

Contents Authoring Guideline

For MA-3 Authoring Tool

< SMAF edition >

Version 1.6.0

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YAMAHA Corporation

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Revision History

Ver.	Date	Description
1.0.0	2002/11/20	Renewal
1.1.0	2003/4/25	Revision history was omitted.
1.2.0	2003/5/14	
1.2.1	2003/6/13	
1.3.0	2002/8/29	
1.4.0	2003/12/22	<p>Document name was changed to “Contents Authoring Guideline”.</p> <ol style="list-style-type: none"> 1. Comparison table between hexadecimal and decimal numbers was added. In its entirety, “H” was added to all MIDI messages described with hex-decimals In the explanation about a value of MIDI messages, hexadecimal numbers were added in addition to the decimal numbers as an adscription. The numerical value of an explanatory note was unified into the number notation of decimal numbers.. 2.1 SMF Format 1 was added. 2.5 The description about time base was added. 3.1 The description about Note inserting of Stream PCM Edit View was added. 3.3 The description about Note inserting of Stream PCM Edit View was added. 3.4.1 Bank select applicability table was changed. 14-bit notation value table was added. Description about the note insertion by Stream PCM Edit View was added. 3.4.8.1 [Note] about Pitch bend sensitivity MSB=0 was added. 3.4.12 [Note] was corrected. 4.1 Explanation about the number of the maximum pronunciation was corrected. 4.3 Clerical error about the restriction of the unit bytes number 8 K byte/s was corrected. 5.7 Note and supplementary explanation were added. 5.9 Total Size after a Conversion was added. 5.11. The description about operation under tool playback was added.
1.4.1	2004/01/16	<p>“2003” in Copyright description was changed to “2004”.</p> <ol style="list-style-type: none"> 3.7.1 Hexadecimal Master Volume was changed to decimal. 5.10 Description of Key Control Status was changed.
1.5.3	2004/10/29	<ol style="list-style-type: none"> 3.3 Description about Program Change under generating sound. [Note] was deleted. 3.4.1 Clerical error in Table 2 of Bank Select was corrected. 3.4.7 Note about NRPN of Data Entry was added. 3.7.1 Clerical error of Master volume was corrected. 5.2 Descriptions which relates with volume designation, note-event, and Start Point were newly added.
1.6.0	2005/09/14	<ol style="list-style-type: none"> 3.3 Program Change Note about Program Change under generating sound was deleted. 3.6.7 Karaoke Guide channel designation was added. 3.6.8 Karaoke Guide Scoring Section designation was added.

1. Outline

This document stipulates a guideline in order to create SMF (Standard Midi File) that can pull out the performance of Yamaha's synthesizer LSI, MA-3 to the maximum extent when authoring the contents for terminals equipped with MA-3 by using MA-3 authoring tool. Moreover, this document describes the point which should be careful.

MA-3 authoring tool guarantees normal operation in the playback check and the conversion to career format in the case of using SMF only with the MIDI event indicated by this document. (In the case of reading SMF containing the MIDI event which is not described in this document, the operations 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.

[Note] About the numerical notation

In this documentation, the data values are described using decimal numbers and hexadecimal numbers. In the case of using hexadecimal numbers, a letter "H" (Hexadecimal) follows the numerical value. Moreover, "n" expresses the arbitrary integers. When you input a data value, refer to the following table 1.

Table 1 Comparison between Decimal numbers and Hexadecimal numbers

Decimal	Hex	Decimal	Hex	Decimal	Hex	Decimal	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

2. Notes on Authoring SMF

2.1. SMF Format

Use Standard MIDI File Format 0 or Format 1.

2.2. MIDI Channels

MIDI channels from 1 to 16 are available.

2.3. Synthesizer Mode and 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 16 tone mode, up to 16 tones (all of them in 4 operator) as FM synthesizer and up to 8 tones as PCM synthesizer can be used [Total 24 tones]. Although data can be described with poly-mode in one MIDI channel, be careful that the maximum number of tones generated simultaneously is not exceeded in all MIDI channels. When tones exceeding the maximum number of tones generated simultaneously are inputted, MA-3 Authoring Tool silences notes of tones that are generated before by giving priority to the ones that arrives later.

Mode change is set by using preference of the Authoring Tool.

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

When FM 32 Tone mode is designated, and bank select MSB is designated as 124,125, all of default voices of FM prepared are those in 2 operator. For the voice maps, refer to attached document.

2.4. Temp

Only the range of 5BH 8DH 80H (quarter notes of 10) to 00H EAH 60H (quarter notes of 1000) becomes valid for Set Tempo value. It corresponds with tempo changes in music.

Tempo cannot be changed after MA-3 Authoring Tool takes SMF. When tempo is not designated, MA-3 Authoring Tool treats quarter notes as 120.

2.5. Time Base

There is no particular regulation in Time-Base. For MA-3 Authoring Tool, time base and tempo information of SMF are converted to an event that defines time per one tick.

Moreover, when converting to SMAF, one of time base values can be selected from 4/5/10/20msec.

2.6. Channel Attribute

As the Channel attribution, both normal channels and drum channels are provided. These attributes can be changed by a bank select (refer to the Voice List in MA-3 Authoring Tool Users Manual).

When there is no designation with bank select specifically, the channel 10 is treated as a drum channel, and other channels are treated as a normal channel.

3. *Applicable MIDI Events*

MA-3 Authoring Tool is directed to the following MIDI events; in addition, it ignores the other than events. Meanwhile, be sure to insert the Note-event on it. The following description shows a default values used by MA-3 Authoring Tool when there is no specification in SMF.

3.1. NoteOn

9nH kkH vvH

- n: channel number 0 to 15 (0H to FH)
 kk: note number 0 to 114 (00H to 72H) 44Hz of A=69 (45H)
 vv: key velocity: Interpreted as NoteOff when this is "0".

Starting a sound generation with key of the specified note-numbers in an applicable channel. When an applicable channel is drum/stream PCM channels, the keys of note numbers 0 to 12 and 92 to 110 indicates the starting of stream PCM tones.

In addition, Note-event of Stream PCM can also be inserted from the authoring tool (Stream PCM Edit View of Piano Roll window).

- [Note] SMF with no Note-event cannot be converted into an internal data, and it might cause an abnormal operation of tool. Be sure to insert a Note-event in it.
- [Note] There are some temperaments which differ by program change numbers. For the details about the corresponding program change numbers, refer to the "VoiceList" in the "MA-3 Development User's Manual".
- [Note] In MA-3, when more than two Notes are generated as an identical timing, the outputted voices generated latterly are delayed about 115μs from the one in front. For the reasons, the generation in an identical timing of identical note, it has a possibility to be level downed by the frequency of playback.
- [Note] In MA-3 Authoring Tool, the simultaneous sound generations of the multiple identical note numbers in identical channels are not guaranteed.

3.2. NoteOff

8nH kkH vvH

- n: channel number 0 to 15 (0H to FH)
 kk: note number 0 to 114 (00H to 72H) 440Hz of A=69 (45H)
 vv: Key velocity is ignored.

Terminating a sound generation with keys of designated note numbers in applicable channels. When an applicable channel is drum/stream PCM channel, the keys of note numbers 0 to 12 and 92 to 110 indicates the ending of stream PCM tones.

3.3. Program Change

CnH ppH

n: channel number 0 to 15 (0H to FH)

pp: program number 0 to 127 (00H to 7FH)

Initial setting value: 0

Setting voices of designated channels.

When applicable channels are set as normal channels, voices are selected from the bank which is specified by bank select. In addition, when an applicable channel is designated to the drum channels, it selects a drum set.

Be sure to insert a program change after a bank select. Program change in the middle of music, it is not accepted when applicable channel is generating sound. Be sure to insert the program change into unsounded time point.

The default value of the drum banks includes a mixture of PCM voices and FM voices.

By the MA-3 Authoring Tool, the user's voice can be assigned either FM voices or PCM voices.

When Note-event of Stream PCM is inserted on the authoring tool (Stream PCM Edit View of Piano Roll window), a program change is automatically inserted in the head ("0" tick) of the channel.

[Note] For the details about the voice which can be set by program changes, refer to the "VoiceList" of "MA-3 Authoring Tool User's Manual".

[Note] When a program change is performed during pronunciation, the sound under pronunciation may be affected. When performing a program change during music, be sure to insert a program change into unpronounced time point as applicable channels.

3.4. Control Change

3.4.1. Bank Select

BnH 00H mmH (MSB)

BnH 20H llH (LSB)

n: channel number 0 to 15 (0H to FH)

mm: MSB value of bank number 0 to 127 (00H to 7FH)

ll: LSB value of bank number 0 to 127 (00H to 7FH)

Initial setting value: 0/0

Setting a bank of designated channels. It is recommended to use bank select MSB and bank select LSB as a set.

Table 2 shows a bank select that is handled by MA-3 Authoring Tool.

MSB	LSB											
	0	1	2	3	4	5	6	7	8	9	10	11 to 127 Un-specified
0~121,126,127 Un-specified	When 10ch, it is replaced to MSB:125/LSB:0/Pch:2 When except 10ch, it is replaced to MSB:124/LSB:1											
122,124 (Normal)	Preset Voice	User Voice									Replace LSB to 1	
123,125 (Drum/StreamPCM)	Refer the following table											

MSB	LSB	Pch											
		0	1	2	3	4	5	6	7	8	9	10	11 to 127 Un-specified
123,125 (Drum/StreamPCM)	0	Preset Voice	User Voice									Replace Pch to 2	

Table 2 Bank select applicability table

[Note] 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 in MA-3 Authoring Tool.

MSB	LSB	14 bit value
124	0	15872
	1	15873
	2	15874
	3	15875
	4	15876
	5	15877
	6	15878
	7	15879
	8	15880
	9	15881
125	0	16000

Table 3 Bank select 14-bit notation value

In each channel, by specifying a program change before specifying a Drum bank, it becomes drum channels. In addition, by specifying a program change before specifying a Normal bank, it becomes normal channels. Moreover, even if the bank select is received, the voices of present program change is valid until the next Program change is received. The channel is made drum channel by designating drum bank and then by designating Program change.

When multi-bank selects exist, the latest message (last one on the time axis) is processed preferentially.

[Note] About the voice which can be set up by a bank selection and program change, please refer to the Voice List clause of MA-3 authoring tool users manual.

[Note] It is decided by bank select setup whether the key control is accepted in the channel.
Key control is accepted by the channel which used the voice of the Normal bank. Key control is not accepted by the channel which used the voice of a drum bank.

By designating the Bank MSB 125, the applicable channel becomes drum/stream PCM channels.

When drum set is changed with program change, the instrument of drum is changed to the one that 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 4. The maximum number of Stream Wave IDs that can be registered into SMAF is to be 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 4 Correspondence of Note# of drum/stream PCM bank

[Note] When a note event of Stream PCM is inserted on the authoring tool (Stream PCM Edit View of Piano Roll window), a bank selection is automatically inserted in the head ("0" tick) of the channel.

3.4.2. Modulation Depth

BnH 01H vvH

n: channel number 0 to 15 (0H to FH)

vv: vibrato value 0 to 127 (00H to 7FH)

Initial setting value: 0

Designating the depth of vibrato (LFO pitch modulation) of a designated channel.

The relationship between the value and depth of vibrato is shown in Table 5. The depth of vibrato here shows the multiple for vibrato depth that is set for each voice.

Vibrato value	Depth of vibrato
0	OFF
1 to 31	x 1
32 to 63	x 2
64 to 95	x 4
96 to 127	x 8

Table 5 Relationship between vibrato value and depth

When the applicable channel is drum/stream PCM channel, it is invalid for note numbers 0 to 12 and 92 to 110. (0 fixation)

3.4.3. Channel Volume

BnH 07H vvH

n: channel number 0 to 15 (0H to FH)

vv: control value 0 to 127 (00H to 7FH)

Initial setting value: 100 (64H)

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

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

When the applicable channel is drum/stream PCM channel, it is invalid for note numbers 0 to 12 and 92 to 110.

[Note]: For the volume of individual waveforms that are assigned to Stream PCM, use velocity.

3.4.4. Panpot

BnH 0AH vvH

n: channel number 0 to 15 (0H to FH)

vv: control value 0 to 127 (00H to 7FH)

Initial setting value: 64 (40H) [Center]

Designating a position in the stereophonic sound field of designated channels. The positioning is made between the left end (vv=0) and right end (vv=127) of the stereophonic sound field by using the following formulas.

When the applicable channel is drum/stream PCM channel, it is also valid for note numbers 0 to 12 and 92 to 110 (Decimal number).

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

BnH 0BH vvH

n: channel number 0 to 15 (0H to FH)

vv: control value (00H to 7FH)

Initial setting value: 127 (7FH)

Designating the change of volume that is set with channel volume of applicable channel.

When the applicable channel is drum/stream PCM channel, it is invalid for note numbers 0 to 12 and 92 to 110.

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

The Channel volume was used for mix down with volume of overall music that are set before the reproduction of music data and the fader. And the expression is used to adjust the setting of the Channel volume.

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

3.4.6. Hold 1 (Damper)

BnH 40H vvH

n: channel number 0 to 15 (0H to FH)

vv: control value (00H to 7FH)

Initial setting value: 0

Designating on/off of damper (sustain pedal) of applicable channels. Off is designated when the value is 0 to 63, or On is designated when the value is 64 to 127.

When the applicable channel is drum/stream PCM channel, it is invalid for note numbers 0 to 12 and 92 to 110. (0 fixation)

[Note]: NoteOff is sustained when it is received with damper on. When the damper changes from On to Off, the delayed NoteOff is executed, and volume envelope proceed to release.

3.4.7. Data Entry

BnH 06H mmH (MSB)

BnH 26H llH (LSB)

n: channel number 0 to 15 (0H to FH)

mm: MSB of data value 0 to 127 (00H to 7FH)

ll: LSB of data value 0 to 127 (00H to 7FH)

Initial setting value: 0/0

Using for the input value of RPN (MSB/LSB). For the details, refer to the section of RPN.

[Note]: Data Entry is ignored when NRPN is positioned before it.

3.4.8. RPN

BnH 64H llH (LSB)

BnH 65H mmH (MSB)

n: channel number 0 to 15 (0H to FH)

ll: LSB of parameter number 0 to 127 (0H to 7FH)

mm: MSB of parameter number 0 to 127 (00H to 7FH)

Initial setting value: 127/127 (7FH/7FH)

Using for the designation of parameter numbers of RPN.

3.4.8.1. Pitch Bend Sensitivity

BnH 64H 00H / BnH 65H 00H (RPN parameter designation)

BnH 06H mmH / BnH 26H llH (data entry)

n: channel number 0 to 15 (0H to FH)

mm: MSB of data value 0 to 24 (00H to 18H)

ll: LSB of data value (fixed to 0)

Initial setting value: 2/0 (2 half-tones)

Performing a setup of sensitivity of pitch bend. MSB of data entry shows the sensitivity in halftones, and LSB of data entry shows the sensitivity in cents. For example, when MSB=1 and LSB=0, the sensitivity becomes ± 1 halftones (Overall range of change is 2 halftones.)

[Note]: When MSB=0 is designated, after that, pitch bend events <3.5 Pitch Bend> are disregarded.

In addition, since a bend value holds the last value, please be sure to return a bend value to the initial value before designating MSB=0.

3.4.9. All Sound Off

BnH 78H 00H

n: channel number 0 to 15 (0H to FH)

After the specification of this message, all voices under pronunciation are muffled on applicable channels immediately.

When the applicable channel is drum/stream PCM channel, it is also valid for note numbers 0 to 12 and 92 to 110 (Decimal number).

3.4.10. Reset all Controller

BnH 79H 00H

n: channel number 0 to 15 (0H to FH)

After the designation of the message, the following controllers are re-set to initial value immediately.

Controller	Name	Value
1	Modulation	0 (OFF)
11	Expression	127 (MAX)
64	Hold1	0 (OFF)
100	RPN LSB	127 (NULL)
101	RPN MSB	127(NULL)
-	Pitch Bend	MSB 64/LSB 0
-	Key Velocity	64

Table 6 The initial value of a reset all controller

Program change, bank select, channel volume and pan are not reset.

[Note]: Be sure to the “Reset all controller messages” before the Start Point.

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

3.4.11. All NoteOff

BnH 7BH 00H

n: channel number 0 to 15 (0H to FH)

Turning off all voices during sound generation on applicable channel.

When the applicable channel is drum/stream PCM channel, it is also valid for note numbers 0 to 12 and 92 to 110 (Decimal numbers).

3.4.12. Mono Mode On

BnH 7EH 01H

n: channel number 0 to 15 (0H to FH)

Switching an applicable channel to Mono-mode.

When the applicable channel is drum/stream PCM channel, this message is invalid.

Mode change in the music is prohibited.

When a channel is in Mono-mode, notes of poly are subjected to slur (legato) processing. When a tone of note of the first tone in the slur processing is silenced by DVA, attack can be attached (retrigger) to the note of the second tone.

[Note]: In the channel which specified mono mode, when two or more note -on exist at the same timing, only the last note is left and others are deleted. (This processing is applied also to the drum / stream PCM channel)

3.4.13. Poly-mode On

BnH 7FH 00H

n: channel number 0 to 15 (0H to FH)

Switching an applicable channel to poly-mode.

Any mode change in the music is prohibited.

In drum/stream PCM channel, it is always pronounced by poly mode irrespective of the existence of this message.

3.5. Pitch Bend

EnH lH mmH

n: channel number 0 to 16 (0H to FH)

l: LSB of bend value 0 to 127 (00H to 7FH)

mm: MSB of bend value 0 to 127 (00H to 7FH)

Initial setting value: 0/64 (00H/40H) (center)

Changing the pitch of applicable channel ups and downs. The initial value of change width (pitch bend sensitivity) is ± 2 halftones. 0/0 makes the downward pitch bend maximum. 127/127 makes the upward pitch bend maximum. Pitch bend sensitivity can be set with 00H/00H of RPN.

When the applicable channel is drum/stream PCM channel, it is invalid for note numbers 0 to 12 and 92 to 110 (Decimal number).

3.6. Meta Events

3.6.1. Tempo

FFH 51H 03H ttH ttH ttH

tt tt tt: length of quarter notes (μ sec)

Since MA-3 Authoring Tool corresponds to a tempo change in music, it can be specified as arbitrary positions.

3.6.2. Text

FFH 01H llH ttH...ttH

ll : bytes number of text data (variable length presentation)

tt: text data

By describing the XF information header (refer to <appendix>), title, composer, writer, arranger, player, and singer can be inputted using this meta-event.

MA-3 Authoring Tool converts this event to each information of Optional Data Chunk of SMAF/MA-3.

Normally, the control sign, such as ”(“, “[“ and “/”, defined by XF information header is displayed as a character as it is with MA-3 Authoring Tool.

3.6.3. Display of Copyright

FFH 02H llH ttH...ttH

ll : bytes number of text data (variable length presentation)

tt: text data

By describing the copyright information, copyright can be inputted.

In MA-3 Authoring Tool, this event is converted to the Copyright of Optional Data Chunk in SMAF/MA3.

3.6.4. CuePoint

FFH 07H 05H 53H 54H 41H 52H 54H (START)

FFH 07H 04H 53H 54H 4FH 50H (STOP)

Describing the playback start and stop positions as CuePoint of Meta-event.

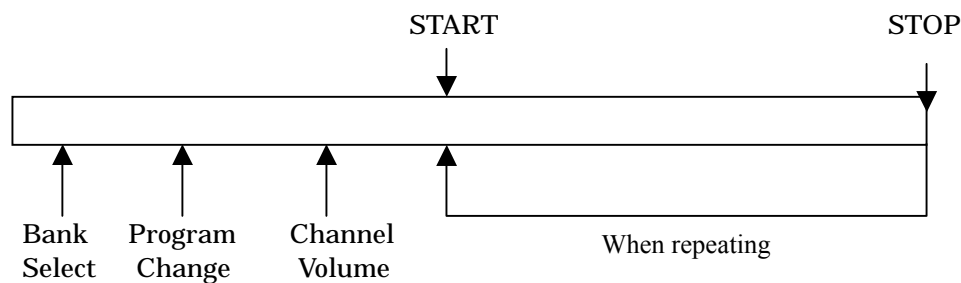
In MA-3 Authoring Tool, this event is converted to Start Point and Stop Point of SMAF/MA-3.

4th to 8th bytes of START (53H, 54H, 41H, 52H and 54H) means “START”(capital letters) in ASCII.

4th to 7th bytes of STOP (53H, 54H, 4FH and 50H) means “STOP”(capital letters) in ASCII.

START is to be inserted into the position of the first NoteOn or before it, and STOP is to be inserted after the last NoteOff.

In addition, START and STOP are set to one per music and inserted into music as a pair.



As described above, when START is inserted after the control messages, these control messages are read also at Repeat.

3.6.5. XF Cue Point

FFH 7FH 04H 43H 7BH 02H rrH

rr : Rehearsal Mark

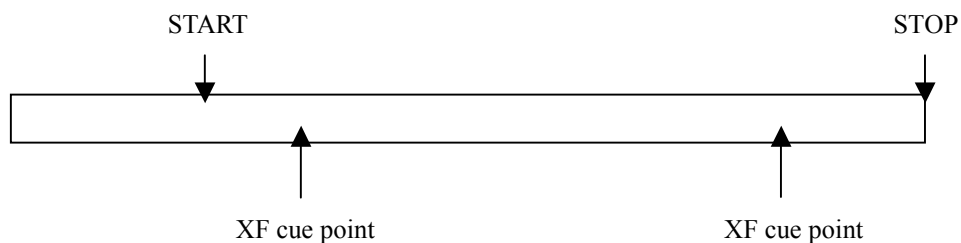
By describing the rehearsal mark (refer to <Appendix>) defined by XF-formatting, loop playback of those sections can be carried out on MA-3 Authoring Tool at the time of playback. In addition, the interpretation of a rehearsal mark is usually disregarded depending on a terminal.

MA-3 Authoring Tool converts this event to Phrase List of SMAF/MA-3. For the conversion, refer to the following table.

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)

Table 7 Correspondence table of Rehearsal Mark and Phrase List

This Meta event is to be inserted between START and STOP of the cue point (3.6.4) in time.



3.6.6. Channel Status Designations

FFH 7FH 14H 43H 7BH 02H 00H 04H ssH ...ssH

ss: from channel 1 till 16 of VS/LED setup value (16 fixation)

:

Table 8 Channel status setup value

Setup Value	VS	LED
0	OFF	OFF
1	OFF	ON
2	ON	OFF
3	ON	ON

Channel status information is specified. VS and LED of channels 1-16 are specified according to Table 8.

3.6.7. Karaoke Guide Channel Designations

FFH 7FH 06H 43H 02H 01H 05H ch1H ch2H

Ch1: Karaoke Guide Channel Designation 1 (ch#15(MSB) to ch#08(LSB))

Ch2: Karaoke Guide Channel Designation 2 (ch#07(MSB) to ch#00(LSB))

Karaoke Guide channel is designed. (Multiple designations can be made.)

Whether multiple channels are used as a scoring channel is dependent on implementation of application.

Each channel of 0 to 15 is designated by one bit.

1: designated 0: Not designated

Table 9 Karaoke Guide designation channel

Ch1								Ch2							
15 Ch	14 Ch	13 Ch	12 Ch	11 Ch	10 Ch	9 Ch	8 Ch	7 Ch	6 Ch	5 Ch	4 Ch	3 Ch	2 Ch	1 Ch	0 Ch

In MA-3 authoring tool, this event information is written into the MD tag of Optional Data Chunk of SMAF/MA-3.

3.6.8. Karaoke Guide Scoring Section designations

FFH	7FH	05H	43H	02H	01H	06H	00H (START)
FFH	7FH	05H	43H	02H	01H	06H	01H (STOP)

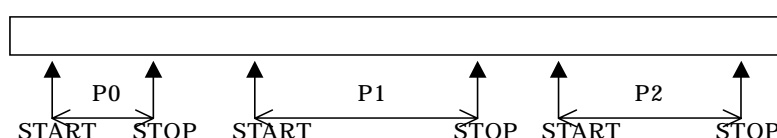
Karaoke Guide Scoring starting position and Karaoke Guide Scoring end position are designated.

Designation of all 16 sections is possible.

P0, P1, P2, P3, P4, P5, P6, P7, P8, P9, Pa, Pb, Pc, Pd, Pe, and Pf are assigned from the top section in this order.

Duplication of the section is prohibited.

In MA-3 Authoring Tool, when the starting position and the end position overlap, the process is performed on a first-come-first-served basis.



The kinds of section designation tag names is 16.

In MA-3 Authoring Tool, this event is converted into Phrase List of SMAF/MA-3.

For correspondence of conversion, refer to Table 10.

Table 10 Section designation tag correspondence table for Karaoke Guide

Section designation tag name	Karaoke Guide Scoring section designation
P0	Karaoke Guide Scoring section designation 1
P1	Karaoke Guide Scoring section designation 2
P2	Karaoke Guide Scoring section designation 3
P3	Karaoke Guide Scoring section designation 4
P4	Karaoke Guide Scoring section designation 5
P5	Karaoke Guide Scoring section designation 6
P6	Karaoke Guide Scoring section designation 7
P7	Karaoke Guide Scoring section designation 8
P8	Karaoke Guide Scoring section designation 9
P9	Karaoke Guide Scoring section designation 10
Pa	Karaoke Guide Scoring section designation 11
Pb	Karaoke Guide Scoring section designation 12
Pc	Karaoke Guide Scoring section designation 13
Pd	Karaoke Guide Scoring section designation 14
Pe	Karaoke Guide Scoring section designation 15
Pf	Karaoke Guide Scoring section designation 16

3.7. Universal System Exclusive Message

3.7.1. Master Volume

Message	Description
F0H 7FH	Universal real time exclusive header
<device ID>	ID of unit that becomes target (127:ALL)
04H	Sub-ID number #1
01H	Sub-ID number #2
ll	Master Volume LSB
mm	Master Volume MSB
F7H	EOX

Initial setting value: 100 (64H)

Performing a volume setting of final stage of synthesizer output. "llH" is ignored.

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

[Note]: It recommends raising the volume control of the last contents to the maximum level which does not carry out a clip.

[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 authoring 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

Performing a definition of items such as voice setting and waveform setting specific to each device exclusively.

3.8.1. MA-3 Stream PCM Pair

F0H 43H 79H 06H 7FH 08H CLH No1H No2H F7H

CL: Pair designation (00H), pair cancellation (01H)

No1: WaveID 1 1 to 32 (01H to 20H)

No2: WaveID 2 1 to 32 (01H to 20H)

Designating the WaveID 1 and the WaveID 2 as a pair with CL= "0". After receiving this message, both of the sound generations can be controlled with NoteOn/off of either one. At this time, the time of generation of the two sounds are guaranteed to be simultaneous.

The pair of WaveID 1 and WaveID 2 can be cancelled by designating "1" for CL.

[Note]: This message is not canceled until the pair release or MA-3 native reset will be transmitted, once it is set a pair setup. Especially when verifying using a MIDI sequencer by MA-3 Authoring Tool after music is changed, be care.

3.8.2. MA-3 Stream PCM Wave Panpot

F0H 43H 79H 06H 7FH 0BH IDH CLH ppH F7H

ID: WaveID 1 to 32 (01H to 20H)

CL: panpot designation(00H), clear (01H), pan off (02H)

pp: panpot value 0 to 127(00H to 7FH)

Designates panpot for individual waveform in stream PCM of applicable channel. "data=0" shows left end, and "127" shows right end.

Reception of this message makes channel panpot invalid. (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 "1" for CL, all of wave panpot settings that have been received are returned to channel panpot. Moreover, by specifying "2" to CL, turns OFF pan pot assignment and pronounces by 0dB.

3.8.3. MA-3 User Event

F0H 43H 79H 06H 7FH 10H IDH F7H

ID: Interrupt classification 0 to 15 (00H to 0FH)

Specifying the setting position of the user event on sequence.

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 a performance.

[Note]: When specifies a 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. Note in the Setting of Stream PCM

4.1. Maximum Number of Sound Generation

The maximum number of sound generation in Stream PCM is designated by MA-3 Authoring Tool (“Reserve setting” of Piano Roll/Stream PCM Edit View), and it is to two at the maximum.

In addition, the simultaneous pronunciation of the stream exceeding the reserve number was not guaranteed. The stream pronounced simultaneously should not exceed a setup of the reserve number.

Moreover, 1024 bytes of MA-3 RAM area (total 8176byte) is consumed by one stream (2048 bytes is consumed at the maximum).

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, when , for example, 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 tones (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 individually. It can be set individually even if instrumental sound of drum exists. At this time, change of panpot is prohibited during generation of tones (between NoteOn and NoteOff).

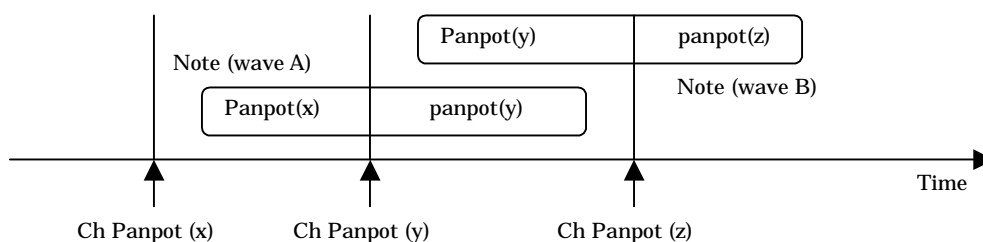


Figure 1 Setting with channel panpot

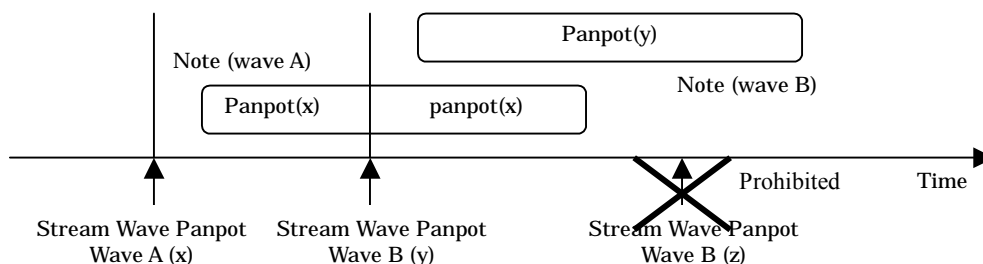


Figure 2 Setting with MA-3 stream PCM wave panpot

4.3. Limitation 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 8 K byte/s or less. In the MA-3 authoring tool, restriction is applied so that the number of unit bytes cannot save more than 8 K byte/s.

The number of unit bytes of the waveform of 4bits ADPCM [Kbytes/s] \leftarrow Sampling frequency Fs [kHz] / 2

The number of unit bytes of the waveform of 8bits PCM [Kbytes/s] \leftarrow Sampling frequency Fs [kHz]

In the example of Fig. 3, in the time zone when reproduction of two waveforms has overlapped, since it is set to 9 [Kbyte/s], it be cannot saved.

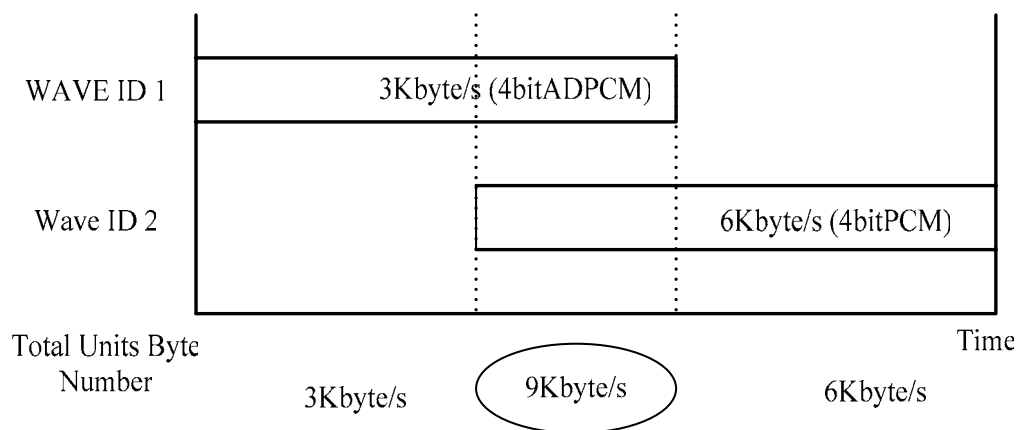


Figure 3 Example of a calculation of the Maximum Stream PCM unit bytes number

4.4. About the 8 bits PCM

A noise may be worrisome when using 8 bits for a sound file. Please be sure to check tone quality to the real sound reproduced on the MA-3 authoring tool.

5. Supplement

5.1. Vibration and LED

In MA-3 Authoring Tool, vibration and LED are controllable per channels. It is recommended to use this function by channel which does not pronounce a note more moderately than a channel by which the note is always pronounced. Moreover, When you consider to use both vibration and LED effectively, please create the track (for example, track only the high hat portion of a drum) which inputted only the specific note.

Moreover, about vibration, when the gate time of the note of a synchronous specification channel is short, an effect may be unable to be confirmed. Moreover, when the interval of two notes is short, it may be unable to check that vibration has stopped. These are based on the response characteristic of an oscillating motor. Please set up the length of a gate time, and the interval of a note in consideration of this.

The operation of both vibration and LED, we recommend checking by actual mobile phones.

5.2. Volume Designation and Note-event

In MA-3 Authoring Tool, please do not place a Note-event and volume specification at the same time because it may cause an outbreak of noises or lost an attack of sound. In order to avoid this, after volume specification should place a note event, after vacating the time more than 22 msec.

Noise may be generated by the timing of first time Note-on in a playback which is later than second repeat playback when an interval between Start Point and first Note-on is similarly short.

The messages of the target volume specification are Master volume, Channel volume, Expression, and Pan pot. When especially volume change is large, it becomes easy to generate this problem.

5.3. About restriction of mono mode-on and the number of the maximum simultaneous pronunciation

When there is a Mono mode-on use channel, if the number of the maximum simultaneous pronunciation is exceeded, the number of pronunciation may decrease. Therefore, such contents are 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 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. The Range of Pronounceable Frequency in PCM Voice

The pronunciation frequency range of a PCM voice is 1.5 kHz to 48 kHz. Please do not carry out pronunciation which is 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 pronounced key

- When becomes smaller than 1.5 kHz : It is 1.5 kHz
- When becomes bigger than 48 kHz : It is 48 kHz

By the pitch bend or LFO

- When becomes smaller than 1.5 kHz : 1.5 kHz or less is pronounced.
- When becomes more than 48 kHz : Un-expected value is carried out (Because of BTB)

5.6. The Recommended Fs Setup Value of PCM Voice

If it uses for Fs of a PCM tone except the value of the following table "a recommendation Fs setting value list", gap may arise in a pitch. Table

Please set up the value of Fs like shown in Table 11.

(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	

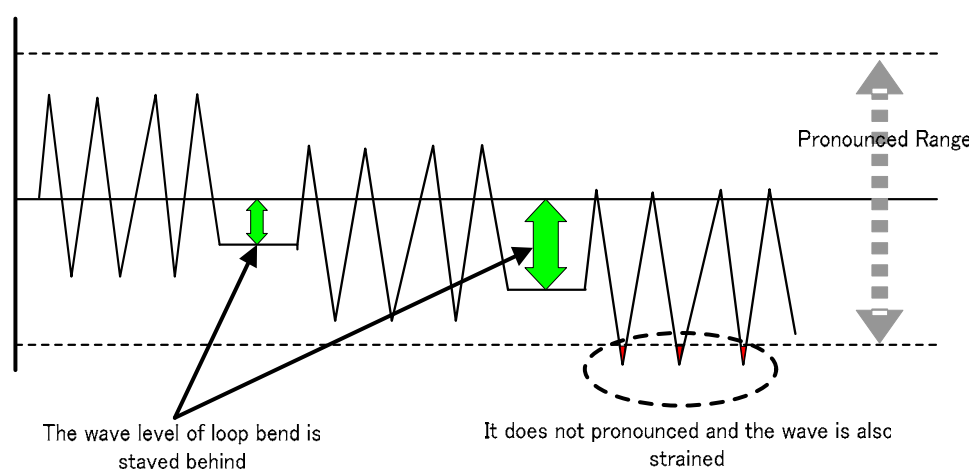
Table 11 Synopsis of the recommended Fs setup value

5.7. Notes at the Time of Creating Voice Included PCM User Wave

When you create the tone using the PCM user waveform, be careful of below with the specification of MA-3 hardware.

When there is no waveform loop (a loop point and a loop end are the same value), the waveform value is continued and read with the specification of MA-3 hardware in the place where read-out of a waveform reached the loop end. for this reason, a tone parameter -- XOF = 1 -- and -- SR = 0 (or setup with long attenuation time) XOF = 0 [or] -- and -- If it is set as RR = 0 (or setup with long attenuation time), after note-off will be continued and this value will be maintained.

In this state, when much note-on of big volume overlaps, sound becomes easy to be distorted. Moreover, if the tone of such a waveform is pronounced repeatedly, it will become large by the number of times by which the value maintained in note-off was also pronounced, and will much more become easy to be distorted.



In order to prevent such a condition, a loop and the waveform level which comes out are set to "0", or it recommends a loop and adjusting an envelope so that pronunciation may be lost more in front.

Please make a PCM voice according to Table 12.

With or without of wave	What kinds of color?	Wave level on loop bend	XOF	DR	SR	RR	SUS	Point
Without	One shot or Chunked	0	free	free	free	free	free	A problem is not produced.
		not 0	on	not 0	not 0	free	off	There is a possibility that a problem will arise. By DR and SR, please adjust so that pronunciation is lost a loop and before.
			off	free	free	not 0 Shorter is better	off	There is a possibility that a problem will arise. By RR, please adjust so that pronunciation is lost a loop and before.
With	Continuance	0	off	free	0	not 0	free	A problem is not produced.
		not 0	off	free	0	not 0	free	A problem is not produced.
	With Loop Decay	0	free	free	free	free	free	A problem is not produced.
		not 0	free	free	Free	free	free	A problem is not produced.

Free : You may have what setup carried out.

Table 12 PCM voice work guideline

In addition, in PCM Voice Edit, when the O.K. button is clicked, the following checks are performed.

1) Check of LoopPoint/EndPoint

If "LoopPoint/EndPoint" is out of the following rang, it is defined to "Error".

- In case of the 4bit ADPCM
 - $0 \leq \text{LoopPoint} \leq [\text{Number of sample waves}-1]$
 - $1 \leq \text{EndPoint} \leq [\text{Number of sample waves}]$
- In case of the 8bit PCM
 - $0 \leq \text{LoopPoint} \leq [\text{Number of sample waves}-2]$
 - $0 \leq \text{EndPoint} \leq [\text{Number of sample waves}-1]$
- In case of the LoopPoint indicates a place where it over the EndPoint, it is also defined to "Error".

2) When Loop Point = End Point, The check of a wave high price at EG and LoopPoint are performed

When all the conditions of the following a. to c. are satisfied, it considers as an error.

a. Loop Point and End Point are specified as the same position.

b. In the wave high value of following samples, 1000 or more are also one side by 16bit PCM conversion.

In case of 4bit ADPCM in used, Loop Point (=End Point) and last sample.

In case of 8bit PCM in used, Loop Point (=End Point) and Next sample.

c. One of the following setup is performed.

- (1) $\text{XOF} = 1$ and $\text{SR} \leq 1$
- (2) $\text{XOF} = 1$, $\text{DR} = 0$, and $\text{SL} \neq 0$
- (3) $\text{XOF} = 0$ and $\text{RR} \leq 1$

5.8. Total Length after a Conversion

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

Be sure to create SMF so that total length exceeds 20 msec.

5.9. Total Size after a Conversion

When total size exceeds 256000 bytes, it is not converted to SMAF as an error.

Be sure to create SMF so that total size is 256000 bytes or less.

5.10. Key-control Status

If there is a one of the following condition, the key control status of relevant channels are defined as "OFF".

- 1) The value of an existing bank select MSB is only "125(7DH)", and there is a program change after that.
- 2) In 10 (09H) channel, the value of bank selection MSB "124 (7CH) (or "122 (7AH)") are not existed.
- 3) There are no Note events existing.

What was described above is judged as a drum / stream PCM channel in MA-3 authoring tool.

By the other channel, key control status becomes "unspecified."

5.11. Operation under tool playback

In case that the MIDI keyboard is connected to an authoring board, when the board receives the MIDI message by operation of a keyboard touch etc. during tool playback, a board will change the mode to which receives a MIDI message, and playback processing will be stopped.

Please do not perform such operation during playback.

6. Appendix

6.1. XF Information Header (by Language)

Sets information of features and attributes of music by using the form of text metha-event in the format of SMF.

FFH 01H 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.

1) and 2) of information items and various control codes are described with ASCII.

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

6.1.1. Information Items

6.1.1.1. XF Information Header Language Specific ID (XF Information header (by Language) ID)

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

6.1.1.2. Language

Information that designate the code system of characters that are used for XF information header (by language).

It does not designate the character code system that is used for words. The character code system for words is designated with XF words header. It does not show the place of composition.

The Authoring Tool only the following languages.

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

Name of composer of 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

Name of writer when words are given to the original music.

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

6.1.1.6. Arrange

Name of a person who arranged original music or music data.

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

6.1.1.7. Performer (Player / Singer)

Name of a person or a 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)

Name of a person who authored music 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.

FFH 7FH 04H 43H 7BH 02H rrH 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.