by describing XF information header (referring to <appendix>). This events is changed to each information on “Optional Data Chunk of SMAF/MA-3” in MA-3 Authoring Tool. It is defined by XF information header (control signs, such as ", and "[", "/", are displayed as a character as they are by MA-3 Authoring Tool.)

3.6.3 Copyright Display

0xFF 0x02 len text

len : no. of bytes of text (variable length presentation)

text: text data

A copyright can be inputted by describing the copyright information. This event is changed into the copyright of “Optional Data Chunk of SMAF/MA-3” in MA-3 Authoring Tool.

3.6.4 CuePoint

0xFF 0x07 0x05 0x53 0x54 0x41 0x52 0x54 (START)

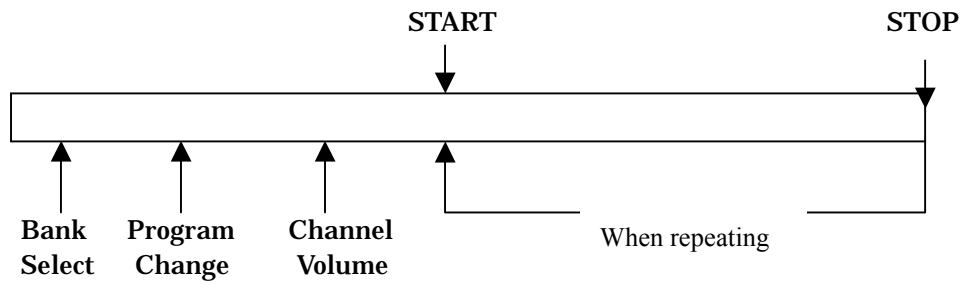
0xFF 0x07 0x04 0x53 0x54 0x4F 0x50 (STOP)

The performance starting position and the end position are described as CuePoint of a meta-event. This event is changed into Start Point and Stop Point of SMAF/MA-3 in MA-3 Authoring Tool.

4th to 8th bytes of START (0x53, 0x54, 0x41, 0x52 and 0x54) mean “START” (capital letters) in ASCII.

4th to 7th bytes of STOP (0x53, 0x54, 0x4F and 0x50) mean “STOP” (capital letters) in ASCII.

Please insert “START” in the first note-on, and this position or the position before it, and insert STOP in the position after the last Note-off. Moreover, into music, please carry out “START” and “STOP” all the time and insert them in a pair.



As shown in the above figure, when “START” is inserted after the control message, these control messages are read also at the time of “Repeating”.

3.6.5 XF cue point

0xFF 0x7F 0x04 0x43 0x7B 0x02 rr

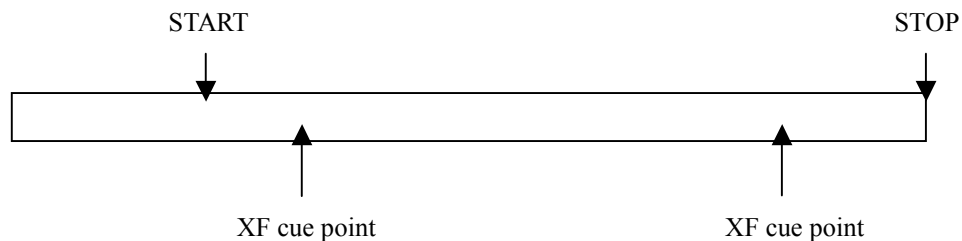
rr : Rehearsal Mark

By describing the rehearsal mark (referring to <appendix>) defined by XF format, loop playback of those sections can be carried out on MA-3 Authoring Tool at the time of playback. In addition, the interpretation of a rehearsal mark is usually disregarded depending on a terminal. This event is changed into Phrase List of SMAF/MA-3 in MA-3 Authoring Tool. Refer to the following table for conversion correspondence.

Table 5 Correspondence table of a rehearsal mark and Phrase List

XF Rehearsal Mark	Loop setting
Intro	Introduction (PI)
Ending	Ending (PE)
A	Melody A (PA)
B	Melody B(PB)
C	Sabi (PS)
D	Interlude (PK)
E	Refrain (PR)

Please insert in an insertion position of this meta-event to become between “START” and “STOP” of a cue point (3.6.4th clause) in time.



3.6.6 Channel status designation

0xFF 0x7F 0x14 0x43 0x02 0x00 0x04 ch1 ch2 ... ch16

ch1: VS/LED setting value of channel 1

ch2: VS/LED setting value of channel 2

:

ch16: VS/LED setting value of channel 16

Table 6 Channel status setting value

Setting value	VS	LED
0x00	OFF	OFF
0x01	OFF	ON
0x02	ON	OFF
0x03	ON	ON

It designates channel status information. VS and LED setting of channel 1 to 16 are designated according to Table 6.

3.7 Universal system exclusive message

3.7.1 Master volume

Message	Contents
0xF0 0x7F	Universal real time exclusive header
<device ID>	ID of unit that becomes target (0x7F:ALL)
0x04	Sub-ID number #1
0x01	Sub-ID number #2
ll	Master Volume LSB
mm	Master Volume MSB
0xF7	EOX

Initial setting value: 0x64(100)

A volume setup of the sound source output last stage is performed. The clause “ll” is disregarded.

Formula: $\text{Gain[dB]} = 20 \cdot \log((\text{Data})^2 / 127^2)$

[Note]: The volume control of the final contents is recommended to raises up till the maximum level which is not clipped.

[Note]: When there is no setup of the master volume in SMF, a Master Volume value is set up by Master Volume set up of Preference of a development tool as follows.

- When a default is set up, a master volume value "100 (decimal)" is set as the "MV" column of a volume bar, and the head of data at the time of Import/Reload of SMF.
- When 0 to 127 (decimal) are set up, set this value as the "MV" column of a volume bar, and the head of data at the time of Import of SMF. At the time of Reload, the value of the "MV" column of a volume bar is set as a data (the value which the user set up is held).

3.8 Classified system exclusive message

It performs the definition of items such as voice setting and waveform setting specific to each device exclusively.

3.8.1 MA-3 Stream PCM pair

0xF0 0x43 0x79 0x06 0x7F 0x08 CL No1 No2 0xF7

CL: Pair designation (0x00), pair cancellation (0x01)

No1: WaveID 1 (0x01 to 0x20)

No2: WaveID 2 (0x01 to 0x20)

It designates WaveID 1 and WaveID 2 as a pair with CL=0x00. After receiving this message, both the tone generations can be controlled with NoteOn/Off of either one. At this time, the time of generation of the two tones are guaranteed to be simultaneous.

The pair of WaveID 1 and WaveID can be cancelled by designating 0x01 to CL.

[Note]: This message is not canceled until it will transmit a pair release or MA-3 native reset, once it carries out a pair setup. Cautions are required, when verifying using a MIDI sequencer by MA-3 Authoring Tool , and music is especially changed.

3.8.2 MA-3 Stream PCM wave Panpot

0xF0 0x43 0x79 0x06 0x7F 0x0B ID CL data 0xF7

ID: WaveID (0x1 to 0x20)

CL: Panpot designation (0x00), clear (0x01), pan off (0x02)

data: Panpot value (0x00 to 0x7F)

The Panpot of the corresponding Stream PCM waveform is specified. data=0x00 shows a left end and 0x7F shows a right end.

Reception of this message makes the channel Panpot void. (Waveforms that are not designated by this message uses the setting of channel Panpot) After receiving this message, wave Panpot designation is given priority only when clear is issued with this message.

By designating 0x01 for CL, all of wave Panpot settings that have been received are returned to channel Panpot. Moreover, by specifying 0x02 to CL, turns OFF pan pot assignment and pronounces by 0dB.

3.8.3. MA-3 user event

0xF0 0x43 0x79 0x06 0x7F 0x10 Data 0xF7

Data: User event classification (0x00 to 0x0F)

The interruption position on a sequence can be specified. A user can set up 16 kinds of events and this event is used in applications, such as JAVA and a game. Moreover, this event does not affect the music play.

[Note]: When specifies user event, specify after interval more than 100 m sec surely from the front user event. If don't do it, it may not operate normally.

4 Notes on setting Stream PCM

4.1 Maximum number of voices generated

The number of the maximum pronunciation of Stream PCM is specified by MA-3 Authoring Tool (Preference "Stream PCM Reserve"). Although there is total 8176 bytes of RAM area of MA-3, 1024 bytes is consumed by one. For example, 2048 bytes will be consumed if it specifies with the two numbers of the maximum pronunciation. In addition, the stream which can be pronounced simultaneously by MA-3 is two or less. The simultaneous pronunciation of three or more streams has not guaranteed. Please make sure to set up the stream of simultaneous pronunciation becomes less than two.

4.2 Panpot

As means for setting Panpot in Stream PCM, two methods are available; setting it with channel Panpot by using control change and setting it with MA-3 Stream PCM wave Panpot.

When the former method is used, for example, when two Stream PCMs exist in one channel at the same time, Panpot with the same value is set in both of them. When the instrumental sound of Drum exists in an applicable channel, this is also set in the Panpot with the same value. When Panpot of only one Stream PCM is set at the same time, it is necessary to assign one Stream PCM to one channel. At this time, Panpot can be changed during generation of voices (between NoteOn and NoteOff).

When the latter method is used, even when, for example, two Stream PCMs exist in one channel at the same time, Panpot can be set for the Stream PCMs individual. It can be set individually even if instrumental sound of Drum exists. At this time, change of Panpot is prohibited during generation of voices (between NoteOn and NoteOff).

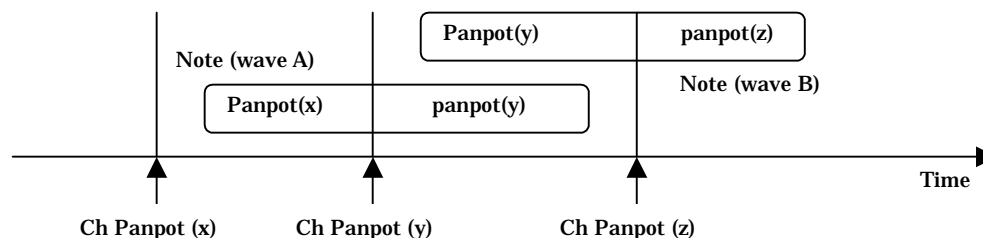


Figure 1 Setting with channel Panpot

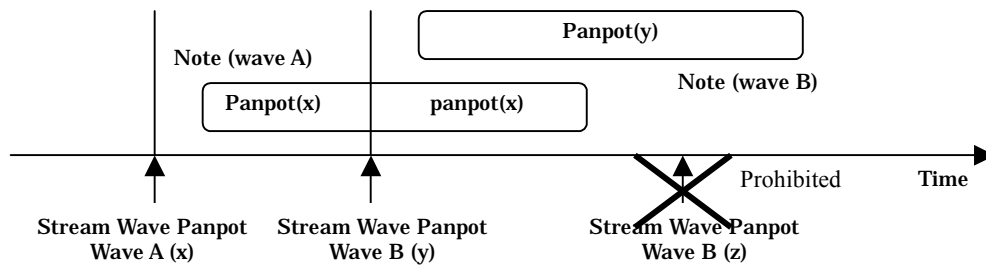


Figure 2 Setting with MA-3 Stream PCM wave Panpot

4.3 Limit of sampling frequency (Fs)

Since the number of maximum Stream PCM unit bytes (the number of following unit bytes) has made 8 K byte/s the maximum, please create the sampling frequency of a sound file to fit in less than this. In the MA-3 Authoring Tool, restriction is applied so that the number of unit bytes cannot save 8 or more K byte/s.

The unit bytes number of 4bit ADPCM waveform [kByte/s] ← Sampling frequency Fs [kHz]÷2

The unit bytes number of 8bit PCM waveform [kByte/s] ← Sampling frequency Fs [kHz]

In the example of Fig. 3, in the time zone when playback of two waveforms has overlapped, it cannot be saved since it becomes 9 [kByte/s].

[Example] When using ADPCM of FS=6kHz and PCM of FS=6kHz

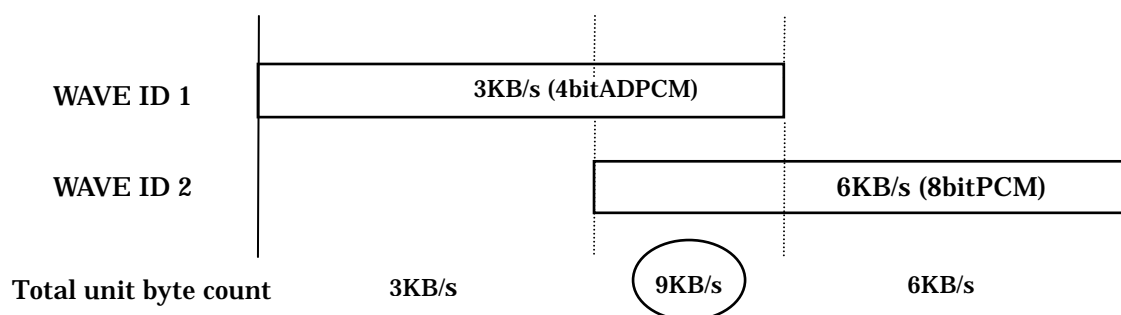


Figure 3 The calculation example of the maximum Stream PCM unit byte count

4.4 About 8 Bit PCM

A noise may occur when using 8 bit PCM for sound file. Be sure to check sound quality by playing actual sound on the MA-3 Authoring Tool.

5 Other notes

5.1 Vibration and LED

In MA-3 Authoring Tool, vibration and LED are controllable per channels.

We recommend you to use this function at channel which note is not pronounced more moderately than channel which note is always pronounced. In addition, please create the track which inputted only the specified note to use this vibration and LED effectively especially (For example, the track of only the high hat portion of Drum).

About vibration, when the gate time of the note of synchronous assignment channel is short, the effect may be unable to be seen. Moreover when the interval of note and note is short, it may be unable to check that the swing has stopped. These are based on the response characteristic of the vibrating motor. The length of gate time and the interval of notes should be set up in consideration of this.

Please check the operation of vibration and LED by actual playback.

5.2 Volume specification and a note event

In MA-3 Authoring Tool, please do not set a note event as same time of the volume specification. A noise may occur or the attack of sound may be lost. In order to avoid this problem, after the volume specification should vacate the time of 22 msec or more, and then set a note event. The message of volume specification which becomes a subject is Master volume, Channel volume, Expression, and Panpot. When especially volume change is large, it becomes easy to generate this problem.

5.3 Mono mode-On and maximum simultaneous pronunciation number limitation

Since the number of pronunciation may decrease if the number of the maximum simultaneous pronunciation is exceeded when there is a mono mode-on use channel, such contents have been controlled so that it cannot save by MA-3 Authoring Tool. When the corresponding error message outputs, in SMF, it is correcting sequence data so that the number of the maximum simultaneous pronunciation may not be exceeded not using mono mode, and please avoid.

5.4 Note-On of the same timing in Mono mode-On

Please do not put two or more note-on on the same timing (DURATION =0) by the mono mode-on use channel. Although the note which it has on the back is pronounced by the mono mode-on use channel when the same timing has two or more note-on, volume may have gone up to a total level.

5.5 Frequency of a PCM voice which can be pronounced

The pronunciation frequency range of a PCM voice is 1.5kHz to 48kHz. Please do not carry out the pronunciation out of this range. When the frequency which reflected a pronunciation key, pitch bend, and LFO in Fs (frequency when flipping NoteNo.60 (C key)) exceeds this range, it processes as follows.

By the pronunciation key

- When becoming smaller than 1.5kHz : It is set to 1.5kHz.
- When becoming larger than 48kHz : It is set to 48kHz.

By pitch bend or LFO

- When becoming smaller than 1.5kHz: 1.5kHz or less is pronounced.
- When becoming larger than 48kHz : It becomes an unexpected value (since a folding occurs).

5.6 The recommended Fs setting value of a PCM voice

If it uses for Fs of a PCM voice except the value of the following table "List of the recommended Fs setting value", gap may arise in a pitch.

Please set up Fs value of the following table.

[List of the recommended Fs setting value] (unit Hz)

4125	10125	16125	22125	28125	34125	40125	46125
4500	10500	16500	22500	28500	34500	40500	46500
4875	10875	16875	22875	28875	34875	40875	46875
5250	11250	17250	23250	29250	35250	41250	47250
5625	11625	17625	23625	29625	35625	41625	47625
6000	12000	18000	24000	30000	36000	42000	48000
6375	12375	18375	24375	30375	36375	42375	
6750	12750	18750	24750	30750	36750	42750	
7125	13125	19125	25125	31125	37125	43125	
7500	13500	19500	25500	31500	37500	43500	
7875	13875	19875	25875	31875	37875	43875	
8250	14250	20250	26250	32250	38250	44250	
8625	14625	20625	26625	32625	38625	44625	
9000	15000	21000	27000	33000	39000	45000	
9375	15375	21375	27375	33375	39375	45375	
9750	15750	21750	27750	33750	39750	45750	

5.7 Caution in the case of creating the voice using the PCM user waveform

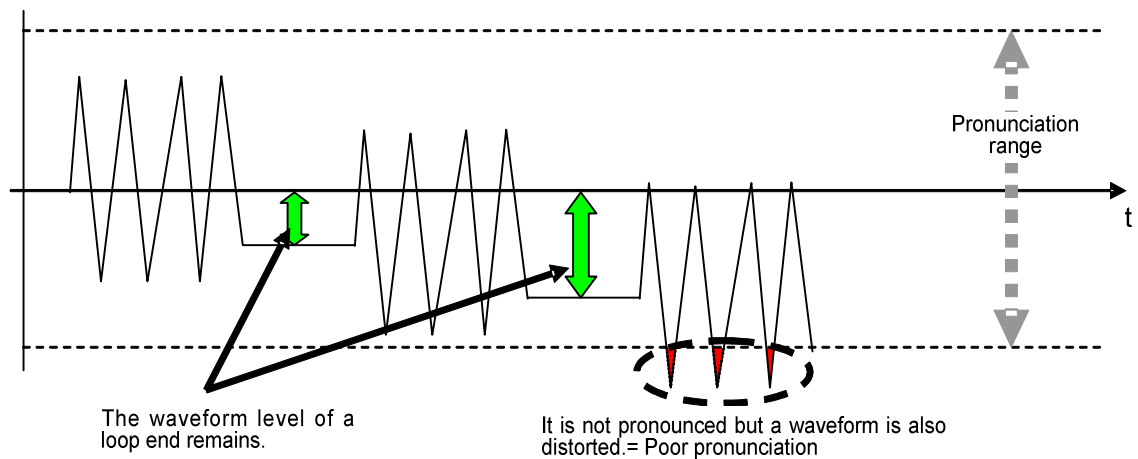
When you create the voice using the PCM user waveform, be careful of below according to the specification of MA-5 hardware

When there is no waveform loop (a loop point and a loop end are the same value), the waveform value is read continuously according to the specification of MA-5 hardware in the place where read-out of a waveform reached the loop end.

Therefore, if a voice parameter is set as “XOF = 1 and SR = 0 (or setup with long decay time)”, or “XOF = 0 and RR = 0 (or setup with long decay time)”, this value will be maintained continuously after note-off also.

In this state, when many note-on of big volume overlaps, sound becomes easy to be distorted.

Moreover, if the voice of such a waveform is pronounced repeatedly, the value maintained after note-off also becomes large by the number of pronounced times, and becomes easy to be distorted much more.



In order to prevent such a condition, we recommend you to set the waveform level at loop end as "0", or to adjust a envelope so that pronunciation may be completed before a loop end.

Please create PCM voice according to Table 6.

With/Without waveform loop	What voice	waveform level at loop end	XOF	DR	SR	RR	SUS	Comment
None	One shot or Chunk	0	free	free	free	free	free	No problem occurs.
		not 0	on	not 0	not 0	free	off	A problem may occur. Please adjust DR and SR so that pronunciation is completed before a loop end.
			off	free	free	not 0 Shorter is better.	off	A problem may occur. Please adjust RR so that pronunciation is completed before a loop end.
	Sustaining	0	off	free	0	not 0	free	No problem occurs.
		not 0	off	free	0	not 0	free	No problem occurs.
	With loop Decaying	0	free	free	free	free	free	No problem occurs.
		not 0	free	free	free	free	free	No problem occurs.

free : You may do any setup.

Table 4 PCM voice authoring guideline

5.8 Total length after conversion

When total length becomes below 20msec, it is not converted to SMAF as an error.

Please be sure to create a SMF so that total length exceeds 20msec.

5.9 Key control status

The key control status of the channel concerned sets to "OFF" on condition that either of the followings.

1. The value of the existing bank selection MSB is "0x7D (125)", and a program change exists after it.
2. In channel 0x09 (Channel 10), the bank selection MSB of "0x7C (124)" (or "0x7A (122)") does not exist.
3. A note event does not exist.

These judge it as a Drum / Stream PCM channel in MA-3 Authoring Tool. By the other channel, key control status becomes "non-appointed."

6 Supplement

6.1 XF information header (by language)

The feature of music and information on an attribute are set up in the form of the text meta-event under format of SMF.

0xFF 01 len <text>

The information items are divided by an 8 bit colon, “:”, and listed.

No data is placed in the information items that are not described.

New items are to be added after the last item. When no text exists, the processing system places blanks in the following information items even when an 8 bit colon is not found.

The first two of information items and various control codes are described with ASCII.

The following sections describe XF Information Header -- Language Specific that uses Japanese.

6.1.1 Information clause

6.1.1.1 XF Information Header -- Language Specific -- ID XF information header (by language)ID

XF Information Header -- ID indicating Language Specific (4 characters) "XFln"

6.1.1.2 Language

It is the information which specifies the code system of the character used by XF information header. (according to language). The character code system used for words is not specified. The character code system of words is specified by XF words header. The work ground of a musical piece is not expressed. Only the following languages are supported in an authoring tool.

Symbol	Character code	Applicable languages
L1	Latin 1(ASCII(7bit) + ISO 8859-1)	English, French, German, Italian, Spanish, Portuguese, etc.
JP	Shift-JIS	Japanese
KR	EUC-KR	Korean

6.1.1.3. Song Name

Expression of time by language.

When using two or more lines to express a title, place an 8 bit slush, "/", in the place a linefeed is to be made.

6.1.1.4 Composer

The name of composer of the original music

Divide the family name and given name with an 8 bit space, " ".

When two or more composers are written, divide them with an 8 bit slush, "/".

6.1.1.5 Lyricist (Lyric writer)

When words are in the original melody, it is the songwriter name.

A format is the same as a composer.

6.1.1.6 Arranger (Editor)

The name of the person who arranged the original music or music data.

The format is the same as the one for the composer.

6.1.1.7 Performer (Player / Singer)

The name of the person or the group of persons who plays or sings original music.

The format is the same as the one for the composer.

6.1.1.8 Programmer (Author of music data)

The name of the person who created a musical piece data

The format is the same as the one for the composer.

6.2 XF rehearsal mark

For XF format, rehearsal marks are defined as the style message as described below.

FF 7F 04 43 7B 02 rr Rehearsal Mark

rr Rehearsal Mark 0yyyxxxx

Lower 4 bits (xxxx)

0: Intro

1: Ending

2: Fill-in

3: A

4: B

:

15: M

Upper 3 bits (yyy)

0-7: individual variation

1 : it is ' A', B' , etc.

2 : it is " A", B" , etc.

Used for designation of an end of the so-called individual sections.

It is placed in between measures.

Music that does not have some rehearsal marks may exist.

The number of measure placed between rehearsal marks can be determined arbitrarily.